The Diffusion of Climate Protection Planning among U.S. Municipalities

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ABSTRACT

Many U.S. municipalities are engaged in climate protection planning, or efforts to reduce their communities' greenhouse gas (GHG) emissions through land use, transportation, and energy planning. However, they face a number of procedural and institutional obstacles that limit the adoption and implementation of those plans. The literature on climate protection planning identifies some of the factors that lead municipalities to join relevant policy networks, but provides little guidance for overcoming the aforementioned obstacles and adopting policies to reduce community-wide GHG emissions. This dissertation increases the understanding of climate protection planning by examining whether the adoption of these plans and policies is driven primarily by local demographic, economic, environmental, or political characteristics. It also contributes to the literature on local government policy diffusion by examining whether the spread of climate protection policies is dictated primarily by internal or external determinants.

The research for this report includes a survey with responses from 255 U.S. municipal leaders. These responses are combined with secondary data and analyzed using multiple regression techniques to estimate the impact of 15 demographic, political-institutional, economic, and environmental variables on the adoption of climate protection plans and policies.

A series of follow-up telephone interviews provides a more detailed understanding of how these factors influence the extent of climate protection planning. The quantitative findings indicate that the influence of neighboring jurisdictions, the presence of staff members assigned to energy or climate planning, and the level of community environmental activism have the greatest impact on climate protection policy adoption. The interviews reveal that the most successful municipalities tend to coordinate with their neighbors on energy and climate issues and incorporate meaningful community participation in their climate protection planning processes. This supports the conclusion that the extent of climate protection planning is driven primarily by internal processes, and municipalities that are successful in this area do not fit any one profile according to their demographic, economic, or environmental characteristics. Therefore, most if not all municipalities have the potential to adopt climate protection policies if sufficient resources, support, and initiative are in place.

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Chapter 1. Introduction

While climate change is a global problem, it is influenced in many ways by actions and behaviors at the community level. A growing number of municipalities acknowledge this global-local nexus and are actively working to reduce their communities' greenhouse gas (GHG) emissions through planning measures and a variety of energy, land use, transportation, and other policies. Two major non-governmental programs – ICLEI Cities for Climate Protection (CCP) and the U.S. Mayors Climate Protection Agreement (USMCPA) – have emerged to assist local governments in these "climate protection" planning efforts. Little data is available on the emission reductions that these initiatives have achieved thus far. However, the sheer quantity of municipalities that have recently begun climate protection planning processes demonstrates a potential for significant future GHG reductions – if the plans they prepare can be implemented through effective policies.

Prior research has uncovered many of the obstacles that municipalities face when trying to adopt and implement climate protection plans and policies. More information is needed on how municipalities can overcome those obstacles and the characteristics that make them more likely to have adopted climate protection plans and policies. While other scholars have studied the characteristics of municipalities that sign the USMCPA and/or join CCP, the purpose of this research is to identify the factors influencing *the extent to which* municipalities pursue climate protection planning, i.e., the number of planning measures and policies they have adopted. The specific research questions are as follows:

- What factors lead municipalities to adopt climate protection policies?

- Is the adoption of climate protection policies driven primarily by the internal characteristics of a given community or the external characteristics of its surrounding metropolitan area, region, or state?
- Is the adoption of climate protection policies driven primarily by local, demographic, political-institutional, economic, or environmental conditions?
- To what extent is the adoption of climate protection policies motivated by the pursuit of "co-benefits," such as air quality improvements, energy cost savings, or traffic alleviation?

The answers to these questions will significantly help municipal leaders, including those already pursuing climate change policies, to develop and implement approaches to reduce their communities' contributions to global GHG emissions. They also will provide valuable information to CCP, the USMCPA, and other organizations so that they may more effectively assist local governments through the climate protection planning process.

This topic is important because most GHG emissions can be attributed, either directly or indirectly, to actions taken at the community level (Angel, et al., 1998; Bulkeley and Betsill, 2003; Dhakal & Betsill, 2007; Droege, 2002; Romero-Lankao, 2007; Wheeler, London, & Randolph, 2009). Because of this local nexus, municipalities have the opportunity to curb GHG emissions through land use and transportation planning, building codes, waste management, and other government functions. They also can support climate protection efforts by facilitating the activity of various community partners (Bulkeley & Betsill, 2003; Granberg & Elander, 2007; Holgate, 2007; Parker & Rowlands, 2007) and giving legitimacy to climate policy initiatives that can then be translated to the local level (Aall, Groven, & Lindseth, 2007).

Urban planning has an important role in climate protection because land use, transportation, and other areas traditionally of concern to urban and regional planners have an impact on GHG emissions (Bulkeley & Betsill, 2003; Bulkeley, 2007; Gupta, 2007; Gupta, Lasage, & Stam, 2007; Wheeler, et al, 2009). Early planning models embraced an auto-dependent culture and contributed to the suburban explosion of the mid-twentieth century. This increased fossil fuel dependence, and thus GHG emissions, in American cities. More recently, the "smart" or "compact" growth movements have sought to reduce automobile dependency through greater densities, mixed-uses, and transit-oriented development. These new approaches to land use and development have the potential to reduce GHG emissions from transportation fuel use (Ewing, Bartholomew, Winkelman, Walters, & Chen, 2007; Stone, Mednick, Holloway, & Spak, 2007) and building energy use (Brown & Southworth, 2008).

This dissertation focuses on municipal approaches to community climate protection planning and policy adoption. As used here, the term "municipalities" refers to local government entities, including cities, towns, villages, and counties. While some counties have had notable achievements in climate protection planning (e.g., Tompkins County, NY, and Durham County, NC), this study focuses primarily on U.S. cities, towns, and villages, referred to generically as "cities." The terms "municipalities," "counties," and "cities," all refer specifically to local government entities, and the term "communities" refers to the entirety of a given locality, including its residents, businesses, institutions, etc. Thus "community climate protection planning" includes efforts by municipalities to reduce GHG emissions not only from their government operations, but from their entire communities including the residential, commercial, and industrial sectors. The term "planning" as used herein includes not only the preparation of long-term goals and objectives for reducing GHG emissions (e.g., through a climate action plan), but also the formulation and adoption of policies to achieve those objectives via energy efficiency and conservation, renewable energy use, growth management, and alternative transportation policies. The terms “climate protection policy” and “climate protection policy adoption” refer to policies and programs to reduce community-wide GHG emissions. Finally, the terms “energy conservation” and “energy efficiency” refer to reductions in building energy use, i.e., the consumption of electricity, natural gas, and other fuels in homes and businesses. More specifically, energy conservation reduces the demand for energy, such as by hanging laundry to dry on a clothesline, while energy efficiency reduces the energy input needed to achieve a given energy input, such as by replacing an old clothes dryer with a newer Energy Star model.

This remainder of this chapter includes a brief discussion of the research approach, background information on current U.S. climate change mitigation policies at the federal and state levels, and a history of climate protection planning efforts in U.S. municipalities. It concludes with an outline of the remaining chapters.

Research Approach

This dissertation is based upon the author’s survey of U.S. municipal leaders, in which the respondents identified the specific climate protection policies that their jurisdictions had adopted, described the political and institutional characteristics of their communities with respect to energy, climate, and environmental issues, and shared their personal opinions and experiences with respect to climate protection planning. Secondary data were gathered on a number of economic, demographic, and environmental characteristics of the municipalities represented in the survey responses. A series of multiple regression analyses were conducted to estimate the impact of these demographic, political-institutional, economic, and environmental variables on the extent of local government climate protection planning in the subject municipalities. Follow-up telephone interviews were conducted to further elaborate on the findings from the survey analysis.

This dissertation is the first quantitative analysis of the factors behind local government climate protection policy adoption. It contributes to the growing body of literature on climate protection by illuminating the characteristics that make a municipality more likely to adopt climate protection plans and policies. It also enhances the policy diffusion literature by applying this theory to the domain of local government environmental policy. It paves the way for future research on opportunities for municipalities to overcome institutional barriers to the adoption of these plans and policies. Finally, the results of this study should help organizations such as CCP and USMCPA to refine their recruitment and implementation strategies so that more municipalities can adopt these policies in the future.

Background

Climate change is rapidly emerging as the preeminent environmental policy issue of the early twenty-first century. The scientific consensus that global temperatures are increasing due to anthropogenic causes is reflected in the Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC, 2007b), which found that "global atmospheric concentrations of carbon dioxide, methane and nitrous oxide have increased markedly as a result of human activities since 1750" (p. 2). Working Group II of the IPCC reported that the environmental impacts of climate change could have numerous negative impacts on the natural environment and human health including rising sea levels, increases in drought-affected areas, more frequent heavy precipitation events, melting of glaciers, and ecosystem damages, particularly in coastal areas. Projected direct impacts to humans include increased risk of heatwaves, floods, storms, fires and droughts, and health effects such as increased malnutrition, cardio-respiratory diseases, and "the altered spatial distribution of some infectious disease vectors" (IPCC, 2007a, p. 43).

International, National, and State Climate Protection Policies

The international policy response to climate change began with the adoption of the United Nations Convention on Climate Change (UNCCC), which went into effect in March, 1994. The UNCCC set the basic framework for international cooperation to share information about GHG emissions and develop national strategies for mitigation and adaptation. The UNCCC has been ratified by 191 countries, including the United States (United Nations Framework on Climate Change, 2007). Since 1994 the UNCCC member nations have gathered approximately annually in Conference of Parties (COP) meetings to refine and improve the UNCCC's international climate protection efforts. The third such COP, in December 1997, resulted in the Kyoto Protocol, which established the first binding GHG emission reduction requirements for UNCCC member nations and has been signed by every developed Western nation other than the United States.

The protocol established emission reduction requirements for each country, with the goal of reducing global GHG emissions to 5% below 1990 levels by 2012. It placed a heavier burden on developed nations, which were found to be more capable of paying for emission reduction efforts and had traditionally contributed more GHG emissions per capita than developing countries. Subsequent COP's established emissions trading protocols and other mechanisms for implementing the Kyoto requirements, and the most recent COP's have focused on developing new international climate protection efforts to go into effect after the Kyoto Protocol expires in 2012. The 14th COP took place in Poznań, Poland, in December, 2008. The participating parties agreed to prepare a negotiating text of a new international climate change agreement by June, 2009, with the goal of adopting said agreement at the 15th COP in Copenhagen in December, 2009 (United Nations Framework on Climate Change, 2009).

The United States has not signed the Kyoto Protocol or adopted any mandatory emissions reduction measures. Instead, the Bush administration established in 2002 a goal of reducing greenhouse gas intensity (i.e., emissions per unit of GDP) to approximately 18% below 2002 levels by 2012. The government expected to achieve these reductions through a combination of voluntary programs and technological breakthroughs, and the plan included no mandatory requirements (U.S. Environmental Protection Agency [EPA], 2007). Achieving this emissions intensity goal would not necessarily reduce overall U.S. emissions, as total GDP in 2012 will likely be significantly higher than in 2002. In fact, the Pew Center for Global Climate Change found that the Administration's goal would allow a 12% increase in total emissions from 2002-2012, a number consistent with recent trends (Pew Center on Global Climate Change, 2007).

The election of President Barack Obama signaled a potential shift in United States federal policy towards climate change and other environmental issues. The Obama administration has stated its goal to implement "an economy-wide cap-and-trade program to reduce greenhouse gas emissions 80 percent by 2050" and make the United States "a leader on climate change" (The White House, 2009). However, at the time of this publication, significant climate or energy-related legislation had not yet been adopted under the Obama administration.

In the face of the lackluster efforts at the US federal government level to address climate change and reduce GHG emissions, many efforts have emerged to address this problem at the "sub-national" level. As of February, 2009, 32 U.S. states had completed climate action plans, and four other states were in the process of preparing such plans (Pew Center on Global Climate Change, 2009b). In addition, over half of U.S. states had joined one or more regional climate change organizations, either as a participating or observer state. For example, ten northeastern states had joined the Regional Greenhouse Gas Initiative (RGGI), a mandatory cap-and-trade program that seeks to reduce CO2 emissions to 10% below 2005 levels by 2019. Other regional climate agreements include the Western Climate Initiative and the Midwestern Regional GHG Reduction Accord (Pew Center on Global Climate Change, 2009c).

Local Government Climate Protection Policies

Community climate protection planning represents in some ways a re-emergence of the energy planning efforts of the late 1970s and early 1980s, when a number of cities pursued policies to promote energy efficiency, energy conservation, and renewable energy in their communities. Portland (OR) is considered the first U.S. city to engage in comprehensive energy planning, having produced a six-volume report in 1979 that resulted in a variety of energy policies and ordinances. Around this same time, the U.S. Department of Energy's (DOE) Argonne National Laboratory's Comprehensive Community Energy Management Program supported energy planning efforts in 16 communities. A handful of other communities prepared comprehensive energy plans independently, or with support from state governments.

A pioneering study by Kron and Randolph (1983) looked at the experiences of 11 communities that had developed comprehensive energy plans in the early 1980s. The implementation of those plans led to a variety of programs and policies, including the following:

- Education programs for residential weatherization

- Solar access and solar siting ordinances
- Residential energy conservation funds
- Planning, construction or retrofit of hydropower facilities
- Establishment of a municipal electric utility
- Retrofits of municipal and/or residential buildings
- Construction of a bikeway system

The authors also found that some municipalities had adopted independent energy policies, i.e., policies that were not part of a broader energy planning effort. This included a variety of building code, subdivision, or zoning regulations to support solar energy, such as solar access ordinances, performance standards and density bonus incentives for residential energy efficiency, solar domestic hot water system, and time-of-sale energy efficiency retrofit requirements.

Another early study, by Corbett and Hayden (1981), described innovative new policies that Davis and a number of other California cities had adopted to encourage energy conservation and solar energy use. These included strict conservation-oriented building codes, some of which went so far as to mandate the use of solar water heaters and/or solar space heating in new residential buildings. The authors also described how many California cities had used land use and transportation planning techniques to encourage pedestrian and bicycle use over automobile transportation, maximize solar exposure for buildings, and promote passive cooling through the use of narrow streets and shading. Many of the cities also invested in energy efficiency upgrades at municipal facilities and investigated opportunities to generate renewable energy through the use of municipal solar utilities or landfill gas capture.

The success of these pioneer municipalities led some to believe that these innovative community energy planning approaches would become the norm. After describing the successes in California, Corbett and Hayden were inspired to conclude that:

> "[T]he reborn traditions of self-reliance and community control are giving rise to new initiatives that spread by example. It is only logical that solar energy, the most dispersed source of heat, light, and power, come into existence as a national program one community at a time, in a chain reaction spreading from coast to coast."

However, the burst of community energy planning from the late 1970s and early 1980s had largely waned by the mid 1980s, due to lower energy prices and reduced concern for energy issues (Kron & Randolph, 1983; Randolph, 1988). While some achievements were made, in the end few municipalities had adopted major local energy programs or become more energy self-reliant (Randolph, 1988).

While community energy planning faded through the late 1980s, the following decade saw the slow emergence of a local climate protection movement amid growing awareness and concern about GHG emissions and their potential to cause global climate change. In 1991 the International Council of Local Environmental Initiatives (ICLEI) launched its Urban CO_2 Reduction Initiative, later to become the Cities for Climate Protection (CCP) Campaign. Working with a small number of American, Canadian, and European cities, ICLEI "developed a municipal planning framework for greenhouse gas reduction and strategic energy management" (ICLEI, 2006, p. 1). In 1993, one of the original CCP members, Portland, OR, adopted what is often considered the first community-wide plan to reduce GHG emissions and combat global warming. Other municipalities with early climate protection plans included Miami-Dade County, FL (1993), Fort Collins, CO (1999), and Burlington, VT (2000) (ICLEI, 2006).

The CCP program grew slowly over the next decade, accumulating approximately 75 U.S. members by 2001 (Betsill, 2001). In 2005, Seattle Mayor Greg Nickels drafted the U.S. Mayors Climate Protection Agreement (USMCPA). Nickels and eight other mayors signed this pledge to inventory GHG emissions within their jurisdictions and to reduce those emissions to 7% below 1990 levels by the year 2012 (i.e., to meet Kyoto protocol targets for the U.S.). The U.S. Conference of Mayors passed a resolution supporting the USMCPA in 2005 (U.S. Conference of Mayors, 2008b). Soon thereafter the Sierra Club began its Cool Cities campaign, which provides a support network for local elected officials, administrators, and community activists that wish to pursue climate protection planning in their jurisdictions. The Cool Cities network has grown dramatically in the past couple of years, with members in hundreds of communities across the country (Cool Cities, 2008). Over 900 mayors have now signed the USMCPA (U.S. Conference of Mayors, 2009). ICLEI now has 535 member municipalities in 48 U.S. states and the District of Columbia, and a total of 710 members in 32 countries worldwide (ICLEI, 2009a; 2009d). The vast majority of the U.S. members, if not all, are participating in the CCP program. As of 2006 the CCP member cities in the U.S. accounted for an estimated 19% of the country's population (Zahran, Brody, Vedlitz, Grover, & Miller, 2008). The rapid increase in CCP participation over the past two years suggests that the percentage is much higher today.

ICLEI encourages the municipalities that join CCP to pursue a five-step climate protection planning process. These five "milestones" are as follows:

1. Conduct a baseline emissions inventory and forecast

2. Adopt an emissions reduction target

3. Develop a local climate action plan

4. Implement policies and measures
5. Monitor and verify results (ICLEI, 2009c)

Because so many municipalities have joined these organizations very recently, only a relatively small number have achieved even the first milestone of completing a GHG emissions inventory. As of mid-2008 only around 40 to 50 were known to have completed a comprehensive climate action plan.

The specific climate protection policies adopted by U.S. municipalities vary greatly, depending on the extent of the local government's authority, the nature of local energy use and emissions, and a host of other factors that are examined in this dissertation. While numerous case studies have described the range of climate protection policies adopted in specific CCP-member municipalities (e.g., ICLEI, 2006; Osofsky & Levit, 2008), very few studies have measured the extent of climate protection policy adoption by surveying both CCP-member and non-member municipalities in the United States. Walsh (2007) performed perhaps the only such study, and found that 43% of the 473 municipalities in her sample had adopted some form of climate change policy, including both mitigation and adaptation policies. The most common climate mitigation policies among the survey respondents were related to smart growth (145 respondents) and energy conservation (136 respondents). A much smaller number of respondents (78) reported having adopted renewable energy strategies. Walsh also asked if the respondents had plans to adopt the policies in the future. In this case the respondents most often indicated an interest in energy conservation policies (183 respondents), followed by smart growth initiatives (157) and renewable energy strategies (127).

While some of the policies pursued in the name of climate protection are similar to those adopted in earlier energy planning efforts, some notable differences exist between the two types of planning programs. The primary difference is that climate protection planning has the ultimate objective of reducing GHG emissions, whereas the energy planning efforts of the 1970s and 1980s were inspired primarily by concerns about long-term energy supply in the wake of the OPEC production cuts and ensuing "oil crisis" of the mid 1970s. Climate protection planning also differs from energy planning in that it goes beyond building energy efficiency and renewable energy use to include transportation, land use planning, waste management, and other areas of potential GHG emissions reduction. Finally, climate protection planning is, at least in some cases, motivated by concerns that go beyond energy issues or even GHG emissions. Some municipalities have begun to recognize that GHG emission reductions can have many co-benefits, such as air pollution reduction, energy cost savings, and quality of life improvement, and are using those benefits as an extra incentive for pursuing climate protection planning, if not the primary reason for doing so (Betsill, 2001; Bulkeley, 2000; Eckberg & Forsberg, 1998; Kousky & Schneider, 2003; Lindseth, 2004; Slocum, 2004; Romero-Lankao, 2007).

This dissertation explores the range of climate protection policies that U.S. municipalities have adopted, but more importantly identifies the factors that influence the adoption of these policies. As many U.S. municipalities have only recently indicated an interest in climate protection planning, this study will help them to develop an effective planning approach that increases the likelihood of adopting policies to reduce their communities' GHG emissions.

Outline of the Study

The following chapter summarizes the relevant literature on climate protection planning and policy diffusion from political science, planning, and other disciplines and explains how this study constitutes a unique contribution to those bodies of work.

Chapter three describes the research methods used in this study, including the survey distribution methodology, operationalization of variables, and statistical techniques. It describes the conceptual model and explains how the previous literature has informed the selection of variables and research hypotheses.

Chapter four details the study's quantitative research findings, including both descriptive statistics from the survey and secondary data and multiple regression analysis results.

Chapter five describes the qualitative findings from a series of telephone interviews that expanded upon the quantitative analysis and sought a deeper understanding of the factors that influence municipalities' pursuit of climate protection policies.

Chapter six summarizes the study and discusses its implications for local governments and non-governmental advocates of community climate protection planning.

The Appendices include the survey instrument, survey results, detailed quantitative analyses, and interview summaries.

Chapter 2. Literature Review

This chapter begins with a review of relevant theories and findings from the public policy literature. The following section discusses the literature on climate protection planning, focusing on prior findings regarding the factors influencing the adoption and implementation of climate protection goals. The chapter concludes with an explanation of how the relevant literature has helped to shape the research goals of this dissertation.

Policy Studies Literature

At least two bodies of work from the public policy literature are relevant to this study of the factors behind the adoption of climate protection policies in U.S. municipalities. The first is policy implementation, which Birkland (2001) defines as the study of "what happens after legislation or some other statement of policy is enacted and then put into effect" (p. 181). The second body of work, policy transfer, studies the manner in which policies disseminate among governments, including both horizontal transfers of policies across the same level of government (i.e., from city to city or state to state) and vertical transfers up or down the government hierarchy (e.g., from federal to state governments, or from local governments to states).

To determine which of these two literatures is most applicable to the study of local government climate protection planning depends on one's definition of where policy-making ends and policy implementation begins. Certainly signing the USMCPA and joining CCP are acts of policy-making. To achieve the goals set out by these policies, local governments must inventory their current and projected GHG emissions, set emission reduction targets, create a plan for meeting those targets, and adopt policies, initiate programs, and otherwise take action to facilitate GHG emission reductions. The question then becomes, are these acts of policy implementation, or policy-making? Some, such as preparing a GHG emissions inventory and taking actions to reduce emissions from government operations (e.g., switching to LED traffic lights) may be considered acts of implementation. However, to adopt a climate action plan or a more energy-efficient building code would seem to be an act of policy-making. Given that there are no clear answers to these questions, both theories have relevance to the study of climate protection planning. Theories of policy implementation could be used to study what happens after a community joins USM/CCP, and theories of policy transfer could be used to study how and why specific climate protection policies spread among municipalities.

Most investigations of climate protection planning have focused on the CCP program and the extent to which member municipalities have implemented its goals. This perspective considers specific policy measures such as adopting new incentives for renewable energy use to be acts of policy implementation, which would call for an approach rooted in policy implementation theory. However, municipalities that have not joined USM/CCP still can, and often do, adopt policies or programs that have climate protection benefits. Therefore, this study considers specific policies such as incentives for energy conservation or mass transit use to be acts of policy adoption on par with joining USM/CCP, preparing a GHG emissions inventory, or other climate protection planning steps. It seeks to identify the factors that cause municipalities to adopt any of these policies, regardless of whether they are members of USM/CCP or other networks. For these reasons it relies on policy transfer, specifically policy diffusion theory, to inform the research hypotheses. The following sections include a brief review of the policy implementation literature, focusing on its relevance to climate protection planning generally, followed by a more detailed discussion of the policy transfer and diffusion literature and its relevance to this dissertation.

Policy Implementation

Most observers identify two primary approaches to the study of policy implementation. "Top-down" approaches begin by studying the goals and strategies associated with a given policy, then focus on the "gaps between the goals set by a policy's drafters and the actual implementation and outcomes of the policy" (Birkland 2001, p. 182). This model is often associated with Van Meter and Van Horn (1975) and Mazmanian and Sabatier (1989). "Bottom-up" approaches, on the other hand, focus on the implementers of policy at the lowest level, and identify implementation gaps by working their way up to the original policy goals.

The bottom-up approach is often associated with Richard Elmore (1979), who advocated a process of "backward mapping," in which all of the relevant relationships in the implementation process are identified, starting with the ultimate implementers of the policy and moving back to its original designers. While top-down models emphasize compliance with policy goals, bottom-up approaches seek to understand the conflicts that cause policies not to be implemented, and how those conflicts can be avoided (Birkland, 2001).

Birkland (2001) concluded that the top-down approach is most useful for studying policy realms dominated by a single, dominant program or policy statement, whereas the bottom-up approach is best when studying a policy realm made up of many diffuse policies, or when the interest is in "the local dynamics of implementation rather than in the broad sweep of design" (p. 187). It is unclear which approach is best for the study of local government climate protection planning. If we consider the act of joining USM/CCP to be policy-making, and all subsequent actions as implementation, then it is clearly a single-policy issue for which the top-down approach may suffice. However, if we are interested in the local dynamics of how climate protection goals are, or are not, implemented successfully then the bottom-up approach may be more appropriate. Fortunately, a number of "synthesis models" have been proposed that integrate elements of both models.

Elmore's (1985) synthesis model combined his bottom-down, "backward mapping" model with a top-down, "forward mapping" element. According to Sabatier (1986), Elmore's model was primarily intended as a tool to help policymakers incorporate multiple perspectives into their policy implementation strategies. Sabatier's own synthesis approach, however, was intended to be a scientific, "general model" of the policy process that could be used to predict future implementation outcomes. Sabatier's model was based on his Advocacy Coalition Framework (ACF) theory of policy change, and like the ACF, was grounded in the assumption that a policy system must be in place for at least a decade before it can be properly evaluated. This is because, among other reasons, the longer time period allows for the effects of policy learning to take hold. Sabatier (1986) explained his model as follows:

> "In short, the synthesis adopts the bottom-uppers' unit of analysis - a whole variety of public and private actors involved with a policy problem - as well as their concerns with understanding the perspectives and strategies of all major categories of actors (not simply program proponents). It then combines this starting point with top-downers' concerns with the manner in which socio-economic conditions and legal instruments constrain behavior" (p. 39).

Exworthy and Powell (2004) presented a synthesis model that has interesting implications for the study of local government climate protection policy. Their theory of policy implementation built off of John Kingdon's "three streams" metaphor of the policy process (1995), as modified by Webb and Wistow (1986) and Challis, et al. (1988). The model put forth by Exworthy and Powell (2004) envisioned the three streams as follows:

> "The policy stream is concerned with goals and objectives. The process stream includes issues such as causal, technical, and political feasibility. The resource stream deals with – unsurprisingly – resource adequacy but not simply financial resources. Human resources, including staff time, power, reputation and ownership play crucial roles in organizations and may hamper implementation. In other words, a successful policy is likely to have clear objectives, mechanisms that achieve these objectives, and resources to fund them" (p. 266).

The authors went on to describe the three "dimensions" of policy implementation. The vertical dimension concerns the interplay between different levels of government (i.e., federal, state, and local). They described two forms or versions of the horizontal dimension. The first, "joined-up government at the centre," referred to intergovernmental relations within the same level of government, such as among the various departments within a municipality. The second, "joined-up governance at the periphery," referred to horizontal partnerships between governments or among governments and other organizations. The authors concluded that "successful" implementation is more likely when the three streams come together across each of the policy dimensions.

This theoretical approach is appropriate for an analysis of local government climate protection initiatives in the U.S. The USMCPA and CCP programs can be considered the "policy stream," as they have framed the goals and objectives that communities are adopting for their climate protection planning efforts. The established literature on local government climate protection planning identifies many technical, procedural, and political issues that impact the implementation of the USM/CCP goals. These issues fit Exworthy and Powell's conceptualization of the "process stream." Resources are of course needed to implement local government climate protection initiatives, including both human resources (dedicated staff with the necessary technical skills) and financial resources.

Local government climate protection planning takes place within each of the policy implementation dimensions described above. While the policies themselves are conceived, adopted, and implemented locally, as opposed to resulting from federal or state directives, state and federal policies affect the feasibility of local policy implementation in a number of ways. Horizontal relationships within a local government are particularly important, as climate protection initiatives require action on a number of fronts and therefore require collaboration among several departments within a given locality. Finally, partnerships with other entities, such as local utilities, citizen groups, universities, and other local governments are often essential to the successful implementation of USM/CCP policy goals.

This theoretical construct of policy implementation could provide the foundation for empirical research into local government climate protection initiatives. Studying the nature of these planning efforts across a wide range of communities, through survey research and case studies, could produce findings about the obstacles to climate protection policy implementation and the types of planning approaches that are most likely to overcome these obstacles. The findings could then be referenced back to the theoretical construct to see if the three streams, three dimensions model holds for the implementation of local government climate protection policies.

While such an analysis could have meaningful scholarly as well as practical applications, it is not the focus of this study. This study does take into account the effect of both vertical relationships (i.e., the influence of state-level climate policies) and horizontal relationships (i.e., the influence of community groups, nearby jurisdictions and other outside entities) on local climate protection policy adoption, but it does not thoroughly examine the mechanics of these relationships within individual municipalities. Instead, it includes the influence of these relationships among a host of other demographic, environmental, and economic characteristics that are hypothesized to influence the extent of climate protection policy adoption. To consider how these broad factors affect policy adoption across a wide range of municipalities we turn to the literature on policy transfer and policy diffusion.

Policy Transfer

A substantial body of literature exists on policy transfer and the related subjects of policy learning, policy diffusion, lesson drawing, and policy failure. However, there is little consistency in the literature about the meanings of these terms and their relationship to one another. For example, Wolman and Page (2002) characterized policy transfer as a subset of policy learning, while Evans and Davies (1999) described policy learning as a subset of policy transfer. Policy transfer is most often presented as the most general category, of which the other areas of study are all subsets. The common thread among these focus areas was perhaps best described by Dolowitz and Marsh (2000):

> "While the terminology and focus often vary, all of these studies are concerned with the process by which knowledge about policies, administrative arrangements, institutions and

ideas in one political system (past or present) is used in the development of policies, administrative arrangements, institutions and ideas in another political system" (p. 5).

Policy transfer can entail a transfer of ideas or knowledge without the actual adoption of new policies. Evans and Davies (1999) described these as "soft" transfers, or the transfer of ideas, concepts, and attitudes, rather than "hard transfers" in which programs and implementation strategies are transferred.

Many analysts have acknowledged that the policy transfer literature and its subsets are limited in that they consist only of a variety of classification schemes used to describe observed behavior. They lack a unified theory that is generalizable and can be used to predict the transfer of policies or ideas among governments (Braun & Gilardi, 2006; Dolowitz & Marsh, 2000; Evans & Davies, 1999; Wolman & Page, 2002). Dolowitz and Marsh (2000) sought to develop such an integrated model. Their framework for policy transfer focused on "the relationship between voluntary and coercive (forced) transfer and the links between policy transfer and policy 'success' or failure" (p. 6). The authors found that few policy transfers are perfectly rational, as most actors have limited information at their disposal and make their decisions within the confines of bounded rationality. They concluded that in order to understand policy transfer one must understand not only the nature of what was transferred, but also the actors involved and their motivations.

Other relevant subsections of the policy transfer literature include policy failure and policy learning. The study of why policies "fail," or are unsuccessful, is important because it can teach us how to better design and implement policies in the future (Birkland, 2001). Ingram and Mann (1980) suggested that policies can fail for any number of reasons, including excessive demands or expectations, relationships with other policies, reliance on an unsound causal theory, use of inappropriate policy tools or implementation strategies, or the failure of the political institution itself. Dolowitz and Marsh (2000) wrote that policy failure can result from policy transfer that is uninformed, incomplete, or inappropriate.

Birkland (2001) defined policy learning as the process through which "policy failure induces policy change" (p. 191). Policy learning studies can focus on the organizational learning of governments or other organizations, or the way in which the learning of individual actors within an organization leads to policy change. Wolman and Page (2002) characterized policy transfer as a form of organizational learning, or "policy learning that is done by governments" (p. 478). Their study of policy transfer focused on the role that specific actors play in policy learning by producing, facilitating, and sending information among one another.

Policy Diffusion Theory

The specific theoretical foundation for this dissertation is the study of policy diffusion, a sub-set of the policy transfer literature. Policy diffusion has been described as "the temporal pattern of adoption of a particular policy within, as well as among, countries" (Wolman & Page, 2002, p. 477). More than any other policy transfer theory, it has historically been applied at the state or local government level (e.g., Crain, 1966; Scott, 1968; Walker, 1969). This study contributes to the policy diffusion literature by identifying the extent to which demographic, environmental, and political characteristics influence a municipality's adoption of climate protection policies.

Berry and Berry's (1990) study of the spread of state lottery systems is perhaps the most influential recent work on policy diffusion. The authors reviewed the literature on state government innovation and found that most of the studies prior to 1990 fell into one of two general categories. Internal determinants models argue that the political, economic, and social characteristics of a given state are the primary factors leading to policy innovation. Regional diffusion models, on the other hand, emphasize the spread of policy adoption among neighboring states. Berry and Berry argued that the two perspectives are compatible based on Mohr's theory that innovation is a function of a government's "motivation to innovate, the strength of obstacles against innovation, and the availability of resources for overcoming such obstacles" (Mohr, 1969, as cited in Berry & Berry, 1990, p. 396).

Many recent studies have focused on the dynamics of policy diffusion, which Jones-Correa (2001) described as the study of "why states may adopt policies when they do and in particular why there may be differences in the speed and rate of adoption among states" (p. 452). In the regional diffusion framework, several studies from the economics literature have looked at the spatial dispersion of policy instruments among U.S. state and local governments, although without necessarily using the term "policy diffusion" (e.g., Brueckner, 1998; Fredriksson & Millimet, 2002). Brueckner's (1998) study of the adoption of growth control measures in California municipalities found that cities' decisions on growth control policies are influenced by the policies of their neighbors. Specifically, regional diffusion impacts the type of growth control measures adopted, as "when nearby cities impose stringent growth controls, a given city is likely to do the same," and "when nearby growth controls are mild, the city is likely to adopt mild controls as well" (p. 466).

Other studies have focused on the internal dynamics of policy diffusion at the state level. For instance, Grossback, Nicholson-Crotty, and Peterson (2004) focused on the role of political ideologies in policy diffusion, emphasizing "the importance of ideological similarity between states as a specific factor that can reduce the uncertainty a state may have about a policy and thus induce emulation" (p. 522).

Braun and Gilardi (2006) described several different diffusion mechanisms. The first of these mechanisms, competitive cooperative interdependence, occurs when the choice of one government creates externalities that other governments must account for in their own policies. A second mechanism, coercion, occurs when "powerful actors can impose costs and rewards on policy alternatives." A third mechanism involves interaction between policy actors, which leads to policy diffusion by creating "common norms of action." Policy diffusion can also occur when policies become so widespread that they are taken for granted, and are "almost automatically considered as the appropriate choice." Finally, Braun and Gilardi defined "symbolic imitation" as a diffusion mechanism in which orthodox policies are found to have normative awards for the decision-makers who adopt them (p. 299-300).

The most relevant literature for this study is that which addresses the dynamics of policy diffusion at the municipal or local government level in the United States, particularly that which illuminates the effect of internal and external characteristics on the likelihood of adoption of a given municipal policy. One such study comes from Martin (2001), who adopted a new-institutionalist perspective on policy diffusion to examine the spread of living wage ordinances among U.S. cities. According to Martin, the new-institutionalist perspective argues that:

> "Policy makers select policies based on cultural conformity rather than economic imperatives… [and] come to absorb the assumptions of their milieu and take for granted that certain policies are appropriate solutions to common problems, regardless of the actual technical performance of these policies" (p. 478).

He used a combination of qualitative and quantitative analysis to determine that the dispersion of living wage policies results from "the interaction of national progressive networks with local actors and opportunities" (470).

Shipan and Volden (2008) studied of diffusion of anti-smoking policies among U.S. cities. They found evidence that policy diffusion is influenced by "learning from earlier adopters, economic competition among proximate cities, imitation of larger cities, and coercion by state governments" (p. 840). They also found that strength of these diffusion mechanisms depends on the size of the city, with larger cities generally being more capable of learning from other cities, less concerned about economic competition, and less likely to resort to policy imitation.

Godwin and Schroedel's (2000) study of local gun control ordinances in California found that adoption of these ordinances was associated with demographic and political characteristics of the communities involved, including "population density, education, year of city incorporation, political culture, and ethnic makeup" (p. 772) and that the transfer of local policy innovations up to the state level was influenced by the following factors:

1. "Circumstances or focusing events that resonate among local government leaders and policy entrepreneurs.
2. The establishment of new interest groups that provide a fresh face to policymakers.
3. The promotion of a new policy image that provides: (a) a new perspective on the problem, (b) new supporters, and (c) new financial and organizational resources.
4. The presence and strength of regional associations that can actively promote policy adoption and diffusion within particular geographical areas.

5. The ability of interest groups and entrepreneurs to target activities correctly toward receptive local governments" (p. 773).

Many of these characteristics seem, on the surface, to be relevant to a local government's decision of whether or not to pursue climate protection policies. Several, including education and political culture, have been identified as possible causal factors in the local government climate protection literature.

A limited number of studies have explored the diffusion of climate protection planning or other sustainability policies. The most applicable is that of Vasi (2006), who applied sociological theories on social movements and the diffusion of organizational innovations to a study of the diffusion of CCP membership among U.S. municipalities. His study is discussed in more detail later in this chapter, under the sub-heading "Factors Leading Municipalities to Pursue Climate Protection Goals."

Although she does not specifically reference policy diffusion, Holgate (2007) uses similar terminology and concepts in discussing how the implementation of climate protection policies in South African cities is impacted by external institutions (specifically, NGO's), "internal institutional policies and arrangements, [and] unexpected factors, such as an energy crisis" (p. 473). Finally, Kern, Koll, and Schophaus (2006) studied the diffusion of Local Agenda 21 policies among German states, or *Länder*. They concluded that this diffusion is heavily influenced by pioneering cities, regional diffusion and "bi-lateral transfer" within metropolitan regions, and through vertical transfers between cities and the Länder. They found that the pioneering cities that had driven Local Agenda 21 policy diffusion were often mid-sized or large cities with sufficient financial resources, including many "university cities and cities which are well-known tourist centres" (p. 620).

The prior research on policy diffusion points to many possible diffusion mechanisms that could help explain the extent of climate protection policy adoption in U.S. municipalities. The findings of those research efforts have helped to shape this study's research questions, as is explained at the conclusion of this chapter. The literature on climate protection planning also helps to inform those research questions, as described in the following section.

Climate Protection Planning Literature

A growing body of material in the planning and public policy literature focuses on local government climate mitigation, or climate protection planning. The areas of emphasis from this prior literature on climate protection planning can be summarized into five categories:

1. The causal factors that lead municipalities to join CCP or other climate protection policy networks
2. Implementation obstacles encountered by municipalities that have joined CCP
3. Keys to successful implementation of climate protection goals
4. The relationship between climate mitigation and adaptation strategies
5. The relationship among local, state, and federal-level climate protection strategies

The first three categories are particularly relevant to this research, and are discussed in detail below. The last two categories are less directly relevant, but are discussed briefly in the following sections in order to provide a comprehensive description of the current literature on climate protection planning. Other relevant works that do not fit these five categories include technical studies on the impacts of` urban land use patterns on transportation-related GHG emissions (Ewing, et al., 2007; Stone, et al., 2007); the relationship among urban form, GHG's, and other forms of air pollution (Stone, 2005), and opportunities for reducing GHG emissions through green building and Smart Growth (Brown & Southworth, 2008) or urban energy efficiency and renewable energy applications (Kellett, 2007). Additional studies have addressed potential inadequacies with local GHG emissions accounting methods (Easterling, et al., 1998; Satterthwaite, 2008), described or compared specific techniques for measuring local carbon emissions (Dhakal and Betsill, 2007; Kates, Mayfield, Torrie, & Witcher, 1998), connected local GHG emission patterns to national and international trends (Angel, et al., 1998), or compared urban carbon footprints across a number of communities (Brown & Logan, 2008; Southworth, Sonnenberg, & Brown, 2008). The literature also includes numerous case studies of climate protection planning efforts in the United States (Knuth, Nagle, Steuer, & Yarnal, 2007; Osofsky & Levit, 2008), Europe, (Aall, et al.; Eckberg & Forsberg, 1998; Gupta, et al., 2007a; Massetti, Pinton, & Zanoni, 2007; Mathy, 2007), and other locations (Holgate, 2007; Romero-Lankao, 2007; Parker & Rowlands, 2007).

Climate Adaptation

Climate adaptation refers to planning for resilience in the face of impending climate change impacts. While awareness of the global need for climate adaptation strategies is increasing, very few municipalities in the United States have pursued specific climate adaptation plans or policies. This may be due in part to a lack of direction or support for local adaptation measures from the federal government and the international community. However, some U.S. states have begun to plan for climate adaptation, and this movement is trickling down to the municipal level. The academic literature on climate adaptation is also growing, although it is still far less developed than the literature on climate mitigation.

The IPCC (2007a) addressed adaptation in the Working Group II section of its Fourth Assessment Report, which defines adaptation as the "adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities" (p. 27). While the Working Group II report discussed in detail the potential local-level impacts of climate change, it did not address local government policy implications or recommend specific local adaptation measures. The EPA's U.S. Climate Change Science Program released a "Preliminary Review of Adaptation Options for Climate-Sensitive Ecosystems and Resources" in June, 2008, but this report focused primarily on the projected impacts of climate change on U.S. federal lands and did not discuss the community-level implications of climate change or municipal approaches to adaptation (U.S. Climate Change Science Program, 2008).

The majority of the climate adaptation policy accomplishments in the United States have occurred at the state level. California and seven other coastal states (Alaska, Washington, Oregon, Florida, Maryland, Massachusetts, and New Hampshire) have adopted climate adaptation plans or are in the process of developing them. Another seven states have recommendations for a climate adaptation plan included in their statewide climate action plans (Pew Center on Global Climate Change, 2009a).

Only a small handful of U.S. municipalities have adopted a climate adaptation plan or strategy, although many others are in the process of developing such a plan. Several other cities have combined mitigation and adaptation plans, and still more have adaptation elements incorporated into their climate action plans (R. Carter, personal communication, February 12, 2009). To support these local adaptation efforts, ICLEI in 2005 launched its Climate Resilient Communities (CRC) program, which helps municipalities to "protect their people, property, and resources from climate change" (ICLEI, 2009b). The Center for Clean Air Policy is also assisting local governments to develop climate adaptation plans through its Urban Leaders Adaptation Initiative. Currently eight U.S. cities, plus Toronto, are participating in this initiative (Center for Clean Air Policy, 2009).

The gap between local level mitigation and adaptation approaches is also reflected in the academic literature (Betsill & Bulkeley, 2007; Granberg & Elander, 2007; Gupta, et al., 2007a). Betsill and Bulkeley (2007) observed that "we have a limited understanding of whether and how cities are planning for the impacts of climate change" (p. 453). Granberg and Elander (2007) found this emphasis on mitigation rather than adaptation to be paradoxical, because "the tangible effects on global warming of reducing GHG emissions in a single locality are microscopic, whereas measures of adaptation are crucial for preventing potential flooding and related natural catastrophes" (p. 545). They also noted that municipalities are more capable of taking on adaptation challenges, whereas mitigation requires the involvement of a broader set of actors.

Scholars of local climate adaptation planning have focused primarily on the opportunities and obstacles for adaptation, potential synergies between mitigation and adaptation strategies, and potential problems with the synergistic approach. Wilson (2007) studied local climate adaptation policies in the UK. She found that awareness of climate change concerns had increased since 2000, and that measures to minimize flood-related risks had been integrated into local plans. However, other, less obvious climate change risks, such as impacts on bio-diversity and water resources, had not been integrated into local plans. Potential reasons for this discrepancy included a lack of political support for such policies and "lack of engagement of the planning profession with climate change networks" (p. 609). Wilson also found that the long-term nature of climate change risk made it a difficult problem to address through local plans with relatively short-term planning horizons.

In a study of local climate adaptation programs in Sweden, Storbjörk (2007) identified three major obstacles to local climate adaptation planning. The first, which she called the "safety vs. scenery" conflict (p. 461), reflects concerns that planning for climate adaptation would not be compatible with the public's desire to settle along flood-prone rivers and coastlines. A second challenge was that it can be difficult for local governments to decide which risks they must adapt to and identify the appropriate adaptation measures for reducing those risks. Finally, Storbjörk described the challenge of "knowledge input" (p. 465), or the need to provide appropriate guidance to local authorities regarding adaptation issues so that they can make informed decisions on adaptation and risk management policies.

Some scholars have argued that adaptation and mitigation can be complementary or synergistic approaches (Betsill & Bulkeley, 2007; Granberg & Elander, 2007; McKevoy, Lindley, & Handley, 2006; Storbjörk, 2007), as some policy actions can simultaneously reduce GHG emissions and the adverse effects of climate change. Klein, Schipper, and Dessai (2003) described planting trees in urban areas to be a "classic example" of such complementary approaches, as the trees "sequester carbon as they grow and they reduce urban heat stress in summer" (p. 5). McKevoy, et al. (2006), wrote that the greatest synergies between mitigation and adaptation occur at the local level, and discussed how the two objectives can be pursued simultaneously through urban design:

> "Building height, layout and spacing, building material and albedo, shading, ventilation and air-conditioning all influence energy requirements (and hence emissions). These

factors are also important considerations for the adaptation agenda, and synergies should be exploited wherever possible" (p. 190).

However, some of the same scholars who have identified possible synergies between mitigation and adaptation have also pointed out potential conflicts or trade-offs between the two approaches. McKevoy, et al. (2006), for example, discussed how urban densification would fulfill mitigation goals, by reducing energy use, but would potentially make populations more susceptible to climate change risk. Klein, et al. (2003), identified three potential problems with seeking synergies between mitigation and adaptation: the greater institutional complexity created by attempting to institute mitigation and adaptation simultaneously could effectively hamper both approaches; the synergistic approaches would likely not achieve the necessary levels of either mitigation or adaptation; and the combined net effect of synergistic efforts might be less than if the mitigation and adaptation objectives were pursued separately. In light of these challenges, the authors recommended an approach in which both adaptation and mitigation objectives are tied directly to development policy, as both are inextricably linked to human socio-economic development patterns.

Multi-level Governance and Climate Protection Strategies

The term "governance" is used in the study of public administration, political science, and other policy-related fields to refer to new processes of governing or new conceptualizations of how government operates. Rhodes (1996) identified six distinct uses of the term: as a minimal state; as corporate governance; as the new public management; as 'good governance'; as a socio-cybernetic system; as self-organizing networks" (p. 653). The latter use is of greatest relevance to this discussion. Bevir, Rhodes, and Weller (2003) defined governance as "a pattern of rule characterized by networks that connect civil society and the state" (p. 192). It is a more nuanced understanding of the forces behind policy adoption and policy change than explanations which focus on the distinct roles of "official" and "unofficial" actors.

Much of the literature on climate protection planning has described local climate protection efforts as occurring within a multi-level governance framework. Betsill and Bulkeley (2007, p. 448) characterized this multi-level governance approach as "one of the most important contributions of the academic research on cities and climate change." They described the two types of multi-level governance addressed in the climate protection literature as follows:

> "Type I conceptions emphasize the multiple tiers at which governance takes place, typically differentiating between administrative units (e.g. cities, states, countries) where governments are the central governing authority. Type II forms of multilevel governance are dominated by networks between public and private actors across levels of social organization" (p. 449).

The Type I descriptions focus on the interaction among local, state, and national levels of government on climate change issues, and in the case of the United States, emphasize the growing importance of local initiatives in response to the lack of federal leadership on the topic. Gupta (2007) characterized climate change as a global-local or "glocal" issue that "operates simultaneously at several levels" (p. 132), and therefore requires a "multilevel governance solution" (Gupta, Van der Leeuw, & de Moel, 2007, p. 146). The inability of national governments to effectively address the problem via existing regulatory frameworks has led them to redefine their relationships with lower levels of government in order to "ensure greater coherence in policymaking and to seek new opportunities for policymaking" (Gupta, 2007, p. 136). Much of the Type I literature has tried to determine the most appropriate level for governmental response to climate change and whether responses should be "scaled up" from the local to the national level or "scaled down" from the national to local level (Gupta, 2007; Gupta, et al., 2007a; Osofsky & Levit, 2008).

Many of the Type II descriptions have focused on the role of CCP and other networks in supporting local climate protection approaches, such as by facilitating the exchange of information and ideas among municipalities (Betsill & Bulkeley, 2004, 2007; Osofsky & Levit, 2008). Other studies have focused on the role of universities and other community institutions or stakeholders in furthering local climate protection efforts (e.g., Knuth, 2007).

Bulkeley and Betsill have used the CCP program as the backdrop for numerous studies of multi-level governance in environmental policy and urban sustainability (Betsill, 2007; Betsill & Bulkeley, 2004; Betsill & Bulkeley, 2006; Bulkeley & Betsill, 2003; Bulkeley & Betsill, 2005; Bulkeley & Moser, 2007). They have argued that both Type I and Type II multi-level governance frameworks are essential for the understanding of climate protection planning and other urban sustainability issues. The prevailing theme among these works has been that transnational networks such as CCP have blurred the lines among the traditional scales of political analysis – local, state, national, and international – and have in the process created a new form of environmental governance. Gupta, et al. (2007a), presented a similar argument, suggesting that even the top-down transfer of climate policies from the national to sub-national levels is "often the result of external influences from epistemic communities or networks, through which local communities are galvanized into developing possible policy options" (p. 143).

The literature includes a number of case studies, mostly from Europe, which have examined the specific mechanics of climate change policy in a given country and reflected upon those policies within a multi-level governance framework (Gupta, et al., 2007a; Granberg & Elander, 2007; Holgate, 2007; Massetti, et al., 2007; Mathy, 2007; Romero-Lankao, 2007). Far fewer studies have explained how climate policy in the United States fits this model. Dilling (2007) investigated the challenges of "carbon governance" across all scales of the U.S. political system, concluding that "no organized structure exists to manage carbon governance at all scales… the public is not yet engaged, and the issue of potentially conflicting norms about private property rights and protecting the climate has yet to emerge and be openly considered" (p. 42). Osofsky and Levit (2008) compared the climate mitigation efforts in two U.S. cities – Tulsa, OK, and Portland, OR – with distinct environmental, political, and social conditions. They focused on the roles of various official and unofficial actors in shaping local climate policies and sought to identify the "socio-economic, political, and cultural forces that linked these actors" (p. 408). They concluded that the role of networks in shaping the local climate policy decisions in both cities represented "bottom-up networking" created through "simultaneous scaling up and scaling down processes" (p. 433).

Obstacles to the Implementation of Climate Protection Goals

Much of the previous research on climate protection planning has focused on identifying the challenges and barriers that inhibit the implementation of climate protection goals, i.e., adoption of GHG-reduction policies, in communities that have joined CCP. An understanding of these obstacles can shed light on the factors that influence the extent to which climate protection goals are implemented. Some of the challenges identified in the literature include: the long time horizons typically associated with planning efforts (Bulkeley, 2007); political opposition, including from business and industry interests (Bulkeley & Betsill, 2003; Wheeler, et al., 2009); and organizational and cultural barriers that limit the ability of local governments to instigate broad change (Droege, 2002; 2006). Another potential barrier is a lack of community support, which according to Slocum (2004) stems from insufficient public involvement efforts and "the difficulty of communicating climate change to the public because of its scientific complexity, uncertainty, and future nature" (p. 768). Betsill (2001) also identified the global nature of GHG emissions and climate change as an obstacle, because "city officials often have little understanding of how they contribute to the problem… or how they might be affected by the impacts" (p. 394).

The literature describes how internal administrative and procedural obstacles can inhibit climate protection planning processes. Betsill (2001) identified three such barriers: bureaucratic structure; administrative capacity; and budgetary constraints. These obstacles can often be related, as for example the lack of public funds dedicated to climate protection planning results in a lack of administrative capacity to effectively carry out the process.

Betsill (2001) argued that bureaucratic obstacles arise due to the nature of the climate protection issue, which is impacted by a variety of local government activities and therefore requires coordination among a number of municipal departments. Slocum (2004) also saw the lack of a clear "lead agency" as one of the primary hurdles facing implementation of climate protection goals.

Administrative capacity can be an obstacle because of the complexity and time-consuming nature of climate protection planning. Ideally, local governments would have personnel dedicated specifically to this task, but many U.S. municipalities are either unable or unwilling to commit the necessary resources to this task (Pitt & Randolph, 2008). The adoption of climate protection plans and policies can be impeded if the individuals responsible for the work are not dedicated to the climate protection objective do not have the technical capacity to gather and analyze the necessary data (Betsill, 2001; Holgate, 2007; Romero-Lankao, 2007), or must balance their climate protection work with other responsibilities (Holgate, 2007). Additionally, municipalities often have difficulty gaining access to the necessary data, particularly when dealing with privately owned gas and electric utilities (Bailey, 2007; Pitt & Randolph, 2008).

Many observers in both the U.S. and Europe have noted that budgetary constraints can inhibit the implementation of climate protection goals, due to a lack of funding from national governments (Collier, 1997; Granberg & Elander, 2007; Mathy, 2007) or limited local tax revenues (Parker & Rowlands, 2007). Bailey (2007) found that "cities are not investing significant amounts of their own money to reduce GHG emissions" (p. 3). While it is clear that most local governments must work within tight budgets, Bailey argued that unlike many other public investments, energy-related expenditures can often pay for themselves within a relatively short period of time. Betsill (2001) found that city budget officials are often "skeptical of such arguments [and] are more likely to proceed on a step-by-step basis rather than investing in a larger package that would be more cost-effective in the long run" (p. 401). She observed that most local governments view climate protection projects as "luxury" expenditures, and they are often the first programs to be cut in the event of a budget shortfall.

While most of the implementation obstacles identified in the literature are internal to the individual municipalities, external factors also can create implementation obstacles. Collier (1997) noted that an "unfavourable policy context" (e.g. through nationally imposed budget constraints or low energy prices)" can present a challenge to local authorities, and that "appropriate supporting measures" were needed at both the international and national levels (p. 55). Similarly, Betsill (2001) notes that "it is also questionable whether local initiatives can make meaningful contributions to mitigating global climate change in the absence of policy changes at the state and national levels" (p. 395).

