

DRAFT FOR REVIEW

Local Communities and Climate Change

How do communities establish effective involvement?

For:
Mayor's Task Force On Energy and Environment
Honorable Mayor T.M. Franklin Cownie
City of Des Moines

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Tara Lynne Clapp

Executive Summary

Community members interested in reducing greenhouse gas emissions in their communities need good information about what programs and initiatives other communities have established. As well, many communities would like to know how to establish and build similar programs and initiatives in their own areas. In this report we address the question of how communities have been able to establish, maintain and grow effective greenhouse gas (GHG) emission-reduction programs.

Seven communities with effective programs to reduce global warming and increase sustainability were identified. We conducted interviews to learn the key factors that motivated people to become involved with establishing programs in each community. For each community, the programs are also described and analyzed.

Key factors in involvement included a local problem that people felt was serious, local leaders in government and in NGOs, and value-sets that existing and new residents were more likely to have or to adopt. Most successful initiatives grew out of smaller and frequently environmentally-related programs, from Tree City USA to programs that address air-quality problems.

Introduction

How Can Your Community Begin to Reduce Greenhouse Gas Emissions?

Community members interested in reducing greenhouse gas (GHG) emissions can learn from communities with successful programs. In this report, we review seven communities of various sizes that have established successful programs to reduce GHG emissions and increase the sustainability of their communities. For many community innovators that would like to establish new programs and initiatives, how to motivate and involve community members is a key question. In this report we address the question of how communities were able to establish, maintain, and grow effective GHG emission-reduction programs.

This report and the research behind it developed in response to a question raised at the Des Moines Mayor's Task Force on Energy and Environment. Mayor Frank Cownie has taken a leadership role in Des Moines' initiative to reduce greenhouse gas emissions. Mayor Cownie is also interested in involving other cities and towns in Iowa and the Midwest. In reflecting on his efforts to involve other Midwest communities, he said that many other mayors and citizens wanted to know how to start.

With greenhouse gas reductions, as in sustainable communities more generally, many ideas and technologies can be implemented to make communities less energy and resource consumptive. It is clear from a brief introduction to the GHG issue in the local community context that most emissions of greenhouse gases come from the usual suspects of transportation and buildings. As soon as you consider what is transported and what is inside the buildings (activities and processes), the range and variety of possible initiatives and

programs is almost unlimited. Beyond light bulbs and building insulation, any measure that conserves energy reduces greenhouse gases. Programs can easily include more convenient and convivial public transportation and improved land-use patterns, and extend to local food programs and changed consumption habits.

Given the bewildering variety of choices of what individuals and communities could do, one could also ask why more communities do not have a shared set of approaches to reducing greenhouse gas emissions.

Local communities are not required by law to conserve natural resources, and there are some limitations on their ability to control waste streams and to regulate commercial enterprise. However, local communities can, through volunteer action, cultural shifts, regulatory action and spending programs, become much more responsible in their use of natural resources and more responsible about their collective effect on the global environment. The question for us, and for many interested individuals, community leaders, mayors and activists, is:

How do we bring **about change**?

How Communities Change

In the absence of federal and state requirements, local governments have to depend on local willingness to support initiatives that are voluntary. Individuals acting alone can make some changes, some perhaps even in community policy. In the medium and longer term, effective programs themselves must be sustained through a breadth of public acceptance and support. As in sustainability, the framework of reducing greenhouse gases in the U.S. is democratic and depends on individual action.

Sociologists have several ideas about what makes for sustained change in public attitudes and individual action. Some of these theories feature key leaders who—through such sources of power as charisma or political coalition-building, social or financial capacity, or persuasiveness—act as community catalysts. The idea of the importance of key leaders is not unique to the local level, and most of us can think of a role that a key leader played in our lives at a local, state or national scale. For example, at the moment, Al Gore is a key national leader in the movement to reduce greenhouse gas emissions. Many community members we interviewed talk about the importance of certain individuals that take on leadership roles in their communities.

Many historians and some sociologists will point to a key event as a catalyst for change. Typically this is an event that seems to bring attention to a problem and evoke changes in behavior and attitudes. When the Cuyahoga River in Ohio caught on fire, it focused national attention sufficient that the Clean Water Act was passed not long afterward. Similarly, when it was known that the bald eagle was endangered, it gave impetus to the passage of the Endangered Species Act. Many community members in our case studies describe how a key issue was perceived in their communities.

Economists and sociologists that use economic theories tend to explain community behavior with reference to the individual decision-making process. In this view, individuals act “rationally” with regard to some value, which is not always money. Individuals calculate their advantage and choose the path that maximizes benefits. While it is difficult to use this theory to explain changes within a whole community that is in many ways similar to other communities, it is useful in understanding incentive and penalty programs within communities.

Many people believe that education will lead to changes in social and individual behavior. Education may refer to simple public information, such as where to buy compact fluorescent light bulbs and how much energy they will save. Or, education may refer to the more gradual change in social norms and values that we have seen in the last few decades with regard to increased use of seat belts and the reduction of smoking in workplaces, restaurants and hotels. While at the basic levels education emphasizes the voluntary nature of change, at the more complex level the changes become habitual and eventually are enforced as new social norms. At this end of the “education” spectrum, change is more like a social movement.

Social movements are a way of explaining these larger changes in social norms. While social movements typically

start with a small social group distinguishing itself from the majority, many individuals may adopt the changes in norms and attitudes that these initially small groups have advocated. Examples of social movements of the past century include the suffrage movement, the environmental movement, and the property rights movement. Each of these has resulted in change over time in the way that many people believe and act, whether or not they would consider themselves environmentalists or property-rights activists. Each of these movements resulted eventually in changes in the law as well as in social norms. While the community members we spoke with do not mention the idea of “social movements” directly, they do mention aspects of social movements, including distinctive community identities, a small group motivating broader involvement, and eventual changes in local cultures.

How Can Others Use Our Research in Their Own Communities?

The Spring 2007 Sustainable Communities class at Iowa State University chose seven communities that have successful programs to reduce greenhouse gas emissions implicated in global warming and to increase the sustainability of their communities more generally. We used a “key informant” interview process to ask how these communities organized themselves to reduce greenhouse gas emissions in the absence of federal or state requirements, to take on this local initiative without mandate. We also researched a set of communities that offer a variety of economic and geographic contexts, populations sizes and approaches. Most small and medium-sized cities are likely to find something in these case studies that speaks to them. Interested individuals reading these stories can find similarities that may be applied to their particular community contexts, while adjusting for local specifics. Typically, the people we spoke with were often either the initial leaders in the efforts or knew the initial leaders and how the initiatives got started.

