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How Are American Cities Planning for Climate Change? An Evaluation of Climate Action Planning in Chicago, IL and Portland, OR

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How Are American Cities Planning for Climate Change?
An Evaluation of Climate Action Planning in Chicago, IL and Portland, OR

A Thesis

Submitted to the Graduate Faculty of the
University of New Orleans
in partial fulfillment of the
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Master of Urban and Regional Planning

by

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B.A. Tulane University, 2005

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Abstract

Contending with a changing climate presents a necessary push for planning. Although climate change is considered a global environmental problem requiring a global commitment and trans-national action, more and more, policymakers are recognizing the vital need for action at the local level. In the US, especially in the absence of national climate legislation, many local governments have begun developing strategic plans, or climate action plans (CAPs), to address adapting to impacts of climate change and mitigating greenhouse gas emissions. This thesis involves case studies of Portland, OR and Chicago, IL, cities with recently adopted CAPs and with considerable recognition in the field. The analysis involves an evaluation each city's CAP and an evaluation of its implementation. The studies help elicit an understanding of the measures cities are employing to mitigate climate change and determine ways the planning profession can better assist communities in climate policy development and its prompt implementation.

Keywords: climate change mitigation; climate action plan; Chicago Climate Action Plan; Portland and Multnomah County Climate Action Plan

1. Introduction

The twenty-first century will present a multitude of challenges for urban planners in the United States. Among those challenges, and perhaps the most bewildering, will be contending with a changing climate. Today, there is evidence that we are already experiencing climatic changes across the globe, and scientists predict that future impacts as a result of global warming will be even greater if greenhouse gas emissions continue at or above current rates (IPCC, 2007a). Climate change affects both natural and human systems and “what is at risk of being destroyed is not the Earth itself, but the conditions that have made it hospitable for human beings” (Gore, 2009).

The planning profession in America has evolved responding to the crises of the times (Wheeler, 2011). Through organizing and activism, planners have guided development to provide for the welfare needs of communities. Planning for climate change is no different, but it adds a new dimension to the role of an urban planner. As Wheeler (2011) notes, “muddling through in a generally desirable direction is no longer enough” (p.18). The complexity and uncertainty of the issue calls for planners to acquire new tools and training to better assess climatic vulnerability and to choose the most appropriate policy responses to better equip communities to changing physical and societal conditions. Finally, the urgency of the issue, the fact that we need to greatly reduce our greenhouse gas emissions levels immediately in order to mitigate severe changes, means that planners must be ever more proactive, creative, and engaging.

Although climate change is a global environmental problem requiring a global commitment and trans-national action, more and more, policy-makers are recognizing the vital need for local action in solving the global crisis (Betsill and Bulkeley, 2007). Much of the recent academic research on climate policy champions the local level as the site of climate change governance and highlights the recent successes of cities in this pursuit (Betsill, 2001; Betsill and Bulkeley, 2007; Dolan et al., 2010; Kousky and Schneider, 2003; Lutsey and Sperling, 2007; Tang et al., 2010).

Today, more than half of the world’s population resides in urban areas (United Nations Population Division, 2012), and these urban populations are the primary consumers of energy (i.e., fossil fuels) contributing to the climate dilemma. According to the UN-Habitat’s *Cities and Climate Change: Global Report on Human Settlements* (2011), the world’s cities make up two percent of the Earth’s land mass, but are responsible for up to 70 percent of the harmful anthropogenic greenhouse gases. Precisely because of the size of their contribution to global warming, cities must set the stage for a policy overhaul that significantly curbs greenhouse gas emissions and mitigates climate change.

Cities must rethink their habits and processes that are contributing to global warming. Fortunately, however, cities are able to achieve efficiencies that can have a profound effect on mitigation efforts (UN-Habitat, 2011). Municipal governments, through policy choice, have the authority to affect behavioral decisions that contribute to the main sources of greenhouse gas emissions such as energy usage, transportation decisions, and waste generation (ICLEI, n.d.). Nation states will not be able to meet the reduction targets they have negotiated at international conventions without the support of policy action at sub-national levels including states, regions, and cities (Betsill and Bulkeley, 2007).

Especially in the United States, where federal climate change policy has been lagging (Drummond, 2010), city and state governments must assume leadership in directing effective policies toward mitigation and adaptation. Accordingly, many states and cities have risen to the challenge in recent years by enacting local climate change legislation (Cohen and Miller, 2012; Lutsey and Sperling, 2008). Referring to the pace of recent local action towards climate change, Cohen and Miller (2012) note that these trends could help provide an alternate route to climate mitigation apart from international treaties and national legislation.

Many cities across the United States have or are beginning to develop climate change-related policies. One recent trend in particular in cities is the preparation of climate action plans (CAPs) which include a collection of measures to reduce greenhouse gas emissions as well as measures that prepare communities for changing climatic conditions. By the end of 2009, there were over 200 US municipalities that had or were in the process of adopting climate-related plans including climate action plans and sustainability plans (ICLEI, 2009). This type of planning and policy development is relatively new, so most local plans that have been adopted to date were only just completed in the past decade (Pitt, 2010). Similarly, research addressing climate change as a planning problem and critically viewing the new climate action planning typology is only just beginning to take form.

This thesis evaluates recently adopted local CAPs in order to elicit a better understanding of the policies and measures cities are employing to mitigate climate change. In particular, this thesis examines climate policies directed towards the built environment (i.e., transportation, land use, and energy efficiency measures in buildings), a field where, traditionally, urban planners have had influence. Additionally, this thesis aims to determine whether or not these CAPs and their component policies are being implemented to the degree that is necessary to stave off serious climatic changes. In assessing the implementation of CAPs, this thesis seeks to determine ways the planning profession can better assist communities in climate policy development and its prompt implementation.

This thesis evaluates local climate action planning and the role of the urban planner in the process. It begins with **Chapter 2**, consisting of background research into the issue of climate change: the problem, the projected impacts, and the policy action proposed by climate scientists. Next, **Chapter 3** reviews climate action planning-related literature, examining the recent development of climate change planning at the local level and addressing broad questions on the topic. In general, how are American cities planning for climate change? Have recent climate action planning efforts of municipalities been effective? Are the actions sufficient in reducing greenhouse gases or are more or different actions needed? Finally, what is the role of the planning profession in these efforts? **Chapter 4** explains the methods used to address the research questions, and details the case study design and protocol used to evaluate the climate action planning efforts of Chicago, IL and Portland, OR.

In order to address narrower questions regarding the climate action planning subject, this thesis employs a case study analysis which examines the experiences of climate action planning in two American cities. The case cities are Chicago, Illinois, and Portland, Oregon. These cities were chosen because they have been active in creating climate change related policies in the past decade and may serve as models of best practices. Each city has also monitored the progress of their mitigation efforts with published annual progress reports. Analyzing the content of each case city's climate action plan and the success of its implementation, the case studies address the following research questions:

RQ1. What policy measures are outlined in the case cities' CAPs?

- How do the measures target built environment goals, in other words, how do the policies relate to transportation, land use, and buildings?
- Do policy responses vary among cities or are they similar in their approach to lowering greenhouse gas emissions?

RQ2. Are climate actions being implemented?

- To what degree are actions being implemented?
- How are the case cities monitoring and evaluating progress?
- Are the case cities meeting their mitigation goals?

RQ3. How has the planning profession been involved in both the design and implementation of climate action plans?

Chapter 5 reports findings from the Chicago and Portland case studies including a content analysis of each city's CAP and a plan implementation analysis that evaluates the success of climate policy measures. **Chapter 6** provides concluding remarks, recommendations for planning professionals, and implications for future climate action planning efforts in other municipalities.

2. Background

The Problem of Climate Change

Average global temperatures are increasing and have been increasing at significantly faster rates than in the past (Crane and Landis, 2010). The Intergovernmental Panel on Climate Change (IPCC) asserts that it is very likely that the temperatures observed in the latter half of the 20th century are the highest of any other 50 year time period within the past 500 years (IPCC, 2007a). In fact, the top 10 warmest years on record since 1880 occurred between 1990 and 2010 (NOAA, 2011) suggesting that there is no subsiding of the warming trend in the near future. It now appears that 2012 will be included in the top ten warmest years on record and could potentially be the warmest yet, given how warm 2012 has been thus far (NOAA, 2012). The month of May in 2012 was the warmest of any of that month recorded in US history (NOAA, 2012). Table 1 below reveals that the past ten years have had some of the highest ranking average annual temperatures since 1880 with 2005 and 2010 tied for the warmest.

Table 1. High Ranking Annual Temperature: Years 2002-2011		
21st Century Year	Rank 1880-2011	Anomaly °F
2011	11	0.92
2010	1 (tie)	1.15
2009	7 (tie)	1.04
2008	13	0.9
2007	7 (tie)	1.04
2006	6	1.06
2005	1 (tie)	1.15
2004	9	1.01
2003	4	1.1
2002	5	1.08
Source: NOAA State of the Climate Global Analysis 2011		

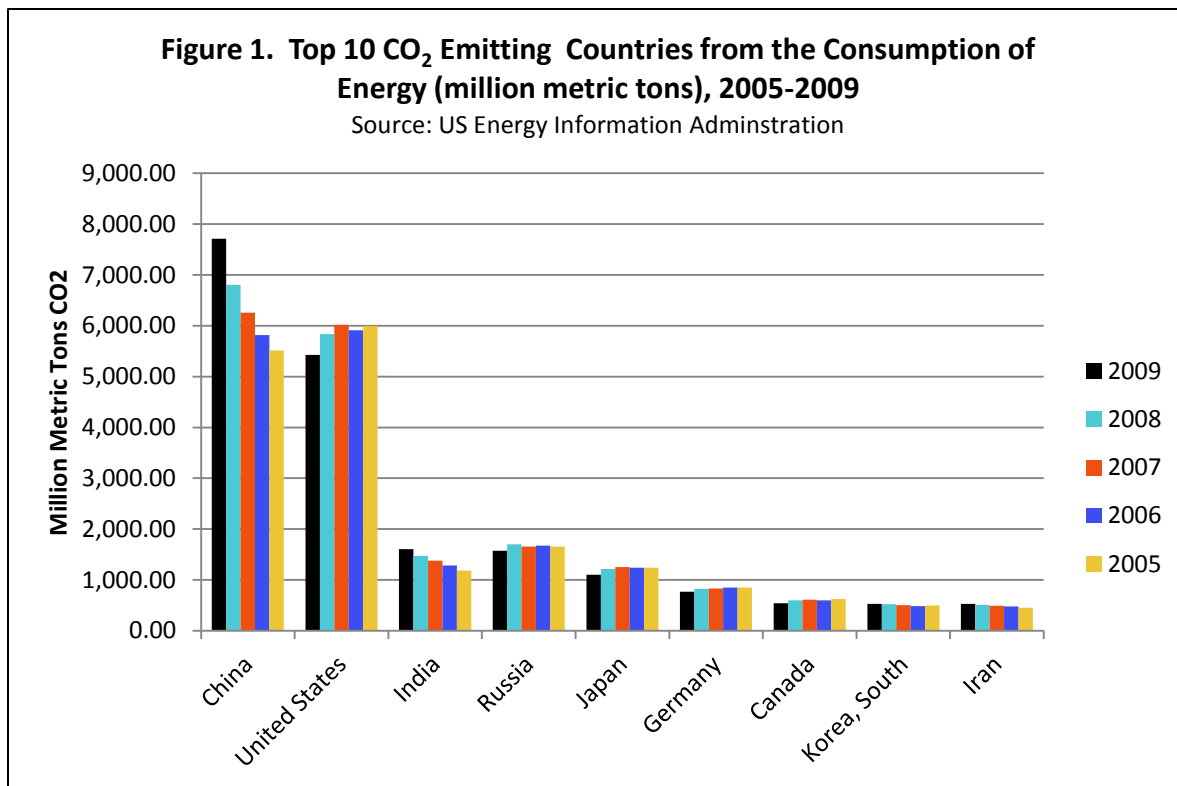
Global warming is not occurring as a result of natural phenomena but as a result of human actions and lifestyles which have increased concentrations of greenhouse gases in the atmosphere (IPCC, 2007c). There is now scientific consensus regarding this matter (Oreskes, 2004). The increase in greenhouse gas accumulations observed since the beginning of the industrial era can be attributed primarily to an increased reliance on fossil fuels such as coal, oil, and natural gas, which when burned emit

carbon dioxide (CO₂), the most important anthropogenic greenhouse gas because of its great contribution to the enhanced greenhouse effect (IPCC, 2007c). Other greenhouse gases driving climate change, but at lower proportions, include nitrous oxide, methane, and man-made greenhouse gases such as chlorofluorocarbons, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride (NOAA, n.d.).

Global warming brings about various climatic changes including the melting of glaciers, rising sea levels, more frequent heat waves and periods of drought, and more intense tropical storms, among many others (IPCC, 2007b). If greenhouse gas emissions continue to increase, this will “induce many changes in the global climate system during the 21st century” (IPCC, 2007a). Climate change will impact natural and human systems and the impacts can be expected to intensify with increasing average temperatures (IPCC, 2007c). At risk and vulnerable are a number of important climate-sensitive systems such as food supply, infrastructure, public health, coastal systems, and ecosystems. Some impacts noted by the IPCC in their *Fourth Assessment Report* include: increased water stress and reduced water availability in certain regions; increased damage from floods and storms in coastal areas; increased risk of heat-related mortality; and reduced agricultural yields in warmer regions due to heat stress (IPCC, 2007b). These are only a few of many predicted impacts. These impacts will impose costs on societies that will only increase as global temperatures increase over time (IPCC, 2007b).

Climate change is expected to affect regions differently as a result of varied geographies, but also due to the adaptive capacity of each region, or their ability to endure changes. Adaptive capacity is directly related to social and economic advantage and is “unevenly distributed across and within societies” (IPCC, 2007c). Vulnerable populations and regions exist within both developed and developing societies, and as the IPCC asserts, “even societies with high adaptive capacity remain vulnerable to climate change variability and extremes” (IPCC, 2007c).

Just as certain regions will be affected unevenly by climate change, the contribution towards total greenhouse gas concentrations is disproportionate. A relatively small number of countries have contributed the most to global greenhouse gas levels. These countries are the most populous and have the largest economies (Baumert et al., 2005). The top 25 emitting countries today have contributed 90 percent of total past cumulative global emissions (Baumert et al., 2005). The United States was the number one emitter of greenhouse gases per year until 2007 but still is the number one greatest contributor to cumulative greenhouse gas emissions (Sperling and Gordon, 2009).



In order to stabilize the climate, policy discussions at the international and domestic levels have been focused recently on limiting global average temperatures to 2 °C above pre-industrial levels (Zickfeld et al., 2008). To reach this limit would require intense mitigation efforts in order to reduce, delay, or avoid climatic impacts. For the US this means that greenhouse gas emissions must be lowered by 60 to 80 percent below 1990 levels by 2050 (Ewing et al., 2009). The IPCC stresses the importance of acting quickly noting that delaying emissions reductions only will hinder chances to stabilize temperatures; it may also increase the risk of more severe climatic changes (IPCC, 2007c). Especially as the demand for energy continues to rise as urban populations grow (IPCC, 2011), mitigation efforts must be robust and coordinated at all sectors both private and public in order to achieve the necessary 60 to 80 percent emissions reductions urged by scientists. Mitigation measures have to address the source of energy (i.e., fossil fuels) and focus on de-carbonizing the global energy mix.