The vast majority of studies on climate protection implementation obstacles have relied on qualitative interview data. Robinson and Gore (2005) are perhaps the only previous scholars to study this issue quantitatively. They surveyed 392 Canadian municipalities in 1998-1999 to identify the number of "CO_2 reduction measures" adopted in each municipality and the barriers that limit adoption of those policies. Approximately 34% of the municipalities surveyed had adopted at least one CO_2 reduction measure. The representatives of municipalities that had not adopted any CO_2 reduction measures identified a number of barriers to adoption of those policies, which the authors divided into capacity barriers and priority barriers. The capacity barriers included a lack of staff time, a lack of training in CO_2 reduction programs, and a lack of funds. The priorities barriers included a low-prioritization of CO_2 issues on the part of the local council or legislative body; a belief that climate change is a federal or provincial responsibility and/or not a local government issue; and the belief that CO_2 reduction is not a priority for local residents. Among the municipalities that had adopted CO_2 reduction policies, the capacity restrictions (staff time, training, and budgets), were the most often cited barriers to expanded CO_2 reduction efforts, but the issues of priorities or local government responsibility were seen as much less of a barrier.

Keys to Implementation of Climate Protection Goals

While the literature summarized in the previous section focused on the obstacles to implementing climate protection goals, other scholars have attempted to identify the keys to overcoming those obstacles. In other words, their works seek to identify the factors that help communities that have adopted climate protection goals to implement them through policies to reduce GHG emissions.

Kron and Randolph’s (1983) study of municipal energy in the early 1980s found that the characteristics of the planning and implementation processes affected the likelihood that they would be implemented in policy. For example, the most successful plans were those produced by autonomous energy offices, including those located within the mayor or city manager's office. They found that appointing a specific department for implementation could potentially skew the implementation effort towards the types of programs that emphasize that department's objectives. The most successful efforts involved a detailed implementation process including work programs, consultant studies, progress reports, and public hearings. The direct involvement of elected officials in the implementation efforts also was important. The authors found that an emphasis on early program implementation helped to capture "the attention and interest of elected officials and the community," which was "one of the keys to successful implementation" (p. 11). Local experience with energy shortages and price increases, the presence of an energy constituency (such as active university or neighborhood groups), supportive state programs, and a healthy local economy also could increase the likelihood of implementation. The involvement of local utilities, on the other hand, had little effect on implementation.

Corbett and Hayden (1981) explored the question of why some California cities had “notable success responding to the energy crisis” of the late 1970s (p. 959), while others had attempted to address this issue but had adopted few if any meaningful energy conservation policies. The authors found that the most successful cities had followed a similar energy planning process. The successful process included the involvement of three “key players” – a local elected official or other political leader, a dedicated municipal staff person with appropriate technical capabilities, and a community activist or grassroots organization that could help to publicize and build public support for the proposed energy conservation measures. The authors also found that the most successful planning processes included an initial study of local energy consumption patterns, public hearings on the proposed energy conservation measures, and a citizens advisory task force empowered to review the proposed measures, suggest modifications, and make recommendations to the local legislative body. Finally, they described how coordination and collaboration with other municipalities via the SolarCal Local Government Commission had helped many California cities to further their energy conservation programs.

Much of the more recent research in this area has identified characteristics that increase the likelihood of implementing climate protection policies in municipalities that have joined CCP and/or other similar local sustainability programs (i.e., Local Agenda 21). These characteristics include leadership from political and/or community leaders and support from business, industry, and other institutions (Bulkeley & Betsill, 2003; Droege, 2002; Eckberg & Forsberg, 1998; Wheeler, et al., 2009), education about energy and climate issues (Randolph, 2005), and a pre-existing commitment to energy conservation and/or sustainability (Bulkeley & Betsill, 2003; Collier, 1997). Other factors that have been found to support implementation include ownership of local electric utilities and transport systems (Collier, 1997), relationships with external networks (e.g., ICLEI), universities, or other institutions (Holgate, 2007; Knuth, et al., 2007), or events that focus community awareness on the cost and importance of energy (Holgate, 2007).

ICLEI itself has identified partnerships with state and federal governments as a key to successful implementation, as well as arrangements with private financial institutions to create access to capital for climate protection projects. ICLEI also has acknowledged that municipalities that own their own energy utilities have greater opportunities to implement climate protection policies (Lindseth, 2004).

Factors Leading Municipalities to Pursue Climate Protection Goals

While substantial bodies of work exist on implementation obstacles, and keys to overcoming those obstacles, very little of the previous research has focused on why municipalities choose to join USM/CCP or pursue climate protection policies in the first place. Several scholars have noted that little rational reason exists for municipalities to pursue climate protection planning (Betsill, 2001; Kousky & Scheider, 2003; Zahran, Grover, Brody, & Vedlitz, 2008a; Zahran, et al., 2008b). The actions of one individual city, no matter how large, can have no more than a minor impact on overall global GHG emissions levels, and achieving local emission reductions would not likely reduce the impacts that a given municipality experiences from global climate change. As Zahran, et al. (2008a, p.448) describe, the collective benefits of GHG emission reduction are "nonexcludable and nonrival," meaning that nothing could stop localities from being free-riders and enjoying the benefits of other localities' efforts to protect the climate. Finally, in the United States no federal law compels municipalities to pursue climate protection planning, and the federal government offers very little support for local climate protection efforts. Simply put, the costs of GHG mitigation are "significantly higher than the expected benefits" (Zahran, 2008a, p. 448).

Because of these seemingly unfavorable conditions for local climate protection planning, it is important to understand the factors that lead municipalities to pursue climate protection goals. Perhaps the first scholar to investigate this topic was Betsill (2001), who in addition to discussing implementation obstacles described several factors that lead cities to join CCP. She noted that most of the cities that had joined CCP had a prior interest in environmental issues. She argued that due to the global nature of the climate change problem, "localizing" the issue is critical to establishing interest in community-level climate protection policies. She identified several "hooks" that are used to establish this local nexus or otherwise build interest for these policies, including concerns about local air pollution or traffic congestion and opportunities for cost-savings through energy efficiency improvements.

Kousky and Schneider (2003) further examined the motivations behind the pursuit of climate protection goals among U.S. municipalities. They interviewed staff members and officials from 23 CCP-member cities to explore the motivations and decision-making processes that led them to join CCP. Participants were asked to choose from among seven motivating factors, and could select all that applied to their municipality. "Cost savings from policies," and "existence of co-benefits" were the most often cited motivations, followed by the influence of an "issue champion" (p. 361). Lobbying by citizens or an NGO and contact from ICLEI were the least-cited motivations.

Vasi (2006) and Zahran, et al. (2008a, 2008b) are the only scholars to have studied the factors that influence CCP participation using advanced quantitative methods. In many ways their studies are the most directly relevant predecessors to this dissertation, and they are described here in detail.

Vasi (2006) used an event history analysis model to measure the likelihood that a city would join CCP based on a combination of its intrinsic characteristics and its spatial and administrative proximity to other CCP-members. The intrinsic characteristics included population, form of government (i.e., "weak mayor" or "strong mayor"), organizational resources (measured as total government expenditures per capita), education (percent of population with at least a bachelor's degree), political orientation (ratio of democratic to republican votes in the 1988 presidential election), and environmental orientation (measured as the number of environmental NGO's per capita). He found these intrinsic characteristics collectively to be relatively weak predictors of the likelihood of CCP membership. Only per-capita level of education and government expenditures increased the likelihood of CCP membership, while the others had no statistically significant effect.

Vasi included local carbon monoxide (CO) and particulate matter pollution in the model as "environmental degradation characteristics." These were coded dichotomously, with a value of "1" if the city was located in a designated non-attainment area for those pollutants for every year between 1993 and 2002. The results indicated that these environmental degradation variables had little effect on the likelihood of CCP membership.

Vasi used a "Multiplicative Heterogeneous Diffusion Models (mhdiff) SAS routine" (p. 451) to measure spatial and administrative proximity to prior CCP-member cities. This variable significantly increased the likelihood of CCP membership, supporting his hypothesis that "the CCP program diffuses at a faster rate to local governments that are spatially and administratively proximate to previous adopters" (p. 455). Vasi also included several variables that measured whether or not the city was a member of ICLEI or other environmental organizations prior to joining CCP. Cities that were members of any of these organizations were significantly more likely to join CCP, and among those organizations prior participation in ICLEI had the greatest positive impact on the likelihood of CCP membership.

Vasi followed this statistical analysis with qualitative research to further examine the "the microprocesses involved in the adoption of the CCP program" (p. 456). Among the key findings was that "ICLEI change agents and local government champions of local actions to address global climate change are constantly extending the boundaries of the CCP program" to include other secondary benefits, such as saving money and reducing air pollution, that are of importance to local governments (p. 457). It is interesting that while Vasi's quantitative results found that the environmental degradation variables had little effect on the likelihood of CCP membership, his qualitative research found that the perception that CCP membership would reduce local air pollution had a significant influence on cities' likelihood of adoption. He wrote that these results "agree with previous studies showing that the social perception of environmental degradation is more important than the environmental degradation itself for the adoption of environmental protection practices"(p. 454).

Two studies by Zahran, et al. (2008a, 2008b), used collective action theory to answer the question of why local governments join CCP when it is often irrational for them to do. In "Risk, Stress, and Capacity: Explaining Metropolitan Commitment to Climate Protection" (2008a), Zahran, et al., used Metropolitan Statistical Areas (MSA's) as the unit of analysis. The 307 MSA's identified by the U.S. Census Bureau are defined as population clusters having a core city of at least 50,000 residents and a metropolitan area of at least 100,000 residents. The dependent variable was the extent of "CCP campaign involvement" in each MSA, measured as "the number of persons in a metropolitan area that reside in a jurisdiction (county, city, or town) committed to the CCP campaign divided by the total number of persons residing in a metropolitan area" (p. 452). Of the 307 MSA's examined, 67 had at least one CCP member jurisdiction. The authors did not specify exactly how many CCP member communities were included in the analysis, but wrote that at the time of the research "over 100" U.S. local governments were members of CCP (p. 447). Since that time many more localities have joined CCP and/or signed the USMCPA.

The authors hypothesized that local governments experience selective incentives for participating in CCP that override the incentives for nonaction, and these incentives “correspond with a metropolitan area’s physical location, natural capital, production and transportation modalities, and socioeconomic characteristics” (p. 448). They calculated a series of independent variables measuring each metropolitan area’s “vulnerability to climate change ‘risk,’ the amount of ‘stress’ it imposes on climate systems, and its ‘civic capacity’ to commit to climate change policy initiatives” (p. 448).

The following variables measured climate change risk in each metro area: deaths from extreme weather events (1991-2000); location in a coastal area (the percentage of the MSA lying at or below 3.5 meters in elevation); precipitation levels (excess precipitation above national averages from 1991-2000); and “eco-sensitivity” (the percentage of land area covered by forests and wetlands). Metropolitan areas with a high level of climate risk were located primarily in the Gulf Coast and in Atlantic coast areas of Florida and the Northeast. While two of the individual measures of climate change risk (deaths from natural hazards and location in a coastal area) were positively correlated with CCP membership, combining those variables with the other measures of climate change risk resulted in an index of “climate change risk” that was not significantly correlated with membership in CCP.

The authors’ “climate stress” variables included population density, carbon employment (the percentage of workers employed in carbon-intensive industries such as manufacturing, mining, and agriculture), automobile commuting (the percentage of workers who travel to work alone in a private vehicle), and solar energy use (the percentage of residents that heat their homes with solar energy). Metropolitan areas with a high level of climate stress (i.e., high levels of climate impacts) were located primarily in heavily industrialized areas of the Midwest and Deep South, particularly in MSA's with a high level of auto-industry manufacturing.

The areas with high levels of climate stress (i.e., those with high carbon employment and automobile commuting but low population density and solar energy use) were believed to have a disincentive to adopt climate protection policies because they are located far away from the areas that have the greatest potential risk from climate change impacts (i.e., coastal areas). The authors hypothesized that these areas would be less likely to commit to CCP because the cost of reducing GHG emissions would be greater in those areas than in areas of low climate stress (i.e., those with low carbon employment and automobile commuting but high population density and solar energy use). The findings supported this hypothesis, as population density and solar energy use were positively correlated with CCP membership and carbon employment and automobile commuting were negatively correlated with membership.

The authors' "civic capacity variables" included participation in an environmental cause (the percentage of adults who participated in an environmental cause in the past twelve months, based on consumer behavior survey data), high incomes (the percentage of residents with incomes in the upper quintile of national average incomes), education (the percent of residents with a bachelor's degree or higher), and the number of environmental organizations registered in the county (based on data from the National Center for Charitable Statistics). Metropolitan areas with a high level of civic capacity were located primarily in the Atlantic Northeast and on the West Coast. All "civic capacity" variables were positively correlated with CCP membership.

An OLS regression model including all three indices found that climate change stress and civic capacity were statistically significant indicators of CCP membership, with climate change stress having a negative correlation to membership and civic capacity having a positive correlation. The climate change risk index was found to be not significantly correlated with CCP membership. In this model the independent variables combined to explain 20% of the variation in the model (adjusted *R*-squared = .202). Civic capacity was the strongest indicator, explaining 15% of the total variation in the model. In fact, many of the MSA's with the highest dependent variable scores were in neither high-risk nor high-stressor areas. The civic capacity variables were found to drive the initiative to join CCP in those areas. Zahran, et al., interpreted this to mean that "from a collective action perspective, officials in jurisdictions with high human capital and high percentages of residents involved in environmental causes derive selective benefits from participation in the CCP campaign by satisfying citizen preferences for climate protection" (p. 468).

In a second study, "Vulnerability and Capacity: Explaining Local Commitment to Climate-Change Policy," Zahran, et al. (2008b), evaluated participation in CCP at the county level. They created a binary dependent variable with a score of 1 if the county or any of the cities within it were members of CCP, and a 0 if they were not. The independent variables differed slightly from the previous study, including only risk vulnerability and socioeconomic capacity, not climate stressors. The researchers also used two control variables: education (the percent of residents with at least a bachelor's degree), and percent urban population (the percentage of county residents living in an urbanized place, according to census data).

The risk vulnerability variables included total natural hazard casualties between 1960 and 2004, temperature change (average minimum) projected from 2004 to 2099, and coastal proximity (a dummy variable indicating if at least 15% of the county lies within a coastal watershed). These variables were all found to increase the likelihood of CCP membership.

The socioeconomic variables were divided into those related to community capacity and those related to a community's "structural encumbrance." The socio-economic capacity variables included voting trends (percent net Democrat in the 2004 election), the percent of residents who recycle (based on consumer behavior survey data), and number of non-profit environmental organizations in the county. As expected, all of these variables significantly increased the likelihood of CCP membership.

The "structural encumbrance" variables included hazardous air pollutant emissions per capita and the percent of workers employed in carbon-intensive industries (e.g. manufacturing, transportation, mining, agriculture). They were expected to increase the selective costs of GHG emissions reduction, and thus reduce the likelihood of CCP membership. As expected, counties that did not include any CCP members experienced more "structural encumbrance" (i.e., more carbon-intensive employment and more emissions per capita).

A binary logistic regression model including all of these independent variables explained nearly 60% of the variation in the likelihood of CCP membership. The socio-economic capacity variables (Democratic voting, recycling, and presence of environmental organizations) significantly increased the odds of CCP participation. The percentage of workers in carbon-intensive industries decreased the odds of CCP participation, as expected, but hazardous air pollutant emissions per capita were a statistically insignificant variable. The climate change risk variables were all statistically significant, with coastal location having the greatest impact among those variables on the likelihood of CCP membership. The control variables (urban population and college education) also were statistically significant.

Upon further analyzing these results, the authors found what they characterized to be a "recruitment dilemma for the CCP campaign" (p. 558). In short, no counties with a low socio-economic capacity score included any CCP-member municipalities. This finding suggests that high socio-economic capacity is perhaps a "necessary precondition for CCP involvement" (p. 558), which indicates a need for CCP or other climate advocacy organizations to devise improved recruitment strategies that can reach out to communities with lower incomes and education levels and encourage them to adopt climate protection policies.

Zahran, et al. (2008a), noted that the use of MSA's as a dependent variable is "limited when it comes to understanding local and regional contextual factors" (p. 471). The county-based approach is equally limited, as many counties are home to multiple incorporated municipalities and the political and socio-economic conditions within one such municipality are not necessarily indicative of the remainder of the county. Due to these limitations, Zahran, et al. (2008a), called for future research to "examine specific communities within these regions to better understand why some engage in climate change policy while others do not" (p. 471). Perhaps more importantly, the two Zahran, et al., studies only investigated CCP membership, and did not provide information on how the various independent variables impacted the degree of implementation or extent of climate protection policy adoption. The authors acknowledged these limitations, noting that additional research was still needed on the specific policies that jurisdictions have adopted and "the degree to which they are being implemented throughout the community" (2008a, p. 471, 2008b, p. 560).

Summary and Research Goals

Growing public awareness of the climate change problem has led to a flurry of new municipal-level plans for conserving energy, increasing renewable energy use, and reducing GHG emissions. Research on these planning processes, and in particular, the policies that result from them, is still somewhat limited. This study will fill two voids in the climate protection planning literature. It will constitute the first detailed survey of the extent of climate protection policy adoption in the U.S., including both CCP-member and non-member municipalities. As such it will provide a much more detailed picture of this phenomenon than the Walsh (2007) study, albeit with a slightly smaller sample size. This is important because a basic, fundamental understanding of the current extent of climate protection planning is necessary to further study the opportunities and obstacles in this domain and create improved planning procedures that have a greater likelihood of success.

This study also will contribute to the policy diffusion literature. The limited number of prior studies on policy diffusion at the sub-national level has identified a variety of internal determinants that influence the dissemination of policies across jurisdictions. These include demographic and political characteristics, focusing events, "policy image," and the influence of interest groups, entrepreneurs, and regional associations. This study will be among the first to apply this theory to the domain of local government environmental policy and the very first to test the impact of internal and external determinants on the adoption of climate protection policies.

Finally, this will be the first study to use multiple regression analysis in identifying the demographic, political-institutional, economic, and environmental characteristics that most impact the extent of climate protection policy adoption in U.S. municipalities. While many of the prior studies have identified characteristics such as income, education levels, and political ideology as factors that increase the likelihood of adopting climate protection policies, few have attempted to confirm these relationships through quantitative analysis. The only previous studies to quantitatively assess the factors behind community climate protection planning used participation in the CCP program as their dependent variables, and did not examine the extent to which the CCP goals have or have not been implemented in policy (Vasi, 2006; Zahran, et al., 2008a; Zahran, et al., 2008b). Thus, this will be the first study to use a detailed quantitative analysis to investigate the characteristics that support the implementation of climate protection goals into policy, rather than simply the adoption of those goals via CCP membership. Its findings will improve our understanding of the processes by which municipalities can move through the climate protection planning stages from CCP membership to policy adoption. This understanding is critical, because it is the adoption of these policies that could ultimately contribute to reducing global GHG emissions and mitigating climate change.

Chapter 3. Methodology

This chapter describes the methodology for this study, including data collection and sampling methods, operationalization of dependent and independent variables, and data analysis techniques.

Study Population and Units of Analysis

The population for this research is the over 25,000 cities, counties, and other municipalities in the 50 U.S. states. The study population is a group of 3,959 U.S. mayors, city managers, and other administrative officials included on a mailing list obtained from the National League of Cities (NLC). While the NLC professes to represent all cities regardless of size, location, or demographic characteristics, its membership is slightly skewed towards cities in urban metropolitan regions (J. Miller, personal communication, May 1, 2009).

The unit of analysis for this research is U.S. municipalities, specifically those represented on the NLC mailing list. Data on these municipalities was gathered via a survey and secondary data sources, as described below. This unit of analysis is appropriate because the dependent variables being studied are types of municipal-level policy adoption. Previous quantitative analyses of the factors influencing climate protection planning used Metropolitan Statistical Areas (Zahran, et al., 2008a) or counties (Zahran, et al., 2008b) as their units of analysis. The MSA and county-level units of analysis were appropriate for those studies, as they included as independent variables complex geographical data that was best measured at the regional level. This dissertation is limited in the use of geographic features as independent variables because the units of analysis are defined as a single point on a map.

However, the use of MSA's or counties as the unit of analysis for research on the factors that drive municipal policy adoption can be problematic. This is because different municipalities within the same MSA or even the same county can have far different economic, demographic, and social characteristics. It may be erroneous to assume that the policy adoption decisions that take place within specific municipalities are driven by county or regional-level economic or demographic conditions when there can be significant variation in those characteristics within the county or region. This dissertation is particularly interested in the "internal determinants" of policy adoption, or the unique demographic and political-institutional characteristics that may explain why certain municipalities adopt extensive climate protection policies while other neighboring municipalities do not. Municipal-level data is therefore used when measuring those internal variables, with the exception of voting history. Voting records for U.S. federal elections typically are not aggregated at the municipal level, and this study therefore uses county-level voting patterns as the independent variable for voting history.

While the municipalities themselves are the unit of analysis, much of the data comes from the individual mayors, city managers, and other municipal officials who completed the survey. These municipal officials are the *units of observation*. Babbie (1995) describes the difference between units of analysis and units of observation:

> "Units of analysis in a study are typically also the units of observation. Thus, to study voting intentions, we would interview ('observe') individual voters. Sometimes, however, we 'observe' our units of analysis indirectly. For example, we might ask husbands and wives their individual voting intentions, for the purpose of distinguishing couples who agree and disagree politically… In this case our units of analysis would be

families, though the units of observation would be the individual wives and husbands" (p. 87).

The first five sections of the survey instrument (Questions 1-21) asked the respondents to provide factual information about their respective municipalities, including information on the climate protection policies that their municipalities had adopted. The following section (Questions 22-29) asked the respondents to comment on political conditions in their community, such as the support for environmental issues among local elected officials or the general public. As high-level administrative officials for their respective municipalities, the survey respondents were qualified to comment on the political conditions that affect policy adoption in their municipalities. The final section (Questions 30-37) asked the respondents to provide their personal positions on issues related to climate protection planning. As high-level administrative officials for their respective jurisdictions, the survey respondents' positions on these issues were relevant characteristics of the municipalities themselves. Thus, while the respondents answered many of the survey questions with their personal opinions, those individual respondents are merely the *units of observation*, and their respective municipalities are the units of analysis.

Data Collection

The primary data source for this analysis was a survey of the 3,959 U.S. mayors, city managers, and other administrative officials represented on the NLC mailing list. A survey of local government officials is the best way to evaluate the extent to which U.S. municipalities have adopted policies or programs to reduce energy use and/or GHG emissions, as no sufficient secondary data sources can provide this information. The Cool Cities, USMCPA, and CCP organizations have not kept detailed records on the initiatives that their members have adopted, and they would not have any information on policies adopted by municipalities that are not members. This is an important point, because it is likely that some municipalities are pursuing policies that reduce energy use and/or GHG emissions without including them in a comprehensive climate protection planning effort. Another potential source, the Database of State Incentives for Renewable Energy (DSIRE), includes a wealth of information on local government programs to encourage energy efficiency and renewable energy but does not provide information on other areas, such as transportation and land use, which can have significant climate protection benefits. Furthermore, some policies, such as increased mass transit service or mixed-use zoning ordinances, may be pursued primarily for purposes other than energy use and GHG emissions reductions. A survey is therefore the best mechanism for determining the extent to which all of these types of policies have been adopted across a wide range of municipalities.

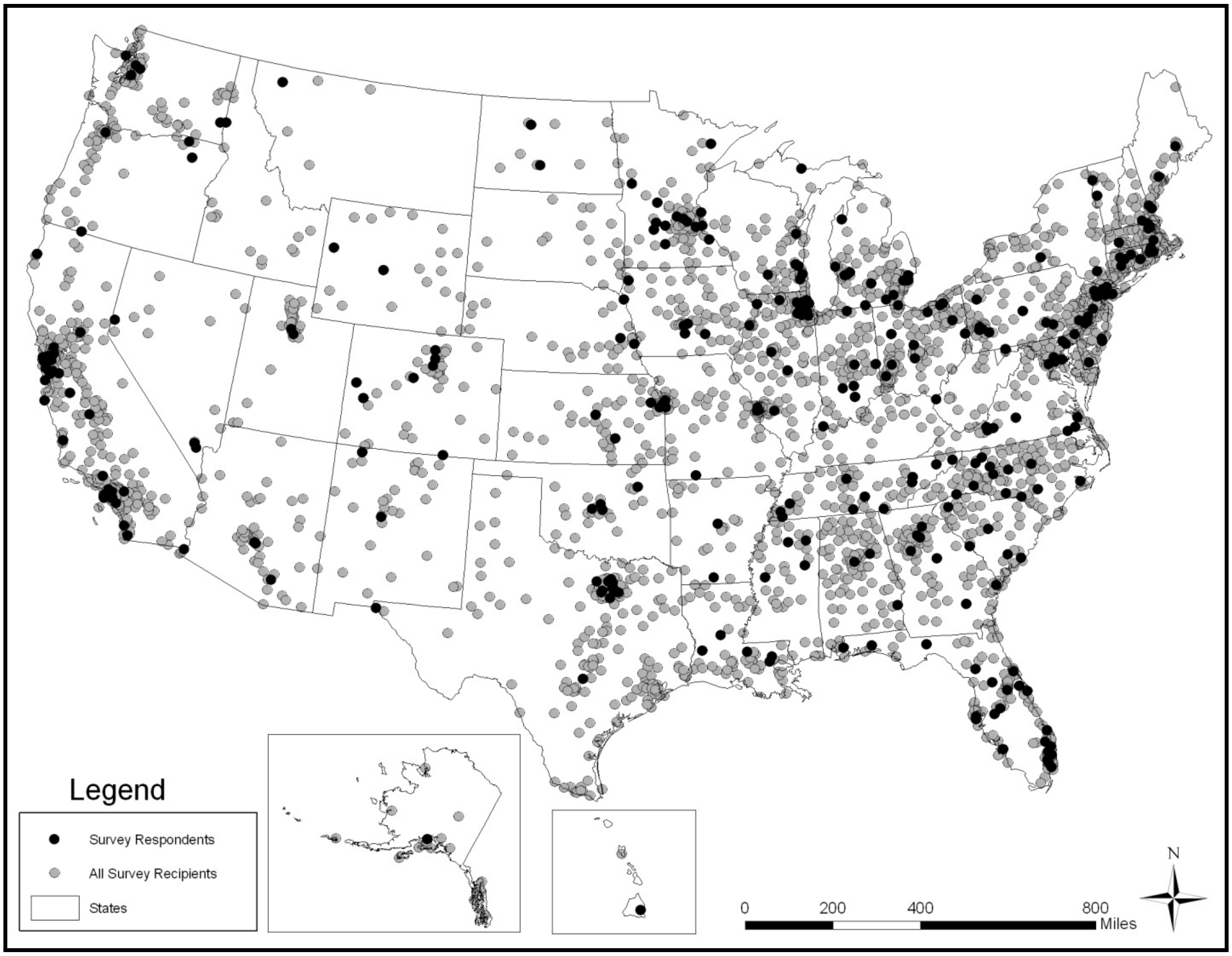
Survey Administration

Members of the ICLEI Mid-Atlantic region listserv pre-tested the draft survey instrument in early October, 2008. The final survey instrument was posted on-line at www.surveymonkey.com, and was available for completion from October 15 to December 1, 2008. A cover letter mailed on October 17 introduced the members of the study population to the research project and asked them to complete the survey. A copy of this letter is included in Appendix A. The letters included a shortcut survey link from www.tinyurl.com that allowed the recipients to access the online survey instrument. Each letter also included a unique survey access code that allowed the survey responses to be sorted by municipality. Digital and paper copies of the survey instrument were available upon request. A follow-up postcard was mailed in early November.

Primary Data Collection

Representatives of 320 municipalities responded to the survey, for a response rate of just under 8.1%. Of these, 57 survey responses were incomplete. Figure 3-1 identifies most of the survey recipients and whether or not they submitted a response.

Figure 3-1. Survey Recipients and Respondents



Note: The map shows 3,058 of the 3,959 municipalities that received the survey. The remaining 901 municipalities could not be mapped because the zip code included in their mailing address was not found in the U.S. Census Bureau's TIGER database zip code GIS shapefile.

The survey instrument included a list of climate protection policies and asked respondents to identify which, if any, had been adopted by their municipalities. These responses became the dependent variables in the multiple regression analyses, as described under "Dependent Variables" below. The survey instrument also included questions that provided contextual information about the respondent municipalities, some of which became independent variables in the analyses.

Secondary Data Collection

The independent variables that were not derived from the survey results were operationalized using secondary data from the 2000 U.S. Census and other sources. The Census includes data on all but five of the 263 municipalities that submitted complete survey responses. This information, which was gathered in 1999, is now ten years old. While the Census Bureau's 2006 American Community Survey (ACS) is a more recent source of demographic data, it could not be used for this research. The ACS only includes data for municipalities with populations of at least 65,000, and the survey population for this study includes many municipalities that fall below this threshold. The Census 2000 data on conditions in the respondent communities at the beginning of the decade is sufficient because the phenomenon being studied – adoption of climate protection policies – occurred throughout the decade.

The source of many of the independent variables was the Census 2000 Summary File 3 sample data set, which is based on a weighted sample of approximately 1 in 6 residents rather than the 100% count data from the Summary File 1 data set. This Summary File 3 data is not considered as accurate as the Summary File 1 data, but it is the best way to obtain detailed population information for U.S. municipalities and is commonly used in demographic research.

Several of the independent variables were calculated using spatial data and Geographic Information Systems software. The municipalities from the survey population were mapped by geo-coding their zip codes to a zip code layer from the U.S. Census Topologically Integrated Geographic Encoding and Referencing (TIGER) data system. This process successfully mapped 3,058 of the 3,956 municipalities in the original NLC database, including 235 of the 263 municipalities that submitted complete survey responses. Most of the remaining survey respondent municipalities were mapped using a shapefile from a GIS training module that includes all U.S. cities with a population of over 10,000. This accounted for 25 of the remaining respondent municipalities. As a result, 260 of the 263 municipalities with complete survey responses could be mapped, albeit in two separate shapefiles. After removing the five municipalities that did not have census data the data set contained 255 complete cases.

The data from both the NLC database and the GIS training module included the 1990 County FIPS numbers for each municipality. These numbers are a unique geographic identifier provided by the U.S. Census Bureau for every county in the United States. This allowed for county-level data on air quality, coastal location, and voting history to be joined to the two shapefiles for the respondent municipalities, as described below under Independent Variables.

Dependent Variables

The dependent variables in this analysis are a series of count data variables that reflect the number of policies that the respondent municipalities have adopted in each of four categories: climate protection planning measures (PLAN); energy efficiency policies (EFF); renewable energy policies (REN); and land use and transportation policies (LUTP).

The purpose of these variables is to reflect the extent of climate protection planning and policymaking in terms of the number of steps that each municipality has taken to reduce its energy use and emissions. Evaluating and comparing the strength or effectiveness of those policies, while certainly a topic worthy of future investigation, is not the purpose of this analysis. In addition, only policies that would reduce community-wide GHG emissions are included in the dependent variables. Many local climate protection programs include efforts to reduce energy use and emissions from municipal operations, but these typically account for a very small percentage of the total emissions from a given city or county. For example, approximately 1% of the GHG emissions from Blacksburg, VA, are attributable to the town's municipal operations (Randolph & Pitt, 2008). Similarly, many local climate protection programs include efforts to increase community-wide recycling rates, which can have significant energy conservation benefits but have a minimal impact on the total emissions attributed to the local community (Pitt & Randolph, 2008). For these reasons recycling programs and efforts to reduce energy use from municipal operations are not included as dependent variables in this analysis.

The survey instrument included a list of potential policies, including "other," in each of the four categories identified above. Table 3-1 lists the specific policies included in each category. An extensive literature review informed this list, which is representative of the range of policies that have been adopted by municipalities participating in the Cool Cities and CCP programs.

Table 3-1. Policies Included in the Dependent Variable Measurements

Climate Protection Planning Measures (PLAN)
A community-wide inventory of GHG emissions.
Goals or targets for the reduction of community-wide GHG emissions.
A plan to reduce community-wide GHG emissions.
Energy Efficiency Policies (EFF)
Enhanced energy efficiency requirements in municipal building code
Planning incentives (e.g., "fast-track" approval, density bonuses, etc.) for energy-efficient buildings
Property tax exemptions or reductions for energy-efficient buildings

Free or reduced-rate weatherization or energy conservation supplies
Energy audits or other assistance for the installation of energy efficiency upgrades
Other policies to promote or encourage energy conservation and/or energy efficiency
Grants or rebates to assist construction of new energy-efficient homes or buildings
Grants or rebates to assist weatherization or energy efficiency upgrades to existing buildings
Grants or rebates to assist purchase of energy-efficient appliances
Other grants or rebates to promote or encourage energy conservation and/or energy efficiency
Low-interest loans to assist construction of new energy-efficient homes or buildings
Low-interest loans to assist weatherization or energy efficiency upgrades to existing buildings
Low-interest loans to assist purchase of energy-efficient appliances
Other low interest loans to promote or encourage energy conservation and/or energy efficiency
Renewable Energy Policies (REN)
Planning incentives (e.g., "fast-track" approval, density bonuses, etc.) to developers who include renewable energy systems in new construction
Streamlined or "fast track" permitting processes for small-scale renewable energy systems added to existing buildings or properties
Building height exemptions for small-scale renewable energy systems
Waiver or reduction of permit fees for small renewable energy systems
Solar access or "solar rights" laws
Property tax exemptions or reductions for on-site renewable energy systems
Grants or rebates to offset some of the cost of new renewable energy systems
Low-interest loans to offset some of the cost of new renewable energy systems
Technical assistance for the installation of new renewable energy systems
Public benefits fund, or local levy to support renewable energy programs
Community choice aggregation to negotiate renewable energy options for private utility customers
Other policies to promote or encourage the use of renewable energy systems
Land Use and Transportation Policies (LUTP)
Adopted comprehensive plan goals or objectives to manage growth, reduce sprawl and/or focus development in existing urban areas
Adopted comprehensive plan goals or objectives to encourage mixed-use, pedestrian-oriented, and/or transit-oriented development
Updated zoning code to manage growth, reduce sprawl, and/or focus development in existing urban areas
Updated zoning code to encourage mixed-use, pedestrian-oriented, and/or transit-oriented development

Adopted additional growth management tools such as transfers of development rights (TDR's) or conservation easements
Collaborated with nearby jurisdictions and/or regional agencies on regional or metropolitan-area growth management plans
Other planning actions that would reduce Vehicle Miles Traveled and community-wide energy use
Increased mass transit service (e.g., increased service frequency, added new bus or rail lines)
Built new bicycle lanes, multi-use paths, or other bicycle or pedestrian amenities
Provided carpool matching or "guaranteed ride home" programs for commuters
Worked with private sector to provide subsidized transit passes and/or other programs to encourage employees to use alternative transportation modes
Other policies to reduce vehicle miles traveled by encouraging the use of alternative transportation modes

For each option the respondents identified if their municipality had adopted the policy, and if so, whether it was adopted within the past two years, between two and five years ago, or more than five years ago. This extra detail about the time of adoption created useful descriptive statistics about recent trends in climate protection policy, but for the purposes of the multiple regression analysis all adopted policies were coded equally. If a policy had not been adopted, respondents could select either "have not adopted and not pursuing" or "have not adopted but currently pursuing and intend to adopt." The survey instrument also included a "don't know" option for each policy.

This approach resulted in two separate measurements for each policy category. The "A" measurements indicate the number of policies that have been adopted by each municipality, while the "B" measurements include both adopted policies and those for which the municipalities selected "currently pursuing and intend to adopt." This second set of measurements reflects the recent rapid growth in climate protection policy and the fact that many cities across the nation are currently engaged in the planning process but so far have few adopted policies to show for it.

The two scores for each category are dependent variables in the multiple regression analyses. They are also combined into two Total Climate Protection Policy scores, identified as TOT-A and TOT-B, which are the primary dependent variables discussed in Chapter 4. Because there are fewer possible points in the climate protection planning measurement, those scores are weighted (i.e., multiplied by four) so that all four policy categories have roughly equal value in the final TOT scores. Table 3-2 describes these ten dependent variables, their possible point totals, and applicable questions from the survey instrument.

Table 3-2. Dependent Variables

Variable Name	Maximum Points	Survey Questions
TOT-A/B: Climate Protection Policy Score	50	All listed below
PLAN-A/B: Climate Protection Planning Measures	12	4
EFF-A/B: Energy Efficiency Policies	14	8-9, 15-16
REN-A/B: Renewable Energy Policies	12	10-11, 16
LUTP-A/B: Land Use and Transportation Policies	12	18, 20

The survey instrument included separate lists of policies for the energy efficiency and renewable energy policies, depending on whether or not the responding municipalities were served by a municipal electric utility. This allowed for descriptive statistics and cross-tabs to compare the extent of renewable energy and energy efficiency policy adoption between municipalities served by a municipal utility and those that are not.

Independent Variables

This section describes the logic behind the 16 independent variables included in the regression model and how each one was measured and operationalized. The independent variables for this analysis are a series of internal and external determinants that were hypothesized to significantly impact the extent to which a municipality adopts climate protection policies.

The internal determinants are divided into five demographic characteristics and four political-institutional characteristics. The six external determinants include regional diffusion effects (i.e., the influence of neighboring jurisdictions) as well as environmental conditions or other contextual characteristics. They are divided into the categories of environmental, economic, and political characteristics. They differ from the internal characteristics in that they are not specific to the municipalities in the population sample, but rather are regional characteristics that equally affect the subject municipalities and other surrounding communities. For example, the City of Baltimore is in a coastal location (on the Chesapeake Bay) and in an air-quality non-attainment area designated by the US Environmental Protection Agency. These characteristics are also true for many other neighboring municipalities. However, the city's per-capita income, voting record, and participation in environmental issues, for example, are unique to Baltimore and could be vastly different from those of neighboring municipalities. Therefore those unique demographic and political characteristics are considered internal, while the regional characteristics are considered external. Table 3-3 lists the 15 independent variables and identifies their source and type.

Table 3-3. Summary of Independent Variables

Independent Variable	Source	Type
Internal Determinants – Demographic		
Population	Census 2000	Continuous
Income per-capita	Census 2000	Continuous
Education	Census 2000	Percentage
Voting history	Various[1]	Percentage
College town status	Census 2000	Binary
Internal Determinants – Political-Institutional		
Municipal electric utility	Survey Responses	Binary
Staff responsible for energy / climate	Survey Responses	Binary
Local gov't environmental awareness	Survey Responses	Scale (0-5)
Community environmental activism	Survey Responses	Scale (0-5)
External Determinants – Environmental		
Air quality non-attainment	U.S. EPA (2008)	Binary
Coastal location	GIS layer by author	Binary
External Determinants – Economic		
Automobile dependency	Census 2000	Percentage
Electricity price	U.S. DOE, Energy Information Admin. (2008)	Continuous
External Determinants – Political		
State energy / climate policies	Pew Center on Global Climate Change (2009)	Scale (0-21)
Influence of neighboring jurisdictions	Survey Responses	Scale (0-6)

[1] *Sources for election data: The GeoCommunity, http://spatialnews.geocomm.com/features/election2000/; Center for Congressional and Presidential Studies, http://spa.american.edu/ccps/pages.php?ID=12; State of Alaska Division of Elections. http://www.elections.alaska.gov/04genr/data/sovc/hd33.pdf; State of Hawaii Office of Elections, http://hawaii.gov/elections/results/2004/general/04genhafinal.pdf; USA Today. http://www.usatoday.com/news/politics/election2008/president.htm. All sources accessed January 9, 2009.*

While many other internal and external factors could potentially influence the extent of climate protection policy adoption, the characteristics examined in this study are derived directly from the literature on policy diffusion and climate protection planning, as described in the previous chapter. The following sections describe why each characteristic was selected, based on the literature review and other information, and how they were measured and operationalized.

Internal Determinants

These variables address demographic and political-institutional characteristics that are unique to the municipalities included in the study. They are informed by the policy diffusion literature, which identifies a number of internal determinants as factors in policy diffusion. The climate protection planning literature also identifies a number of specific demographic and political-institutional characteristics that impact the ability or likelihood of a municipality to adopt climate protection policies.

Internal Demographic Characteristics

Five independent variables are included under the heading of internal demographic characteristics: population, per-capita income, educational attainment, college town, and voting history. Each of these variables was hypothesized to be positively correlated with each of the dependent variable measurements.

1. **Population.** Anecdotal evidence suggests that most large cities with populations over 1,000,000 have joined CCP and/or adopted a number of climate protection policies. This implies that certain characteristics associated with a larger population make municipalities more likely to adopt these policies.

   The literature on policy diffusion suggests that larger cities are more likely to adopt new policies. For example, Shipan and Volden (2008) found that larger cities are more likely to adopt anti-smoking policies because they are more capable of learning from other cities and less concerned about the potential economic competition consequences of adopting those policies (i.e., the concern of losing economic activity to neighboring jurisdictions that do not have those policies). Godwin and Schroedel (2000) found that higher population densities raised the likelihood of adopting local gun control ordinances in California. Kern, Koll, and Schophaus's (2006) study of Local Agenda 21 policies in Germany found that the first municipalities to adopt these policies were often mid-sized or large cities.

In the climate protection planning literature, Gupta, Lasage, & Stam (2007) found that larger cities in the Netherlands tend to develop more comprehensive climate protection plans or policies, while smaller cities are more likely to focus on individual projects and collaborations with neighboring jurisdictions.

Population data for each responding municipality were obtained from the 2000 U.S. Census.

2. **Income per-capita.** Anecdotal evidence suggests a correlation between a municipality's demographic characteristics, specifically income and education levels, and the adoption of climate protection policies. For example, many of the approximately 40-50 local governments that have adopted climate action plans to date are home to one or more major universities and have median educational levels and incomes that exceed national averages.

   Previous scholars have noted the relationship between income and the adoption of environmental policies. In the policy diffusion literature, Kern, Koll, and Schophaus (2006) found that the cities in Germany that were most likely to adopt Local Agenda 21 policies were those with "sufficient" financial resources (p. 620). Within the economics literature, the Environmental Kuznets Curve theory suggests that demand for environmental quality, and thus environmental policies, increases once communities reach a certain threshold of per-capita income. While there is substantial debate within the literature as to whether this theory holds true, Kahn (2006) has found that urban residents in the United States become more likely to demand environmental regulation as their incomes rise.

In their study of community energy planning in the early 1980s, Kron and Randolph (1983) identified a healthy local economy as one of the primary characteristics that positively impacted the implementation of community energy plans. More recently, Zahran, et al. (2008), found that the percentage of residents that have high incomes was positively correlated with membership in CCP.

Per-capita income figures for each municipality were obtained from the 2000 U.S. Census.

3. **Education.** As noted above, a preliminary review of community climate protection planning trends suggests that cities with higher levels of educational attainment may be more likely to adopt climate protection policies. Previous studies have found a significant positive correlation between educational attainment and CCP membership in U.S. municipalities (Vasi, 2006; Zahran, et al., 2008a). In the urban economics literature, Kahn (2006) found a correlation between high per-capita education levels and the demand for environmental policies. While the policy diffusion literature does not draw a connection between education and local environmental policies, at least one study has found it to be positively correlated with the adoption of other progressive municipal policies, such as local gun control programs (Godwin & Schroedel, 2000).

   The Census provides data on the educational attainment of all individuals above 25 years of age. Totals are provided for the number of residents that have completed different levels of education, such as a high school diploma, some college education, a bachelor’s degree, etc.

In this analysis education was measured as the percent of residents in each municipality who have a bachelor's degree or higher.

4. **Voting history.** The voting history of a municipality's residents is an indicator of local views on political, social, and economic issues. Democrats and Green Party supporters are typically more likely than Republicans to place a priority on environmental issues, and municipalities with a high percentage of these voters are arguably more likely to adopt climate protection policies.

   In the policy diffusion literature, Grossback, Nicholson-Crotty, and Peterson (2004) emphasized that similarities in political ideology are one of the key determinants of the spread of policies at the state level. In the climate protection planning literature, Zahran, et al. (2008b), found that a high percentage of residents who vote for the Democratic Party significantly increased the odds that a municipality would participate in CCP.

   County-level voting records for the 2000, 2004, and 2008 presidential elections were obtained as GIS shapefiles and joined to the shapefile created for the municipalities that responded to the survey. The voting history variable was calculated as the average percent of voters who voted for the Democrat or Green party candidate in these three elections.

5. **College town status.** Many of the earlier U.S. cities to join CCP were "college towns," i.e., cities or towns that are home to a major college or university and in which college students represent a significant portion of the total population. The resources that a college or university can provide to assist climate protection planning efforts may impact the extent of policy adoption in a way that goes beyond the impact of other demographic variables such as income and education (see Knuth, et al., 2007; Pitt & Randolph, 2008). While the previous

literature has not investigated that relationship exactly, Kern, Koll, and Schophaus (2006) found that many of the first municipalities to adopt Local Agenda 21 policies in Germany were university cities.

Data on the percentage of residents who are college students were obtained from the 2000 U.S. Census. The college town variable was measured as a binary or "dummy" variable, with a score of 1 for municipalities in which students enrolled in a college or university (undergraduate or graduate level) represent at least 1/3 of the total population, and a score of 0 for all other municipalities. This percentage is approximately five times higher than the 6.2% of all United States residents that are enrolled in a college or university. For example, the state of Virginia includes 10 cities, towns, and census-defined places that meet these criteria for being a college town, as shown in Table 3-4.

Table 3-4. College Towns in Virginia

Geography	Total Population	College/ University Enrollment	Percent College/ University Students
Hampden Sydney CDP	1,234	875	70.9%
Blacksburg town	39,393	23,895	60.7%
Ferrum CDP	1,283	691	53.9%
Williamsburg city	11,998	5,403	45.0%
Radford city	15,859	6,952	43.8%
Lexington city	6,867	2,876	41.9%
Farmville town	6,660	2,558	38.4%
Ettrick CDP	5,613	2,146	38.2%
Harrisonburg city	40,468	14,822	36.6%
Charlottesville city	45,049	15,501	34.4%

Source: 2000 U.S. Census, SF3 Sample Data

<u>Internal Political-Institutional Characteristics</u>

This category contains four variables that measure local political and institutional conditions within the respondent municipalities. It includes two characteristics of the municipalities' institutional structures – whether or not they have a municipal utility or staff responsible for energy or climate planning. The other two variables estimate local political conditions with respect to environmental issues – the level of environmental awareness among local government officials and the extent of community activism on local environmental issues. Each of these variables was hypothesized to be positively correlated with each of the dependent variables.

The variables included in this category are all specific to local political and institutional conditions. That is why the voting history variable, which reflects voting patterns in federal elections, is included with the demographic characteristics.

6. **Municipal electric utility**. Many of the local governments that have had the greatest success in energy and climate protection planning, including Austin, Seattle, Sacramento, and Los Angeles, are served by municipal electric utilities. While Kron and Randolph (1983) found that the involvement of local utilities had little effect on the implementation of community energy plans, municipal ownership of the local electric utility has been found to increase the implementation of climate protection planning (Collier, 1997). In addition, ICLEI's 2006 report on the CCP program found that cities with a municipal electric utility tend to have greater success in implementing the program goals (ICLEI, 2006).

Data for this variable were gathered via the survey. Question 13 asked: "Does your municipality own and operate its own electric utility?" The responses to this question were coded as a binary variable, with a value of 1 for "yes" and 0 for "no."

7. **Staff responsible for energy or climate planning.** The literature on climate protection planning suggests that a lack of staff dedication or capacity is a barrier to the adoption of municipal climate protection plans and policies (Betsill 2001; Holgate, 2007; Pitt & Randolph, 2008; Robinson & Gore, 2005; Romero-Lankao, 2007). This barrier can perhaps be avoided if the municipality assigns one or more staff members the responsibility of working on energy and climate protection planning issues.

   Data for this variable were gathered via the survey. Question 6 asked: "Does your municipality have any employees who are responsible for planning for energy use and/or GHG emission reductions?" Question 7 asked respondents to identify the number of employees, in FTE, that were responsible for those tasks. The data from Question 7 were not usable, as many of the respondents did not answer the question and those that did answer had wildly varying responses, perhaps due to differing interpretations of the phrase "responsible for those tasks." Therefore, the values for this variable were based solely on Question 6, and were coded as a 1 for "yes" and a 0 for "no."

8. **Local government environmental awareness.** The literature on climate protection planning suggests that municipalities that have a prior history of adopting environmental policies are more likely to engage in climate protection planning (Betsill, 2001; Bulkeley and Betsill, 2003; Collier, 1997). Robinson and Gore (2005) found that local government attitudes can be a barrier to climate protection policy adoption if they place a low priority on CO_2 issues or believe that climate change is not the responsibility of local governments. In

Data for this variable were gathered via the survey. Questions 22-24 asked the respondents to indicate the level of concern for environmental issues on the part of their municipalities' department heads and other high-level staff, mayor or top elected official, and other elected officials (e.g., city councilors). The response options were presented on a Likert scale, with values ranging from a value of 1 for "no concern/ not a priority" to 5 for "highly concerned." The value for the local government environmental awareness variable was measured as the average score, on a scale of 1-5, of those three responses.

9. **Community environmental activism.** This variable includes information on the participation of local citizens, community groups, and business and industry groups in support of local environmental policies. The policy diffusion literature notes the influence that outside actors and policy entrepreneurs can have over local policy adoption decisions (Godwin & Schroedel, 2000). Braun and Gilardi (2006) wrote that such influence can occur when those outside actors "impose costs and rewards on policy alternatives" (p. 300).

   The climate protection literature suggests that municipalities with a history of community environmental activism or environmental awareness are more likely to engage in climate protection planning (Betsill, 2001; Bulkeley and Betsill, 2003). This includes support from businesses, industry, and other institutions (Bulkeley & Betsill, 2003; Droege, 2002; Eckberg & Forsberg, 1998; Wheeler, et al., 2009). Similarly, a lack of community support can be a barrier to adoption of climate protection policies (Slocum, 2004). Zahran, et al. (2008a, 2008b), found participation in environmental causes and the number of local environmental organizations per-capita to be among the strongest indicators of membership in CCP.

Data for this variable were gathered via the survey. Questions 25-27 asked the respondents to indicate how often they or other staff or elected officials in their municipality are contacted or lobbied by local citizens, community groups, or businesses in support of local environmental policies. The response options were presented on a Likert scale, with values ranging from 1 for "never" to 5 for "very often." The value for the community environmental activism variable was measured as the average score, on a scale of 1-5, of those three responses.

External Determinants

The external determinants examined in this study are variables that may impact a given municipality's decisions on climate protection policy, but are not distinct characteristics of the individual municipality or its immediate community. This includes environmental characteristics, which most likely are shared with other nearby jurisdictions, as well as economic and political characteristics that exist at the regional or state level.

The impact of external environmental and economic characteristics on climate protection policy adoption may be related to municipalities' pursuit of "co-benefits" such as improved local air quality, reduced traffic congestion, and financial savings from energy efficiency improvements (Betsill, 2001; Bulkeley, 2000; Eckberg & Forsberg, 1998; Kousky & Schneider, 2003; Lindseth, 2004; Slocum, 2004; Romero-Lankao, 2007). The potential for these co-benefits is directly related to external conditions that impact the municipality, such as poor air quality, high traffic congestion, and high energy prices. Therefore, the municipalities that experience these conditions may be more likely to pursue climate protection policies.

External Environmental Characteristics

The environmental conditions that impact a given municipality are external characteristics, in that they are characteristics of a given region rather than specific to a given municipality. These include local air quality conditions and location within a coastal region. Both characteristics were hypothesized to be positively correlated with climate protection policy adoption.

10. **Air quality non-attainment.** Several scholars have noted that municipalities with poor local air quality may be more likely to adopt climate protection measures due to the perceived co-benefit of improving local air quality (Betsill, 2001; Bulkeley, 2000; Eckberg & Forsberg, 1998; Kousky & Schneider, 2003; Lindseth, 2004; Slocum, 2004; Romero-Lankao, 2007). This could be due to a genuine desire to improve air quality conditions, or simply because they may be required to adopt policies with climate protection benefits in order to achieve compliance with federal air quality regulations. However, prior studies have found air pollution levels to be a statistically insignificant determinant of participation in CCP (Vasi, 2006; Zahran, et al., 2008b).

    Local air quality was defined as a binary variable using data from the U.S. Environmental Protection Agency on air-quality attainment status for National Ambient Air Quality Standards (NAAQS) criteria pollutants. A map from the U.S. EPA website identifying all non-attainment counties was re-created in GIS, using a shapefile of all U.S. counties from a GIS training module. All municipalities from the study located within those non-attainment counties were selected and assigned a value of 1 indicating poor air quality. The remaining municipalities were assigned a value of 0.

11. Coastal location. The economics literature suggests that communities are more likely to demand policies to address a given environmental problem if they experience the localized effects of that problem (e.g., Panayotou, 1997). Rising sea levels are perhaps the most well-known potential consequence of climate change, and therefore municipalities in coastal areas may be more likely to pursue climate protection policies. Anecdotal evidence supports these findings, as a large number of coastal communities are members of CCP and/or have signed the USMCPA. Zahran, et al. (2008a, 2008b), found that location in a coastal area was among the variables with the greatest impact on the likelihood of CCP membership.

The respondent municipalities located in a coastal county were identified using GIS software tools. Using the U.S. counties shapefile from the GIS training module, a layer was created for all counties that have a coastline, including the coast of major bays such as the Chesapeake Bay, San Francisco Bay, etc. All municipalities located within those coastal counties received a value of 1, and the remaining municipalities received a 0.

External Economic Characteristics

This category includes two characteristics, automobile dependency and electricity prices, which reflect regional or state-level conditions that might impact a municipality's motivations for pursuing climate protection policies.

12. Automobile dependency. Many of the policies that municipalities could adopt to alleviate traffic congestion and automobile dependency, such as expanding mass transit services or zoning for transit-oriented development, are policies that have climate protection benefits. Therefore, municipalities that have a high level of automobile dependency may be more likely to adopt certain climate protection policies, in part due to the perceived "co-benefit" of relieving traffic congestion. This is considered an external determinant because the level of automobile dependency experienced in a municipality is often a function of regional growth and development patterns that are not necessarily unique to the municipality itself.

Betsill (2001) identified traffic congestion relief as one of the "hooks" that are used to establish a local nexus for climate protection policies. However, Zahran, et al. (2008a), found that the percentage of residents who commute to work by automobile was negatively correlated with membership in CCP. They hypothesized that this relationship was because the cost of reducing GHG emissions would be greater in those areas with lower levels of automobile commuting. It must be noted, however, that since the time of Zahran's research, much of which took place in 2006, there has been a noticeable change in public attitudes about automobile use due to rising gasoline prices and fuel efficiency concerns.

This study hypothesized that automobile dependency would be negatively correlated with climate protection policy adoption in general, but would be positively correlated with interest in adopting land use and transportation policies to reduce GHG emissions (i.e., the LUTP-B variable). In other words, municipalities with a high level of automobile dependency were not likely to have adopted policies for growth management or alternative transportation, but would indicate that they were currently pursuing those policies and intended to adopt them.