The communities we chose for our case studies were Austin, Texas; Cambridge, Massachusetts; Chattanooga, Tennessee; Clifton, New Jersey; Fort Collins, Colorado; Madison, Wisconsin; and Portland, Oregon. The cities range from suburbs to larger central cities with populations of 80,000 to 600,000. The case studies are ordered by increasing size of communities and increasing complexity of goals and programs. The programs these communities have in place vary widely: tree planting, public education, new building codes, changes in purchasing and city/town building requirements, recycling and waste treatment improvements, water conservation efforts, public housing improvements and many others. In short, there are plenty of ideas about how communities can reduce their impact on the earth's

climate. The way our report is different from a mere “listing of programs” or a “Google search” of programs is for the insights we gained about the social processes of change. When are key leaders important? How much can a committed key leader get done in a particular community context? When are focusing events important? How much are local communities influenced by national trends? Rather than focusing on the specifics of technologies and programs, we focus on the process of social change and how each community explains how and why they managed to go beyond the status quo at the local level to address global environmental problems.

About the Class

We were an interdisciplinary group of 30 mostly senior undergraduate students and a few graduate students from Community and Regional Planning, Architecture, Interior Design, Physics, Biology, Construction Engineering, Agricultural Education, Environmental Studies and Interdisciplinary Graduate Studies.

For several of the students, this class served as an introduction to the ideas of sustainable communities. For most, this course built on the basics from other courses, but was the first experience in interviewing and research design, especially for policy-relevant research. A subset of the students in the class (one from each case study group) attended the Des Moines Mayor’s Task Force meetings over the Spring 2007 semester, to gain understanding of public process in action. The entire class participated in reviewing a new energy and environment policy for Des Moines.

We learned a lot about how and why people do things together in communities, and we learned a lot about research. We presented a selection of what we learned from this report to the Des Moines Mayor’s Task Force on May 2, 2007. We hope that this report will help the people of Des Moines and other communities in Iowa and around the Midwest to get started, to broaden involvement, and to reduce global warming emissions.

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Sustainable Communities Class, Spring 2007

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Clifton, New Jersey

Kristen Dosch | Jared Graeve | Brandon Gries | Derek Partridge | Ashley Roach

Introduction

There are many ways to define sustainability. Most definitions stress an emerging social contract that balances the enhancement of social equity, care for the environment, and economic viability. A common thread through all of them is the consideration given the generations that follow and their inheritance. When considering the truly long range, it is possible that the private sector may be able to develop innovations to replace many kinds of environmental services that we now derive directly from nonrenewable sources. Yet, in our view, it is governments that have the ability and responsibility to effectively oversee sustainability efforts. One initial way for governments themselves to begin to act more sustainably is through the adoption of durable patterns of consumption that stress renewable source materials, the preservation of precious places for the future, and reusing and recycling material whenever possible.

Looking over northern New Jersey from a bird's-eye view, you see a landscape frequently described as a concrete jungle. Hidden within are many different municipalities; each has its own unique characteristics and culture. Within the northern New Jersey landscape, Clifton has created an identity as a model city for particular maxims of sustainability, including a nationally recognized recycling program, open-space preservation and citizen involvement in the process.

Background

The city of Clifton, New Jersey, is not known by many outside the northern New Jersey region. With a population of nearly 80,000 (United States Census Bureau 2005), Clifton has seen steady growth in the past 15 years (State of New Jersey Department of Labor & Workforce

Development). The city is located in Passaic County, 10 miles outside of New York City, and has its roots in industrial textiles (Anzaldi 2007, pers. comm.). While Clifton may not be the largest town, especially with respect to some of its neighbors, the efforts it is making to help create a sustainable community are some of the most astonishing and impressive. The success and pride Clifton has in its environmental programs have not come without hard work. Many obstacles, such as financial concerns over the programs and investments, have led local citizens to become involved in the long-term thinking over Clifton's future; they knew they would have to conquer all obstacles to achieve the desired results.

In 2007, Clifton's recycling program received the U.S. Environmental Protection Agency's highest award, the Environmental Quality Award, for its work in the WasteWise program, which the city joined in 1991 (EPA Environmental Achievers, 2007). What has made and will continue to make Clifton's recycling efforts successful is its commitment to community outreach and education. Clifton annually circulates information-packed recycling calendars and has a robust infrastructure of recycling collection facilities, as well as curbside pickups. Clifton's system and infrastructure is able to accommodate most products and materials. And most important, the citizenry has not ignored the message. Mayor James Anzaldi proudly notes that Clifton is a unique community, and its citizens are easily motivated to follow new initiatives through their conservative fiscal values, civic pride and sense of financial responsibility (Anzaldi 2007, pers. comm.).

Clifton began to make the move toward becoming an environmentally friendly community with actions on

multiple fronts. One was a simple program to help plant more trees in the early 1990s. From there, Clifton's environmental efforts have expanded greatly, supported by lifelong residents who are personally motivated and led by innovative minds (Shukaitis 2007, pers. comm.). By taking the initiative to do simple things, such as spray stencils on freeway underpasses to reduce or eliminate graffiti (Anzaldi 2007, pers. comm.), the citizens have shown that they have a heartfelt interest in making their city improvements a success. The road has not been without challenges; nevertheless, Clifton has committed itself to these efforts and continues to enjoy the reward of a more vibrant and satisfied community.

First Steps

Most people in our society see a tree in many ways: a source for shade, a buffer between uses, and for some, a source of sustenance. Most people, however, may not acknowledge the value of a single tree. People perceive them as an abundant resource. However, in a place where "open spaces are being eaten up by black top and buildings are continuously being developed" (Kolodziej 2007, pers. comm.), individual trees suddenly inherit a far greater value.

Clifton was one of those places in the early 1990s. In the midst of an economic boom and rapid development, the town's residents sought more greenery in their neighborhoods. According to former Mayor of Clifton Gloria Kolodziej, Clifton retains only three percent of its open space though the community was initially all farm and open land. She suggests that the desire for more trees was a grassroots campaign (Kolodziej 2007, pers. comm.).

During the environmental revolution of the early 1990s, many environmental and conservation groups were creating mild political pressure and calling for earth-friendly policies and programs. What resulted was a tree-planting program, still active today. The program is responsible for planting over 500 trees per year, paid for through grants from various organizations. Citizens have also contributed by participating in the Adopt-a-Tree program. One reason the program has been successful, said Clifton City Manager Albert Greco, is that the city has its own tree farm (Greco 2007, pers. comm.).

