

CLIMATE ACTION PLANS: DO THEY HELP CITIES ACHIEVE THEIR GOALS?

By

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Professor Robert F. Young

Cities in the United States are increasingly committing to taking action on climate change, sustainability, and justice issues. One such pathway cities take for action is through creating Climate Action Plans (CAPs). This study analyzes nine cities that have both CAPs and associated progress reports to evaluate whether CAPs aid cities in achieving their broader goals. The results indicate that cities with developed CAPs (in terms of accountability measures, target benchmarks, etc.) have higher rates of successful actions than less developed CAPs. This study also identifies how the differences between developed and less developed CAPs impact CAP quality. Finally, this study offers policy makers recommendations on improving their cities' CAPs.

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DEDICATION

To my parents – for being my teachers for life

To Meaghan - for whom I always want to see the stars

To Professor John Baumann – for showing me how to find a lifeplace

To Professor Robert Young – for inspiring passion

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I. Introduction

Overview

Over the past twenty years, the movement towards concerted municipal action on addressing global climate change, achieving sustainability, and fostering just communities continues to grow (Tang et al. 2010). In response, many local city governments initiated climate mitigation and adaption plans that articulate tangible goals with constructive transformations at all levels of the city landscape including broader issues of sustainability and environmental/climate justice. A number of cities have started drafting Climate Action Plans (CAP). CAPs outline a city's desired outcomes for responding to climate change (and often, issues of sustainability and environmental/climate justice) through targeted policies, guidelines, and location-specific ideas from key sectors (Pew Center on Global Climate Change 2010). Proposed CAP strategies often focus on addressing combinations of societal and economic elements impacted by climate change, such as relocalizing agriculture, improving energy efficiency, and reducing waste.

The City of Eugene's recently completed Climate and Energy Action Plan (CEAP) inspired me to explore the potential of CAPs. The CEAP, finished on September 15th 2010, outlines how Eugene can lower its CO₂ emissions, lessen its dependency on fossil fuels, increase human health, localize its agricultural systems, etc (Pew Center on Global Climate Change 2010). However, the CEAP's ambitions for changing Eugene also demonstrate the challenges in radically changing a city's complexion.

The breadth of CAPs demonstrates the rich array of variables present in responding to climate change and achieving sustainability. Though some cities have CAPs with a limited scope, a few cities strive to accomplish comprehensive works with their CAPs. My project will focus on action strategies that high-achieving CAP cities (as defined by Tang et al. 2010) use in buildings and energy, transportation, food and agriculture, land use, consumption and waste, urban natural resources, and justice issues to effectively implement their CAPs (Tang et al. 2010). In particular, my research will determine whether high-achieving CAPs are more effective than other CAPs.

My research question asks which actions high-achieving CAP cities have found most successful and what actions could cities take to support and increase the capacity of their CAPs. I hypothesize that CAPs with detailed and explicit actions in the areas of buildings and energy, transportation, food and agriculture, land use, consumption and waste, urban natural resources, and justice initiatives in all sectors (municipal, commercial, industrial, and residential) move cities into a better position to meet their goals. However, even the most high-achieving CAP cities can incorporate higher levels of initiatives within these realms to better implement the entirety of municipal CAPs.

Explanation of terms

Throughout this project I will be using several terms and acronyms, which I explain below:

- Climate Action Plan (CAP)
- Developed Climate Action Plan (D-CAP)
- Less Developed Climate Action Plan (LD-CAP)
- Greenhouse gas (GHG)

- Carbon dioxide (CO₂)
- City sectors (municipal, commercial, industrial, and residential)

II. Background on climate change, sustainability, and justice issues

Climate Change

While this project does not scrutinize climate science, one must first understand the crucial elements surrounding climate change to gain a holistic comprehension of the motivation behind many CAPs. The Intergovernmental Panel on Climate Change (IPCC) demonstrates how climate change is occurring on a global scale, and will increase throughout the twenty-first century at rates very likely unprecedented in the twentieth century (Meehl et al. 2007). The main contributor to this climatic variation is the continual rise of greenhouse gas (GHG) emissions, such as carbon dioxide (CO₂), methane (CH₄), water vapor, etc (Cox et al. 2011). Cyclic CO₂ patterns over the past couple hundred thousand years, clearly showcase this correlation between GHG emissions and varied climates (Barnola et al. 2011). Over the past century CO₂ emissions have dramatically risen and could possibly double during the current century (Hallett 2001). Alterations to the world's climate "that takes place due to increases in carbon dioxide concentration is largely irreversible for 1,000 years after emissions stop," demonstrating that the fluctuation of GHG emissions will influence the planet's future for the long-term (Solomon 2009).

Human settlement on the planet introduces additional anthropogenic elements into the climate change equation, in addition to the array of complex natural variables, such as cloud cover, water vapor feedbacks, and cryospheric feedbacks, affect the global climate (Bony et al. 2006). The vast majority of scientists across the globe have

reached a consensus that the current rate of global climate change is highly unlikely when considering only natural factors (Oreskes 2004). Anderegg et al. write that “97–98% of the climate researchers most actively publishing in the field surveyed here support the tenets of ACC (anthropogenic climate change) outlined by the Intergovernmental Panel on Climate Change,” which pinpoints human activities as the cause behind GHG increase and climate change (Anderegg et al. 2010). This combination of human and natural GHG forcing in respect to climate change is, according to Joos and Spahni, “larger during the Industrial Era than during any comparable period of at least the past 16,000 years” (Joos and Spahni 2008).

While anthropogenic GHG emissions contributed to this historically unparalleled affect on the climate, the distribution of anthropogenic forcings is unequal across countries. During the twentieth century, the United States accounted for 28.7% of anthropogenic GHG emissions, with current European Union (EU) countries accounting for 20.5% and Eastern Europe/Former Soviet Union countries accounting for 17.7% (for a total of 66.9%) (Yang and Sirianni 2010). Currently, as of July 2011, the United Nations Statistics Division ranks the top five CO₂ emitters (in order of most annual CO₂ emissions) as China, United States, India, Russia, and Japan (United Nations Statistics Division 2011). However, the United States’ per capita emissions are approximately 6 times that of China and 13 times that of India (International Energy Agency 2011). The primary sources of GHG emissions worldwide are transportation, electricity and heat, other combustion, industry, fugitive emissions, industrial processes, land use change, agriculture, and waste (GRID-Arendal 2008).

The intensity of GHG increases could have potentially significant negative effects for all aspects of the environment and society. The IPCC predicts that global temperatures will increase by 1.1 to 6.4° Celsius. Though seemingly small, the temperature increase could significantly change both the human and natural world (Meehl et al. 2007). One example of potential planetary warming shocking systems is clear in species. Thomas et al. write that species extinction could reach catastrophic proportions, stating that they “predict, on the basis of mid-range climate-warming scenarios for 2050, that 15–37% of species in our sample of regions and taxa will be ‘committed to extinction’” (Thomas et al. 2004). Species loss may lead to even greater unknown impacts. Haines et al. note that climate change could negatively impact human health through “increased frequency and intensity of heat waves, reduction in cold-related deaths, increased floods and droughts, changes in the distribution of vector-borne diseases, and effects on the risk of disasters and malnutrition” (Haines et al. 2006). Along with human health, alterations to the global climate may drastically damage society’s economies through disruptions to agriculture, trade, settlements, etc (Mendelsohn et al. 200).

Climate change will disrupt the entire globe though the impacts however, will vary by region and community. This looming threat poses serious questions for a country as ecologically diverse as the United States with its 120 ecoregions (areas of distinct biodiversity, ecosystems, and other natural systems [also called a bioregion]) (Western Ecology Division 2010). Even just over this past century, extreme weather events caused by changing climate have been wide-ranging with some of the most statistically significant events occurring “over the southwest United States and in a

broad region from the central Great Plains across the middle Mississippi River and southern Great Lakes basins,” as noted by Kunkel, Andsager, and Easterling (Kunkel 1999). Beyond extreme events due to warming temperatures, there is the possibility that modest warming of the United States could benefit some forms of agriculture (Antle 2008). However, projections indicate that continuing at the current rate of temperature increases throughout the century will lead to considerable decreases in crop yields in most areas of the United States (Schlenker and Roberts 2009). All of these factors combined underscore the very likely negative effects of climate change on the United States and its future.

Though the scientific community has a near unanimous consensus that climate change is occurring, anthropogenic inputs drive it, and that the impacts will be severe, the U.S. public remains much more divided. James Hansen, Director of NASA’s Goddard Institute for Space Studies, was one of the first major figures to bring climate change to the forefront of U.S. attention, when he testified before congress in 1986 and 1988 concerning the negative impacts of climate change (McCright and Dunlap 2003). By 1996, the Sustainable Energy Coalition found that 34% the U.S. public viewed climate change as 'very serious' while 37% viewed it as 'somewhat serious' (Bord et al. 1998). Now fifteen years later, in May 2011, Yale and George Mason University conducted a study that found 12% of the U.S. population to be "alarmed" by climate change, 27% were "concerned," 25% were "cautious," 10% were "disengaged," 15% were "doubtful," and 10% were "dismissive" (Leiserowitz et al. 2011). These results indicate that in spite of the scientific consensus, the general population persists in splintered beliefs about climate change. McBean and Hengeveld state that “a

combination of factors, including ineffective communication skills of the scientists involved, misinformation presented by contrarians and the failure of media to distinguish between scientific debate about detail versus significance” are the primary explanations behind the dichotic viewpoints between scientists and the general population (McBean and Hengeveld 2000). In particular, Maxwell Boykoff pinpoints the American media’s failure to precisely report on climate change science as one of the greatest contributing factors to the U.S. general population’s divergent viewpoints (Boykoff 2007).

The public and scientific communities’ differing viewpoints on climate change may seem to some to lead to broad inaction and in indecisiveness, however many institutions from federal to local levels implement policies, actions, etc. to combat rising CO₂ emissions. Unfortunately, governmental action does not respond to a strong enough degree. To date, the U.S. has not done enough to slow the rise of GHG emissions, let alone to reduce current GHG levels (Harrison 2007). Lutsey and Sperling argue that only a systematic approach from all areas of government will yield real and effective responses to climate change (Lutsey and Sperling).