While the U.S. Federal Highway Administration and other organizations (e.g., the Texas Transportation Institute) provide data on Vehicle Miles Traveled and traffic congestion for large cities and metropolitan areas, no secondary data is available on automobile use in small cities and towns. This variable was therefore defined using Census data on the travel time to work as a proxy for automobile dependency.

The Census provides data on the travel time to work by means of transportation for workers age 16 years and over. The travel times are divided into twelve categories, ranging from less than 5 minutes to 90 or more minutes. The data shows that 68% of all American commuters, excluding those who use public transportation, have commute times of less than 30 minutes. The variable for automobile dependency was measured as the percent of non-public transportation commuters in each municipality that have travel times exceeding 30 minutes, i.e., that are in roughly the upper 1/3 of travel times among all workers nation-wide.

An alternative approach would have been to simply use the percentage of workers who commute by auto as the measurement for automobile dependency. However, the variable used here is more appropriate as it reflects the amount of time spent in the car, not just whether or not one uses a car to get to work. For example, an individual who drives 45 minutes to work should be considered more auto-dependent than one who drives 5 minutes, but that distinction would not be made if the variable were only measured as the percentage of workers who commute by auto.

One weakness is that the variable as defined here includes a small amount of non-automobile commuters. The U.S. census data on travel time to work by means of transportation is not broken down into all possible transportation modes, only public-transit vs. non-public transit. The auto dependence variable includes all the non-public-transit users who have commute times of greater than 30 minutes, which could include a small number in each municipality that commute by bicycle, walking, or other alternative modes. The 2000 Census shows that only 4% of total U.S. commuters use those means, and while the Census does not provide information on the length of their commutes it can be assumed that many of those alternative mode commuters have travel times of less than 30 minutes. Therefore, the number of non-auto commuters captured in the auto dependency variable is something less than 4%.

13. **Electricity price.** Several scholars have noted that municipalities may be pursuing climate protection planning policies, particularly those related to energy efficiency, conservation, and renewable energy, to achieve the "co-benefit" of lowering energy costs for the municipal government and/or local residents (e.g., Betsill, 2001; Kousky & Schneider, 2003). Collier (1997) noted that low energy prices can present a challenge to the adoption of climate protection policies. Furthermore, Kron and Randolph (1983) found that local experience with energy shortages and price increases raised the odds of implementation of community energy plans in the 1980s. If these findings are true, then municipalities with higher electricity prices should be more likely to adopt climate protection policies, particularly those related to energy efficiency and renewable energy use.

    The U.S. Energy Information Administration (EIA) publishes data on average retail electricity prices by state for the years 1990-2006. The electricity price variable for each municipality was measured as the average state-wide electricity price, in cents/kWh, for the years 2000-2006.

External Political Characteristics

This final category includes two external political characteristics that may influence a municipality's climate protection policy decisions – state energy and climate policies and the influence of neighboring jurisdictions. These variables reflect two phenomena discussed in the policy diffusion literature – top-down policy diffusion and regional diffusion.

14. **State energy and climate policies.** Much of the policy transfer literature focuses on the vertical transfer of policies from states to local governments, or vice versa. For example, Shipan and Volden (2008, p. 840) found that "coercion by state governments" was a factor in the diffusion of anti-smoking policies among U.S. cities.

    In the climate protection literature, Betsill (2001), Collier (1997), Lindseth (2004) and others noted the importance of state, federal, and international policies to support local climate protection initiatives. Supportive state programs also were important for the successful implementation of community energy programs in the early 1980s (Kron & Randolph, 1983).

    Approximately half of U.S. states have climate action plans that are completed or in progress, and most have one or more of the following other programs to reduce state-wide energy consumption and/or GHG emissions: public benefits funds, renewable portfolio standards, energy efficiency resource standards, or vehicle GHG emissions standards. The Pew Center on Global Climate Change tracks 21 types of state energy and climate policies and provides information on the number that each state has adopted (Pew Center on Global Climate Change, 2009b). The municipalities in the data set were assigned a value of between 0 and 21 according to the number of these policies that their respective states had adopted.

15. **Influence of neighboring jurisdictions.** The policy diffusion literature says that horizontal policy transfer at the state or local government level can take the form of "regional diffusion," or the spread of policies among neighboring jurisdictions (Berry & Berry, 1990). One explanation for this phenomenon is that the policy choices of one government create externalities that other nearby governments must account for in their own policy decisions (Braun & Gilardi, 2006). Studies of policy diffusion at the municipal level have identified a pattern of regional diffusion in the spread of growth control policies (Brueckner, 1998), anti-

smoking policies (Shipan & Volden, 2008), local gun control ordinances (Godwin & Schroedel, 2000), and Local Agenda 21 policies (Kern, Koll, & Schophaus, 2006). Vasi (2006) found that spatial and administrative proximity to prior CCP-member cities significantly increased the likelihood of membership in CCP.

This study does not offer a comprehensive spatial analysis of regional diffusion patterns for climate protection policies. It does, however, acknowledge the potential for regional diffusion by including a variable that measures municipal officials' awareness of climate protection policy adoption in nearby jurisdictions and the extent to which their own municipalities' climate protection policies have been influenced by their neighbors' policies.

Data for this variable was gathered via the survey. Question 28 asked "Are you aware of any nearby municipalities, other than your own, that have adopted policies to reduce energy use and/or GHG emissions? The respondents received a 1 for "yes" and a 0 for "no." Respondents who indicated "yes" then answered Question 29, which asked "if yes, please indicate the extent to which the experience of those municipalities with their energy and climate-related policies has influenced your municipality's decisions on whether or not to pursue similar policies." The response options were presented on a Likert scale, with five options ranging from a score of 1 for "no influence" to 5 for "major influence." The two values were combined to create an influence of neighboring jurisdictions score of between 0 and 6. A score of 0 indicates a municipality that is not aware of any nearby jurisdictions that have adopted climate protection policies, and a 6 indicates a municipality that is aware of nearby municipalities with climate protection policies and is significantly influenced in its approach to climate protection planning by the experiences of its neighbors.

Research Objectives and Hypotheses

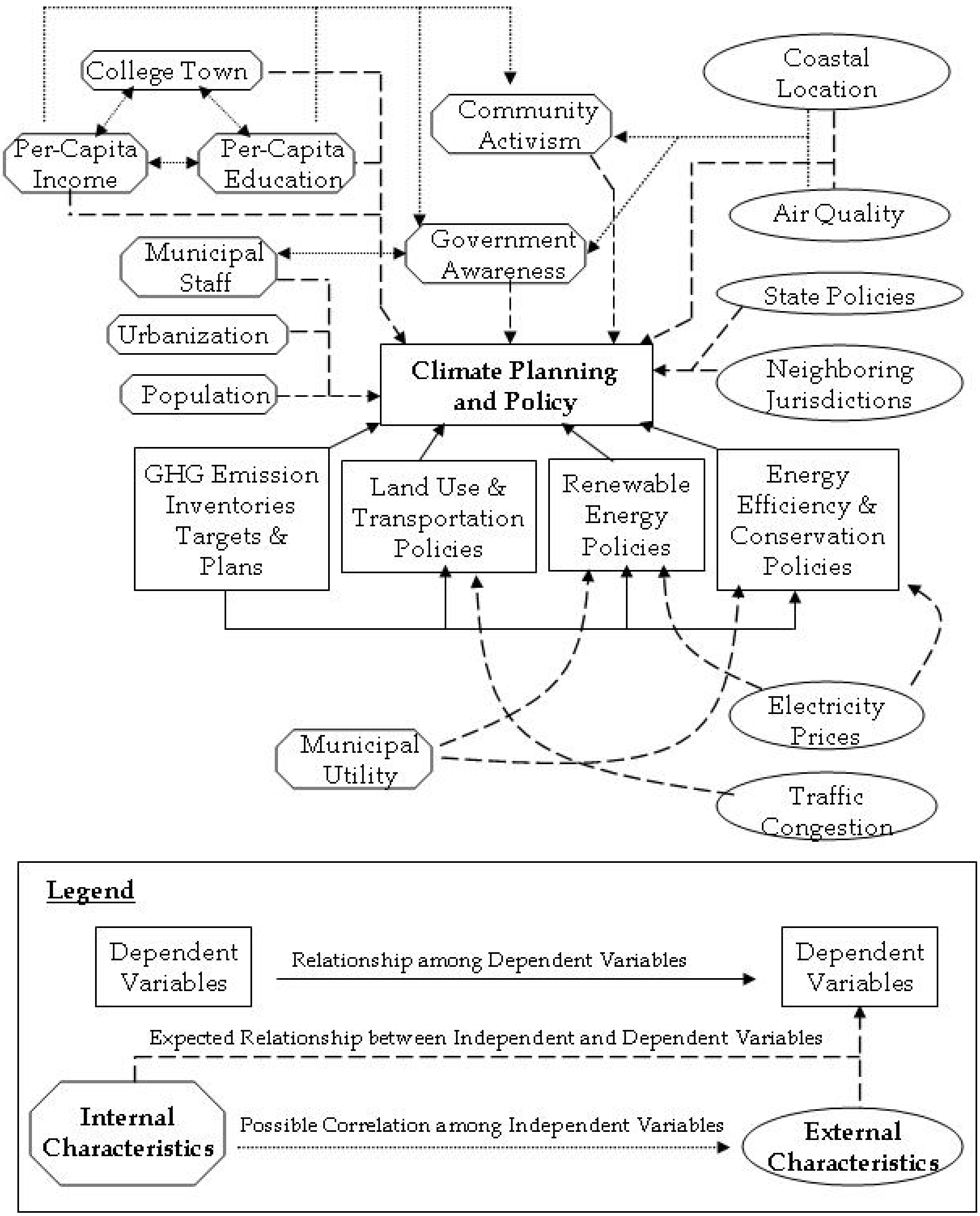
This study is grounded in the belief that the extent of climate protection planning and policy adoption in U.S. municipalities is influenced by a variety of internal and external determinants. Internal determinants, such as local demographic and political-institutional characteristics, are believed to more strongly influence a municipality's adoption of climate protection policies than regional environmental characteristics or other external determinants. In some cases, however, the desire to achieve environmental "co-benefits," i.e., address specific environmental or economic problems, likely leads municipalities to adopt specific types of climate protection policies. These assumptions form the basis of the research hypotheses.

Figure 3-2 illustrates the theorized relationship between the dependent and independent variables. All of the independent variables were believed to affect the extent to which a municipality adopts climate protection planning. Some were expected to have a stronger impact on one or more of the policy adoption measures, such as land use and transportation policies, than on the total climate protection policy scores.

This study tested five key hypotheses about the characteristics of municipalities that are engaged in climate protection planning. The first three hypotheses described the theorized relationship between the independent variables and the total number of climate protection policies that the municipalities had adopted or intended to adopt.

Hypothesis 1: Many of the variables included in the multiple regression analyses, including both the internal and external determinants, will have a statistically significant impact on the TOT-A and TOT-B scores and all other dependent variables.

Figure 3-2. Diagram of the Conceptual Model



Hypothesis 2: The internal determinants variables are more likely to be statistically significant in the regression analyses, and the magnitude of their impact on the TOT-A and TOT-B dependent variables will be greater than those for the external determinants.

Hypothesis 3: The internal variables of education, voting history, and community environmental activism will have the greatest magnitude of impact on the TOT-A and TOT-B dependent variables.

The following two hypotheses tested the theorized relationships between the independent variables representing opportunities for co-benefits and the adoption of policies that would achieve those co-benefits.

Hypothesis 4: Electricity prices will have a statistically significant positive impact on the dependent variables for energy efficiency (EFF-A and EFF-B) and renewable energy (REN-A and REN-B).

Hypothesis 5: Automobile dependency will be negatively correlated with climate protection policy adoption in general (TOT-A), but will be positively correlated with interest in adopting land use and transportation policies to reduce GHG emissions (i LUTP-B).

The following section describes the analytical tools used to test these hypotheses.

Data Analysis Techniques

The quantitative results presented in Chapter 4 include both descriptive statistics and multiple regression analyses. The descriptive statistics are used primarily to summarize the results of the survey and secondary data collection and to compare the results between municipalities that are USM/ CCP members to those that are non-members. The remainder of this section focuses on the construction of the regression models and use of regression tools.

Regression Model

The primary objective of the data analysis was to determine the effect of the various independent variables on the extent to which municipalities have adopted or intend to adopt climate protection plans and policies. The best way to test these relationships is through multiple regression analysis, which can find the effect of each of the independent variables (*x's*) on the dependent variable (*y*) while controlling for all other independent variables included in the model. Regression models were constructed for each of the ten dependent variable measurements. The regression models were each structured as follows:

$$y = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \beta_3 X_{3i} + \beta 4 X_{4i} + \beta_5 X_{5i} + \beta_6 X_{6i} + \beta_7 X_{7i} + \beta_8 X_{8i} + \beta_9 X_{9i} + \beta_{10} X_{10i} + \beta_{11} X_{11i}$$
$$+ \beta_{12} X_{12i} + \beta_{13} X_{13i} + \beta_{14} X_{14i} + \beta_{15} X_{15i} + u_i \quad for\ i = 1, 2, 3, \ldots, n$$

Where y = the dependent variable measurement

X_1 = population

X_2= income per-capita

X_3 = education

X_4 = voting history

X_5 = college town status

X_6 = municipal electric utility

X_7 = staff responsible for energy or climate planning

X_8 = local government environmental awareness

X_9 = community environmental activism

X_{10} = air quality non-attainment

X_{11} = coastal location

X_{12} = automobile dependency

X_{13} = electricity price

X_{14} = state climate and energy policies

X_{15} = influence of neighboring jurisdictions

u = random disturbance

n = number of cases

Estimation Methods

The two primary regression models – those using the TOT-A and TOT-B dependent variables – were estimated using ordinary least squares (OLS), Poisson, and negative binomial regression methods.

Ordinary Least Squares (OLS) Regression

OLS is always assumed to be the best linear unbiased estimator of a multi-variable relationship if the following assumptions hold:

- The dependent variable (*y*) is the product of a linear relationship between all applicable independent variables (*x's*) and a random disturbance (*u*).

- This random disturbance *u*, which represents the amount of "random noise" in the relationship between the *y* and *x* variables, is not correlated with any of the independent variables in the model.
- The *u* term is homoskedastic, meaning that its variance is not correlated with any of the *x* variables.
- The values of *u* for the different cases in the data set are not correlated with one another.
- The *u's* for all of the cases in the data set display a standard normal distribution.

The dependent variables evaluated in this study are count variables, or variables that can only take on non-negative integer values (e.g., 0, 1, 2, etc.). Linear models such as OLS may not provide the best fit for count variables, as these variables are not continuous and therefore cannot have a normal distribution. The Poisson and Negative Binomial models are generally considered to be more appropriate methods for count variable data.

Poisson Regression

According to King (1988), the use of OLS regression for count data variables can result in coefficients of the wrong size, and even the wrong sign. He writes that "the exponential Poisson regression model provides an unbiased and consistent alternative estimator" and results in much more efficient estimates than the OLS method for both large and small samples (p. 859). Woolridge (2006) added that "the nominal distribution for count data is the Poisson distribution," and the best estimation method for count variables is a form of maximum likelihood estimation known as the Poisson regression model (p. 205).

The Poisson model has been used to evaluate the effect of various independent variables on the adoption of state health insurance reform policies (Barrilleaux & Brace, 2007) and local government economic development policies (Feiock & Clingermayer, 1992).

Negative Binomial Regression

A key assumption of the Poisson model is that the mean and the variance of the model are equivalent. When the variance is larger than the mean, a condition known as *overdispersion*, the standard errors and coefficient estimates become unreliable. An alternative approach is to use a negative binomial regression model, which is based upon a negative binomial distribution assumption in which the variance of the model is equal to $\lambda + \lambda 2/r$, or the mean plus the mean squared over a disperson p (Jewell & Hubbard, 2006). The negative binomial regression results generated in the Stata computer program include a likelihood ratio test which tests the overdispersion parameter. When this overdispersion parameter is statistically significant from zero the negative binomial model is more appropriate than the Poisson model (UCLA Academic Technology Services, 2009).

The negative binomial model has been used in a variety of political science applications using event count data as the dependent variable. Examples include an analysis of privatization policy adoption in developing countries (Banerjee & Munger, 2004), implementation of EU directives in member states (Mbaye, 2001), and Zapatista movement protests in Mexico (de la Luz Inclán, 2008).

Model Selection

A comparison of the log likelihood scores for each regression method indicated that the negative binomial method was the most statistically sound approach for this data. Table 3-5 shows that the log likelihood scores for the TOT-A and TOT-B models (those using TOT-A and TOT-B as the dependent variables) were lowest for the Poisson method, indicating that it was the least appropriate of the three estimation methods for this data. However, the log likelihood scores for the negative binomial method were only slightly better than those for the OLS method.

Table 3-5. Log Likelihood (nLL) Scores for OLS, Poisson, & Negative Binomial Methods

	Dependent Variable	
Estimation Method	**Tot-A**	**Tot-B**
Log Likelihood (nLL) Scores		
Ordinary Least Squares (OLS)	-747.231	-864.097
Poisson	-792.135	-1019.761
Negative Binomial	-712.717	-849.309
Overdispersion parameter (chi^2)	158.84	340.90
Significance of parameter (Prob>=chi^2)	0.00	0.00

Table 3-5 also shows that the mean overdispersion parameter was statistically significant in both the TOT-A and TOT-B models, meaning that the data did not fit a Poisson distribution. Further examination of the data clarified the existence of overdispersion, as the mean for TOT-A was 7.71 and the variance was 37.01. For the TOT-B dependent variable the mean was 15.5 and the variance was 123.1.

The similar log likelihood results for the OLS and negative binomial methods indicated that the OLS method could be used for this data with relatively little loss of statistical validity. There was little practical benefit to using the negative binomial method for this data set, as Table 3-6 shows that the results of the OLS and negative binomial methods on the TOT-A and TOT-B dependent variables were nearly identical. The OLS and Negative Binomial methods found the same six independent variables to be significant for TOT-A: population, education, presence of a municipal electric utility, staff assigned to energy/climate issues, local government environmental awareness, and influence of neighboring jurisdictions.

Table 3-6. Significant Results for the Ordinary Least Squares and Negative Binomial Methods on TOT-A Dependent Variable (Unstandardized Coefficients)

Independent Variables	OLS		Negative Binomial	
	Coef.	Std. Err.	Coef.	Std. Err.
Dependent Variable = TOT-A				
Population	0.005**	0.001	0.0004*	0.0001
Education	0.105**	0.037	0.013**	0.005
Municipal electric utility	3.469**	0.826	0.393**	0.105
Staff responsible for energy / climate	2.653**	0.686	0.361**	0.092
Local gov't environmental awareness	1.270*	0.546	0.217**	0.075
Influence of neighboring jurisdictions	0.350*	0.170	0.044[1]	0.022
Dependent Variable = TOT-B				
Population	0.003*	0.001	NA[2]	NA[2]
Staff responsible for energy / climate	6.881**	1.085	0.449**	0.077
Local gov't environmental awareness	1.993*	0.864	0.208**	0.065
Community environmental activism	1.999**	0.672	0.141**	0.048
Automobile dependency	NA[2]	NA[2]	0.008*	0.003
Influence of neighboring jurisdictions	1.471**	0.269	0.089**	0.019

** Coefficient is significant at the 0.05 level (2-tailed)* *N = 255*

*** Coefficient is significant at the 0.01 level (2-tailed)*

[1] *Coefficient is significant at the .051 level*

[2] *Coefficient is not significant using this method*

The results were nearly identical for the TOT-B variable as well, as both methods found the following four variables to be significant: staff assigned to energy/climate issues, local government environmental awareness, community environmental activism, and influence of neighboring jurisdictions. Population was significant using the OLS method, but was not significant using the negative binomial method. However, the coefficient for the population variable in the OLS method was extremely small, meaning that population had a negligible impact on TOT-B values. Similarly, automobile dependency was significant using the negative binomial method, but not the OLS method. It too had an extremely small coefficient and therefore minimal substantive impact on the dependent variable.

The log-likelihood results in Table 3-5 indicate that the increase in statistical accuracy from using the negative binomial method over the OLS method would have been marginal. Comparing the results of the two methods in Table 3-6 reveals little difference in the variables that were determined to have a statistically significant impact on the dependent variables. The minimal improvement in statistical accuracy from using the negative binomial model did not outweigh the clarity and ease of interpretation from using the OLS method. This study therefore focuses on the OLS results. Appendix D presents the full results for the negative binomial method for all 10 dependent variables.

Interpretation of Results

In the OLS model the "goodness of fit" is represented with an R^2 value, which is calculated as the correlation coefficient between the actual y_i values from the data set and the fitted y_i values estimated by the model. The R^2 represents how much of the variation of the dependent variable is explained by the independent variable, and the closer that it is to 1.0 then the better the "fit" of the model.

OLS identifies a coefficient for each independent variable that measures its impact, independent of the other variables, on the value of the dependent variable. The analysis generates coefficients (β_1, β_2, etc.) and standard errors for each independent variable. Dividing the co-efficient by the standard error generates a t-statistic for each independent variable, which can be used in a hypothesis test to determine if the impact of the independent variables on the dependent variable is statistically significant from zero. Each t-statistic is associated with a P-value, which is the probability of getting a co-efficient of at least that same magnitude of value if the true co-efficient is actually zero. For a co-efficient of 10, a P-value of .05 means there is a 5% chance that random error could produce a co-efficient with an absolute value of at least 10 if the true co-efficient were actually zero (i.e. if the variable had no influence on the dependent variable). Typically a P value of less than .05 is interpreted as evidence for a non-zero co-efficient, meaning that the independent variable is statistically significant. A P value of less than .01 is "highly significant," or strong evidence for a non-zero co-efficient.

Once the statistically significant independent variables have been identified their coefficients can be examined to determine the level of impact that each one has on the dependent variable. The basic "unstandardized" coefficient generated in an OLS regression represents the partial impact of an independent variable x on the dependent variable y (i.e., its impact on y after controlling for all other variables), or the difference in the value of y that would result from a one unit change in the value x. Thus if the unstandardized coefficient for a given variable were 1.5, a one unit increase in that variable would increase the expected value of the dependent variable by 1.5 units if all other variables were held equal.

The OLS regression results can also be presented using "standardized" coefficients, which are generated by multiplying the unstandardized coefficient of an independent variable x by the ratio of the standard deviation of x to the standard deviation of the dependent variable y. The absolute value of the standardized coefficient represents that variable's partial impact on y without regard for its unit of measurement. This allows for more direct comparisons of the partial impacts of the various independent variables on y.

Analysis of Validity and Potential Methodological Problems

The primary methodological problems that could arise with this research are potential survey bias, limitations of the dependent variables, and problems with the data analysis.

Potential Survey Bias

Sample bias is a potential problem with virtually any survey research project. Biased samples can affect both the internal and external validity of survey research. Most simple random samples have external validity, meaning that the results of the sample can be generalized to other groups or populations. The sample frame for this survey is a mailing list of high-level municipal officials, primarily mayors and city managers, who are members of the National League of Cities (NLC). The results can therefore be generalized to the population of municipalities that are represented on the mailing list. However, their external validity, i.e., the extent to which they can be generalized to the population of all U.S. municipalities, is limited by the fact that the NLC mailing list is slightly skewed towards municipalities from urban metropolitan regions (J. Miller, personal communication, May 1, 2009).

Internal validity is the question of whether the sample selection process could have produced erroneous results for the sample itself. This can happen when substantial portions of a potential population do not answer or participate, especially if a specific sub-population participates less than the remainder of the population. Self-selection bias may affect the internal validity of a mailed survey sample. This occurs when the characteristics of certain members of the sample make them more likely to respond to the survey than other members.

In this case, municipal officials who have something to report may have been more likely to complete and return the survey than those working for municipalities that have adopted few if any climate protection policies. Additionally, those who have strong opinions about climate change, including "deniers" or those who feel it is not the responsibility of local governments, may have been more likely to answer the survey then those who are ambivalent about the topic. This potential internal validity problem was addressed by making the survey instrument as neutral as possible, such as by avoiding terms like "sustainability" and "global warming" and using more neutral terminology such as "energy" and "greenhouse gas emissions."

The validity of the survey results can also be influenced by the size of the sample and the number of respondents. With a small number of cases, the correlation between an independent variable and the dependent variable must be very high for that variable to be statistically significant. The test statistics become only rough approximations when the sample size is small, meaning that small sample sizes have "low power" to test hypotheses. The data set includes 255 complete cases, which was a sufficient number to produce reliable results in the multiple regression analyses.

Limitations of the Dependent Variable Measurements

A limitation of the count variables used in this analysis is that they are measures of policy adoption, not actual GHG emission reductions, and thus do not account for the effectiveness or thoroughness of each municipality's climate protection efforts.   While some policies will have much greater GHG emission reduction benefits than others, the purpose of this study is to examine the extent of climate protection policy-making in municipalities, not to evaluate the effectiveness of those policies.

Potential Analysis Problems

This analysis was subject to some potential problems that are inherent to multiple regression analysis, including omitted variables bias, heteroskedasticity, reverse causation bias, multi-collinearity, and measurement error. The approaches used to resolve or mitigate these potential analysis problems are described briefly below, and in greater detail in Appendix E.

Omitted Variables

Omitted variables bias occurs when important independent variables are left out of the regression equation. The equation must control for all of the variables that may have an effect on the dependent variable, including variables that are not being directly studied. This study attempted to identify every measurable variable that could impact the extent to which a municipality adopts climate protection policies, including all of the variables alluded to in the relevant literature.

Heteroskedasticity

The OLS method assumes that the model is homoskedastic, meaning that the variance of the error term is not a function of any of the independent variables. Heteroskedasticity occurs when the error term does vary with one or more independent variables. It does not influence the coefficients that are generated by the OLS regression model, but it can bias the standard errors and thus the test statistics and confidence intervals for the affected independent variables. In extreme cases heteroskedasticity can alter the outcome of significance tests.

The Breusch-Pagan / Cook-Weisberg test and the White's test are two methods of determining if heteroskedasticity exists in a given regression model. Both tests determined that heteroskedasticity exists in the study's two primary models. The Breusch-Pagan test identified the specific independent variables that exhibit heteroskedasticity.

The significant findings on the heteroskedasticity tests can be evidence of model misspecification, such as an incorrect functional form of the dependent variable, omission of relevant variables, or measurement error. Such misspecification errors are not likely for this data set, as explained in Appendix E. The potential bias created by the heteroskedasticity in the model was minimized through the use of robust standard errors in the final regression analyses.

Reverse Causation

Reverse causation bias occurs when the dependent variable affects any of the independent variables. This can be a worse problem than omitted variables bias because it can affect all of the coefficients in the model. Reverse causation is possible with the independent variable that measures whether or not the municipalities have staff members that are responsible for energy and climate planning. While the literature suggests that having staff members assigned to these efforts can increase a municipality's adoption of climate protection plans and policies, it is also possible that municipalities would hire or reassign staff members to implement the climate protection policies they have already adopted. This potential reverse causation was tested by comparing the OLS results for the full regression model with a version of the model in which the staff variable was included as part of the dependent variable measurement rather than as an independent variable, as described in Chapter 4 and Appendix E.

Multi-collinearity

Multi-collinearity occurs when some of the independent variables are highly correlated with one another. The independent variables are always assumed to be correlated to some extent, but if they are too correlated then the regression results will have high standard errors and may incorrectly appear not to be significant. In this study the independent variables for income and education had a high correlation coefficient, indicating potential multi-collinearity problems. This problem was addressed by testing forms of the models that excluded income or education, as well as versions that included a different functional form of the income variable.

Measurement Error

Measurement error can bias the coefficients of the independent variables towards zero, thus affecting the reliability of the results. This model has the potential for measurement error in the dependent variables because the municipal officials on the NLC mailing list may not have been familiar with the specific policies addressed in the survey. It is anticipated that in this case some of the survey recipients delegated the survey to other employees (e.g., the public works director or planning director), but others likely chose not to respond. Measurement problems also could occur from participants misrepresenting themselves in their survey responses. For example, respondents could have purposely overstated the extent of their climate protection policy adoption in order to make their municipality appear to more “green.” The survey instrument and survey recruitment letter sought to mitigate this problem by specifically stating that the survey responses would be anonymous. However, the potential remains for inaccurate or purposely misleading survey responses.

This type of measurement error in the dependent variable would create biased, inconsistent coefficient estimates if it were non-random, i.e., if the measurement error were a function of one or more of the independent variables or were related to the error term of the model (e.g., a function of an omitted variable). In this study it can be assumed that any measurement error in the survey results would be random and unsystematic, and would therefore not influence the coefficient estimates from the regression models.

Measurement error is also possible for some of the independent variables, particularly the variables for local government environmental awareness and community environmental activism. The survey respondents may not have been aware of the level of support for climate protection planning in their community, or they may not have been comfortable speculating about the opinions of elected officials or others in the community. They also may not have been aware of activity on the part of community, university, or business groups to support or advocate for local environmental policies. This would have been particularly true in those cases where little if any progress had been made to adopt those policies at the municipal level. This type of measurement error could also reduce the reliability of the results, but should not introduce bias.

An alternative approach to increase the reliability of the results would have been to survey local activists or community members who are advocates of climate protection initiatives in their communities. In theory, this could have been accomplished by surveying the members of Cool Cities which, unlike CCP, allows community activists who do not work for a municipality to become members. These individuals might have had a better understanding than the mayors and city managers about the extent of public and political support for climate protection in their communities. However, Cool Cities would not release any contact information for its members or allow for them to be interviewed. Furthermore, using the National League of Cities mailing list allowed for the results to include a control group of communities that did not have active climate protection programs, which would not have been the case if the Cool Cities membership were surveyed.

In conclusion, the measurements for the independent variables should be highly reliable, with the possible exception of the variables representing local government environmental awareness and community environmental activism. The dependent variables are a reliable measurement of the extent to which the respondent municipalities have adopted climate protection policies, but do not measure the effectiveness of those policies or quantify the GHG emissions that will result from them. The results have internal validity with respect to the sample frame, i.e., the other municipalities represented on the NLC mailing list, but may not be generalizable to all municipalities in the U.S.

Follow-Up Interviews

The research included 10 follow-up interviews with municipal representatives who completed the survey. The interviews investigated the dynamics behind the relationships observed in the quantitative analysis and provided greater context for the findings and conclusions. This qualitative research focused on the characteristics of local government support and community involvement in climate protection planning processes, as those variables were the most difficult to measure in the quantitative model.

The municipalities to be included in the interviews were identified based on the quantitative results. The quantitative results described the impact of demographic, political-institutional, economic, and environmental characteristics on municipal adoption of climate protection policies. The qualitative analysis focused on municipalities whose adoption of climate protection policies was not consistent with what would be expected based on this profile.

The final OLS multiple regression results were used to generate predicted values for each respondent municipality on the TOT-A and TOT-B dependent variables. The predicted values were then subtracted from the actual scores on those variables to determine the residuals for each municipality. These residuals represented the municipalities' performance relative to what would be expected given their independent variable characteristics, with higher numbers representing municipalities that adopted more policies than would be expected, and lower scores representing those that adopted less. Five of the interview participants were selected from among the municipalities with the highest residuals, and five were selected from among those with the lowest residuals.

Prospective interview participants were contacted via e-mail and follow-up telephone calls. Of the 15 prospective interviewees contacted, 10 agreed to participate. The interviews were conducted via telephone, and were not recorded. The interviews followed a semi-structured format based on the following questions:

1. Please describe the plans and/or policies that your municipality has adopted to reduce community-wide energy use and greenhouse gas emissions.
2. What have been your municipality's motivations for adopting these policies?
3. Are there other energy or GHG emission reduction policies that your municipality is considering? If yes, please describe them.
4. Please describe the process that led your municipality to adopt these policies.
5. Has the local community been involved in formulating and/or advocating for these policies?
6. Is your municipality a member of ICLEI-CCP or the USMCPA?
7. Does your municipality have staff members that are assigned to work on energy and climate issues?

8. Are you aware of other municipalities in your region that have adopted policies to reduce energy use and/or greenhouse gas emissions?

Appendix G includes summaries of the individual interviews. The interview results are evaluated in Chapter 5.

Chapter 4. Quantitative Analysis

This chapter describes the findings of the study, including descriptive statistics for the dependent and independent variables and the results of the multiple regression analyses.

A total of 263 municipalities submitted complete survey responses, and 57 submitted incomplete responses. Of the 263 municipalities with complete responses five did not have census data, and another three could not be mapped. This resulted in a data set with 255 complete cases. Tables in this chapter show the survey responses for the 255 municipalities included in the full data set, and tables showing the results for all 320 survey respondents are found in Appendix B.

Of the 255 municipalities included in the analysis, 95 (37%) indicated that they are members of at least one of the two major national municipal climate protection networks: Cities for Climate Protection (CCP) or the US Mayors Climate Protection Agreement (USMCPA). Of these, 48 (17%) are members of both networks. Table 4-1 shows the extent of the survey respondents' membership in each network. The table indicates that the majority of member municipalities have joined those networks within the past two years. Also, a relatively small number of the respondent municipalities indicated that they are currently pursuing membership in the networks. This response indicates that, among the municipalities included in this study, the majority of those that would be likely to join a climate protection network have already done so. These numbers are much higher than the percentage of overall U.S. municipalities that are members of these networks, a figure that is likely less than 10%. This over-representation of USM/CCP members indicates that the survey population could be affected by self-selection bias, although formal tests for self-selection bias were not conducted.

Table 4-1. Membership in Climate Protection Policy Networks

Policies	Not Pursuing	Pursuing/ Intend to Adopt	Have Adopted
Cities for Climate Protection	158 (62%)	17 (7%)	69 (27%)
U.S. Mayors Climate Protection Agreement	138 (54%)	28 (11%)	74 (29%)
Cool Cities	194 (76%)	17 (7%)	29 (11%)
Other climate policy network (N=91)	46 (51%)	7 (8%)	26 (29%)

N = 255, except where noted

The following section summarizes the survey data on climate protection policy adoption, which forms the dependent variables used in the regression analysis. Appendix C describes these survey responses and the calculation of the dependent variables in greater detail.

Dependent Variables

The respondent municipalities identified the number of policies they had adopted, or intended to adopt, in each of four categories. Where applicable, the municipalities identified how long ago they had adopted each policy – in the past two years, two to five years ago, or more than five years ago. Each category included a list of twelve to fourteen possible policies, including "other." The respondents were required to provide an answer for each policy, except for "other." The exception was the first category, climate protection planning measures, which included only three options: GHG emission inventories, emissions reduction targets, and climate action plans. Those planning measures corresponded to the first three milestones of the climate protection planning process, as recommended by CCP. Table 4-2 shows the adoption of climate protection planning measures among the municipalities included in the analysis.

Table 4-2. Survey Responses: Climate Protection Planning Measures

Policies	Not Pursuing	Pursuing/ Intend to Adopt	Have Adopted
A community-wide GHG emissions inventory	150 (59%)	65 (25%)	37 (15%)
Goals or targets for the reduction of community-wide GHG emissions	144 (56%)	74 (29%)	29 (11%)
A plan to reduce community-wide GHG emissions	141 (55%)	81 (32%)	23 (9%)

N = 255, except where noted

Just over 50% of the respondent municipalities had not adopted any of these climate protection planning measures, and did not intend to do so. Only a small number had adopted a GHG emissions inventory (15%), with even fewer having adopted emission reduction targets (11%) or an emission-reduction plan (9%). Roughly 1/4 to 1/3 indicated that they had not adopted these planning measures but were pursuing them and intended to adopt them.

Table 4-3 lists the most commonly adopted energy efficiency and conservation, renewable energy, and land use and transportation policies among the municipalities included in the analysis. The table does not include the options for "other policies," which were among the most commonly selected survey options in both the energy efficiency and conservation and renewable energy categories. The land use and transportation policies, particularly those related to growth management, were far more common among the respondent municipalities than those from the other two categories. The policies to promote renewable energy use were by far the least common, as seven of the twelve policies had been adopted by less than 5% of the municipalities. Many of the municipalities noted that they have not adopted energy efficiency or renewable energy policies because similar policies are offered by the state or the local utility.

Some indicated that they partner with non-profit organizations that offer energy assistance, and provide information to the public about those programs, but do not offer the services themselves.

Table 4-3. Climate Protection Policies with Highest Rates of Adoption

Policies	Not Pursuing	Pursuing/ Intend to Adopt	Have Adopted
Energy Efficiency and Conservation[1]			
Enhanced energy efficiency requirements in municipal building code	90 (35%)	85 (33%)	70 (27%)
Energy audits or other technical assistance for the installation of energy efficiency upgrades	148 (58%)	47 (18%)	52 (20%)
Free or reduced-rate weatherization or energy conservation supplies	180 (71%)	25 (10%)	36 (14%)
Renewable Energy[1]			
Technical assistance for the installation of new renewable energy systems	202 (79%)	25 (10%)	18 (7%)
Planning incentives (e.g., "fast-track" approval, density bonuses, etc.) to developers who include renewable energy systems in new construction[2]	182 (71%)	49 (19%)	12 (5%)
Waiver or reduction of permit fees for small renewable energy systems	206 (81%)	21 (8%)	14 (5%)
Land Use and Transportation			
Built new bicycle lanes, multi-use paths, or other bicycle or pedestrian amenities	37 (15%)	53 (21%)	161 (63%)
Adopted comprehensive plan goals or objectives to encourage mixed-use, pedestrian-oriented, and/or transit-oriented development	46 (18%)	48 (19%)	154 (60%)
Adopted comprehensive plan goals or objectives to manage growth, reduce sprawl and/or focus development in existing urban areas	62 (24%)	41 (16%)	148 (58%)

[1] *Totals include policies adopted by a municipal electric utility.* *N = 255, except where noted.*

[2] *Approximately 5% of the municipalities also adopted a similar policy to offer fast-track permitting processes for small-scale renewable energy systems added to existing buildings or properties.*

The municipalities described a number of interesting and innovative climate protection policies in an open-ended questions provided for each category. Some examples included mandatory green building program for new residential and commercial development (Frisco, TX), the use of tax increment financing (TIF) district funds to support private energy efficiency upgrades (Middleton, WI), a requirement that all new residential development be pre-wired for potential solar PV or solar water heating systems (Lemoore, CA), and the construction of new electric car recharge areas (Cypress, CA). Appendix C includes more examples of the policies listed under “other.”

Each municipality has two scores for each policy category. The “A” score represents total adopted policies in each category, and the “B” score includes the adopted policies as well as those that the municipalities indicated they were pursuing and intended to adopt. Appendix C includes graphs illustrating the distribution of “A” and “B” scores for each of the individual policy categories. The A scores from the four policy categories are combined into a “TOT-A” score representing the total number of policies adopted by each municipality, and the B scores are combined into a “TOT-B” score for each municipality. The scores from the GHG emission inventories, targets, and plans category (PLAN-A and PLAN-B) are multiplied by four so that each policy category contains roughly the same weight within the TOT-A and TOT-B scores.

Figure 4-1 shows the distribution of TOT-A scores in the final data set. The mean is 7.71, and the standard deviation is 6.08. Eighteen of the respondents have a score of zero, with nearly all of the remainder scoring between 0 and 23. Three outliers have scores in the 30s: Alameda, CA; San Jose, CA; and Louisville, CO.

Figure 4-1. Total Adopted Policies (TOT-A)

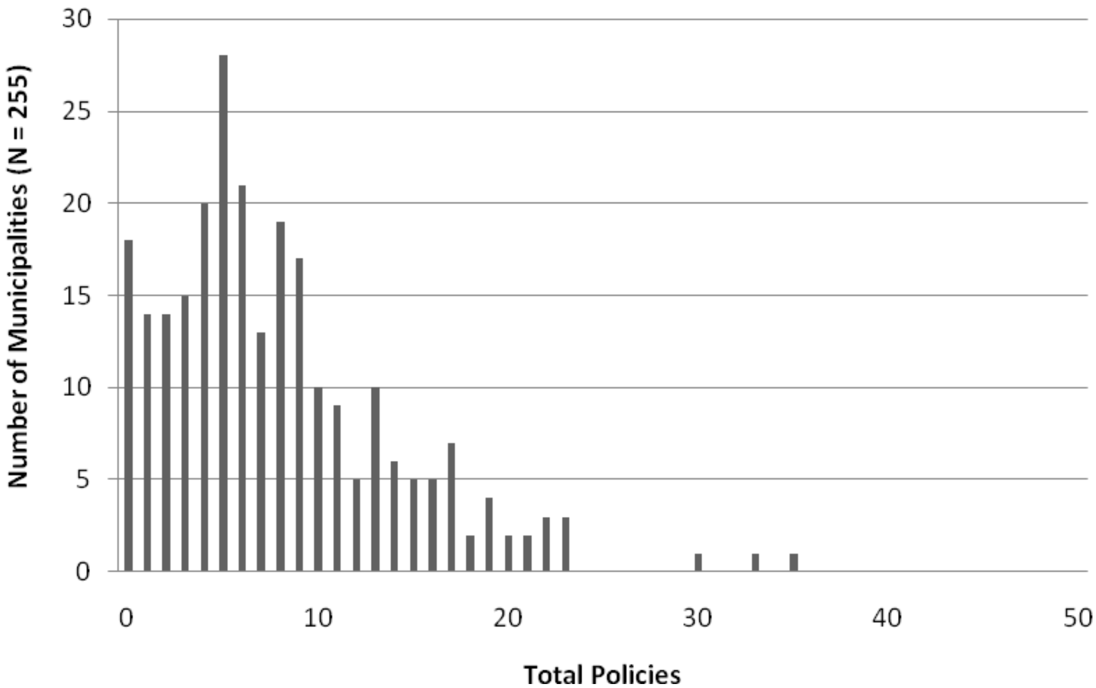


Table 4-4 shows the top TOT-A scores among respondent municipalities. Surprisingly, three of the top 10 scores belong to municipalities that are not members of USMCPA or CCP.

Table 4-4. Top 20 Climate Protection Policy Scores among Respondent Municipalities ("A" Variables)

	NAME	ST	POP.	MEMBER*	TOT	PLAN	EFF	REN	LUTP
1.	City of Alameda	CA	72,259	Y	35	12	10	5	8
2.	City of San Jose	CA	893,889	Y	33	4	12	5	12
3.	City of Louisville	CO	18,868	N	30	12	5	3	10
4.	City of Arcata	CA	16,714	Y	23	12	1	1	9
5.	City of Los Angeles	CA	3,694,834	Y	23	8	6	2	7
6.	City of Ashland	OR	19,511	Y	23	0	7	8	8
7.	City of Kansas City	MO	441,269	Y	22	12	6	0	4
8.	City of Philadelphia	PA	1,517,550	Y	22	12	2	1	7
9.	Town of Reading	MA	23,708	N	21	8	5	1	7
10.	City of Shaker Heights	OH	29,415	N	21	0	8	5	8

** Indicates if the municipality is a member of USMCPA or CCP.*

Figure 4-2 shows the distribution of scores on the TOT-B variable. The majority of the scores fall into the ranges of 0-10 or 20-30. The mean is 15.54, and the standard deviation is 11.10. The highest scores, those above 40, belong to San Jose, CA, Miami-Dade County, FL, Orlando, FL, Henderson, NV, and Daly City, CA. Of these, only San Jose is among the top 20 municipalities on the TOT-A score.

Figure 4-2. Total Adopted or Pursued Policies (TOT-B)

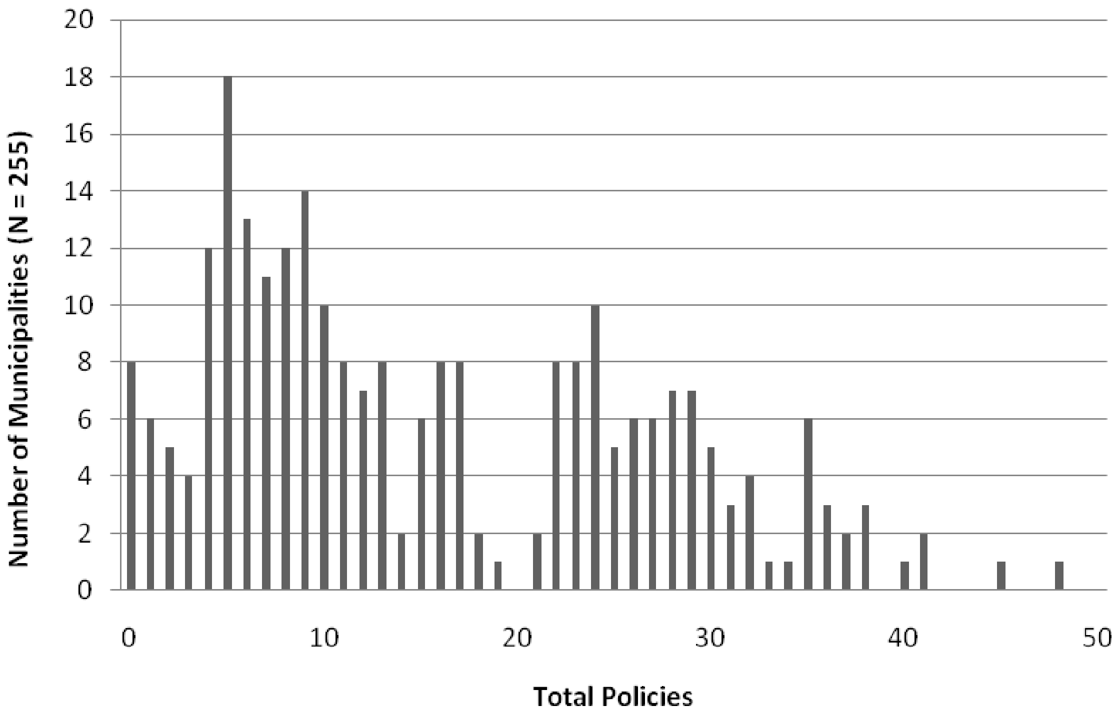


Table 4-5 summarizes the descriptive statistics for the 10 dependent variables.

Table 4-5. Summary of Dependent Variable Measurements

Dependent Variable	Possible Points	Min.	Max.	Mean	Standard Deviation
TOT-A	50	0	35	7.71	6.08
TOT-B	50	0	48	15.54	11.10
PLAN-A	12	0	12	1.41	2.91
PLAN-B	12	0	12	4.86	5.53

Dependent Variable	Possible Points	Min.	Max.	Mean	Standard Deviation
EFF-A	14	0	12	1.55	2.03
EFF-B	14	0	14	3.04	3.00
REN-A	12	0	8	0.60	1.22
REN-B	12	0	10	1.75	2.37
LUTP-A	12	0	12	4.15	2.72
LUTP-B	12	0	12	5.89	2.72

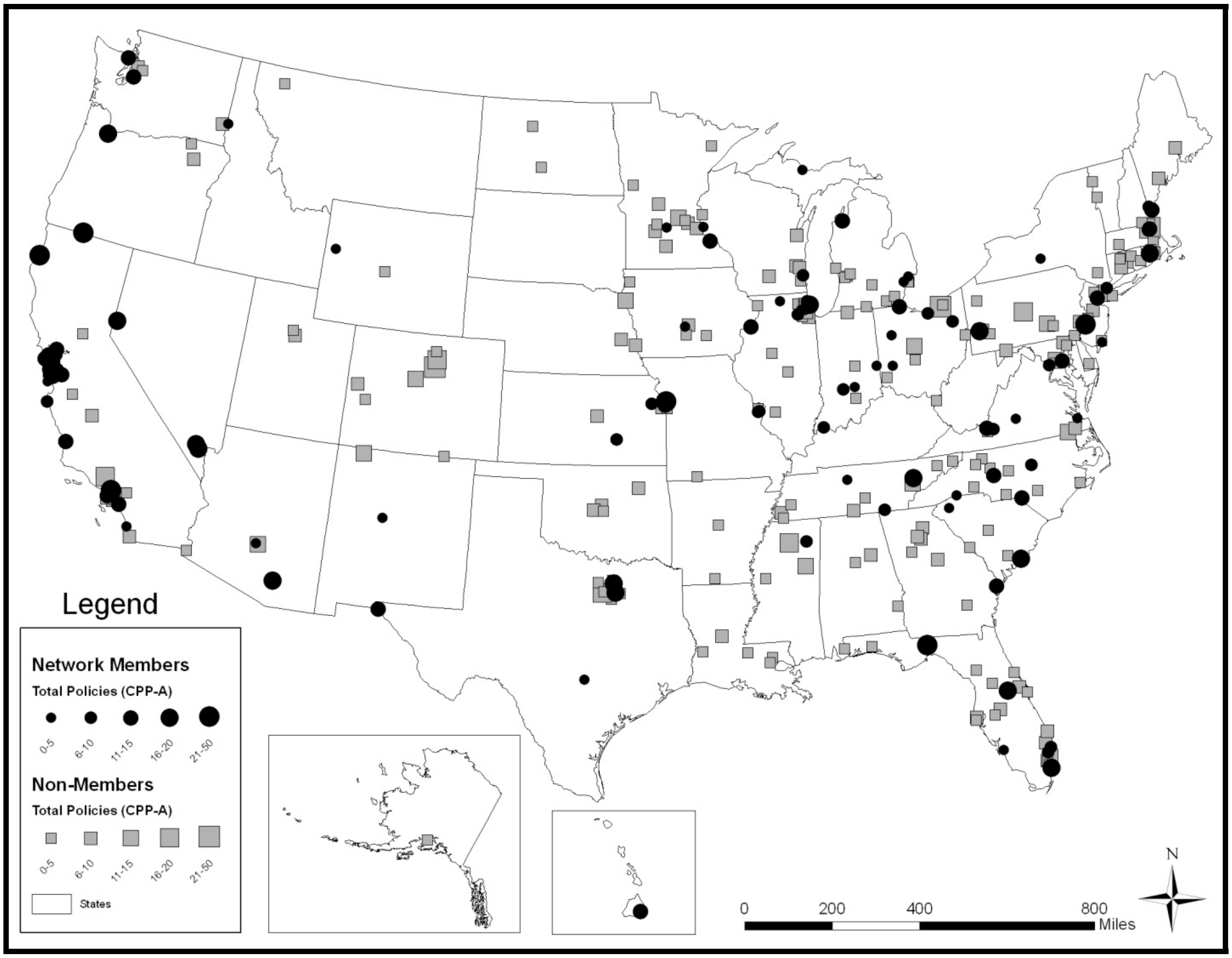
Table 4-6 compares the scores between member and non-member municipalities on each dependent variable. As would be expected, the member municipalities tend to have adopted more climate protection policies. The mean score on the TOT-A and TOT-B are more than twice as high for USM/CCP members as for non-members. The greatest disparity between member and non-member scores occurs in the PLAN and REN variables and the least disparity occurring in the LUTP variables. The disparity in the PLAN variables is logical, as USM/CCP members would seem to be far more likely to complete GHG emissions inventories, targets, and plans. Similarly, municipalities who are interested in pursuing those planning measures would be highly likely to join one or both of the climate protection planning networks. The lack of disparity on the land use and transportation variables (LUTP-A and LUTP-B) also makes sense, as these actions have other positive outcomes beyond climate protection and have been relatively common planning approaches since well before municipalities began to pursue climate protection objectives.

Table 4-6. Mean Dependent Variable Scores for USM/CCP Members and Non-Members

Dependent Variable	Possible Points	USM/CCP Members	Non-Members
TOT-A	50	11.22	5.86
TOT-B	50	24.48	10.46
PLAN-A	12	3.03	0.68
PLAN-B	12	9.64	2.25
EFF-A	14	2.08	1.23
EFF-B	14	4.69	2.06
REN-A	12	0.99	0.37
REN-B	12	3.11	0.94
LUTP-A	12	5.12	3.58
LUTP-B	12	7.04	5.20

A map of all respondent municipalities by USM/CCP membership status and scores on the TOT-A variable is shown in Figure 4-3. This map demonstrates the fact that many of the highest-scoring municipalities are located on the west coast, particularly in California, in the northeast Atlantic corridor, and in Florida.

Figure 4-3. Total Adopted Policies (TOT-A) by USM/CCP Member Status



The following section describes the descriptive statistics for the independent variables included in this study.

Independent Variables

The independent variables for this analysis are a series of internal and external determinants that are hypothesized to significantly impact the extent to which a municipality adopts climate protection policies. The internal determinants are divided into demographic and political-institutional characteristics, and the external determinants are divided into economic, environmental, and political characteristics. Table 4-7 shows the descriptive statistics for each of the independent variables.

Table 4-7. Summary of Independent Variable Measurements

Independent Variable	Source	Min.	Max.	Mean	Std Dev
Internal Determinants – Demographic					
Population[1]`	Census 2000	0.25	3694.83	78.32	275.83
Income per-capita[1]	Census 2000	9.54	99.62	23.76	11.66
Education	Census 2000	4.52	79.83	29.35	15.98
Voting history	Various[2]	14.74	84.31	50.13	13.32
College town status	Census 2000	0	1	0.06	0.24
Internal Determinants – Political-Institutional					
Municipal electric utility	Survey Responses	0	1	0.17	0.38
Staff responsible for energy / climate	Survey Responses	0	1	0.44	0.50
Local gov't environmental awareness	Survey Responses	1.67	5	4.16	0.68
Community environmental activism	Survey Responses	1	5	2.77	0.96
External Determinants – Environmental					
Air quality non-attainment	U.S. E.P.A. (2008)	0	1	0.49	0.50
Coastal location	G.I.S. layer by author	0	1	0.27	0.45
External Determinants – Economic					
Automobile dependency	Census 2000	30.00	95.53	71.89	13.00
Electricity price	U.S. Dep't of Energy, Energy Information Administration (2008)	4.81	15.81	7.78	2.01
External Determinants – Political					
State energy / climate policies	Pew Center on Global Climate Change (2009)	3	20	12.67	4.46
Influence of neighboring jurisdictions	Survey Responses	0	6	1.82	2.10

[1] *Values shown are in thousands.* *N= 255*

[2] *Sources for election data: The GeoCommunity, http://spatialnews.geocomm.com/features/election2000/; Center for Congressional and Presidential Studies, http://spa.american.edu/ccps/pages.php?ID=12; State of Alaska Division of Elections. http://www.elections.alaska.gov/04genr/data/sovc/hd33.pdf; State of Hawaii Office of Elections, http://hawaii.gov/elections/results/2004/general/04genhafinal.pdf; USA Today. http://www.usatoday.com/news/politics/election2008/president.htm. All sources accessed January 9, 2009.*

Table 4-8 compares the independent variable values for the survey respondents to those of the survey population for the five variables derived from U.S. Census Bureau data.