Since the adoption of the tree-planting program, the city of Clifton has also implemented an open-space program in which Clifton buys "for sale" lots for the sole purpose of keeping them open spaces. Mayor James Anzaldi estimated that, to date, the city has acquired about 75 acres of land that will not be used for commercial development (Anzaldi 2007, pers. comm.).

The tree-planting program and the open-space program were only the beginning of Clifton's efforts. Many movements and efforts wither and die because only a few people are involved and they are unable to broaden participation. In order to get the entire population involved and interested in making the city a more sustainable community, there would need to be innovative and engaging programs in place.

Programs

Clean Communities Program

One program that has been successful in public outreach is the Clean Communities Program, created in 1986 in response to New Jersey's littering problem. Revenue from state taxation on litter-causing products funds the program. With this money, cities like Clifton are required to provide programs to support litter cleanup and removal, educational programs, graffiti cleanup, enforcement of anti-littering laws and sponsorship of the Adopt a Highway Program (DuBois 2007, pers. comm.).

One way that Clifton uses these funds is in its landscaping program. Through this program, the city not only meets some of the criteria for the Clean Communities Program, but gets its residents involved as well. Through the landscaping program, a citizen adopts a piece of land. They are responsible for the upkeep of the land and the removal of trash and litter on the property. They may also choose to do landscaping, such as planting flowers. Currently, more than 75 501(c) nonprofit organizations participate. These organizations are eligible to be reimbursed for their efforts by up to \$250. In addition, professional landscapers can have their annual permitting fee of \$150 waived if they participate in the program. Now in its 18th year, the program oversees the adoption of around 200 properties in the city (Anzaldi 2007, pers. comm.).

Clifton also makes an effort to hold large community events. For example, the city celebrates Earth Day and gives out trees to those who cannot afford them, with the only requirement that the trees be properly maintained (Kolodziej 2007, pers. comm.).

One of the biggest aims of both Clifton's environmental efforts and New Jersey's Clean Communities Program is reaching out to the public through education. The city of Clifton goes to great lengths to educate the public on its nationally recognized recycling program, holding annual Clean Communities presentations with skits put on by children of the community and over 50 organizations.

Public Education Outreach

One of the key areas where the city of Clifton provides the most outreach is to the Clifton Public School District. They gear many of the workshops toward young people to help make the next generation more environmentally conscientious. Marie Hakim, president of the Clifton Board of Education and liaison to the schools in the Clean Communities Program, spoke of the importance of building relationships between the CCP and the schools. Mayor Anzaldi pointed to the conservation clubs at the middle and high schools and Clifton High School's peace garden as particular highlights of the public schools' involvement (Anzaldi 2007, pers. comm.).

Adopt-a-Tree

The Adopt-a-Tree Program is closely associated with the Tree Planting Program. Citizens are also responsible for one of the trees in the Clifton Organic Tree Farm. The duties associated consist of general upkeep, such as pruning.

Clifton also has programs that help encourage at-home activities that will help the environment. Through these informational sessions, the city educates its residents on things such as how to compost properly in their backyard. It has also provided the public with information on energy-efficient products ranging from common items inside the home, like appliances and light bulbs, to things that may be considered luxuries, such as hybrid cars. Citizens can learn about a wide array of topics through workshops and forums offered by the Department of Recycling.

Municipal Conservation

The city of Clifton not only encourages its residents to be environmentally friendly, but is itself an example. It has taken many steps to make the city buildings and assets better for the environment. Said City Manager Al Greco, "Hybrid cars are being purchased by Clifton to replace the city's fleet and we're replacing V8 [engines] with V6's." In addition, new energy-efficient light bulbs are being installed in city buildings (Greco 2007, pers. comm.).

By using various programs to connect with the public, Clifton has overcome a major obstacle. With people interested and involved with the city's environmental efforts, Clifton only needed to give the citizens reasons and ways to become involved. Today city leaders will attest to an 85 percent participation rate by its citizenry. As Mayor Anzaldi put it, "The people in Clifton rise up to the occasion; with a small community they feel banded together" (Anzaldi 2007, pers. comm.).

Recycling in Clifton

While Clifton has a wide arsenal of programs to help make its city and citizens more environmentally friendly, one program is at the forefront of the city's efforts: a nationally recognized recycling program.

The program was born in the 1970s, before the huge increase in the cost of garbage collection. The city council began the effort, eventually setting up a recycling center so that people could drop off their goods. Mayor Anzaldi boasts that the program was ahead of its time, with creative advertising and promotional strategies including coordinating with the Cub Scouts, Boy Scouts and Girl Scouts. He also recalls that various organizations used recycling as a means to raise funds because recycled newspapers were valuable, with profits of \$1 per 100 pounds (Anzaldi 2007, pers. comm.).

Today, the Clifton Department of Recycling holds many workshops and forums for businesses, neighborhoods and the general public. During these informational sessions, people can learn the benefits of recycling as well as how to identify recyclable products and the proper sorting of them. The recycling coordinator, Al DuBois, organizes these events.

When I was young, recycling was just coming about. I started getting involved in environmental clubs. ... I grew up in Clifton, and as time moved on, I became the recycling coordinator" (DuBois 2007, pers. comm.).

The recycling program in Clifton is very accommodating for residents. The city provides two ways for citizens to get rid of their recyclables: curbside collection and a drop-off depot. For curbside pick-up, a recycling truck goes to houses every three weeks to collect the recyclables. The city collects the materials separately and treats them as a commodity. The city provides residents a calendar of pick-up days to resolve any concerns on occasions when the regularly scheduled pick-up day falls on a holiday or otherwise. City Manager Greco observed that "curbside pick-up is convenient and encourages recycling. We also provide metal pick-up by appointment so that it can be reused" (Greco 2007, pers. comm.).

Clifton also has a drop-off depot for other recyclables. This is useful for high-volume items such as plastics, which would be too cumbersome to manage with curbside collection (Anzaldi 2007, pers. comm.), and especially for hazardous materials, such as computer parts, batteries and tires. The drop-off depot makes it cheaper and more convenient for people to dispose of those things the right way.

Clifton has diverted at least 34 percent of total household waste as a result of its efforts, and revenue exceeds \$13 per

ton. The city uses the revenue to pay for its overhead costs and earns more than \$200,000 per year from its current contracts (WasteAge, 2001).