The Challenge for Planners

The field of urban planning has a role to play in preparing communities to adapt to as well as mitigate climate change. But planners may face many challenges in confronting the issue. First, the issue presents a technical challenge. Planners will be required to evaluate and obtain different types of data than is typical. They may have to acquire a better understanding of climate science as well as natural sciences in order to fully understand the concept and communicate these findings to constituents (Bassett

and Shandas, 2010). It will become important that planners, along with local government officials, assess the climate impact of different development decisions. That may require that planners be able to incorporate greenhouse gas emissions analyses into the benefit/cost assessments of development options. Many also recognize that a high quality greenhouse gas assessment includes a lifecycle analysis which considers both the upstream and downstream emissions associated with the end product (Meyer, 2010). In sum, greenhouse gas emissions analyses will require planners to assess a broader range of cost and benefits (Meyer, 2010).

The second major challenge of climate change will be dealing with uncertainty. Although there is scientific consensus that the planet is warming as a result of human activity, the magnitude of the effects are yet to be known. It is difficult to assess the impacts of present mitigation measures, whether they are sufficient or lacking, because as Crane and Landis (2010) note, “the range of possible solutions cannot be tested in an experiment or before the fact, and can only be evaluated in retrospect” (p.389). This will make continual monitoring and policy evaluation key.

Besides uncertainty surrounding the extent of risk and impact of global warming, planners will also have to contend with an uncertain or disbelieving public, as well as reluctant elected officials. The Brookings Institute has put together a biannual National Survey of Public Opinion on Climate Change since the fall of 2008 tracking public belief in global warming (Borick and Rabe, 2012). In 2008, 72 percent of Americans believed the earth was warming. But in 2010, the survey found that the percentage dropped to 52 percent, only about half of the population. It will be difficult for planners to engage local leaders and community members and rally support if half of the population does not see the value of prioritizing climate action. The 2012 results, however, show that 65 percent of Americans believe in climate change (Borick and Rabe, 2012). This rebound could be related to the observed weather events of 2011 which included drought in several parts of the country and unusually heavy storm activity in the Northeast (Kuipers, 2012). The decision to take aggressive climate change measures depends on the willingness to live with uncertainty about the future (Crane and Landis, 2010).

Some researchers attribute the large percentage of public disbelief to the fundamental difference between how the scientific discipline and the journalistic discipline are taught to communicate (Boykoff and Boykoff, 2004). The journalistic tendency of balance, or telling both sides of the story, “is problematic in practice when discussing the human contribution to global warming” and hinders “meaningful, accurate, and urgent coverage of the issue” (Boykoff and Boykoff, 2004, p.134). A study by Boykoff and Boykoff (2004) examining the prevalence of balance in communicating climate change shows that in a random sample of over 340 news articles related to global warming from four major US newspapers, *The Los Angeles Times*, *The Washington Post*, *The New York Times* and *The Wall Street Journal*, about

53 percent of articles displayed balanced accounts of the causes of global warming. In other words, the articles gave equal attention to the two opposing sides, one side attributing global warming to human induced factors and the other side attributing global warming to natural forces (Boykoff and Boykoff, 2004). Scientific literature, on the other hand, overwhelmingly supports the notion of anthropogenic climate change (Weaver presentation, citing Anderegg et al., 2010). As the general public receives most of its information on climate change from mass media, the disconnect between science and journalism presents a considerable problem. Since much of the public is misinformed on the actual situation, serious climate action has been stifled (Weaver presentation, 2012).

In order to implement policies that are truly effective in mitigating climate change, planners must engage the support of community members, especially if greenhouse gas reduction measures are participatory and not mandatory. If only half of a community's constituents believe climate change is a real concern, then climate policies will not likely be prioritized by public officials, and any mitigation measures that are enacted are likely to have little influence on the substantial emissions reductions which are needed. Campaigning for prompt climate policy action will be a challenge for planners working with a constituency as well as a local government that do not view climate change as an immediate crisis.

Using climate models at the University of Victoria, Weaver et al. (2007) attempted to estimate the climatic consequences of the various greenhouse gas emissions reduction targets proposed internationally ranging from no reductions at all to 100 percent reductions from 2006 levels. All reduction scenarios, despite the large differences between them, point to a similar increase in temperature: a warming by 2050 between 1.5 degrees and 1.8 degrees Celsius (Weaver et al., 2007). Differences among the scenarios only begin to show at the end of the 21st century and into the 22nd century when mean temperatures greatly increase for the minimal reduction scenarios and taper off for the greater reduction scenarios. However, as the authors note, "even if emissions are stabilized at 90 percent below 2006 levels globally, the 2 degree threshold will be broken well before 2500" (Weaver et al., 2007). This indicates that carbon neutrality, or having a net zero carbon footprint, is the only viable policy option to avert serious temperature changes (Weaver, presentation, 2012).

Thus the challenge in the United States is great and involves rapidly transforming an entrenched economy and society dependent on fossil fuels for their livelihood, sustenance, and prosperity. Transformative decisions and policy changes will be required. Planners can play a part in affecting policy changes by "developing new models, building coalitions, changing incentives, and posing sustainable alternatives and visions for the public" (Wheeler, 2011, p. 24).

The concept of planning for climate change gained momentum at the international level at the Earth Summit in Rio de Janeiro in 1992 where representative nations signed the United Nations Framework Convention on Climate Change treaty (Bulkeley and Betsill, 2003). The establishment of the Convention led to the creation of the Kyoto Protocol in 1998, another international agreement which was meant to strengthen governmental action against global warming and legally bind signatories to greenhouse gas emissions reduction targets, seven percent below 1990 levels by 2012 (United Nations Framework Convention on Climate Change). More recently since the release of IPCC's *Fourth Assessment Report* in 2007, addressing global warming has become a top priority of political agendas around the world (Weaver et al., 2007).

Many critique, however, that there is too much emphasis on an international response to global warming when solutions could be better handled by local governance (Betsill, 2001). Nations will not be able to reach the target greenhouse gas emissions reductions without local initiatives and local policy action (Betsill, 2001). Local jurisdictions have the power to affect the many behavioral decisions that contribute to the main sources of greenhouse gas emissions such as energy use, land development, transportation mode choice, and waste generation (Tang et al., 2010). At the same time as global negotiations were initiated in the late 1990s, at the sub-national level, cities and states were also taking strides to reduce greenhouse gas emissions. The former International Council of Local Environmental Initiatives (ICLEI), a policy entrepreneur in the field of climate action planning that provides local governments with methodologies and protocols for tracking greenhouse gas emissions, initiated the Climate Protection Campaign in 1993 and enlisted local governments across the US to set targets and implement greenhouse gas reduction strategies (Center for Climate and Energy Solutions, 2011). Today there are more than 600 local governments pledged to the campaign (Center for Climate and Energy Solutions, 2011). In 2005, in response to the failure of the US to ratify the Kyoto Protocol, the mayor of Seattle spearheaded an initiative, the US Conference of Mayors Climate Protection Agreement, where local leaders made a similar pledge as the Kyoto Protocol, to achieve a seven percent reduction from 1990 emissions levels by 2012 (Center for Climate and Energy Solutions, 2011). Well over 1000 mayors have signed the agreement to date (Center for Climate and Energy Solutions, 2011). And so, in the past decade, despite the absence of climate policy at the federal level, policy makers including planners and elected officials have adopted policies to mitigate global warming (Drummond, 2010). As Lutsey and Sperling (2008) note, "the balance of environmental federalism has shifted decidedly toward lower-level government action on climate change policy" (p. 673).

3. Literature Review

This chapter is a literature review that looks into recent studies examining the development of climate action planning at the local level. The purpose of the literature review is to address the following questions:

- How are American cities planning for climate change?
- Have recent climate action planning efforts by municipalities been effective?
- Are the actions sufficient in reducing greenhouse gases or are more or different actions needed?
- What is the role of the planning profession in these efforts?

Climate Action Planning Research

Planning for climate change is an emergent topic in the planning field, and so corresponding research is also fairly recent and not yet as extensive as within other subjects. According to Bassett and Shandas (2010), even “planning scholars have paid little attention to climate change as a planning problem” (p. 436). Only recently has climate change become a concern of planning academics and of the profession. Wheeler (2011) also notes that the topic of global warming was addressed once in the *Journal of the American Planning Association* in the 1990s. It then disappeared and did not reappear until the mid-2000s. Literature that focuses particularly on the climate action plan (CAP) as a planning document and on the experiences of American communities in adopting and implementing climate policies has only recently been initiated, perhaps mirroring the trend in local climate action. This makes the research that is available ever more significant and valuable. Fortunately, as the pace of climate change planning is accelerating so is the research based on this type of planning (Wheeler, 2008).

Research related to climate action planning addresses several questions. Research has examined recent climate action planning efforts with the intention to learn from past experiences (Wheeler, 2008). Studies have attempted to understand the motivation behind climate action at the local level and the obstacles that communities face in the process of planning (Burch, 2010). Some research asks what is driving American communities to plan, especially given the absence of any comprehensive federal strategies (Zahran et al., 2008; Kousky and Schneider, 2003). Others studies attempt to find out if the policy actions adopted are sufficient in reducing greenhouse gas emissions or if more or different actions are needed (Drummond, 2010, Wheeler, 2008).

How are American Cities Planning for Climate Change?

It is a puzzle to many researchers that localities would tackle climate change policy considering the scale of the issue. Minimizing emissions locally will not lessen local impacts since the greenhouse gas effect and resultant climate change are bound within a global dimension. Climate change is a classic example of a global commons problem, or “tragedy,” where the Earth’s atmosphere is the global common pool resource (Hardin, 1968). While collectively there is a desire to preserve the commons, it is economically irrational to do so as an individual because it does not benefit the individual to preserve the commons when everyone else is exhausting it (Engel and Saleska, 2005). And thus it becomes difficult to break the habits that result in greenhouse gas emissions because there is no incentive for an individual party not to pollute. Only the presence of an “enforceable collective agreement” could disrupt the destruction of the commons (Engel and Saleska, 2005, p. 187). Because of the diverse array of actors and institutions involved, creating an enforceable collective agreement at the global scale is much more difficult and nuanced (Dolsak, 2009).

There has been no establishment of an enforceable agreement in the United States (Zahran et al., 2008). Cohen and Miller (2012) attribute the growing partisan divide in Congress to the hindrance of any effort to pass national climate policy in 2011. Since it is an election year, they also predict similar inaction will mark 2012, especially because climate change has become an ideological issue, one differentiating Democrats and Republicans (Cohen and Miller, 2012). In the absence of a federal mandate or any significant legislation, regional governments that have implemented climate change policies have done so based on the voluntary will of community members and local leaders.

Some hypothesize that this decision at the local level may be influenced by the perceived risk a city may face due to their geography (Zahran et al., 2008). Kousky and Schneider (2003), in a study on cities and global climate policy, also found that cities were driven to adopt climate mitigation policies in large part because of the “co-benefits” of climate policies unrelated to greenhouse gas emissions reductions, such as cost savings from energy efficiency measures. Similarly, Betsill (2001) found that emissions reduction policies are “motivated by the recognition that these activities contribute to other objectives” such as improving air quality or providing more infrastructure for walking or alternative forms of transportation (p. 402). Climate change policies are more likely to be accepted when they addresses concerns on the local agenda. To motivate cities to address global climate change, the issue must be framed as a local issue rather than a global one, using the “think locally, act locally” strategy (Betsill, 2001, p. 404).

Recently, US cities have begun producing planning documents specifically focused on climate change which include an assortment of different measures to address mitigation as well as adaptation. A few studies have attempted to analyze the characteristics and content of CAPs (Wheeler, 2008; Bassett and Shandas, 2010; Boswell et al., 2010), while some attempt to evaluate the effectiveness of such plans upon implementation (Millard-Ball, 2012; Drummond, 2010).

Most CAPs consist of a baseline inventory of greenhouse gas emissions from which to set a reduction target and to measure progress and implementation (Boswell et al., 2010). Other common components of CAPs include a forecast of emissions under business as usual, a target percentage of greenhouse gas reductions to reach by a year in the future, and a set of policy measures they intend to implement to achieve the reduction goal (Drummond, 2010). Yet, “there is no established path for approaching climate action planning” (Bassett and Shandas, 2010, p. 442).

Wheeler (2008) examined 25 state CAPs as well as 35 municipal CAPs of cities with both large and small populations. He found plans to vary in form, from extensive to succinct and from elaborate to simple (Wheeler, 2008). Extending Wheeler’s (2008) research, Bassett and Shandas (2010) analyzed the content of local climate action plans, focusing on the planning process and the policies. They noted that many cities modeled their plans on those of other communities and many consulted ICLEI (Bassett and Shandas, 2010). Nonetheless, the authors also noticed variance among plans. Many localities framed policies in a specific way to receive political acceptance, tying local issues to global climate change. And in many cases the major actors pushing climate action in cities were mayors and elected officials (Bassett and Shandas, 2010).

Most plans began by setting an emissions reduction target—that is a percentage reduction to achieve by a certain future date. Most states and cities set reduction targets similar to those outlined in the Kyoto Protocol which is a 7% reduction from 1990 levels by 2012 (Wheeler, 2008). This may allude to the importance of international negotiations in setting standards for sub-national governments to replicate. Other cities were found to set targets less than the Kyoto Protocol for the short term, but much more ambitious reduction targets for the long term (Wheeler, 2008). One of the key targets emerging in policy discussions is a reduction by the year 2050 (Weaver et al., 2007). Boswell et al. (2010) critique that a third of communities surveyed in their study adopted reduction targets but did not take into account how future growth and change would affect their ability to achieve them.

An emissions inventory and the use of statistics help to define the local environmental problem and provide an anchor for the CAP and its component policies (Rutland and Aylett, 2008). Without inventories, target reductions would be baseless. Boswell et al. studied CAPs to find out how emissions inventories inform policy

decisions like the reduction target, for example. They noticed that very few plans adequately documented data and assumptions used in estimating emissions (Boswell et al., 2010). For some sources of greenhouse gas emissions it is near impossible to acquire an exact measurement, such is the case with personal vehicle use, (Boswell et al., 2010), and so estimations are made using assumptions and simplification. Boswell et al. (2010) stress the importance of having assumptions be transparent and well documented in plans as climate policies are based upon these estimations. Clear communication of data also enables cities to track progress over time (Boswell et al., 2010).

CAP policy actions include changes to both the built and natural environment (Bassett and Shandas, 2010). Plans address a broad range of sectors such as energy, transportation, land use, buildings, industry, and agriculture (Wheeler, 2008). Most policies are participatory policies while some are mandatory (Rutland and Aylett, 2008). Many states and cities establish renewable energy portfolio standards for utilities, but with little consistency in regards to the proportion of energy required by renewable sources (Wheeler, 2008). Concerning buildings, many cities address energy efficiency measures and some commit to requiring LEED certification of government buildings. Many CAPs also outline provisions for expanding recycling programs.

CAPs also include measures that increase the use of alternative fuels and fuel efficient vehicles to reduce vehicle emissions (Wheeler, 2008). At the federal and state levels climate policies directed toward the transportation sector have focused almost exclusively on technological advances in vehicles and fuels (Ewing et al., 2009). Many cities recognize that to achieve emissions reductions in the transportation sector it is essential to reduce vehicle miles traveled (Ewing et al., 2009). And so, many CAPs outline smart growth land use policies to reduce transportation emissions (Wheeler, 2008). Adaptation measures will also be necessary in order to adapt the impacts that are already unavoidable (IPCC, 2007b). However, most of the plans examined by Wheeler (2008) and Bassett and Shandas (2010) were found to avoid adaptation and deal only with the mitigation of emissions.