Sustainability

Global understanding and action towards climate change has in some ways mirrored the increasing emphasis on “sustainability.” Actions to mitigate climate change only analyze a subset of Earth’s systems. On the other hand, sustainability initiatives aim to address an array of human and non-human issues. The most oft-cited definition of sustainability comes from the World Commission on Environment and Development (also called the Brundtland Commission), which defines “Sustainable development...

[as] development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (World Commission on Environment and Development 1987). The influential 1992 United Nations Conference on Environment and Development (also called the Rio Summit/Conference and Earth Summit) adopted the definition proposed by the Brundtland Commission and used it as the basis of “Agenda 21” (action plan for sustainable development) and The Rio Declaration on Environment and Development (27 elements towards achieving sustainable development) (Hirsch Hadorn 2006). Observations from some astute individuals, such as Susan Owens, highlight the fact that though many people and organizations lump sustainability and development together--two aims that are distinctly separate (with only potential linkages) (Owens 2003). In addition, this definition focuses almost exclusively on human populations and does not consider non-human ecosystems and processes, which must thrive in order for human systems to survive (Norton 1992). This complexity over the definition, prompts Owens to write that “if we have learned anything since Brundtland, it must be that there is no singular definition of sustainable development upon which all can agree” (Owens 2003).

While there is no common definition of “sustainability,” several existing important paradigms currently influence contemporary ideologies and initiatives. One of the most dominant sustainability frameworks is the “Three Pillar of Sustainability” (sometimes referred to as the “triple-bottom-line”) model that puts the economic, social, and environmental realms as equal contributors to long-term sustainability (Hunkeler and Rebitzer 2005). This approach clearly comes out of the Brundtland and Rio views

of sustainability and one can see its association with international businesses (such as the conglomeration of multi-national corporations in the World Business Council for Sustainable Development) and small cities (like the City of Eugene) (WBCSD.org 2011, Office of Sustainability 2011). However, as noted earlier, not everyone agrees that sustainability should emphasize economy, environment, and society equally, which gives rise to frameworks such as the concentric circles model that has the environment as the base level, then society, and at the smallest level the economy as a subset of the others (Adams 2006). Rodrigo Lozano writes that while both “these representations are helpful, they do not fully capture all the aspects and interactions of sustainability and are highly anthropocentric and compartmentalized” (Lozano 2006). Explicit inclusion of ecological processes and systems within definitions of sustainability may make analysis difficult due to essential variables, however those aiming to achieve a sustainable world and planetary survival must learn how to support complex natural structures along with human societies and economies (Becker and Ostrom 1995).

Climate and Environmental Justice

The rise of international, national, regional, and local dialogue around sustainability and climate change matters described above, fail to address some of the past, present, and future disparate negative impacts on marginalized communities the world over. Environmental justice fills part of this significant void by going beyond mere “equity” and distribution of “environmental ills,” to achieve true “justice” (Schlosberg 2004). David Schlosberg identifies this global movement’s three key demands for environmental justice as “equity in the distribution of environmental risk, recognition of the diversity of the participants and experiences in affected communities,

and participation in the political processes which create and manage environmental policy” (Schlosberg 2004). In general, the environmental justice movement illuminates the prominent simplistic narrative behind environmental issues, and puts forth a counter inclusive description that incorporates multiple perspectives, individual identities, and historical events, along with contemporary processes (Pellow 200).

Climate justice complements environmental justice and aims to ameliorate unequal distributions of negative climate impacts that occur through the marginalization of communities based on race, ethnicity, gender, ability, socio-economic class, geographic location, etc (Burkett 2008). This definition should not be confused with those who argue for “climate justice for countries,” meaning each country should play an equal part in reducing emissions based on contemporary issues and not on their past or future GHG emissions i.e. Posner and Sunstein (Posner and Sunstein 2007-2008). In other words, environmental justice addresses the current and historical oppression of communities; whereas climate justice for countries calls for equal reduction of resource use, without accounting for population local resources, or predominant historical inequities (such as a few countries emitting the majority of GHG emissions). Thus far, in regards to responding to the climate justice movement, the current global regime of national governments “largely omits responsibility but makes a general commitment to assistance. However, the regime has so far failed to operationalise assistance and has made only minor progress towards eliminating obstacles for fair participation...” according to Jouni Paavola and W. Adger (Paavola and Adger 2006).

These holistic approaches of environmental and climate justice pose serious questions for mainstream environmental and climate movements in terms of meeting

the needs of all communities and rectifying the injustices of the twenty-first century (Gauna 1995). However, these powerful challenges offer opportunities for the dominant paradigms and groups to reflect on past and future trends in order to find adequate responses to climate change and progress towards a sustainable world.

III. Motivators for cities' involvement in combating climate change and achieving sustainable and just communities

The above section highlights the current realities and predictions surrounding climate change and a sustainable future, thus considering the asserted scientific background, my project investigates the role of cities in these movements. Urban areas globally account for approximately 71% of CO₂ emissions worldwide, which demonstrates why cities often express interest in municipal action to reduce their levels of GHG emissions (Parshall et al. 2010). Before analyzing what actions cities can take in regards to climate change and sustainability, it is important to consider whether cities' actions actually make important contributions to finding solutions. In both environmental literature and on a global political level, the idea of the "local government" as a focal point of strong environmental policies continues to grow (Gibbs and Jonas 2000). Some authors, such as Benjamin Sovacool and Marilyn Brown, even go so far as to state that local initiatives "must be coupled with global and national scales of action in order to achieve the levels of carbon dioxide reductions needed to avoid dangerous climate impacts" (Sovacool and Brown 2009).

While there is undoubtedly a growing body of research to suggest the importance of including local municipalities in combating climate change and moving towards sustainability, one must understand the impetus behind this movement. David Gibbs and Andrew Jonas describe, in *Governance and regulation in local environmental policy: the utility of a regime approach*, two main reasons why individuals and organizations increasingly place more emphasis on local governments. The authors' first point is that people view local environmental policies as increasingly

more and more compatible with economic development, instead of in conflict (Gibbs and Jonas 2000). Their second point is that international environmental governance increasingly tries to include local organizations since these large international organizations have begun to realize the power of the local government (Gibbs and Jonas 2000). In addition to these points, many authors highlight the rising role of urban areas as contributors to environmental degradation, and a need to scrutinize cities' abilities to limit their negative impact on the human and natural world (Newman 2006). Through this critical lens towards urban areas, city governments vastly increased their investigation to better incorporate cities into entities that support both humans and the world around them. Cities have the opportunity to effectively implement environmentally and socially conscience policies because they have considerably more autonomy in land use planning, waste management and applying local regulations (Betsill and Bulkeley 2006).

One of the rising areas of interest around cities involved in environmental issues falls under the auspices of environmental governance. Maria Carmen Lemos and Arun Agrawal define environmental governance as "the set of regulatory processes, mechanisms and organizations through which political actors influence environmental actions and outcomes...It includes the actions of the state and, in addition, encompasses actors such as communities, businesses, and NGOs [non-governmental organizations]" (Lemos and Agrawal 2006). This focus on multiple levels of cooperation between numerous entities has a decidedly higher positive impact on environmental outcomes than entities operating individually (Newig and Fritsch 2009). In addition, a main focus

of environmental governance is to ameliorate a variety of environmental issues using the combined forces of the above state and non-state actors (Davidson 2004).

Breaking down the framework of environmental governance even further, one finds the concept of multi-level environmental governance. Multi-level environmental governance works at the periphery of well-defined politics, between state and non-state players, and between, local, national, and international political structures (Hooghe and Marks 2001). Harriet Bulkeley and Michele Betsill write, in *Cities and climate change: urban sustainability and global environmental governance*, that “governance at the frontier of domestic and foreign politics is conducted through 'spheres of authority'... This more flexible interpretation of governance, which we term *multi-level*, captures both the multiple levels at which governance takes place, and the myriad actors and institutions that act simultaneously across these levels” (Bulkeley and Betsill 2003). Through this critical evaluation of several levels of governmental and non-governmental functioning, one sees how cities, though not the only players in environmental governance, act as crucial entities in pushing forward strong environmental and social policies.

Alongside multi-level environmental governance, there is a growing recognition of the potential of cities to critically evaluate deep ethical and social issues when implementing policies and initiatives relating to climate change and sustainability (Haughton 1999). However, the general population must continually stoke cities’ interest on justice issues since financial and political capital may swiftly shift to another sector (Egger 2006). Many of the underlying issues behind cities’ response to climate

change and sustainability relate to environmental and climate injustices, thus underscoring the importance of tackling all at once.

Enthusiasm for city involvement in climate change, sustainability, and justice actions, though significant, shadows some of the potential critical views towards municipalities' effectiveness in responding to these vital issues. Private sector organizations in recent years have played an increasing more significant role in global environmental subjects, through lobbying political systems at all levels (Falkner 2003). The federal government maintains a much higher degree of power to hold private actors in check compared to cities, and may possibly be more efficient in ensuring corporate compliance with social and environmental regulations (Potoski and Prakash 2004). Overall, Lucy Ford writes that "global environmental governance grounded in orthodox International Relations lack an analysis of agency and power relations..." which prevent cities from making prescient changes (Ford 2003). Another severe concern with cities is that they could be contributing to increased compartmentalization of certain demographics and facilitating the transfer of negative environmental ills onto marginalized communities (Yiftachel 2009). While these counterarguments do not totally sweep away earlier analysis and evaluation, one must keep these critiques in mind when considering how to induce global transformations through city initiatives.

IV. Background on city responses to climate change and sustainability

International initiative

The steady rise in cities' interest in responding to climate change and sustainability may seem odd to some who wonder why local municipalities should be so deeply concerned with issues of international scope, however there are several

motivators for cities to dedicate their time and resources to these issues of sustainability and climate change. The aforementioned “Brundtland Report,” created an emphasis on sustainable development in cities due to rising population levels in urban areas, which moved the concept of cities as leaders in the movement of sustainability to center stage (World Commission on Environment and Development 1987). Later, in 1992 this focus on cities received further attention with the momentous Rio Conference which called on local authorities, along with partnerships with their local stakeholders and communities, to develop extensive plans towards sustainable development (Bulkeley and Betsill 2005). This conference marked the burgeoning focus on sustainability and led to an array of actions at all levels of government. The combination of the “Brundtland Report” and the UN conference paved the way for greatly increased acceptance of the need for city level changes and the idea that cities could lead the charge for finding sustainable solutions to climate change (Whitehead 2003). The Pew Center on Global Climate Change writes “Across the United States...Many local governments are motivated by concerns about the impacts of climate change in their communities as well as an understanding that energy and climate solutions can benefit local economies and residents” (Pew Center on Global Climate Change 2010).