In addition, the city picks up over 40 types of waste from businesses on a weekly basis and provides can and paper recycling for all city employees (Anzaldi 2007, pers. comm.). Mayor Anzaldi explained that a number of materials must be recycled by state law, including rubber or tar roofing, car tires, and motor oil. However, he proudly notes that the city enforces several regulations which surpass those established by the state, and that the city is active on many fronts (Anzaldi 2007, pers. comm.).

Many times, the effort and hard work put into something goes unnoticed, but this is not the case with Clifton. Clifton has been able to garner respect and recognition from the environmental community nationwide.

Results

The saying goes that nothing beats a hard day's work. For Clifton, it has been many hard years' work to achieve its current reputation and stature among the environmental community. This reputation continues to grow as the city receives many different awards and honors, including being named an EPA Model Community, being a Tree City for the past decade, participating in WasteWise, as well as numerous awards for its recycling program.

One measures results not only in awards and honors, however, but also in per annum changes, benefits and improvements to culture that the people who live and work in Clifton experience.

It used to be that developers took down healthy trees and they were never replacing what they took, but now they have to. There is awareness, education, property maintenance as well as being sure that the application of federal grant money is toward healthy trees. Clifton has now implemented, by law, when a new building goes up, only the trees in that building's footprint can be taken out; the rest have to stay. Also, when new roads are set in place, in a neighborhood, each house will have a new tree planted in the yard (Kolodziej 2007, pers. comm.).

The most important accomplishment that Clifton has made is its reduction of greenhouse gas emissions. It is in this respect that the efforts to become more sustainable are truly measurable. In 2001, Clifton reduced its greenhouse gas emissions by 233,357 metric ton carbon equivalents. This would approximately equal the removal of 175,400 cars from the road for an entire year.

While there have been many successes, the task of becoming more sustainable and environmentally friendly is far from done. As former mayor Gloria Kolodziej said, "Clifton still faces the same problems as everyone else ... There is overcrowding in New Jersey. Rivers are being polluted (Kolodziej 2007, pers. comm.)."

According to Steve Shukaitis, a member of the Clifton Environmental Commission, Clifton also needs to work together on a more holistic level addressing and including the growing minority populations. He believes there will be an enhancement of the results, with respect to combating greenhouse gases as well as becoming more sustainable, if each individual group coordinates its efforts and synergizes (Shukaitis 2007, pers. comm.). There are also areas for improvement in terms of more reliable energy sources, not only for Clifton, but for the entire country. Deploying energy-efficient projects has become difficult.

"Energy-efficient projects, such as turbines, solar panels, and other innovative methods of saving energy are hard to sell," said Albert Greco (Greco 2007, pers. comm.).

Perhaps the most critical view is the need for a whole new look regarding recycling. While the increased efforts to recycle are good, it still has its downfalls, since it uses up a great deal of energy and much of the recycled material still ends up sitting in a landfill.

We need to implement the use of refillables and reusables into our communities. This would help cut down on a lot of the energy used in recycling and processing. Why not reuse a container more than once? This would cut costs on the energy used to make that container or to recycle that container. We still would be recycling, but we would be saving money, too. We need to simplify and we need real solutions. We are not solving the problems; we are just replacing one with another (DuBois 2007, pers. comm.).

Conclusion

The city of Clifton has gone to great lengths to become a more sustainable community. Given its size, few municipalities can mount a challenge to the effort, impact and results achieved there. Through its public education and recycling programs, Clifton has not only made a difference for the environment, but has also provided a cultural change for the community and future generations.

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Cambridge, Massachusetts

Blake Fisher | Steven Diesburg | Justin Dowhower | Travis Duggan

Introduction

The city of Cambridge, Massachusetts, has been attempting to reduce its energy consumption and greenhouse gases for quite some time. In the early 1990s a group of citizens started a small grassroots effort to make the city “greener.” Unfortunately, that effort was somewhat poorly organized and failed as a result. The current environmental push, which has been much more successful, gained momentum around 2000. The latest initiative to make Cambridge a “green” city is not traceable to a single person, or even a group of people. Rather, this initiative was a combination of factors all falling into place at the same time. When asked about why and how Cambridge initially became interested in becoming a more environmentally friendly, city councilwoman Henrietta Davis simply said, “It was a combination of things; the time was just right” (Davis 2007, pers. comm.).

Background

Cambridge is located in the Greater Boston Area of Massachusetts, along the Charles River. Famous for its educational institutions, Cambridge is home to both Harvard University and the Massachusetts Institute of Technology (MIT). As one might expect, the residents of Cambridge boast a higher-than-average education level with respect to the rest of the country. Nationally, about 24.4 percent of Americans have a bachelor’s degree or higher; in Cambridge that figure is about 65.1 percent. Cambridge’s citizens also have a higher per capita income, of about \$31,156, while the national average is \$21,587. The presence of Harvard and MIT has helped to inflate real estate prices, which have recently held steady, despite being

very high. In 2000, the median value of owner-occupied homes in Cambridge was \$398,500, compared to \$119,600 nationally. These high real estate values may be due in part to the fact that Cambridge is the fifth most densely populated city in the United States. As of the 2000 census, 101,355 “Cantabrigians” called Cambridge home.

Historically, Cambridge was a center of industry for New England, and saw the height of its industrial boom just before the Great Depression. Since then, the number of manufacturing firms has dwindled, but Cambridge saw an economic resurgence in the early 1980s with a number of technology firms gaining rapid success. The emergence of Silicon Valley in California, however, coupled with the standardization of DOS-based computers, forced many of these firms to fizzle as rapidly as they grew. Today the two universities are the largest employers in Cambridge, with MIT employing about 9,500 people and Harvard about 10,000. The presence of these institutions has fostered a new boom in biotechnology in the city. While no big computer company from the 1980s is still a major player in Cambridge’s employment arena, there are many small entrepreneurial start-up firms. Collectively, they are a significant part of Cambridge’s employment picture.

First Steps

Sam Seidel, chair of the Cambridge Conservation Commission, observed, “We’re Cambridge; we ought to be doing something radical!” (Seidel 2007, pers. comm.)

Many Cantabrigians share the sentiment that dramatic action on global warming is appropriate for Cambridge, ranging from Seidel as a citizen activist to Susanne

Rasmussen in the city government, to elected officials like city councilman Craig Kelley. They all believe there is a general environmental consciousness among the citizenry, which has grown, supported and at times pushed the climate initiatives of the city. There is an attitude that they can and should be championing environmental improvement.