Some climate plans only address reducing emissions from the operations of the municipal government, or corporate emissions (e.g., municipal buildings, street lighting, the city fleet, etc.) (Rutland and Aylett, 2008). Creating policies which affect the entire community including residential, commercial, and industrial sectors becomes a much greater challenge for the local government as the bulk of the emissions reductions lies outside of their direct control. The challenge is to change the behavior of the city's constituents "while still governing in a broadly democratic manner and without taking unacceptable political risks" (Rutland and Aylett, 2008, p. 638). The task requires planners and policy makers to be careful of how they frame their messages, making sure their goals are communicated in a way to encourage support and acceptance.

Some critique local climate policy to date for failing to address strategies that appear necessary to reduce greenhouse gas emissions, such as changing the economics of vehicle use and implementing carbon taxes (Wheeler, 2011). Climate plans are often “hamstrung by questionable political commitment, public understanding, and resource availability” in part because it is not “politically viable” to address the fundamental drivers of global climate change (i.e., population, consumption, technology, and equity) (Wheeler, 2011, p. 23).

Have Recent Climate Action Planning Efforts Been Effective?

Research on the subject of climate action planning also aims to assess the effectiveness of plans in achieving climate mitigation goals. Are the current planning actions enough to reach the longer term goals of climate stabilization? Some say that present research is focused too much on analyzing plan documents when what is needed is more analysis regarding the impacts of plans (Millard-Ball, 2011). According to Millard-Ball (2012) the majority of the research on climate action planning is qualitative and “has yet to provide generalizable conclusions regarding the effectiveness of local climate change policies” (p. 6). When studying effectiveness, however, it is difficult to determine the causal contribution of the climate plan (Millard-Ball, 2012). Millard-Ball’s (2012) research attempted to explain the impacts of climate planning quantitatively, not by examining greenhouse gas emissions, but by looking to see if climate planning affects the implementation of eight different policy outputs (e.g., the number of LEED certified building projects, the commute mode share by single-occupant vehicle, etc.). Results show no statistically significant evidence that climate plans impact the implementation of emissions reduction policies, but cities with climate plans did in fact implement more strategies overall to reduce greenhouse gas emissions than cities without (Millard-Ball, 2012). A stronger correlation is found between the implementation of greenhouse gas emissions reduction policies and residents’ environmental preferences, thus implying that environmental preferences seem more of a deciding factor in taking action than do climate action plans themselves (Millard-Ball, 2012).

Another study looking at the effects of climate action planning (Drummond, 2010) assessed whether or not state-level plans have been successful in reducing emissions. Drummond (2010) compares the *actual* outcomes of plans to the *intended* outcomes of plans. While he did not find that plans were the actual cause of emissions reductions, he did find that taking climate action at the state level resulted in “modest but measurable” reductions in greenhouse gas emissions (Drummond, 2010). However, these reductions seem quite small compared to reductions needed to stabilize global warming (Drummond, 2010). This finding reinforces research that contends that stronger and more aggressive policies are needed to mitigate climate change.

Wheeler (2008) found that despite the urgency of climate change mitigation, progress was slow among the regions surveyed and implementation was a problem. Many did not have adequate funding to complete measures, and as a result, no state was meeting target reduction goals (Wheeler, 2008). Not only were states and cities short of meeting reduction goals, these goals, according to Wheeler (2008), are still too low to put the regions on track toward meeting longer term goals of 60 to 80 percent reductions by 2050 (Wheeler, 2008). Most cities who adopt reduction targets seemed to be influenced by the Conference of Mayors Agreement which adopted the Kyoto reduction goal. The Kyoto goal, however, is “based on political feasibility rather than scientific necessity” (Wheeler, 2008, p. 486). Therefore, cities and states must adopt stronger measures and greater near term goals if they wish to stabilize levels of warming (Wheeler, 2008).

Setting goals and targets is one thing, but it is also important that the potential and actual emissions reductions be quantified to assess whether or not targets can truly be reached (Boswell et al., 2010). Very few cities have evaluated CAP actions since adoption and few have issued progress reports (Wheeler, 2008). Wheeler (2008) notes that this is typically the case with planning but in the case of climate change planning, evaluation is necessary considering the limited time available to mitigate severe impacts.

Many share the same opinion that future policies must be more aggressive. The major recommendation among researchers is to set greater greenhouse gas emissions reduction targets and initiate stronger measures that will help to achieve the emissions reductions needed (Drummond, 2010; Wheeler, 2008). Therefore, what remains for future research is an inquiry into the specific measures necessary to substantially reduce greenhouse gas emissions, as well as the optimal governance structures to implement and enforce reduction policies. Perhaps the most effective actions involve a mixture of policies tailored to the particular conditions of communities (e.g., their energy consumption characteristics and the resources available for use as non-fossil fuel energy alternatives). On the other hand, the most effective actions could involve broader systemic changes and may require the authority of higher levels of government in addition to the coordination among key economic sectors.

How Should the Planning Profession Take Part in Preparing Communities for Climate Change?

Research on local climate action planning to date attempts to reveal the motivating factors behind it, impediments to its fulfillment, and also the effectiveness of climate policies already put in place. Research overwhelmingly shows that while climate planning has become a more prominent endeavor among American cities in recent years, so far the results of planning seem to be insufficient in mitigating the

climate crisis. While several local communities have made an initial effort by becoming members of ICLEI and joining the Cities for Climate Protection Campaign, the majority are still in the very early stages of the climate planning process (Pitt, 2010). A little over a fourth of ICLEI member cities have drafted CAPs, but only about a fourth of those with plans have actually implemented half or more of their policy measures (ICLEI, 2010). According to Wheeler (2008), “there is a long way to go in making climate change a central part of American planning” (p. 486). That being said, this thesis asks what type of role must the planning profession play in preparing communities for climate change. How does the issue of climate change become more integrated with typical planning efforts related to land use, transportation, and development?

In most cities, planners have not been the key players in instituting climate policy (Bassett and Shandas, 2010). Bassett and Shandas (2010) found that the push for climate change action mainly came from mayors, elected officials, or environmental departments. Betsill (2001) notes that because climate change planning and policy development has no real institutional home within local governments, it is often held back even in cities even where local leaders understand the need for reducing greenhouse gas emissions. Similarly, budgetary constraints and limited staff capacity were found to be major challenges for cities in the pursuit of climate mitigation goals (Pitt, 2010; Betsill, 2001). Research agrees that the planning field needs to take a more active role in solving the climate crisis, but how considering the obstacles?

One way is through more tailored training. The American Planning Association's (2008) *Policy Guide on Planning and Climate Change* recommends that planning school curricula be updated to provide students with new approaches to climate change adaptation and mitigation. Some suggest that the profession obtain a more technical climate and science background since climate action planning involves different types of data than is traditionally used (Bassett and Shandas, 2010; Crane and Landis, 2010). Others stress the need for planners to learn to compose more refined analyses, including life cycle analysis, and to utilize modeling tools to adequately assess the costs and benefits of different emissions reduction strategies (Meyer, 2010). Responding to climate change demands that planning professionals “regulate and evaluate development in a way that accounts for or reduces greenhouse gas emissions” (APA, 2008, p. 15).

Planners must promote a shift away from business as usual, away from traditional public policies that have driven development, growth, and infrastructure investment and that have reinforced a dependency on fossil fuels (APA, 2008). Planners can no longer rely on traditional development regulations; they must encourage municipalities to modify building codes to require and enforce that new and existing buildings become more energy efficient. They should encourage the modification of land use regulations to permit on-site renewable energy systems (Crane

and Landis, 2010). The shift away from business as usual can be observed in the promotion of “smart growth” principals that have become the new paradigm of contemporary planning at all levels. Smart growth, according to Ewing et al. (2009), lowers vehicular carbon emissions by inspiring development that requires people to drive less (Ewing et al., 2009). Analysis shows that residents of compact communities drive 33 percent less than residents of sprawling communities (Ewing et al., 2009).

Crane and Landis (2010) note that “planners should consider whether current, conventional planning strategies are appropriate to a warming world” (p. 399). Can traditional theories of policy development be applied to climate policy? In some regards planning for climate change evokes the theoretical question: “by root or by branch?” (Lindblom, 1959). On the one hand, the urgency of climate change necessitates a complete policy overhaul, a comprehensive transformation that begins from the ground up, characteristic of the root method of policy development—or the rational planning model. Changing the economics of vehicle use or placing a tax on carbon are such examples of transformative policy decisions. The goal in the case of planning for climate change, to halt carbon emissions, requires that Americans address the real fundamental drivers of greenhouse gas emissions instead of searching for a technological fix (Wheeler, 2011). It also involves resolving some of the classic conflicts of sustainable development including “jobs versus environment” and “income equality versus growth” (Berke and Conroy, 2000). It is then the planner’s role to frame sustainable alternatives and to communicate different visions and scenarios for a low or no carbon future to the public (Wheeler, 2011). Traditional elements of the rational planning model are still valuable when it comes to planning for climate change.

But on the other hand, the incremental approach to policy making, the branch method, also seems appropriate in regards to planning for climate change, especially at lower levels of government. Lindblom (1959) argues that “limits on human intellectual capacities and on available information set definite limits to man's capacity to be comprehensive” (p.84). Therefore, according to Lindblom (1959), being truly comprehensive in complex policy decisions is near impossible. The alternative, practicing “the science of muddling through,” involves gradually reaching long term goals by continually building off of previous policy decisions—“a succession of incremental changes” (Lindblom, 1959, p. 86). Because of the complexity of climate change as well as the intricacies of the economic systems and political structures that contribute to carbon emissions, perhaps it is impossible for a planner to singularly identify the most appropriate policy response to the problem. And local governments do not have the capacity to enforce some of the policies that may be necessary. They can, however, take small steps toward achieving carbon neutrality by gradually amending current policies until a tangible solution becomes apparent. The incremental approach to planning for climate change may be promoted because in this manner climate-related

policies are more likely to garner political backing. The American Planning Association, however, warns that marginal reforms will not suffice (APA, 2008). They emphasize that the nation as well as communities must “incorporate climate change considerations in a thorough, comprehensive new approach to physical, social and economic planning” (APA, 2008, p. 4).

For a community to be able to carry out the actions necessary to avert climate change there needs to be a broad support base. Planners must first start engaging public understanding of scientific realities. Climate planning won’t succeed if it is only administered by elites and technicians (Bassett and Shandas, 2010). The best climate action plans according to Boswell et al. (2010) include public participation and outreach. Planners can assume a primary role in facilitating outreach as they are trained in participatory and inclusionary processes (Bassett and Shandas, 2010).

It is clear that planners must assume a greater leadership role in preparing communities for climate change. Even though climate-related policies, such as smart growth, transit oriented development, and sustainable development, have become a focal point of contemporary planning, in general planners have yet to give planning for climate change the urgency it necessitates. Planning for climate change requires not only discussion but also considerable action at a much faster pace than is traditional. In order for mitigation efforts to be effective, climate action plans must not only be crafted and shaped, but they must be implemented by governments and individual citizens alike.

4. Research Methodology

Purpose of Study

Climate change presents a necessary push for planning. Many cities have responded recently by developing climate action plans (CAPs) composed of multiple measures that aim to mitigate climate change and adapt to its unavoidable impacts. That being said, it is important to evaluate the plans that have been developed, looking at what has been effective or ineffective, so to improve our response to the urgent crisis that climate change presents (Berke and Godschalk, 2008). Because climate change has become a burgeoning planning issue, this thesis is motivated by the obvious need for continuing analysis and evaluation of climate policy actions taken to date. This is supported by Crane and Landis (2010) who remark: “It is clear that climate change planning is still in its formative stage, and has produced mixed results, calling for further study of what works for which kinds of places and why” (p. 399). Not only must we plan accordingly, but proper implementation of the subsequent policies we create is crucial. This thesis examines both the quality of climate action plans and the success in their implementation.

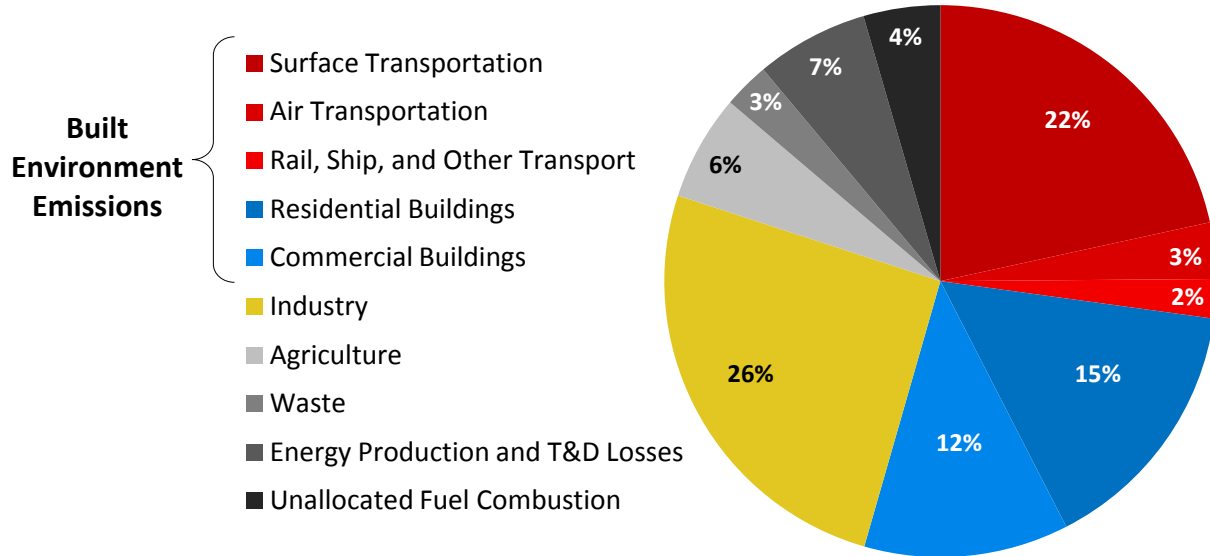
Built Environment Policies

Climate action plans include a number of policies that address reducing the many sources of greenhouse gas emissions. In order to narrow this research toward a subject where planners have had traditional influence, this thesis only examines those climate policy actions that target the built environment, that is, transportation and energy usage in buildings, all of which are affected by land use regulations, building codes, and transportation plans (Pitt, 2010). Peter Calthorpe (2011), examining sources of greenhouse gas emissions in the United States, explains that over half of the total yearly generated emissions are directly attributed to the nature of our buildings and personal transportation systems, in other words as he describes, “the realm of urbanism” (p. 10). The remaining sources of emissions come from industry, energy production, agriculture and other non-energy-related activities (Calthorpe, 2011). Figure 2 breaks down the sources of US greenhouse gas emissions by sector, or activity. Because it encompasses such a significant proportion of greenhouse gas emissions, addressing the built environment, or “the realm of urbanism”, should be a key focus of greenhouse gas reduction measures in the United States.

For this reason, this thesis looks at built environment-related climate policies in the CAPs of Chicago, IL and Portland, OR. This is not to minimize the importance of other objectives such as technological efforts that aim to increase renewable energy generation, or programmatic efforts such as public education campaigns that are

Figure 2. US Annual Greenhouse Gas Emissions by Sector

Source: adapted from World Resources Institute, EPA 2003 Greenhouse Gas Inventory Report



equally as valuable in stabilizing climate change. Also, this thesis only examines climate action plan policy measures that are related to mitigation (reducing greenhouse gas emissions) versus adaptation in order to further limit the scope of the analysis.