These international events sparked the energies of municipalities to look at how their cities would be impacted by climate change and sustainability issues, but also to evaluate the reasons restructuring made sense for economic, social, health, etc. reasons. Kristen Engel, in the *Urban Lawyer*, breaks up the main reasons that have prompted cities to start planning or to immediately take action into five clear sections (Engel 2006). Firstly, Engel writes “promises are easy [for cities] to make” in terms of

responding to climate change and peak oil, however, so far many cities have not begun the process of implementing their climate action plans or drafting strong regulations to induce needed responses to fulfill their action promises (Engel 2006). Secondly, climate change regulation can bring about new local economic gains (Engel 2006). Some examples of these economic benefits include, renewable energy providing more jobs than other energy sources, and the financial savings of increased energy efficiency (Rabe 2006, Kousky and Schneider 2003). Thirdly, more and more local political leaders see standing up to large industries as political opportunities to demonstrate their commitment to a progressive energy future, in particular due the federal government's general lack of response to climate change (Engel 2006). Fourthly, many cities feel pressured to keep up with other cities' climate initiatives (Engel 2006). The power of this competition model helps explain why certain cities have stressed, at least publically, strong climate action (Rabe et al. 2005). Finally, many voters want to see strong action on climate change, thus politicians are merely being responsive to their constituents and seeking to uphold their values (Engel 2006). Engel notes that the most invested populations in responding to climate change tend to have more natural resources threatened by climate change that underpins the area's economic base (Engel 2006).

While the above analysis demonstrates some cities' reasoning behind addressing climate change, it is also extremely important to highlight international organizations and initiatives that are prompting cities to take action, based on their own unique set of motivations. Local Governments for Sustainability (ICLEI [formerly the International Council for Local Environmental Initiatives]) is one of the most prominent examples of

a transnational municipal network that has had great success in advocating for cities to mobilize their communities around local sustainability issues (Cuthill and Fien 2005). ICLEI's mission "is to build and serve a worldwide movement of local governments to achieve tangible improvements in global sustainability with special focus on environmental conditions through cumulative local actions" (ICLEI 2011). ICLEI provides training and resources for participating cities in their network, while also demanding that cities in their program maintain their progress and continue to push towards broader achievements.

ICLEI's most publicly visible campaign is their Cities for Climate Protection (CCP), whose methodology stimulates local governments to find effective greenhouse gas (GHG) emissions reduction measures that also have co-benefits such as community livability improvement and financial savings through energy and fuel efficiency (Bulkeley 2005). Bulkeley writes that "The CCP programme is one example of an arena within which a complex, contested and never complete politics of scale is emerging...Here, the politics of scale involves attempts to reframe an issue which is usually considered in global terms within practices and institutions which are circumscribed as local" (Bulkeley 2005). This international focus on the power of local movements brought about by ICLEI and their CCP campaign, provides an important catalyst for cities to engage in local issues, while at the same time utilizing a much broader network.

ICLEI's CCP initiative, with its internationally focused and stringent requirements for participating cities, has many similarities with a group of cities in the United States participating in the U.S. Conference of Mayors Climate Protection

Agreement and they have even found some ways to work together (Selin and VanDeveer 2007). The Mayors Climate Protection Agreement began on February 16th, 2005 (the same day as the Kyoto Protocol went into effect for the countries that ratified the treaty) with the goal to have mayors sign on to the agreement and commit to meet or beat, in their own towns and cities, the Kyoto Protocol's targets (Sussman 2008). The U.S. Conference of Mayors (the official nonpartisan organization of over 1,000 cities with populations of over 30,000) officially endorsed the initiative in 2005 and encouraged all its members to sign on (Sussman 2008). Currently, as of January 2011, 1049 mayors from all 50 states, along with the District of Columbia and Puerto Rico, have all signed the agreement (Mayors Climate Protection Center 2011). A few of the actions cities need to take when signing the agreement include; urging federal and state governments to create strong climate policies that fulfill or exceed the Kyoto Protocol's targets and decreasing the use of fossil fuels by increasing the use of renewable energy technology (Gore and Robinson 2009).

The Mayors Climate Protection Agreement has accomplished a great deal in terms of recruiting cities to their cause and spreading awareness of the urgency of climate change, however the initiative has some limitations. One contrast between The Mayors Climate Protection Agreement with ICLEI's CCP is that the agreement does not necessarily tie local governments to detailed analysis of their progress in achieving their emissions reduction targets, while the CCP has a strong emphasis on evaluation. This lack of dedication to evaluation makes the Mayors Climate Protection Agreement less reliable when determining the effectiveness of the program. When people do conduct analysis on the Mayors Climate Protection Agreement they have found a few troubling

trends among cities in the program. Christopher Gore and Pamela Robinson write, in *Local Government Response to Climate Change: Our Last, Best Hope?*, that one deficiency with cities participating in the Mayors Climate Protection Agreement is that they "are largely focused on corporate operational practices, outreach efforts, and creating new business opportunities...In contrast, cities have been much less active targeting community emissions within municipal boundaries" (Gore and Robinson 2009). Another limiting factor impeding the Mayors Climate Protection Agreement's progress, through little fault of its own, is that cities often receive only slight help from state and federal agencies (Sussman 2008). This means that cities often have to rely on support of their local populations in order to achieve their goals.

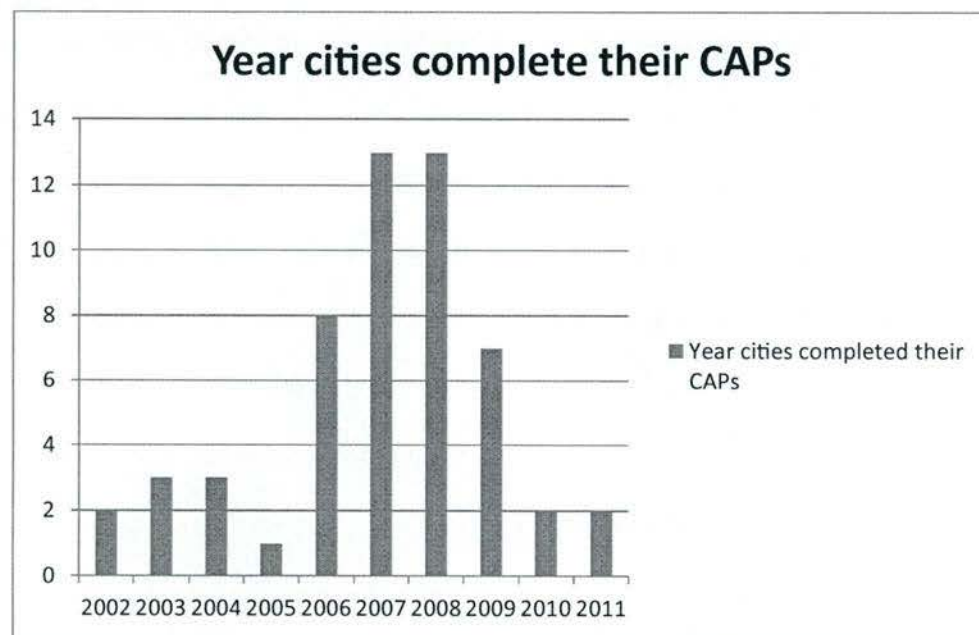
Climate Action Plans

With the above international and national initiatives to increase the level of urban involvement with the climate movement highlight the power of large networks, local municipalities have increasingly turned to creating their own action plans to respond to climate change and sustainability. According to the Environmental Protection Agency (EPA) a Climate Action Plan (CAP) "lays out a strategy, including specific policy recommendations, that a local government will use to address climate change and reduce its greenhouse gas (GHG) emissions" (Environmental Protection Agency 2001). In addition to the EPA's definition, a number of U.S. Cities include a significant emphasis on implementing sustainable systems and resolving environmental/climate justice issues, as well as climate change (City of Portland 2009). There are no set parameters a city must use to draft their CAP, thus these plans often demonstrate a wide range of target areas and points of interest, for example the City of

Worcester breaks up their focus areas into energy efficiency, renewable energy, transportation and vehicle fleet, waste and recycling, and green space, while the City of Houston breaks up their categories into buildings and structures, mobile sources, waste, and community measures (City of Worcester 2006, City of Houston 2009). Since CAPs have no strict national or international requirements or guidelines, they often range greatly in size such as the City of Austin Texas' 20-page "Climate Protection Plan" compared to the City of San Francisco's 140-page "Climate Action Plan" (City of Austin 2008, City of San Francisco 2004). In general, each city's CAP intentionally tailors itself to target the areas that the City and local community consider to be of the highest priority in working towards solutions.

Due to CAPs unique ability to simultaneously incorporate the ideas and concerns of city and community members along with also providing a locally-derived long-term plan for local environmental governance issues, CAPs have steadily grown in number over the past few years. Since the beginning of the twenty-first century, approximately 54 cities in the United States have drafted their own CAPs, with one of the most recent being the City of Eugene's 2010 Climate and Energy Action Plan (Environmental Protection Agency 2011). The chart below shows the year in which each city finished their completed CAP draft. CAPs have also spread beyond the bounds of the United States and into at least one country on every continent (with the exception of Antarctica), which demonstrates CAPs appeal to municipalities of all different sizes and identities (Global Carbon Project 2011). The movement of cities to create their own CAP appears, at the moment, to keep growing and highlighting effective uses of multi-

level environmental governance in responding to the dual issues of climate change and peak oil.



V. Frameworks for evaluating municipal CAPs

Tang et al.'s evaluation framework for CAPs

The popularity of CAPs across the country has not spurred the same interest in the academic community, currently with very little research directly on CAPs and almost no critical scrutiny of each CAP's value except for Tang et al.'s comprehensive study in their article *Moving from agenda to action: Evaluation local climate change action plans* (Tang et al. 2010, Wheeler 2008). While Tang et al. note that numerous studies have investigated elements of local planning, they also state that "little research has quantitatively measured the factors influencing local climate change action plan quality" (Tang et al. 2010). Their article aims to fill the void of research on CAPs and

quantitatively rank city CAPs in terms of their 1. **Awareness** of climate change issues and effects, 2. **Analysis** of their own emission sources and climate change drivers and 3. **Actions** they are taking to reduce their emissions through eight specific realms (1. Communication and collaboration policies 2. Financial tools 3. Land use policies 4. Transportation policies 5. Energy strategies 6. Waste strategies 7. Resources management strategies and 8. Implementation and monitoring strategies) (Tang et al. 2010). In addition, Tang et al. broke down these categories further by analyzing CAPs based on 36 indicators (4 in “Awareness,” 6 in “Analysis,” and 26 in “Actions”). The authors analyzed each of the 40 CAPs identified by ICLEI and ranked them based on the amalgamated scores received in each of the above three categories. I have included the authors’ final results in Appendix Part I.