The environmental awareness of the Cambridge population stems back to before it had taken any action in terms of climate change. In the 1990s, a group of concerned citizens approached the city government hoping to establish a city-based program using sustainability indicators. Although the presentation of the idea was not enough to persuade the city government to take action, it set the stage for a better-established means yet to come.

In the late 1990s the International Council for Local Environmental Initiatives (ICLEI), with a Regional Capacity Center in neighboring Boston, contacted the city of Cambridge. The council's precise and established means for measuring emissions and indicators and running a city program for climate protection were much more acceptable to the city government. Some of the city staff felt strongly about the program and took it upon themselves to advance it. In 1999, the city council voted to join the Cities for Climate Protection Program (CCP). Working through the CCP helped Cambridge to establish a baseline for greenhouse gas (GHG) emissions and move forward more quickly than cities not participating in the program. Shortly thereafter, the city, working through the ICLEI program, finished its Climate Protection Plan in 2002, establishing the lofty goal of a 20 percent reduction from its 1990 baseline in citywide GHG emissions by 2010.

After the initial boom of action at the city level, citizens perceived a disappointing lag in actual response and movement toward the goal. Two factors may have contributed to this. First, the goals seemed to some to be much too ambitious. With a lack of realistic targets, people were not prone to believe in and put effort toward the program. Second, Cambridge was lacking a definite leader or champion of climate control. Cities like Chicago, having a popularly elected mayor, have great potential for an environmental leader. In the Cambridge system, however, the people elect the council, which then chooses a mayor from among its members. This takes any mandate away from the mayoral position, and the lack of a definite leader in this early process may have led to a slow beginning.

Although there is a general feeling in the community that more fundamental change is needed in the way our society works in order to truly solve environmental problems,

Cambridge's climate initiatives are a great start and means to become a national and international leader. Although the country may not look to Cambridge for answers on societal changes, they already look to the city for expertise on scientific and technical issues stemming from Harvard and MIT. The city realized this and felt it extremely critical to the success of their climate protection plan to gain the support of Harvard and MIT and include them in any planning that might be occurring. MIT had a representative on the Cambridge Climate Protection Task Force. After the official adoption of the ICLEI program, one of the city's early actions was to pose a challenge to the institutions, adding legitimacy to the Climate Protection Program and tapping into both MIT and Harvard's respective sense of pride. Henrietta Davis approached the universities and other major organizations with this challenge: increase their recycling rates by 40 percent by December 2005. The institutions' competitive spirit surfaced, and with publication of the challenge, Harvard and MIT were then publicly accountable if they did not take action, not only to complete the goal, but also to have a larger impact on the state of GHG emissions in Cambridge. The spotlight was now directly on MIT and Harvard to reduce—and document reductions in—GHG emissions.

MIT took action. The institution successfully increased recycling by 40 percent, and continued with a comprehensive GHG emissions analysis of the campus. In 2003, an MIT graduate student was pursuing her master's degree by analyzing all the major infrastructure systems at MIT and their GHG emissions from 1990 to 2003. Using an initial framework provided by the nonprofit Clean Air Cool Planet, she gradually developed her method, specific to the needs of MIT. Compiling this information into MIT's ecological footprint allowed them to understand where the largest problems relative to climate change were occurring. The results suggested that 90 percent of MIT's GHG emissions were from campus buildings.

The city of Cambridge's ability to gain the support of the local universities allowed the program to make drastic leaps forward. Community members began to see the city's persistence and commitment regarding the Climate Protection Program, and with their pride and desire to act as a model city for climate protection already present, the transition gained momentum and action became easier.

Building Involvement

Because the public in Cambridge is already conscious of environmental problems, emphasis was not required to increase environmental awareness, but rather to influence the

actions of residents and businesses. Nonetheless, there seems to be broad agreement that this is still the point at which city activity is somewhat lacking. With all of the environmental backing, there should be a lot of change going on, but it has been slow to get moving.

The Cambridge Climate Leaders program is one way in which the city is trying to bridge this gap at the business level. Businesses are invited to voluntarily sign on to the program and agree to incorporate Cambridge's climate goals into their business development. The city then provides assessments and expertise to help the businesses take steps toward the goals they have endorsed.

Not all programs are voluntary. The city enacted its Parking and Transportation Demand Management (PTDM) ordinance in 1998 before the climate efforts; it has since morphed into a part of the climate protection program. Through this program, new parking developments and refurbishments are required to comply with certain criteria. In the case of small parking developments, developers are given a list of options intended to decrease single-occupant vehicle (SOV) use, and incentivize things like bike riding, walking and carpooling. In the case of larger developments, the developer is required before construction to provide and have a PTDM plan approved that will meet the requirements. Developers are free to develop the specifics of the plan themselves, but such plans often include:

- Transit and vanpool subsidies
- Pre-tax deduction of transit and vanpool fares
- Carpool and vanpool matching service
- Shower and locker facilities for bicyclists and walkers
- Bicycle parking
- Carpool and vanpool parking
- On-site car sharing vehicle
- Employee shuttle
- Emergency Ride Home (ERH) program
- Commuter information center (bulletin board, web page, brochure table)
- Employee Transportation Coordinator (ETC)
- Flexible or alternative work hours
- Telecommuting program

(City of Cambridge 2004)

On an annual basis, the owners must either count the percentage of SOV using the lot, or survey their users to get the same information. If it isn't functioning, the city has the

power to force the owner to make reasonable changes to reach the right levels. The ability to actually enforce environmental regulations is essential, according to Susanne Rasmussen, director of environmental and transportation planning for the Cambridge Community Development Department. "Because of monitoring, [PTDM] is real," she said (Rasmussen 2007, pers. comm.). The program is also an indirect way to give Cambridge citizens cues to change behavior and reduce their personal GHG emissions through less driving.

GoGreen business awards are also given out annually to businesses that are doing their part in three different categories: transportation, waste reduction (formerly recycling), and climate/energy. Systems like this recognize good efforts and provide a way for citizens to be aware of which businesses are taking the lead and should be patronized if they want to support environmental business practices. Citizen awareness is also raised through the annual energy fair and advertisement of programs at Riverfest, a city festival.

Two means of building involvement have not been as functional. The city has discovered through experience that mass mailings of pertinent information are for the most part ineffectual. Following ICLEI advice, the city also started a project called Ecoteams in which neighborhoods or groups of people would be trained to reduce their ecological footprints through responsible energy, water, transportation and waste practices. The program was extremely ambitious and teamed each voluntary group with a leader with expertise from the city government. They would then meet six or seven times and use a systematized approach to teach the participants how to lower their personal environmental effects and give them the means to do so through in-depth knowledge building. This program, although extremely well thought out, appears to require much more input than the participants or the city employees are capable of for a sustained period of time.