Table 4-8. Comparison of Independent Variable Measurements between Survey Respondents and Survey Population

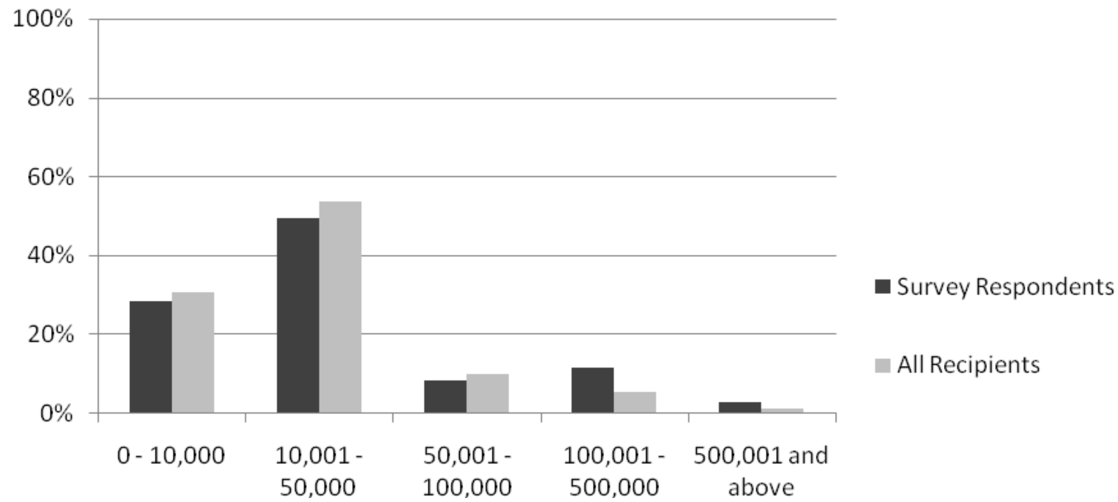
Independent Variable	Group	Min.	Max.	Mean	Standard Deviation
Population	Respondents	0.25	3694.83	78.32	275.83
	All Recipients	0.09	8008.28	40.60	177.64
Income per-capita	Respondents	9.54	99.62	23.76	11.66
	All Recipients	4.36	112.41	21.53	10.08
Education	Respondents	4.52	79.83	29.35	15.98
	All Recipients	0.00	88.40	24.09	14.50
College town status	Respondents	0.00	1.00	0.06	0.24
	All Recipients	0.00	1.00	0.02	0.15
Automobile dependency	Respondents	30.00	95.53	71.89	13.00
	All Recipients	29.20	98.60	72.00	12.78

Source: U.S. Census Bureau, Census 2000 *N= 255 for survey respondents, 3,540 for survey population.*

The only variables in which there is a substantial difference between the survey respondents and the survey population are population and college town status. The mean population among the survey respondents is 96,000, compared to 40,600 for the survey population. This indicates that the survey sample is biased towards municipalities with larger populations. Six percent of the respondent municipalities have college town status (i.e., at least 30% of their residents are college students), versus only 2% of the total survey population. The survey respondents also have slightly higher levels of education than the survey population, with 29.5% of their residents having bachelor's degrees versus 24% of residents in the survey population as a whole.

The population of the respondent municipalities ranges from a low of 254 (Lake Lillian, MN) to a high of 3,694,834 (Los Angeles, CA). Figure 4-4 illustrates the population distribution among the municipalities included in the analysis compared to that of the entire survey population. A greater portion of the municipalities in the study have populations over 100,000.

Figure 4-4. Population Distribution among Survey Respondents and Survey Population



Source: U.S. Census Bureau, Census 2000

Table 4-9 shows the 15 municipalities from the analysis that have college town status, along with their scores on the TOT-A and TOT-B variables. The mean scores for the college towns are higher than those of all survey respondents: 11.6 for the college towns on TOT-A, versus 7.71 for all respondents, and 22.4 on TOT-B versus 15.54 for all respondents.

Table 4-9. College Towns among Respondent Municipalities

NAME	ST	Population	Percent College Students	TOT-A	TOT-B
1. State College	PA	38,420	72%	20	29
2. Blacksburg	VA	39,393	62%	14	27
3. Ithaca	NY	29,006	59%	5	11
4. Pullman	WA	14,203	59%	7	9
5. Bloomington	IN	69,229	47%	8	19

NAME	ST	Population	Percent College Students	TOT-A	TOT-B
6. Princeton	NJ	14,203	46%	7	26
7. Frostburg	MD	7,529	43%	10	15
8. San Marcos	TX	34,005	41%	4	29
9. Arcata	CA	16,714	37%	23	27
10. Oberlin	OH	8,257	36%	8	31
11. San Luis Obispo	CA	44,148	36%	11	25
12. Oxford	MS	11,792	32%	19	24
13. Starkville	MS	22,037	32%	14	26
14. Lawrence	KS	80,083	31%	6	15
15. Tallahassee	FL	150,581	31%	18	23

Source: 2000 U.S. Census, SF3 Sample Data; 2008 Municipal Climate Protection Planning Survey

Table 4-10 shows the Pearson correlations among the independent variables and the primary dependent variable (TOT-A). Many of the variables are significantly correlated with one another at the 0.05 and 0.01 levels. However, in most cases the magnitude of those correlations is minor. Only four pairs of variables are significantly correlated (all at the 0.01 level) and have a correlation coefficient of over 0.5: education and per-capita income; local government environmental awareness and community environmental activism; electricity prices and coastal location; and electricity prices and state energy prices. All of these correlations are fairly intuitive, with the possible exception of that between electricity prices and coastal location.

The correlation between education and per-capita income presents the greatest concern for the analysis, as it is strong enough (.736) to alter the coefficients and significance levels that emerge for those variables from the multiple regression analyses. The relationship between education and income, and their respective impacts on the dependent variables, is further explored in the multiple regression findings below.

Table 4-10. Pearson's Correlation Coefficients among Variables

Variable Name	1	2	3	4	5	6	7	8
Total Adopted Policies (TOT-A) (1)	1.000							
Population (2)	.352**	1.000						
Income per-capita (3)	.121	-.063	1.000					
Education (4)	.302**	-.055	**.726****	1.000				
Voting history (5)	.260**	.168**	.386**	.376**	1.000			
College town status (6)	.160*	-.035	-.147*	.312**	.038	1.000		
Municipal electric utility (7)	.215**	.092	-.157*	-.098	-.152*	.106	1.000	
Staff responsible for energy / climate planning (8)	.441**	.201**	.093	.245**	.262**	.081	-.028	1.000
Local government environmental awareness (9)	.381**	.103	.222**	.292**	.253**	.136*	.078	.251**
Community environmental activism (10)	.440**	.262**	.223**	.372**	.264**	.169**	.087	.383**
Air quality non-attainment (11)	.116	.150*	.312**	.178**	.225**	-.180**	-.161*	.153*
Coastal location (12)	.142*	.074	.297**	.137*	.311**	-.077	-.161**	.155*
Automobile dependency (13)	.058	-.092	-.275**	-.019	-.210**	.296**	.115	.085
Electricity price (14)	.181**	.132*	.327**	.217**	.393**	.041	-.158*	.206**
State energy and climate policies (15)	.201**	.131*	.323**	.259**	.433**	-.008	-.223**	.219**
Influence of neighboring jurisdictions (16)	.382**	.175**	.285**	.303**	.334**	-.002	-.005	.299**

Variable Name	9	10	11	12	13	14	15	16
Local government environmental awareness (9)	1.000							
Community environmental activism (10)	**.544****	1.000						
Air quality non-attainment (11)	.031	.111	1.000					
Coastal location (12)	.248**	.129*	.016	1.000				
Automobile dependency (13)	-.040	.098	-.356**	-.282**	1.000			
Electricity price (14)	.168**	.188**	.371**	**.514****	-.205**	1.000		
State energy and climate policies (15)	.114	.090	.374**	.358**	-.245**	**.632****	1.000	
Influence of neighboring jurisdictions (16)	.396**	.461**	.167**	.200**	-.025	.268**	.253**	1.000

** Correlation is significant at the 0.05 level (2-tailed)* *N = 255*

*** Correlation is significant at the 0.01 level (2-tailed)*

Regression Analyses

The two primary regression models – those using the TOT-A and TOT-B dependent variables – were estimated using ordinary least squares (OLS), Poisson, and negative binomial regression methods. Log-likelihood tests revealed that the Poisson model was not appropriate due to overdispersion of the dependent variables, and that the negative binomial model performed slightly better than the OLS model. However, the OLS and negative binomial results were functionally the same, as discussed in Chapter 3. This analysis therefore focuses on the OLS regression results, which are far easier to interpret in explaining the impact of the independent variables on the adoption of climate protection plans and policies. Appendix D presents the negative binomial regression results for all 10 dependent variables.

Base OLS Regression Results

Base OLS regressions using normal standard errors found each of the 10 dependent variable models to be statistically significant, with adjusted R^2 values between .222 for the LUTP-A model and .555 for the TOT-B model. All of the models included at least three statistically significant independent variables, and all of the 15 independent variables were significant in at least one of the models. Appendix E describes these base OLS results.

Statistical Diagnostics and Model Refinement

A number of additional analyses were conducted to determine the appropriate role of USM/CCP member status in the models and to test for heteroskedasticity, potential reverse causality effects in the variable measuring staff responsible for energy or climate planning, and multi-collinearity effects between the income and education variables.   Appendix E describes those analyses in detail.

USM/CCP Membership Status as Independent Variable

The conceptual model does not include membership in CCP or USMCPA in any of the dependent variable measurements. The goal of the study is to identify the factors that impact climate protection policy adoption, and joining these organizations is more of a statement of political intent than an act of policymaking. Membership in these organizations is not included as an independent variable either, as it is a step along the path towards climate protection policy adoption rather than a community characteristic that would have an independent affect on policy adoption. However, it is worthwhile to explore the effects of membership status by including it as an independent variable and comparing those results to the original model.

Appendix E includes an analysis of the impacts on the OLS regression models if USM/CCP membership status were added as an independent variable. All of the models remained significant according to their F-test scores, but with relatively small improvements in goodness of fit tests. The variable for membership status were only significant in a few of the models, and impacts to the other independent variable results were minor. Given these results little could be gained by adding membership in USM/CCP as an independent variable.

Tests for Heteroskedasticity

As with most statistical analyses in the social sciences, this data set has significant potential for heteroskedasticity. Appendix E includes a complete analysis of heteroskedasticity concerns in the TOT-A and TOT-B models. Breusch-Pagan / Cook-Weisberg and White's tests indicated evidence of heteroskedasticity in both models. The Breusch-Pagan test identified income per-capita, education, voting history, and presence of a municipal electric utility to be the independent variables that exhibit heteroskedasticity in the TOT-A model. For the TOT-B model, only population exhibited heteroskedasticity. These results are likely the result of actual heteroskedasticity in the relationship between those variables and the dependent variables, rather than model misspecification. Robust standard errors were therefore used in the analyses discussed through the remainder of this chapter.

Potential Reverse Causality Effects

The potential for reverse causality between the adoption of climate protection policies and the presence of staff responsible for energy or climate planning (STAFF) was tested by measuring the OLS regression models with STAFF included in the dependent variables rather than as an independent variable. Appendix E discusses these results in detail.

The new regression model had slightly poorer fits than the base OLS models in which STAFF was an independent variable. The independent variables for education, income, automobile dependency, and coastal location became significant in the TOT-A and/or TOT-B models once STAFF was included in the measurement of the dependent variable. However, the results for income per-capita and education are uncertain due to the high correlation coefficient between those two variables. While automobile dependency became significant in the TOT-A model, its coefficient indicated very little practical impact. The only practical improvement in the models was the increased significance of the coastal location variable in the TOT-B model. These minimal benefits, in combination with the lower adjusted R^2 scores, did not justify including STAFF in the dependent variable measurements for the final analysis.

Potential Multi-Collinearity Effects

The correlation coefficient between the income and education variables was .726, indicating a multi-collinearity issue that could compromise the models. To test the impacts of income and education independent of one another the OLS models were estimated with those variables excluded. While the resulting models were significant, the removal of the education and income variable did not improve the goodness of fit of the models or the results for the remaining independent variables. Income was not a significant independent variable for TOT-A or TOT-B when education was removed from those models. Both the significance and coefficient for education barely decreased after the income variable was removed. Impacts to the other independent variables were relatively minor. These results indicated that removing the education or income variables would weaken the overall models without providing meaningful changes to the results for any of the independent variables.

The multi-collinearity effects between income and education were further examined by testing the models using the square of the income variable. In bivariate regressions against the TOT-A and TOT-B dependent variables the income-squared variable fared more poorly than income, as it had a lower significance level, a smaller coefficient, and a smaller R^2 value. The performance of the TOT-A and TOT-B regression models changed very little when income squared replaced income as an independent variable. The adjusted R^2 value did not improve for either model. Income squared was significant in both models, but with an extremely small negative coefficient that had no practical impact on the dependent variables. The significance levels and coefficients of the other independent variables experienced several minor changes, but none of these effects were sufficient to justify replacing income with income squared in the models. Appendix E describes these multi-collinearity tests in greater detail.

Final Analysis of Regression Results

The final regression models retain all of the original variables but use robust standard errors to minimize the impacts of heteroskedasticity on the model. Table 4-11 summarizes the performance of these models. The R^2 of .443 for the TOT-A model indicates that the independent variables explain 44% of the variance in the total number of adopted climate protection planning policies. The R^2 values for the PLAN-A, EFF-A, REN-A, and LUTP-A models are lower than that of the TOT-A model. This indicates that the independent variables are appropriate for explaining the overall adoption of climate protection policies, but other independent variables not included in the models have a greater impact on the adoption of policies in the specific sub-categories of energy efficiency, renewable energy, etc.

Table 4-11. Performance of Full OLS Models Using Robust Standard Errors

	TOT-A	PLAN-A	EFF-A	REN-A	LUTP-A
F-test	8.890	3.540	5.310	4.590	6.570
Prob>F	0.000	0.000	0.000	0.000	0.000
R-squared	.443	.277	.349	.270	.268
Root MSE	4.682	2.549	1.690	1.070	2.398
N	255	255	255	255	255
	TOT-B	PLAN-B	EFF-B	REN-B	LUTP-B
F-test	30.100	38.360	10.150	9.040	9.590
Prob>F	0.000	0.000	0.000	0.000	0.000
R-squared	.581	.535	.382	.327	.340
Root MSE	7.404	3.886	2.433	2.006	2.276
N	255	255	255	255	255

The R^2 values for the “B” dependent variable models are much higher than those for the “A” variable models. Because the “B” variables include the pursuit or intent to adopt climate protection policies, not just policies that have already been adopted, they are arguably a better measure than the “A” variables for those municipalities that are just beginning to pursue climate protection goals and have not yet adopted many climate protection policies. The better performance of the “B” variable models indicates that the independent variables included in this analysis explain current conditions that influence municipalities’ climate protection planning efforts, rather than the conditions that influenced the “pioneer” communities that have been working on climate protection for some time and have already adopted a number of policies.

Table 4-12 summarizes the OLS regression results for the five “A” dependent variable models using robust standard errors and standardized coefficients. The variables for municipal electric utility (MUNI), staff dedicated to energy and climate projects (STAFF), and local government environmental awareness (LGAWR) are all significant at the .01 level, while population (POP), education (EDU), and influence of neighboring jurisdictions (NEIGHB) are significant at the .05 level. EDU and POP have the highest standardized coefficients, at .277 and .222 respectively. However, the coefficient for education is likely influenced by its multi-collinearity with income, and it must be noted that when the income variable is removed the coefficient for EDU drops to .131. Among the remaining significant variables, MUNI and STAFF have standardized coefficients slightly less than that of population, indicating that all three have roughly the same impact on the adoption of climate protection policies. The standardized coefficients for local government environmental awareness and influence of neighboring jurisdictions are noticeably lower, indicating that those variables have less impact on the adoption of climate protection policies.

Table 4-12. OLS Results for "A" Models using Robust SE's and Standardized Coefficients

	TOT-A	PLAN-A	EFF-A	REN-A	LUTP-A
Constant	-5.987 (3.229)	-2.379 (1.707)	-1.676 (1.259)	-2.561** (.704)	.629 (1.633)
Population	.222* (.002)	.260* (.001)	.119 (.000)	.018 (.000)	.121 (.001)
Income per-capita	-.181 (.051)	-.218 (.033)	.004 (.020)	.011 (.018)	-.181 (.024)
Education	.277* (.045)	.252 (.027)	.045 (.015)	.031 (.011)	.302** (.019)
Voting history	.029 (.028)	.094 (.016)	.044 (.009)	.014 (.005)	-.076 (.013)
College town status	-.016 (2.143)	.131 (1.371)	.001 (.699)	-.041 (.478)	-.157 (.933)
Municipal electric utility	.216** (1.052)	-.007 (.475)	.425** (.418)	.310** (.228)	.034 (.428)
Staff responsible for energy or climate planning	.217** (.715)	.075 (.364)	.227** (.235)	.131* (.145)	.177** (.365)
Local government environmental awareness	.142** (.471)	.072 (.253)	.092 (.195)	.026 (.117)	.159* (.265)
Community environmental activism	.059 (.499)	.083 (.277)	-.061 (.170)	.042 (.122)	.069 (.226)
Air quality non-attainment	.051 (.697)	.101 (.373)	-.027 (.228)	.017 (.165)	.019 (.369)
Coastal location	.068 (.774)	.072 (.491)	-.123* (.271)	-.050 (.160)	.190* (.444)
Automobile dependency	.056 (.025)	.023 (.014)	-.002 (.009)	.150* (.006)	.035 (.014)
Electricity price	-.035 (.184)	-.048 (.113)	.138* (.068)	.112 (.058)	-.180* (.101)
State energy and climate policies	.087 (.089)	-.009 (.048)	-.010 (.033)	.201* (.027)	.122 (.045)
Influence of neighboring jurisdictions	.121* (.173)	.024 (.099)	.137* (.062)	.133* (.033)	.082 (.091)

** Coefficient is significant at the 0.05 level (2-tailed)* *N = 255*

*** Coefficient is significant at the 0.01 level (2-tailed)*

In some cases the standardized coefficient might be flawed, such as when a variable has a high standard deviation. The variable POP, for example, has the highest standardized coefficient (other than that for income). However, this is likely distorted by the fact that the sample includes a handful of cases (e.g., Los Angeles, Philadelphia, Dallas, and San Jose) with populations that are many times larger than the mean, which results in a very high standard deviation for the POP variable (514.28). Because these municipalities with outlier populations all have high TOT-A scores the standardized coefficient for POP becomes unnaturally high. Indeed, the unstandardized coefficient of .005 indicates that a one-unit increase in POP (i.e., 1,000 more residents) increases the predicted number of adopted climate protection policies by only .005. In other words, 200,000 additional residents results in one additional point on the predicted TOT-A score. This variable thus has little practical impact, as the vast majority of municipalities in the sample have populations of 200,000 or less.

The true impact of these significant independent variables on the adoption of climate protection policies is better understood by examining their unstandardized coefficients. The unstandardized coefficient for a given independent variable represents the difference in the predicted score of the dependent variable that would result from a one unit increase or decrease in the value of the independent variable, holding all other factors equal. Because the primary dependent variable in this analysis, TOT-A, is the sum of the four policy sub-variables, its unstandardized coefficients are the sums of the unstandardized coefficients for those other dependent variables. Appendix F includes the full regression results for all 10 dependent variables using unstandardized coefficients.

Municipal electric utility (MUNI) and staff dedicated to energy and climate policies (STAFF) are both presented as dummy variables, with scores of 1 if those conditions are in place and zero if they are not. Thus the unstandardized coefficients represent the difference in predicted TOT-A scores between those municipalities that have a municipal electric utility, or staff dedicated to energy and climate projects, and those that do not. The MUNI variable has a slightly higher coefficient of 3.469, meaning that cities that have their own electric utility are predicted to have adopted almost 3.5 more climate protection policies than those that do not. As would be expected, the impact of the MUNI variable on TOT-A is almost entirely a result of its impact on the sub-variables for energy efficiency and renewable energy policies. Holding all other factors equal, a municipality that has a municipal electric utility is expected to have adopted 2.28 additional energy efficiency policies and .99 additional renewable energy policies than one that does not have a municipal electric utility.

The STAFF variable has an unstandardized coefficient of 2.65, meaning that municipalities that have staff members assigned to energy and climate projects are predicted to have adopted 2.65 additional climate protection policies than those that do not, holding all other factors equal. The impact of the STAFF variable is distributed more evenly across the four sub-variables, with unstandardized coefficients ranging from 0.32 for adopted renewable energy policies (REN-A) to 0.967 for adopted land use and transportation policies (LUTP-A).

The variables for local government environmental awareness (LGAWR) and influence of neighboring jurisdictions (NEIGHB) are both measured on a scale, with possible values ranging from 0-5 and 0-6 respectively. The unstandardized coefficients represent the change in predicted policy adoption from a one-unit shift along those scales. For example, the unstandardized coefficient of 1.27 for LGAWR in the TOT-A model means that a municipality with a score of 4 for that variable would have 1.27 more predicted climate protection policies than a municipality with a score of 3, holding all other factors equal. Put another way, a municipality with the highest possible score for local government environmental awareness would have a predicted TOT-A score 6.35 points higher than a municipality with a score of 0 on that variable. The practical impact of the NEIGHB variable is much lower, as a municipality that reported the greatest amount of influence from its neighboring jurisdictions on climate policy issues (i.e., a score of 6 for NEIGHB) would be predicted to have just over two more adopted climate protection policies than a municipality that reported zero awareness of or influence by the climate protection efforts of its neighbors.

Table 4-13 shows the results of the five regression models on the “B” variables, using robust standard errors and unstandardized coefficients. Because the “B” variables include the pursuit or intent to adopt climate protection policies, not just policies that have already been adopted, they are arguably a better measure than the “A” variables for those municipalities that are just beginning to pursue climate protection goals and have not yet adopted many climate protection policies. Therefore, the results of these models can help to identify the factors that influence the current phenomenon of climate protection planning.

The most important variables in these models are STAFF and NEIGHB. While both had strong results for the “A” variable models, they have an even greater impact on the “B” models. Both are significant at the .01 level for TOT-B, with standardized coefficients of .308 and .278 respectively. The unstandardized coefficients indicate that, controlling all other factors, municipalities that have staff responsible for energy or climate planning would have TOT-B scores that are 6.8 points higher than municipalities that do not have staff assigned to those areas. The influence of neighboring jurisdictions also has a substantial impact, as municipalities reporting the highest level of influence would score 8.8 points higher than those reporting no influence. These are substantial differences considering that the mean for TOT-B is 15.5.

Table 4-13. OLS Results for "B" Models using Robust SE's and Standardized Coefficients

	TOT-B	PLAN-B	EFF-B	REN-B	LUTP-B
Constant	-12.769	-8.852	-2.433**	-2.262**	.778
	(5.022)	(2.778)	(1.717)	(1.333)	(1.514)
Population	.094	.070	.119	.071	.047
	(.004)	(.001)	(.001)	(.001)	(.001)
Income per-capita	-.110	-.032	-.064	-.075	-.250**
	(.063)	(.034)	(.022)	(.026)	(.022)
Education	.077	.007	.029	.023	.250*
	(.056)	(.032)	(.019)	(.016)	(.017)
Voting history	-.009	.025	.059	.007	-.158*
	(.038)	(.021)	(.012)	(.010)	(.013)
College town status	.037	.130*	.015	.002	-.133
	(2.506)	(1.407)	(.878)	(.683)	(1.001)
Municipal electric utility	.075	-.026	.221**	.140*	-.010
	(1.289)	(.652)	(.470)	(.337)	(.425)
Staff responsible for energy or climate planning	.308**	.236**	.312**	.252**	.214**
	(1.234)	(.665)	(.381)	(.325)	(.325)
Local government environmental awareness	.122*	.089	.091	.034	.185**
	(.789)	(.441)	(.272)	(.220)	(.277)
Community environmental activism	.173**	.201**	.042	.126	.143
	(.655)	(.346)	(.226)	(.196)	(.213)
Air quality non-attainment	.101*	.143*	-.001	.090	.044
	(1.129)	(.630)	(.347)	(.310)	(.323)
Coastal location	.102	.132*	-.051	.061	.151*
	(1.488)	(.788)	(.477)	(.379)	(.431)
Automobile dependency	.099*	.106	.031	.083	.081
	(.038)	(.023)	(.012)	(.010)	(.012)
Electricity price	.016	-.030	.130	.020	-.035
	(.356)	(.198)	(.116)	(.085)	(.100)
State energy and climate policies	.024	.047	-.082	.012	.082
	(.135)	(.074)	(.043)	(.036)	(.045)
Influence of neighboring jurisdictions	.278**	.273**	.206**	.227**	.155*
	(.304)	-8.852	(.098)	(.082)	(.082)

** Coefficient is significant at the 0.05 level (2-tailed)* *N = 255*

*** Coefficient is significant at the 0.01 level (2-tailed)*

Both STAFF and NEIGHB are significant at the .01 level for all four of the "B" sub-variables. In all four categories their standardized coefficients are higher than those of any other independent variable, indicating that these are the most important variables for predicting the extent to which a municipality has adopted or is pursuing climate protection policies. They make their greatest impact on the PLAN-B sub-variable, which measures the municipalities' progress in completing the climate protection planning process (i.e., completing a GHG emissions inventory, adopting emissions reduction targets, and completing a climate action plan).

Community environmental activism (COMACT) and local government environmental awareness (LGAWR) are also significant in the TOT-B model, and these variables have the potential to greatly influence the extent to which a municipality has adopted or is pursuing climate protection policies. Each variable has an unstandardized coefficient of just under 2.00, which means that a municipality reporting the highest possible score of 5 on either variable would have a predicted TOT-B score nearly 10 points higher than an equivalent municipality reporting a score of 0 on that variable. While LGAWR had a similar impact on the TOT-A variable, COMACT was not significant in that model and has a much greater impact on TOT-B.

The remaining significant variables in the TOT-B model are air quality non-attainment and automobile dependency. A 25-point increase in auto dependency (the percentage of workers driving to work with commutes greater than 30 minutes) is required increase the predicted TOT-B score by 2 points, and air quality non-attainment status increases the predicted TOT-B score by 2.24 points. Neither variable was significant in the TOT-A model, which indicates that these conditions have recently begun to have a stronger influence on municipalities' desire to pursue climate protection policies.

Perhaps the most unexpected result of the TOT-B model is that none of the internal demographic characteristics are statistically significant. This is a marked shift from the TOT-A model, in which population and education are both significant, albeit with relatively insubstantial impacts on the final TOT-A scores.

A closer examination of the results for the specific policy sub-variables reveals some interesting and unexpected results. This discussion focuses on the "B" versions of those variables and how their results differ from the "A" versions. The PLAN-B variable reflects the number of climate protection planning measures – GHG emissions inventories, reduction targets, and action plans – that the municipalities have adopted or are currently pursuing and intend to adopt. The same independent variables that have the greatest impacts on the TOT-B scores (STAFF, MUNI, and COMACT) are the most impactful for PLAN-B. The exception is the local government environmental awareness variable, which is significant for the TOT-B score but not for PLAN-B. Air quality non-attainment and coastal location are both significant for PLAN-B, but not PLAN-A, which indicates that concerns about air quality conditions and climate change susceptibility are playing an increasing role in municipalities' decisions to pursue climate protection planning. Among the internal demographic characteristics, only college town is statistically significant for the PLAN-B variable.

The energy efficiency (EFF-B) and renewable energy (REN-B) variables measure the number of policies in those categories that the municipalities have adopted or are currently pursuing and intend to adopt. In addition to STAFF and NEIGHB, the only other statistically significant variable in those categories is the presence of a municipal electric utility. Holding all other factors equal, municipalities that have their own electric utility are predicted to have 1.75 more points on EFF-B and 0.9 additional points on REN-B compared to municipalities that do not have a municipal electric utility. It is notable that while electricity price is significant for EFF-A, and state energy and climate policies is significant for REN-A, neither of those independent variables is significant for the "B" versions. This indicates that current efforts to adopt or pursue energy efficiency and renewable energy policies do not appear to be influenced by local electricity prices or the presence of energy and climate policies at the state level.

For the LUTP-B model, in which the dependent variable is a count of land-use and transportation policies that have GHG emission reduction benefits, income, education, and voting history (VOTE) are all statistically significant. Of these, only EDU is significant in the LUTP-A model. Interestingly, INC and VOTE both have negative coefficients in the LUTP-B model, indicating that municipalities with higher incomes and higher percentages of Democratic and Green party voters are predicted to have adopted or be pursuing fewer of the land use and transportation policies, holding all other factors equal. However, the strong negative standardized coefficient (-.250) associated with INC is likely affected by its multi-collinearity with EDU, which has an equally strong positive coefficient (.250). Also, the impact of VOTE on LUTP-B is fairly weak, especially when considering the unstandardized coefficient (-.032), which indicates that an increase of 30% in the percentage of voters supporting the Democratic and/or Green parties would result in only one less point on the predicted LUTP-B score.

The LUTP-B variable is also impacted by STAFF and NEIGHB, as mentioned above, as well as local government environmental awareness and coastal location. These latter two independent variables have small coefficients however, and very little practical impact on the predicted LUTP-B variables. It is notable that three variables which might be expected to influence the pursuit of land use and transportation policies, air quality non-attainment, automobile dependency, and community environmental activism, are not significant in either version of the LUTP model.

Evaluation of Hypotheses

The quantitative analysis tested five key hypotheses about the characteristics of municipalities that are engaged in climate protection planning. This section describes the findings with respect to each hypothesis. Table 4-14 summarizes these results.

Table 4-14. Summary of Hypotheses and Research Findings

Hypotheses	Results
Many of the independent variables will be statistically significant	✓
The internal determinants are more likely to be statistically significant and their magnitude will be greater	✓
The internal variables of education, voting history, and community environmental activism will have the greatest magnitude of impact on the TOT-A and TOT-B dependent variables.	X
Electricity price will be positively correlated with energy efficiency and renewable energy policies	X
Automobile dependency will be positively correlated with interest in adopting land use & transportation policies	X

Hypothesis 1: Many of the variables included in the multiple regression analyses, including both the internal and external determinants, will have a statistically significant impact on the TOT score and all other dependent variables.

This hypothesis is confirmed, as nine of the fifteen dependent variables are statistically significant in either the TOT-A or TOT-B model. Interestingly, only three dependent variables – staff assigned to energy and/or climate projects; local government environmental awareness, and influence of neighboring jurisdictions – are significant in both models. All of the dependent variables are significant in at least one of the eight sub-variable models (i.e., those measuring the adoption or intent to adopt policies in specific categories).

Hypothesis 2: The internal determinants variables are more likely to be statistically significant in the regression analyses, and the magnitude of their impact on the TOT-A and TOT-B dependent variables will be greater than those for the external determinants.

The results also confirm this hypothesis, as the internal characteristics represent the majority of the statistically significant independent variables in both the TOT-A and TOT-B models. Among the external characteristics, the influence of neighboring jurisdictions is significant in both models, while air quality non-attainment and automobile dependency are significant in the TOT-B model only. The practical impacts of these external characteristics are relatively small compared to those of the internal characteristics, with the exception of the influence of neighboring jurisdictions in the TOT-B model.

It is also notable that the internal political-institutional characteristics have a much greater impact in the models than the internal demographic characteristics. Population and education are the only statistically significant internal demographic characteristics in the “A” models, but their practical impacts are quite small after accounting for population’s distorted standardized coefficient and education’s multi-collinearity with the income per-capita variable. None of the internal demographic characteristics are significant in the TOT-B model, and for the most part they had minimal impacts on the “B” versions of the policy category variables. The internal political-institutional characteristics, on the other hand, are all significant in many of the models, often with strong coefficients indicating significant practical impacts on the dependent variables.

Hypothesis 3: The internal variables of education, voting history, and community environmental activism will have the greatest magnitude of impact on the TOT-A and TOT-B dependent variables.

The multiple regression results do not support this hypothesis, as only community environmental activism emerges as a significant variable in the analysis. Education is statistically significant in the TOT-A and LUTP-A models, but with relatively minor coefficients after removing the income variable to account for multi-collinearity impacts. Voting history is significant only in the LUTP-B model, with an extremely small unstandardized coefficient. Community environmental activism is not significant in the "A" models, but had some of the strongest results of all the independent variables in the TOT-B and PLAN-B models. The qualitative analysis also strongly supports the notion that community environmental activism is a major determinant in the adoption and/or pursuit of climate protection plans and policies, as described in Chapter 5.

Hypothesis 4: Electricity prices will have a statistically significant positive impact on the dependent variables for energy efficiency and renewable energy.

This hypothesis is not supported by the multiple regression results, as the electricity prices variable is not significant for either version of the renewable energy policies dependent variable. Electricity prices are significant at the .05 level in the EFF-A model, but with a relatively insignificant coefficient: a ten-cent increase in the average statewide electricity price would increase the predicted number of adopted energy efficiency policies by 1.4.

The municipal electric utility variable is a much stronger predictor of the adoption or pursuit of energy efficiency and renewable energy policies, as it is statistically significant in all four models (EFF-A, EFF-B, REN-A, REN-B). The presence of a municipal electric utility increases the predicted number of adopted or adopted/pursued renewable energy policies by just under one, while the predicted energy efficiency policies increase by around two.

Hypothesis 5: Automobile dependency will be negatively correlated with climate protection policy adoption in general, but will be positively correlated with interest in adopting land use and transportation policies to reduce GHG emissions (i.e., the dependent variable LUTP-B).

The multiple regression results do not support this hypothesis, as the automobile dependency variable is only significant in the REN-A and TOT-B models. No logical relationship exists between automobile dependency and the adoption of renewable energy policies, therefore the significance of that variable in the REN-A model appears to be a statistical fluke. The practical impact of automobile dependency on the TOT-B variable is quite modest, as an increase of 10% in the percentage of workers commuting alone in a vehicle would raise the predicted TOT-B score by only 0.84.

While several of the original hypotheses are not supported by the quantitative analysis, the study resulted in many interesting findings that contribute to the literature on climate protection planning and policy diffusion. These findings are discussed in Chapter 6. The following chapter describes the further exploration of the characteristics of community climate protection planning efforts through the use of targeted telephone interviews.

Chapter 5. Qualitative Analysis

The follow-up telephone interviews provided a more detailed qualitative understanding of the factors that lead municipalities to adopt climate protection plans and policies. They provided information on the municipalities' motivations for pursuing climate protection planning, the planning process that they followed, and their collaboration with nearby jurisdictions and/or outside networks such as CCP or the USMCPA.

Selection of Interview Participants

The ten interview participants were selected based on their residual scores for the TOT-A and TOT-B regression models. The residual scores represented the difference between the number of policies the municipalities had adopted and their predicted values in the final regression model. In other words, a positive residual indicated that a municipality had adopted more policies than would be expected, and a negative residual indicated the municipality had adopted fewer policies than would be expected.

Five of the interview participants were selected from among the municipalities with the highest residuals for the TOT-A model, as shown on Table 5-1. The characteristics of the climate protection efforts in these "over-performer" municipalities illustrate some of the keys to success for the adoption of climate protection plans and policies. Rather than simply selecting the five municipalities with the highest residuals, four of which are located in California, factors such as geographic location and population were considered so that the common threads of successful climate protection planning in a variety of contexts could be identified.

Table 5-1. Highest Scoring Municipalities Relative to Predicted Values (TOT-A Model)

Municipality	State	USM/CCP	Score	Predicted	Residual
*Louisville	CO	N	30	8.33	21.67
Alameda	CA	Y	35	16.41	18.59
San Jose	CA	Y	33	19.35	13.65
Arcata	CA	Y	23	11.57	11.43
*Kansas City	MO	Y	22	11.58	10.42
Oxford	MS	N	19	9.41	9.59
Harrisburg	PA	N	15	6.09	8.91
*Reno	NV	Y	19	10.68	8.32
Shaker Heights	OH	N	21	12.75	8.25
Frisco	TX	Y	17	9.46	7.54
State College	PA	N	20	12.61	7.39
* Charleston	SC	Y	16	8.64	7.36
*Toledo	OH	Y	14	6.72	7.28
Las Vegas	NV	Y	16	8.77	7.23
Miami-Dade County	FL	Y	17	9.84	7.16

** Indicates municipalities that participated in the interviews.*

The remaining five interview participants were selected from among the "under-performer" municipalities, or those that had the lowest residuals on the TOT-A and TOT-B variables as shown in Table 5-2. This approach included both municipalities that have adopted fewer climate protection policies than would be anticipated (the TOT-A residuals) and those that indicated less interest in pursuing climate protection policies than would be anticipated (the TOT-B residuals). Including the municipalities with low TOT-B residuals allowed for greater variety among the interview participants, as the municipalities with high residuals in the TOT-A model were mostly located in the Midwest or Northeast and had populations of less than 65,000. While Los Angeles appears to be an under-performer in both the TOT-A and TOT-B models, its low residual is a reflection of its exceptionally high predicted value rather than a lack of adopted climate protection policies. The under-performing municipalities that were selected for the interviews are not identified here, as in several cases their representatives requested anonymity when answering the interview questions.

Table 5-2. Lowest Scoring Municipalities Relative to Predicted Values

Municipality	State	USM/CCP	Score	Predicted	Residual
Total Adopted Policies (TOT-A)					
Elmhurst	IL	Y	0	11.47	-11.47
Los Angeles	CA	Y	23	33.36	-10.36
Millburn	NJ	N	1	9.97	-8.97
Hamilton	OH	N	5	13.79	-8.79
Solana Beach	CA	Y	5	12.85	-7.85
Ithaca	NY	Y	5	12.71	-7.71
Coldwater	MI	N	1	8.61	-7.61
San Marcos	TX	Y	4	11.60	-7.60
Olivette	MO	Y	3	10.58	-7.58
Hutchinson	MN	Y	5	12.53	-7.53
Total Adopted, Pursued, or Intended to Adopt Policies (TOT-B)					
Ithaca	NY	Y	11	28.58	-17.58
Los Angeles	CA	Y	29	46.16	-17.16
Delaware	OH	N	11	25.30	-14.30
Franklin	WI	N	2	15.68	-13.68
Coldwater	MI	N	1	14.60	-13.60
Dayton	OH	Y	4	17.58	-13.58
Christiansburg	VA	N	7	20.10	-13.10
Hutchinson	MN	Y	12	24.18	-12.18
Olivette	MO	Y	11	22.35	-11.35
Olathe	KS	N	8	19.30	-11.30

Each municipality was contacted by an initial e-mail and follow-up telephone call to the office of the individual listed on the original National League of Cities mailing list used for the survey distribution (i.e., the mayor's or city manager's office). In all cases the mayor or city manager delegated participation in the interview to the staff member that was primarily responsible for the municipality's energy and climate programs. The interview participants were mid to high-level municipal staff holding the following titles: Deputy Town Manager; Special Projects Manager; Environmental Services Administrator; Deputy City Manager; Chief Environmental Officer; Contracted Sustainability Coordinator (consultant); Water and Wastewater Director; and Environmental Manager. All of the participants from over-performing municipalities granted permission for their responses to be attributed to their individual municipalities. Several of the participants from under-performing municipalities requested anonymity in this regard, and therefore the results for the under-performers are not attributed to the individual municipalities.

The first interview question asked the participants to summarize the plans and policies their municipalities had adopted to reduce community-wide energy use and greenhouse gas emissions. This question was primarily intended to confirm the information from the survey results about the extent of climate protection policy adoption in the participating municipalities. In the majority of the interviews the survey results were confirmed, but in three cases the interview responses did not match the survey results. Two of the municipalities identified as over-performers – Toledo and Louisville – had not adopted as many climate protection policies as indicated on their survey responses. Specifically, the interviews revealed that neither municipality had adopted any climate protection planning measures, while the survey responses showed that they had adopted two (Toledo) or three (Louisville) of those measures.

In the case of Toledo, this discrepancy appeared to be a result of user error on the part of the survey respondent. Subtracting those two planning measures from Toledo's TOT-A score would have changed its residual dramatically, to the point that it would no longer be considered an "over-performing" municipality. Toledo was therefore removed from the qualitative analysis.

The interview participant from Louisville indicated that while the municipality itself had not completed a GHG emissions inventory, reduction target, or action plan, it had signed a county-wide sustainability plan in which it agreed to pursue policies to help reach the County's goals for reducing GHG emissions (H. Balser, personal communication, April 21, 2009). In addition, Louisville's residual was so large that it would still be among the five most over-performing municipalities even if the three planning measures were removed from its TOT-A score. Therefore, Louisville's interview results were included in the qualitative analysis.

The interviews also identified one apparent under-performing municipality – Solana Beach – that in fact had an active community climate protection program and was on the verge of adopting a number of climate protection planning measures and policies (S. Didier & D. King, personal communication, April 15, 2009). While it had adopted few such policies at the time of the survey, and therefore had one of the lowest residuals in the TOT-A model, it could hardly be considered an under-performer given its level of activity in this area. Therefore, that municipality was excluded from the qualitative analysis.

Interview Results

The following sections analyze the interview results for the remaining eight municipalities, beginning with the reasons why the municipalities have or have not pursued climate protection planning policies.

Perspectives on Municipal GHG Emission Reduction Policies

The responses to the first interview question revealed that all of the municipalities had initiated efforts to reduce energy use from their municipal operations (referred to here as "energy conservation" approaches or policies), but only the over-performing municipalities had adopted climate protection plans and policies (i.e., those intended to reduce community-wide GHG emissions). This section explores the reasons why the over-performing and under-performing municipalities adopted these different approaches.

The second interview question asked participants to identify their municipalities' motivations for pursuing their energy conservation and/or climate protection policies. Table 5-3 shows that the desire to reduce energy costs was the most commonly cited motivation among both groups of interview participants. Both also cited the desire to improve environmental conditions and reduce global GHG emissions as a motivation for their municipalities' energy conservation and/or climate protection planning policies.

Table 5-3. Motivations for Energy Conservation / Climate Protection Planning

Motivations	Over-performers	Under-performers
Desire to reduce energy costs	3	4
Desire to improve environment and/or reduce GHG emissions	2	2
Concern about local susceptibility to climate change impacts	2	
Opportunity to simultaneously reduce GHG emissions and achieve other community livability benefits	2	
Desire to set a positive example for the community	1	1
Need to improve local air quality to comply with federal regulations	1	

The motivations that were unique to the over-performing municipalities included concerns about local susceptibility to climate change impacts, the need to improve air quality to comply with federal regulations, and the awareness that climate protection policies could also achieve local livability benefits. These latter two motivations, along with the desire to reduce energy costs, support the notion that the pursuit of co-benefits is a motivating factor behind climate protection planning efforts.

A follow-up question asked the under-performing municipalities if they had considered pursuing community-wide climate protection policies. Only one respondent indicated that the municipality had no desire or interest in this approach. Two of the respondents said their municipalities had plans to eventually adopt a GHG emissions inventory, reduction targets, and action plan. Another said that the municipality was considering these planning measures, but had not yet pursued them. When asked why their municipalities had not yet pursued a community-wide effort, all three indicated a desire to lead by example before pushing policies for GHG emissions reduction onto the community. Two indicated that the lack of staff or other resources was a major obstacle. One suggested that a community-wide approach was outside the scope of the municipality's powers, saying that "we feel we do not have the authority or right to dictate to individuals what they have to do" (Anonymous, personal communication, April 23, 2009). Another argued that "the city operates within the community, so any reduction of emissions from our operations will reduce those of the community as well" (Anonymous, personal communication, April 21, 2009). While technically true, this quote raises the question of whether the underperforming municipalities are aware of the relatively small impact that municipal operations have on overall energy use and GHG emissions.

Approaches to Climate Protection Planning

Another question asked the participants to describe the processes by which their municipalities adopted energy conservation and/or climate protection policies and to identify the driving forces behind those processes. Table 5-4 summarizes the responses from both sets of municipalities. Six of the eight municipalities were members of the USMCPA, and in all six cases the local energy conservation and/or climate protection efforts were said to have been initiated by the Mayor's signing of the USMCPA. Of the two non-USMCPA members, the climate protection programs in Louisville (CO) had primarily been inspired by the efforts of nearby municipalities, specifically surrounding Boulder County (H. Balser, personal communication, April 21, 2009). The other non-USMCPA member was the one under-performer municipality that had no interest in pursuing GHG emissions reduction strategies.

Table 5-4. Characteristics of Local Energy and/or Climate Protection Planning Processes

Interview Response	Over-performers	Under-performers
Initiated by Mayor's signing of the USMCPA	3	3
Identified as priority by community and/or environmental advisory board	3	1
Initiated through combined effort of Mayor, city staff, and community	2	
Driven primarily by the Mayor and/or Council	2	2
Involved active leadership from City Manager and/or high-level staff	2	1
Supported by state legislators and/or Congressional representatives	1	
Inspired by actions of other nearby municipalities	1	

In both the over and under-performing municipalities the energy conservation and/or climate protection planning process involved significant participation and leadership from elected officials and/or high-level staff such as the city manager or department heads. Both groups experienced little if any political resistance from local elected officials. The primary distinguishing characteristic between the over and under-performers was the extent of community participation early in the process. Input from the community helped to initiate climate protection planning efforts in three of the over-performing municipalities. Reno held two community-wide “green summits” in which residents identified GHG emissions reduction as an important objective (J. Geddes, personal communication, April 24, 2009). In Louisville, local residents identified their support for energy planning, specifically policies to encourage renewable energy use, in a citizen survey. The city’s Conservation and Resource Board, a group of municipal staff and community members that advises the Mayor on environmental issues, also pushed for energy and climate protection initiatives (H. Balser, personal communication, April 21, 2009). Similarly, Kansas City’s environmental management commission identified climate protection planning as a major priority (W. Cauthen & D. Murphy, personal communication, April 17, 2009). Charleston was the only over-performer in which the process was initiated completely internally, by the mayor (C. Williams, personal communication, April 15, 2009).

Community Involvement and Support

The over-performers also demonstrated greater community involvement throughout their energy conservation and climate protection planning processes, as shown in Table 5-5. While all but one of the municipalities had a standing environmental advisory committee that recommended energy conservation and/or climate protection efforts, three of the over-performers had separate committees dedicated specifically to those issues. All four over-performers allowed community members to directly participate in formulating climate protection policies, either through the standing environmental advisory committee, the dedicated energy and climate committee, or various sub-committees.

Table 5-5. Extent of Community Involvement in Energy and Climate Planning Process

Interview Response	Over-performers	Under-performers
General environmental advisory committee	Four	Three
Advisory committee specific to energy and/or GHG planning	Three	
Committee or sub-committees to create energy / GHG policies	Four	
Public meetings to solicit community input on climate protection	One	
No community involvement on environmental issues in general		One

In Kansas City the standing 17-member environmental management commission advised the mayor that climate protection planning should be a major priority. After signing the USMCPA, the mayor appointed an 11-person steering committee to work with city staff in developing emissions reduction goals and a climate action plan. The committee included representatives of the city planning commission and other community leaders plus representatives of the metropolitan planning organization, the local electric utility, neighborhood associations, local environmental groups, and the AFL-CIO. Separate work groups formed to develop specific GHG emissions reduction measures. These work groups involved over 100 individuals from across the community, as well as city staff and representatives of the metropolitan planning organization, the local American Institute of Architects and U.S. Green Building Council, the Sierra club, and other environmental groups. The steering committee evaluated the policy proposals from the work groups and determined which ones would be included in the final climate action plan. It continues to serve in an oversight role as the plan is being implemented (W. Cauthen & D. Murphy, personal communication, April 17, 2009).

Reno formed a dozen different committees to develop specific climate protection policy proposals. These groups discussed the best ways to move forward on a given issue and developed suggestions that were brought to Council. Their membership varied by topic, but generally included representatives of relevant industries, community organizations, and other interested citizens. The local university participated in most of the groups, and various community college and high school groups also contributed. The suggestions from these committees were incorporated into an action plan, which has been updated annually with new actions developed internally by city staff (J. Geddes, personal communication, April 24, 2009).

A 20-member advisory committee drove the climate protection planning effort in Charleston. This committee oversaw the process and raised funds to support local climate protection initiatives. Five sub-committees worked to formulate policies and write the draft climate action plan. Both the advisory committee and subcommittees included representation from a number of community interests including members of the Planning Commission, architects and builders, representatives of local environmental groups, students and university officials, business owners, and individual community members. Approximately 150 people participated in the various committees, with an average of at least 100 attending the monthly meetings. According to the interview participant from Charleston, individuals have remained involved in the process because they have had meaningful roles in the subcommittees (C. Williams, personal communication, April 15, 2009).

Louisville's Conservation and Resource Board developed some of the city's climate protection policies and has made recommendations to the Council on energy and climate issues. The Board consists of seven community volunteers, most of whom have personal or professional knowledge about various environmental issues (H. Balser, personal communication, April 21, 2009).

According to the interview participants the climate protection planning processes in the over-performing municipalities encountered little to no community resistance. Some local industries in Reno objected at first, out of concern for potential impacts to their businesses, but this opposition quickly diminished (J. Geddes, personal communication, April 24, 2009). In Kansas City the Chamber of Commerce participated reluctantly at first, and included a representative on the steering committee primarily to protect local business interests. The Chamber's attitude toward the process turned around over time, to the point where it became a valuable partner in the city's climate protection planning process and developed its own climate protection partnership program (W. Cauthen & D. Murphy, personal communication, April 17, 2009). Some residents in Louisville expressed cautious support initially, and wanted to make sure that any new policies would not take away their individual choice in matters such as how they can build their homes (H. Balser, personal communication, April 21, 2009).

The representatives of under-performing municipalities also cited little community resistance to their energy conservation measures and speculated that there would be little objection to proposed community-wide emissions reduction programs. One noted that there might be resistance from municipal staff, but not political leaders or the community at large, and another speculated that there would be community resistance only if GHG emissions reductions were mandatory.

Staff Involvement

The interview participants also discussed the role of municipal staff in their local energy conservation and / or climate protection planning processes. Two of the over-performers – Kansas City and Reno – had a high-level staff member assigned primarily to the municipal climate protection planning effort. Charleston and Louisville, the other over-performers, had a high-level staff person that worked part-time on climate protection planning. Kansas City and Louisville also had staff members working on climate protection projects specific to their individual departments. Two of the under-performers had an employee working part-time on energy conservation for municipal operations, but none had a full-time employee working on this or any other climate protection effort. Several municipalities from both groups had staff members of various ranks participating on energy conservation and/or climate protection committees.

Outside Influences on Energy Conservation and Climate Protection Processes

The final two interview questions related to the role of outside influences in shaping the energy conservation and/or climate protection planning efforts within the participating municipalities. One question concerned the extent to which membership in CCP and/or the USMCPA had influenced the processes, and another addressed the influence of neighboring jurisdictions.

Among the over-performing municipalities, Kansas City and Charleston were members of both CCP and the USMCPA, while Reno was a member of the USMCPA only. The interview participant from Louisville indicated that the city had not considered joining either group, and that it looks to Boulder County and other neighboring municipalities for guidance rather than outside associations (H. Balser, personal communication, April 21, 2009). Interestingly, the underperformers also included two municipalities that were members of both CCP and USMCPA and a third that was a USMCPA member only. As noted above, many of the participants from both groups noted that the act of joining the USMCPA was instrumental in initiating the energy conservation and/or climate protection programs in their municipalities. However, the over-performers indicated that CCP provided more meaningful support than USMCPA for their climate protection planning processes.

Table 5-6 summarizes the participants' answers to the question "are you aware of other municipalities in your region that have adopted policies to reduce energy use and/or greenhouse gas emissions?" Follow-up questions included "have the experiences of those nearby municipalities influenced your municipality's pursuit of these policies," and "have you actively worked with representatives of other municipalities to coordinate efforts to reduce energy use and/or greenhouse gas emissions?" The responses to these questions revealed that the over-performer municipalities had significantly greater involvement and interaction with their neighboring jurisdictions on climate protection issues.

Table 5-6. Influence of Neighboring Jurisdictions on Energy and Climate Planning

Motivation Cited	Over-performers	Under-performers
Communicated with nearby municipalities about energy conservation and /or climate protection issues	Three	One
Collaborated with nearby municipalities to develop joint energy conservation and /or climate protection strategies	Three	One
Developed policies that were adopted by neighboring jurisdictions	Two	
Learned from other municipalities and borrowed from their policies	Two	
Communicated with other regional municipalities on energy conservation and /or climate protection issues	One	
Were aware of activity in nearby municipalities but did not coordinate or communicate regularly with them		Two
Was not aware of any energy conservation or climate protection programs in nearby municipalities		One

Three of the over-performing municipalities – Kansas City, Louisville, and Reno – had both communicated with nearby municipalities about energy and climate issues and had collaborated with them on regional climate protection strategies. The fourth, Charleston, had communicated and shared ideas with other regional municipalities, but none in its immediate vicinity. Kansas City and Reno, the two larger cities with more adopted climate protection policies, had been leaders in their regions and had developed policies that were adopted by other surrounding municipalities.

Kansas City has been working with a group of 18 municipalities from its metropolitan area that jointly signed the USMCPA in November. It has shared resources with those municipalities and has encouraged them to adopt measures described in the city's climate action plan (W. Cauthen & D. Murphy, personal communication, April 24, 2009). Reno has formed an informal working group with leaders from nearby cities, the surrounding county, and various public service districts. The working group meets monthly to share individual plans and compare ideas, and has been coordinating efforts to develop a regional climate action plan (J. Geddes, personal communication, April 24, 2009).

Louisville, on the other hand, has primarily followed the lead of neighboring Boulder County on energy and climate issues. In some cases the county directly provides climate protection services within Louisville, such as through its Climate Smart program that subsidizes residential energy audits and energy efficiency improvements. In some cases Louisville has adopted the policies first developed by the county, such as new building codes to support and encourage green building (H. Balser, personal communication, April 21, 2009).

Only one of the under-performer municipalities had communicated and collaborated with its neighbors on strategies to reduce energy consumption from municipal operations. Two of the others were aware of energy conservation and/or climate protection activities taking place in nearby municipalities, but had not coordinated with them in any way. The fourth claimed not to be familiar with any such activity taking place in neighboring municipalities, which is notable as at least 20 municipalities from its same state are members of CCP and/or the USMCPA.

Conclusions from Qualitative Analysis

The greatest differences between the over-performing and under-performing municipalities were the extent of community participation in energy and climate issues and the level of communication and coordination with neighboring municipalities on these issues. In the over-performing municipalities community input and activism helped to bring climate protection to the municipal agenda, and community involvement was instrumental in developing local climate protection plans and policies. In the under-performing municipalities community involvement was much more limited. The over-performers all had collaborated with nearby municipalities on climate protection planning efforts, whereas the under-performers almost exclusively had not. The over-performers also had dedicated more staff time to climate protection projects, including significant participation from high-level staff, although this seems to be a result of the municipalities' decisions to pursue climate protection planning rather than as a causal factor in the pursuit of those policies. Finally, the under-performing municipalities placed greater weight on reducing energy use and emissions from municipal operations, which may reflect a lack of awareness of the relatively insignificant role that municipal operations play in the carbon footprints of most communities.