While this groundbreaking study contains very valuable research, there are a few details that remain problematic. One such issue is that for the “Actions” category, the authors lump together support actions (e.g. communication and collaboration policies, financial tools, and implementation and monitoring strategies) with policy/management strategies (land use policies, transportation policies, energy strategies, waste strategies, and resources management strategies), which in my view should be separate considerations when considering CAP “action” effectiveness. In addition, the authors’ choice of variables though fairly broad, still does not capture the full spectrum of initiatives cities need to take in order to have comprehensive CAPs (such as food and agriculture).

Notwithstanding my few criticisms, Tang et al. provide the first compelling review of municipal CAPs and a glimpse into the steadily increasing world of city driven climate and sustainability responses. This research lays down the first major stepping stone for further exploration of CAPs and whether cities can actually use CAPs to move forward with an agenda of combating climate change and achieving sustainability. My project seeks to take this next step by comparing municipal CAPs that received high “Action” scores to those that received low scores.

Alternate framework for evaluating CAPs

As I describe earlier in this project, CAPs frequently address a wider array of issues beyond climate change (such as sustainability and justice matters), thus it is important to evaluate CAPs using a comprehensive rubric. Though Tang et al. include many important elements in their framework, below I put forth a system through which one can better assess CAP outputs to include a full range of interests. The following sections explicate the categories and associated elements I used in my project in order to provide background and rationale for inclusion.

Buildings and energy

The buildings and energy category analyzes factors relating to the construction and maintenance of buildings, along with energy efficiency and renewable energy strategies. The building sector consumes the majority of energy produced in the U.S. each year meaning that any effort to implement successful CAPs must look at these two aspects in relationship to each other (Psomopoulos et al. 2010). The first element in this category reviews city CAP initiatives to transition to renewable energy, which includes solar,

wind, biomass, energy from waste, and geothermal energy (Lior 2010). The second element in this category reviews city CAP initiatives to implement energy efficiency and energy star/guide programs, which aim to reduce energy use or at least to reduce wasted energy (Andrews 2008, Banerjee and Solomon 2003). The third element in this category reviews city CAP initiatives to reduce individual energy consumption, which aims to motivate individuals to personally reduce energy use (Dietz et al. 2009). The fourth element in this category reviews city CAP building policies through city mandates, codes, and regulations, which focus on ensuring buildings have some degree of responsibility for reducing their energy use (Rawlins and Paterson 2010). The fifth element in this category reviews city CAP green building design, which is the sustainable construction and maintenance of buildings throughout its life-cycle (Kibert and Grosskopf 2007, Bronin 2008).

Urban Mobility

The urban mobility category analyzes factors relating to alternative fuel sources and forms of mobility, along with mobility-focused planning and design. The transportation sector is the second largest source of GHG emissions in the U.S., with an ever increasing rate of produced emissions. The first element in this category reviews city CAP initiatives to increase use of alternative fuel sources (e.g. biofuels) and improve vehicle efficiency, which aim for a slow transition away from fossil fuels (Black 2010). The second element in this category reviews city CAP initiatives related to mobility-focused planning and design, which focuses on creating pedestrian and bicycle-centric cities in order to make using alternate transportation easier for people (Black 2010). The third and fourth elements in this category reviews city CAP

initiatives to promote and motivate their populations to use public transportation (e.g. bus, trolley, etc.) and active mobility (e.g. walking, biking, etc.), which directly change personal transportation norms (Bamberg et al. 2007, Maibach et al. 2009).

Food and agriculture

The food and agriculture category analyzes factors relating to alternative food networks, soil conservation and management, and urban agriculture spaces. Food and agriculture systems present one of the most interconnected relationships within the U.S. with ties to economy, human and ecosystem health, transportation, etc. which highlights its importance for any city's CAP (Wirén-Lehr 2001). The first element in this category reviews city CAP initiatives to promote and support alternative food networks (i.e. respatializing and resocializing food production), which include local farmers and organizations (e.g. community supported agriculture) (Jarosz 2008). The second element in this category reviews city CAP initiatives to preserve and maintain robust soil conservation and management techniques, which protect the long-term vitality of agricultural systems through the appropriate use of soil inputs, etc. (Noble and Ruaysoongnern 2010). The third element in this category reviews city CAP initiatives to create urban agriculture spaces, which is the production of food outputs directly within the city boundaries (Lovell 2010).

Land use

The land use category analyzes factors relating to Brownfield revitalization, land use regulations, urban growth boundaries, compact and mixed use development, and low impact development. Land use constitutes one of the most important natural resources at cities' disposal and dramatically impacts their long-term actions for an

array of issues (Haberl 2004). The first element in this category reviews city CAP initiatives to revitalize Brownfield sites, which are contaminated or underutilized sites that often contribute negatively to the surrounding natural systems (Wedding and Crawford-Brown 2007). The second element in this category reviews city CAP initiatives in relation to land use regulations, since cities have a rising influence in this realm (Bronin 2008). The third element in this category reviews city CAP projects relating to urban growth boundaries, which are controls that limit the expansion of urban spheres of influence (Turnbull 2004). The fourth element in this category reviews city CAP initiatives to implement compact and mixed use development, which are generally high-density and multi-purpose zones that brings together land use planning and population settling (Salkin 2009).

Consumption and waste

The consumption and waste category analyzes factors relating to zero waste, storm water, water demand, landfill methane capture, and individual consumption reduction strategies. According to Rees and Wackernagle human populations "now consume, divert, or otherwise appropriate for their own purposes 40% of the product of net terrestrial photosynthesis...and up to 35% of primary production from coastal shelves and upwellings..." however human society wastes much of this use (Rees and Wackernagel 1996). The first element in this category reviews city CAP zero waste strategies (e.g. increased recycling, composting, reuse, etc.), which ensures that materials have a continuous recurring life-cycle and always have a purpose (Greyson 2007). The second element in this category reviews city CAP urban water managements

systems, such as storm water (i.e. low impact development or integrated water management) and water demand management, which promote water reuse, conservation, reclamation, etc. (Daigger 2009). The third element in this category reviews city CAP landfill methane capture strategies, which prevent the release of CH₄ into the atmosphere and diverts the gas into another form (often a useful form of energy) (Matthews and Themelis 2007). The fourth element in this category reviews city CAP initiatives to reduce individual consumption patterns, which deal with personal norms, habits, patterns, etc. that contribute to increased waste (Tukker et al. 2008).

Urban natural resources

The urban natural resources category analyzes factors relating to ecosystem and watershed focused designs, urban forestry and green space, and conservation areas. Peter Newman writes "One of the strongest themes running through the literature on urban sustainability is that if we are to solve our environmental problems we need to view the city as an ecosystem..." which highlights how important it is for cities to create and maintain the natural functions and systems incorporated into the city (Newman 1999). The first element in this category reviews city CAP initiatives to implement ecosystem and watershed focused designs, which link natural processes, systems, and functions (e.g. plant ecology) into the urban form instead of creating a dichotomy between the two through the emphasis on mutually beneficial exchanges (Pickett and Cadenasso 2007, Pickett et al. 2001). The second element in this category reviews city CAP initiatives to promotion of urban forestry and green space, which includes the creation and management of urban forests both at municipal and

community level (Foster et al. 2011). The third element in this category review city CAP initiatives to implement and preserve conservation areas, which generally aim to protect indigenous and endangered plant and animal species (Gordon et al. 2009).

Justice initiatives (Haughton 1999)

The justice initiatives category analyzes factors relating to social justice and environmental risk assessment, coalition building with marginalized communities, geographic justice, procedural justice, and interspecies justice. Graham Haughton writes that the renewed lens on sustainability "has enlarged the consideration of rights through its explicit attention to the rights of future generation and of present-day socially marginalized groups and also to the need to consider *other* (nonhuman) dimensions of the natural world as having rights to continued existence, as recognized in biodiversity treaties" (Haughton 1999). The first element in this category reviews city CAP initiatives to address social and environmental injustices, through means such as environmental risk assessment and indices (Harner et al. 2002). The second element in this category reviews city CAP initiatives to build coalitions with marginalized communities within the urban sphere, which aims to increase the level of participation from varied communities without simply focusing on one or a few communities' needs and ideas (Gauna 2008). The third element in this category reviews city CAP initiatives to create geographic justice, which aims to ensure that cities work on broader challenges and issues than just those in their direct community (Beatley 1994). The fourth element in this category reviews city CAP initiatives to create procedural justice, which aims to ensure that laws and regulations treat all individuals and organizations fairly and eliminate burdens on any particular group and without the possibility of transferring

those burdens outside a municipality's control (Lake 1996). The fifth element in this category reviews city initiatives to create interspecies justice, which ensures that human populations do not impinge on non-human life (Bosselmann 2004).

In addition to evaluating city initiatives in various categories, it is also important to review to what extent municipal actions achieve sustainability. There are multiple sustainability assessment frameworks, however one of the most prominent is the strong sustainability model which argues that there are certain natural resources and functions that humanity and its technology cannot replace (Ayres 2006). Paul Ekins et al. in their 2003 article *A framework for the practical application of the concepts of critical natural capital and strong sustainability*, outline seven key principles to consider for strong sustainability (Ekins et al. 2003). The first principle is the stabilization of the global climate through ending abnormal GHG emissions and stopping ozone-depleting matter (Ekins et al. 2003). The second principle is through maintaining biological diversity as a key component of ecological resilience (Ekins et al. 2003). The third principle is “through the maintenance of soil fertility, hydrobiological cycles and necessary vegetative cover and the rigorous enforcement of sustainable harvesting. The latter implies basing harvesting rates on the most conservative estimates of stock levels” (Ekins et al. 2003). The fourth principle is that use and maintenance of non-renewable resources should remain balanced with development of new renewable substitutes, with the vision towards completely ending non-renewable energy use (Ekins et al. 2003). The fifth principle is that emissions into the air, water, and soil should not exceed these systems' ability to disperse emissions (Ekins et al. 2003). The sixth principle is that areas of special ecological or human significance, due to their “their rarity, aesthetic

quality or cultural or spiritual associations,” must be preserved (Ekins et al. 2003). The seventh principle is that human technologies that pose serious human or environmental risks must be ended (Ekins et al. 2003).