Programs

Cambridge has many city and community-oriented initiatives that have been created over time to deal with GHG emissions, transportation, waste, energy efficiency and energy consumption.

Programs for a Sustainable Built Environment

Cambridge has focused on making all new and existing buildings "greener." It is now city policy to have all new construction and renovation work LEED (Leadership in Energy and Environmental Design) certified based on the U.S. Green Building Council guidelines. The city planning board encourages developers to use the LEED rating system under project review guidelines. Cambridge put the LEED

guidelines into action on its City Hall Annex, which became the city's first "green" building. Due to a grant from the Renewable Energy Trust Fund, the money was put toward purchasing energy-efficient features for the building, including low-e windows, photovoltaic solar panels and "Energy Smart" lighting. This initiative was partly in response to the awareness that buildings are major energy consumers and residential buildings create the majority of greenhouse gas emissions. The EPA provides a Green House Gas Emissions Calculator on its Web site for residents and individuals in an effort to reduce energy usage. NSTAR, the largest Massachusetts-based, investor-owned electric and gas utility company, also provides efficiency programs for businesses and residents to assess energy usage and tips on how to reduce consumption.

Energy Management Workgroup

Energy management has been another focus for the Cambridge community. The Energy Management Workgroup established by the city manager and maintained by the Public Works Department measures city building energy usage and identifies necessary efficiency upgrades. This workgroup works closely with NSTAR in improving technology assessment and implementation.

In response to growing GHG emissions, Cambridge has made significant strides in integrating alternative fuels and electric vehicles into the government fleet. Almost all the city vehicles use B20 biodiesel (20% blend), which is converted from vegetable oil to work in most diesel engines. The advantage of biodiesel is that it burns much cleaner than petroleum fuel and requires little, if any, retrofitting for engines. In addition to alternative fuels, the city has a fleet of GEMs (Global Electric Motorcars), which operate completely on batteries. Although the average capacity is 30 miles at a top speed of 25 mph, these vehicles are ideal for short trips within communities, campuses and commercial districts. Various departments use the vehicles for transporting materials, patrols and maintenance.

Parking and Transportation Demand Management

Transportation is one area in which Cambridge has a special interest. Due to its geographic location near Boston, there are large numbers of commuters to and from Cambridge adding to congestion and air pollution. To deal with commuting and parking demands, the city adopted the Parking and Transportation Demand Management (PTDM) program. It works by marketing and giving incentives to businesses and institutions that reduce the number of single-occupancy vehicles. In addition, the PTDM promotes other transportation options, including buses, bicycling, walking

and ridesharing.

Urban Forestry Program

The urban heat island effect is a common problem in developed cities. To deal with this problem, the Urban Forestry Program was initiated under the Public Works Department, which plants and maintains trees throughout the city. Trees are pruned, treated and planted according to the most current arboricultural and safety standards. The program has a goal to plant 150-300 new trees annually.

Waste Reduction and Recycling

Waste is an issue for many cities, and Cambridge is no exception. The city took part in the 40% Challenge in which MIT and Harvard also participated. This regional effort by businesses and institutions worked to raise their recycling levels to 40 percent by 2005. The Recycling Division of the Department of Power and Water encourages residents to consume less, reuse materials and recycle as much as possible. In addition, the division handles curbside recycling for homes, businesses and institutions.

Green Decade/Cambridge

Several grassroots community initiatives have taken shape over the years in Cambridge. One of the most influential has been Green Decade/Cambridge, which is an umbrella organization for other local action groups in the region. This group grew out of Cambridge Climate Action (CCA), which formed in 1999. Currently, Green Decade works to educate residents and business owners in taking action in reducing greenhouse gas emissions. Awareness has been an influential factor for Cambridge's sustainable development, and many grassroots organizations play a pivotal role in getting people actively involved.

MIT and Harvard

Both MIT and Harvard have been actively assessing their own GHG emissions and concurrently implementing programs to reduce emissions on their respective campuses. The Harvard University Green Campus Initiative began in 2000 through a grant from the Office of the Provost, which was used to hire Harvard's first full-time sustainability professional. It has now become a million-dollar business with GHG reductions of over 60 million pounds over the past five years. MIT has also undertaken initiatives to reduce GHG emissions, including recycling/conservation programs, composting, "green" procurement, pollution prevention and a Green Building Task Force. It is not surprising that two of the most well-known educational institutions in the U.S. are also leaders in

alternative-fuel research, pollution reduction, environmental programs and sustainable techniques.

Results

The pace at which Cambridge's Climate Protection Plan has taken hold has seemed relatively slow with respect to the GHG Inventory reports from 1990, 1998 and 2003. Until 2007 there was no real "progress" relative to those statistics. However, more indirect indicators have been measured and are explained in the "Cambridge Climate Protection Action Committee 2004 Annual Report." For example, according to the GHG Inventory, commercial and industrial CO² emissions increased 63.3 percent between 1990 and 2003, and electricity use increased 39.3 percent. At first glance this may suggest that the Climate Protection Plan is not working. However, upon closer inspection, it turns out that the amount of floor space used by the commercial/industrial sector has increased by 73.2 percent, a much higher rate than electricity use. This suggests that the commercial/industrial sector expansion resulting from population growth, economics, etc., has actually developed in a more energy-efficient way, likely due to Cambridge's Climate Protection Plan and the programs developed under it.

One of the more direct indicators, at least as far as the GHG Inventory statistics are concerned, is that of the tons of CO² from waste. Between 1990 and 2003 the total mass of CO² from waste decreased by 35.6 percent. This was a result of the city's recycling programs. With two of the main contributors being MIT and Harvard, it can be assumed that the challenge to increase their amount of recycling by 40 percent played a partial role in maintaining a low CO² production from waste, simply because of their sheer size in regard to the number of Cambridge citizens they employ. When such large organizations sign on to pursue such a serious and difficult challenge, it is going to have a very large impact on GHG emissions in the city.

Unfortunately, we all know that sometimes these types of indirect indicators just don't convince people of changes actually occurring. The proportions, factors and trends of these statistical reports just aren't as attractive as, for instance, a feature-length film dedicated exclusively to climate change, or articles in major international news publications. Cambridge is getting its hands dirty in those arenas as well. The community's sustainability efforts have recently been mentioned in both Time and Newsweek magazines, placing Cambridge on par with cities like Chicago or Seattle that are becoming known specifically for their climate-changing initiatives. With serious media attention and, however subtle, GHG statistical indicators, the environmental awareness has

grown in Cambridge. People now have an outlet for their civic pride and desire to have an impact.