Chapter 6. Discussion and Conclusions

This final chapter revisits the original research questions to determine which were confirmed or disputed by the research. It also compares the research findings to the previous literature on climate protection planning and policy diffusion. It concludes by describing the practical implications of the findings and how they can be used to further the growth and effectiveness of community climate protection planning in the United States.

Discussion of Research Findings

This dissertation explored the following key questions about the diffusion of climate protection planning among U.S. municipalities:

- What factors lead municipalities to adopt climate protection policies?
- Is the adoption of climate protection policies driven primarily by the internal characteristics of a given community or the external characteristics of its surrounding metropolitan area, region, or state?
- Is the adoption of climate protection policies driven primarily by local, demographic, political-institutional, economic, or environmental conditions?
- To what extent is the adoption of climate protection policies motivated by the pursuit of "co-benefits," such as air quality improvements, energy cost savings, or traffic alleviation?

The results for the "A" and "B" versions of the dependent variables demonstrate that the answers to these questions are evolving as more municipalities begin to pursue climate protection objectives. For example, while demographic characteristics such as population and education are important when examining only adopted climate protection policies (the "A" models), they become much less significant when the policies that municipalities are pursuing or intend to adopt are included in the analysis (the "B" models). Other characteristics, particularly the role of community environmental activism and the influence of neighboring jurisdictions, become more significant when looking at this broader range of policies. Due to the rapid growth of climate protection planning these "B" models are considered to be more indicative of current conditions, and therefore are the focus of the discussion and conclusions. The key research findings are summarized in Table 6-1.

Table 6-1. Key Research Findings

Research Questions	Findings
Key factors in the adoption of community climate protection policies?	Influence of neighboring jurisdictions Staff assigned to energy or climate planning Community environmental activism and participation in the planning process Local government environmental awareness and leadership in the planning process
Driven primarily by internal or external characteristics?	Internal characteristics
Driven primarily by local demographic, political-institutional, economic, or environmental conditions?	Political-institutional conditions (How the municipality carries out the planning process and who is involved)
Motivated by the pursuit of "co-benefits?"	Perhaps (Energy conservation measures motivated by cost savings; climate protection sometimes motivated by susceptibility to climate change impacts)

Key Factors in Climate Protection Planning and Policy Adoption

The first research question was "what factors lead municipalities to adopt climate protection policies?" The research findings described in Chapters 4 and 5 point clearly to four factors that most strongly impact the extent of climate protection planning and policy adoption. The influence of neighboring jurisdictions and the presence of staff assigned to energy or climate planning are by far the most significant variables in the statistical analysis. The qualitative analysis confirms the importance of these factors. All of the over-performing municipalities have worked closely with nearby jurisdictions on climate protection planning efforts and have assigned high-level staff members to spend a significant portion of their time on energy and climate issues.

The quantitative results also identify community environmental activism as a highly significant variable that can increase the adoption of climate protection policies. In the qualitative analysis, the over-performer municipalities all have included significant public involvement opportunities in their climate protection planning processes, which supports the finding that an active and engaged community is critical for the adoption of climate protection policies. Finally, the quantitative analysis found local government environmental awareness to be a statistically significant variable, albeit one with less influence over the adoption of climate protection policies than the other variables mentioned above. The interview results indicated that the presence of an outspoken and highly supportive political leader can help spur the adoption of these policies, but political leadership alone is not sufficient and must be paired with support and involvement of the municipal staff, outside institutions, and the community at large.

Influence of Internal vs. External Characteristics

The second research question asked if the adoption of climate protection policies is driven primarily by the internal characteristics of a given community or the external characteristics of its surrounding metropolitan area, region, or state. The research results point strongly towards internal rather than external characteristics as the primary motivators for climate protection planning. Three of the four primary factors in climate protection planning described above are internal characteristics. While many of the external characteristics were significant in one or more of the statistical models, the magnitude of their influence on the adoption or pursuit of climate protection policies was generally weak.

The number of energy and climate mitigation policies adopted by the municipalities' respective state governments was included as an external political variable to examine possible top-down policy diffusion from the state to the local level. This variable is not statistically significant in any of the models measuring the adoption or pursuit of climate protection policies. The qualitative analysis uncovered one potential explanation for this somewhat surprising result, as one of the interview participants indicated that his municipality had not adopted any energy efficiency or renewable energy policies because "a lot of those policies are available through state agencies" (Anonymous, personal communication, April 21, 2009).

The influence of neighboring jurisdictions emerged as the only external characteristic to strongly impact the extent of climate protection planning. However, this phenomenon also relies to some extent on internal characteristics. While the presence of nearby jurisdictions that are active in climate protection planning is an external characteristic, the act of engaging with them and learning from them still involves internal decisions on the part of the municipality being influenced. The internal component of this highly important variable reinforces the finding that the extent of community climate protection planning is more strongly influenced by internal rather than external characteristics.

Influence of Political-Institutional, Demographic, Economic, and Environmental Conditions

The third research question asked if the adoption of climate protection policies is driven primarily by local political, demographic, economic, or environmental conditions. The internal political-institutional characteristics – which include staff assigned to energy or climate planning, local government environmental awareness, and community environmental activism – are the most influential variables in both the quantitative and qualitative analyses.

The internal demographic characteristics – population, income, education, voting history, and college town status – have virtually no influence over the adoption or pursuit of climate protection policies. These unexpected results may be due to the highly variable nature of the population, income, and voting history characteristics, which can impact the likelihood of climate protection policy adoption in a number of different ways. For example, cities with low per-capita incomes would be expected to have fewer resources available for climate protection planning, and perhaps greater needs for other types of public services. In this model, for example, the mean number of adopted or pursued climate protection policies among the 20 cities with the lowest per-capita incomes (excluding college towns) was 13.8, compared to 15.5 for the model as a whole. However, cities with large populations often have adopted or pursued a large number of climate protection planning policies, even though they tend to have lower-than-average incomes. In this model, for example, the 21 of the 25 largest municipalities (all those with populations over 150,000) had higher-than-average scores on their total adopted or pursued climate protection policies, despite the fact that the same percentage (21 of 25) had lower-than-average per-capita incomes. Meanwhile, higher-than-average incomes are characteristic of many well-known progressive and environmentally friendly communities (e.g., Marin County, CA), but are also be typical of traditionally conservative suburban communities that may be less likely to adopt climate protection policies. Thus, there is no clear, consistent relationship between either population or income and the adoption of climate protection policies.

This complex relationship between income and the likelihood of climate protection planning can impact the results for the education variable, as income and education are highly correlated. It can also have spillover effects into the voting history variable. For example, while residents of the highly progressive and environmentally friendly communities mentioned above are likely to vote primarily for Democratic and Green party candidates, so too are the residents of low-income communities that may be less likely to adopt or pursue climate protection policies due to more pressing social and economic concerns. These complex relationships combine to create statistically insignificant impacts for population, income, education, and voting history on the extent of climate protection planning.

The final internal demographic characteristic, college town status, is limited in part by its small sample size. Only 15 of the municipalities in the final model meet the criteria of a college town (a municipality in which college students account for at least 30% of residents). While the mean scores on the dependent variables are higher for the college towns than the model as a whole, the fact that several of the college towns have lower than average scores is enough to make that variable a statistically insignificant determinant of climate protection planning.

Pursuit of Co-Benefits

The final question was "to what extent is the adoption of climate protection policies motivated by the pursuit of 'co-benefits,' such as air quality improvements, energy cost savings, or traffic alleviation?" Three of the external economic and environmental characteristics included in the statistical models – air quality non-attainment, automobile dependency, and electricity price – all address some form of potential co-benefit. The fourth of these variables, coastal location, addresses the municipalities' susceptibility to future climate change impacts, which like the co-benefits concept reflects the impact of local self-interest on planning decisions that are ostensibly meant to address the global problem of climate change.

The research produced mixed results for these variables. With the exception of electricity price, all are statistically significant in at least one of the models measuring the pursuit or adoption of climate protection policies. However, the magnitude of their impacts in those models is generally rather small. The qualitative analysis produced similarly mixed results on the subject of co-benefits. As would be expected, none of the interview participants from under-performer municipalities identified any potential co-benefits from climate protection planning. However, only two of the four participants from over-performer municipalities identified the potential for local livability benefits to be a contributing factor in the pursuit of climate protection planning.

These findings suggest that the desire for co-benefits such as improved local air quality, minimized future impacts from rising sea levels, and reduced traffic congestion and other automobile dependency impacts all have some impact on climate protection policy adoption, but their impacts are less significant than those of the other variables discussed earlier in this chapter.

Implications for the Climate Protection Literature

These research findings have many important implications for the academic literature on climate protection planning, and they affirm many of the conclusions from previous studies. Table 6-2 compares this study's findings to those from the previous literature. The strong impact of the influence of neighboring jurisdictions variable on the pursuit and adoption of climate protection policies supports Vasi's (2006) finding that "spatial and administrative proximity" to participating cities significantly increased the likelihood of CCP membership (p. 451). Also, the importance of having high-level staff members assigned to energy and climate projects is consistent with much of the prior research on the implementation of climate protection planning goals (Betsill, 2001; Holgate, 2007; Romero-Lankao, 2007). While the direction of the causal relationship between the staff variable and the pursuit of climate protection planning is not entirely clear, these findings leave no doubt that the presence of staff assigned to these areas is a characteristic of municipalities that have adopted and/or pursued a large number of climate protection planning measures and policies.

The importance of community environmental activism and local government environmental awareness in the statistical analysis is consistent with prior studies that identified support from the community, political leaders, business, industry, and other institutions to be among the keys for successful implementation of climate protection or community energy planning (Bulkeley & Betsill, 2003; Droege, 2002; Eckberg & Forsberg, 1998; Kron & Randolph, 1983; Wheeler, et al., 2009). The significance of those variables also matches previous findings that various indicators of community environmental awareness are positively correlated with CCP membership (Vasi, 2006; Zahran, et al., 2008a, 2008b).

Table 6-2. Comparison of Research Findings to Prior Climate Protection Literature

Factors Increasing Extent of Climate Protection Planning	Prior Studies Citing these Factors	Supported by this Research?
High-level staff assigned to energy and climate projects	Betsill, 2001; Corbett & Hayden, 1981; etc.	Yes. Highly significant in both quantitative and qualitative findings.
Influence of neighboring jurisdictions (regional diffusion)	Vasi, 2006	Yes. Highly significant in quantitative and qualitative findings
Support from the community (incl. business, industry, etc.)	Bulkeley & Betsill, 2003; Wheeler, et al., 2009, etc.	Yes. Community environmental activism and engagement in planning process are highly significant.
Community environmental awareness and activism	Zahran, et al., 2008a, 2008b	Yes. See above.
Active political leadership	Betsill, 2001; Corbett & Hayden, 1981; Kron & Randolph, 1983; etc.	Yes Active political leadership can help push climate protection policy adoption, but is not sufficient
Working with internal and external institutions	Knuth, et al., 2007; Pitt & Randolph, 2008, etc.	Yes. Over-performers actively collaborated with CCP, local universities, other institutions.
Municipal electric utility	Collier, 1997; Lindseth, 2004	Yes. Positively correlated with adoption/ pursuit of energy efficiency and renewable energy policies
High income and education	Vasi, 2006; Zahran, et al., 2008a, 2008b	No. Variables not significant in quantitative models
Voting for Democratic party	Zahran, et al., 2008a, 2008b	No. Variable not significant in quantitative models
Commitment to sustainability on part of local government	Bulkeley & Betsill, 2003; Collier, 1997	** Local government environmental awareness has small influence
Location in area susceptible to climate change impacts	Zahran, et al., 2008a, 2008b	** Variable significant in some models; mentioned by some over-performers
Factors Decreasing Extent of Climate Protection Planning	**Prior Studies Citing these Factors**	**Supported by Research?**
Lack of community or political support	Bulkeley & Betsill, 2003; Robinson & Gore, 2005; Slocum, 2004	No. Evidence does not suggest lack of support is a barrier, in fact, widespread community and political support was found even in under-performer municipalities
Automobile commuting	Zahran, et al., 2008a	** Variable is statistically significant with a small positive coefficient

*** Relevant variables were significant in the quantitative and/or mentioned in the qualitative analysis but did not emerge as substantial indicators of climate protection policy adoption.*

The quantitative results support the notion that a pre-existing commitment to energy conservation and/or sustainability helps ease the implementation of climate protection planning (Bulkeley & Betsill, 2003; Collier, 1997). The qualitative results, however, suggest that direct community participation in the climate protection planning process is more important than a pre-existing commitment to sustainability. In only one of the over-performer municipalities (Louisville, CO) did the climate protection effort emerge directly from prior sustainability initiatives. While community activism was generally not the driving force behind the initial pursuit of climate protection planning, all of the over-performer municipalities utilized extensive public involvement and direct participation of community interests in the formulation of their climate protection planning measures and policies. The qualitative results also supported previous findings about the importance of working with internal and external institutions (Holgate, 2007; Knuth, et al., 2007), as nearly all of the over-performer municipalities engaged CCP, local universities, and other institutions in their climate protection planning processes.

Furthermore, while local government officials' awareness of environmental issues emerged as an important variable in the statistical models, it seems less critical given the results of the qualitative analysis. The vast majority of interview participants from both over-performer and under-performer municipalities indicated that their local officials were generally supportive of climate protection planning. While a lack of support from local elected officials would certainly stymie climate protection efforts, it appears that their support in and of itself is not sufficient to push the agenda forward to pursue and adopt climate protection policies.

In the qualitative analysis all of the interview participants, even those from the under-performing municipalities, experienced widespread community support for the notion of climate protection planning. This differs from previous studies that cited political opposition (Bulkeley

& Betsill, 2003; Robinson & Gore, 2005) and a lack of community support (Robinson & Gore, 2005; Slocum, 2004) as major obstacles, and supports recent findings by Pitt and Randolph (2008) that political and community opposition have become less of a concern as the issue of climate change has entered mainstream public thinking.

As mentioned above, the significance of the internal political-institutional variables – staff assigned to energy or climate planning, local government environmental awareness, and community environmental awareness – is consistent with much of the prior literature on climate protection planning. The fourth internal political-institutional characteristic, the presence of a municipal electric utility, is not a statistically significant determinant of total adopted or pursued climate protection policies, but has a very strong effect on the adoption or pursuit of energy efficiency and renewable energy policies. This result is not unexpected, and is consistent with prior studies (Collier, 1997; Lindseth, 2004).

The findings for the internal demographic characteristics, however, are markedly different from those of previous studies. While Vasi (2006) also found that population size was not a significant variable, the insignificant results for income, education, and voting history contrast with Vasi (2006) and Zahran, et al. (2008a, 2008b). These prior studies all found one or more of these internal demographic variables to be significant indicators of CCP membership. It appears, therefore, that while these internal demographic characteristics may help determine a municipality's likelihood to state climate protection goals (e.g., by joining CCP), other factors are more important in determining the extent to which they actually pursue plans and policies to achieve those goals.

These findings leave a somewhat muddled picture of the influence of co-benefits on the adoption of climate protection policies, particularly when compared to those of the prior quantitative studies. The statistically significant yet functionally minor impact of air-quality non-attainment in the models is consistent with Vasi's (2006) finding that air quality non-attainment status had little effect on the likelihood of CCP membership. The similar finding for automobile dependency contrasts with that of Zahran, et al. (2008a), who found automobile commuting to be negatively correlated with CCP membership.

On the subject of local susceptibility to climate change impacts, Zahran, et al. (2008a, 2008b), found location in a coastal area to be positively correlated with CCP membership. In this dissertation, the variable for coastal location is positively correlated with the adoption or pursuit of both climate protection planning measures and land use and transportation policies, but is not statistically significant in the overall model measuring total climate protection planning. In the qualitative analysis, two of the four interview participants said that their community's susceptibility to climate change impacts, such as rising sea levels or prolonged droughts, influenced their municipality's approach to climate protection. These responses indicate that coastal location and other characteristics of climate change sensitivity could be a significant motivating factor in regions where such conditions exist.

The fact that electricity price was not significant in the quantitative analysis is perhaps due to the fact that the models addressed policies that would have a community-wide impact, and did not include those related to energy conservation in municipal operations. The climate protection literature describes a perceived cost saving "co-benefit" from reducing energy use in municipal operations (e.g., Kousky and Schneider, 2003), but does not discuss community-wide cost savings as a co-benefit. The qualitative analysis confirmed that potential cost savings are an important motivation for reducing energy use from municipal operations, but they are not considered to be a benefit of community-wide climate protection strategies.

The most fascinating comparison to the previous literature is the surprising similarity between these findings and Corbett and Hayden's conclusions from their seminal (1981) study of community energy planning in California cities. Their findings about the keys to success still ring true nearly thirty years later. For example, they found that successful energy planning processes included the involvement of a local elected official or other political leader, a dedicated municipal staff person, and a community activist or grassroots organization. Similarly, dedicated staff and community environmental activism were among the most important variables in both the qualitative and quantitative components of this research, with leadership from elected officials also noted as a significant factor. Corbett and Hayden also found that successful energy planning processes included public hearings and citizens advisory task forces, both of which were identified in the qualitative research as highly important components of climate protection planning. Finally, this dissertation found the influence of neighboring jurisdictions, and collaboration with them, to be key determinants of climate protection policy adoption. This conclusion mirrors Corbett and Hayden's findings that participation in a regional policy network helped many cities to advance their energy planning programs and that "successful passage of an ordinance in one city… caused a chain reaction of interest and action in others" (p. 954).

Implications for the Policy Diffusion Literature

The results of this dissertation are valuable for the study of local government policy diffusion. As discussed in Chapter 2, policy diffusion theory includes two models by which policies can spread "horizontally" among jurisdictions at the same level of government. The internal determinants model suggests that policies spread among governments that share similar political, economic, or social characteristics, while the regional diffusion model emphasizes the spatial dissemination of policies among neighboring jurisdictions. The research findings are consistent with elements of both models. Table 6-3 compares this study's findings to those from the previous literature on policy diffusion.

Table 6-3. Comparison of Research Findings to Prior Policy Diffusion Literature

Factors Causing Local Government Policy Diffusion	**Prior Studies Citing these Factors**	**Supported by Research?**
Regional diffusion	Brueckner, 1998; Kern, et al., 2006; Vasi, 2006; etc.	Yes. Influence of neighboring jurisdictions is highly significant in quantitative and qualitative findings
Vertical diffusion (from state)	Kern, et al., 2006; etc.	No. Number of state-level energy and climate policies not significant
Shared political ideologies	Godwin & Schroedel, 2000; Grossback, et al., 2004	No. Voting history variable not significant in models
Education	Godwin & Schroedel, 2000	No. Variable not significant in quantitative models
Population size	Shipan & Volden, 2008	No. Variable not significant in quantitative models
College town status	Kern, et al., 2006	No. Variable not significant in quantitative models
Influence of outside networks	Martin, 2001	Yes. Participation and engagement with CCP common to over-performers

As discussed above, internal political-institutional characteristics identified in this research have a significant positive impact in the statistical models. However, these characteristics describe internal planning processes in the participating municipalities, not the types of shared political ideologies that Godwin and Schroedel (2000) and Grossback, et al. (2004), found to be factors in the diffusion of local government policies. This study measured shared political ideologies through the voting history variable, an internal demographic characteristic that is statistically insignificant in the final results. The results also show that other internal demographic characteristics discussed in the policy diffusion literature, such as education (Godwin and Schroedel, 2000), population size (Shipan & Volden, 2008), and college town status (Kern, et al., 2006), have minimal impacts on the adoption or pursuit of climate protection policies. The one area of consistency between this dissertation and prior studies of the internal determinants of local policy diffusion lie in the role of outside networks. Martin (2001), for example, found that outside networks influenced the dispersion of living wage policies among U.S. municipalities. The qualitative results support this finding, as the over-performer municipalities worked closely with CCP, and to a lesser extent the USMCPA, throughout their climate protection planning processes.

The quantitative analysis for this dissertation found a significant positive correlation between the influence of neighboring jurisdictions variable and the pursuit and adoption of climate protection policies. This finding indicates the strong possibility of regional diffusion patterns in the climate protection policy domain. As mentioned in the previous section of this chapter, this result is consistent with Vasi's (2006) finding that "spatial and administrative proximity" to participating cities significantly increased the likelihood of CCP membership (p. 451). In addition, Brueckner (1998) found that regional diffusion impacts the adoption of local growth control measures, which are included in this dissertation as an element of climate protection planning. Finally, Kern, et al. (2006), found that the diffusion of Local Agenda 21 policies in Germany is heavily influenced by regional diffusion and "bi-lateral transfer" within metropolitan areas. Further research is needed to analyze the regional diffusion of climate protection policy adoption, using a dependent variable similar to those constructed for this study and a spatial autocorrelation methodology such as that used by Vasi (2006).

Conclusions

Municipal approaches to climate mitigation are important, as the U.S. government has no notable policies or even strategies in place to reduce the country's contributions to global climate change. Even if the federal government were to adopt a carbon tax, cap-and-trade system, or other large-scale effort to reduce GHG emissions, the direct impacts of those policies would likely fall on industry and electric power producers. Most of our nation's energy use will still be attributed to individual actions at the local level, such as how we heat our homes, illuminate our offices, and travel within our communities. Municipalities will continue to have direct influence over these activities, and the energy consumption they cause, through their land use, building code, and transportation planning responsibilities. They also have the opportunity to encourage, facilitate, and in some cases mandate energy efficiency improvements and renewable energy use. For these reasons, active participation at the local government level is critical to our nation's hopes for long-term climate mitigation.

While prior studies have determined that a municipality's intent to pursue climate protection planning (as measured by its participation in CCP) is predicted in large part by local socio-cultural and environmental conditions, this dissertation finds that the extent to which municipalities actually adopt climate protection plans and policies is a function of how they engage in the planning process. Municipalities that communicate and collaborate with neighboring jurisdictions, involve the public and community interests in the planning process, and assign staff to work directly on climate protection projects have far greater success in the adoption of these policies. The municipalities that display these characteristics do not necessarily fit a certain profile, such as having high levels of income or education or being located in areas with high susceptibility to climate change. This means that most if not all municipalities have the potential to adopt climate protection policies if sufficient resources, support, and initiative are in place. Given these findings, and the fact that membership in CCP and the USMCPA has grown dramatically in recent years, climate protection should no longer be thought of as a niche within planning. Instead, it should be considered an important component of a community's long range goals, one that stands alongside existing areas of emphasis such as transportation, land use, and economic development and is integrated with them in a comprehensive planning strategy.

The presence of staff members assigned to energy and climate planning is critical for municipalities that wish to thoroughly pursue and adopt climate protection policies. The lack of funding and staff resources for these efforts has been identified as a major obstacle for many municipalities (Betsill, 2001; Collier, 1997; Granberg & Elander, 2007; Mathy, 2007; Parker & Rowlands, 2007; Pitt & Randolph, 2008; Robinson & Gore, 2005). The survey research affirms these findings, as 78% of responding municipalities noted that insufficient financial resources are an obstacle to the preparation and/or implementation of climate protection policies, and 75% cited insufficient staff or personnel resources as an obstacle (see full survey results in Appendix B). The interview participants in the qualitative analysis reiterated these concerns about both funding and personnel resources. However, some municipalities have been able to dedicate staff resources to the climate protection cause, and their approach to finding and prioritizing funds for climate protection initiatives should be replicated in other municipalities. Also, the federal government and the states should provide funding support for local government climate protection initiatives. The recently announced Energy Efficiency and Conservation Block Grant (EECBG) program, in which the U.S. Department of Energy will award over $3.2 billion to cities, counties, and tribes for local energy efficiency improvements (U.S. Department of Energy, 2009), is a positive step in this direction. However, these and future funds must include support for ongoing planning efforts and policies to reduce community-wide energy use, not merely for one-time energy-efficiency and renewable-energy infrastructure projects.

This research demonstrates that the influence of nearby jurisdictions that are active in climate protection planning can greatly enhance a municipality's opportunities for adopting these plans and policies. Organizations such as CCP, USMCPA, and other climate action networks should promote dialogue and coordination among neighboring municipalities within metropolitan areas or more broadly defined regions. Such coordination allows participating municipalities, particularly those that are new to climate protection planning, to learn from the successes and failures of their neighbors and move more efficiently through the planning and policy development process. These efforts would ideally include the joint development of policies to be implemented across the region, which would help strengthen ties among the participating municipalities and reduce the duplication of work. Such a regional approach would be particularly useful for addressing transportation-related emissions, which are heavily influenced by regional or metropolitan-area infrastructure and land use patterns and thus cannot be effectively addressed by a single municipality acting independently of its neighbors. Regional efforts can also provide consistency for private sector developers and other affected businesses operating within the region. For example, regionally consistent permitting procedures for residential solar photovoltaic systems reduce labor demands for local builders and renewable energy contractors, thus lowering the cost to consumers of installing these systems (Pitt, 2008).

The significant impact that neighboring jurisdictions can have on climate protection policy adoption means that "pioneer" municipalities such as Portland (OR), Miami-Dade County (FL), and others can further their contributions to climate mitigation by assisting other jurisdictions in their regions in pursuing climate protection planning. This assistance can take the form of coordinating the regional planning efforts described above, sharing policies or policy development strategies with neighboring municipalities, or otherwise guiding them through the planning process. They could also help neighboring municipalities to overcome resource limitations, such as by pointing them towards funding sources or demonstrating how they could re-organize or re-prioritize existing funds to support climate protection initiatives. Climate action networks such as CCP can play a role by encouraging these pioneer communities to assist neighboring jurisdictions and helping to build connections between them where necessary.

Perhaps the greatest key to expanding climate protection policy adoption is to increase the level of community involvement in the planning processes. This includes both active lobbying on the part of individuals and community groups to initiate climate protection planning processes where they have not yet begun and meaningful community participation in the processes once they are underway. For this first element, the Cool Cities program and other activist networks must continue to build community interest and coordinate efforts to bring climate protection planning to the attention of local governments where it is not yet on the political agenda. Once climate protection initiatives have begun the municipalities must engage community groups, local businesses and institutions, and individual citizens through the entire planning and policy development process. Involving the community early on will affirm the municipality's intent to make real policy change, create momentum to carry out the planning process, and build community buy-in and support for the final products.

CCP and other climate action policy organizations should continue to provide support and guidance for municipalities that are pursuing climate protection planning and to help them work through the issues and opportunities described in this chapter. This support could include helping member municipalities to raise funds and otherwise acquire resources to complete the planning process, facilitating regional climate protection planning efforts, and encouraging the active and meaningful participation of community members in the planning processes. These networks must also provide information that can increase the effectiveness of climate protection planning efforts, such as by raising awareness of the relatively insignificant carbon footprint of municipal operations and encouraging members to focus their efforts on policies that would reduce community-wide GHG emissions.

This dissertation does not support the finding of Zahran, et al. (2008b), that high socio-economic capacity is a "necessary precondition for CCP involvement" (p. 558). The rapid growth of CCP and climate protection planning in general has rendered this point moot, and characteristics such as income and education are no longer significant predictors of the pursuit of climate protection policies. However, Zahran's recommendation that CCP or other climate action policy networks reach out to communities with less socio-economic capacity remains valid, as these communities may still face unique implementation challenges and would likely benefit from extra attention and support.

While this study has brought new information to light about the factors that influence community climate protection planning and the keys to successful planning processes, many important research questions remain. For example, most prior studies of the obstacles to climate protection planning have been based on qualitative research, and further quantitative studies are needed to further the understanding of those obstacles and their effect on the adoption of climate protection policies. More detailed research should also be pursued on the various types of procedural approaches to climate protection planning and their relative success.

In the future, as more data becomes available, researchers will be able to evaluate the successes and failures of the climate protection planning efforts in specific municipalities based on their actual impact on community-wide GHG emissions levels. At this time an entirely new set of research questions will emerge about the effectiveness of various planning approaches and the relative costs and benefits of specific climate protection policies. In the meantime, however, researchers can best impact climate protection planning by sharing information with municipal decision-makers, climate action policy networks, and other stakeholders. This information should include findings, from this study and others similar to it, about the opportunities that exist for community climate protection planning, the obstacles that might be encountered, and the options for overcoming those obstacles. These recommendations will further the growth and success of community climate protection planning, which is an important component of the long-range, multi-level approach that must be taken in the United States and throughout the world to reduce GHG emissions and mitigate future impacts of global climate change.

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Appendices

Appendix A: Survey Recruitment Letter

2008 Municipal Climate Protection Planning Survey

You have been selected to participate in the 2008 Municipal Climate Protection Planning survey, sponsored by the School of Public and International Affairs at Virginia Tech. Over 4,000 municipal officials from across the United States have been invited to participate in this survey, which will gather data on the range of policies that local governments have adopted to reduce their communities' greenhouse gas emissions, as well as municipal officials' perspectives on climate change and the role of local governments in addressing climate change.

Please take the opportunity to complete this survey, which is available on-line at http://tinyurl.com/4h3ttv. For the first question please enter the following access code: XXXX. The survey includes about 30 questions, and should take around 20 to 30 minutes to complete. A very small number of participants will be contacted and asked to participate in a brief follow-up telephone interview. All survey and interview responses are anonymous, and your name will not be published in the final project report or any other publicly available materials.

The deadline for completing the survey is November 21, 2008.

The first set of questions addresses the extent of climate protection policy adoption in your municipality. The term "climate protection" as used here includes any plan or policy that would result in reduced community-wide greenhouse gas emissions. Examples include "climate action plans," policies to promote residential energy efficiency, and land-use policies to manage growth or reduce urban sprawl. We would like to know if your municipality has adopted any of these types of policies, even if the intent of adopting the policy was not necessarily to reduce greenhouse gas emissions.

The remaining survey questions ask for your personal perspectives on climate change, local governments' role in addressing climate change, the level of general environmental awareness and activism in your community, and your experience (if applicable) with adopting and implementing municipal climate protection policies. This information provides important context for understanding how and why climate protection policies are adopted in U.S. municipalities.

If you have any questions about this survey or how the results will be used, or if you would like to request a paper copy of the survey, please contact Damian Pitt, Virginia Tech School of Public and International Affairs, at (540) 818-5547 or dpitt@vt.edu.

Appendix B. Complete Survey Instrument and Responses

Thank you for participating in the 2008 Municipal Climate Protection Planning survey, sponsored by the School of Public and International Affairs at Virginia Tech. Over 4,000 municipal officials from across the United States have been invited to participate in this survey, which will gather data on the range of policies that local governments have adopted to reduce their communities' greenhouse gas (GHG) emissions, as well as municipal officials' opinions or perspectives on climate change and the role of local governments in addressing climate change.

The survey includes about 30 questions, and should take approximately 20-30 minutes to complete. A very small number of participants will be contacted and asked to participate in a brief follow-up telephone interview. All survey responses are anonymous, and your name will not be published in the final project report or any other publicly available materials.

If you have any questions about this survey or how the results will be used, or if you would like to request a paper copy of the survey please contact Damian Pitt, PhD candidate, Virginia Tech School of Public and International Affairs, at (540) 818-5547 or dpitt@vt.edu.

A total of 263 municipalities submitted complete survey responses, and 57 submitted incomplete responses. Thus the N for most descriptive statistics derived from the survey data ranges between 263 and 320 (excluding those questions for which an answer was optional).

A. Introduction

Question 1 asked the survey participants to enter the access code from the survey recruitment letter they received in the mail.

Question 2. What is your title at the municipality you are representing in this survey? (N=320)

Mayor	Elected Representative	Manager or Chief Administrator	Department Head	Other Municipal Employee
35 (11%)	2 (1%)	138 (43%)	38 (12%)	107 (33%)

Question 3. Does your municipality have a "strong mayor" or city manager form of government? (N=320)

Strong Mayor	City Manager	Other
90 (28%)	213 (67%)	17 (5%)

B. <u>Climate Protection Plans and Policies</u>

Sections B through E of this survey address the extent of climate protection policy adoption in your municipality. The term "climate protection" as used here includes any plan or policy that would result in reduced community-wide GHG emissions. Examples include "climate action plans," policies to promote residential energy efficiency, and land-use policies to manage growth or reduce urban sprawl. Please indicate if your municipality has adopted any of these types of policies, even if the intent of adopting the policy was not necessarily to reduce GHG emissions.

Please do not include any policies or programs to reduce energy use or GHG emissions from your city or town's municipal operations, such as re-lighting municipal buildings or purchasing fuel-efficient vehicles for the municipal fleet. While these "municipal operations" policies may result in significant reductions of GHG emissions, they are not the subject of this study.

Question 4. Has your municipality joined any regional, national, or international organizations dedicated to reducing energy consumption and GHG emissions at the community level? Please check all that apply and identify how recently your municipality joined.

Policies	Not Pursuing	Pursuing/ Intend to Adopt	Adopted			Don't Know	Total Adopted
			In Past Two Years	2-5 Years Ago	More than 5 Years Ago		
Cities for Climate Protection (N=298)	188 (63%)	18 (6%)	54 (18%)	14 (5%)	7 (2%)	17 (6%)	75 (25%)
U.S. Mayors Climate Protection Agreement (N=298)	161 (54%)	33 (11%)	47 (16%)	35 (12%)	1 (0%)	21 (7%)	83 (28%)
Cool Cities (N=297)	222 (75%)	20 (7%)	21 (7%)	11 (4%)	1 (0%)	22 (7%)	33 (11%)
Other (N=93)	55 (53%)	8 (8%)	21 (20%)	4 (4%)	2 (2%)	13 (13%)	27 (26%)

Question 5. Has your municipality completed, or is it in the process of completing, any of the following steps to plan for climate protection and reduce community-wide GHG emissions? Please check all that apply and identify how long ago the step was completed.

Policies	Not Pursuing	Pursuing/ Intend to Adopt	Adopted			Don't Know	Total Adopted
			In Past Two Years	2-5 Years Ago	More than 5 Years Ago		
A community-wide inventory of GHG emissions (N=298)	175 (59%)	77 (26%)	35 (12%)	3 (1%)	2 (1%)	6 (2%)	40 (13%)
Goals or targets for the reduction of community-wide GHG emissions (N=298)	164 (55%)	91 (31%)	25 (8%)	6 (2%)	1 (0%)	11 (4%)	32 (11%)
A plan to reduce community-wide GHG emissions (N=298)	162 (54%)	97 (33%)	17 (6%)	8 (3%)	1 (0%)	13 (4%)	26 (9%)

Question 6. Does your municipality have any employees who are responsible for planning for energy use and/or GHG emission reductions? (N=298)

No	Yes
170 (57%)	128 (43%)

Question 7. If Yes, approximately how many employees (in FTE) are responsible for this task? Please enter a response in numerical form for each employee type?

Response	Number
Department head(s) or other high-ranking employee(s)	*The responses varied tremendously, to the extent that the participants clearly interpreted the question in a variety of ways. Therefore, totals for each response option have not been calculated.*
Department head(s) or other high-ranking employee(s)	
Entry-level municipal employees	
Interns	

C. Energy Efficiency, Energy Conservation, and Renewable Energy Policies

Please indicate if your municipality has adopted any of the following policies for energy efficiency, energy conservation, or renewable energy use. If your municipality owns its electric utility, do not include any incentives or policies offered by the utility on this page. A separate set of questions for municipal electric utilities is on the next page.

Please do not include any policies or programs to reduce energy use or GHG emissions from your city or town's municipal operations, such as re-lighting municipal buildings. While these policies may result in significant reductions of GHG emissions, they are not the subject of this study.

Question 8. Has your municipality adopted any of the following policies to promote or encourage energy conservation and/or energy efficiency? Do not include any programs offered by a municipally owned electric utility, as those will be addressed in a separate question. Please check all that apply and identify how long ago the policy was adopted.

Policies	Not Pursuing	Pursuing/ Intend to Adopt	Adopted			Don't Know	Total Adopted
			In Past Two Years	2-5 Years Ago	More than 5 Years Ago		
Enhanced energy efficiency requirements in municipal building code (N=275)	95 (35%)	90 (33%)	54 (20%)	10 (4%)	14 (5%)	12 (4%)	78 (28%)
Planning incentives (e.g., "fast-track" approval, density bonuses, etc.) for energy-efficient buildings (N=275)	156 (57%)	67 (24%)	24 (9%)	5 (2%)	7 (3%)	16 (6%)	36 (13%)
Property tax exemptions or reductions for energy-efficient buildings (N=275)	226 (82%)	26 (9%)	4 (1%)	1 (0%)	0 (0%)	18 (7%)	5 (2%)
Free or reduced-rate weatherization or energy conservation supplies (N=275)	192 (70%)	28 (10%)	12 (4%)	11 (4%)	16 (6%)	16 (6%)	39 (14%)
Energy audits or other technical assistance for the installation of energy efficiency upgrades (N=275)	156 (57%)	52 (19%)	30 (11%)	12 (4%)	16 (6%)	9 (3%)	58 (21%)
Other policies to promote or encourage energy conservation and/or energy efficiency (N=92)	53 (58%)	3 (3%)	12 (13%)	6 (7%)	4 (4%)	14 (15%)	22 (24%)

If “other,” please specify:

- Adopted General Plan policies and a resolution to join ICLEI and implement Build It Green standards
- Adopted Green Fleets Policy Evaluating land use and zoning codes
- Anti-idling policy, duplex printing policy, lights out policy. Considering LEED requirement on new municipal facilities and an environmental procurement policy.
- Capped permit fees at $500 for solar energy projects.
- City Council is currently reviewing a green building ordinance that will mandate LEED silver for all buildings over 10,000 sq. ft.
- Cycle and Save Program for Hot Water Heaters Educational Opportunities through our Electric Department
- Dark sky ordinance = reduced electricity use tree preservation ordinance = increased air quality and some energy efficiency benefits
- Edmond Electric provides "Wind Energy" as an option to our customers along with free residential or commercial energy audits through our Utility Office.
- Encourage sustainable development by providing tax incentives to high density mixed-use development near public transit centers
- Energy efficiency programs focused on lighting, appliances and HVAC
- Environmentally Preferable Purchasing Policy
- Green building requirements
- Installed hydro generator on city water canal
- Instead of "intend to adopt" Should read "evaluating adoption and funding"
- Internal Green Team affects internal policies
- Joined CT 20% by 2010 campaign
- LEED elements are required for Special Exception mixed-use redevelopment projects
- Most if not all of the aforementioned items are addressed either through a different level of government or through the local power supplier.

- Note: on the last two items, the city promotes the services of regional partners, such as the Energy Trust of Oregon (ETO), for energy audits, technical assistance, efficiency upgrades, etc., which are offered to our citizens as customers of Portland General Electric and NW Natural Gas.

- Our energy audits and technical assistance are provided by Pacific Gas & Electric and the County of Santa Clara.

- Permit Fee rebates for LEED certified buildings. Facade rebate for energy efficient investments Low-interest loans for energy reducing construction components

- Property tax exemption for solar arrays and passive solar heating systems

- Property Tax is a county function and the utilities themselves offer audits

- Residential green building

- Selected retrofit/efficiency programs exist for low-income households; community-wide incentives are not energy-efficiency specific, e.g. green building fast-track policies

- State funding for weatherization is available. State public benefits fund provides rebates for energy audits and implementation of energy efficiency practices and appliances

- Tax exemptions for hybrid vehicle owners

- The state has property tax exemptions for certain pollution control equipment.

- The Village adopted a Floor Area Ratio law which reduces the maximum size of a home relative to the overall lot size. The Village Board also adopted a policy statement encouraging the use of energy efficient materials and technologies in building.

- We are looking into the NJBPU Energy Audit Program.

- We have a municipal utility

- We have both a mandatory Residential (adopted 2001) and Commercial Green Building Program (adopted 2006). The program is a requirement for all construction and no incentives are tied to it.

- We partner with non-profit organizations who offer free/reduced-rate weatherization and energy audits, and disseminate information to our citizens about these services.

Question 9. Has your municipality adopted any of the following financial incentives to promote or encourage energy conservation and/or energy efficiency? Do not include any programs offered by a municipally owned electric utility, as those will be addressed in a separate question. Please check all that apply and identify how long ago the incentive was adopted.

Policies	Not Pursuing	Pursuing/ Intend to Adopt	Adopted			Don't Know	Total Adopted
			In Past Two Years	2-5 Years Ago	More than 5 Years Ago		
Grants or rebates to assist construction of new energy-efficient homes or buildings (N=275)	216 (79%)	32 (12%)	7 (3%)	4 (1%)	2 (1%)	14 (5%)	13 (5%)
Grants or rebates to assist weatherization or energy efficiency upgrades to existing buildings (N=275)	206 (75%)	37 (13%)	7 (3%)	9 (3%)	7 (3%)	9 (3%)	23 (8%)
Grants or rebates to assist purchase of energy-efficient appliances (N=275)	219 (80%)	23 (8%)	13 (5%)	6 (2%)	5 (2%)	9 (3%)	24 (9%)
Other grants or rebates to promote or encourage energy conservation and/or energy efficiency (N=99)	72 (73%)	1 (1%)	8 (8%)	5 (5%)	2 (2%)	11 (11%)	15 (15%)
Low-interest loans to assist construction of new energy-efficient homes or buildings (N=275)	239 (87%)	11 (4%)	5 (2%)	2 (1%)	1 (0%)	17 (6%)	8 (3%)
Low-interest loans to assist weatherization or energy efficiency upgrades to existing buildings (N=275)	223 (81%)	19 (7%)	5 (2%)	3 (1%)	9 (3%)	15 (5%)	17 (6%)
Low-interest loans to assist purchase of energy-efficient appliances (N=275)	234 (85%)	17 (6%)	4 (1%)	3 (1%)	4 (1%)	13 (5%)	11 (4%)
Other low interest loans to promote or encourage energy conservation and/or energy efficiency (N=107)	88 (82%)	2 (2%)	2 (2%)	1 (1%)	3 (3%)	11 (10%)	6 (6%)

If “other,” please specify:

- Any projects with City funding (grants or loans) must be LEED certified or, for small or residential projects, meet Maine State Housing's Energy Efficiency Guidelines
- CHIP grants and others requiring home efficiency and energy use reduction
- Citizens for Energy Awareness (CEA) initiative
- Commitment to LEED certify new public library
- Energy efficiency rebates are provided by Pacific Gas & Electric.
- Instead of "intend to adopt" should read "evaluating adoption and funding"
- Like above, the ETO and State of Oregon offer grants, rebates, low interest loans, etc. to encourage efficiency, that we promote.
- Loans for low income housing energy upgrades
- Partnership with utility to offer incentives
- Rebate on permit fees for photovoltaic installations
- Rebates are available for heat pumps if they meet the energy efficiency requirements
- Reduced permit fees for solar installations
- Solar Hot Water Heater
- Solar/Renewable Energy Financing Program
- Some of these things may be available in the City through the local power company or state but have not been enacted by the City
- Tax credits for energy efficient vehicles and solar panels on homes
- The rebates have been offered at the state level. We are trying to ensure that more of the state resources are spent in Milwaukee
- This is offered by utility companies
- We're looking at implementing financial incentives for the installation of solar energy systems on structures that meet certain energy efficiency specifications (following the new Berkeley model).

Question 10. Please identify the specific policies that your municipality has adopted to encourage energy efficiency and energy conservation.

- Sustainable energy policy, green vision, green building policy, general plan policies

- We are currently developing a green building program

- In the municipal buildings all of the temperatures are set to a standard temp on programmable thermostats. We have a "green team"- a group of employees that pursue green initiatives within our employee base. We recycle and shred office paper and documents. We have recycling for can and bottles within our buildings. New municipal buildings are built using green technology and geo thermal heat and air. We offer wind power through Edmond Electric Customers. We have a comprehensive list available if you should need it.

- All done via municipal utility

- For city buildings - reduce energy use by 15% by 2012 (using 2005 baseline); LEED silver requirement for new municipal construction

- Full compliance with state law and participation in utility company rebates and programs

- 1) Ordinance for expedited review and approval of green buildings. 2) Sustainable Buildings Ordinance for construction and major/minor renovation of County-owned buildings/facilities

- 1. Passed green building legislation in 2002 2. Upgraded pool/hockey rink to be more energy efficient 3. Use fluorescent bulbs in City buildings 4. Increased citywide recycling 5. Launched the Go Green Program in 2002 to help homeowners get energy audits and make energy efficient improvements. Rebates are available for homeowners who are at or below the City median income. 6. Reduced the use of pesticides/chemical lawn care by 40% 7. Use environmentally friendly cleaners and paints 8. Sponsored the construction of energy efficient houses 9. Have architectural plans for green houses available for only $1,110 for Shaker buyers 10. Will give a $5,000 architectural subsidy for well designed green homes that will make plans available for future Shaker buyers. 11. All of our city is within 1/4 mile of transit or bus lines 12. Expanded bike lanes and improved park areas 13. Promote smart growth policies including infill housing, land banking, and regional cooperation 14. There are probably more but this is what comes to the top of my head

- Adopted a Climate Protection Resolution Use of LED Lighting in all stoplights

- Adopted building codes that emulate building standards associated with the USGBC LEED program.

- Adopted Florida building code which contains some energy conservation requirements

- Adopted LEED Silver for our new buildings to show leadership. LEED grant program. Working on upgrading and existing low-income energy efficiency program.

- Advocate for improved State building code - adopted encourage new building to be LEED certifiable

- All city buildings must be built to LEED silver or higher standards since 2003. All private buildings must be built to "green" standards starting in 2009. 40% of city's electric power comes from renewable sources. Altering city's landfill to produce more methane faster, which can then be recovered for energy use. Changing sludge digesters to capture energy potential.

- Anti-idle policy for city vehicles upgrading energy efficiency of lighting, heating and air when municipal buildings are remodeled new municipal buildings will probably be required to be LEED City actions are voluntary at this point

- Building Code

- Building Code, Property Maintenance Code and Energy Conservation Code.

- Building codes in Florida are controlled at the state level and they are bing reviewed to increase energy efficiency requirements.

- Building codes including low-flow water fixtures

- Building lighting audits

- Check website for Green Initiatives: www.rigov.org

- City of Irvine Energy Plan 2008

- City purchasing guidelines -- Area mandates re emissions -- state building code mandates --

- Coordinating with County Agencies for grants and low interest loans.

- Coordination with the county to install intelligent transportation systems

- Currently we have no adopted any policies for non-city operations. We are working on a Home Performance program with incentives that should be out in the next couple of weeks/months.

- Currently working on a sustainability ordinance to include climate change and energy conservation practices. We are also making recommendations to this effect for all new projects within the city.

- Developed an environment friendly preferred purchasing policy. Began conducting IBC Chapter 34 reviews allowing for adaptive building reuse.

- Energy Efficiency Plan

- Energy saving monitors and computer peripherals; change in fluorescent light applications

- Enhanced building codes and higher minimum insulation Tree-focused landscaping with local adaptable plants

- Entirely 'in-house' changes including vehicle use, electrical appliances and lighting, heating, etc.

- Environmentally Preferable Purchasing Policy

- Formal adoption of resolution to participate in ICLEI's climate protection campaign; formal adoption of Vision Statement and Strategic Plan that include energy efficiency goals

- Four day work week. Changed heating and air to highest SEER rating available.

- Governor's Energy Challenge (Sonny Perdue) to reduce energy emissions 15% by the year 2020.

- Green Building Ordinance Solar Energy Program to assist homeowners with information

- Green Building Ordinance 2008; Fast-track for LEED Buildings 2007. Also water conservation ordinance 2008.

- Green Building ordinance requiring new buildings, and renovations on existing to meet certain green building standard. Also close to adopting a program promoting energy audits that offers low interest loans for energy efficiency improvements.

- Green Building Program

- Green building standards Town public works trucks being changed over to be more fuel efficient through grant from County Air Pollution Control District

- Green Policy

- Housing and commercial codes

- Idling policy for fleet vehicles

- In house review of energy use. Change to energy efficient light fixtures and improved mileage on vehicles and some electric vehicles

- In the process of adopting a Sustainability Element with specific goals and actions aimed at encouraging energy efficiency and energy conservation. Require submission of a green building checklist with building permit application.

- In the process of drafting a Green Building Ordinance

- Incorporation of 2006 IECC standards into the City Building Code

- International Energy Conservation Code 2006 adopted in January 2008.

- Land Use Laws that encourage mixed use - non auto oriented development

- LEEDs

- MAQ (mobility and air quality plan), Urban Village development program, Mixed-use growth centers (MUGC), Lawn watering restrictions, the city's comprehensive plan includes policies to promote transit-oriented development.

- Must exceed state energy conservation requirements on new construction - Provide incentives for use of solar heat

- No idling policy for vehicles and school buses LED lighting   Energy efficient lighting in buildings Pursuing wind power

- None but are pursuing

- None to date. All policies are under development at this time.

- Only to the extent that our city buildings have been audited for energy efficiency and we are pursuing improvements that will make them more energy conserving.

- Our Comprehensive Plan notes that the City encourages energy efficiency.

- Participating in a weatherization and insulation program and energy star in new construction

- Planned Unit Developments are eligible for up to 20 percent bonus density if they meet specified criteria including energy efficiency (PMTC 17.32.070)

- Policies on ultra efficient, low flow water fixtures

- Policy regarding Idle Free Zone for all city vehicles.

- Public announcements, pamphlets, tv info.

- Public Outreach-formation of neighborhood "climate action teams" aimed at educating community on simply and cheap ways to reduce energy use.   California Assembly Bill

32 - Reduce GHG emissions by 30% of 1990 levels by 2020 and 80& by 2050 All new buildings carbon neutral by 2030

- Purchase of hybrid vehicles for town use, energy conservation policies in town buildings.
- Purchasing
- recycle energy conservation
- Reduce idling of vehicles and new vehicle purchases, excepting police vehicles, will be alternate fuels
- Reduced the hours of operation to reduce energy usage.
- Reduction in fees for LEED certified buildings--new or remodeled.
- Requirements for photovoltaics on new developments of 20+ units; protection of solar exposure; land use policies that encourage alternative transportation; required green build checklists at time of project submittal; free peer review from greenbuild professionals for projects prior to submittal; plus many other policies throughout the Land Use Element and Conservation and Open Space Element;
- Revised Building Codes that include energy efficient building practices and structure designs
- State construction Codes
- State of Michigan Energy Code
- Support use of housing funds for weatherization, support emergency funding for furnace/boiler replacements
- Sustainability policy
- Sustainable Practices Policy for municipal facilities.
- The City is currently working on a master plan that would move City forward with developing policies.
- The City Manager has taken steps to encourage City Staff to be conscious of daily energy usage in Municipal buildings. With new construction, the City is pursuing LEEDS certification when possible.
- The City of Henderson will adopt a Strategic Plan for Sustainability in early 2009. This plan will include goals and strategies for energy efficiency and energy conservation, including grant programs for efficiency upgrades in existing homes, low-interest loans (in conjunction with local banks) for energy efficiency upgrades coupled with solar

installations (where feasible); and we also support an on-going regional effort to create a Home Performance Energy Board to administer the EnergyStar program for existing buildings.

- The council has adopted moving forward with implementing items that have under a 10 year payback

- The Mayor's Sustainable Millburn Task Force was created in early 2008 and is "charged with creating plans and initiatives that will encourage the residents and institutions of Millburn Township to cooperatively adopt fundamental principles of sustainability. The plan is intended to include feasible goals, recruitment for public participation and specific recommendations to achieve the goals set forth." The resolution creating the task force anticipated that the plan would be submitted by December 2008. The task force will be reporting to the Township Committee in December 2008.

- The only policies are internal with experimentation with biodiesel fuels and propane. Concerning zoning amendments to encourage use of wind turbines.

- The single largest energy conservation work done by this City has been in the new construction of major rehab of over 6000 residential units, employing energy conservation state-of-the-art techniques and technology in doing so. Reduced consumption and owner/renter savings resulted.

- Transit Oriented Development standards.

- Under the recently passed General Plan: 1) Require new development to incorporate passive heating and natural lighting strategies to the extent feasible and practical. Includes using building orientation, mass and form, including facade, roof, and choice of building materials, color, type of glazing, and insulation to minimize heat loss during winter months and heat gain during the summer months; Designing building openings to regulate internal climate and maximize natural lighting, while keeping glare to a minimum; and, reducing heat-island effect of large concrete roofs and parking surfaces. 2) Incorporate green building standards into the Zoning Ordinance and building code to ensure a high level of energy efficiency in new development, retrofitting projects, and City facilities. Includes: Requiring the use of Energy Star appliances and equipment in new and substantial renovations of residential development, commercial development, and City facilities; requiring all new City facilities and new residential development incorporate green building methods to qualify for the equivalent of LEED Certified "Silver" rating or better (passive solar orientation must be a minimum component). The Recommendation for adoption of a Green Building Design Ordinance is in the General Plan, but hasn't actually been defined or taken to task. City does not allow continuous all night outdoor lighting in sports stadiums, construction sites, and rural areas unless they are required for safety reasons.

- Vehicle purchases lighting retrofits

- Voluntary Green Building Incentive program US Mayors Agreement (Kyoto Protocols)

- We are an electric power provider, and provide programs such as time of use and load management programs for our customers.

- We certainly support energy efficiency and energy conservation, but are not in a position to offer any financial incentives to developers at this time.

- We coordinate energy audits on commercial, industrial and residential structures. Promote energy efficiency in articles, newsletters etc. Encourage industry to use energy efficient motors.

- We do not have any policies that regulate or provide incentives for private developments. We have a newly formed and very active Sustainability Committee. We are looking at City operations first. We have discussed updating our zoning code to require more energy efficient upgrades for private development.

- We had an energy audit prepared for all municipal buildings and are enacting those recommendations.

- We have adopted our own mandatory Residential & Commercial Green Building Programs as well as set goals for our Public Facilities to achieve LEED Silver. Standards are included for energy efficiency, indoor air quality, water conservation, waste recycling, and mitigation of the heat island effect.

- We have adopted the NCLM Green Challenge. We are working to complete energy audits of our buildings. Energy efficient trucks have been purchased for public works department.

- We have goals and information in our sustainability plan which is on our website www.cityofsummit.org

- We have had an electrical audit and as a result we will move our water pumping to the 1-3AM time frame and we are at this time installing compact fluorescents and the new 28 watt green bulbs.

- We have instructed municipal department heads to explore energy efficient vehicles for all new purchases and have circulated a memo about reducing energy consumption at city facilities.

- We have joined the EPA Challenge and committed to cut energy by at least 10% in municipal buildings. We established a Clean Energy Committee in the City composed of residents of the City knowledgeable in energy conservation.