VI. Methodology (benchmarks)

This project aimed to illuminate effective municipal efforts to creatively redesign their cities’ buildings and energy, transportation, food and agriculture, land use, consumption and waste, urban natural resources, and justice initiatives by evaluating cities in terms of comprehensive actions for their CAP. In particular, I analyzed the following elements in each city CAP category:

1. Buildings and energy
 - Renewable energy (solar, wind, biomass, energy from waste, and geothermal)
 - Energy efficiency and energy star/guide
 - Reducing individual energy consumption
 - Building policies
 - Green building design
2. Urban Mobility
 - Alternative fuel sources and improving vehicle efficiency
 - Mobility-focused planning and design (e.g. pedestrian and bicycle friendly)
 - Public transportation
 - Promotion of active mobility
3. Food and agriculture
 - Alternative food networks (respatializing and resocializing food production)
 - Soil conservation and management (including soil inputs)
 - Urban agriculture spaces
4. Land use
 - Brownfield revitalization
 - Land use regulations
 - Urban growth boundaries
 - Compact and mixed use development
5. Consumption and waste
 - Zero waste strategies
 - Urban water management systems
 - Landfill methane capture strategies
 - Individual consumption reduction strategies

6. Urban natural resources

- Ecosystem and watershed focused designs
- Urban forestry and green space
- Conservation areas

7. Justice initiatives

- Social justice (intragenerational justice) and environmental risk assessment
- Coalition building with marginalized communities
- Geographic justice
- Procedural justice
- Interspecies justice

I categorized information I gathered in each of the above seven categories and broke initiatives up into actions that affected the municipal sector, the commercial sector, the industrial sector, and the residential sector. The sub-elements highlight the specific projects I looked for and researched during my study. I then compared the information in each city's CAP to each city's subsequent CAP "progress reports" to see how many initiatives the city was able to implement/initiate since adopting the CAP (again broken down by each category's element and into municipal, commercial, industrial, and commercial sectors). This analysis indicated what actions cities had the most success in implementing. To get a better idea of each city's quality of actions, I ranked each city's efforts within each element based on a sustainability scale of 1-5 (1 being very weak sustainability and 5 being very strong sustainability) using Ekins et al.'s sustainability framework and the number of actions cities' proposed in each element, how well the city moved towards achieving their action, and the thoroughness/ambitiousness of their proposed actions.

I used Tang et al. 2010 study's ranked list of CAPs to determine which cities have CAPs with extensive proposed actions and those that have less extensively proposed actions. For my study I researched CAP cities that Tang et al. give a score of

6.0/10 or above for their CAP “Actions” as my subjects for CAPs with extensive proposed actions and those with a score of 4.5/10 or below for their CAP “Actions” as my subjects for CAPs with less extensively proposed actions. I further limited my study to those CAP cities that have subsequent “Progress Reports.” For this work I differentiated between Developed CAPs (D-CAPs) and Less Developed CAPs (LD-CAPs) to make comparisons around CAP quality.

To analyze initiatives I began by reviewing the CAP documents themselves and online information listed on city websites in order to get background information on CAPs as seen by city officials. As noted above, after doing this initial survey of information I went through each city’s CAP to compile a summary of each city’s proposed goals and actions in different elements and sectors. I then did this same research for the subsequent CAP “Progress Reports” to see how many proposed CAP actions the city continued to implement after publishing their CAP. I kept track of all this information on a spreadsheet and used the information to showcase the results using different tables, graphs, etc.

VII. Results

City Selection

For my study I reviewed all cities that Tang et al. gave a score of 6.0/10 or above (or what I am calling D-CAPs) for their CAP “Actions”, to find which cities also had CAP progress reports. I identified 5 cities that had both a CAP and at least one CAP progress report. These 5 D-CAP cities were Portland OR, Bellingham WA, King County WA, Boulder CO, and Berkeley CA. After reviewing the D-CAPs I researched all cities with a score of 4.5/10 or below for their CAP “Actions” as my subjects for

CAPs with less extensively proposed actions (or what I am calling LD-CAPs). These 4 LD-CAP cities were Menlo Park CA, Boston MA, Evanston IL, and Austin TX. The results summary, as follows, uses these two populations to make comparisons around CAP quality and subsequent performance.

CAP and Progress Report Review

Portland, Bellingham, King County, Boulder, Menlo Park, Evanston, and Austin all had fairly clear and organized CAPs and progress reports, meaning they listed goals and associated objectives/actions in a list format that the reader could easily comprehend. The City of Berkeley had this same format for its CAP (of goals and associated objectives/actions), but had its CAP progress report in a digital format on the city's website. In essence this online version was the same as the other CAPs' progress reports, however the City of Berkeley's CAP progress report was scattered among various different pages on the website (though I was able to obtain all the information). The main individual CAP that I had difficulty analyzing was the City of Boston's CAP, due to the City of Boston's penchant for highlighting past and present City actions in combination with proposals for future actions (which made classifying information slightly more tedious, though still possible). However, the City of Boston's CAP progress report had a heightened degree of organization and readability.

The D-CAPs displayed general homogeneousness in terms of stating the unambiguous actions they would take in a wide variety of areas. LD-CAPs on the other hand, with the exception of the City of Menlo Park's CAP, were not nearly as definitive about the actions their cities would take, using language such as "The city could/would/possibly/will try/etc." While the City of Boston and the City of Austin

only used this type of language sparingly in their CAPs, the City of Menlo Park's CAP frequently emphasized that the City would not commit to any particular action. One of the strongest dichotomies between D-CAPs and LD-CAPs was that D-CAPs proposed actions that impacted a range of entities rather than just focusing on one specific aspect (e.g. having an energy policy that affected all municipal buildings, rather than just one or a few). LD-CAPs, in particular the City of Evanston, proposed actions that impacted only a small part of the city (e.g. a single building, neighborhood, business, etc.) rather than wider expanses of the city. The rest of this results section will go into details about the above CAP generalities.

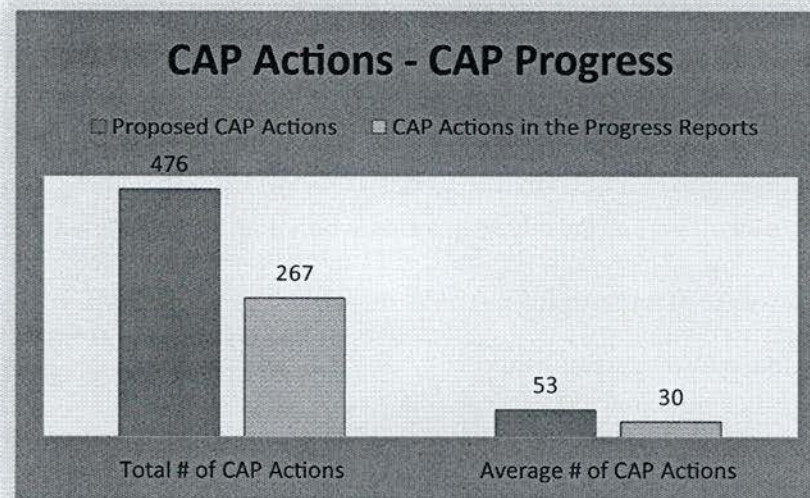
For a full breakdown of each city's CAP actions, please see the appendix Figures 1-5 for D-CAPs (Portland, Bellingham, King County, Boulder, and Berkeley respectively) and Figures 6-9 for LD-CAPs (Menlo Park, Boston, Evanston, and Austin respectively).

Amalgamated total results

The average amount of time between CAP adoption and subsequent CAP progress reports is 2.4 years for D-CAPs and 2.5 years for LD-CAPs, which makes any comparisons between the D-CAP and LD-CAP data set much more relative. The total data I collected from the 9 cities, as shown in Figure 1 below, indicates that cities proposed 476 actions in their CAPs and listed 267 actions in their subsequent progress reports (or a per city average of 53 proposed actions and 30 actions in the progress reports), which breaks down to cities implementing/initiating 56.1% of proposed initiatives. This indicates that from CAP inception to CAP implementation, cities have

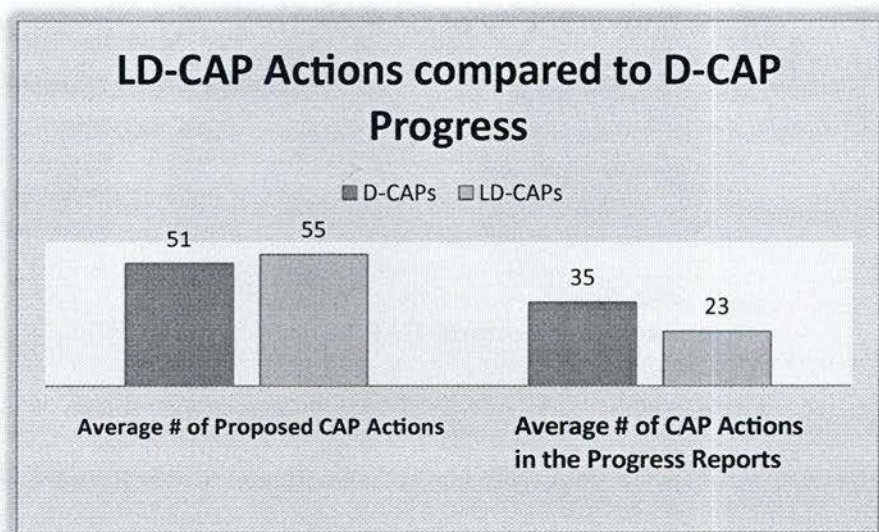
implemented or started to implement a little over half of their actions within approximately 2.5 years.

Figure 1.