Case Study Design

Focusing on the CAPs of two American cities, this thesis employs case study research (**Chapter 5**) to address specific questions related to the climate planning topic. Building off prior climate action plan evaluation studies by Wheeler (2008), Bassett and Shandas (2010), and Boswell et al. (2010), and plan implementation studies by Talen (1996), the case studies are designed to answer the following questions:

RQ1. How are Chicago and Portland planning for climate change?

- What are each city's short term and long term mitigation goals?
- What policy measures are outlined in each CAP and how do the measures target the built environment?
- Do policy responses vary among cities or are they similar in their approach to lowering greenhouse gas emissions?

RQ2. Are policy actions being implemented?

- To what degree are actions being implemented?
- How are cities monitoring and evaluating progress?
- Are cities meeting their mitigation goals?

RQ3. How has the planning profession been involved in both the design and implementation of climate action plans?

The case study strategy is used as a method to analyze the remaining research questions because they addresses “how” questions “about a contemporary set of events” (Yin, 1994, p. 9). The research questions reflect what Schramm notes is “the essence of a case study” in that each “tries to illuminate a decision or set of decisions: why they were taken, how they were implemented, and with what result” (Schramm, 1971 cited by Yin, 1994, p. 12). In the case of this thesis, the intention is to understand how cities are addressing climate change with local policies and to what degree they are achieving their goals. Each case study is centered upon the CAP of each case city and is conducted in three parts: I.) a background that develops and explains the context of climate planning within the region; II.) a content analysis of the CAP; and III.) an evaluation of the implementation of the plan, in other words, of the results of climate action. A multiple case study design allows for a comparative evaluation between regions and across policy actions. Two cities were chosen to allow for an in depth evaluation of climate policy action within the limits of time available to conduct this research project. Chicago, Illinois and Portland, Oregon were chosen as case cities because they meet the following criteria:

1. Each city has developed a stand-alone climate action plan document.
2. Each city has monitored the progress of its climate change goals and actions and has published these evaluations in the form of written progress reports.
3. Each case city is located within a different region of the county and therefore will experience varying impacts from global warming.
4. Each case city is located within a different American state and therefore each is subject to distinctive state-level climate regulations which may or may not influence policy action at the local level.

In order to be reliable, to minimize errors and/or biases, the case studies follow a specific protocol combining methods used by planning researchers. The protocol is outlined in the following section.

Case Study Protocol

Part I. Background/Context

The first component of each case study, the background, develops the context of planning for climate change in the particular city. Background research was directed by the following questions: What are the characteristics of the city (physical characteristics, demographic characteristics, economic characteristics etc.)? How do these characteristics affect this city’s vulnerability to climate change and what are projected climate impacts in this region? What are the major sources of greenhouse gas

emissions in the city, those that contribute most to global warming? The background component also investigates the history of the region's involvement in planning for climate change. How was the planning process initiated? Who were the key participants or drivers? What if any has been the state's role in the development of the local climate action plan?

Part II. Plan Evaluation and Content Analysis

The second component of each case study involves an evaluation of the climate action planning document. Previous literature guides the procedures used to conduct a content analysis. Plans were evaluated in a similar fashion as evaluated by Bassett and Shandas (2010). The objective is to describe and evaluate built environment policies within each city's CAP.

There is no universally accepted standard for assessing plan quality (Berke and Godschalk, 2008); plan evaluation studies use varying instruments and judge according to varied criteria. However, most plan evaluation studies agree on the main characteristics of a high quality plan. Those are a substantial fact base, clear goals, and fully developed policies which allow for the fulfillment of goals (Brody, 2003). Instead of evaluating overall plan quality, the focus of this content analysis is primarily on policy, examining closely the range of policies proposed and designed to mitigate climate change. Not only was it important to check to see if certain policies were present, but also to assess the degree to which they were developed and their internal consistency (Berke and Godschalk, 2008)—whether or not the policies were linked to goals, facts, and issues expressed in the plan.

Case studies are often criticized for “failing to develop a sufficiently operational set of measures” (Yin, 1994, p.34). For this research, the policy content of each CAP was operationalized under a scoring method according to a 0-2 ordinal scale (where a score of “0” means the policy is not mentioned, a score of “1” means that the policy is mentioned but not fully developed, and a score of “2” means the policy is fully developed). Fully developed policies demonstrate internal consistency (i.e., they are well integrated with goals and facts), articulate an emissions reduction target and have measureable indicators for assessing effectiveness. They also identify actors responsible for implementation, and how the policy will be funded (Bassett and Shandas, 2010). A policy evaluation matrix was used to navigate plans for built environment policy actions. Table 2 lists the specific built environment policies that were assessed. All of these policies, which were based on the research of Bassett and Shandas (2010), could be used as strategies to reduce greenhouse gas emissions levels.

Table 2. Built Environment Climate Action Strategies	
Transportation and Land Use	
1. Reduce carbon content of fuels (biofuel standards; electric vehicles; switch municipal vehicle fleet to low- or no-carbon fuels)	
2. Increase fuel efficiency (idling policies; taxi fleet improvements; transit fleet improvements; municipal fleet improvements)	
3. Reduce vehicle miles of travel (increase infrastructure of alternative modes of transportation such as transit lines, bicycle tracks, and pedestrian facilities)	
4. Increase transit service	
5. Promote alternative transportation (discounted transit passes; free bike helmet programs)	
6. Travel demand management (parking pricing, road pricing, commuter financial incentives, pay-as-you-drive vehicle insurance policies)	
7. Promote mixed-use and compact development (increase densities; remove lot size minimums, increase degree to which different land uses are located near each other by changing traditional Euclidean zoning ordinances)	
8. Zoning ordinances to reduce auto-use (transit oriented development ordinances, parking maximums, etc.)	
Buildings	
9. Retrofit existing residential, commercial, industrial, and municipal buildings and facilities (weatherization, using programmable thermostats, furnace and HVAC retrofits, real time utility bills)	
10. Establish green building standards for new buildings	
Source: Adapted from Bassett and Shandas (2010)	

No matter how well a policy is linked to issues and goals or how detailed a plan, procedures for implementation, monitoring, and evaluation must be delineated in order for a plan to be successful (Berke and Godschalk, 2008). This leads to the final component of the CAP analysis which assesses how and to what degree each city has fulfilled their climate change objectives since adopting the CAP. Granted it has only been about three years since these plans were adopted and the mid-term emissions reductions targets are set for the year 2020, it is still important to assess climate plan implementation early on to verify if cities are truly meeting their objectives.

Part III. Plan Implementation Analysis

The final component of each study evaluates plan implementation, or the results of the region's CAP plan to date. A high-quality plan is also one that conveys procedures for implementing a plan's actions once it is adopted (Brody and Highfield, 2005). Brody and Highfield (2005) urge that the planning profession employ thorough methods for evaluating the implementation success of plans because only then is the real importance of planning validated. They note that while the literature is saturated with studies that assess plan quality, there are very few studies that actually assess the quality of plan implementation on its own (Brody and Highfield, 2005). Along these same lines, Talen (1996) writes that "too much of planning evaluation focuses on planning implementation in abstraction, or on proposed planning activity, and not the actual implementation of plans" (p. 249). She highlights the distinction between "planning implementation" and "plan implementation", where the former evaluates the steps delineated in a plan to achieve implementation, while the latter evaluates the actual outcome of plan implementation after it has been adopted (Talen, 1996). She argues the latter "should occupy a more prominent position in planning theory and research" because the analysis of implementation is the essence of linking planning and practice (Talen, 1996, p. 249). Taking these two critiques into account, this study attempts to evaluate plan implementation first by evaluating how implementation is prescribed within the CAP document, and then evaluating the actual implementation success of climate policies.

First, each case city's plan was examined to evaluate how each has prescribed the implementation of climate actions. A high quality plan outlines detailed mechanisms for implementation, as well as detailed descriptions of monitoring and evaluation techniques (Norton, 2008). With adequate indicators to assess the progress of climate policy actions, "planners, decision makers, and communities in general are aware of the degree to which goals have been either implemented, changed, or abandoned" (Talen, 1996, p. 257). The examination of each plan's implementation mechanisms was directed by the following questions: Does the policy action propose a time period for implementation? Is there a clearly defined actor to perform mitigation actions? Does the plan indicate a funding mechanism? Does the plan describe a protocol for monitoring and evaluation? Are there provisions for tracking change? Are there indicators to assess progress, and are they adequate?

Finally, the success of policy implementation (post plan adoption) was assessed for each case city. The measurement of plan implementation is delimited as the "degree to which policies and programs have been fulfilled" (Talen, 1996, p. 248). Similar to the previously mentioned evaluation of policy content in Part II, policy implementation also was operationalized under a scoring method according to a 0-2 ordinal scale (where a score of "0" means the policy has not been implemented, a score

of “1” means that the policy has been partially implemented, and a score of “2” means the policy has been fully implemented as observed by specified indicators). A fully implemented policy meets the target degree specified by the indicator outlined within the plan document. Since the case CAPs have only recently been adopted, a fully implemented policy may or may not be achievable until a much later date, depending on the policy. However, the urgency of climate change necessitates expedient action, and the goal of this assessment is to gauge how quickly cities are able to respond to warnings and achieve results in the built environment.

Implementation was evaluated by surveying yearly progress reports and other documentation published by each case city, and therefore was based on each city’s own assessment of themselves and of their progress. According to Talen (1996), “quantitative research remains largely underdeveloped in planning evaluation, particularly in the realm of determining the outcome of plans” (p. 256). The challenges include uncertainty, time lags, multi-causality, and definitional problems (Talen, 1996).

Creating a quantitative assessment of policy implementation for this study’s purposes largely depends on the processes established within each CAP for monitoring and the types of indicators each presents. If these methods are not fully present within plans, or if methods are unreliable for whatever reason, it becomes more difficult to assess implementation for this study’s purposes and results are limited on account of this matter.

Fortunately, it is relatively easy to operationalize a broader assessment of CAP implementation success by measuring city-wide greenhouse gas emissions reductions. Each of the case cities in this study has charted total greenhouse emissions through annual inventories. This documentation was analyzed per case city to measure percent greenhouse gas emissions reductions since plan adoption and to gauge whether or not Chicago and Portland are reaching their proposed reduction targets. The ability to compare emissions reductions between case cities is, however, limited by a lack of a national source of emissions data for any geographic level below the state level (Drummond, 2010). This rules out any opportunity for an “apples to apples” emissions comparison between cities as each constructs their own emissions accounting method. It is possible, however, to compare cities by whether or not they are meeting their own personalized targets.

Assessing the implementation of climate action plans, and plans in general, helps determine whether or not the failure to achieve greenhouse gas emissions reductions is a result of failed implementation or failed policy (Talen, 1996). The results of policy action are best evaluated after the fact. Although a case study cannot be generalized to all regions or localities, because of the multitude of variables that potentially cause the specific impact or effect, they still can provide insight into what works or what doesn’t in

terms of confronting climate change and reducing carbon emissions. It must be noted that the purpose of this thesis is to provide insight into the development and implementation of climate action planning at the local level. It is not to link cause and effect, or in other words, to prove that mitigation success (i.e., decreased greenhouse emissions) is directly caused by climate action plans or the planning processes. It is a complex task to attribute emissions reductions to any one or any combination of climate policy actions especially because of the many variables that are involved in determining greenhouse gas emissions quantities. Even if policies have been implemented or environmental outcomes achieved, pinpointing the causal role to the climate plan is very difficult (Millard-Ball, 2012).

Data Collection

Data that were used to evaluate CAPs were acquired from multiple sources. Both CAPs and CAP progress reports from the cities examined are published and available online. In some cases where necessary documents were not published online, agencies within the city emailed the documents needed.

5. Case Studies

To elicit a better understanding of the policies cities are employing to confront climate change and to assess the effectiveness of these planning efforts in meeting mitigation goals, this chapter reports on the data collected and the findings from the Chicago, IL and Portland, OR case studies. This case study analysis is intended to answer the following research questions:

RQ1. How are Chicago and Portland planning for climate change?

- What are each city's short term and long term mitigation goals?
- What policy measures are outlined in each CAP and how do the measures target the built environment?
- Do policy responses vary among cities or are they similar in their approach to lowering greenhouse gas emissions?

RQ2. Are policy actions being implemented?

- To what degree are actions being implemented?
- How are cities monitoring and evaluating progress?
- Are cities meeting their mitigation goals?

RQ3. How has the planning profession been involved in both the design and implementation of climate action plans?

Chicago, IL

I. Background

Chicago, the Midwest's largest city and the third largest city in the United States, has taken considerable steps in the last decade to address climate change with policy. Located along the western shore of Lake Michigan, Chicago houses a population of about 2.7 million that lives in approximately one million households across 77 neighborhoods (City of Chicago, 2012). The greater Chicago metropolitan region comprises six counties with a combined population of 8.3 million (US Census Bureau 2010 Decennial Census). The area is an economic hub with several natural and capital resources such as Lake Michigan, a well integrated regional transportation system, and a diverse mix of industries. It is expected to experience continued population growth, estimated to grow by 25 percent by the year 2040 (CMAP, 2010). The Chicago population is diverse with 26 identified ethnic groups (City of Chicago, 2012). Chicago's 2010 median household income is \$46,877 which is less than the \$51,914 national median household income (US Census Bureau 2010 Decennial Census). Surrounding suburban counties, however, demonstrate median incomes almost twice as high as that in the Chicago city area (US Census Bureau 2010 Decennial Census). The City of

Chicago's total proposed budget for 2012 was \$8.2 billion (City of Chicago, 2012). Having a climate action plan with teeth may depend on the ability of a City to fund the necessary staff to implement and monitor climate actions.

Chicago has a continental climate; its weather conditions range from snowy and icy winters to hot and humid summers (Hayhoe and Wuebbles, 2008). The Chicago area is situated within a forest-grassland transition zone. The surrounding ecosystems include forests, woodlands, grasslands, and wetlands (Hayhoe and Wuebbles, 2008). These ecosystem types, however, have been highly modified during the past two centuries to allow for mechanized agriculture and accommodate urban and suburban growth (Hayhoe and Wuebbles, 2008). With climate change, Chicago could experience significant increase in annual temperatures and many more instances of extreme heat and severe storms (Hayhoe and Wuebbles, 2008). Chicago currently has an average of two 100-degree days during the year, but this number could increase 15 fold to 31 100-degree days at the end of the 21st century if emissions levels continue to increase (City of Chicago, 2008). The change in climate could impact several human and natural systems including water systems, infrastructure, and public health. More severe storms could put pressure on the city's combined sewer system, possibly contaminating the water supply and increasing the risk of water borne illnesses (Hayhoe and Wuebbles, 2008). The reduced cold season will have many affects on agriculture and Lake Michigan, the region's water source. As the climate shifts ecosystems will be modified as plant and animal species migrate to and from the area (Hayhoe and Wuebbles, 2008). This could lead to the entry of several invasive species including the gypsy moth and Japanese beetle, both of which threaten existing ecosystems (Hayhoe and Wuebbles, 2008).