- We now use LED light bulbs in all buildings. Computers automatically shut off after four hours of idle time. Reduced the amount of servers in operation.

- Weatherization

- Working on a Green Build Ordinance to encourage builders to get LEEDS certification

- Working on creating policies using an employee task force. An example of a policy would lights out in all rooms when not in use.

Question 11. Has your municipality adopted any of the following policies to promote or encourage the use of renewable energy systems, such as wind turbines, solar photovoltaic (PV) panels, or solar water heaters? Do not include any programs offered by a municipally owned electric utility, as those will be addressed in a separate question. Please check all that apply and identify how long ago the policy was adopted.

Policies	Not Pursuing	Pursuing/ Intend to Adopt	Adopted			Don't Know	Total Adopted
			In Past Two Years	2-5 Years Ago	More than 5 Years Ago		
Planning incentives (e.g., "fast-track" approval, density bonuses, etc.) to developers who include renewable energy systems in new construction (N=275)	194 (71%)	56 (20%)	7 (3%)	6 (2%)	2 (1%)	10 (4%)	15 (5%)
Streamlined or "fast track" permitting processes for small-scale renewable energy systems added to existing buildings or properties (N=275)	198 (72%)	50 (18%)	8 (3%)	2 (1%)	2 (%)	15 (5%)	12 (4%)
Building height exemptions for small-scale renewable energy systems (N=275)	228 (83%)	20 (7%)	5 (2%)	0 (0%)	3 (1%)	19 (7%)	8 (3%)
Waiver or reduction of permit fees for small renewable energy systems (N=275)	221 (80%)	21 (8%)	11 (4%)	1 (0%)	2 (1%)	19 (7%)	14 (5%)
Solar access or "solar rights" laws (N=275)	221 (80%)	27 (10%)	2 (1%)	2 (1%)	6 (2%)	17 (6%)	10 (4%)
Property tax exemptions or reductions for on-site renewable energy systems (N=275)	237 (86%)	16 (6%)	3 (1%)	0 (0%)	2 (1%)	17 (6%)	5 (2%)
Grants or rebates to offset some of the cost of new renewable energy systems (N=275)	226 (82%)	25 (9%)	5 (2%)	1 (0%)	4 (1%)	14 (5%)	10 (4%)

Policies	Not Pursuing	Pursuing/ Intend to Adopt	Adopted			Don't Know	Total Adopted
			In Past Two Years	2-5 Years Ago	More than 5 Years Ago		
Low-interest loans to offset some of the cost of new renewable energy systems (N=275)	226 (82%)	30 (11%)	5 (2%)	1 (0%)	1 (0%)	12 (4%)	7 (3%)
Technical assistance for the installation of new renewable energy systems (N=275)	216 (79%)	27 (10%)	12 (4%)	2 (1%)	5 (2%)	153 (5%)	19 (7%)
Public benefits fund, or local levy to support renewable energy programs (N=275)	238 (87%)	18 (7%)	0 (0%)	2 (1%)	0 (0%)	17 (6%)	2 (1%)
Community choice aggregation to negotiate renewable energy options for private utility customers (N=275)	238 (87%)	10 (4%)	0 (0%)	3 (1%)	5 (2%)	19 (7%)	8 (3%)
Other policies to promote or encourage the use of renewable energy systems (N=93)	69 (74%)	4 (4%)	6 (6%)	2 (2%)	1 (1%)	11 (12%)	9 (10%)

If "other," please specify:

- Again, ETO and State offer incentives, tech. assistance, etc. for renewable energy solutions. Re: property tax exemptions, this would have to occur at the county level.
- All via muni utility
- City is municipal electric utility and purchase 10% of its power as renewables.
- Conservation and Open Space element policies direct City to consider CCA.
- Coordinate with utility companies on their rebates and offers
- For the "Grants of rebates to offset the cost..." and "Low interest loans to offset some of the cost..." questions, we are looking at the possibility of adopting those policies but currently have not decided either way.
- Have adopted an ordinance that requires a special use permit for wind-powered electric generation on buildings.

- Have purchased several hybrid vehicles for the City fleet and plan to push for an increase in hybrid purchases in the future.
- Incentives from state level; considering some incentives to reduce initial cost of solar
- Jefferson County voters recently approved Prop. 1, authorizing the local PUD to pursue electric power. Currently, our area is served by an investor owned private utility (PSE). The city has been engaged in the process and has been considering its own municipal electric utility.
- Lowered construction permit costs for installation of solar
- Master Plan advocates for incentives and programs that create energy efficient policies.
- Most of the above are not permitted by state law
- Instead of "intend to adopt" Should read "evaluating adoption and funding"
- Purchase of municipal electricity from renewable sources
- Rather than other - I'd note that we are currently developing a climate protection plan with the assistance of a citizen committee and at this point no policy or regulation is out of the realm of possibility
- Request for solar flood lighting for City 'gateway' signage.
- Requirement for all new residential development to be pre-wired for optional photovoltaic roof energy systems and/or solar water heating on south facing roofs; and, require all new projects that will use more than 40,000 kw-hours per year of electricity to install photovoltaic systems
- These policies and incentives are not applicable to a community like ours i.e. no municipal utilities.
- We are currently looking at the City of Berkeley's Solar Initiative and hoping to offer a similar program for our city. We are also working to install additional solar and wind technologies in our city
- We have a new TIF district and we have approximately $500k per year for energy efficient upgrades to private developments within a 1 mile distance from our TIF district boundary.
- We have no control over property taxes in this state.
- We just beginning to formulate a plan so many things are don't know at this point
- Zoning regulations to allow the erection of wind turbines

Question 12. Please identify the specific policies that your municipality has adopted to encourage renewable use.

- Adopted state requirements for solar
- Any implementation has been voluntary. Public education is an important factor.
- As of right now we are in the process of developing specific incentives
- Assistance to Homeowners and reduction of fees for solar energy on homes. Pursued community choice aggregation with a consortium of communities but was found not workable.
- Capped permit fees for solar projects.
- Consider policies concerning solar and wind use.
- CT 20% by 2010 campaign
- Currently we have no adopted any policies for non-city operations. We are working on a Home Performance program with incentives that should be out in the next couple of weeks/months.
- Directives on the power down of computer equipment when not in use. Recycling of paper.
- Discount on solar panel permit fees
- Environmentally Preferable Purchasing Policy, Green Building standards for City buildings
- Fast track planning review, as part of LEED building determination.
- For over 20 years, this City has been engaged in alternate energy generation using renewable materials (water for hydro, methane gas from wastewater treatment, etc.) and providing the electrical energy to the area power grid; net profits were attained for the municipality as a result, along with a reduced reliance on foreign and fossil fuels.
- Full compliance with State law in this area including conservation plans
- Green team formed; anti idling policy; energy efficient muni buildings;
- Have exempted renewable energy equipment from City sales tax
- Have not done any

- In the process of drafting a Green Building Ordinance that will likely include fee waiver for energy efficient appliance replacement and solar panel installation

- Joined Solar America City to develop information, outreach and grant assistance

- LEED certified buildings are encouraged, with no additional incentives given

- LEED grant program

- Lexington has had an anti-idling bylaw for a number of years

- Low interest loans and building permit rebates for LEED buildings

- No policies adopted but pursuing

- No specified policies, but we are in process of finishing a strategic plan

- None...yet

- NPDES

- Outreach and education, i.e. support of the solar neighbors tour, solar panels on City hall and Arcata marsh interpretive center

- Possible construction of wind turbines included in city's 5-year CIP. Possible move to municipal electric production and distribution.

- Provide additional development area to residents who install solar - eliminate all planning and permit fees for solar installations

- Purchased dual fuel vehicles

- Pursuing several geothermal exchange projects 2. Looking at how to take an entire street off the grid. Hope to start construction/redevelopment within 2 years. 3. Our City is 90% developed- we are 80% housing and over 60% of that housing is historic. We have some design/historic preservation constraints for some renewable energy e.g. would not want to destroy slate roof tiles, houses already situated on sites, etc.

- Recycling

- Reduction in solar permit fees

- Requirement for all new residential development to be pre-wired for optional photovoltaic roof energy systems and/or solar water heating on south facing roofs; and, require all new projects that will use more than 40,000 kw-hours per year of electricity to install photovoltaic systems

- See "other" above.
- See 10.
- See above -- form of this survey is somewhat limiting in accurately responding
- See above. We are also part of a regional government buying block of energy and pursuing an increase in this group's purchasing of renewable energy.
- Solar access. Rebate program Energy Trust incentives Green Business Technical Assistance program
- Specific policies pending
- Sustainable energy policy, green vision, green building policy, general plan policies
- Sustainable Practices Policy for municipal facilities
- Tax Credits for solar water heaters, streamlining permitting process for solar water heaters
- The city has not adopted any plans specifically aimed at renewable energy use. however, we are in the midst of creating a sustainability plan that may include such components.
- The City is considering its "E3 + Solar Initiative" which would provide low-interest loans to residents to have a home energy audit and then purchase and install energy efficiency upgrades as well as PV panels, where feasible. Various goals and strategies to encourage renewable energy use are also included in the City's forthcoming Strategic Plan for Sustainability.
- The Town is currently looking at the best way to offer assistance to residents wishing to install a PV power source for their homes.
- The Village adopted a Floor Area Ratio law which reduces the maximum size of a home relative to the overall lot size. The Village Board also adopted a policy statement encouraging the use of energy efficient materials and technologies in building.
- Town has purchased renewable energy credits that equate to 10% of the Town's electric consumption.
- Via muni utility arm
- Village has focused more on community education
- We are implementing the use of solar systems on some projects. We expect to have more in the near future. We are also doing research to see if wind energy will be feasible for the city.

- We are looking at our Zoning Ordinance to ensure that we are making solar/wind easy to implement. City is considering adding solar panels to Library and City Hall rooftops.
- We are reviewing our Land Development Regulations for needed amendments to accommodate wind turbines.
- We currently have 2 hydroelectric facilities and are constructing a third.
- We have adopted a policy to purchase hybrid and alternative fuel vehicles. We have installed solar water hearing in our Public Works building.
- We have just started our GHC reduction efforts.
- We offer the fast track permits and greater FAR for LEED projects and Energy star projects which can contain energy conservation and renewable projects. We are not offering these incentives for stand alone energy projects. We have a grant program with EPA in which we got money to a non-profit to demonstrate Energy Star and LEED construction of homes for low income individuals.
- We're currently working on one that will go along with our GHG Inventory and targets....these are all interconnected.
- We're in the beginning months of our Solar America Cities initiative, so we're going to be looking at a variety of different options.
- Wind tower ordinance currently being drafted for adoption by the Town Council to allow wind tower.

Question 13. Does your municipality own and operate its own electric utility? (N=274)

No	Yes
225 (82%)	49 (18%)

Question 14. If "Yes," are you familiar with the policies offered by your municipal electric utility with respect to energy conservation, energy efficiency, or renewable energy? (N=50)

No	Yes
9 (18%)	41 (82%)

D. Municipal Electric Utilities

Please describe any policies offered by your municipal electric utility in this section.

Question 15. Does your municipal electric utility offer any of the following financial incentives to promote or encourage energy conservation, energy efficiency, or renewable energy use? Please check all that apply and identify how long ago the incentive was adopted.

Policies	Not Pursuing	Pursuing/ Intend to Adopt	Adopted			Don't Know	Total Adopted
			In Past Two Years	2-5 Years Ago	More than 5 Years Ago		
Grants or rebates to assist construction of new energy-efficient homes or buildings (N=39)	28 (72%)	2 (5%)	5 (13%)	1 (3%)	2 (5%)	1 (3%)	8 (21%)
Grants or rebates to assist weatherization or energy efficiency upgrades to existing buildings (N=38)	18 (42%)	3 (8%)	7 (18%)	3 (8%)	6 (16%)	1 (3%)	16 (42%)
Grants or rebates to assist purchase of energy-efficient appliances (N=38)	14 (37%)	4 (11%)	3 (8%)	5 (13%)	11 (29%)	1 (3%)	19 (50%)
Other grants or rebates to promote or encourage energy conservation and/or energy efficiency (N=8)	4 (50%)	0 (0%)	0 (0%)	0 (0%)	2 (25%)	2 (25%)	2 (25%)
Low-interest loans to assist construction of new energy-efficient homes or buildings (N=37)	31 (84%)	2 (5%)	0 (0%)	0 (0%)	1 (3%)	3 (8%)	1 (3%)
Low-interest loans to assist weatherization or energy efficiency upgrades to existing buildings (N=37)	25 (68%)	3 (8%)	3 (8%)	0 (0%)	2 (5%)	4 (11%)	5 (14%)
Low-interest loans to assist purchase of energy-efficient appliances (N=37)	26 (70%)	3 (8%)	3 (8%)	0 (0%)	2 (5%)	3 (8%)	5 (14%)
Other low interest loans to promote or encourage energy conservation and/or energy efficiency (N=9)	6 (67%)	0 (0%)	0 (0%)	0 (0%)	1 (11%)	2 (22%)	1 (11%)

If "other," please specify:

- Appliance replacement for low income customers
- Subsidies for energy efficiency, weatherization program, CFL program, appliance meter loan, refrigerator rebate program,
- TVA Energy Aid New Construction Package

Question 16. Does your municipal electric utility offer any of the following additional incentives to promote or encourage energy conservation, energy efficiency, or renewable energy use? Please check all that apply and identify how long ago the policy was adopted.

Policies	Not Pursuing	Pursuing/ Intend to Adopt	Adopted			Don't Know	Total Adopted
			In Past Two Years	2-5 Years Ago	More than 5 Years Ago		
Free or reduced-rate weatherization or energy conservation supplies (N=39)	19 (48%)	2 (5%)	6 (15%)	4 (10%)	6 (15%)	3 (8%)	16 (40%)
Energy audits or other technical assistance for the installation of energy efficiency upgrades (N=39)	7 (18%)	4 (10%)	6 (15%)	7 (18%)	16 (40%)	0 (0%)	29 (73%)
Grants or rebates to offset some of the cost of new renewable energy systems (N=39)	18 (46%)	9 (23%)	2 (5%)	1 (3%)	7 (18%)	2 (5%)	10 (26%)
Low-interest loans to offset some of the cost of new renewable energy systems (N=39)	28 (72%)	2 (5%)	2 (5%)	0 (0%)	2 (5%)	5 (13%)	4 (10%)
Electricity rate discount for homes or businesses meeting energy efficiency requirements or that include an on-site renewable energy systems (N=39)	30 (77%)	4 (10%)	1 (3%)	1 (3%)	0 (0%)	3 (8%)	2 (5%)
"Green power pricing," or sale to local utility customers of electricity generated from renewable resources (N=39)	16 (41%)	7 (18%)	7 (18%)	3 (8%)	6 (15%)	0 (0%)	16 (41%)

Policies	Not Pursuing	Pursuing/ Intend to Adopt	Adopted			Don't Know	Total Adopted
			In Past Two Years	2-5 Years Ago	More than 5 Years Ago		
Renewable production incentive, or guaranteed purchase of electricity generated from private renewable energy systems (N=39)	21 (54%)	7 (18%)	4 (10%)	2 (5%)	3 (8%)	2 (5%)	9 (23%)
Local renewable portfolio standard, or requirement that a certain percentage of the utility's electricity is generated from renewable sources (do not check if required by state law) (N=39)	14 (36%)	8 (21%)	6 (15%)	7 (18%)	3 (8%)	1 (3%)	16 (41%)
Other policies (N=10)	7 (70%)	1 (10%)	0 (0%)	0 (0%)	0 (0%)	2 (20%)	0 (0%)

If "other," please specify:

None listed

Question 17. Please identify the specific policies that your municipal electric utility has adopted to encourage energy efficiency and energy conservation.

- Bi-directional meters to allow selling back to the city the energy produced
- CIP programs through MMPA; wind turbine in 2009; State requirement for renewable resources
- City Council adopted sustainability resolution in 2001 and voted to end participation in a planned power plant to be fueled with coal in 2008.
- Conservation Improvement Program, rebates for energy efficient appliances etc.
- Energy Audit, free building information on efficient building techniques, classes for builders
- Geothermal, landfill gas, wind generation contracts, solar rebate program, refrigerator rebate program, cash weatherization grant, audits, lighting grants, low-cost loans, EV rate discount, etc.
- Numerous, for residential, commercial & industrial customers. Avail at: www.ladwp.com

- Online audits, consultations. Green Power Switch (consumers can elect to pay more for a green power option), Generation Partners (TVA will pay 15-cents per kwh for grid-connected green power). TVA is going to roll out some new efficiency programs in January, but I don't know what they're going to look like.

- We plan on converting to LED street lights in Main Street in 2010.

E. Land Use and Transportation Policies

Please indicate if your municipality has adopted any of the following land use or transportation policies, even if the intent of adopting the policy was not necessarily to reduce GHG emissions.

Please do not include any policies or programs to reduce energy use or GHG emissions from your city or town's municipal operations, such as purchasing fuel-efficient vehicles for the municipal fleet. While such policies may result in significant reductions of GHG emissions, they are not the subject of this study.

Question 18. Has your municipality taken any of the following planning actions that would reduce Vehicle Miles Traveled and community-wide energy use? Please check all that apply by and identify how long ago the policy was adopted.

Policies	Not Pursuing	Pursuing/ Intend to Adopt	Adopted			Don't Know	Total Adopted
			In Past Two Years	2-5 Years Ago	More than 5 Years Ago		
Adopted comprehensive plan goals or objectives to manage growth, reduce sprawl and/or focus development in existing urban areas (N=264)	64 (24%)	44 (17%)	47 (18%)	34 (13%)	70 (27%)	5 (2%)	151 (57%)
Adopted comprehensive plan goals or objectives to encourage mixed-use, pedestrian-oriented, and/or transit-oriented development (N=264)	48 (18%)	49 (19%)	61 (23%)	45 (17%)	52 (20%)	9 (3%)	158 (60%)
Updated zoning code to manage growth, reduce sprawl, and/or focus development in existing urban areas (N=264)	54 (20%)	57 (22%)	54 (20%)	36 (14%)	51 (19%)	12 (5%)	141 (53%)
Updated zoning code to encourage mixed-use, pedestrian-oriented, and/or transit-oriented development (N=263)	47 (18%)	75 (28%)	58 (22%)	37 (14%)	35 (13%)	12 (5%)	130 (49%)

Policies	Not Pursuing	Pursuing/ Intend to Adopt	Adopted			Don't Know	Total Adopted
			In Past Two Years	2-5 Years Ago	More than 5 Years Ago		
Adopted additional growth management tools such as transfers of development rights (TDR's) or conservation easements (N=261)	161 (61%)	29 (11%)	19 (7%)	10 (4%)	24 (9%)	20 (8%)	53 (20%)
Collaborated with nearby jurisdictions and/or regional agencies on regional or metropolitan-area growth management plans	89 (34%)	42 (16%)	29 (11%)	23 (9%)	59 (23%)	19 (7%)	111 (43%)
Other planning actions that would reduce Vehicle Miles Traveled and community-wide energy use (N=68)	38 (56%)	5 (7%)	2 (3%)	1 (1%)	9 (13%)	13 (19%)	12 (18%)

If "other," please specify:

- Added metra train station for commuter access
- Again -- don't know is not appropriate response - we are still identifying what will or will not be addressed policy-wise based recommendations of climate protection plan - anticipated to be presented to governing body next spring.
- Annexation policy to manage sprawl
- City Adopted $17.7 million open space bond program. City used the money to purchase green spaces, for parks and conservation.
- City is currently updating its comprehensive land use plan to include more "smart growth" policies
- COH Open Space and Trails Plan Boulder Highway Investment Strategy Sloan Canyon Gateway Design Guidelines
- Compliance with State law. Also, please see 2008's SB 375 (just signed) which will change all these issues going forward throughout State
- Comprehensive tree plan, including tree retention and growth plans; permeable surface requirements; density incentives

- Departmental encouragement to reduce personal emissions/energy consumption by working 4 10-hour work days, telecommuting, using public transit, carpooling, and alternate forms of transportation. 2) Current policy in the development stage to set guidelines for meetings held over the phone and internet to cut back on travel to meetings.

- Drafted Bike/Ped Master Plan

- New Land Development Ordinance

- Policies that encourage infill, such as allowing accessory dwellings outright, lowered parking requirements, and density bonuses for compact development that saves open space and natural features. Policies that place

- Policy on allowing slow moving vehicles

- Pursuing a 'Big Box Ordinance' and a 'Traditional Neighborhood Ordinance.'

- Riparian setback requirements within zoning code around streams and waterways reduce pavement and cluster development

- The City manages a commute trip reduction program for businesses and property owners.

- The Greenline/Urban Growth Boundary Sustainable City Major Strategy

- The Town is not growing so we don't have a need for "fast tract" and "TDR" policies.

- We also have a Subdivision Ordinance that addresses some of these principles. We updated our Comprehensive Plan to include even more of these principles in 2006 and are currently updating our Comprehensive Zoning Ordinance to do the same.

- We are continuing to work with the regional "How Shall We Grow" initiative and the County-wide Smart Growth initiative.

Question 19. Please identify the specific land use or zoning policies that your municipality has adopted that would reduce community-wide energy consumption.

- Allowing mixed use and increased densities in the urban core and facilitating transit oriented development.

- Changed several zones within downtown. Increasing FAR within downtown

- City of Irvine Energy Plan - http://www.cityofirvine.us/files/2008_June_24_Energy_Plan_FINAL.pdf

- Community Development Plans in various stages of conception/implementation; in general would encourage smart growth

- Comp plan has specific boundaries to maintain a free-standing city with specific zoning for residential, commercial and industrial areas. Zoning regulations require evaluation of transportation options as part of development review and approval. A green-build ordinance requiring energy-efficient features to be included in new construction and remodels was passed in 2007. A commercial green-build ordinance is being reviewed for action in 2009.

- Construction of linear trail through major portion of town, mixed use permitted

- Creating more walkable communities. A strategic plan was completed but policy has not yet been adopted.

- Currently update Comprehensive Plan to address Smart Growth policies

- Currently, the Future Land Use Element (FLUE) provides for the coordination of land use and transportation planning (Objective 1.4 and Policies 1.4.1 through 1.4.5); requires land use designations to be based on accessibility to necessary infrastructure and public services (Objective 1.5 and Policies 1.5.1, 1.5.3, and 1.5.4); requires future development to be directed into appropriate areas based on availability of necessary infrastructure and public services (Objective 1.6 and Policies 1.6.1 and 1.6.2); and ensures that new development is designed in a manner that enhances traffic access, circulation, and intermodal connections. Furthermore, FLUE, Policy 1.8.6 requires the utilization of site design criteria that considers accessibility, aesthetics, internal function, and energy efficiency. The City of Port Orange has already taken steps to ensure that its transportation policies and future transportation growth reflect a balance between modes. The Transportation Element currently includes a section in the introductory text, as well as goals, objectives and policies, regarding alternative transportation modes. Goal 2 of the Transportation Element is to, "Transform Port Orange into a "walkable/multimodal city" by creating a safe, convenient, attractive, efficient, and cost-effective transportation system that emphasizes mass transit, is truly multi-modal in scope, and that serves the needs of all segments of its population." The Transportation Element requires proposed development to provide improvements to transportation system to mitigate projected impacts (Objective 1.4 and Policies 1.4.1 through 1.4.4); provides for the coordination of land and transportation planning, such that existing and proposed population densities, housing and employment patterns, and land uses are consistent with the transportation modes and services proposed to serve them (Objective 3.3 and Policy 3.3.1); and provides for the coordination of new development with the available mass transit system (Policies 2.2.4 through 2.2.8). The Conservation Element currently includes an objective and policies (Objective 1.6 and Policies 1.6.1 through 1.6.3) regarding protection and conservation of area resources through a comprehensive recycling program and by promoting energy efficiency and the use of renewable energy resources. Recent changes to Chapter 163, F.S., included in HB 697 and codified as part of Chapter 2008-191, Laws of Florida, require local governments to take certain actions to reduce greenhouse gas emissions, including requirements for specific strategies and policies in the Future Land Use, Transportation, Conservation and Housing Elements of the Comprehensive Plan. Once complete, the City will review the guidance material that the

Department of Community Affairs (DCA) is preparing to assist local governments in responding to these requirements and will amend the Comprehensive Plan accordingly. The City will explore strategies that further promote a compact mix of land uses, a range of housing opportunities and choices, walkable neighborhoods, compact building design, directing development towards existing communities, a variety of transportation choices, and preservation of open space and sensitive environmental areas.

- Density incentives for LEEDS buildings, Regional Growth Boundary

- Density...under both our form-based code and general zoning requirements...encourage multi-modal transportation in all planning districts...have started to develop, implement alternative transportation walking / biking / limited public transit

- Desert village model for new growth areas, transit-oriented design for major transportation corridor planning

- Developed charrette area plans and adopted implementing ordinances to increase density and intensify development around adopted community urban centers to reduce traffic and community-wide energy consumption. The urban centers are centered along the Busway and Metrorail stations.

- Development Rights Open Space purchases with federal and state partners Open space acquisition with private partners Collaboration with educational facilities on preservation of open space Maximum recycling issues

- Do not have zoning authority.

- Downtown Development Plan - Component of General Plan

- Downtown master plan, which promotes mixed use development and multimodal transportation

- Encourage density, walkability to reduce vmt's.

- Encourage pedestrian paths between subdivisions and to local schools/playgrounds, encourage mixes use developments, reduce width of subdivision streets

- Encourage the construction of sidewalks throughout the community

- Energy Conservation Code

- Established urban growth boundary; improved flexibility in zoning for downtown area; cluster development; new open space requirements.

- Focused residential development

- Form Based Codes

- Form-based codes that emphasize density, "complete streets." Tax incentives and facade grants are available in urban areas.

- Fund for purchasing land to remain as "greenspace" and not be developed; Investment in a new, several mile long pedestrian path through town

- General Comp. Plan Update

- General Plan focus to limit intrusion into productive agricultural lands

- General Plan policies that encourage sustainability

- General Plan update currently under revision will revise existing zoning and land policies to encourage TOD, pedestrian and bicycle improvements, etc. In addition, also developing a downtown specific plan to focus high-density development adjacent to rail and bus transit.

- Green Building Policy The City's Green Vision

- Higher density development in buildup areas and lower densities in rural areas, requiring more sidewalks and bike/pedestrian paths in developments.

- Higher density residential areas together with a Community redevelopment area to encourage more business in the City

- Hillside Development Standards and Guidelines Commercial, Municipal and Residential Design Guidelines Housing Element in General Plan

- In 1999, our zoning ordinance was revised to allow mixed uses in most of the commercial districts. Also, in 1992, we adopted a Downtown Design Plan that allows for residential densities of 30 to 65 units per acre.

- In process of adopting new zoning code.

- In process of encouraging higher density and mixed use development

- Increased density; no development outside urban growth boundaries, etc.

- Infill projects are encouraged by density, as are mixed use projects.

- Land Use Code has focused development in downtown area, identified many areas for natural resource protection or agricultural exclusive. Strong link between public transportation and sites of new development, particularly multi-family. work on creating neighborhood 'clusters' with centers of commercial development for mixed use community.

- Land use/zoning was updated in 1996 with key element being mixed use centers in various parts of town and a non-motorized transportation plan to enhance the "walkability" of our city.

- Low income housing density bonus encourage cluster dwellings

- Mentioned in previous section

- Mixed use development districts

- Mixed use zones

- Mixed use zoning

- Mixed use zoning transit oriented development pedestrian/non-motorized pathways

- Mixed Use zoning adjacent to rail transit facilities

- Mixed used zones, inter-connected streets, pedestrian oriented development, requirements for sidewalks and bicycle paths, encouragement of ride sharing

- Mixed-use developments, Downtown Core & Downtown Fringe zoning classifications.

- Mixed-use, form-based codes, transit-oriented development, connectivity requirements, hike and bike trails, parking reductions, outside light ordinance, drought tolerant landscaping (reduces need for mowing and maintenance),

- Narrow road widths, walkable neighborhoods

- New comprehensive plan , update codes, ordinances

- New 'Smart-code' for both zoning and comp plan

- Newhall Redevelopment Plan, Sustainable Community Guidelines, Working on One Valley One Vision Joint General Plan, Non-motorized Plan

- Not available. Is currently under revision

- Our comp plan that was recently adopted talks about reducing energy consumption, and encouraging green development.

- Our comprehensive land use plan increases densities to stop sprawl to suburban cities thru TOD development in the central city. We've started to adopt form based code to implement the comp plan and created new zoning types to allow mixed use and transit oriented developments.

- Our Town is only residential with a few schools and churches. No commercial development or multi-family dwellings
- Ozone Alert
- Planned residential developments
- Plans encourage sidewalk and pedestrian friendly ways and bike trails
- Please see Ashland Comprehensive Plan and Land Use Zoning ordinance at www.ashland.or.us
- Policies emphasizing infill development, transit oriented districts, brownfields redevelopment.
- Revitalization initiative to promote inner-core development away from greenfields.
- Statewide energy conservation codes Transit and Pedestrian-friendly land use plans and zoning
- TDRs
- The City has implemented the following: Urban Center Plan which will allow mixed use development, mixed use development along old Hwy 99, the City plans under the Washington State Growth Management Act which requires that urban growth be accommodated in existing urban areas, the City has a critical area standards and shoreline protection standards.
- The City has sidewalk requirements, bike lane requirements, roundabouts, trail connections, etc
- The City is dedicated to maintaining Open Space and curtails development of the areas by not issuing special building permits.
- The City Plan. The Master Plan
- The city's 2020 Master Plan - Community Design Element
- Transit oriented developments and mixed use developments
- U.S. Mayor's Agreement; Green Building Policy (voluntary)
- Urban growth boundary; gathering place zoning
- Use of reclaimed water, encouragement of alt energy on site --
- Various

- We are already pretty much built out and we have a wide variety of housing choices all 1/4 mile from rapid transit or bus lines

- We intend to budget for a comprehensive master plan study and zoning code review within the next year.

- We require sidewalks; impact fees including parkland and required park land dedication

- We work within the Portland metro region 2040 growth management concept to focus higher density and mixed use development in identified town centers, including town center plan for Lake Grove (one of two town centers in Lake Oswego), and employment centers. Allow accessory dwelling units in s.f. residential zones, though not many have been built.

- Wide ranging, including higher density/more open space (20-50%), mixed use, connectivity

- Wisconsin Smart Growth Plan, encouraging mixed-use through the use of PDDs, extensive bike trail system, encouraging the development of medium- to high- density housing along public transit routes.

- Working on developing a new public transit system. Current system is outdated and inefficient.

- Zoning Overlay Areas

Question 20. Has your municipality adopted any of the following policies to reduce vehicle miles traveled by encouraging the use of alternative transportation modes? Please check all that apply and identify how long ago the policy was adopted.

Policies	Not Pursuing	Pursuing/ Intend to Adopt	Adopted			Don't Know	Total Adopted
			In Past Two Years	2-5 Years Ago	More than 5 Years Ago		
Increased mass transit service (e.g., increased service frequency, added new bus or rail lines) (N=264)	124 (47%)	47 (18%)	43 (16%)	20 (8%)	22 (8%)	8 (3%)	85 (32%)
Built new bicycle lanes, multi-use paths, or other bicycle or pedestrian amenities (N=264)	39 (15%)	56 (21%)	67 (25%)	35 (13%)	63 (24%)	4 (2%)	165 (63%)

Policies	Not Pursuing	Pursuing/ Intend to Adopt	Adopted			Don't Know	Total Adopted
			In Past Two Years	2-5 Years Ago	More than 5 Years Ago		
Provided carpool matching or "guaranteed ride home" programs for commuters (N=264)	203 (77%)	18 (7%)	13 (5%)	10 (4%)	10 (4%)	10 (4%)	33 (13%)
Worked with private sector to provide subsidized transit passes and/or other programs to encourage employees to use alternative transportation modes (N=264)	177 (67%)	28 (11%)	18 (7%)	7 (3%)	13 (5%)	21 (8%)	38 (14%)
Other policies to reduce vehicle miles traveled by encouraging the use of alternative transportation modes (N=67)	39 (58%)	6 (9%)	7 (10%)	1 (1%)	2 (3%)	12 (18%)	10 (15%)

If "other," please specify:

- Again many of the issues identified by you are addressed by entities other than the local government in this Florida County
- Bike trails and encouraging more expansion of bike trails.
- City Travel Policy promotes alternative transportation modes and reduction of VMT
- Completed a Transit Study this year that addresses all of these issues. Implementation has not yet begun.
- Electric Vehicle Charging station free and open to public. Bike Library-has been operational in past and are working on getting running again.
- Free bus ridership on designated ozone action days
- Increase use of hybrid cars in Village fleet.
- Much of this area is controlled by outside transit agencies and not a city function.
- Note - all of the above are ongoing activities that began in earnest during the last administration, and that Mayor Haslam has carried forth. Transit service and bike resources have grown each year.

- Instead of "intend to adopt" Should read "evaluating adoption and funding"

- Our county handles all mass transit and senior citizen transportation

- Provide incentives for City employees to commute by transit, car-pool, or use alternative fuel technology vehicles;   Offer alternative work hours and telecommuting when appropriate to City employees to reduce VMT and trips to work;   Purchase hybrid gasoline-electric, bio-diesel fuel, electric vehicles, and CNG Refuse vehicles for the City fleet; Ensure that new development is designed to make public transit a viable choice for residents. Options include: - Locating medium-high density development whenever feasible near streets served by public transit; and   - Link neighborhoods to bus stops by continuous sidewalks or pedestrian paths; Educate employees and department managers about sustainability with a focus on specific operational changes that can be made to reduce GHG emissions, such as fuel efficient driving and reducing energy use at work

- See previous notes!

- The City is served by TriMet, a regional transit agency, and the City is working with other regional partners to extend the Portland streetcar to Lake Oswego. Otherwise, local transit service provided by the regional agency does not really meet the needs of local residents trying to get around in the community without a car. We have investigated car sharing, and would like to look more closely at local circulator bus/jitney opportunities (have looked at this in the past, but momentum may be better now).

- The city manages a commute trip reduction program for certain employers within the City.

- The Town is working to increase the amount of mass transit options available to residents and employees of Los Gatos.

- The Village of Scarsdale is currently suffering from a lack of parking. As such, we have encouraged commuters to carpool, use public transport provided by Westchester County or use bicycles to travel to and from the Village Center and the main intermodal transportation center.

- Transit system offers fare-free service to encourage ridership.

- We are currently preparing TSM and TDM strategies for our Town Center/Redevelopment Area.

- We have numerous policies that encourage non-motorized transportation. Our municipality does not have control of mass transit, but, we coordinate with them and support their operations.

- Work with a non-profit agency to provide subsidized transit, primarily for the elderly.

Question 21. Please identify the specific policies that your municipality has adopted to encourage the use of alternative transportation modes.

- 1) 2008 Smart Growth Planning Grant for Millburn Bicycle Network from Association of New Jersey Environmental Commissions with planned completion of plan for May 2009. 2) Examining jitney service to bus commuters to New Jersey Transit trains through partnerships with neighboring municipalities.
- Added bicycle lane on road to commercial office park, that connects with existing rails-to-trails path
- Added bike lanes, trails and require sidewalks
- Adopted Bikable/walkable program for future trails and connectors to green areas and parks.
- Adopted PART (park and ride transportation) agreement
- Are currently creating Bike and Pedestrian Plan
- Bicycle/walking routes currently under construction
- Bike to Work Day, Rideshare Week, City Employee Carpool program, Non-motorized Plan.
- Bike trails. No public transportation other than at fringe areas
- Bike/Ped Masterplan, TODs with trolley circulator.
- Boulder Highway Corridor Investment Strategy - land use planning in collaboration with the Regional Transportation Commission to support neighborhoods along a soon-to-be expanded transit line through a mature area of the City.
- CDBG has Share a Fare program that provides reduced rates for bus and cab transit fares
- City plans for multi-purposes paths and has constructed several miles worth or trails in the City. City also has a sidewalk program funded by the City. City requires all new developments to provide sidewalks along all road frontages (since 1996).
- City subsidized bus transit program. Cooperation with City, State, Fed. grants and donations.
- Complete streets policy; a pathways commission with a board authorized bicycle plan (Oxford was recently designated as a Bicycle Friendly Community by the League of American Bicyclists); increased budget percentages for sidewalk repair and construction; state recently enabled tax free vouchers for bicycle commuters

- Construct bicycle trail that rings the community
- Constructed a bike/walking path--more for recreational use, however--
- Construction (with satet and federal partners) of new commuter rail Creation of new intermodal rail station at airport
- Constructed new bike lanes and designated additional bike routes within city limits.
- County provides transit service; has expanded
- Creation of local bus circulator, construction of bridge along regional bicycle trail
- Deducted-cost mass transit passes and expended mass transportation alternatives
- Designated bike lanes around town, placed bike racks in public areas, work with a local TMO, transportation management organization, to encourage biking to work, etc.
- Developing trails
- Electric car recharge areas
- Employee Commuter/Rideshare Policy
- Encourage and participate in car pool efforts --
- Established a free shuttle bus system between our beach, downtown and our main transit station.
- EV loaner program via utility, Bike to Work Day are the only I am aware of, but not my primary area.
- Expanded transit service
- Expanding walking and biking opportunities
- Free bus rides for City employees. Massive transit expansion ($100) to add transit centers and busses. In pre-design phase on Bus Rapid Transit. Will incorporate Transit Oriented Development into Comp Plan update in 2009.
- Free Trolley in downtown core, Downtown improvement program to increase pedestrian use
- Frisco Public Transit Study, Hike & Bike Trail Master Plan, connectivity requirements and walkable neighborhoods, mixed-use requirements
- Help Create the First TMA in the State 18 years ago.

- Improved access and funding to mass transit, specifically buses
- In the application process to achieve Bicycle Friendly Community status from the League of American Bicyclists. Have greatly enhanced bicycle and scooter infrastructure. Working with the department of transportation to promote the boulevard concept with bike lanes and sidewalks as an alternative to high speed 6 lane roads.
- Include bike and pedestrian facilities on all streets and continue to build a transit system
- Increased rails to trails for bicycle use.
- Increasing services and amenities.
- Increased bus service, added many new miles of bike lanes, offer a carpool; program through local COG
- Leased train station from Amtrak to provide greater accessibility and access
- Middleton has one of the most extensive bike trail systems for smaller city. Bike trails are required in new developments as well. Middleton contracts with Madison Metro. Transit to provide bus service in the City.
- Mixed Use zoning adjacent to rail transit facilities.
- New commercial development is required to provide pedestrian and bike amenities, including new bike lanes in areas called out in Transportation System Plan. Building entrances must be oriented to the street, parking behind, etc.
- No official policy statement has been adopted by the Village Board
- No specific policy
- None. we are a small rural city, without mass transit
- Non-Motorized Transportation plan Mixed-use and multi-family upzones Require bicycle racks with new commercial development Parking reductions if shared parking, mass transit, non-motorized opportunities are enhanced.
- Our light rail system continues to grow. We've started street cars and plan to expand that system. We have a region wide program to encourage carpooling, ride sharing, etc.
- Pelivan, Tulsa Transit
- Proclamation in support of car-free day
- Providing wider shoulders on roadways to encourage more biking.

- Put a bike rack at City hall
- Reduced transit passes, MAQ plan, incentivized car-pooling.
- Regional transit (bus) passes available to all employees at no charge, guaranteed ride home included. Bicycle lanes are included in all new roadway projects, new or renovation.
- See answer to question 19
- Sponsor and manage citywide Commute Trip Reduction program
- Sponsored additional transit route, provide fare subsidies to residents, aggressive program to construct sidewalks and bicycle lanes
- Started our own free shuttle service for commuters and looking to expand if another subsidy is located.
- Support rideshare opportunities offered by County transit & regional groups; bicycle improvements on-going; City operates commuter & local shuttle transit - expanding local lines in response to land use changes.
- The city is part of and sponsors the Club Ride program - which encourage employees to use alternative modes of transit - the city subsidizes bus passes for all employees who participate. The city also initiated the City Ride bus program which provided more frequent bus service in the downtown areas for employees and senior - seniors are offered discounted fares. The 2020 Master Plan Recreational Trails Element and Transportation Trails Elements provide specific policies for trails, bicycles and other amenities.
- The City Plan
- The city works with regional agencies on commute trip reduction efforts including ride shares, flex passes and other programs to reduce congestion.
- Town participated in "Bicycle Rewards" program which provided incentives for people to ride their bicycles instead of drive around Town. The Town has also worked to improve the availability of bike lanes, has a community bus program, and is advocating a light-rail line.
- Trail system additions to encourage more bicycle and pedestrian use.
- Transit system offers fare-free service to encourage ridership.
- Transportation and park elements being updated to encourage alternative modes such as pedestrian and bike facilities.

- Transportation Demand Management (TDM) programs to reduce overall peak-hour demand and the use of single occupant vehicles.

- Various

- We are a bedroom community where a public bus system is not available and where the numbers for either BRT or other rail option are not yet there; however, our greenway/pedestrian system is a living project, with continual linkages and will eventually connect with three counties, and at least five cities.

- We are currently looking to expand our bus routes. More than 5 years ago we built new bicycle and walking paths. We also offer subsidies for bus passes

- We are working with other cities in the County to provide for area wide transportation systems (buses)

- We have recently adopted a new master plan for hike and bike trails that will ultimately lead to the construction of more trails throughout the city.

- Worked with a developer of condos on the rapid line to provide transit passes to buyers. The City also put in significant streetscape improvements and offers grants to income eligible buyers. 2. Expanded bike paths as a result of the Citywide recreation study completed last year.

- Worked with state transportation department to include bike trail on the new MO Hwy 150 project to connect trails between cities.

- Working on a comprehensive bicycle/pedestrian (sidewalk) Master Plan for the whole city.

F. Community Environmental Awareness

The questions in this section concern your perceptions of the level of general environmental awareness and activism in your community. This information provides important context for understanding how and why climate protection policies are adopted.

Question 22. Please indicate the level of concern for environmental issues on the part of high-level staff (e.g., department heads) in your municipality. (N=263)

No Concern/ not a Priority	Little Concern or Interest	Neutral	Somewhat Concerned	Highly Concerned	Don't Know
2 (1%)	9 (3%)	25 (10%)	134 (51%)	86 (33%)	7 (3%)

Question 23. Please indicate the level of concern for environmental issues on the part of your municipality's mayor or top elected official. (N=263)

No Concern/ not a Priority	Little Concern or Interest	Neutral	Somewhat Concerned	Highly Concerned	Don't Know
0 (0%)	10 (4%)	21 (8%)	103 (39%)	121 (46%)	8 (3%)

Question 24. Please indicate the level of concern for environmental issues on the part of high-level staff (e.g., department heads) in your municipality. (N=263)

No Concern/ not a Priority	Little Concern or Interest	Neutral	Somewhat Concerned	Highly Concerned	Don't Know
3 (1%)	10 (4%)	26 (10%)	130 (49%)	87 (33%)	7 (3%)

Question 25. Please indicate how often local citizens in your municipality contact you and/or lobby local elected officials or municipal staff in support of local environmental policies. (N=263)

Never	Rarely	Sometimes	Often	Very Often	Don't Know
11 (4%)	72 (27%)	93 (35%)	44 (17%)	36 (14%)	7 (3%)

Question 26. Please indicate how often local community groups, including any affiliated with colleges or universities, contact you and/or lobby local elected officials or municipal staff in support of local environmental policies. (N=263)

Never	Rarely	Sometimes	Often	Very Often	Don't Know
29 (11%)	87 (33%)	79 (30%)	38 (14%)	23 (9%)	7 (3%)

Question 27. Please indicate how often businesses, industry, or other institutions in your municipality contact you and/or lobby local elected officials or municipal staff in support of local environmental policies. (N=263)

Never	Rarely	Sometimes	Often	Very Often	Don't Know
32 (12%)	121 (46%)	65 (25%)	23 (9%)	10 (4%)	12 (5%)

Question 28. Are you aware of any nearby municipalities, other than your own, that have adopted policies to reduce energy use and/or GHG emissions? (N=263)

No	Yes
144 (55%)	119 (45%)

Question 29. If yes, please indicate the extent to which the experience of those municipalities with their energy and climate-related policies has influenced your municipality's decisions on whether or not to pursue similar policies. (N=119)

No influence	Little influence	Moderate influence	Significant influence	Major influence	Don't Know
5 (4%)	32 (27%)	43 (36%)	31 (26%)	6 (5%)	2 (2%)

G. <u>Your Perspectives</u>

In the remaining sections please share your personal perspectives on the issue of climate change, local governments' role in addressing climate change, and your experience (if applicable) with adopting and implementing climate protection policies.

Question 30. Please describe your personal level of concern for environmental issues. (N=263)

No Concern/ not a Priority	Little Concern or Interest	Neutral	Somewhat Concerned	Highly Concerned	Don't Know
3 (1%)	1 (0%)	9 (3%)	82 (31%)	168 (64%)	0 (0%)

Question 31. Do you believe that climate change is occurring as a result of fossil fuel energy consumption and other human activities?

No	Yes
44 (17%)	219 (83%)

Question 32. Do you believe that your municipality should make it a priority to mitigate climate change by taking action to reduce GHG emissions in your community?

No	Yes
55 (25%)	162 (75%)

Question 33. What led you to believe that climate change should be a priority for your municipality? Please check all that apply? (N=144)

Response	Number	Percent of Total
Information gathered through personal research and observations	140	97%
Discussions with staff and department heads of your municipality	75	52%
Discussions with staff and department heads from other nearby municipalities	52	36%
Discussions with elected officials in your municipality	58	40%
Information provided by ICLEI Cities for Climate Protection and/or the Cool Cities campaign	71	49%
Information provided by local community or environmental organizations	84	58%
Information provided by local residents and community members	61	42%
Information provided by local college or university faculty and/or students	54	38%
Information provided by businesses, industry, or other institutions in the community	42	29%
Information provided by local residents and community members	19	13%
Other (Please specify)	140	97%

If "other," please specify:

- Budget constraints and belief in sustainability
- Climate change issues go hand and hand with reducing consumption of resources which allows the City to save money.
- Economic benefits of energy efficiency
- Growing up in the 70's in an environmentally aware community
- Highly educated SF/Bay area community and media exposure
- I arrived in Knoxville having worked on climate change in my previous two jobs and with a masters degree in environmental policy. I was convinced a long time ago that this is an issue that cities can/should engage in.
- ICMA
- If governments expect citizens to acknowledge environmental issues and take action with their regard, the governments should lead citizens to do so.
- Info from US Conference of Mayors

- Information provided by Florida Green Building Coalition, Inc.
- Information provided by the League of Minnesota Cities.
- IPCC report, information from utility-specific organizations such as APWA, WEF, AWWA.
- Mass communication sources
- National League of cities conference, ICMA
- National, state and regional political and news coverage.
- News.
- Please note that we are limited as a first ring suburb- we don't produce electricity, we don't have industry in our city, etc. We do participate by working on a regional basis and keep in close contact with the sustainability director of the City of Cleveland.
- Regional and State agencies
- Regional committees of mayors or staff members interested in pursuing climate protection initiatives
- Regional Council of Governments
- The neglect of sustainability observed in developments and day-to-day procedures.
- We are a suburb of a large metro area (Oklahoma City) so we are affected by those around us. In addition, we are not too far from Dallas and they have significant air quality concerns that are affecting the OKC metro area.
- While currently employed as the Project Coordinator, I also have a part-time job working for the San Joaquin Valley Clean Energy Organization, which has currently been hired to calculate the Carbon Footprint for the City of Visalia

Question 34. Did any particular event, such as a news story, conference, meeting, or other personal experience, cause you to believe that climate change should be a priority of local governments?

No	Yes
132 (79%)	36 (21%)

If yes, please describe this incident or event:

- 2005 US Mayors Climate Protection Agreement was a significant event for the Mayor and City Council - when ratified during 2006.
- A local environmental group paid for a national speaker on the topic to address our city council and that turned the tide for our elected officials' interest and concern.
- An inconvenient truth
- By reading and researching
- Data, data, data
- EPA National Brownfields Conference
- Have heard the concerns that have been expressed through the news media.
- Hurricane Katrina
- Illinois City Management Association Conference in 2007 - U of I professor made compelling case
- Impacts on water, health, species
- In the 70's reading silent spring
- Information presented at Conference of Mayor's events.
- IPCC report, 2008 APWA Climate Change Symposium
- Lots of newspaper articles and previous work as a consultant
- National and Regional Planning conferences
- Natural evidence of global warming i.e. melting glacier, loss of polar bears, unusual weather pattern.
- News reports, "An Inconvenient Truth"
- NLC Conference, read "Hot, Dry and Crowded"
- Obviously there has been an accumulation of evidence, but Hurricane Katrina certainly let people in this part of the world know that climate change is here.
- Programs at ICMA and national news items.
- Read "The Long Emergency" by James Howard Kunstler

- Regional mayors committee on climate protection and their ongoing pursuits
- Silent Spring
- The Bush Administrations blatant disregard for this issue led me to believe that the solution had to come from the bottom up.
- The empirical data that the planet is warming over the past fifteen years and anecdotal evidence in the potential destruction of the polar bear habitat
- USGBC - GreenBuild 2007 - Reinforced my beliefs
- Videos such as those prepared by the Southern Alliance for Clean Energy group
- VML Green Government Challenge
- Watched "An Inconvenient Truth"
- Watching "An Inconvenient Truth"
- Watching Al Gore
- We are located in a "non-attainment" area. While transportation related, it obviously has a significant impact on the environment; 2) Various articles, etc. that lead one to believe that the issue of climate change will have a significant impact on land use and transportation planning.
- Yes, when I started to think about my own carbon footprint!

Question 35. Has your municipality encountered any of the following obstacles to the adoption and/or implementation of climate protection policies? Please check all that apply. (N=161)

Response	Number	Percent of Total
Political opposition from local residents	23	14%
Political opposition from local businesses or industry	37	23%
State or federal rules that limit the authority of municipalities to adopt climate protection policies	21	13%
Insufficient financial resources to prepare and/or implement climate protection policies	125	78%
Insufficient staff or personnel resources to prepare and/or implement climate protection policies	120	75%
Methodological difficulties, such as inability to obtain sufficient data	39	24%

Response	Number	Percent of Total
Difficulty obtaining data from private utilities or other private businesses	25	16%
Other reason.	17	11%

If "other," please specify:

- After some initial reluctance to participate, the Greater Kansas City Chamber of Commerce has become a valued partner in the development and implementation of the City's climate protection plan
- Apathy
- At this stage, we don't know if we will encounter opposition from residents/business. Our main industry, the mill, is on the committee and very cooperative.
- City staff has encountered obstacles with elected officials.
- Differing perspectives amongst policymakers on where the County should be focusing its resources to address climate change mitigation and adaptation. What is needed is an executive-level commitment to a prioritized list of interventions based on the potential impact on the climate challenge that each of the interventions represent. For example New York's PlaNYC commits the City to four intervention areas that each will reduce carbon emissions to enable the City to achieve its emissions reductions targets.
- Does not apply to use because we have not actively pursued any cp policies
- Gaining a political consensus on governments role in addressing climate change.
- Lack of a general sense of priority or urgency from city residents
- Lack of encouragement from local citizens. Our town is not strong in environmental literacy.
- Lack of interest from some elected officials
- Lack of political will of area politicians
- Lack of recognition and education on the subject manner.
- Lack of staff time financial constraints are most significant
- No community-wide support for the initiatives
- Not yet an obstacle, but solar access vs. tree preservation (the City has a very strict tree code) is an area we will need to deal with as we move forward.

- Our Council does not currently believe that addressing climate change is a priority.

- Our main problem is we are a small town, population 20,000. So the public tends to have an attitude that the battle for the environment needs to be waged on an individual basis, and that City Hall is not really going to make sweeping legislative change.

- Political opposition from certain elected officials

- Political opposition from elected officials

- Size and scale- not many good examples of what smaller, first ring suburbs can do.

- Small, rural community, lack of public input; citizens focused on retaining jobs in a difficult economy.

- Some of our elected officials (local and state) who don't believe climate change is a local or state issue.

- Thus far I am unaware of any such obstacles

Question 36. If you answered "no" to Question 32, what causes you to believe that climate change should not be a priority for your municipality? Please check all that apply. If you answered "yes" to Question 32, please skip to the next question. (N=46)

Response	Number	Percent of Total
Climate change should be the priority of the federal government, not local governments	22	48%
My municipality does not have the power or authority to do anything about climate change	13	28%
My municipality does not have the financial resources to consider policies for climate protection or to reduce greenhouse gas emissions	35	76%
My municipality does not have the staff or personnel resources to consider policies for climate protection or to reduce greenhouse gas emissions	37	80%
We should accept climate change as inevitable and should prepare to adapt to the impacts of climate change	0	0%
Other reason.	8	17%

If "other," please specify:

- At some point any government level is limited in its impact to change personal habits.

- My municipality has taken the position that it should be an example but not attempt to actively influence decisions made by the citizens. There are a number of private organizations educating the community. The city will do all that it can.

- Small municipalities, such as ours, need direction from the resources that have studied the climate changes and need to give us direction on what we need to do.

- Small sized community; scant resources; limited authority; look to larger government to implement

- The City's financial condition due to Florida's so called tax reform is very shaky. We simply do not have the resources to spend on this important but lower priority issue

- The timing of this survey for California communities is interesting as this issue has now become a state one and is in a state of flux. More will be defined in the next 18 months

- This question is absurd. The fact that I do not know what GHG emissions are does not mean that I do not believe that climate change should not be a priority for my municipality.

- Too many other important priorities

- Village's environmental focus is on preserving green space and increase urban forest rather than GHG.

- We all have a responsibility to contribute to the solution, my concern comes from the use of the word "priority"

Question 37. Do you have any additional comments about municipal climate protection planning or any of the other topics covered in this survey? If so, please enter them here.

- #31 - Don't know

- Cities can do much and should do much to fight global warming. But a big part of the problem in the U. S. is the failure to regulate development OUTSIDE cities. Controlling rural development (or urban development that moves to the country) should be controlled by state or (better) federal government, as it is in most European countries, where rural areas are not allowed to develop until the state has permitted it. Our nation is being killed by suburban development.

- City governments do not have any financial resources to do any activities in the first place. Secondly, there is no hard science that shows that the climate is actually changing over the long term. Local governments cannot spend limited dollars on climate protection when there are many other needs that need to be addressed.

- City of Los Angeles is working with CCAR on our municipal inventory, and will develop a more refined community emissions inventory beginning spring 2009. Our experience with ICLEI began in late 1990's, but we have not been involved much recently. Hope to re-establish connection soon. California has many regulations, helping us reach out to other departments in City to discuss how to implement climate protection measures. These discussions still on-going. We hope to launch a public engagement campaign in spring 2009 to make our strategies more comprehensive. We began with reducing emissions from our own municipal facilities to show our commitment.