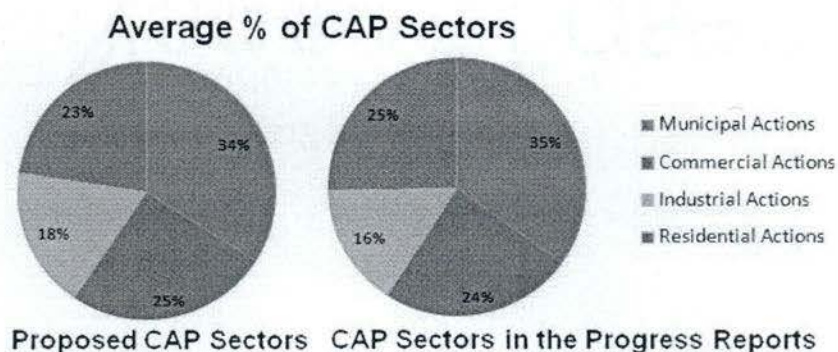
To see whether CAP quality impacted CAP progress, I separated the data score for the D-CAPs and the LD-CAPs, from which I created Figure 2 below. This chart shows that, on average, D-CAPs proposed 51 actions and implemented/initiated 35 of those actions (or approximately 68.6%). LD-CAPs proposed a higher rate of actions at 55 per CAP (though significantly increased by the City of Evanston's 106 proposed CAP actions), but only ended up implementing/initiating 23 of those actions (or approximately 41.8%). The percentage difference between D-CAPs and LD-CAPs' progress was 27.2%, which is quite substantial. This demonstrates that D-CAPs were able to realize a much higher degree of their actions compared to LD-CAPs.

Figure 2.



To break these numbers down further, I classified all CAP actions into the municipal, commercial, industrial, and residential sectors. Figure 3 below highlights proposed CAP actions in the municipal sector at 34%, in the commercial sector at 25%, in the industrial sector at 18%, and the residential sector at 23%. This demonstrates that cities' CAPs called for approximately a third of all actions in the public sphere, and the other two thirds in the private sphere. In addition, the graph shows the average percentage of CAP actions in the CAP progress reports within each sector. In the CAP progress reports municipal actions increased by 1%, residential actions increased by 2%, commercial actions decreased by 1%, and industrial actions decreased by 2%.

Figure 3.



To see whether CAP quality altered the percentage of actions in each sector, I compared the data score for the D-CAPs and the LD-CAPs, from which I created Figure 4 below. This pie chart illustrates that, on average of D-CAPs' proposed actions:

- 28% were in the municipal sector
- 26% were in the commercial sector
- 20% were in the industrial sector
- 26% were in the residential sector.

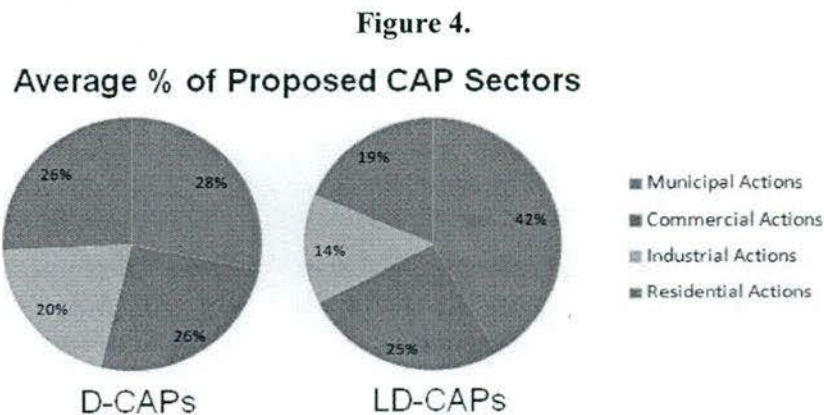
In contrast, on average of LD-CAPs' proposed actions:

- 42% were in the municipal sector (14% higher than the D-CAPs)
- 25% were in the commercial sector (1% lower than the D-CAPs)
- 14% were in the industrial sector (6% lower than the D-CAPs)
- 19% were in the residential sector (7% lower than the D-CAPs).

This clearly demonstrates that D-CAPs were fairly well-rounded in their choice of actions by sector, while LD-CAPs focused much more heavily on municipal actions.

This difference is important since the data show that LD-CAPs focus internally on

municipal operations, without nearly as much emphasis on the private sector, while D-CAPs seem to have no such delineation.



In the progress reports, these D-CAP and LD-CAP actions by sector did not change very dramatically. On average of D-CAPs' actions in the progress reports:

- 31% were in the municipal sector (an increase of 3% from the original CAP)
- 25% were in the commercial sector (a decrease of 1% from the original CAP)
- 18% were in the industrial sector (a decrease of 2% from the original CAP)
- 26% were in the residential sector (which was the same as in the original CAP).

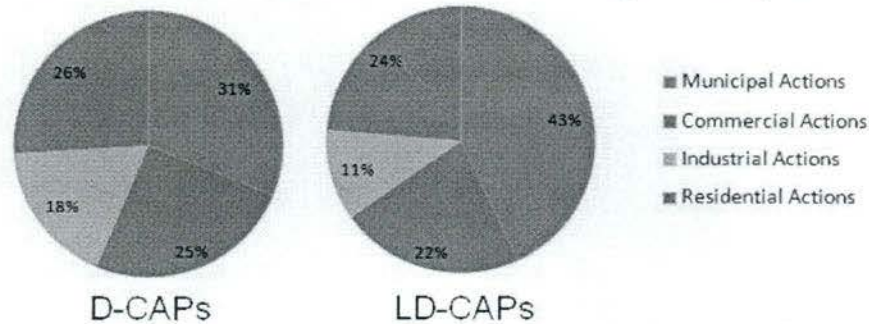
On average of LD-CAPs' actions in the progress reports:

- 43% were in the municipal sector (an increase of 1% from the original CAP)
- 22% were in the commercial sector (a decrease of 3% from the original CAP)
- 11% were in the industrial sector (a decrease of 3% from the original CAP)
- 24% were in the residential sector (an increase of 5% from the original CAP).

These results indicate the cities had, in general, the most success in implementing/initiating actions in the municipal and residential sectors compared to the commercial and industrial sectors. See Figure 5 for a complete breakdown.

Figure 5.

Average % of CAP Sectors in the Progress Reports



Outside of the CAP sector breakdown, these city CAP actions cover to varying degrees all of the 7 main CAP categories that I analyzed throughout my research (buildings and energy, urban mobility, food and agriculture, land use, consumption and waste, urban natural resources, and justice initiatives). However, cities' actions do not have an equal distribution across all the 450+ proposed actions and 250+ actions in the CAP progress reports. Figure 6 below compares proposed CAP actions to those in the CAP progress reports. From highest to lowest percentage from proposed CAP actions, there was:

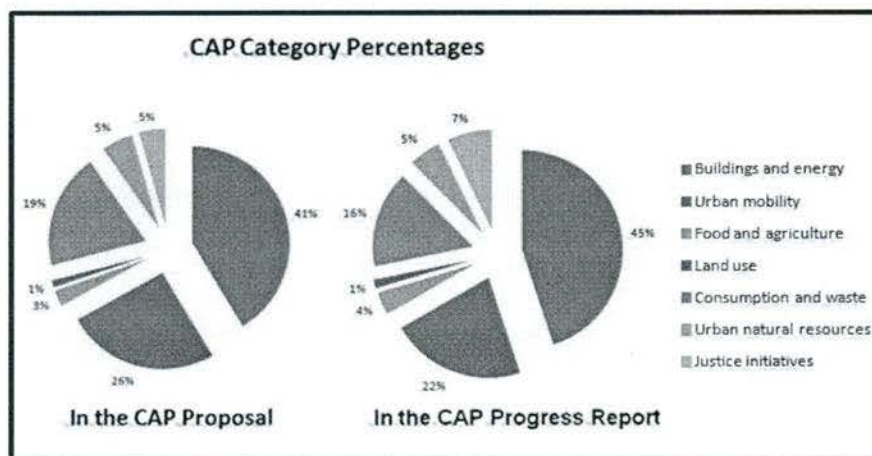
1. Buildings and energy at 41%
2. Urban mobility at 26%
3. Consumption and waste at 19%
4. (tied) Urban natural resources at 5%
4. (tied) Justice initiatives at 5%
6. Food and agriculture at 3%
7. Land use at 1%.

From highest to lowest in CAP progress reports, there was:

1. Buildings and energy at 45% (up 4% from the proposed CAP actions)
2. Urban mobility at 22% (down 4% from the proposed CAP actions)
3. Consumption and waste at 16% (down 3% from the proposed CAP actions)
4. Justice initiatives at 7% (up 2% from the proposed CAP actions)
5. Urban natural resources 5% (same % from the proposed CAP actions)
6. Food and agriculture at 4% (up 1% from the proposed CAP actions)
7. Land use at 1% (same % from the proposed CAP actions)

These results indicate that, overall, cities implemented most CAP actions in each category at a similar rate, except for the buildings and energy, urban mobility, and consumption and waste categories. Cities appeared to have an increased likelihood to implement/initiate actions within the buildings and energy category, while having a decreased likelihood to implementing/initiate actions within the urban mobility and consumption and waste categories.

Figure 6.



The total category results among CAPs, shadows the fairly substantial difference between D-CAPs and LD-CAPs and their subsequent progress reports. Though both D-CAPs and LD-CAPs have similar action levels in the seven categories, these levels change dramatically in the CAP progress reports as shown in the figure below.

However, D-CAPs remain fairly constant in terms of their # of actions in each category between the CAPs and the progress reports. By percentage of implemented/initiated actions in each category, D-CAPs have:

- 39% in buildings and energy (a 1% decrease from the original CAP)
- 22% in urban mobility (a 2% decrease from the original CAP)
- 17% in consumption and waste (the same percentage as the original CAP)
- 9% in justice issues (a 2% increase from the original CAP)
- 7% in urban natural resources (the same percentage as the original CAP)
- 4% in food and agriculture (a 1% increase from the original CAP)
- 2% in land use (the same percentage as the original CAP).