Throughout the past two decades Chicago has undertaken several environmental initiatives and Chicago's former mayor, Richard Daley, was a major promoter of such efforts. Some of these include: a tree-planting campaign in 1989, the construction of alternative fuel stations for City fleets in 1999, and the implementation of a "green roof" initiative to reverse heat island effects starting with City Hall in 2001 to four million square feet of green roof space in the Chicago area today (City of Chicago, 2008). The recent climate action planning efforts were fueled by the Mayor's belief in the co-benefits of such actions; the Mayor believed climate policies were important not only in terms of mitigation, but because of their potential to improve overall quality of life in the city (City of Chicago, 2008).

Chicago was one of the first cities to sign the Conference of Mayors Climate Protection Agreement of 2005. In 2006, the City formed the Climate Task Force comprised of civic, business, and government leaders, to begin the development of the Chicago Climate Action Plan (CCAP) (Parzen, 2009). Chicago's Department of Environment was the initial group that spearheaded the Climate Task Force initiative

(Parzen, 2009). In the months and years that followed, many were involved in a multiple stake-holder process to research and then draft the plan. The Department of Environment engaged foundations, non-profits, and university research centers to help fund, manage, and sculpt policies. According to Parzen (2009), collaboration with the non-profit, Global Philanthropy Partnership, which served as an external project management team, was essential in adding strategic and technical expertise to the planning process. The outside partner also gave the City access to business and professional partners. To gain buy-in from the many stakeholders in the large city, the Department of Environment brought together 50 to 100 identified stakeholders every few months to collaborate in the plan-making process. However, there were no town meetings to involve residents of different neighborhoods (Parzen, 2009). The long planning process was enabled and sustained with philanthropic support from foundations such as the Lloyd A. Fry Foundation, the Joyce, the Clinton Foundation, and many others (Parzen, 2009). The CCAP was also supported financially by the City of Chicago. The plan was released to the public, from the Mayor's Office, as the City's plan. This was intentional to guarantee full support and accountability from the city government (Parzen, 2009). The plan was adopted in September of 2008.

The State of Illinois does not require communities to adopt climate action plans. However, as the City of Chicago was constructing its climate-related policies, the State was taking similar actions. In early 2007, Illinois Governor Blagojevich announced a statewide goal to reduce greenhouse gas emissions to 1990 levels by 2020 and 60 percent below 1990 levels by 2050 (Illinois Office of the Governor, 2007). Later that year, the Illinois Climate Change Advisory Group released a set of recommendations (Illinois EPA), and in August the Governor signed a law requiring utilities to implement energy efficiency programs, renewable portfolio standards, and reduce peak demand by 0.1 percent each year until 2018 (Illinois Public Act 095-0481).

The Climate Task Force commissioned a greenhouse gas emissions inventory analysis to help inform policy development of the CCAP. In the year 2005, Chicago emitted 36.2 million metric tons CO₂ (CNT, 2008). Most of the emissions, 91 percent, come directly from the consumption of electricity and natural gas, and from transportation fuel emissions (CNT, 2008). Energy usage accounts for the most greenhouse gas emissions, 70 percent, and transportation account for 21 percent of emissions (CNT, 2008). The greater Chicago metropolitan area, a six-county area including the city of Chicago, emitted and estimated 116 million metric tons of CO₂ in the year 2005, with transportation and natural gas and electricity usage being the main sources as well (CNT, 2008).

II. Plan Content Analysis

Long Term Goals: The 2008 Chicago Climate Action Plan (CCAP) sets a long term goal to reduce annual greenhouse gas emissions to 80 percent below 1990 levels by the year 2050. This means that Chicago would have to lower its emissions from 32.3 million metric tons per year (1990 estimate) to 6.5 million metric tons per year. This is an ambitious goal compared to many other American cities that have instituted greenhouse gas reduction plans thus far (Wheeler, 2008). The justification for this target, noted in the plan, is based on research predicting different climate outcomes at different emissions scenarios. The CCAP notes that even a goal to cut emissions by 60 percent is not high enough, admitting that this reduction “could produce a less dramatic change but still not prevent troubling impacts” (p. 14).

Midterm Goals: The CCAP also proposes an initial goal to cut greenhouse gas emissions to 25 percent below 1990 levels by 2020. The reason for setting this interim goal is to allow for a midterm assessment far enough in the future so that major infrastructure and behavioral changes have time to develop, but soon enough to ensure the city is on the proper course toward its long term objective (CCAP, 2008).

Actions: The policy measures in the CCAP are centered upon first meeting the 2020 midterm goal. The CCAP outlines 26 mitigation actions that combined are supposed to help Chicago achieve its target for 2020. They actions are organized within four key categories of strategies. They are: 1.) *Energy Efficient Buildings*; 2.) *Clean and Renewable Energy Sources*; 3.) *Improved Transportation Options* and; 4.) *Reduced Waste and Industrial Pollution*. The plan outlines an additional nine actions related to climate change adaptation.

The plan explains the multiple criteria used in choosing and prioritizing the mitigation policies that it did. The actions were analyzed and chosen according to first, their greenhouse gas reduction potential. They were also chosen based on their cost-effectiveness (i.e., could the action generate net cost savings within a certain time period). The other criteria included how easily the action could be implemented, how quickly it could affect changes, how many benefits and/or burdens were associated with the action, and the effect the policy action could have on the entire six-county region.

Co-Benefits: As was found in much of the research on local climate action planning, the perceived existence of “co-benefits” in the implementation of climate policy was an important motivating factor in Chicago’s decision to adopt the CCAP (Dolan et al., 2010; Kousky and Schneider, 2003). Chicago’s CAP makes note of several potential co-benefits of its proposed actions. Similarly, the message at the introduction of the plan

from Chicago's Mayor emphasized local benefits of environmental protection. The plan acknowledges that while the CCAP is helping solve a global problem, the actions can also benefit local residents of Chicago by improving air quality, creating jobs, and improving transportation accessibility.

Implementation Plans: One unique aspect of the CCAP case study is that part of the planning process included the additional drafting of implementation plans for each of its major climate action strategies. This process occurred while the CCAP report was being finalized (Parzen, 2009). As was mentioned previously, the drafting of Chicago's CAP involved the collaboration of many stakeholders including multiple public agencies, private businesses, non-profits, and universities. Chicago delegated the implementation planning tasks to several outside groups and agencies as well. According to Parzen (2009), the Department of Environment and the Global Philanthropy Partnership supervised implementation efforts in the *Buildings* category, hiring outside organizations to research both the energy intensity of all Chicago buildings and funding mechanisms for the implementation of the policy actions. An additional outside agency, Katzenbach, provided their services pro bono and put together the final *Buildings Implementation Plan*.

Chicago's climate action website displays the CCAP's implementation plans but only two of the five major strategies have plans listed. There are also many inconsistencies among the implementation plans and the CCAP itself in terms of structure. The *Buildings Implementation Plan* resembles a cost analysis and offers implementation strategies based off of existing funding sources identified. The analysis shows a substantial funding gap between the 2020 objective and the funds that are currently earmarked towards the strategy. The analysis offers practical advice for maximizing CO₂ reduction per dollar spent, but does not go into many details about securing additional funding to implement the entire strategy. The *Transportation Implementation Plan* is comprehensive in that it outlines a portfolio of over 120 transportation related initiatives or actions to reach the 2020 target. The implementation plan includes a timeframe when each policy should be implemented, but does not detail the actor responsible for implementation or how each initiative will be funded. It seems that while enlisting support from several outside groups during the planning process broadens a commitment to climate action, which is certainly needed in a city of Chicago's size, contracting out separate implementation plans, however, leaves room for inconsistency and in the long term may make implementation as well as monitoring and evaluation of mitigation actions more difficult.

Policy Evaluation: For this analysis, the only actions that were evaluated in further detail were those actions related to the built environment. Of the four major mitigation strategies that Chicago outlines, only the *Buildings* and *Transportation* categories were

assessed. First, I evaluated the plan to see if the following ten greenhouse gas reduction strategies listed earlier were present.

1. Reduce carbon content of fuels
2. Increase fuel efficiency
3. Reduce vehicle miles traveled
4. Increase transit service
5. Promote alternative transportation
6. Manage transportation demand
7. Promote compact and mixed use development
8. Reduce auto use through zoning
9. Retrofit existing buildings
10. Create green building standards for new buildings

Next, I assessed the policies that were present evaluating the degree to which they had been developed, or their “depth” (Bassett and Shandas, 2010). Again, a fully developed policy was defined as one that is justified (it is well integrated with goals and facts), and is articulated in a way that “facilitates implementation as well as monitoring and evaluation” (Bassett and Shandas, 2010, p.437).

The CCAP identifies eight actions within the *Energy Efficient Buildings* strategy. Together, Chicago estimates that these actions could make up a third of the emissions reductions necessary to meet the 2020 target. This estimate was derived from a study prepared by the Center for Neighborhood Technology (CNT). CNT calculated that if 47 percent of the existing residential housing stock were retrofitted to consume 30 percent less energy, and if 50 percent of industrial and commercial buildings were retrofitted to produce a 30 percent reduction in usage as well, then Chicago would reduce annual emissions by 2.6 million metric tons. Chicago’s plan included both actions that addressed retrofitting the existing building stock and creating green building standards for new buildings and facilities. Both of these policies were considered fully developed because they exhibited all of the main characteristics of fully developed policies, including: being well integrated with goals and facts, articulating an emissions reduction target, identifying measurable indicators for assessing implementation effectiveness, identifying multiple actors for implementation, and finally, identifying funding sources, though it was not clear how all of the many retrofits would be funded. The plan identified some mechanisms for securing funding for these policies, but the specifics were hardly detailed, making it questionable whether or not these policies could be implemented in the timeframe available.

The *Improved Transportation* strategy within the CCAP identifies 10 actions that together could account for 23 percent of the reduction needed to meet the 2020 goal, based on estimates from CNT. The transportation and land use actions identified by

Bassett and Shandas (2010) as potential greenhouse gas reduction strategies were all present within Chicago's CAP or within the transportation implementation plan mentioned in the previous section. The transportation strategy addresses reducing the carbon content of fuels by doing three things: switching the City's vehicle fleet fuel to biodiesel blends, reducing taxes on alternative fuels, and providing on the road incentives for clean vehicles. The policy was not scored as fully developed because it did not identify funding mechanisms. The policy was attached to a potential greenhouse gas reduction, but no indicators were listed to explain to what degree each action should be pursued. The transportation strategy also addresses reducing vehicle miles traveled (VMT) by implementing Chicago's current Bike and Pedestrian Plans and increasing biking and walking trips to one million a year. Expanding the car sharing network is another action mentioned to reduce VMT. This policy was also scored as partially developed because of two reasons: neither strategy identified funding mechanisms, nor did the CCAP or transportation implementation plan identify indicators for evaluating implementation of these strategies. The CCAP does reference Chicago's Bike and Pedestrian Plans, and perhaps within these two plans is a more detailed description of policy implementation and measurement.

Chicago's CAP also focuses on the movement of freight to lower VMT by reducing truck traffic and increasing the efficiency of rail movement. The CCAP points to another policy development that the region is embarking upon, the CREATE program (Chicago Region Environmental and Transportation Efficiency). The CCAP states that if this program were implemented, the region could experience a reduction of 1.61 million metric tons CO₂ per year. Once again, the plan does not detail funding mechanisms and does not outline any indicators for assessing implementation of the freight program.

Chicago's transportation strategy also focuses on increasing transit service. Although Chicago has the second largest transit system in the nation, the plan emphasizes the need to increase ridership even more. The goal stated in the CCAP is to increase transit ridership by 30 percent by 2020. The CCAP points out actions that can encourage increased ridership such as investing in the creation of more routes to decrease travel times, improving services, and implementing better and more innovative payment methods like encouraging businesses to offer employee transit benefits. The transit policies were considered fully developed because there are clear and measureable indicators for assessing effectiveness (ridership counts), clear actors responsible for implementation (CTA and Metra), and the plan mentions one funding source (a \$153.1 million grant from the USDOT to reduce traffic congestion). The funding source, however, does not seem adequate in funding all of the ideas mentioned to increase transit ridership.

The CCAP also mentions using transit-oriented development (TOD) to encourage walking and use of transit. The corresponding transportation implementation plan

mentions redefining zoning near transit (e.g., increasing height limits, decreasing required parking, and including regulations to limit parking) as well as expediting developers' approval processes. The plan mentions actors in this case, including the City and the Chicago Transportation Authority (CTA). But like previously mentioned policies, there are no indicators to assess progress, nor any gauge of the degree to which the CTA and the City will implement TOD measures.

Conclusion: Overall, Chicago's CAP is a comprehensive collection of climate policy actions focused on reducing the major sources of emissions identified in the city's greenhouse gas emissions inventories. The plan mentions every one of the 10 key mitigation strategies used to assess the plan, and includes several more. The plan is metrics-based in that each of the strategies is associated with an estimated emissions reduction figure. A metric based plan seems appropriate and well serving when long term goals are metric-based as well (i.e., reducing emissions). The CCAP uses metrics to assess whether or not the combination of policies that it outlines in the plan can effectively reach its midterm goal. The problem, however, is that while all of the actions have an associated emissions reduction potential, not all actions indicate benchmarks in which to assess the progression of each policy into the future. Because of the lack of performance indicators, indicating the degree to which the policy must be implemented by a specific time, many of the climate action policies within Chicago's CAP, and especially those within the transportation implementation plan, were not scored as "fully developed policies" in this analysis.

Since administrators of the CCAP contracted out the implementation planning effort, the resultant implementation plans were not consistent with the original CCAP. The transportation implementation plan included several additional policy actions, and the buildings implementation plan did not mention several actions mentioned in the CCAP. While it is beneficial for many reasons to include multiple interest groups and organizations in the planning process, the inconsistencies created by delegating different tasks may lead officials and the public to question what should be implemented and what is being implemented.

In a sense, Chicago's CAP seems to be more of a marketing tool, or a campaign for climate action, than a precise plan. Essentially, the CCAP only provides highlights of the proposed climate actions without really mapping out detailed implementation and funding mechanisms. Photos of the City of Chicago's Mayor Daley are pasted throughout the report, perhaps as a way to advertise the CCAP as a principal initiative on the political agenda. That's not to say that this type of planning is not effective in achieving the overall objectives. The planning process, by enlisting a multitude of stakeholders, engaged both public and private entities and allowed Chicago to secure endorsement of its policy proposals. This support, along with the Mayor's publicity, seemed to have validated the city-wide climate planning effort in Chicago.

III. Plan Implementation Analysis

The analysis of plan implementation involved two parts. First, I evaluated how policy implementation mechanisms have been prescribed within the CCAP; this is *planning implementation*. Then, I evaluated the degree to which climate policies have been fulfilled since plan adoption, *plan implementation*, basing this assessment on the Chicago Climate Action Plan's two-year progress report and Chicago's 2010 Regional Greenhouse Gas Emissions Inventory.

Planning Implementation: According to Norton (2008), a high quality plan outlines detailed mechanisms for implementation including detailed descriptions of monitoring and evaluation techniques. In this analysis, policy actions were evaluated based on the presence of the following implementation mechanisms.

- a time period for implementation
- a clearly defined actor to perform actions
- an indicated funding mechanism
- a protocol for monitoring and evaluation
- provisions for tracking change
- indicators to assess progress

All of the policies in Chicago's CCAP include a time period for implementation. Obviously the mid-term period is "by 2020" or 12 years after adoption of the plan. Both the *Buildings* and the *Transportation* Implementation Plans map out short term (e.g., first year, first 2 years, etc.) and midterm time periods for completing specific actions.