- City to City communication via organizations like ICLEI, the CCAR, the ILG, etc has been invaluable in sharing our stories of success and hearing those from others.

- Dayton is still in its infancy in planning to manage and reduce its GHG emissions. We have, however, established a "Cool Energy" Team and developed a Sustainable Practices Policy. This policy applies to municipal operations only at this time.

- Difficult for a small town like ours (9,000 residents) with no commercial zone to be truly effective. Most issues are taken on at the county or state level.

- EPA has been a good partner to us. The fact that we are non-attainment for ozone has driven us to energy conservation and concern about climate change.

- Federal/State government should provide incentives for local gov't to "green up", just like they now mandate numerous actions on our part, but with corresponding funding.

- Grants, or other funding measure offered by the feds or at the state level, may assists small communities like this one in implementing plans to help reduce the environmental impacts caused by our residents.

- Hydro power should be classified as renewable. Our municipal utility's power is 80% carbon-free. We have a public-private partnership program called CASA (Community Action for a Sustainable Alameda) designed to generate action around accomplishing the objectives of our Local Action Plan for Climate Protection.

- I am only an intern here and don't know the answers to many of the zoning and policy questions, but am sure that some have been completed.

- I believe carbon emissions have some effect on climate change but the extent is undetermined. That being said, I believe the issues of clean air, clean water, stormwater management, open space, green space, containment of urban sprawl etc. are all extremely important issues for government at all levels. No matter what a person's position on the human effect of climate change, we can all agree on the importance of protecting our environment. Our quality of life depends upon it.

- I believe that climate change is occurring. I am not convinced that it is all caused by man since we have gone through several ice ages and then to a warmer more tepid climate.

- I have concerns about the way we conduct business in dealing with this matter. Many agencies along with many developers have an "us vs them" mentality that serves no one's best interest. There is a great deal of hype associated with the processes as well. 'Green washing' is wasting resources and discouraging well intentioned people form actually doing better with environmental stewardship. Not only are the wannabe suppliers giving us smoke and mirrors, but any number of non-profits and academia are sensationalizing the issues along with politicians to posture themselves as so called "authorities" in an effort to secure fiscal gain, position and influence. No one is dealing with the men and women who have dirty boots out in the trenches everyday and struggling to make a living. Rather, they are sitting in their ivory towers and making up rules and layers of government (nearly solely based upon supposition and conjecture) but without real substance in dealing with the issue or the daily needs of the public. Nearly every approach made to my office by state government, universities or so called environmental groups/non-profits has been on the basis of using me to secure grant funding for their agenda that is skewed and biased to perpetuate their machine. No one has the time or will to engage working people (except contributors and lobbyists) in acts of integrity and service to a greater good. I hate soap box causes. I hate that people of position miss the point and don't serve the common man or the common good... everyone should have dirty hands from serving... not a squeaky clean starched collar and ideas that are no more than 'get my name on a plaque' diatribe. Green washing is almost as bad as the idea of giving money for a bail out to the banks that bankrupted us in the first place and letting it go to bonuses. That just what we need; spend billions on what ought to be a noble cause and end up putting it in the pockets of people who will never get it to the problem or the people who are tasked with handling it.

- I know that some cities are jumping at "solutions." I fear that the solutions, which are not tested, could have a negative impact on the overall goal of reducing emissions.

- I read in an APA article that although local plans are important to garner support, they have not been effective in reducing GHG emissions. This is discouraging news. The implication was that the issue requires action at all levels of government to be effective.

- I would be interested in knowing what other NJ municipalities are doing about climate protection. Thank you. Albert Dib.

- ICLEI and Sierra Club doing great jobs informing communities of climate issues but we need a "Ten Easy Things" you can do list to make it easier to show people that change can happen - and happen quickly and without major issues.

- It is a concern and an interest may many but the resources and ability to affect climate change is very limited in a small community. Our goal is to better understand how we may be affected by climate change and then how do we prepare to mitigate its impact i.e. rising sea level for a coastal community.

- It is truly a shame that there is so little leadership at the federal and state level. It is appropriate to have a common set of goals and standards, however, because of the lack of leadership, it has been left to the US conference of Mayors. Unfortunately, they have to work on a local level with thousands of municipalities nationwide to spread the word whereas, a strong statement from the federal government would be a unifying measure that would carry weight nationwide.

- Last question should read both

- More attention needs to be paid to this important issue that concerns all of us!

- Need to have more efficient data sharing between utilities and government and federal/state funding to help pay for consultants and staff time.

- Not enough Federal or State assistance for Cities to offer their residents rebates or reduced costs towards the purchase of Ground Source Heat Pump systems, Solar powered water heaters, Solar PV panels, etc. If this were different, then I believe that Cities would have a much greater probability (and probably would put more effort toward) affecting their residents and their community carbon emissions levels.

- Our region does a better job of implementing environmental policies and in providing regional transportation than our individual city does.

- Resources, methods for cities to implement the more cost effective, meaningful GHG reductions is a key tool for cities

- Small communities with limited staff time and expertise will have a difficult time implementing climate change policies. The need and rewards are there but not knowing or having someone show them the way is a big obstacle.

- Small towns are going to be limited in what they can do because of budgets. They will need help in the form of grants.

- Sorry to answer "don't know' on so many questions. the municipality asked us to fill out the survey on their behalf and I'm not comprehensively aware of all their current policies and programs.

- The City of Fort Worth is beginning to understand the importance of climate protection, and is currently undertaking the task of developing a sustainability plan.

- The city recently implemented a "No Idle" policy for all municipal vehicles except in emergency situations. The plan is to reduce our emissions and save on fuel costs. It will be monitored by our mechanics to measure the reductions.

- The Federal Government needs to begin to take the lead on this issue. Also, the survey was good but it was directed towards mitigation. We have also begun to discuss the possibility that mitigation will not stop climate change and looking at how the city needs to adapt to reflect possible changes in the community (i.e. more floods, etc).

- The infrastructure is here and any change will not occur in large enough impact to make an immediate difference. Who is going to tear a community down just to build a new GHG compliant community? All we will be doing is minimal impact.

- The population of our city is 238 - we would need to partner with neighboring communities or at the county level to be able to do anything significant.

- The time to act is NOW.

- There is little if any funding to accomplish most of the goals in this survey, such as no 11. Also, you may have bias issues. Be aware that municipalities that own and operate electrical utilities have the incentive to sell as much power as possible, a disincentive to conserve. It is extremely difficult to convince managers and officials to promote a reduction in use when the utility is money generator. Often that money is used to pay for items like schools, parks, and to offset the cost of services to residents.

- We are currently creating a sustainability plan so many of the items I marked as do not know because of this status.

- We are engaged today on a city sustainability plan. The choice of "evaluating options, but not yet adopted" would have been helpful.

- We are in the initial stages of our Climate Change work. Much has been directed by California state mandates including AB32, SB97, SB 375. We recently instigated a Planning Commission Climate Action Sub-Committee to direct staff.

- We are trying--just had an energy audit to become more energy efficient and are implementing the suggestions we can afford--becoming the energy supplier for the city is a long-range goal, powered by wind turbines. Just don't have the $$ or staff right now to make a concerted effort at it.

- We have a very energetic Citizens Energy Advisory group who does the bulk of the work due to limited staff. We are also in the midst of hiring an energy consultant who will take on the bulk of the work looking at energy efficiency for our buildings and vehicles, as well as recommend policies for the Town.

- Within Virginia, local governments have very little authority to implement some of the programs you ask about.

- Would like to emphasize the difficulty in gathering data. How can you measure your emissions today and compare them with 1990 without making a wide range of potentially inaccurate guestimates, especially about the past.

- Would like to obtain a copy of the survey results.

- Your survey answers do not always fit

Appendix C – Full Description of Dependent Variables

The respondent municipalities identified the number of policies they had adopted, or intended to adopt, in each of four categories. Where applicable, the municipalities identified how long ago they had adopted each policy – in the past two years, two to five years ago, or more than five years ago. Each category included a list of twelve to fourteen possible policies, including "other." The respondents were required to provide an answer for each policy, except for the "other" policies. The exception was the first category, climate protection planning measures, which included only three options. Those options corresponded to the first three milestones of the climate protection planning process, as recommended by CCP. Table C-1 shows the survey responses under that category.

Table C-1. Survey Responses: Climate Protection Planning Measures

Policies	Not Pursuing	Pursuing/ Intend to Adopt	Adopted			Don't Know	Total Adopted
			In Past Two Years	2-5 Years Ago	More than 5 Years Ago		
A community-wide GHG emissions inventory	150 (59%)	65 (25%)	32 (13%)	3 (1%)	2 (1%)	3 (1%)	37 (15%)
Goals or targets for the reduction of community-wide GHG emissions	144 (56%)	74 (29%)	23 (9%)	5 (2%)	1 (0%)	8 (3%)	29 (11%)
A plan to reduce community-wide GHG emissions	141 (55%)	81 (32%)	15 (6%)	7 (3%)	1 (0%)	10 (4%)	23 (9%)

N = 255, except where noted.

Just over 50% of the respondent municipalities had not adopted any climate protection planning measures, and did not intend to do so. Only a small number had adopted a GHG emissions inventory (15%), with even fewer had adopted emission reduction targets (11%) or an emission-reduction plan (9%). Roughly 1/4 to 1/3 indicated that they had not adopted these measures but were pursuing them and intended to adopt them.

Table C-2 shows the survey responses for the adoption of energy efficiency policies, including those adopted by a municipal electric utility. Over a quarter of the municipalities (27% of respondents) had adopted enhanced energy efficiency requirements in their municipal building codes. Other commonly adopted policies included energy audits or other technical assistance programs (20%), and "other policies" (24%). Far fewer of the municipalities had adopted programs to provide low-interest loans for energy efficiency or conservation measures (up to 7% of respondents). Slightly more municipalities (up to 16%) had adopted grants or rebates for energy efficiency measures.

The distribution of these policies among the three time categories was fairly even, with the exception of enhanced building code energy efficiency requirements. Eighteen percent adopted such a policy within the past two years, versus 9% that that adopted the policy two or more years ago.

Table C-2. Survey Responses: Energy Efficiency and Conservation Policies

Policies	Not Pursuing	Pursuing/ Intend to Adopt	Adopted			Don't Know	Total Adopted
			In Past Two Years	2-5 Years Ago	More than 5 Years Ago		
Enhanced energy efficiency requirements in municipal building code	90 (35%)	85 (33%)	47 (18%)	10 (4%)	13 (5%)	10 (4%)	70 (27%)
Planning incentives (e.g., "fast-track" approval, density bonuses, etc.) for energy-efficient buildings	146 (57%)	64 (25%)	23 (9%)	5 (2%)	7 (3%)	10 (4%)	35 (14%)
Property tax exemptions or reductions for energy-efficient buildings	211 (83%)	24 (9%)	4 (2%)	1 (0%)	0 (0%)	15 (6%)	5 (2%)
Free or reduced-rate weatherization or energy conservation supplies	180 (71%)	25 (10%)	11 (4%)	10 (4%)	15 (6%)	14 (5%)	36 (14%)

Policies	Not Pursuing	Pursuing/ Intend to Adopt	Adopted			Don't Know	Total Adopted
			In Past Two Years	2-5 Years Ago	More than 5 Years Ago		
Energy audits or other technical assistance for the installation of energy efficiency upgrades	148 (58%)	47 (18%)	26 (10%)	12 (5%)	14 (5%)	8 (3%)	52 (20%)
Other policies to promote or encourage energy conservation and/or energy efficiency (N=87)	50 (57%)	3 (3%)	11 (13%)	6 (7%)	4 (5%)	13 (15%)	21 (24%)
Grants or rebates to assist construction of new energy-efficient homes or buildings	203 (80%)	28 (11%)	7 (3%)	3 (1%)	2 (1%)	12 (5%)	12 (5%)
Grants or rebates to assist weatherization or energy efficiency upgrades to existing buildings	195 (76%)	32 (13%)	7 (3%)	7 (3%)	7 (3%)	7 (3%)	21 (8%)
Grants or rebates for energy-efficient appliances	207 (81%)	20 (8%)	11 (4%)	5 (2%)	5 (2%)	7 (3%)	21 (8%)
Other grants or rebates to promote or encourage energy conservation and/or energy efficiency (N=100)	68 (72%)	1 (1%)	8 (9%)	5 (5%)	2 (2%)	10 (11%)	15 (16%)
Low-interest loans to assist construction of new energy-efficient homes or buildings	225 (88%)	10 (4%)	5 (2%)	2 (1%)	1 (0%)	12 (5%)	8 (3%)
Low-interest loans to assist weatherization or energy efficiency upgrades to existing buildings	209 (82%)	18 (7%)	5 (2%)	3 (1%)	9 (4%)	10 (4%)	17 (7%)
Low-interest loans to assist purchase of energy-efficient appliances	219 (86%)	16 (6%)	4 (2%)	3 (1%)	4 (2%)	9 (4%)	11 (4%)
Other low interest loans to promote or encourage energy conservation and/or energy efficiency (N=100)	83 (82%)	2 (2%)	2 (2%)	1 (1%)	3 (3%)	10 (10%)	6 (6%)

N = 255, except where noted.

The municipalities also described additional energy efficiency and conservation policies in an open-ended question under "other policies." These policies included a property tax exemption for passive solar heating systems, retrofit and energy efficiency programs for low-income households, and fast-track planning incentives for "green building" projects. A few of the more innovative policies identified in the survey responses included a requirement that LEED elements be included in "Special Exception" mixed-use redevelopment projects (Falls Church, VA), a mandatory green building program for new residential and commercial development (Frisco, TX), and the use of tax increment financing (TIF) district funds to support private energy efficiency upgrades (Middleton, WI).

Many of the municipalities noted that they had not adopted these policies because similar policies are offered by their respective states or local utilities. Some said that they partner with non-profit organizations who offer energy efficiency or conservation, and provide information to the public about those programs, but do not offer the services themselves.

Figure C-1 illustrates the distribution of scores on the energy efficiency and conservation variables. The EFF-A variable represents total adopted policies in each municipality, and the EFF-B variable includes the adopted policies as well as those that the municipalities indicated they were pursuing and intended to adopt. Over 41% of the municipalities reported that they had not adopted any energy efficiency or conservation policies. The majority of the municipalities (53%) had adopted between one and five of the policies, and only 5% had adopted more than five. However, over 75% of these reported that they intended to adopt at least one of the listed policies, and 18% intended to adopt more than five. The municipalities with the most adopted policies were San Jose, CA (12 policies), Tallahassee, FL (10 policies), and Alameda, CA (10 policies).

Figure C-1. Adopted and Pursued Policies: Energy Efficiency and Conservation Policies

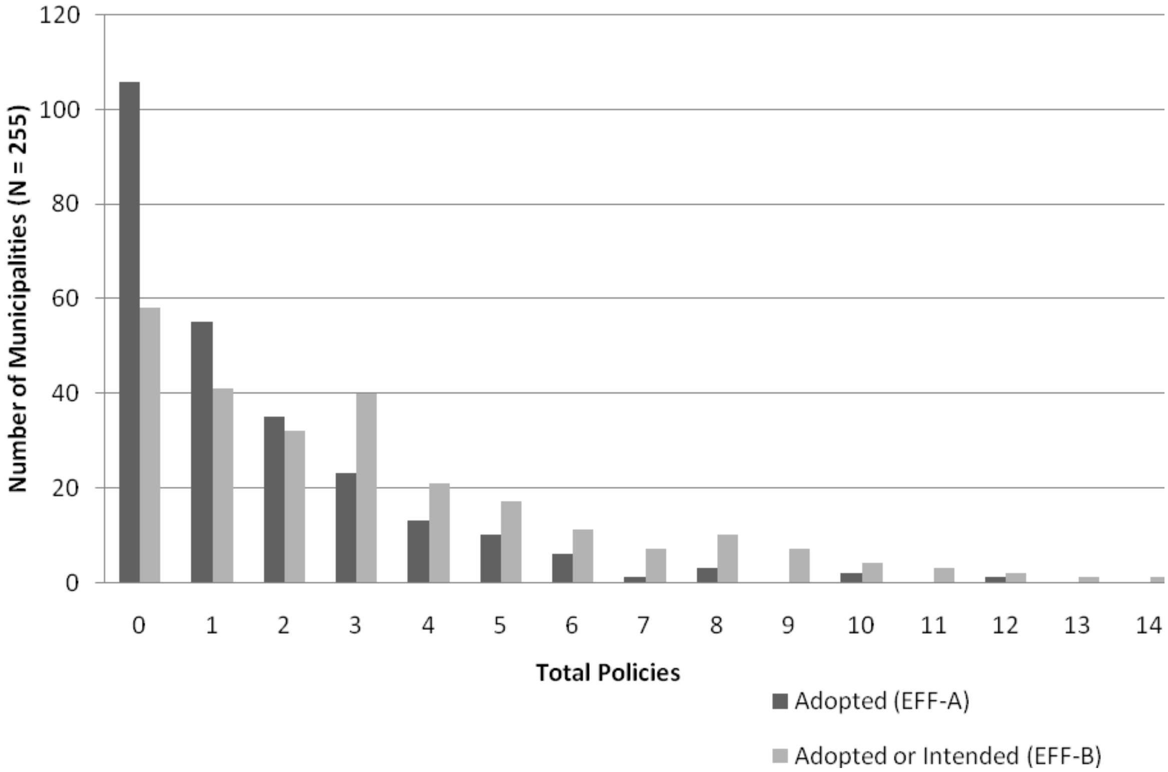


Table C-3 shows the survey responses for the adoption of renewable energy policies, including those adopted by a municipal electric utility. The numbers indicate that adoption of policies to support renewable energy use is lower than any other category of climate protection policies. Seven of the twelve policies had been adopted by less than 5% of the respondent municipalities. The most commonly adopted policies were those falling into the "other" category, as 10% of the municipalities indicated they had adopted renewable energy policies not identified on the survey. Seven percent of the municipalities offered technical assistance for the installation of new renewable energy systems. Five percent offered waivers or reductions of permit fees for small renewable energy systems, and another 5% offered planning incentives (such as density bonuses) for new construction projects or building retrofits that include renewable energy systems.

Table C-3. Survey Responses: Renewable Energy Policies

Policies	Not Pursuing	Pursuing/ Intend to Adopt	Adopted: In Past Two Years	Adopted: 2-5 Years Ago	Adopted: More than 5 Years Ago	Don't Know	Total Adopted
Planning incentives (e.g., "fast-track" approval, density bonuses, etc.) to developers who include renewable energy systems in new construction	181 (71%)	53 (21%)	6 (2%)	6 (2%)	2 (1%)	7 (3%)	14 (5%)
Streamlined or "fast track" permitting processes for small-scale renewable energy systems added to existing buildings or properties	182 (71%)	49 (19%)	8 (3%)	2 (1%)	2 (1%)	12 (5%)	12 (5%)
Building height exemptions for small-scale renewable energy systems	213 (84%)	20 (8%)	5 (2%)	0 (0%)	3 (1%)	14 (5%)	8 (3%)
Waiver or reduction of permit fees for small renewable energy systems	206 (81%)	21 (8%)	11 (4%)	1 (0%)	2 (1%)	14 (5%)	14 (5%)
Solar access or "solar rights" laws	207 (81%)	22 (9%)	2 (1%)	2 (1%)	6 (2%)	16 (6%)	10 (4%)
Property tax exemptions or reductions for on-site renewable energy systems	223 (87%)	14 (5%)	3 (1%)	0 (0%)	2 (1%)	13 (5%)	5 (2%)
Grants or rebates to offset some of the cost of new renewable energy systems	211 (83%)	22 (9%)	5 (2%)	1 (0%)	4 (2%)	11 (4%)	10 (4%)
Low-interest loans to offset some of the cost of new renewable energy systems	222 (82%)	29 (11%)	5 (2%)	1 (0%)	1 (0%)	9 (4%)	7 (3%)
Technical assistance for the installation of new renewable energy systems	202 (79%)	25 (10%)	11 (4%)	2 (1%)	5 (2%)	10 (4%)	18 (7%)
Public benefits fund, or local levy to support renewable energy programs	223 (87%)	16 (6%)	0 (0%)	2 (1%)	0 (0%)	14 (5%)	2 (1%)

Policies	Not Pursuing	Pursuing/ Intend to Adopt	Adopted			Don't Know	Total Adopted
			In Past Two Years	2-5 Years Ago	More than 5 Years Ago		
Community choice aggregation to negotiate renewable energy options for private utility customers	225 (88%)	9 (4%)	0 (0%)	3 (1%)	5 (2%)	13 (5%)	8 (3%)
Other policies to promote or encourage the use of renewable energy systems (N=93)	67 (76%)	3 (3%)	6 (7%)	2 (2%)	1 (1%)	9 (10%)	9 (10%)

N= 255, except where noted.

Under the "other" category, several of the survey respondents indicated that they had adopted new planning ordinances to allow the construction of wind turbines, including roof-top wind turbines (Addison, TX). The City of Lemoore, CA, had the most aggressive renewable energy policy, which required that all new residential development be pre-wired for potential solar PV or solar water heating systems. In addition, all new construction projects expected to use more than 40,000 kWh of electricity per year were required to include pre-installed solar PV systems.

Figure C-2 shows the distribution of scores on the renewable energy policies variables (REN-A and REN-B). More than 2/3 of the survey respondents had not adopted any renewable energy policies, and nearly half were not pursuing any such policies. Only a handful of municipalities, less than 4%, had adopted more than three of the twelve policies listed on the survey. The leaders were Ashland, OR (8 policies), Reno, NV (7 policies), and Harrisburg, PA (6 policies). The municipalities indicated less interest in pursuing these policies than the energy efficiency and conservation category, as only around 14% showed interest in adopting five or more of the renewable energy options.

Figure C-2. Adopted and Pursued Policies: Renewable Energy Policies

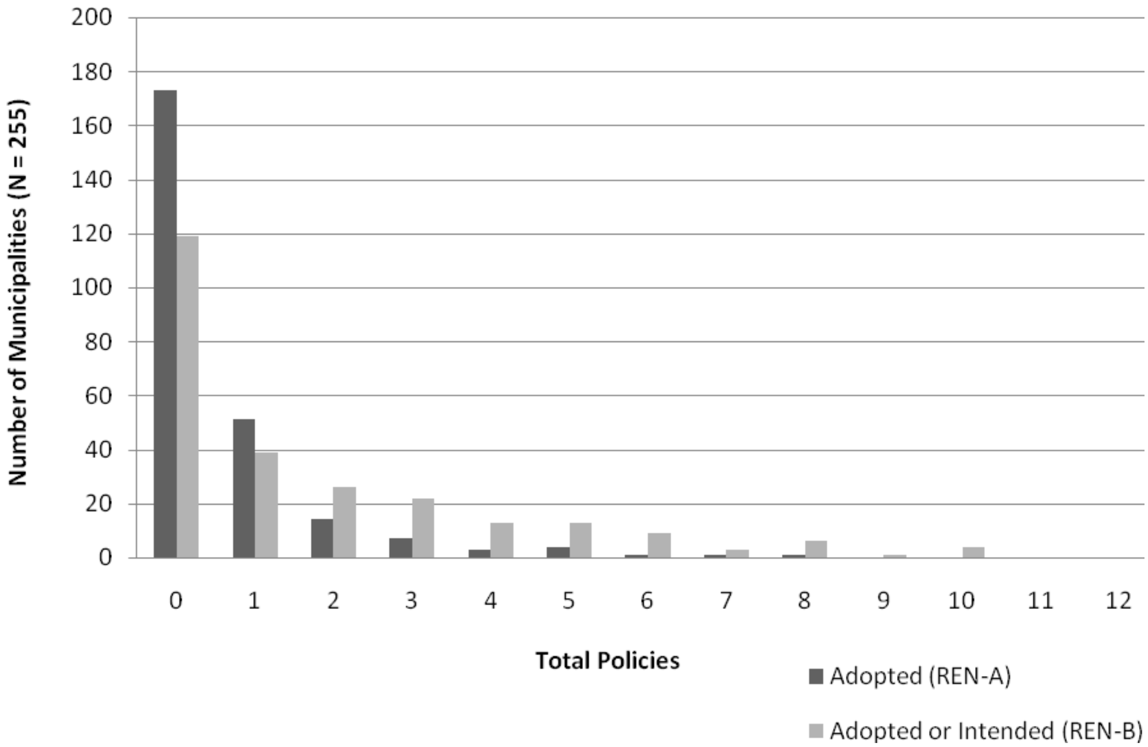


Table C-4 shows the survey responses in the category of land use and transportation policies. These policies, particularly those related to land use and growth management, were far more common among the respondent municipalities than those from any other category. For example, 58% of respondents had adopted comprehensive plan goals or objectives to reduce sprawl or focus development in existing urban areas, and 54% had updated their zoning codes to implement those goals. Many of the respondent municipalities had also adopted comprehensive plan goals (60%) and zoning code regulations (50%) to encourage mixed-use, pedestrian-oriented, or transportation-oriented development. The adoption of these growth management policies was relatively evenly divided among the three time categories. An additional 15-30% of the respondents indicated that they were currently pursuing or intended to adopt these policies.

Construction of new bicycle lanes, multi-use paths, or other bicycle or pedestrian amenities was the most common of the land use and transportation policies. Nearly 2/3 of the municipalities (63%) had developed bicycle and pedestrian amenities, including 25% in the last two years alone, and another 21% indicated that they were currently pursuing and intended to adopt such improvements. Nearly 1/3 of the municipalities indicated that they had expanded mass transit service, half of which had done so in the last two years.

Table C-4. Survey Responses: Land Use and Transportation Policies

Policies	Not Pursuing	Pursuing/ Intend to Adopt	Adopted			Don't Know	Total Adopted
			In Past Two Years	2-5 Years Ago	More than 5 Years Ago		
Adopted comprehensive plan goals or objectives to manage growth, reduce sprawl and/or focus development in existing urban areas	62 (24%)	41 (16%)	45 (18%)	33 (13%)	70 (27%)	4 (2%)	148 (58%)
Adopted comprehensive plan goals or objectives to encourage mixed-use, pedestrian-oriented, and/or transit-oriented development	46 (18%)	48 (19%)	60 (24%)	42 (16%)	52 (20%)	7 (3%)	154 (60%)
Updated zoning code to manage growth, reduce sprawl, and/or focus development in existing urban areas	53 (21%)	55 (22%)	53 (21%)	35 (14%)	50 (20%)	9 (4%)	138 (54%)
Updated zoning code to encourage mixed-use, pedestrian-oriented, and/or transit-oriented development	45 (18%)	72 (28%)	56 (22%)	37 (15%)	35 (14%)	10 (4%)	128 (50%)
Adopted additional growth management tools such as transfers of development rights (TDR's) or conservation easements	159 (62%)	29 (11%)	16 (6%)	10 (4%)	23 (9%)	18 (7%)	49 (19%)

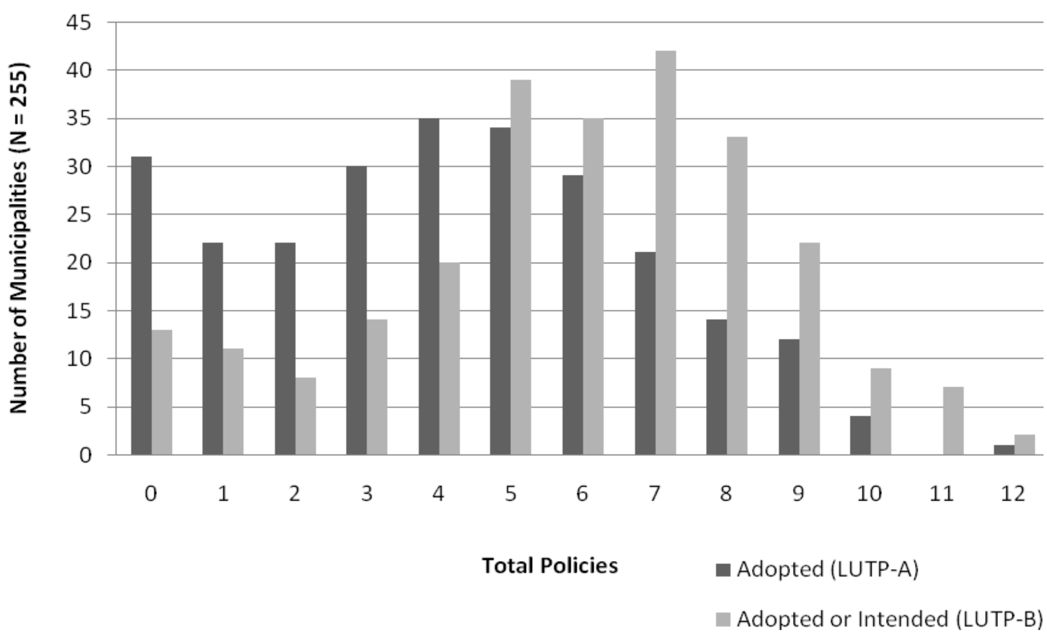
Policies	Not Pursuing	Pursuing/ Intend to Adopt	Adopted			Don't Know	Total Adopted
			In Past Two Years	2-5 Years Ago	More than 5 Years Ago		
Collaborated with nearby jurisdictions and/or regional agencies on regional or metropolitan-area growth management plans	89 (35%)	41 (16%)	28 (11%)	21 (8%)	58 (23%)	18 (7%)	107 (42%)
Other planning actions that would reduce Vehicle Miles Traveled and community-wide energy use (N=67)	38 (57%)	5 (7%)	2 (3%)	1 (1%)	9 (13%)	12 (18%)	12 (18%)
Increased mass transit service (e.g., increased service frequency, added new bus or rail lines)	119 (47%)	46 (18%)	43 (17%)	20 (8%)	20 (8%)	7 (3%)	83 (33%)
Built new bicycle lanes, multi-use paths, or other bicycle or pedestrian amenities	37 (15%)	53 (21%)	65 (25%)	35 (14%)	61 (24%)	4 (2%)	161 (63%)
Provided carpool matching or "guaranteed ride home" programs for commuters	197 (77%)	18 (7%)	13 (5%)	10 (4%)	9 (4%)	8 (3%)	32 (13%)
Worked with private sector to provide subsidized transit passes and/or other programs to encourage employees to use alternative transportation modes	171 (67%)	28 (11%)	18 (7%)	7 (3%)	12 (5%)	19 (7%)	37 (15%)
Other policies to reduce vehicle miles traveled by encouraging the use of alternative transportation modes (N=66)	38 (58%)	6 (9%)	7 (11%)	1 (2%)	2 (3%)	12 (18%)	10 (15%)

N= 255, except where noted.

The additional growth management policies that the municipalities identified under "other" included efforts to manage sprawl via annexation policy, density incentives for developers, and policies to encourage infill development by allowing accessory dwellings and reducing parking requirements. Additional transportation policies included a city managed commute trip reduction program for businesses, Transportation Demand Management (TDM) programs to reduce peak-hour demand and single-occupant vehicle use, construction of new park-and-ride facilities and electric car recharge areas, and requirements for bike trails, bike parking, and other bicycle/pedestrian amenities to be included in new residential or commercial development. Several municipalities noted that they have participated in regional planning efforts for mass transit or bicycle and recreational trail systems, or commute trip reduction.

Figure C-3 illustrates the distribution of scores on the land use and transportation policies variables (LUTP-A and LUTP-B). Only 12% of the respondents had adopted none of the 12 policies listed on the survey, and only 5% indicated that they had no intent to adopt them. Nearly half (45%) had adopted five or more policies. One municipality, San Jose (CA), reported having adopted all twelve policies, and four others claimed ten: Miami-Dade County (FL); Louisville (CO); Breckenridge (CO); and Tukwila (WA).

Figure C-3. Adopted and Pursued Policies: Land Use and Transportation Policies



Appendix D –Negative Binomial Regression Results

	TOT-A	PLAN-A	EFF-A	REN-A	LUTP-A
Constant	-.058	-4.815*	-1.750*	-8.477**	.353
	(.452)	(2.100)	(.818)	(1.583)	(.449)
Population	.000*	.003	.000	.000	.000
	(.000)	(.001)	(.000)	(.000)	(.000)
Income per-capita	-.009	-.040	.007	.013	-.010
	(.006)	(.024)	(.012)	(.014)	(.006)
Education	.013**	.048*	.000	-.002	.012**
	(.005)	(.021)	(.009)	(.012)	(.005)
Voting history	.001	.007	.006	.007	-.004
	(.004)	(.018)	(.007)	(.011)	(.004)
College town status	.000	1.312	.030	-.112	-.430*
	(.213)	(.878)	(.355)	(.486)	(.218)
Municipal electric utility	.394**	.172	1.154**	1.431**	.054
	(.105)	(.513)	(.168)	(.263)	(.106)
Staff responsible for energy or climate planning	.361**	.340	.757**	.604*	.231**
	(.092)	(.418)	(.168)	(.254)	(.088)
Local government environmental awareness	.217**	.796*	.161	.221	.187*
	(.075)	(.397)	(.133)	(.225)	(.075)
Community environmental activism	.036	-.092	-.121	-.024	.052
	(.054)	(.253)	(.095)	(.140)	(.053)
Air quality non-attainment	.093	.788	-.113	.372	.031
	(.100)	(.499)	(.179)	(.274)	(.096)
Coastal location	.141	.451	-.537*	-.399	.297**
	(.116)	(.497)	(.222)	(.340)	(.111)
Automobile dependency	.005	.006	.000	.044**	.003
	(.004)	(.017)	(.007)	(.012)	(.004)
Electricity price	-.024	-.086	.107*	.103	-.060*
	(.029)	(.142)	(.054)	(.073)	(.028)
State energy and climate policies	.013	-.024	-.014	.092**	.017
	(.012)	(.054)	(.021)	(.033)	(.012)
Influence of neighboring jurisdictions	.044	.127	.090*	.132*	.020
	(.022)	(.102)	(.039)	(.060)	(.022)
LR chi2	127.260	41.340	91.200	91.360	68.820
Prob>chi2	.000	0.000	0.000	0.000	0.000
Psuedo R-squared	.082	.064	.105	.173	.056

** Coefficient is significant at the 0.05 level (2-tailed)* *N = 255*
*** Coefficient is significant at the 0.01 level (2-tailed)*

	TOT-B	PLAN-B	EFF-B	REN-B	LUTP-B
Constant	.092	-4.364**	-1.438*	-3.717**	.788*
	(.394)	(1.240)	(.635)	(1.027)	(.311)
Population	.000	.000	.000	.000	.000
	(.000)	(.001)	(.000)	(.000)	(.000)
Income per-capita	-.007	-.010	-.004	-.004	-.009*
	(.006)	(.018)	(.009)	(.013)	(.004)
Education	.005	.009	.002	.001	.007*
	(.004)	(.013)	(.006)	(.010)	(.003)
Voting history	-.001	.000	.007	.008	-.006*
	(.003)	(.011)	(.005)	(.008)	(.002)
College town status	.109	.609	-.045	.141	-.237
	(.184)	(.531)	(.273)	(.428)	(.144)
Municipal electric utility	.136	-.090	.539**	.541*	-.022
	(.095)	(.294)	(.139)	(.224)	(.073)
Staff responsible for energy or climate planning	.449**	.691**	.673**	.792**	.198**
	(.077)	(.227)	(.122)	(.182)	(.061)
Local government environmental awareness	.208**	.530*	.166	.188	.150**
	(.065)	(.206)	(.103)	(.165)	(.052)
Community environmental activism	.141**	.269	.032	.153	.062
	(.048)	(.151)	(.073)	(.108)	(.036)
Air quality non-attainment	.146	.432	-.016	.282	.039
	(.087)	(.270)	(.137)	(.215)	(.066)
Coastal location	.176	.331	-.118	.189	.152*
	(.099)	(.302)	(.158)	(.239)	(.075)
Automobile dependency	.008*	.016	.006	.017*	.003
	(.003)	(.010)	(.005)	(.008)	(.003)
Electricity price	.016	.031	.081	.029	-.009
	(.026)	(.075)	(.042)	(.064)	(.019)
State energy and climate policies	.004	.014	-.025	.001	.009
	(.011)	(.032)	(.017)	(.026)	(.008)
Influence of neighboring jurisdictions	.089**	.126*	.094**	.153**	.033*
	(.019)	(.055)	(.029)	(.043)	(.015)
LR chi2	192.320	76.880	112.300	97.100	98.700
Prob>chi2	0.000	0.000	0.000	0.000	0.000
Psuedo R-squared	0.102	0.062	0.098	0.107	0.078

** Coefficient is significant at the 0.05 level (2-tailed)*
*** Coefficient is significant at the 0.01 level (2-tailed)*

N = 255

Appendix E – Additional Statistical Analyses

This appendix describes the detailed results of the Ordinary Least Squares multiple regression analyses, including the diagnostic test results and model refinement procedures.

Base OLS Regression Results

Table E-1 summarizes the regression results for the original OLS models, using normal standard errors. The F-test scores were all significant at the 0.00 level, meaning that each model included at least one statistically significant independent variable.

Table E-1. Base OLS Model Summaries Using Normal Standard Errors

	TOT-A	PLAN-A	EFF-A	REN-A	LUTP-A
Adjusted R^2	.408	.232	.309	.225	.222
Std Error Est	4.682	2.549	1.690	1.070	2.398
F-test	12.652	6.102	8.556	5.904	5.826
Significance of F-test	0.000	0.000	0.000	0.000	0.000
N	255	255	255	255	255
	TOT-B	PLAN-B	EFF-B	REN-B	LUTP-B
Adjusted R2	.555	.506	.343	.285	.299
Std Error Est	7.405	3.886	2.434	2.006	2.276
F-test	22.094	18.329	9.852	7.752	8.211
Significance of F-test	0.000	0.000	0.000	0.000	0.000
N	255	255	255	255	255

The adjusted R-squared of .408 for the TOT-A regression model indicated that the independent variables explained almost 41% of the variance in the total number of adopted climate protection planning policies. The adjusted R-squared values for the PLAN-A, EFF-A, REN-A, and LUTP-A dependent variables were lower than the value for the TOT-A model. The adjusted R-squared values for these "B" variable regression models were higher than those for the "A" variable models, meaning that the independent variables included in the models did a better job of explaining the variation in the "B" variables than the "A" variables.

Table E-2 summarizes the OLS regression results for the five "A" dependent variable models, using normal standard errors and standardized coefficients. Among the internal characteristics, population (POP), education (EDU), municipal electric utility (MUNI), and staff responsible for energy or climate planning (STAFF) were all significant at the .01 level in the model measuring total adopted policies (TOT-A). The variable for local government environmental awareness (LGAWR) was significant at the .05 level. Among the external characteristics, only the variable for the influence of neighboring jurisdictions (NEIGHB) was significant for TOT-A, at the .05 level.

The independent variables POP, EDU, MUNI, and STAFF, were also significant in two or more of the policy category models (i.e.., the PLAN-A, EFF-A, REN-A, or LUTP-A models).

Table E-2. OLS Regression Results (Standardized Coefficients and Normal Standard Errors) for Adoption of Climate Protection Policies

	TOT-A	PLAN-A	EFF-A	REN-A	LUTP-A
Constant	-5.984	-2.375	-1.676	-2.561**	.628**
	(3.327)	(1.812)	(1.201)	(.761)	(1.704)
Population	.222**	.259**	.119*	.018	.121*
	(.001)	(.001)	(.000)	(.000)	(.001)
Income per-capita	-.181	-.218*	.004	.011	-.181
	(.050)	(.027)	(.018)	(.011)	(.025)
Education	.276**	.252*	.045	.031	.302**
	(.037)	(.020)	(.013)	(.008)	(.019)
Voting history	.029	.094	.044	.014	-.076
	(.027)	(.015)	(.010)	(.006)	(.014)
College town status	-.016	.131	.001	-.041	-.157*
	(1.684)	(.917)	(.608)	(.385)	(.862)

	TOT-A	PLAN-A	EFF-A	REN-A	LUTP-A
Municipal electric utility	.216**	-.007	.425**	.310**	.034
	(.826)	(.450)	(.298)	(.189)	(.423)
Staff responsible for energy or climate planning	.217**	.075	.227**	.131*	.177**
	(.686)	(.374)	(.248)	(.157)	(.351)
Local government environmental awareness	.141*	.072	.092	.026	.159*
	(.546)	(.298)	(.197)	(.125)	(.280)
Community environmental activism	.059	.084	-.061	.043	.069
	(.425)	(.231)	(.153)	(.097)	(.218)
Air quality non-attainment	.051	.101	-.027	.017	.019
	(.744)	(.405)	(.269)	(.170)	(.381)
Coastal location	.068	.072	-.123	-.050	.190*
	(.873)	(.475)	(.315)	(.199)	(.447)
Automobile dependency	.056	.023	-.002	.150*	.035
	(.027)	(.015)	(.010)	(.006)	(.014)
Electricity price	-.035	-.049	.138	.112	-.180*
	(.221)	(.120)	(.080)	(.050)	(.113)
State energy and climate policies	.087	-.009	-.010	.201**	.122
	(.092)	(.050)	(.033)	(.021)	(.047)
Influence of neighboring jurisdictions	.121*	.024	.137*	.133*	.082
	(.170)	(.093)	(.061)	(.039)	(.087)

** Coefficient is significant at the 0.05 level (2-tailed)* *N = 255*
*** Coefficient is significant at the 0.01 level (2-tailed)*

Table E-3 summarizes the OLS regression results for the five "B" dependent variable models, using standardized coefficients. The most significant internal characteristics (.01 level) for the TOT-B model were STAFF and community environmental activism (COMACT). Population and local government environmental awareness were significant at the .05 level. Among the external characteristics, only the variable for the influence of neighboring jurisdictions was significant, at the .05 level.

Table E-3. OLS Regression Results (Standardized Coefficients and Normal Standard Errors) for Adoption or Intent to Adopt Climate Protection Policies

	TOT-B	PLAN-B	EFF-B	REN-B	LUTP-B
Constant	-12.749*	-8.846**	-2.425	-2.259	.780
	(5.262)	(2.762)	(1.729)	(1.426)	(1.617)
Population	.094*	.070	.119*	.071	.047
	(.002)	(.001)	(.001)	(.001)	(.001)
Income per-capita	-.110	-.031	-.064	-.075	-.250*
	(.078)	(.041)	(.026)	(.021)	(.024)
Education	.077	.007	.029	.023	.250*
	(.058)	(.031)	(.019)	(.016)	(.018)
Voting history	-.009	.025	.059	.007	-.158*
	(.043)	(.023)	(.014)	(.012)	(.013)
College town status	.037	.130	.016	.002	-.133
	(2.663)	(1.398)	(.875)	(.721)	(.818)
Municipal electric utility	.075	-.026	.221**	.140*	-.010
	(1.307)	(.686)	(.429)	(.354)	(.402)
Staff responsible for energy or climate planning	.308**	.236**	.312**	.252**	.214**
	(1.085)	(.570)	(.357)	(.294)	(.334)
Local government environmental awareness	.122*	.089	.091	.034	.185**
	(.864)	(.454)	(.284)	(.234)	(.266)
Community environmental activism	.174**	.201**	.042	.126	.143
	(.672)	(.353)	(.221)	(.182)	(.207)
Air quality non-attainment	.101	.143*	-.001	.090	.044
	(1.177)	(.618)	(.387)	(.319)	(.362)
Coastal location	.102	.132*	-.050	.061	.151*
	(1.380)	(.724)	(.454)	(.374)	(.424)
Automobile dependency	.099	.105	.031	.083	.081
	(.043)	(.023)	(.014)	(.012)	(.013)
Electricity price	.016	-.030	.130	.020	-.035
	(.349)	(.183)	(.115)	(.095)	(.107)
State energy and climate policies	.024	.047	-.082	.012	.082
	(.146)	(.076)	(.048)	(.039)	(.045)
Influence of neighboring jurisdictions	.278**	.273**	.207**	.227**	.155*
	(.269)	(.141)	(.088)	(.073)	(.083)

** Coefficient is significant at the 0.05 level (2-tailed)* *N = 255*

*** Coefficient is significant at the 0.01 level (2-tailed)*

In the "B" models, several of the independent variables were significant in a single policy category, but only three were significant in more than one category. STAFF and NEIGHB were both significant in all five of the "B" variable models. The municipal electric utility variable was significant in the models for which the dependent variable was a count of energy efficiency and conservation (EFF-B) or renewable energy policies (REN-B).

Statistical Diagnostics and Model Refinement

Four statistical issues raise concerns with the OLS models presented above, and merit additional discussion here: heteroskedasticity in the models; the role of USM/CCP member status in the models; reverse causality effects in the variable measuring staff assigned to energy / climate projects; and multi-collinearity effects between the income and education variables.

Tests for Heteroskedasticity

The Breusch-Pagan / Cook-Weisberg test and the White's test are two methods of determining if heteroskedasticity exists in a given regression model. These tests assume a null hypothesis of constant variance and generate a Chi^2 test statistic. If the Chi^2 statistic is significant then heteroskedasticity exists in the model. The Breusch-Pagan test can identify the specific independent variables in which the heteroskedasticity is occurring by regressing the independent variables against the squared residuals from the original OLS model. These tests found heteroskedasticity in the TOT-A and TOT-B models, as shown in Table E-4.

Table E-4. Tests for Heteroskedasticity in the TOT-A and TOT-B Models

	BP/CW Test		White's	
	Chi^2	Prob > Chi^2	Chi^2	Prob > Chi^2
TOT-A	40.34	0.0004	181.82	0.0018
TOT-B	30.59	0.0100	157.87	0.0486

The Breusch-Pagan test can identify the specific variables that exhibit heteroskedasticity by regressing the independent variables against the squared residuals from the original OLS regression. This method identified income per-capita, education, voting history, and presence of a municipal electric utility to be the heteroskedastic independent variables in the TOT-A model. For the TOT-B model, only population exhibits heteroskedasticity, as shown in Table E-5.

Table E-5. Breusch-Pagan Tests for Heteroskedasticity in the TOT-A and TOT-B Models

Independent Variables	TOT-A		TOT-B	
	Coef.	**Std. Err.**	**Coef.**	**Std. Err.**
Constant	-31.727	27.051	-34.967	51.694
Population	0.017	0.010	0.051**	0.018
Income per-capita	-0.839*	0.403	-1.318	0.769
Education	0.737*	0.301	0.474	0.574
Voting history	0.503*	0.222	0.333	0.424
College town status	-6.256	13.688	-23.051	26.158
Municipal electric utility	19.001**	6.716	-1.851	12.834
Staff responsible for energy / climate	1.522	5.578	11.829	10.659
Local government environmental awareness	-0.314	4.441	5.895	8.488
Community environmental activism	-0.748	3.454	0.788	6.601
Air quality non-attainment	10.349	6.051	-1.510	11.563
Coastal location	3.473	7.092	-5.763	13.554
Automobile dependency	0.212	0.223	0.299	0.427
Electricity price	0.532	1.795	5.942	3.431
State climate and energy policies	-0.347	0.748	-1.438	1.429
Influence of neighboring jurisdictions	1.540	1.383	3.060	2.644

** Coefficient is significant at the 0.05 level (2-tailed)* *N = 255*

*** Coefficient is significant at the 0.01 level (2-tailed)*

The significant findings on the heteroskedasticity tests can be evidence of model misspecification, rather than actual heteroskedasticity. For example, the functional form of the dependent variable may be incorrect (e.g., the log of the dependent variable may be more appropriate), the independent variables may be measured incorrectly, or relevant variables may be excluded. In this case, using another functional form of the dependent variable (such as the log or square of the count of adopted policies) would have little logical purpose. Measurement error is unlikely, as most of the independent variables that exhibit heteroskedasticity are from highly reliable U.S. census data. The exception is the municipal electric utility variable, which is based on a "yes or no" question from the survey instrument. While other independent variables not included in the model certainly may impact the extent of climate protection policy adoption, the model is comprehensive and covers all independent variables identified in previous research on the topic. For these reasons it seems likely that the significant results from the heteroskedasticity tests indicated actual heteroskedasticity in the model, rather than model misspecification or other problems.

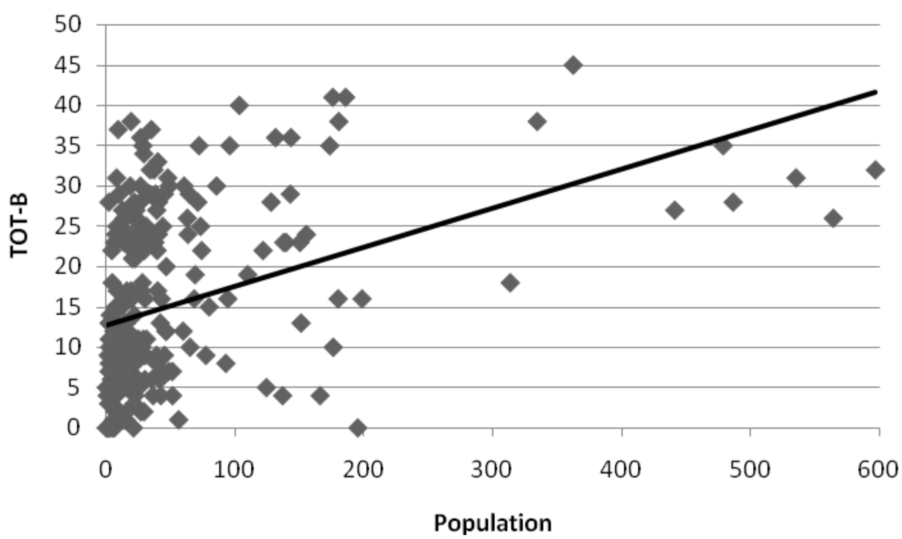
The results of the heteroskedasticity tests shown in Table E-5 are logical given the nature of the variables involved. High incomes, for example, are often found in conservative suburban communities, but are also characteristic of highly progressive and environmentally friendly communities (e.g., Marin County, CA). Municipalities with higher than average per-capita incomes are therefore likely to have a much wider range of climate protection policy adoption than municipalities with average or lower incomes. A similar heteroskedastic effect could be found in the education variable simply because it is so highly correlated with income.

Heteroskedasticity in the voting history variable (measured as the average percentage of residents who voted for the Democratic or Green party in the last three presidential elections) is also somewhat unsurprising. While municipalities with strong environmental records tend to have high percentages of Democratic and Green party voters, these voting patterns can also be found in municipalities with a high percentage of low-income or minority populations that may be focused on more pressing social concerns rather than climate protection. Thus municipalities with higher scores on the voting history variable would have greater variation in their climate protection policy adoption than those with lower voting history scores.

The presence of a municipal electric utility presumably makes it easier to adopt energy efficiency and renewable energy policies, but it does not necessarily make a community more inclined to adopt those policies. This means that municipalities that score a 1 on this variable likely have greater variation in their climate protection policy adoption scores because they have more opportunity to adopt energy efficiency and renewable energy policies.

Finally, heteroskedasticity in the population variable for the TOT-B model may exist due to the fact that the distribution of population in the model is very uneven, with the vast majority of municipalities having populations of less than 200,000. The relatively small number of cases with larger populations, as illustrated in Figure E-1, means that the variance calculated for those cases is likely to be flawed, creating heteroskedasticity.

Figure E-1. Scatterplot of Population and TOT-B Values, with Trendline



** Note: Four outliers with populations over 600,000 are not shown in the figure.* *N = 255*

USM /CCP Membership Status as an Independent Variable

Table E-6 shows the impacts on the OLS regression models after adding USM/CCP membership status (MEMBER) as an independent variable. All of the models remained significant according to their F-test scores. Including the MEMBER variable in the analysis raised the adjusted R^2 for the TOT-A and PLAN-A models, but slightly lowered that value for the other "A" variable models. The increased goodness of fit for the TOT-A model was marginal. The improvement in the PLAN-A model was more significant.

Table E-6. OLS Model Summaries with and Without MEMBER as Independent Variable

Base Models	TOT-A	PLAN-A	EFF-A	REN-A	LUTP-A
Adjusted R^2	.408	.232	.309	.225	.222
Std Error Est	4.682	2.549	1.690	1.070	2.398
F-test	12.652	6.102	8.556	5.904	5.826
Significance of F-test	0.000	0.000	0.000	0.000	0.000
Models with MEMBER	TOT-A	PLAN-A	EFF-A	REN-A	LUTP-A
Adjusted R^2	.413	.258	.306	.223	.219
Std Error Est	4.661	2.505	1.693	1.071	2.403
F-test	12.165	6.510	7.993	5.555	5.439
Significance of F-test	0.000	0.000	0.000	0.000	0.000
Base Models	TOT-B	PLAN-B	EFF-B	REN-B	LUTP-B
Adjusted R2	.555	.506	.343	.285	.299
Std Error Est	7.405	3.886	2.434	2.006	2.276
F-test	22.094	18.329	9.852	7.752	8.211
Significance of F-test	0.000	0.000	0.000	0.000	0.000
Models with MEMBER	TOT-B	PLAN-B	EFF-B	REN-B	LUTP-B
Adjusted R2	.596	.581	.357	.305	.296
Std Error Est	7.049	3.578	2.408	1.978	2.280
F-test	24.466	23.011	9.824	7.975	7.670
Significance of F-test	0.000	0.000	0.000	0.000	0.000

N = 255

Adding the MEMBER variable to the "B" variable models created more substantial increases in the R^2 scores, particularly for the TOT-B (from .555 to .596) and PLAN-B (.506 to .581) models. The only B-variable model in which the adjusted R^2 dropped was LUTP-B.

Table E-7 shows the regression results after adding MEMBER to the "A" dependent variable models. Membership in USM/CCP was only significant for the PLAN-A model.