LD-CAPs are not nearly as even, with the percentage of implemented/initiated actions in each category at:

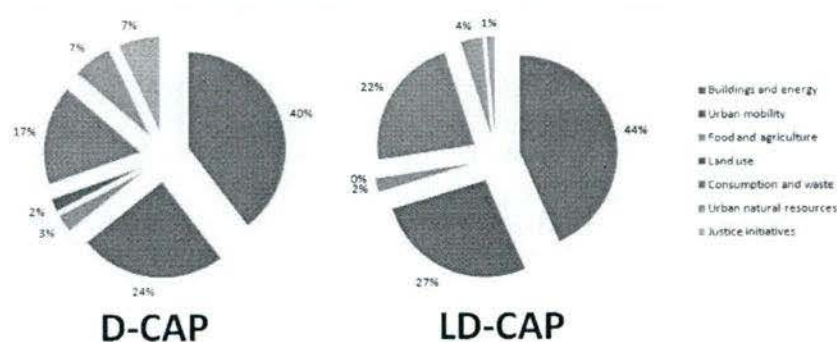
- 56% in buildings and energy (a 12% increase from the original CAP)
- 21% in urban mobility (a 6% decrease from the original CAP)
- 14% in consumption and waste (a 8% decrease from the original CAP)
- 4% in food and agriculture (a 2% increase from the original CAP)
- 3% in justice initiatives (a 2% increase from the original CAP)
- 2% in urban natural resources (a 2% decrease from the original CAP)

- 0% in land use (the same percentage as the original CAP).

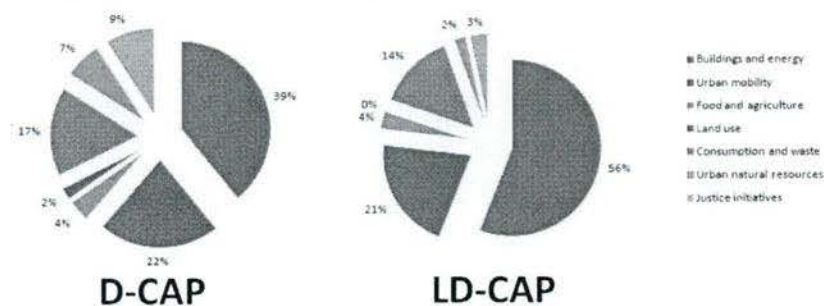
These results indicate that cities with LD-CAPs implemented their proposed actions much less systematically, while D-CAPs implemented their proposed actions at fairly consistent rates. Figure 7 for a comparison.

Figure 7.

D-CAP and LD-CAP Category Percentages Comparison



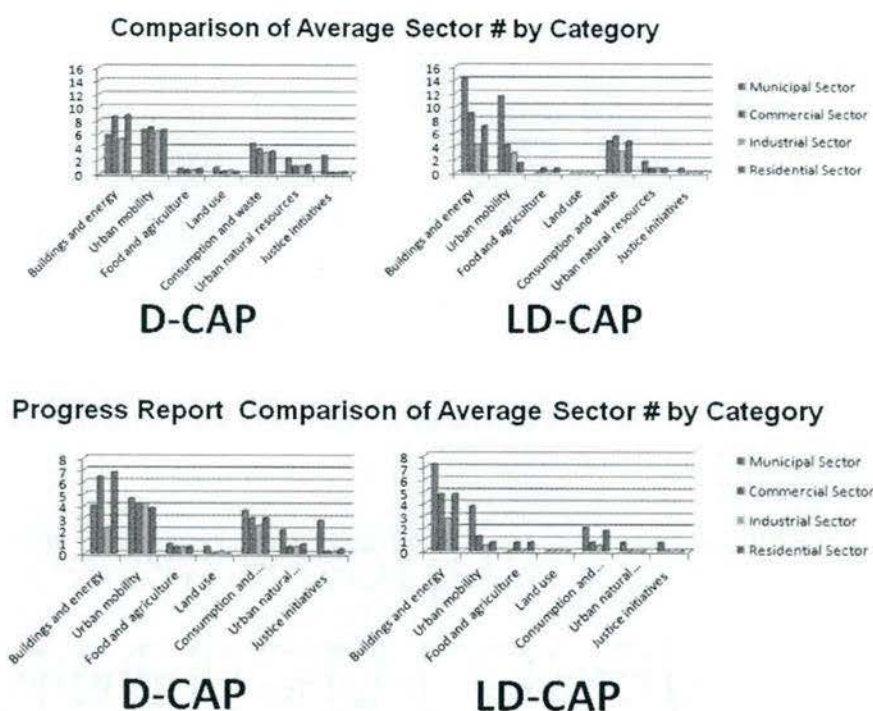
Progress Report Category Percentages Comparison



The inconsistency between CAP proposed actions and those found in the CAP progress reports continues when one looks at the number of actions in each sector among D-CAPs and LD-CAPs. The results contained in Figure 8 below highlight the trend towards evenness for D-CAPs and unevenness for LD-CAPs when comparing the CAP actions to the CAP progress reports. LD-CAPs' municipal sector actions in the

buildings and energy, urban mobility, and consumption and waste categories far exceed those of any other sector (even LD-CAPs' commercial sector actions nearly double industrial actions in those same categories), in both the LD-CAPs' proposed actions and the LD-CAPs' progress report actions. Conversely, D-CAPs' actions in all categories demonstrate marked consistency in the CAP's proposed actions. However, the D-CAPs' implemented actions (described in the CAP progress reports) are not quite as uniform as in the D-CAPs themselves, due to the buildings and energy category in which the commercial/residential sector actions nearly double municipal sector actions and approximately triple industrial actions. Also, the justice issues category in which municipal sector actions nearly triple all other actions (due to King County, which had almost all of the justice issue actions among D-CAPs).

Figure 8.



While D-CAPs and LD-CAPs have a substantial disparity in action output and category/sector focus, they also have an important level of quality difference. For each CAP I ranked each categorical element on a 1-5 sustainability scale score. Overall, I gave D-CAPs an average score of 3.00/5 and LD-CAPs an average score of 2.33/5, excluding scores that cities did not have any proposed actions. In general, D-CAPs implemented/initiated much more comprehensive actions across a broader swath of sectors than LD-CAPs. These results indicate that D-CAPs moved ahead much more steadily toward achieving their overarching goals in a strong sustainability manner than LD-CAPs. For a detailed summarization of scores by each category's multiple elements, please see the appendix Part 2.

VIII. Discussion

Evaluating D-CAPs vs. LD-CAPs

As the average results indicate, D-CAPs achieved a higher degree of their actions compared to LD-CAPs. Many D-CAPs wrote out detailed "mini-plans" for each of their proposed actions, that had a combination of extensive timelines, financial support mechanisms, accountability measures, and a host of other factors that greatly facilitated D-CAPs' ability to accomplish their actions. LD-CAPs need to better adopt these strategies into their plans and find ways to incorporate initiatives that work for their particular city. Since most D-CAPs' actions did not just focus on specific area of their city (e.g. one building, policy, business, etc.) and instead advocated for changing a broader swath of the city's functions (e.g. neighborhoods, all municipally owned buildings, etc.), D-CAPs did not run up against as many issues in their implementation

efforts as LD-CAPs (though D-CAPs still had plenty of challenges realizing their proposed actions). Some of these issues mentioned in both D-CAPs and LD-CAPs (though more prominently in the LD-CAPs) include financial barriers, follow through accountability, political/bureaucratic issues, lack of city employee time, uncertainty regarding the best course of action, etc. LD-CAPs set themselves up for difficulties by looking at very specific projects within the city, which meant these cities with LD-CAPs had only a few paths towards implementing their proposed actions that often would get stalled by one issue or another.

One of the most important success areas for CAPs, though to varying degrees among D-CAPs and LD-CAPs, was in collaboration with multiple city and community partnerships. Both D-CAPs and LD-CAPs had similar success rates in achieving their proposed actions in the private and public spheres, D-CAPs more fully concentrated on constructing broadly inclusive actions with the commercial, industrial, and residential sectors. If LD-CAPs proposed more actions outside of the municipal realm, the results indicate that those cities would increase the likelihood of achieving those actions. Cities that reached out to various community members/organizations and expanded intentional planning and initiatives within disparate city entities themselves, created a process of expanding interest and energy towards resolving sustainability, climate, and justice issues. In addition, cities that looked beyond the municipal operations to work on these external issues gained new partners to implement comprehensive actions, thus allowing cities to continue current work already occurring in their communities while at the same time shifting some of their responsibility to other motivated organizations. Cities that currently focus on municipal actions due to concerns about their ability to achieve

success outside of the city realms, instead of a broader initiative that includes the private sector as well, can look to the D-CAP cities that continued their victories with outside collaboration.

While D-CAPs represent cities with interest in climate and sustainability action some clear role models, both D-CAPs and LD-CAPs still focus the majority of their initiatives in the three categories of buildings and energy, urban mobility, and consumption and waste. According to the CAPs I reviewed in this study, most stated energy and transportation as their city's biggest GHG emitters, which helps explain why cities would so determinedly address those areas. However, if cities truly aim to meet their goals, then they look at how to associate these important categories with food and agriculture, land use, urban natural resources, and justice initiatives. For example, if cities want to reduce GHG emissions from fossil fuel-based transportation, then the city should invest in urban agriculture and land use planning to better support individuals and organizations who wish to consume local food or if cities wish to implement weatherization projects in the private sector, then they should coordinate with marginalized communities to better reach all members and organizations of the city. These examples are only a few possible cases to illustrate that cities should consider complementary actions when implementing their actions. However, D-CAPs are on the right path towards this holistic approach, due to municipal realization that they need a multitude of actions to achieve their goals. LD-CAPs have more work to in this regard.

In regards to justice initiatives, cities (both D-CAPs and LD-CAPs) do not propose CAP justice actions comparable to their focus in CAP narratives. CAPs strongly state their desire to support all individuals and communities, but very few takes

concrete steps to rectify historic, contemporary, and future injustices. To match their justice rhetoric, cities must identify tangible projects that support strong climate and environmental justice action.

As the results and analysis indicate, CAPs that have a broader scope and invest attention to numerous factors also have increased chances to achieve high-quality actions that support cities in achieving their goals (as shown by the sustainability scores). There is no single recipe for an effective CAP, however there are certain traits that have a stronger possibility of bringing about important change.

Limits and issues with this project

While I aimed to be as objective and thorough as possible, there are a few factors that one must consider when evaluating its results and implications. Most significantly, the sample size was extremely small with only nine cities (even smaller when broken up into D-CAPs and LD-CAPs), making meaningful statistical analysis not as reliable. Once more cities create CAP progress reports, then future studies will have more information to review. Another major issue is that CAPs and their progress reports are only municipal self-assessments, which could influence or bias cities' depiction of their results. Conducting independent research of municipal actions would limit this inconsistency between reality and delusion. Most importantly however, is the factor that CAP quality may not correlate to the number of actions each city implemented/initiated. CAP results in this study may result from CAP cities already adopting some measure of municipal action to combat climate change, attain sustainability, or improve justice issues, instead of relating to CAP detail and specificity. However in contrast to this disclaimer, I only recorded CAP actions that the

municipality had not previously implemented and the fact that numerous U.S. environmental/sustainability/climate ranking systems consistently find that nearly all cities in this study are top performers in multiple areas (Thompson 2011, Mother Nature Network 2011). These ranking systems often list D-CAP cities Portland, Seattle (main city in King County) Berkeley and LD-CAP cities Austin and Boston as model cities for a multitude of actions, which indicates that all should have comparable abilities to implement comprehensive actions.