Only about half of the policies identify specific actors to perform actions and in most cases they were the CTA and Metra responsible for implementing transit improvements and switching fleets to low carbon fuels. Only 22 percent of actions identified funding mechanisms and in most cases these were only for short term actions. As the Katzenbach report noted in the *Buildings* implementation plan, there was a wide gap between available funding and that which is necessary to achieve 2020 objectives. No single policy action includes a protocol for monitoring and evaluation, but the CCAP as an entirety notes a process for assessing implementation of the plan. Only 20 percent of the policies that were evaluated note specific indicators to assess progress. The remaining actions use language such as, "encourage," "increase," and "expand," but there is no mention of how much, or to what degree. Since the CCAP's adoption, the City and the Global Philanthropy Partnership have been working on developing a system of adequate performance measures for each strategy and are using those measures to track progress in yearly progress reports (City of Chicago correspondence, 2012). So while the plan does not detail the method used for tracking changes in policy implementation and effectiveness for every one of its actions, there are currently staff

assigned to tracking and reporting these performance measures for each strategy. The City also instituted a “Green Ribbon Committee”, made up of business and community leaders, whose responsibility is to review performance against the overall CCAP goals and to recommend revisions, adjustments, and improvements.

Chicago’s CAP may not fit Norton’s (2008) criteria of a high quality plan because very few of the policies outline specific funding mechanisms and actors to carry out actions. Very few of the policies, in the *Transportation* strategy especially, provide a definite indicator from which policy makers can gauge progress of climate actions. But just because Chicago’s plan may not be considered a “high quality plan” this is not to say that the results of Chicago’s planning efforts are not producing the results that are needed. This relates to Wheeler’s (2008) comment that plans are “neither necessary nor sufficient for action” (p. 482). We can then say further that neither are “high quality plans”, according to the standards of planning researchers, necessary to provoke implementation of climate mitigation strategies. Time will tell if better implementation planning is necessary to meet long term objectives.

Plan Implementation: Again, for this study’s purposes, plan implementation analysis involves evaluating the actual implementation of a plan after its adoption (Talen, 1996). In the case of Chicago, this analysis examines the implementation results of the Chicago CAP in 2010, two years after its adoption. This analysis includes an evaluation of the implementation of each of the policy actions as well as an overall evaluation of total city-wide emissions changes since the adoption of the CCAP.

This evaluation is based on the *CCAP Progress Report: First Two Years*. Through a grant from the Kresge Foundation, the City was able to fund monitoring and evaluation programs to track emissions reductions. In particular, the grant helped fund the creation of a web platform where key agencies could enter energy consumption data along with other important indicators in order to facilitate the monitoring process. The grant also funded the drafting of the 2010 progress report and the 2010 emissions inventory.

In this evaluation, policies were marked as either “not yet implemented,” “partially implemented,” or “fully implemented.” A fully implemented policy meets the target objective as outlined in the CCAP. Only policies related to buildings and transportation were assessed.

One out of Chicago’s 10 climate actions proved to be fully implemented by 2010, and this was the action related to establishing an updated building code to require that new buildings to be energy efficient. The City also created a process to expedite permits for developers building sustainable properties.

Most of Chicago's actions have been partially implemented which is expected since most policies have been structured to meet target greenhouse gas emissions reductions by the year 2020. The action related to the retrofitting of the existing building stock was partially implemented in 2010. The progress report notes that since 2008, after the launch of a retrofit pilot project, a substantial 13,000 homes and 390 commercial properties have been retrofitted, but Chicago still has a ways to go in order to reach its 2020 goal of 400,000 homes. In 2009, the Chicago Retrofit Steering Committee was created, with representatives from both utility companies and commerce organizations, to develop a clear information system for customers looking to finance and carry out energy efficiency improvements on their properties.

Updates on the status of many of the CCAP's transportation-related policies were left out of Chicago's two year progress report including the implementation of TOD projects, land use and development regulation changes, travel demand management programs, and transit incentive programs. Because they were not mentioned it was not possible to gauge the status of their implementation in 2010. What the report did mention, however, was progress made in regards to the use of alternative fuels and fuel efficiency improvements. The report noted fleet efficiency improvements such as the addition of 208 articulated buses, and 228 hybrid buses to the CTA's transit fleet. The report also mentions a \$15 million grant awarded to the city for the Chicago Area Alternative Fuels Deployment project which has increased the number of alternatively fueled vehicles in both public and private fleets. The grant also funded development of alternative fueling infrastructure. As of 2012, there are 198 operational electric charging stations, 15 operational CNG states, and 9 operational E-85 stations (Bingham, 2012).

The progress report did not mention the change in transit ridership since the adoption of the plan, but noted that 2010 budget constraints forced the CTA to reduce bus and rail services by 18 percent and 9 percent, respectively. The CTA's transit ridership statistics for 2011 show only a one percent increase in ridership since 2008 (CTA, 2012).

The progress report does not mention any calculated reduction in VMT, but briefly highlights ongoing development of Chicago's pedestrian and bicycle programs. The report notes the continued implementation of the 2015 bike plan, but a graphic displaying the number of bike lanes in the city does not show any increase in infrastructure since 2008. Finally, the report notes that later in 2010 with the support of the Surdna Foundation the City will begin the implementation of 14 of the 120 initiatives outlined in the transportation implementation plan. Those include traffic signal synchronization, creating transit signal priority systems, a commute trip reduction program, among others.

Conclusion: An analysis Chicago's CAP implementation shows that many actions are currently being implemented and many are taking part in the process, from foundations providing funding of programs to neighborhood groups and utility companies forming partnerships to facilitate future programs and initiatives. The progress report reveals that Chicago has been aggressively seeking funding since the adoption of the CCAP and has acquired substantial backing for many climate-related projects. Chicago has been awarded funding from federal departments and has also leveraged private investments. This type of aggressive fundraising could provide a steady momentum and be enough to keep Chicago on its desired trajectory of emissions reductions.

On the other hand, it's hard to tell if the degree of policy implementation so far is substantial enough to guide Chicago towards its 2020 emissions reduction goal. Only one of the 10 policies evaluated in this study proved to be fully implemented. Especially in the transportation category, many of the policy actions outlined in the CCAP and in the transportation implementation plan were not even mentioned in the two year progress report. This begs the question, have these policies been implemented at all, or are the implementation actions occurring behind the scenes and just not being documented? The CCAP strategy to reduce transportation related emissions is based heavily on increasing transit ridership, yet the main transportation strategies that have been implemented to date include only fuel improvement and efficiency efforts. There is no mention of increased transit services to attract more ridership, nor any mention of TOD implementation that could further encourage walking and transit ridership. The small increase in transit ridership of one percent since 2008 could indicate that Chicago may need to rethink its strategy if it wants to increase transit ridership by a hefty 30 percent by 2020, especially since transit budgets have been strained. The progress report neither made any mention of personal transportation strategies that have been implemented thus far, such as car sharing programs or travel demand management programs.

Table 3. Chicago Greenhouse Gas Emissions Changes 2000, 2005, 2010 (million metric tons CO ₂)				
	2000	2005	2010	*2050 target
Total Emissions	34.7	36.2	33.3	6.5
Total Population	2,896,016	2,701,926	2,695,598	
Per Capita Emissions (metric tons)	12	13.4	12.4	
Transportation Emissions	7.3	7.1	7.8	
Building Emissions	24.4	25.9	23.6	
Chicago Region Emissions	105	-	125.9	
Sources: Chicago 2010 Regional Greenhouse Gas Emissions Inventory; 2008 Chicago Greenhouse Gas Emissions; US Census Bureau 2005 American Community Survey, Table B01003				

The results of the 2010 emissions inventory show reductions but do not provide a clear indication that Chicago is making steady progress toward its 2020 objectives. The results show a decrease in total greenhouse gas emissions from 2005 by 8 percent and a decrease from 2000 by four percent. However, because of population loss the emissions per capita are still higher than 2000 levels, but lower than 2005. Emissions from energy usage in buildings have decreased, but transportation-related emissions have increased from both 2000 and 2005. Table 3 demonstrates these changes.

Portland, OR

I. Background

When it comes to preparing for climate change, Portland is a true leader among American cities. In fact, the City of Portland was the first local government in the US to adopt any kind of municipal climate change policy. It adopted the City of Portland Carbon Reduction Strategy in 1993, setting a precedent for other communities (City of Portland and Multnomah County, 2001). Portland, located in Multnomah County is situated in the northwestern edge of the state of Oregon at the confluence of the Willamette and Columbia Rivers. It is the largest city in Oregon with a population of roughly 580,000 in 2010 (City of Portland, 2011). The greater six-county region including Portland and neighboring counties houses more than two million people, with Portland being the major job center (City of Portland, 2011). The region is expected to grow by another million by 2030 (Metro, 2009). The 2010 median income of Multnomah County was \$49,618, slightly less than that of the nation's (US Census Bureau 2010 Decennial Census). The City of Portland's proposed budget in 2012 was \$3.59 billion (City of Portland, 2011).

Portland prides itself on its wealth of natural resources including waterways and streams, wetlands, conifer forests, nearby Cascade Mountains, and a variety of fish such as trout and salmon and other wildlife. The City has a history of paying special attention to preserving and protecting its resources. In the 1900s, the City began to acquire acres of land to preserve for parks and wildlife refuges. And since the 1980s the City has used zoning to protect natural areas as well as its watersheds. It has done this by creating environmental overlay zones and putting development restrictions on riparian areas. Portlanders, themselves, also have a reputation for having a marked interest in wildlife and the environment (Abbott, 2001). Since the 1970s a culture of public interest in energy policy as it relates to the economy and the surrounding environment grew and still persists to this day (Rutland and Aylett, 2008). The Portland region receives much of its electric power from federally funded hydro-electric dams along the Columbia River (Rutland and Aylett, 2008). In the 1970s the region experienced an energy crisis as a diminished supply of electricity (on account of recent periods of drought) could not keep with an ever-growing energy demand. The effects were rising energy prices for rate payers as energy companies sought investments in

more energy infrastructure (Rutland and Aylett, 2008). In response, rate payers convened with wildlife advocates to promote energy efficiency measures with double objectives: to reduce energy prices and prevent the construction of more dams which were thought to threaten aquatic species (Rutland and Aylett, 2008). This public pressure led Portland to pass its first energy efficiency policy in 1979 (Rutland and Aylett, 2008).

The climate in Portland is temperate with cool dry summers and wet mild winters. These conditions are expected to intensify as the global climate changes, with wetter winters and drier summers. With increased global warming, Portland can expect its watershed to be affected as warmer temperatures cause diminished snow pack and an earlier peak flow of water from mountains into streams (City of Portland and Multnomah County, 2001). Drier summers and increased instances of drought are expected to affect the region's water supply and the habitats of local fish and wildlife (City of Portland and Multnomah County, 2001). Forests may also be strained with drier summer conditions (City of Portland and Multnomah County, 2001). Portland's CAP points out that social change will accompany the expected physical impacts. Portland expects to receive larger influxes of population, "climate refugees," as people move from hotter drier climates to milder wetter ones.

Portland's first greenhouse gas reduction strategy was administered through the Portland Office of Energy. The strategy included a city-wide reduction of CO₂ emissions by 20 percent of 1988 levels (which were estimated at 10.1 million metric tons) by 2010. The main efforts included funding commercial and residential energy retrofits (Rutland and Aylett, 2008). In 2001, the City updated its global warming mitigation strategy to include the entire county and created the Local Action Plan on Global Warming (City of Portland and Multnomah County, 2009). The goal of this plan was to reduce county-wide emissions to 10 percent below 1990 levels by 2010. Despite not reaching its 10 percent reduction goal, the City and County should be commended for coming very close. In 2010, Multnomah County had reduced its emissions to 6 percent below 1990 levels despite population growth at 26 percent (City of Portland and Multnomah County, 2009). In 2007, the Portland City Council and the Multnomah County Board of Commissioners voted to design another greenhouse gas reduction plan, this one with the longer term goal of reducing emissions 80 percent by 2050 (City of Portland and Multnomah County, 2009). In the introduction of Portland's 2009 CAP the City and County recognize their past progress but acknowledge that actions to date are still inadequate, and more ambitious actions are needed to mitigate climate change.

In 2007, the City and County put together a steering committee of members to draft the CAP. Committee members came from the Sustainable Development Commission, a citizen advisory group called the Peak Oil Task Force, and also staff from eight municipal agencies including the Portland Bureau of Planning and

Sustainability (City of Portland and Multnomah County, 2009). After a year of plan development, a draft was released for public comment and eight town hall meetings were held to collect feedback from the community and to gauge their priorities (City of Portland and Multnomah County, 2009). The plan was adopted in October of 2009. Portland's CAP is intended to be an "iterative" or ongoing process. The CAP outlines a structure of this ongoing process; every year the Bureau of Planning and Sustainability will report to the Multnomah County Board of Commissioners and Portland City Council on annual carbon emissions and progress in implementing climate actions. Every three years the City and County will undergo a revision process, evaluating what has been implemented and not implemented, and what individual actions in the plan should be revised to help achieve interim 2030 greenhouse gas reduction goals. At this point, the City and County suggest new actions if necessary. Finally, the plan requires a new CAP to be developed in 2020, based on the latest science and the successes and challenges of policy implementation (City of Portland and Multnomah County, 2009). The new CAP will set a new 2040 interim goal to ensure that the region reaches its long term 2050 goal. In Portland and Multnomah County, although several governmental agencies are involved in implementation, it appears that Portland's planning department, the Bureau of Planning and Sustainability, is the primary agency in charge of administering the CAP, keeping track of its progression and monitoring its implementation. This governing structure differs from the Chicago case study, where Chicago's Department of Environment and Mayor's Office were the primary administrative authorities overseeing CCAP implementation.

The State of Oregon, like Portland, has been one of the more progressive states in terms of implementing climate change policy. The State completed a statewide CAP in January of 2008 entitled, *A Framework for Addressing Rapid Climate Change*. In 2005, the State adopted California's fuel efficiency standards for vehicles (Oregon Department of Environmental Quality, 2011). In 2009, the State signed SB101 which set a carbon dioxide emissions standard of a maximum of 1,100 pounds of greenhouse gas emissions per megawatt hour (Oregon Senate Bill 101, 2009). The Oregon Environmental Quality Commission mandates annual greenhouse gas emissions reporting from emitters over 2,500 metric tons a year (Oregon Department of Environmental Quality, 2008). Communities, however, are not required to adopt climate action plans.

The Multnomah County annual carbon emissions inventories show that total emissions steadily increased from 1990 to 2000, but there were significant reductions in emissions from 2001 to 2005 (City of Portland and Multnomah County, 2009). Reductions are attributed to land use policies and transit policies that have encouraged mixed use development and more alternative transportation options (City of Portland and Multnomah County, 2009). The Bureau of Planning and Sustainability notes that

transportation-related emissions have remained at about the same levels as they were in 1990. Portland attributes this to the region's long standing investments in mixed-use buildings, transit oriented development, and multiple transportation alternatives. Transportation related emissions, however, are still one of the largest emitting sectors, contributing 38 percent of total greenhouse gas emissions in 2008 (City of Portland and Multnomah County, 2009). Buildings are the largest contributor, and compose 40 percent of total greenhouse gas emissions (City of Portland and Multnomah County, 2009). As in Chicago, the majority of emissions in Portland stem from electricity usage in buildings and fuel usage in the transportation sector.