Cambridge has been one of the 700-plus member cities of ICLEI since 1999. During that time the city has implemented a number of measures and launched a number of programs, all aimed at reducing energy consumption and emissions. Cambridge recently embarked on its most aggressive environmental campaign to date with the launch of the Cambridge Energy Alliance (CEA), a nonprofit organization dedicated exclusively to climate change within the city. The nascent nonprofit is receiving overwhelming support from the community, government and individual citizens, and has generated significant excitement within the community about sustainability issues. Although this project has not yet shown results, it deserves special attention due to its uniqueness and potential.

The CEA is unique for a few reasons. First of all, about 80 percent of the funds for the \$100 million project were privately donated from the Henry P. Kendall Foundation, among others. The CEA has also implemented an ingenious revolving fund system. This revolving fund will allow organizations within the city to take advantage of low-interest loans to cover the installation costs of energy-saving technologies. The city will then be able to save enough money from the reduction of energy costs to more than pay for the loan. The CEA is an all-encompassing program not simply focusing on one aspect of sustainability, but seeking to improve Cambridge's environment in all aspects. The program also seeks to reach out to all members of the community: businesses, residents, government buildings and public spaces.

The CEA will be working to reduce the city's consumption of gasoline, water, natural gas, oil and electricity. It is an attainable goal of the alliance to have energy-saving techniques implemented in 50 percent of all buildings in Cambridge by 2010. Over 80 percent of the GHG emissions in Cambridge are the result of energy use in buildings. It is predicted that the program will reduce annual GHG emissions from the city by 150,000 tons (10%) by 2011. The Cambridge Energy Alliance expects to save 164 million kilowatt hours of electricity (10%) annually and to cut the demand for electricity at peak use times by 50 megawatts, or roughly 15 percent of current use.

Given estimates of the future price of energy, the value of the energy savings achieved is expected to be roughly \$160 million over the next 10 years. Some of the money from the energy savings will be used to pay back the costs of the energy-saving investments, and the rest will be used to reinvest in the revolving fund. Once the costs of the

installations are paid off, all of the energy-bill savings will go to participating customers.

The Cambridge Energy Alliance obviously will be a groundbreaking and unique project. It is easy to see why there is such broad-based interest throughout the community. The alliance represents a new approach to sustainability by attempting to address the community as a whole, instead of targeting one particular pollutant or one particular group. All eyes will be on Cambridge in the future; if this alliance can be effective we may soon see a state, regional or even a national alliance. Early this summer, the alliance will begin initial work with a selected group of volunteer participants to evaluate the potential for increasing energy efficiency and installing clean-energy facilities at their sites.

Community members and city agencies are able to believe in the Cambridge Energy Alliance and the majority of Cambridge's environmental initiatives because they are focused on economical and profitable actions that will bring multiple benefits. At this point the city is able to find ways to reduce emissions without requiring sacrifices from any stakeholders for the most part. With this in mind the city government can make good use of the environmentally educated and aware public to advance actions and build on public pride and the belief that Cambridge should be at the forefront of these efforts. What began as slow and seemingly unattainable top-down efforts at the city government level have been met with excitement and action by many grassroots citizen efforts. As the movement develops, it is coalescing with great momentum, and we hope future citizen, city and CEA efforts strengthen it further.

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Madison, Wisconsin

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Introduction

From global warming to the energy crisis, there is a growing awareness of humans' impact on the environment. As cities and nations around the world begin to reflect on their own contribution to environmental problems, the changes implied by the need to become "sustainable" are difficult to identify. Individuals differ in their description of sustainability, and on a policy scale, it is even more difficult to pinpoint. Communities vary in their specific needs as well as available resources. There is no one way that will work for every community.

We chose to study Madison, Wisconsin, as a Midwestern pioneer in sustainability practices and in the reduction of greenhouse gas emissions. Madison has a long history of progressive environmental initiatives that provide a benchmark for other communities to follow. With the city government, the community has committed itself to finding ways to become an environmental steward. Many of their initial programs developed around specific actions for improvements. Their most recent policy decisions break away from prescriptive programs and work to create a common language for city employees to discuss sustainability planning.

Background

To begin to understand Madison's path to becoming a "green capital city," one first must understand the city's context. The capital of Wisconsin, Madison is located in Dane County in the south-central region of the state. According to a 2006 estimate, 223,280 people live in Madison. This comprises roughly half of the population of Dane County, which has 62 main jurisdictions composed of towns and villages. Due

to scale, it is more difficult to work consistently together, but there is a commitment to positive change in Madison (Joiner 2007, pers. comm.).

As home to the University of Wisconsin, Madison is a university town with students representing roughly one-fifth of its population. Historically, environmental leaders such as Aldo Leopold have lived in Madison and taught at the university, and as a result have had a significant impact on the culture and identity of the city (Joiner 2007, pers. comm.). Madison has strong community leaders whose enthusiasm and leadership has inspired its citizens' willingness to take environmental action.

First Steps

The first greenhouse gas-related initiative in Madison began in 1998. Working with the International Council for Local Environmental Initiatives (ICLEI), Madison developed its Climate Protection Plan to directly address reducing greenhouse gas (GHG) emissions. Overall, Madison desired to decrease air pollution, create jobs, reduce energy expenditures and ultimately save money for the city. Strengthening interest in the environment, Madison built its protection plan by building on previously successful plans:

- First curbside recycling program in the nation (began collecting newspapers in 1968). Madison currently recycles 50 percent of its waste.
- Extensive bicycle program with bike racks, lockers and over 100 miles of bikeways.
- Extensive Metro Transit bus system with 164 buses daily.
- Methane gas utilization at sewerage plant and two largest

landfills for electricity and steam generation.

- Streetlight conversion from mercury vapor and incandescent bulbs to high-pressure sodium (11,000 fixtures).
- Conversion of 200 red traffic signals to light-emitting diode (LED) fixtures.
- School district, city and county participation in the EPA Energy Star Building Partnership.
- Full membership in the ICLEI Cities for Climate Protection (CCP) Campaign.
- Largest wind power project (11 MW) in the eastern United States. Implemented by the local utility, Madison Gas and Electric, production from the 17 wind turbines began in June 1999. The wind program sold out faster than any other green power program in the U.S.
- Rideshare Etc. program operates 67 vanpools with 900 riders.
- No pesticide or fertilizer use on green spaces or parks.
- 2,500 trees planted per year.
- Sustainable Lifestyle Campaign started 40 neighborhood ecoteams.