For myself, in reviewing these CAPs I may have incorrectly classified CAP actions into imprecise categorical elements or into wrong sectors. Since some CAP actions applied to multiple categories, I strived to put them into the element that I believed best captured its intent (e.g. promoting private sector tree planting to provide shade cover to save energy would go into the “Reducing individual consumption” action, instead of “urban forestry and green space”). In addition, for some cities (in particular Boston, due its CAP’s unstructured organization) I may have missed some actions altogether and not given the city credit for its actions, or I may have given a city too much/little credit for the actions that it took. To minimize these possible anomalies, multiple individuals (ideally 3-4) could all independently review each CAP and all of these scores could be averaged to produce a report less prone to one individual’s bias or inconsistent work.

IX. Conclusions and recommendations

Implications for policy makers

While I have discussed some potential considerations for making CAPs as effective as possible, there are a few additional points that may support cities in implementing their CAPs. These recommendations to cities are as follows:

- Be explicit in CAP goals and actions. While writing vague actions may make it easier to avoid public failure, overall this project's results indicate that bold effective CAPs have clear and precise actions. Include key metrics to measure CAP success and have a timeline for achieving those actions.
- Get as many cities agencies and departments engaged in implementing the CAP. In order to initiate a wide network of actions across the entire city, the municipal government as a whole need to collaborate together (i.e. not all effort should come from an environmental or sustainability office).
- Do not solely rely municipal entities to implement the CAP, incorporate the private sector since they will be able to implement many initiatives on their own with minimal to moderate city support. In addition, many non-governmental entities are already adopting climate, sustainability, and justice initiatives, thus the city may have a much easier time collaborating rather than just focusing on their own plan.
- Be holistic in implementing actions and categories. While cities may have a strong temptation to break CAPs down into tiny discrete initiatives, cities must ensure that CAPs address the interconnected aspects of climate, sustainability, and justice efforts. In addition, cities may get stalled due to time, money, politics, bureaucracy, etc. so having more flexibility in terms of their actions could partially mitigate these negative impacts.

- Create accountability metrics and measures into the CAP. Cities must publish progress reports in order to ensure they take responsibility for initiating action.

This is not a comprehensive list of all the steps cities could take to buttress their CAPs, however this list does provide a guiding framework to critically analyze CAPs and promote as detailed response as possible.

Next steps for research

As more and more CAPs create progress reports, the sample size on which to analyze CAPs will grow. By having multiple researchers evaluate these new and existing CAPs, results will have much more comprehensive data. Along with this quantitative study, future researchers should interview city officials to see what these officials believe in terms of CAP effectiveness in meeting the city's goals. This qualitative study would nicely complement the statistics. In addition, any future study should aim to find cities that have success outside the buildings and energy, urban mobility, and consumption and waste realms in order to better support cities in moving towards holistic action.

Appendix

Part I: Climate Action Plan Data by City

Appendix 1. Local climate change plan quality across jurisdictions.

Jurisdictions	State	Total quality	Awareness	Analysis	Actions
Austin	TX	5.35	3.75	0.83	0.77
Santa Cruz	CA	6.54	2.50	2.50	1.54
Evanston	IL	6.83	3.75	0.00	3.08
Maplewood	NJ	7.21	6.25	0.00	0.96
Fort Collins	CO	7.82	5.00	1.67	1.15
Portland	ME	8.56	3.75	2.50	2.31
Chapel Hill	NC	8.75	6.25	2.50	0.00
Miami-Dade County	FL	9.13	8.75	0.00	0.38
Montgomery County	MD	10.58	5.00	2.50	3.08
Salt Lake City	UT	11.83	8.75	0.00	3.08
Jefferson County	WA	12.08	3.75	8.33	0.00
Davis	CA	12.24	5.00	6.67	0.58
Benicia	CA	13.30	6.25	6.67	0.38
Boston	MA	15.06	7.50	3.33	4.23
Menlo Park	CA	15.83	7.50	8.33	0.00
Somerville	MA	16.51	8.75	3.33	4.42
Seattle	WA	16.70	8.75	3.33	4.62
Charleston	SC	17.47	8.75	5.83	2.88
Homer	AK	17.60	8.75	2.50	6.35
Marin County	CA	18.43	8.75	5.83	3.85
Aspen	CO	19.01	8.75	5.83	4.42
Anacortes	WA	19.29	7.50	8.33	3.46
Duluth	MN	19.87	7.50	8.33	4.04
Brattleboro	VT	20.16	8.75	5.83	5.58
Pittsburgh	PA	20.16	8.75	5.83	5.58
Durham	NC	20.38	7.50	7.50	5.38
Sonoma County	CA	20.61	8.75	6.67	5.19
Worcester	MA	20.74	8.75	5.83	6.15
San Diego	CA	21.25	8.75	7.50	5.00
Philadelphia	PA	22.08	8.75	8.33	5.00
Denver	CO	22.28	8.75	8.33	5.19
San Francisco	CA	23.24	8.75	8.33	6.15
Boulder	CO	23.59	10.00	6.67	6.92
Portland	OR	23.62	8.75	8.33	6.54
Alameda	CA	24.29	10.00	8.33	5.96
Keene	NH	25.26	10.00	8.33	6.92
Madison	WI	25.64	10.00	8.33	7.31
Berkeley	CA	25.90	10.00	9.17	6.73
Bellingham	WA	26.54	10.00	10.00	6.54
King County	WA	28.65	10.00	10.00	8.65

The maximum score for total plan quality is 30.00. The maximum score for each plan component of awareness, analysis and action is 10.00.

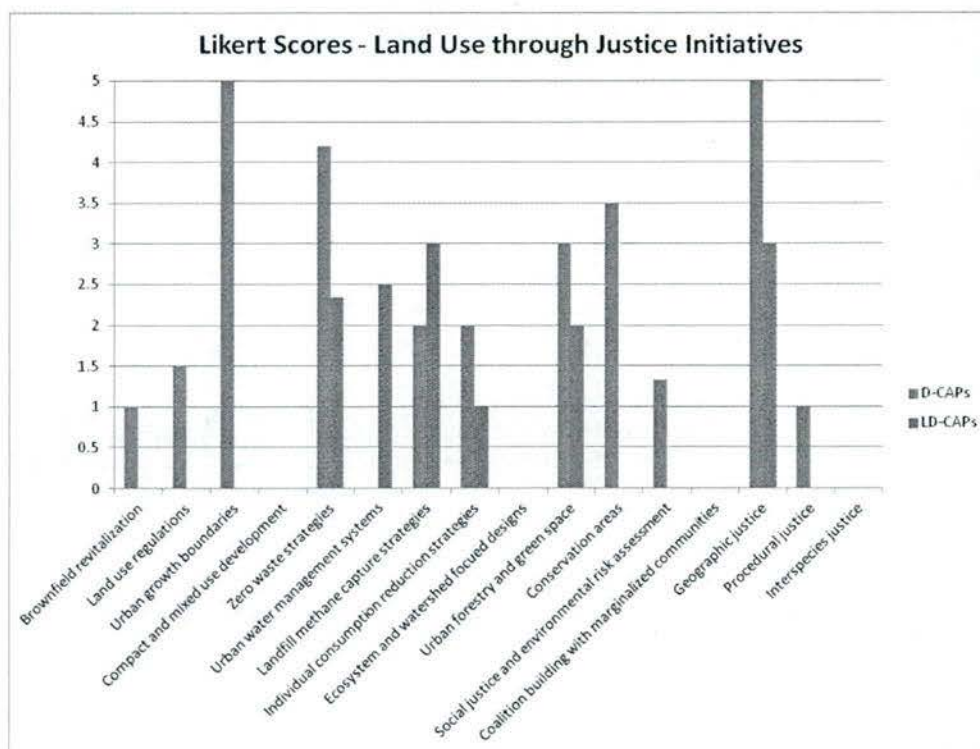
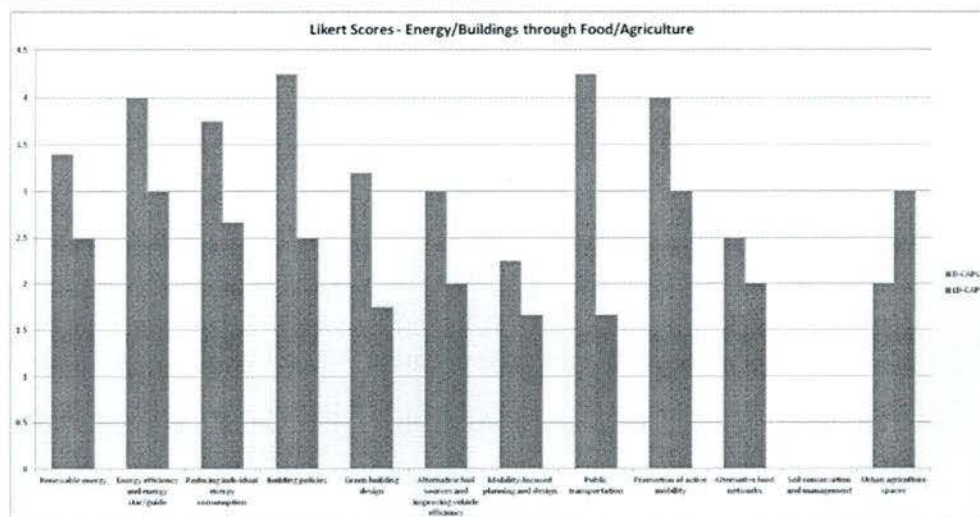
(Tang et al. 2010)

Part II: Climate Action Plan Data by City

The following nine figures give a detailed report of each city's actions as a sum total, the sustainability score, within each categorical element, and in each sector. The following figures also differentiate between proposed actions in the CAPs (PA) and actions described in the CAPs' progress reports (PR).

[illegible]

Part III: Specific Climate Action Plan Data by Sustainability Score



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