II. Plan Content Analysis

Long Term Goals: The Portland CAP outlines the same long term reduction target as Chicago. That is, to reduce greenhouse gas emission by 80 percent of 1990 levels by 2050. Emissions levels from 1990 were estimated to be a total of 8.6 million metric tons CO₂. Therefore, Portland and Multnomah County would have to only emit 1.72 million metric tons in the year 2050 to have reached its target goal. The justifications for this target, just as in the case of Chicago, are influenced by scientist's conclusions that in order to avoid serious climatic changes, total global greenhouse gas emissions must decrease by 50 to 85 percent below 2000 levels by 2050.

Midterm Goals: Similarly to Chicago, the Portland CAP also outlines an interim goal midway between the long term time period. This goal is to reduce emissions by 40 percent of 1990 levels by the year 2030. The CAP is designed around achieving 18 different objectives in order to reach the 2030 midterm target.

Actions: Portland's CAP sets up a distinctive framework for achieving both its midterm and long term goals. The plan outlines 18 objectives for 2030. These objectives are grouped into eight categories including: 1.) *Buildings and Energy*; 2.) *Urban Form and Mobility*; 3.) *Consumption and Solid Waste*; 4.) *Urban Forestry and Natural Systems*; 5.) *Food and Agriculture*; 6.) *Community Engagement*; 7.) *Climate Change Preparation* and; 8.) *Local Government Operations*.

The plan then outlines actions for achieving the 18 objectives. The actions are distinct because they are meant to be achieved by 2012, a timeline of three years. Portland's CAP involves an iterative process where every three years the plan and its actions are reviewed and revised. In 2020 Portland and Multnomah County will redraft the CAP entirely, based on the latest science and current conditions. The 2020 CAP will set a new 2040 interim goal to direct the region toward its 2050 goal.

Portland's CAP outlines a long list of actions for 2012. In just the *Buildings and Transportation* categories that were examined in this analysis, Portland details 39 different actions. The actions were chosen based on their chance of impacting long

term emissions reductions. All of the actions were also able to be carried out by the City and County governments. Unlike the Chicago CAP, where government, businesses, and private households were responsible for implementing actions within the CAP, the actions within Portland's CAP were strictly under the local government's direct sphere of influence.

Co-Benefits: Another important criterion in the choosing of climate policies was their potential for creating additional community benefits, such as job growth, improved quality of life, and improved public health. The plan emphasizes the importance of linking climate change policies with other important local objectives such as economic growth. Portland's stance is that climate policies as well as local objectives are mutually reinforcing.

Policy Evaluation: The only actions that were evaluated in detail were those related to the built environment. In Portland's CAP those categories include the *Buildings and Energy* category and the *Urban Form and Mobility* category. First, I evaluated both sections of the CAP to see if the following ten greenhouse gas reduction strategies were present. I then evaluated the degree to which each action had been developed in the plan.

1. Reduce carbon content of fuels
2. Increase fuel efficiency
3. Reduce vehicle miles traveled
4. Increase transit service
5. Promote alternative transportation
6. Manage transportation demand
7. Promote compact and mixed use development
8. Reduce auto use through zoning
9. Retrofit existing buildings
10. Create green building standards for new buildings

Just as in the case of Chicago's CAP, all ten of the strategies listed above are present within Portland's CAP. In the *Buildings and Energy* category the CAP proposes objectives for existing buildings and new buildings. For existing buildings the goal is to reduce energy usage by 25 percent by 2030. For all new buildings the goal is to achieve net zero greenhouse gas emissions. To achieve these objectives the CAP outlines several actions to complete by 2012 including establishing an investment fund of at least \$50 million to provide low cost energy efficiency financing, require energy performance ratings for all homes, establish a city business tax credit for installers of both solar panels and eco-roofs, and provide resources and incentives for CO₂ reduction related to energy efficiency, renewable energy, building reuse, and materials. The plan also includes an action to amend the Oregon building code to codify

performance standards of Architecture 2030, a non-profit organization that has provided guidelines for reducing carbon emissions in the building sector. The actions related to buildings, both new construction and existing building were not considered fully developed because not all of the actions provided measurable indicators for assessing progress. In both cases actors were clearly defined, as the plan stated earlier that all actions were under the direct purview of the local government. A couple of buildings-related actions did in fact provide an indicator to assess progress like the action to establish an energy efficiency investment fund of at least \$50 million. The others, however, used language that made it difficult to determine to what degree the action would be performed. For example, the action to provide resources and incentives to residents and business about carbon reducing measures does not indicate what kind of incentives, or how many incentives, or what type of resources.

In the *Urban Form and Mobility* category, there are 25 actions described to meet several 2030 objectives. In the category of reducing the carbon content of fuels, Portland describes its objective to reduce the lifecycle emissions of transportation fuels by 20 percent by 2030. The 2012 actions to achieve this objective are to accelerate the transition to plug in hybrids and electric vehicles by supporting the installation of electric car charging stations, and implement the second phase of the City's renewable fuels standard to require diesel fuel sold in Portland to be at least ten percent biodiesel. These actions together are also not considered to be fully developed. Although the actors are indicated, and the diesel fuel action has an exact performance measure from which to assess progress, there is no funding mechanism outlined for the installation of the electric car charging stations, and no indication of the degree to which car charging stations should be developed by 2012.

Another transportation objective is to increase average fuel efficiency of passenger vehicles to 40 miles per gallon by 2030. The actions outlined to achieve this action are varied. The first action is to support the strengthening of federal fuel efficiency standards. The other actions are related to improving performance of the road system by funding demand management projects that prevent congestion and idling. A third action is to implement a congestion pricing pilot program in partnership with the Oregon Department of Transportation. Again, similar to the other policy actions mentioned above, these actions were not considered fully developed according to the evaluation criteria. First, supporting the strengthening of federal fuel efficiency standards, while important, is not measureable and so it is difficult to gauge what level of support is adequate for this objective's purposes. Also, there is no indication of the degree to which demand management projects should be instituted.

Portland's CAP also identifies several policy actions related to increasing transit use and reducing vehicle miles traveled. The two primary 2030 objectives are to reduce per capita daily VMT by 30 percent from 2008 levels, and to create neighborhoods where

90 percent of Portland residents and 80 percent of Multnomah County residents can walk or bike to meet all basic needs. One of the actions to achieve this is to establish a sustainable funding source to maintain and invest in transport capital projects. Another action is to identify infrastructure investments including public private partnerships needed to achieve highly walkable and bike-friendly neighborhoods. Other actions are more specific such as: build East Side streetcar, build 15 miles of bicycle boulevards by 2010, construct two miles of sidewalks on main arterials, and incorporate bike and pedestrian facilities on the Sellwood bridge redesign.

The plan also outlines several land use related actions to achieve the objectives above. Examples are advocate the accommodation of all population and business growth within the Urban Growth Boundary, identify land use planning changes for each type of urban neighborhood that are needed to achieve highly walkable neighborhoods, coordinate decisions about future streetcar investments with the Portland Comprehensive Plan land use decisions, and finally require a minimum amount of long term bike parking spaces for multi dwelling developments. The policy actions related to increasing transit use and reducing VMT are both considered fully developed because they include measureable indicators for assessing progress, and while they don't include an exact funding source, several of the actions themselves are centered upon acquiring a funding source and coordinating inter-agency collaboration to sustain the capital projects needed to increase walking, biking and transit use.

Conclusion: The objectives outlined in Portland's plan include clear and measureable targets to reach by its midterm target of 2030, but the 2012 policy actions outlined are less measurable. Many of the actions use language such as "support," "accelerate," "work with," but these words do not define a gauge from which to measure implementation. The language used to describe the actions is vague. Therefore, it leaves up for interpretation the degree to which the City and County should "support" or "accelerate" certain policy actions. However, these actions were not chosen to be indicator actions. They were chosen as initial actions to encourage collaboration between government agencies. In a sense, they were primer actions; their purpose is to make funding available and establish important partnerships needed to be able to achieve many of the capital projects necessary to avert climate change later on. Again, these actions were designed to be achieved by 2012. After 2012, the actions are to be assessed and more actions are to be implemented; they are just the initial steps toward reaching 2030 objectives. Although several of Portland's CAP actions are not considered "fully developed" according to this evaluation's criteria, the iterative structure of Portland's CAP (i.e., continual reporting and monitoring) allows the City and County to continually monitor their progress despite the subjectivity of some of their policy actions.

III. Plan Implementation Analysis

I assessed both the *planning implementation* and the *plan implementation* of Portland's CAP two years after its adoption in 2009. The evaluation was based off of Portland and Multnomah County's *Year One Progress Report* and *Year Two Progress Report*.

Planning Implementation: All of the policies in Portland's CAP defined a time period for implementation as well as defined an actor for implementation (i.e., the City and County governments). Portland's CAP also clearly outlines a protocol for assessing progress and revising plan actions. All policy actions have an identified protocol for monitoring and evaluation as well as tracking change; the CAP establishes that the Bureau of Planning and Sustainability and the Multnomah County Sustainability Program are to report annually on emissions trends, fossil fuel use, and implementation progress for each of the CAP's actions. Only 20 percent, or four out of the 25 actions evaluated, indicate funding mechanisms, and these are in essence policies geared toward acquiring and establishing funding mechanisms. As was also highlighted in the previous section, most of the actions outlined in Portland's CAP are not indicator actions and so do not provide a clear gauge for assessing implementation progress. The 2030 objectives, however, are measurable and therefore more easily able to be evaluated (e.g., reducing the total energy use of all buildings built before 2010 by 25 percent, and reducing per capita daily vehicle-miles traveled by 30 percent from 2008 levels). Some of the 2012 actions can be either implemented in whole or not implemented at all such as identifying land use changes and infrastructure investments needed in neighborhoods to make them highly walkable and bikeable, or establishing two new parking management districts.

Plan Implementation: Again, for this study's purposes, *plan implementation* analysis involves evaluating the degree to which climate policies have been fulfilled since plan adoption (Talen, 1996). Each year since the adoption of its CAP in 2009, Portland has assessed the implementation of each of its climate actions. It is impressive considering that the CAP includes nearly 100 actions in all of its eight strategy categories. To demonstrate policy implementation in the progress report, each action was categorized as "completed," "on track," "facing obstacles," or "delayed." Portland's *Year Two Progress Report* notes that 12 percent of actions have been completed, 58 percent are on track, 24 percent are facing obstacles, and six percent are delayed. In terms of reporting, Portland's progress report was much more thorough in explaining policy progress than was Chicago's two year report.

In the *Buildings and Energy* category both the policies aimed at retrofitting existing buildings and achieving net zero emissions in new buildings have been partially implemented since plan adoption. First, the City established Clean Energy Works Oregon, a non-profit organization, to be in charge of seeking funding and implementing

the retrofit strategy. The organization has secured about \$45 million. It also successfully implemented a pilot project and retrofitted 1,000 homes and intends to finish 6,000 more homes by 2013. The City also developed a business license fee credit for businesses that install solar panels and eco-roofs together, but it has yet to be accepted within the City budget. The Bureau of Planning and Sustainability provided comments during the development of the Oregon Residential and Commercial Reach Code, and advocated for building code regulations in alignment with Architecture 2030. The Bureau also submitted an Appendix that was adopted into the Reach Code and provided guidance on material resource conservation to reduce life cycle emissions related to new construction. The Reach Code, however, is not obligatory but optional, and so it is uncertain if its implementation will have a real impact in meeting the 2030 objectives.

In the *Urban Form and Mobility* category, all of the actions were at least partially implemented. One action was fully implemented. That included the Metro Council's adoption of a limited Urban Growth Boundary expansion in 2011. Some VMT reduction actions have also been completed such as the building of 32 miles of greenways, the construction of two miles of sidewalks on two main arterial roads, and the development of bicycle and pedestrian infrastructure on the Sellwood Bridge. The City also created an affordable transportation fund for 2010 that funds innovative bicycle projects. Other actions related to VMT reduction have been partially implemented such as an updated Transportation System Plan to include the mode share goals of the CAP, as well as partnering with the Oregon DOT to prioritize transportation investments in bike, pedestrian, transit, and transportation demand management projects.

Actions that support the increase in transit use have also been partially implemented. The construction of the Eastside Streetcar is near completion and expected to open in September of 2012. The City is also making more plans to expand the streetcar system. The City has not, however, achieved its goal of revising the system service plan with TriMet and Metro. The City was partially successful in achieving its goal to establish a sustainable funding source to maintain the existing transportation system and to invest in future capital projects that reduce VMT. Local legislation established an increase in gas taxes and vehicle registration fees to fund capital projects, but the City notes that this boost is still not adequate in meeting all of the City's transportation maintenance and development needs. The progress report notes that adequate and stable transportation funding remains the primary challenge. Similarly as in Chicago, the Portland Bureau of Transportation is also experiencing budget cuts.

Climate actions related to increasing average fuel efficiency and reducing the carbon content of fuels have been partially developed, but the overall progress is very minimal. One of the CAP actions included working with the Oregon DOT to implement a congestion pricing pilot program, but the progress report notes that very little progress

has been made on this effort. The City was also not able to require that diesel fuel sold in Portland be at least 10 percent biodiesel. In 2010, the Portland City Council voted to suspend the requirement due to economic and technical circumstances. The City was more successful in implementing electric vehicle infrastructure. The City and County helped the State secure funding for electric vehicle readiness from the US Department of Energy, and the City created an online permitting process for electric vehicles. The City was also able to open a showcase of seven electric vehicle charging stations downtown.

Conclusion: An analysis of Portland's CAP implementation shows that there has been considerable action to fulfill the 2012 climate actions. According to the *Year Two Progress Report*, the majority of Portland's CAP actions have been partially implemented, but only a few have been completed.

Since many of the climate actions are in some ways subjective, as was mentioned in the content analysis, it may be almost impossible for some of the actions to ever be fully implemented. Support and promotion are constant; there is really no discernible end to these types of policies.

All of the policy actions were at least partially implemented. In part because of its detailed reporting process, gauging Portland's implementation progress was quite simple for this study's purposes. Portland detailed the progress of every one of its actions, unlike Chicago's progress report which mainly presented highlights. This type of detailed monitoring may facilitate a better ongoing climate planning process because it consistently provides a basis from which to move forward. It helps to keep an accurate record of what has been achieved, what is being achieved, and what is facing obstacles toward achievement. The CAP delegated monitoring and reporting responsibilities to the City's Bureau of Planning and Sustainability. This type of monitoring work is dependent on having staff available to provide evaluations and consistent tracking. Perhaps it is important for cities to assign these tasks to specific City departments, like planning, so that monitoring and evaluation are not interrupted.

Greenhouse gas emissions analyses show that emissions reductions have also been very modest since the adoption of Portland's CAP. One year after CAP implementation, 2010 emissions decreased by three percent from 2009 emissions levels. Table 4 demonstrates that 2010 emissions were, however, six percent less than 1990 emissions and 19 percent less than 2000 emissions. Emissions from buildings have shown reductions since CAP adoption, but transportation emissions have increased, although slightly.

Many of the actions outlined in Portland's 2009 CAP were provisional actions, or primer actions. Most were related to fundraising or to further planning actions involving collaboration among different government agencies. Therefore, these actions may not have been effective in producing drastic transportation and energy efficiency changes in the course of two years. Portland's next round of actions need to evolve from the preliminary three year actions to include more definitive policies with concrete reduction goals.