Table E-7. OLS Results for "A" Models with Membership Status Independent Variable

	TOT-A		PLAN-A		EFF-A		REN-A		LUTP-A	
Constant	-4.930		-1.395		-1.724		-2.463	* *	.652	
	(3.365)		(1.809)		(1.223)		(.774)		(1.735)	
Constant	.209	* *	.234	* *	.121	*	.012		.121	
	(.001)		(.001)		(.000)		(.000)		(.001)	
Population	-.192	*	-.238	*	.005		.006		-.181	
	(.049)		(.027)		(.018)		(.011)		(.025)	
Income per-capita	.279	* *	.257	*	.045		.032		.302	* *
	(.037)		(.020)		(.013)		(.008)		(.019)	
Educational attainment	.025		.087		.045		.012		-.076	
	(.027)		(.015)		(.010)		(.006)		(.014)	
Voting history	-.021		.120		.001		-.044		-.157	*
	(1.678)		(.902)		(.610)		(.386)		(.865)	
College town status	.219	* *	.000		.425	* *	.312	* *	.035	
	(.823)		(.442)		(.299)		(.189)		(.424)	
Municipal electric utility	.188	* *	.018		.231	* *	.118		.175	* *
	(.712)		(.383)		(.259)		(.164)		(.367)	
Staff assigned to energy / climate projects	.133	*	.056		.093		.022		.159	*
	(.546)		(.293)		(.198)		(.125)		(.281)	
Local government environmental awareness	.039		.045		-.058		.034		.068	
	(.429)		(.230)		(.156)		(.099)		(.221)	
Community environmental activism	.049		.097		-.027		.016		.019	
	(.741)		(.398)		(.269)		(.170)		(.382)	
Air quality non-attainment	.060		.056		-.122		-.054		.189	*
	(.871)		(.468)		(.316)		(.200)		(.449)	

	TOT-A		PLAN-A		EFF-A		REN-A		LUTP-A	
Coastal location	.040		-.008		.000		.142	*	.034	
	(.028)		(.015)		(.010)		(.006)		(.014)	
Automobile dependency	-.031		-.040		.138		.114		-.180	*
	(.220)		(.118)		(.080)		(.051)		(.113)	
Electricity price	.088		-.007		-.010		.202	* *	.123	
	(.092)		(.049)		(.033)		(.021)		(.047)	
Influence of neighboring jurisdictions	.103		-.010		.140	*	.125		.081	
	(.172)		(.092)		(.062)		(.039)		(.089)	
USM/CCP membership	.108		.211	* *	-.015		.050		.006	
	(.768)		(.413)		(.279)		(.176)		(.396)	

** Coefficient is significant at the 0.05 level (2-tailed)* *N = 255*

*** Coefficient is significant at the 0.01 level (2-tailed)*

The significance levels and coefficients of the other independent variables experienced relatively minor changes as a result of adding MEMBER to the "A" variable models:

- Population was no longer statistically significant on the LUTP-A variable.
- Income per-capita became significant at the .05 level on TOT-A, with a negative coefficient (-.192).
- Staff assigned to energy / climate projects remained significant at the .01 level for the TOT-A variable, but its coefficient dropped noticeably (from .217 to .188).
- Influence of neighboring jurisdictions was no longer significant for the TOT-A or REN-A variables.

Table E-8 shows the regression results when MEMBER was added to the "B" dependent variable models. The MEMBER variable was significant at the .05 level for TOT-B, PLAN-B, and REN-B, and at the .01 level for EFF-B, with coefficients ranging from .159 for EFF-B to .342 for PLAN-B.

Table E-8. OLS Results for "B" Models with Membership Status Independent Variable

	TOT-B		PLAN-B		EFF-B		REN-B		LUTP-B	
Constant	-8.192		-5.824	*	-1.661		-1.549		.843	
	(5.089)		(2.584)		(1.738)		(1.428)		(1.646)	
Constant	.063		.029		.100		.048		.045	
	(.002)		(.001)		(.001)		(.001)		(.001)	
Population	-.134		-.064		-.079		-.092		-.251	*
	(.075)		(.038)		(.026)		(.021)		(.024)	
Income per-capita	.084		.016		.033		.028		.250	*
	(.056)		(.028)		(.019)		(.016)		(.018)	
Educational attainment	-.017		.013		.054		.001		-.158	*
	(.041)		(.021)		(.014)		(.012)		(.013)	
Voting history	.024		.113	*	.008		-.008		-.134	
	(2.538)		(1.288)		(.867)		(.712)		(.821)	
College town status	.083		-.014		.226	* *	.146	* *	-.010	
	(1.245)		(.632)		(.425)		(.349)		(.403)	
Municipal electric utility	.239	* *	.144	* *	.269	* *	.201	* *	.210	* *
	(1.077)		(.547)		(.368)		(.302)		(.348)	
Staff assigned to energy / climate projects	.102	*	.063		.078		.020		.184	* *
	(.825)		(.419)		(.282)		(.232)		(.267)	
Local government environmental awareness	.127	*	.139	*	.013		.092		.140	
	(.648)		(.329)		(.221)		(.182)		(.210)	
Community environmental activism	.097		.138	* *	-.004		.087		.044	
	(1.121)		(.569)		(.383)		(.314)		(.363)	
Air quality non-attainment	.083		.106	*	-.062		.047		.150	*
	(1.317)		(.669)		(.450)		(.370)		(.426)	
Coastal location	.061		.055		.007		.056		.079	
	(.042)		(.021)		(.014)		(.012)		(.014)	
Automobile dependency	.026		-.016		.136		.028		-.035	
	(.333)		(.169)		(.114)		(.093)		(.108)	
Electricity price	.026		.051		-.081		.014		.082	
	(.139)		(.070)		(.047)		(.039)		(.045)	
Influence of neighboring jurisdictions	.237	* *	.218	* *	.181	* *	.196	* *	.153	*
	(.260)		(.132)		(.089)		(.073)		(.084)	
USM/CCP membership	.257	* *	.342	* *	.159	*	.187	* *	.014	
	(1.161)		(.589)		(.397)		(.326)		(.376)	

** Coefficient is significant at the 0.05 level (2-tailed)* *N = 255*

*** Coefficient is significant at the 0.01 level (2-tailed)*

Adding MEMBER to the "B" variable models had the following relatively minor impacts on the other independent variables:

- Population was no longer statistically significant on the TOT-B or EFF-B variables.
- College town status became significant at the .05 level on the PLAN-B variable.
- Community environmental activism remained significant for the TOT-B and PLAN-B variables, but at the .05 level rather than the .01 level. Also, its coefficients dropped significantly.

Potential Reverse Causality Effects

The variable STAFF represents whether or not the municipalities who responded to the survey have staff members assigned to work on energy and/or climate protection projects. It is a dummy variable, with a 1 indicating that a municipality does have staff assigned to such projects, and a 0 indicating that it does not. In the original OLS analysis STAFF was included as an independent variable. It was highly significant in most of the models and had a strong coefficient indicating a substantial positive impact on the dependent variables.

It is not clear if municipalities are able to adopt climate protection policies because they have staff assigned to these areas (as implied in the original analysis) or if they assign staff to those areas to implement the climate protection policies they have already adopted. To test this potential reverse causality effect the OLS regression models were estimated with STAFF included in the dependent variables rather than as an independent variable.

To create these tests the presence of staff assigned to energy and/or climate projects was integrated into the PLAN-A and PLAN-B dependent variables. The original PLAN variables were calculated by muliplying the number of adopted climate protection planning measures (a total between 0 and 3) by four to create a range of values between 0 and 12. New versions of those dependent variables (PLAN-A2 and PLAN-B2) were generated by including the answers to the staff question in a new total (now between 0 and 4) and weighing the responses by three, again creating a range of possible scores between 0 and 12. PLAN-A2 and PLAN-B2 then replaced the PLAN-A and PLAN-B variables in the new totals (TOT-A2 and TOT-B2).

Table E-9 compares the performance of the TOT-A2 and TOT-B2 models to the original TOT-A and TOT-B models. It shows that adding STAFF to the dependent variables did not strengthen the models, as the resulting adjusted R^2 values were slightly lower.

Table E-9. Performance of Models Including STAFF as Dependent Variable

	TOT-A	TOT-A2	TOT-B	TOT-B2
F(15, 239)	12.65	13.43	22.1	18.38
Prob > F	0.000	0.000	0.000	0.000
R-squared	0.443	0.439	0.581	0.517
Adj R-squared	0.408	0.407	0.555	0.489
Root MSE	4.682	5.295	7.404	8.576

Adding STAFF to the dependent variables increased the number of independent variables that were significant in the regression models. Table E-10 compares the results for the TOT-A and TOT-B dependent variables to the TOT-A2 and TOT-B2 versions, using robust standard errors.

The independent variables of population (POP), education (EDU), presence of a municipal electric utility (MUNI), local government environmental awareness (LGAWR), and influence of neighboring jurisdictions (NEIGHB) were all significant in both the TOT-A and TOT-A2 models, with little substantive difference in their coefficients. The TOT-A2 model had two additional significant independent variables that are not significant in TOT-A: income per-capita (INC) and automobile dependency (AUTO). The coefficient for INC was negative, but its magnitude of -0.17 indicated that a $1000 increase in per-capita income would reduce the predicted number of adopted climate protection policies by only .172. The coefficient for AUTO was even smaller, indicating that a 10% increase in automobile dependency (the percentage of workers who commute by driving alone) would increase the predicted TOT-A score by only 0.6.

Table E-10. Significant Results for the TOT-A2 and TOT-B2 Models

Independent Variables	TOT-A		TOT-A2	
	Coef.	Robust SE	Coef.	Robust SE
Population	0.005*	0.002	0.006*	0.003
Income per-capita			-0.172**	0.055
Education	0.105*	0.045	0.160**	0.046
Municipal electric utility	3.469**	1.052	3.424**	1.090
Staff responsible for energy / climate	2.653**	0.715		
Local government environmental awareness	1.270**	0.471	1.412**	0.537
Automobile dependency			0.058*	0.029
Influence of neighboring jurisdictions	0.350*	0.170	0.452*	0.198
Independent Variables	**TOT-B**		**TOT-B2**	
	Coef.	**Robust SE**	**Coef.**	**Robust SE**
Population				
Income per-capita			-0.240**	0.068
Education			0.150*	0.064
Staff responsible for energy / climate	6.881**	1.234		
Local government environmental awareness	1.993*	0.789	2.241**	0.850
Community environmental activism	1.999**	0.655	3.052**	0.746
Air quality non-attainment	2.240*	1.129	3.419*	1.359
Coastal location			3.839*	1.734
Automobile dependency	0.084*	0.038	0.140**	0.048
Influence of neighboring jurisdictions	1.471**	0.304	1.649**	0.349

** Coefficient is significant at the 0.05 level (2-tailed)* *N = 255*

*** Coefficient is significant at the 0.01 level (2-tailed)*

The OLS results for the TOT-B variables yielded similar findings. The independent variables POP, LGAWR, community environmental activism (COMACT), air quality non-attainment (AIR), AUTO, and NEIGHB all were significant for both the TOT-B and TOT-B2 dependent variables. For the majority of those independent variables the coefficient changed very little when STAFF was added to the dependent variable. COMACT and AIR were the exceptions, as both had significantly larger coefficients in the TOT-B2 model.

As in the "A" models, income became significant when STAFF was added to the TOT-B dependent variable, and had a negative coefficient with a relatively minor effect on the dependent variable. Education became significant for TOT-B when STAFF is added, but this variable also had a relatively minor practical impact. Coastal location also became significant when STAFF was added, and had a fairly substantial impact on the dependent variable.

<u>Potential Multi-Collinearity Effects</u>

The correlation coefficient between the income and education variables was .726, indicating a multi-collinearity issue that could compromise the regression results. This may explain why the independent variable for per-capita income did not perform as expected in the original OLS regression models. It was significant at the .10 level, but not the .05 level, in the TOT-A model, and was not significant at any level in the TOT-B model. It became significant for both TOT-A and TOT-B when STAFF was added to the dependent variable measurements rather than included as an independent variable. Surprisingly, it had a negative co-efficient in all of the models, indicating that municipalities with higher incomes would be less likely to adopt climate protection policies.

To address the multicollinearity between income (INC) and education (EDU) and explore the unexpected results for the income variable it was necessary to test the models with and without those variables in order to determine their significance independent of each other. Table E-11 shows that all of the resulting models are significant. Removing EDU or INC from the TOT-A model reduced the resulting R-squared slightly, but there was almost no difference in goodness of fit when those variables were removed from the TOT-B model.

Table E-11. Performance of Models Testing Education and Income Effects

	TOT-A			TOT-B		
Performance Statistics	**Full Model**	**Exclude Income**	**Exclude Education**	**Full Model**	**Exclude Income**	**Exclude Education**
F	8.89	9.32	9.07	30.10	31.16	31.61
Prob > F	0.000	0.000	0.000	0.000	0.000	0.000
R-squared	.443	.434	.424	.581	.578	.580

Note: All models use robust standard errors.

Table E-12 shows the impact of removing EDU or INC on the TOT-A and TOT-B regression models. Income was not a significant independent variable for TOT-A or TOT-B, even when EDU was removed from the models. Education barely missed the threshold of statistical significance after the INC variable had been removed (significant at the .051 level). Its coefficient also dropped noticeably, from .105 to .050. The removal of INC from the models resulted in two minor changes to the other independent variables: air quality non-attainment was no longer significant in the TOT-B model and the influence of neighboring jurisdictions was no longer significant in the TOT-A model. Removal of the INC and EDU variables had very little impact on the coefficients of the other independent variables that were significant in the models. These results indicate that removing EDU or INC would weaken the overall models without providing meaningful changes to the results for any of the independent variables.

Table E-12. OLS Results Testing Education and Income Effects

Independent Variables	All Variables		Exclude Income		Exclude Education	
	TOT-A	TOT-B	TOT-A	TOT-B	TOT-A	TOT-B
Constant	-5.987 (3.229)	-12.769* (5.022)	-6.508 (3.334)	-13.346** (5.080)	-6.541* (3.383)	-13.051* (5.039)
Population	.005* (.002)	.004 (.004)	.005* (.002)	.004 (.004)	.005* (.002)	.004 (.004)
Income per-capita	-.095 (.051)	-.105 (.063)			.016 (.029)	-.049 (.041)
Education	.105* (.045)	.054 (.056)	.050 (.025)	-.008 (.036)		
Voting history	.013 (.028)	-.007 (.038)	.010 (.028)	-.011 (.037)	.020 (.030)	-.004 (.038)
College town status	-.403 (2.143)	1.722 (2.506)	1.262 (1.815)	3.567 (2.215)	2.355 (1.793)	3.127 (2.154)
Municipal electric utility	3.469** (1.052)	2.184 (1.289)	3.428** (1.069)	2.139 (1.293)	3.318** (1.082)	2.107 (1.290)
Staff responsible for energy or climate planning	2.653** (.715)	6.881** (1.234)	2.902** (.695)	7.157** (1.206)	3.006** (.696)	7.061** (1.210)
Local government environmental awareness	1.270** (.471)	1.993* (.789)	1.242* (.481)	1.962* (.794)	1.272** (.486)	1.995* (.792)
Community environmental activism	.371 (.499)	1.999** (.655)	.390 (.512)	2.020** (.665)	.549 (.503)	2.089** (.652)
Air quality non-attainment	.618 (.697)	2.240* (1.129)	.480 (.686)	2.087 (1.119)	.631 (.722)	2.246* (1.132)
Coastal location	.927 (.774)	2.545 (1.488)	.685 (.770)	2.277 (1.479)	.683 (.780)	2.421 (1.485)
Automobile dependency	.026 (.025)	.084* (.038)	.032 (.026)	.091* (.038)	.032 (.027)	.087* (.038)
Electricity price	-.106 (.184)	.089 (.356)	-.162 (.179)	.027 (.343)	-.199 (.185)	.041 (.349)
State energy and climate policies	.119 (.089)	.059 (.135)	.123 (.089)	.063 (.134)	.139 (.089)	.069 (.134)
Influence of neighboring jurisdictions	.350* (.173)	1.471** (.304)	.341 (.173)	1.462** (.302)	.370* (.177)	1.482** (.303)

** Coefficient is significant at the 0.05 level (2-tailed)* *N = 255*

*** Coefficient is significant at the 0.01 level (2-tailed)*

Note: Models use standardized coefficients and robust standard errors

It is possible that income has a quadratic relationship with the adoption of climate protection policies, i.e., the variable income squared may be significant if included in the models. Therefore, the multi-collinearity effects between income and education were further examined by testing the models using the square of the income variable. Table E-13 compares the bivariate regression relationships between per-capita income and its square and the TOT-A and TOT-B dependent variables, using robust standard errors. The income-squared variable fared more poorly for both dependent variables, as it had a lower significance level, a smaller coefficient, and a smaller R^2 value.

Table E-13. Binary Regression Results for Income and Income Squared Variables

	TOT-A				**TOT-B**			
	Coef.	**RSE**	**P>t**	**R^2**	**Coef.**	**RSE**	**P>t**	**R^2**
Income	.063	.030	.036	.015	.134	.054	.013	.020
Income Squared	.000	.000	.094	.006	.001	.001	.006	.009

Note: Models use robust standard errors.

The performance of the full regression models changed very little when income squared replaced income as an independent variable. The R^2 value for the TOT-A model using income squared was slightly lower (.441) than that of the original model (.443). For the TOT-B model the R^2 value was virtually identical whether income (.5811) or income squared (.5814) was used.

Table E-14 compares the significant independent variables for the original models and those using the income squared variable. The income squared variable was significant in both the TOT-A and TOT-B models, but with an extremely small negative coefficient that had no practical impact on the dependent variables. In the TOT-A model, replacing income with income squared reduced the coefficient for the education variable from .105 to .083. It also changed the significance of the influence of neighboring jurisdictions variable, which barely missed the threshold of statistical significance (P>0 = .051) when the income squared variable was used. Education was not significant in the TOT-B model using either form of the income variable. The only notable change to the other independent variables was that air quality non-attainment became not significant when income squared was used in place of income.

Table E-14. Regression Results with Income-Squared as Independent Variable

TOT-A Model	Original Model		Income^2 Model	
	Coef.	**Robust SE**	**Coef.**	**Robust SE**
Population	0.005*	0.002	0.005*	0.002
Income per-capita / income per capita squared			-0.001*	0.000
Education	0.105*	0.045	0.083*	0.035
Municipal electric utility	3.469**	1.052	3.463**	1.054
Staff responsible for energy / climate	2.653**	0.715	2.690**	0.706
Local government environmental awareness	1.270**	0.471	1.255**	0.474
Influence of neighboring jurisdictions	0.350*	0.170		
TOT-B Model	**Original Model**		**Income^2 Model**	
	Coef.	**Robust SE**	**Coef.**	**Robust SE**
Income per-capita / income per capita squared			-0.001*	0.000
Staff responsible for energy / climate	6.881**	1.234	6.893**	1.233
Local government environmental awareness	1.993*	0.789	1.979*	0.789
Community environmental activism	1.999**	0.655	2.015**	0.657
Air quality non-attainment	2.240*	1.129		
Automobile dependency	0.084*	0.038	0.088*	0.038
Influence of neighboring jurisdictions	1.471**	0.304	1.461**	0.303

* *Coefficient is significant at the 0.05 level (2-tailed)* *N = 255*

** *Coefficient is significant at the 0.01 level (2-tailed)*

Appendix F –Final OLS Results with Unstandardized Coefficients

Table F-1. "A" Variable Unstandardized Coefficients and Robust Standard Errors

	TOT-A	PLAN-A	EFF-A	REN-A	LUTP-A
Constant	-5.987	-2.379	-1.676	-2.561**	.629
	(3.229)	(1.707)	(1.259)	(.704)	(1.633)
Population	.005*	.003*	.001	.000	.001
	(.002)	(.001)	(.000)	(.000)	(.001)
Income per-capita	-.095	-.054	.001	.001	-.042
	(.051)	(.033)	(.020)	(.018)	(.024)
Education	.105*	.046	.006	.002	.051**
	(.045)	(.027)	(.015)	(.011)	(.019)
Voting history	.013	.021	.007	.001	-.015
	(.028)	(.016)	(.009)	(.005)	(.013)
College town status	-.403	1.611	.006	-.213	-1.807
	(2.143)	(1.371)	(.699)	(.478)	(.933)
Municipal electric utility	3.469**	-.056	2.283**	.995**	.247
	(1.052)	(.475)	(.418)	(.228)	(.428)
Staff responsible for energy or climate planning	2.653**	.439	.928**	.320*	.966**
	(.715)	(.364)	(.235)	(.145)	(.365)
Local government environmental awareness	1.270**	.310	.275	.046	.638*
	(.471)	(.253)	(.195)	(.117)	(.265)
Community environmental activism	.371	.252	-.129	.054	.195
	(.499)	(.277)	(.170)	(.122)	(.226)
Air quality non-attainment	.618	.584	-.109	.040	.102
	(.697)	(.373)	(.228)	(.165)	(.369)
Coastal location	.927	.468	-.562*	-.137	1.158*
	(.774)	(.491)	(.271)	(.160)	(.444)
Automobile dependency	.026	.005	.000	.014*	.007
	(.025)	(.014)	(.009)	(.006)	(.014)
Electricity price	-.106	-.070	.140*	.068	-.244*
	(.184)	(.113)	(.068)	(.058)	(.101)
State energy and climate policies	.119	-.006	-.005	.055*	.075
	(.089)	(.048)	(.033)	(.027)	(.045)
Influence of neighboring jurisdictions	.350*	.033	.133*	.077*	.106
	(.173)	(.099)	(.062)	(.033)	(.091)

** Coefficient is significant at the 0.05 level (2-tailed)* *N = 255*
*** Coefficient is significant at the 0.01 level (2-tailed)*

Table F-2. "B" Variable Unstandardized Coefficients and Robust Standard Errors

	TOT-B	PLAN-B	EFF-B	REN-B	LUTP-B
Constant	-12.769*	-8.852**	-2.433	-2.262	.778
	(5.022)	(2.778)	(1.717)	(1.333)	(1.514)
Population	.004	.001	.001	.001	.000
	(.004)	(.001)	(.001)	(.001)	(.001)
Income per-capita	-.105	-.015	-.016	-.015	-.058**
	(.063)	(.034)	(.022)	(.026)	(.022)
Education	.054	.002	.005	.003	.042*
	(.056)	(.032)	(.019)	(.016)	(.017)
Voting history	-.007	.010	.013	.001	-.032*
	(.038)	(.021)	(.012)	(.010)	(.013)
College town status	1.722	3.042*	.196	.018	-1.533
	(2.506)	(1.407)	(.878)	(.683)	(1.001)
Municipal electric utility	2.184	-.373	1.753**	.879*	-.075
	(1.289)	(.652)	(.470)	(.337)	(.425)
Staff responsible for energy or climate planning	6.881**	2.627**	1.883**	1.202**	1.170**
	(1.234)	(.665)	(.381)	(.325)	(.325)
Local government environmental awareness	1.993*	.729	.404	.120	.740**
	(.789)	(.441)	(.272)	(.220)	(.277)
Community environmental activism	1.999**	1.154**	.131	.310	.403
	(.655)	(.346)	(.226)	(.196)	(.213)
Air quality non-attainment	2.240*	1.580*	-.007	.427	.241
	(1.129)	(.630)	(.347)	(.310)	(.323)
Coastal location	2.545	1.637*	-.341	.325	.924*
	(1.488)	(.788)	(.477)	(.379)	(.431)
Automobile dependency	.084*	.045	.007	.015	.017
	(.038)	(.023)	(.012)	(.010)	(.012)
Electricity price	.089	-.081	.194	.024	-.048
	(.356)	(.198)	(.116)	(.085)	(.100)
State energy and climate policies	.059	.059	-.056	.006	.050
	(.135)	(.074)	(.043)	(.036)	(.045)
Influence of neighboring jurisdictions	1.471**	.719**	.295**	.256**	.200*
	(.304)	(.166)	(.098)	(.082)	.778

** Coefficient is significant at the 0.05 level (2-tailed)* *N = 255*
*** Coefficient is significant at the 0.01 level (2-tailed)*

Appendix G –Interview Consent Script and Summaries

Verbal Consent Script for Interview Participants

My name is Damian Pitt, and I am a researcher with the School of Public and International Affairs at Virginia Tech. I am calling you in regards to a research project entitled "The Diffusion of Climate Protection Planning Policy among U.S. Municipalities." As you may recall, I sent you a letter a couple of months ago asking you to complete our Municipal Climate Protection Planning survey. Based on your survey responses, you are among a limited number of respondents that are being asked to participate in a follow-up interview, which should take approximately 20-30 minutes to complete. Would you be willing to participate in this follow-up interview?

(If "No," thank the participant for his or her time. If "Yes," proceed with the script.)

The purpose of this study is to gather data on the range of policies that local governments have adopted to reduce their communities' greenhouse gas emissions, as well as municipal officials' opinions or perspectives on climate change and the role of local governments in addressing climate change. The results of the Municipal Climate Protection Planning Survey have been analyzed, and we are now conducting telephone interviews in order to gather more detailed information on the relationships observed in the survey responses. The interview subjects have been selected in order to obtain a representative sample of the types of climate protection planning approaches observed in the survey results. The survey was sent to 4,000 municipal officials, and we are conducting 10 to 20 telephone interviews.

The results will be published as a dissertation and potentially as one or more journal articles. The telephone interview transcripts will not contain the participants' names, only the access codes that they were assigned at the start of the project. The survey and interview responses are completely confidential, and interview participants will not be identified in any published documents resulting from this project unless they give verbal consent at the end of the interview to publish their names. There are no known risks associated with participation in this project, and no promise or guarantee of benefits have been made to encourage you to participate. Participants will not be compensated, and are free to withdraw at any time.

If you have any questions about the interview or how the results will be used, please contact me at (540) 818-5547 or dpitt@vt.edu. If you consent to participate in this interview, please repeat after me: "I voluntarily agree to participate in this study."

I hereby certify that the following individual has given verbal consent to participate in this study: ________________________________

Researcher: __________________________ __________________

Name Date

Witness: __________________________ __________________

Name Date

Final Interview Summaries

<u>City of Charleston. Carolee Williams, Special Project Manager.</u>

1. **Has your municipality adopted any plans or policies to reduce community-wide energy use and greenhouse gas emissions? If so, please summarize them.**

The city has not adopted a specific plan for GHG emissions reduction. A plan was drafted five years ago, but was never adopted by the city council. The data from the original plan has recently been updated, and they are in the process of developing a new plan. The city has adopted some policies and embraced various "philosophies" to reduce energy use. For example, all new city buildings must be LEED certified and there is an anti-idling policy for the municipal fleet. Policies to reduce community-wide emissions include planning for walkable communities and the preservation of historic buildings.

2. **What have been your municipality's motivations for pursuing (or not pursuing) policies to reduce GHG emissions?**

The city staff does not talk much about reducing GHG emissions, but it is a motivation for some of the policies that it adopts. The desire to reduce GHG emissions gave them a good reason to continue to focus on walkable communities and historic preservation. They also have found that some of the policies or procedures they adopt for other purposes are the same things they would do to reduce GHG emissions. For example, they have developed some policies to reduce vehicle trips in order to reduce the cost of maintaining and improving the road network, but trip reduction also has GHG benefits. Finally, the city is near the coast, only12 ft. above sea level, so the threat of sea level rise is major concern and motivation for GHG reduction policies.

3. Please describe the process that led your municipality to adopt these policies.

The process has been driven by the Mayor, who signed the USMCPA and wanted the city to prepare a plan to protect the climate. The Mayor is the catalyst, but a 20+ member advisory committee is in place to move the project forward. The Advisory Committee has met monthly since October 2007. Five sub-committees are actively involved in writing the draft Climate Action Plan and formulating policies.

There has been no local political resistance. City council passed a resolution to establish a few initial energy and climate policies. There was some concern on the Council about the anti-idling policy, but the policy was already in place and the resolution was merely meant to call attention to it and increase enforcement.

4. Has the community been involved in formulating and/or advocating these policies?

The advisory committee and sub-committees include representation from a number of community interests. Approximately 150 people are involved in the committees, and attendance at the monthly meetings is usually around 100. Individuals have remained involved in the process because they have been given a meaningful role in the subcommittees. The committee and sub-committees include a number of architects and builders as well as representatives of local environmental groups, students and university representatives, business owners, and individual community members. The chair of the Advisory Committee is a private business owner. Members of the local planning commission are also involved. The committee has done some fund-raising to support energy and climate programs. There has been no community resistance, but the Climate Action Plan has not been released and therefore interests that might oppose the plan may not know about it yet.

5. Is your municipality a member of ICLEI-CCP or the USMCPA?

The city is a member of both ICLEI-CCP and the USMCPA. ICLEI has been instrumental in giving confidence to the local staff members. The individual in charge of the energy and climate work has a background in urban planning, but did not previously have any specific expertise in energy or climate issues. Working with CCP has helped her to realize that people are doing energy and climate planning all over the country, and has made achieving the five milestones seem like something that the city could accomplish. The city is using the CACP software provided by CCP. The Mayor may be working with USMCPA, but the staff member in charge has primarily worked with CCP.

6. Does your municipality have staff assigned to work on energy and climate issues?

The Special Project's Manager is responsible for energy and climate planning along with other projects. She was asked to take on climate / energy responsibilities after the city joined USMCPA. The city will soon hire a sustainability director. No other staff members are working on big-picture energy and climate issues, but some of the areas they have already been working on are now tied into the climate protection planning effort.

7. Are you aware of other municipalities in your region that have adopted policies to reduce energy use and/or greenhouse gas emissions?

The city does not work with any other neighbors in the immediate metropolitan region, but has shared information and ideas with similarly sized cities in the state and in nearby states. The city is looking to copy at least one specific policy that has been adopted in one of these other cities. The Sierra Club, via the Cool Cities program, organized a meeting about 1 ½ years ago with other cities from throughout the state. The idea was to establish a statewide network that would regularly meet to discuss climate planning approaches, but that has not worked very well.

8. Do you grant permission for me to quote you directly or attribute your responses to your municipality (e.g., "the city of X has experienced Y)?

Yes, you can quote me directly and attribute the information I have shared to the City of Charleston.

<u>City of Kansas City. Wayne Cauthen, City Manager, and Dennis Murphy, Chief Environmental Officer.</u>

1. **Has your municipality adopted any plans or policies to reduce community-wide energy use and greenhouse gas emissions? If so, please summarize them.**

In July, 2008 the Mayor and City Council unanimously adopted a Climate Action Plan that included an emissions reduction target of 30% below 2000 levels by 2020 for both community-wide emissions and those from municipal operations. The CAP includes 55 different strategies and measures to achieve those reduction targets. Many of the strategies focus on energy efficiency and renewable energy, but the plan also includes measures to reduce emissions from the city vehicle fleet and enhancing mass transit and alternative transportation modes.

2. **What have been your municipality's motivations for pursuing (or not pursuing) policies to reduce GHG emissions?**

The city's climate protection planning is part of a culture of sustainability that has emerged over the past three-to-five years. As explained by the city manager, the city officials "want to leave the environment better for young people than it is currently." In addition, the city is close to being in violation of federal ground-level ozone requirements. This has been part of the motivation for pursuing climate protection, as many of the strategies the city has considered for reducing GHG also have the benefit of reducing ground-level ozone. The ozone issue has helped to bring local business partners to the table, which is valuable because the city needs them to be involved in order to achieve its emission reduction goals.

3. Please describe the process that led your municipality to adopt these policies.

The climate protection planning process began as a result of a concurrence of activities. The Mayor, municipal staff, and community members all began showing interest in climate protection at around the same time. The Mayor signed the USMCPA in 2005, but little happened initially. The City has a standing 17-member environmental management commission that advises the Mayor on environmental issues. This commission identified climate protection planning as a major priority, which helped to spur the process.

The city manager and Mayor's staffs then prepared an ordinance to require the city to prepare a climate protection plan. The ordinance was approved unanimously by the Mayor and city council. The city manager then hired a Chief Environmental Officer to help develop the plan. Since then the City Council has been aggressive in promoting climate protection planning, and the CAP was adopted unanimously. There has been no local political resistance.

A local congressman is also supportive. He was appointed to a select Congressional committee on energy independence and global warming and has been involved in local process.

4. Has the community been involved in formulating and/or advocating these policies?

The Mayor appointed an 11-person steering committee to work with city staff to develop the CAP. The committee included two representatives of the city planning commission plus representatives of the metropolitan planning organization, the local electric utility, neighborhood associations, local environmental groups, and the AFL-CIO, plus other community leaders. The committee provided general oversight, developed GHG emission reduction goals, evaluated proposed policies and determined which ones would be included in the plan. The steering committee still serves in an oversight role now that the plan is being implemented.

Separate work groups were involved in developing the specific GHG emissions reduction measures. These work groups involved over 100 individuals from across the community. The city staff was involved in the work groups along with representatives of metropolitan planning organization. Other interests represented in process included members of the local American Institute of Architects and U.S. Green Building Council organizations, the Sierra club, and other environmental groups, plus community leaders and other individuals.

There has been no resistance or pushback from the community. The Chamber of Commerce was initially reluctant to participate, and included a representative on the steering committee primarily to protect business interests. Over time there has been a dramatic turnaround, and the Chamber is now a valuable partner in the city's climate protection planning process and has also developed its own climate protection partnership program.

5. Is your municipality a member of ICLEI-CCP or the USMCPA?

The city is a member of both USMCPA and CCP. They used the CCP software to do the baseline emissions inventory and evaluate GHG reduction strategies. Membership in CCP has been helpful, as it has given the city the opportunity to network with other local governments involved in climate protection activities.

6. Does your municipality have staff assigned to work on energy and climate issues?

The city has a Chief Environmental Officer in the City Manager's Office and a Sustainability Coordinator in the Office of Environmental Quality. Both positions are primarily focused on sustainability, climate protection, and energy. The Chief Environmental Officer was hired after the city signed the USMCPA but before serious work began to implement climate protection.

There are also several energy managers who are focused on energy efficiency in the facilities department, water services, and fleet services. Beyond that it is hard to say how many staff members are assigned to energy and climate work. The city believes that those responsibilities should be disseminated throughout the entire staff, not concentrated in any one person or group.

7. Are you aware of other municipalities in your region that have adopted policies to reduce energy use and/or greenhouse gas emissions?

The city is the core of its metropolitan region, and its work on climate protection has influenced other communities in the metropolitan region. In November 2008 a group of 18 mayors across the metropolitan area jointly signed the USMCPA. The city is working with them through the metropolitan planning agency and is serving as a resource to help them through the process.

The other localities in the metropolitan region have been encouraged to adopt measures described in the city's CAP. Also, the city received funds from the stimulus package energy efficiency block grant program, which requires that recipients coordinate energy strategies with other jurisdictions in their metropolitan area. Seven other cities and two counties are working on similar projects for regional energy efficiency.

8. Do you grant permission for me to quote you directly or attribute your responses to your municipality (e.g., "the city of X has experienced Y)?

Yes, you can quote us directly and attribute the information we have shared to the City of Kansas City.

<u>City of Louisville. Heather Balser, Deputy City Manager.</u>

1. Has your municipality adopted any plans or policies to reduce community-wide energy use and greenhouse gas emissions? If so, please summarize them.

The City manager establishes a set of goals every year, and the 2009 goals include energy conservation measures. However, the goals do not specifically mention greenhouse gases. As part of this effort we are looking at establishing green building codes for residential and commercial development. Recently we signed a new agreement with our local electric utility that requires the utility to provide green energy options. We also have looked at policies to encourage PV's.

In terms of municipal operations, we have done energy audits for our facilities and are looking at ways to make them more energy efficient. He have not completed a GHG emissions inventory, adopted reduction targets, or prepared a climate action plan. However, we have signed on to our county's Sustainable Energy Plan, and in doing so we have agreed to pursue a number of actions to help reach the County's goals for reducing GHG emissions. We have not pursued our own plans in this area because we do not think we have the resources, and we have to prioritize.

2. What have been your municipality's motivations for pursuing (or not pursuing) policies to reduce GHG emissions?

Reducing GHG emissions is one of the motivations, but we also want to set an example for the community about energy efficiency and conservation. That is the perspective of our elected officials. We know that in the long term it will save money, but we also want to set an example about the conservation of resources. People do not specifically say "let's reduce carbon emissions," but they are interested in being more sustainable for the long term and a good steward of our natural resources.

Most importantly, we are hearing from the community that this is the way they want the city to perform. For example, we do a citizen survey every four years, and the last survey identified support for renewable energy. Specifically, residents said they would support using open space for wind turbines and/or solar energy.

3. Please describe the process that led your municipality to adopt these policies.

These policies came about through a "perfect storm" of support from elected officials, municipal staff, and the community. A couple of council members have pushed these issues the most. There has been no resistance from local elected officials. Our Conservation and Resource Board, which includes individuals appointed by the Mayor and Council, has also helped to push the issue. Also, in 2007 we hired a new city manager who had adopted a number of energy and climate initiatives in a different city and had a lot of knowledge about those types of policies.

Most importantly, we have had a lot of community support. The issue of resource conservation came up when the price of gas reached $4 a gallon, and it became apparent that we needed to be more sustainable in the long run. Other nearby municipalities have adopted policies that inspired us, and we were able to witness the success and level of community support for their programs.

4. Has the community been involved in formulating and/or advocating these policies?

The Resource and Conservation Advisory Board includes seven members who are appointed to a four-year term by the Mayor and Council. Many of the individuals work in these areas and have personal knowledge about environmental issues. The Board holds monthly meetings that are open to the public. They develop and formulate policies, make recommendations to the Council, and meet with the Council once or twice a year.

We also allow for open public comments at all Council meetings in which residents can raise comments on any subject of their choosing. The Council also holds ward meetings twice a year. One difficulty with our community outreach efforts is that the same people show up to all the meetings. Finally, we conduct a citizen survey every four years and plan to begin conducting it every two years. It includes questions about significant policy issues, including environmental issues, and is a good way to hear from people we do not normally reach through other means.

There will always be some community resistance, but we try to be flexible and make compromises to help overcome that resistance. There is a bit of a libertarian bent in the community, and people want to make sure that local government policies do not take away their individual choice. For example, they do not want the government to dictate how they can build their homes.

5. Is your municipality a member of ICLEI-CCP or the USMCPA?

No and no. The topic has never come up. We are simply trying to provide services. We are looking to our neighbors for guidance on these issues, and do not feel we need to join an association.

6. Does your municipality have staff assigned to work on energy and climate issues?

Not really. Most of the work on these issues comes out of the city manager's office. The deputy city manager is the person who is most involved. Some issues are dealt with at the departmental level, such as green building policies that are developed in the planning department.

7. Are you aware of other municipalities in your region that have adopted policies to reduce energy use and/or greenhouse gas emissions?

We are a small community, and we rely on our county for guidance and support on these issues. The county has a Sustainability Coordinator and an active Climate Smart Program. Through this program the county supports residential energy efficiency improvements and subsidizes residential energy audits countywide, including within our jurisdiction. They often set the course and we expand on their policies. For example, we are using the County's building codes as a template for our green building efforts.

We are looking for more partnerships with surrounding communities, because that is how we can get things done. We do not have to reinvent the wheel. For example, a neighboring municipality adopted new waste management practices to encourage recycling and reduce refuse, and we recently adopted a similar policy.

8. Do you grant permission for me to quote you directly or attribute your responses to your municipality (e.g., "the city of X has experienced Y)?

Yes, you can quote me directly and attribute the information I have shared to the City of Louisville.

<u>City of Reno. Jason Geddes. Environmental Services Administrator.</u>

1. Has your municipality adopted any plans or policies to reduce community-wide energy use and greenhouse gas emissions? If so, please summarize them.

We have adopted a GHG emissions inventory, but do not have targets other than those in the USMCPA agreement. We also have adopted a climate action plan that includes implementation policies. We have already adopted policies to incorporate renewable energy systems, solar and wind primarily, energy conservation measures, and green building policies. We have more stringent policies related to municipal operations, but some apply community wide.

2. What have been your municipality's motivations for pursuing (or not pursuing) policies to reduce GHG emissions?

One motivation is to reduce energy costs from electricity and transportation fuels. We are also concerned about overall global impacts from climate change. We are in an arid region that is highly dependent on snowfall and are highly susceptible to droughts. We are therefore concerned about climate change because the potential impacts could hit us directly.

3. Please describe the process that led your municipality to adopt these policies.

The process began when the Mayor signed the USMCPA and then provided direction to municipal staff to implement the agreement. Also, we held a community-wide green summit and asked our citizens what our goals and objectives should be with respect to environmental issues. There was a lot of community support for reducing emissions. A follow-up summit confirmed these goals. We then came up with an action plan, and have updated it each year with new items and actions that the staff develops internally.

There has been no political resistance. The City Council and Mayor have been on board. We also have support from the state legislature and the governor's office. For example, we have been looking to use municipal funding to support residential renewable energy systems. State law must be changed to allow us to do that, and our local representatives are moving the bill forward through the state legislature.

4. Has the community been involved in formulating and/or advocating these policies?

We formed community groups to develop policy proposals on specific topics. Over the past two years we have had about a dozen committees. They discuss the best ways to move forward on a given issue and develop suggestions that are brought to Council. The membership of the committees varies by topic, but generally speaking they include average citizens, representatives of relevant industries, and community organizations. The local university is involved in most of the groups, and the community college and various high school groups are involved as well. Other organizations in the community have all been supportive, albeit some slower than others

There are other opportunities for individuals to bring in ideas and suggestions, and we pursue them when possible. For example, we accept comments on our Web site and run them through our internal green team to see which ideas we can pursue. There has not been any significant community resistance. There was some resistance from industry, but not much, based on how they would be impacted by some of the policies. Overall the community has been supportive.

5. Is your municipality a member of ICLEI-CCP or the USMCPA?

We are not a member of CCP, but the County is a member. We share information with a team of local governments, including the County. We did sign the USMCPA, which is what got us started with the goals. It has not been as much help lately, as we have relied on local expertise.

6. Does your municipality have staff assigned to work on energy and climate issues?

We have one staff person that is working primarily on these issues. This person oversees the Green Initiative that the City Council has adopted each of last three years and includes the city's energy and climate programs. Also, representative from every city agency sit on internal green team, which meets once a month to work on these issues. All green team members have the authority to spend time developing both internal and community-wide emissions reduction policies. The green team members include some department heads and some lower-level staff members, basically whoever is interested in these issues and is an advocate within their division. All of this occurred as a result of the Mayor's signing the USMCPA.

7. Are you aware of other municipalities in your region that have adopted policies to reduce energy use and/or greenhouse gas emissions?

Yes, we have formed an informal working group that includes green team leaders from nearby cities, the County, and various public service districts. This working group meets once a month to share individual plans and compare ideas. It is currently coordinating efforts to develop a regional climate action plan to be adopted by all agencies. This will include some jointly developed policies and some developed by the city and shared with others. The regional efforts have been a little slow to develop because our municipality is farther along than most of the other participants. They have adopted some of the same policies as we have, but not all of them.

8. Do you grant permission for me to quote you directly or attribute your responses to your municipality (e.g., "the city of X has experienced Y)?

Yes, you can quote me directly and attribute the information I have shared to the City of Reno.

<u>Anonymous Under-Performer Municipality 1.</u>

1. Has your municipality adopted any plans or policies to reduce community-wide energy use and greenhouse gas emissions? If so, please summarize them.

No. We have done some things related to town operations, but not much community-wide. Our only community-wide energy and sustainability efforts are drop-off point recycling and a zoning ordinance that allows for mixed-use districts. We are not considering any efforts for community-wide GHG emissions reduction.

2. What have been your municipality's motivations for pursuing (or not pursuing) policies to reduce GHG emissions?

We participated in a state-wide competition for municipalities to adopt "green" operations. That was the motivation to start a formal program to reduce energy use at the town level. Other motivations were to save money and reduce our carbon footprint, plus the simple fact that it makes people feel good. There is no specific reason why community-wide climate protection planning is not on the agenda. We just have not gotten to it yet.

3. Please describe the process that led your municipality to adopt these policies.

The Mayor pushed the program for reducing municipal operations energy use, and the staff developed the details. There would not be much resistance to a voluntary community-wide emissions reduction program. There might be some political resistance from within the town staff, but probably not political resistance.

4. Has the community been involved in formulating and/or advocating these policies?

The community has not been involved with energy or GHG emissions policies, or with environmental policies in general. If we pursued a mandatory emissions reduction program there would be community resistance. Anytime you have a program there will be resistance from somebody.

5. Is your municipality a member of ICLEI-CCP or the USMCPA?

No.

6. Does your municipality have staff assigned to work on energy and climate issues?

No staff members have energy or climate issues as a significant part of their responsibility. Our municipal energy working group has a person from each department. In some cases the department head participates, in other cases it is lower-level staff. This committee develops strategies for energy reduction from municipal operations.

7. Are you aware of other municipalities in your region that have adopted policies to reduce energy use and/or greenhouse gas emissions?

I know that a couple of nearby municipalities are doing a lot in this area, but I do not know the particulars about anything. We have not checked into it to see what they are doing and we are not talking or collaborating with them in any way.

8. Do you grant permission for me to quote you directly or attribute your responses to your municipality (e.g., “the city of X has experienced Y)?

No.

Anonymous Under-Performing Municipality 2.

1. **Has your municipality adopted any plans or policies to reduce community-wide energy use and greenhouse gas emissions? If so, please summarize them.**

We adopted a sustainability policy for municipal operations, which includes an anti-idling policy, a green fleet program, and actions to reduce energy use in buildings. We are currently doing an internal inventory of GHG emissions from municipal operations, but we have not adopted and are not pursuing any community-wide policies. We did update our zoning code to include some additional green elements, and we are looking at more low-impact development approaches in the long term.

2. **What have been your municipality's motivations for pursuing (or not pursuing) policies to reduce GHG emissions?**

The primary motivation for our municipal operations strategy is to save money by reducing internal energy use and costs. We also want to lead by example in the community. The number one reason we are not pursuing community-wide emissions reduction policies is that we feel it is important for us to be a leader and set an example for the community by improving our municipal operations. We want the city to be out front on this issue, then we will bring the community along. Community wide climate protection planning is part of our long-term plan. We will use stimulus money to complete our inventory of municipal operations, and we will start addressing community energy use and emissions in 3-5 years.

3. **Please describe the process that led your municipality to adopt these policies.**

The Mayor signed the USMCPA several years ago. That started the process. City management staff is committed to becoming a leader in the community, and is now driving the process. There are no political objections to our plans for reducing GHG emissions from municipal operations, and everybody is also on board for the notion of reducing community-wide emissions.

4. Has the community been involved in formulating and/or advocating these policies?

We have a local environmental advisory board that consists of a group of volunteers that is active in this area. It includes local citizens and representatives of the university and various public service districts. They meet monthly and report to the local governing body. An energy sub-group has been meeting twice a month. The advisory board's focus on energy issues is fairly new, and has only been in place for the past 6-9 months. The current focus is on getting stimulus money and figuring out what we are going to do with it. There is no community opposition. Everybody is all for reducing GHG emissions, but recognizes the financial limitations.

5. Is your municipality a member of ICLEI-CCP or the USMCPA?

Yes, we are a member of USMCPA. I think we are members of CCP, but am not sure. Both groups have been helpful in providing up-to-date information and helping us to understand things. We do not have the emissions inventory software that CCP provides. We used basic calculations to inventory our municipal operations emissions.

6. Does your municipality have staff assigned to work on energy and climate issues?

We do not have an energy manager, which makes it very hard to stay up to date. Only a portion of the environmental manager's position is dedicated to energy and climate issues. We also have an internal energy team of top management staff from the city manager's office and deputy directors from various departments. The energy team started off looking at natural gas issues, evolved after mayor signed USMCPA. This group has met at least monthly for the past two years. We are looking at hiring someone to work on this full-time.

7. Are you aware of other municipalities in your region that have adopted policies to reduce energy use and/or greenhouse gas emissions?

I am not aware of any regional municipalities that have done this. We are talking with some neighboring communities about moving forward on these issues. We have been working with the surrounding county, which sends a representative to our meetings, but we have not talked about specific details for how to work together. We are all trying to get our own act together, and once we realize that we can try to do something on a regional basis. It would be better to enact things in a coordinated manner when the time comes.

8. Do you grant permission for me to quote you directly or attribute your responses to your municipality (e.g., "the city of X has experienced Y)?

No.

<u>Anonymous Under-Performing Municipality 3.</u>

1. Has your municipality adopted any plans or policies to reduce community-wide energy use and greenhouse gas emissions? If so, please summarize them.

We finished a GHG inventory for municipal operations in 2007 and have tried to figure out how to get those back to 1990 levels. Some policies are in place to reduce electricity and vehicle fuel consumption from municipal activities. We also are planning to have an energy audit to see which heating units should be replaced or updated in our municipal buildings. We have considered some policies that would apply community-wide, but have not pursued them.

2. What have been your municipality's motivations for pursuing (or not pursuing) policies to reduce GHG emissions?

There is a public push to have the city update its equipment. This is mostly based on economic concerns, as we are trying to save money on energy use. There is a recognition that we have the responsibility to reduce GHG emissions. However, we feel we do not have the authority or right to dictate to individuals what they have to do. We felt that leading by example was the right thing to do. With the economy as it is we do not have the resources to do incentive programs. That would require additional staff resources to monitor and administer voluntary programs. There is no available staff to do that here, and we have a hiring freeze in place.

3. Please describe the process that led your municipality to adopt these policies.

Our effort to reduce energy use from municipal operations began about a year ago based on public recognition of climate concerns. We have public support for the idea of reducing GHG emissions. The Mayor signed the USMCPA pledge, which started the ball rolling.

After signing USMCPA staff felt it was important to develop a policy that identifies specific goals and methods so that staff could proceed. We wanted the elected officials to pass a policy that would give the staff some direction. In late 2008 the local elected body passed a sustainability policy for city operations. There were some questions, and some ambivalence on the part of a few elected officials, but the policy passed unanimously.

The question is how much time and energy can we devote to this. We would need a full-time person in the city manager's office to implement these policies. Even our existing sustainability policy requires our directors to implement things that can be easily achieved.

4. Has the community been involved in formulating and/or advocating these policies?

The community was involved in developing a sustainability policy. A local Cool Cities coalition formed, comprised of representatives of the city and various local organizations like churches, citizen groups, the library, the chamber of commerce, a downtown merchants group, the park district. There has been no outspoken community opposition.

5. Is your municipality a member of ICLEI-CCP or the USMCPA?

The city signed the USMCPA and is also a member of ICLEI-CCP. We joined CCP as a resource for information, guidance, etc. ICLEI provides a lot of information and is helpful if anything is needed. They provide a lot more than we need.

6. Does your municipality have staff assigned to work on energy and climate issues?

Nobody works specifically on these issues. Every department director puts some of their own time towards implementing the sustainability plan. Less than 5% of any individual's time is dedicated to its implementation, except for the Director of Water and Wastewater, who dedicates about 25% of his time.

**7.	Are you aware of other municipalities in your region that have adopted policies to reduce energy use and/or greenhouse gas emissions?**

There are a couple of other USMCPA signees in our area. We quizzed a few of them as the sustainability policy was developed, so as not to reinvent the wheel, but I cannot recall exactly what they said they have done. There has been no regional effort to meet or coordinate efforts on energy or climate protection issues.

**8.	Do you grant permission for me to quote you directly or attribute your responses to your municipality (e.g., "the city of X has experienced Y)?**

No.

<u>Anonymous Under-Performing Municipality 4.</u>

1. Has your municipality adopted any plans or policies to reduce community-wide energy use and greenhouse gas emissions? If so, please summarize them.

We have primarily focused on reducing energy use and GHG emissions from municipal operations, rather than community-wide emissions. The city operates within the community, so any reduction of emissions from our operations will reduce those of the community as well. We have not adopted a community-wide GHG emissions inventory, reduction targets, or action plan, but we plan to undertake the inventory within the next year. We will try to establish the reduction targets and action plan after the inventory. The surrounding County does have a completed inventory, reduction target, and action plan.

The city does promote bicycle use and public transportation, but we do not have policies for energy efficiency or renewable energy. A lot of those policies are available through state agencies, including incentives for wind, solar, and energy efficiency. We have a contract with a private company to make energy efficiency upgrades to our municipal buildings. We are also training our employees to reduce their energy use both at work and at home.

2. What have been your municipality's motivations for pursuing (or not pursuing) policies to reduce GHG emissions?

We feel it is important to first look at our own municipal operations. The reason we have not pursued for community-wide reductions is simply a matter of lack of resources. We believe it will be easier to pass community-wide policies if the municipality is already walking the talk. The Mayor understands climate change and its consequence and wants to address the issue because that is the right thing to do. The Mayor, City Council, and staff also recognize other benefits, such as the cost benefits from reducing energy use, but the primary purpose is to address climate change and achieve other environmental benefits.

3. Please describe the process that led your municipality to adopt these policies.

The city's efforts have largely been driven by elected officials. I'm not sure of the exact history, whether the Mayor or City Council originally brought up the idea of joining CCP. That was the City's first policy act with respect to climate change. We have also joined the USMCPA and a state-wide program for municipal climate protection. The Mayor is now leading the process, but some Council members have resisted. The city's pledge to address climate change was not passed unanimously by the Council. Overall the majority of our local elected officials are supportive.

The various Department heads are working with their staff on policies to reduce GHG emissions from municipal operations. Some employees participate on the action plan committee. Other staff members feel they are already too busy, and have resisted working on internal energy plans in their departments because it would add to their workload.

4. Has the community been involved in formulating and/or advocating these policies?

Our local action plan committee provides guidance to the Council and the Mayor on climate policies. It includes members of the city council, municipal staff, and the community members. The committee is pushing green building, green fleet, and green purchasing policies for municipal operations, and subcommittees are working on developing those policies.

Many of the members are individuals who have been involved in energy and environmental issues in the past. They are primarily people who have some expertise related to climate change or energy issues. Other members include the sustainability coordinator from a local college and the chair of a local sustainable communities group. The Chamber of Commerce has not been involved in the local action plan committee.

There has been little public resistance, as the community generally tends to be supportive of environmental issues. Some individuals do not acknowledge the problem of climate change, but overall people recognize that it is an issue and we should do something about it. Even if they don't believe in climate change, they still understand that saving energy and saving money is a good thing. Occasionally something in the newspaper will come up, like a letter to the editor saying that global warming is not real or is not caused by humans, but there is not major community resistance.

5. Is your municipality a member of ICLEI-CCP or the USMCPA?

Yes, both. We use ICLEI to get information about best practices and policies that are in place in other communities. We used their emissions inventory software for the municipal operations inventory, and we participate in conference calls and trainings that they organize and use their on-line resource center. They have been very helpful. I have not been involved with USMCPA, and do not know to what extent the Mayor works with them beyond attending their conferences.

6. Does your municipality have staff assigned to work on energy and climate issues?

No. We just have a contract employee that works roughly half-time on energy and climate issues. Some staff members work on energy and climate issues through the local action plan committee and its subcommittees.

7. Are you aware of other municipalities in your region that have adopted policies to reduce energy use and/or greenhouse gas emissions?

The County has adopted a GHG element in its comprehensive plan. We will coordinate with the county in trying to help them achieve their GHG emission reduction goal. There are other ICLEI members in the region, but we work most closely with our local county. The county-wide climate protection initiative committee includes representatives of major employers including the local power company, nearby universities, and the city and county governments. It meets once a month and is looking at leveraging purchasing power, such as through bulk bio-diesel purchases.

8. Do you grant permission for me to quote you directly or attribute your responses to your municipality (e.g., "the city of X has experienced Y)?

No.