Table 4. Multnomah County Greenhouse Gas Emissions Changes (million metric tons CO ₂)					
	2000	2005	2009	2010	*2050 target
Total Emissions	9.5	8.1	7.8	7.6	1.72
Total Population	660,486	656,146	728,855	735,334	
Per Capita Emissions (metric tons)	14.4	12.1	10.8	10.4	
Transportation Emissions	3.05	3.09	2.91	2.93	
Building Emissions	6.33	4.95	4.87	4.68	
Sources: City of Portland and Multnomah County Climate Action Plan 2009 Year Two Progress Report; US Census Bureau 2005 and 2009 American Community Survey, Table B01003					

Case Study Summary Matrix

	Chicago, IL	Portland, OR
Population (2010)	2,695,598	566,686
Population of greater metro region (2010)	8,316,650	2,226,009
2012 City budget	\$8.2 billion	\$3.59 billion
GHG emissions levels 2005	36.2 million metric tons	8.1 million metric tons
per capita emissions 2005	13.4	12.1
CAP	Chicago Climate Action Plan: Our City. Our Future (adopted 2008)	City of Portland and Multnomah County Climate Action Plan (adopted 2009)
Plan Content & Plan Implementation		
% of policies that were considered “fully developed”	30%	20%
plan implementation score	0.3/1.00	0.6/1.00
# of fully implemented policies	1	1
# of partially implemented policies	4	9
# of non-implemented policies	5	0
GHG emissions levels 2010	33.3 million metric tons	7.6 million metric tons
Percent change in GHG emissions levels from 2005 to 2010	-4%	-6%

6. Conclusion

Despite many recognized and unrecognized barriers, climate change planning at the local level is a growing effort in the United States. Especially with very little action on the part of the federal government, climate protection policy development has become ever more present on the agendas of local leaders. Cities have been targeted as important fronts in the effort to combat climate change because they consume the highest amounts of energy and contribute to the majority of greenhouse gas emissions (Betsill, 2001). In the US, local governments have recently begun developing strategic plans, or climate action plans (CAPs), to address adapting to the future impacts of climate change and mitigating greenhouse gas emissions. This thesis aimed to take a closer look at these planning efforts so to better understand how climate action plans go about confronting the climate change issue. This thesis asked what type of climate policies are cities adopting, and are these actions effective in responding to climate change in the urgent manner necessary? This thesis also attempted to gain an understanding of how the urban planning profession has been involved in instituting climate action planning to date and attempted to determine how planners should best be involved in future efforts.

In the past decade the number of cities engaged in climate policy development has dramatically increased (Pitt, 2001). ICLEI's Cites for Climate Change Campaign had 75 enlisted members in 2001, but today that number exceeds 600 communities across the US. As of late 2009, ICLEI reported that approximately 200 municipalities had or were in the process of drafting CAPs or sustainability plans (ICLEI, 2009). Findings from research show, however, that US cities are going about planning for climate change in a number of ways. Even cities that have created individual plans specifically dedicated to climate change have approached policy choice in different manners. Some communities have decided to focus on reducing only corporate greenhouse gas emissions (i.e., emissions from the operations of the local government); this is a lead by example approach. Other communities have chosen policies that target reducing emissions from all sources within the city's boundaries. Actions include changes to the built and natural environment.

This thesis employed a case study analysis of two particular US cities to critically examine climate action planning in more detail and evaluate the success of climate policy implementation. The case cities, Chicago, Illinois and Portland, Oregon, were chosen because, relative to other American cities, these communities are well ahead of the rest of the country in the effort. They have both been recognized as leaders in the climate planning movement.

Both Chicago and Portland promoted the adoption of climate related policies by touting the co-benefits of such actions, showing that implementation of climate policies would produce reciprocal benefits in many other sectors of society in addition to protecting the global environment. Research also shows that many communities preparing for climate change use the “think locally, act locally” approach to reframe global climate change policy and encourage political backing as well as citizen support (Betsill, 2001).

Chicago and Portland are quite similar in their approach to mitigating climate change. They both set the same long term goal, and an ambitious one for that matter (to reduce total annual emissions by 80 percent of 1990 levels by 2050). Their target is based on scientists’ emissions reduction recommendations for the middle of 21st century. In addition, Chicago and Portland both set midterm emissions reduction goals; Chicago set a goal to reduce emissions by 25 percent by 2020 and Portland set a goal to reduce emissions by 40 percent by 2030. The policies actions outlined in each plan were formulated to specifically meet midterm goals. Both Chicago and Portland outlined numerous policies to reach their target objectives. Chicago’s plan noted that it takes an assembly of actions to mitigate greenhouse gas emissions; there is not a single solution.

Although actions were similar in their approach to mitigating emissions, the two plans were organized and structured somewhat differently. Both Chicago and Portland focused efforts on reducing emissions in the transportation sector by using fuels with lower carbon content and reducing vehicle miles traveled by incentivizing alternative forms of transportation such as transit, biking, and walking. In the buildings sector, both cities’ primary objective was to reduce emissions by employing more energy efficiency measures to reduce energy consumption in residential and commercial buildings. Chicago’s choice of policy actions to reach objectives was very much metrics-based. The City associated a potential greenhouse gas emissions reduction with each action and totaled estimates to gauge whether or not the 2020 goal could be reached. Portland, on the other hand, did not quantify potential reductions from its policy actions, but established an iterative planning process, where progress is continually assessed and actions are revised and reconstructed every three years. Since Portland’s actions were designed to be implemented within a short term three year time period (by 2012) many of them were qualitative in nature and cannot be measured in the same sense as Chicago’s actions. Many of Portland’s actions involved creating inter-agency partnerships and developing funding mechanisms to support future capital investments that will be needed mitigate climate change. These short term actions were considered initial steps, part of a long process of moving toward the 2050 goal.

Many of the policies actions included in CAPs, in general, are not innovative, but are similar to traditional planning strategies found in comprehensive plans, hazard

mitigation plans, and sustainability plans (Bassett and Shandas, 2010). Some critique that climate action planning is just a repackaging of current initiatives. But whether or not policy actions are innovative is not necessarily an issue. What's more important in climate action planning is whether policy actions are appropriately linked to emissions reductions targets and whether or not they get implemented.

Talen (1996) notes that too much of planning evaluation is focused on proposed planning activity versus actual plan implementation. The success of planning can really only be determined in the future, therefore analyses of plan implementation are crucial in proving whether or not plans are a legitimate effort (Talen, 1996). When it comes to urgent and drastic greenhouse gas emissions reductions, the case for regular evaluations of CAP progress and implementation is even more imperative.

This thesis asked if climate plans are being implemented to the degree necessary to prevent serious climate change. Research on the climate planning efforts of other American cities found that despite the urgency of climate change mitigation, progress was slow and implementation was a problem in part because many communities do not have adequate funding to complete CAP measures (Wheeler, 2008).

In this thesis, the implementation of Portland and Chicago's CAPs were evaluated by assessing each city's two-year progress report. Portland scored a much higher implementation score than Chicago. Every one of Portland's actions that were evaluated in this study was at least partially implemented in the two years since plan adoption. Many of Chicago's policies were scored as not yet implemented in part because Chicago's progress report did not mention the progress for all of its policies; it only highlighted a few of the CAP's many actions.

There could be many reasons for Chicago's low implementation score. Perhaps Chicago's size, both the size of its government and the size of its population, inhibited the implementation of climate policies that depended on inter-agency collaboration such as in the case of transit oriented development projects. Another factor could be the administration change in Chicago in 2010. Former Mayor Daley was a major proponent of the Chicago Climate Action Plan and when he left office the new mayor, Mayor Emanuel, instituted many organizational changes within city government that temporarily suspended climate action implementation. Due to limited budgets, the new administration got rid of the Department of Environment, which had previously administered the climate action efforts. These institutional changes may have, in some ways, shaken up the plan implementation process. Mayor Emanuel, however, since elected has been a strong advocate of environmental programs just the same. He has recently released an environmental plan for Chicago (City of Chicago, 2012), and has been active in pursuing many of the CCAP's objectives such as increasing bike lanes

and shutting down coal fired power plants. Although the new mayor has demonstrated the implementation of climate related policies in his first term, the continuity of the Chicago Climate Action Plan is still in question, especially since the Department of Environment no longer exists. This begs the question for future climate planning efforts: should climate action plans incorporate implementation strategies that can outlast administration changes? How can a City organize and prioritize an effective monitoring and evaluation system when key government bureaus are often restructured?

Greenhouse gas emissions analyses show total greenhouse gas reductions in both Chicago and Portland since the adoption of their CAPs. The reductions, however, are modest and still leave unanswered the question of whether or not the actions outlined in each city's CAPs are sufficient in mitigating climate change at the speed that scientists deem necessary.

Many researchers criticize local climate change plans for not focusing on the most effective measures and for ignoring key sources of carbon emissions (Wheeler, 2011). Kousky and Schneider (2003) have criticized mitigations efforts being top-down decisions "based on what officials or staff members to be 'good business' or rational policy choices" (p. 3). Rutland and Aylett (2008) criticize energy efficiency strategies, saying that they are not the same as reducing energy consumption. Cities miss major opportunities to reduce emissions by not addressing consumption (Rutland and Aylett, 2008). In fact, many of Chicago and Portland's actions seem conservative in this sense; none of the actions directly regulate emissions or energy consumption of city constituents. And even though it was mention in their plans, neither city was able to institute a congestion pricing program.

Most climate actions—and all in the case of Portland—were under the direct influence of the local government. Even emissions inventories have also been designed to exclude local emissions that cannot be directly governed by the municipality, like emissions as a result of air travel or the long distance travel of imported commodities (Rutland and Aylett, 2008). Local emissions inventories have primarily evaluated emissions based on the production of goods, the supply side of the economy. Only recently have methods been used to count emissions based on the consumption of goods, the demand side of the economy. Portland's CAP mentioned that the Oregon Department of Environmental Quality is currently developing a method to examine demand side emissions. Portland promotes the tracking of emissions from both sides of the economy in order to provide a more complete picture of total emissions and their underlying causes. Researchers also stress the importance of examining climate policies from both the supply and demand sides. Kockelman et al. (2011) note that, on the supply side, the region could supply more fuel efficient vehicles, or the local government could improve public transportation, make neighborhoods more pedestrian friendly and offer more walkable destinations, but on the demand side,

however, people have to be willing to effect these changes as well. Residents have to be willing to buy these fuel-efficient vehicles and be willing to drive less. If communities are to reduce greenhouse gas emissions greatly and in a hurry, can climate actions still be based on conventional economic development strategies? In other words, do climate policies need to address consumption and growth in order to be effective and how do they do so? These are questions for further research.

Implications for Planners

The study of communities' experiences in climate change policy development provides an opportunity for other municipalities that may be considering the adoption of climate policy or just beginning the climate action planning process to glean some valuable guidance. While it has been noted that in the past decade a dramatic number of cities have engaged in climate policy development, there are still quite a few that need to advance their efforts to the next level, towards implementation. There are many US communities that simply need to get started. Studies that examine this emerging type of planning help to establish best practices in the field, providing insight into what works and what doesn't in terms of confronting climate change.

The experiences of Portland and Chicago teach us a lot about how the planning profession can help communities prepare for climate change. First, implementation of climate plans is key. As Portland illustrates, the planning profession has an important role to play in the implementation of climate related policies by continually monitoring and evaluating progression and providing a continual forum for mitigation assessment. Portland also exemplifies the incremental approach to policy development and may provide evidence that this method is indeed applicable to climate policy development. While Portland's success in reducing greenhouse gas emissions is the result of multiple factors, its case definitely affirms that the planning process is equally as important as the actions themselves. Planning must involve an ongoing monitoring process. Planners should examine the implementation of climate actions in order to evaluate what's been effective, what has not been effective, where to move forward, and where to change course.

Chicago's case provides further insight: that marketing is valuable. Millard-Ball (2012) found that it was not necessarily plans that inspire implementation of climate actions, but more it is a population's environmental preferences that seem to predict success in implementing climate change policies. Millard-Ball (2012) even posits that instead of plan development, planners and policy makers should focus more on marketing campaigns to influence a community's environmental preferences and in turn garner support for climate action. Chicago's case illustrates the need for planners to campaign for climate action in order to encourage and spur the development and adoption of a local CAP. The City of Chicago invested months, even years,

collaborating with multiple stakeholders in the drafting of the CCAP (once again demonstrating the importance of process). CCAP administrators from the Department of Environment engaged hundreds of stakeholders in plan preparation representing universities, non-profits, and business and industry leaders. These actions were intentional to gain buy in and support before the plan was even adopted. Furthermore, the City of Chicago was able to secure a substantial amount of funding for CAP implementation from well-known foundations in the months that followed the adoption of the CCAP, and this may certainly be attributed to the City's marketing of its climate action proposals.

Even though Chicago and Portland have both documented greenhouse gas emissions reductions since the implementation of their CAPs, it is still questionable whether the CAP policy actions are enough to achieve each region's long term climate mitigation goals. Both plans focus on measures that are under the purview of local government. Researchers argue that stronger actions are needed. Some argue that more transformative measures are necessary to avert climate change, such as a putting carbon on the market by enforcing a tax. Climate change is a complex systemic issue. Reforming or altering systems takes time and cannot be achieved in one fell swoop, or by one agency alone for that matter. Plans, however, "can potentially establish an ongoing framework for action" (Wheeler, 2008, p.483) even if local climate action planning in and of itself may not be adequate in solving the global climate crisis.

One thing is clear from this study: climate change is an issue that can and must be governed. To mitigate greenhouse gas emissions local governments are able to enact policies that affect consumption of fossil fuels locally. Planning professionals for that matter, can impact greenhouse gas emissions levels related to the built environment by integrating climate-related policies into master plans, land use and transportation plans, and building codes. Additionally, to adapt to the impacts of climate change, local governments have the authority to develop infrastructure in such a way to maintain and conserve important services and resources such as drinking water.

However, in terms of climate mitigation and stabilization, cities are not capable of addressing the multiple sources of greenhouse gas emissions alone. Their efforts could be greatly accelerated with higher level climate change governance. It is unfortunate that US cities preparing for climate change have yet to receive any comprehensive federal support; they should be commended nevertheless for taking their own initiatives. Federal climate legislation has been at a standstill in Congress for the past two years (Cohen and Miller, 2012), and the US has yet to ratify any trans-national climate agreement at international conventions.

The challenge of climate change will necessitate action at all levels of government in the United States. Policies at each level are enhanced by the mutual

support of the others. The American Planning Association (APA) in its *Policy Guide on Planning and Climate Change* provides a framework for multi-level climate action and delineates the roles for each the state, local, and federal governments. Every policy response has an appropriate scale in which it should occur. The APA positions the federal government as the primary scale for most mitigation efforts (e.g., fuel efficiency standards, utility regulation, and carbon pricing). The federal government is in this position because it has more authority to regulate businesses, such as automakers, and more authority to regulate or tax pollutants or create stringent vehicle emissions standards. State roles are similar to federal roles for climate action, but the APA (2008) notes that states' policy responses may vary depending on the climate change impacts to which each are subject. For example, coastal states may choose different policy responses than inland states. The APA (2008) says that local governments are in the best position to handle adaptation efforts as this is the site where homes are flooded, drinking water is supplied, building permits are granted, etc. The APA proposes a suggested multi-level climate change policy response, where the federal ideally take the reins in pushing mitigation. However, we cannot predict when or if Congress will pass any type of comprehensive climate legislation. So today, local governments remain the crux of climate change policy development and implementation in the United States.

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Vita

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