(City of Madison 2002 Climate Protection Plan)

Michael Vickerman, executive director of RENEW Wisconsin and member of the Mayor's Energy Task Force, commented on the effect the 2003 national blackouts had in creating more awareness of the need for a comprehensive energy policy. Vickerman pointed out that citizens were concerned about the "energy footprint" Madison is leaving on the environment as well (Vickerman 2007, pers. comm.). The blackouts reminded residents and leaders in Madison that energy is a precious resource that is taken for granted. Because of the blackouts, Madison's Mayor Dave Cielewicz created the Mayor's Energy Task Force in 2003. This energy task force was designed to address where energy was used in Madison, how energy could be conserved and to investigate alternative and renewable sources of energy.

In addition to energy conservation, Madison sought to address air-quality issues caused by energy production. Over 95 percent of the energy used in Madison comes from fossil-fuel sources, such as coal and natural gas. The Madison area was at risk of being classified by the EPA as a nonattainment area for air quality for ozone levels. These trends, if not remedied, could negatively affect Madison's economic development, specifically business retention, business development and the ability to attract new businesses (Mayor's Energy Task Force 2004).

The goal behind the energy task force's sustainability efforts was to identify a comprehensive theory or model to provide a basis for future initiatives. The Natural Step Framework was chosen in 2006. By implementing several programs slowly and consistently throughout the years, Madison has successfully developed into a more sustainable community.

Programs

Climate Protection Plan

With a commitment to reduce GHGs, the city of Madison passed its first climate protection plan, Resolution 23181, on March 3, 1998. Following the lead of 290 other cities and countries throughout the world already taking action, the Madison Common Council realized the importance of participating in the Cities for Climate Protection Campaign (City of Madison 2002). In order to reduce emissions and increase energy efficiency, Madison's Engineering Division began research on the city's greenhouse gas emissions. A grant from ICLEI allowed Madison to work toward its goal.

Through an analysis of the GHG levels, Madison discovered the University of Wisconsin was responsible for 32 percent of the total commercial/institutional sector energy usage (City of Madison 2002). By identifying problem sectors, the city could formulate specific strategies in the Climate Protection Plan to improve current practices, establish new programs and reduce GHG emissions. Local citizens, city government, environmental programs, the University of Wisconsin, Dane County and energy companies worked together to accomplish this (City of Madison 2002).

With the last update in 2002, Madison is currently implementing recommendations outlined in a report by the Mayor's Energy Task Force, which is a slight change of direction in the city's efforts to minimize their role in climate change (Demorett 2007, pers. comm.). While the Climate Protection Plan was an important initiative in Madison's history of reducing GHGs, the city's new mayor saw the opportunity to become a more sustainable community and realized Madison needed a more comprehensive approach to conserving energy.

Mayor's Energy Task Force

Mayor Dave Cielewicz envisions Madison as a "green" capital city, a national leader in energy efficiency and a leader in renewable energy that supports the city's economic vitality (Mayor's Energy Task Force 2004). According to city councilman Jed Sanborn, who served on the task force "the current mayor, Dave Cielewicz, was the starting force behind Madison's reemphasis on energy conservation"

(Sanborn 2007, pers. comm.). To continue Madison's initiatives in reducing GHG emissions and increasing energy efficiency, Mayor Cielewicz created a Energy Task Force. Once established, it was then divided into two committees: one to organize around utility infrastructure and one for energy conservation and green building. These committees produced a policy document titled *Building a Green Capital City: A Blueprint for Madison's Sustainable Design and Energy Future* (2004).

Utility Infrastructure Committee

The Utility Infrastructure Committee (UIC) of the Mayor's Energy Task Force made several recommendations to the city for ways to reduce its nonrenewable energy use and improve the efficiency of its energy utility system. Currently about 10 percent of the city's energy comes from renewable sources. The goal is to boost this by 10 to 20 percent by 2010. The committee used Moab, Utah's Clean Energy Challenge as an example of a strategy in hopes of increasing public awareness and participation in the use of renewable energy instead of nonrenewable sources. Through utility "green-pricing" programs, residents are encouraged to use more energy-efficient means in their everyday lives. The Utility Infrastructure Committee also wants to establish a Sustainable Design and Energy Commission from area residents and businesses, as well as local government entities to address and evaluate issues that may lead to practices that are more sustainable and better overall for the community and the environment.

The first of two important issues the UIC addressed is an increased city involvement in the siting and approval process of transmission equipment, such as utility poles and wires. Transmission enhancements are necessary and through the approval process, the city should make sure that the residents' interests are fully considered. The committee also recommended capitalizing on cogeneration. Cogeneration is the utilization of heat waste from power plants and industries to create energy that could be beneficial environmentally and economically. The UIC believes cogeneration should be investigated further to understand the extent of its potential.

Details of UIC Initiatives

As discussed earlier, the Utility Infrastructure Committee recommended addressing Madison's utility infrastructure immediately. The Madison Gas and Electric (MGE) Facilities have their main location in the heart of downtown Madison. Blount Generating Station (BGS) is a provider for the 200 MW of electric power that Madison consumed through using fossil fuels, such as coal and natural gas.

Although only about 15 percent of the electricity used by Madison residents is produced in the metropolitan area, Blount produces 90 percent of that electricity. Over 100 years old, the plant is a part of the Wisconsin Department of Natural Resources' Environmental Cooperative Agreement aimed at achieving higher environmental standards than those required by regulation.

It has been a voluntary step by MGE to improve efficiency and reduce environmental impacts. By September 2004, MGE had increased the use of alternative, paper-derived fuels, which reduce mercury, sulfur dioxide and nitrogen oxide emissions and had implemented an environmental management system consistent with the ISO 14001 international standard.

Along with these strategies, plans include burning even greater percentages of alternative, paper-derived fuels (PDF) and coal-burning combustion efficiency improvements. Efficiency improvements are being made in the PDF combustion equipment and to the flame stabilizer. The goal of the improvements is to further reduce sulfur dioxide, mercury and nitrogen oxide emissions.

The West Campus Cogeneration Facility (WCCF) came on line in spring 2005 to help meet the area's growing electricity needs. Fueled by natural gas, WCCF will be one of the cleanest, most efficient plants in the state and in the country. It will be nearly 70 percent efficient whereas most power plants are only 30-35 percent efficient. By combining electric and heating in one facility, it will reduce emissions, use less fuel and less space. Nitrogen oxide emissions will be reduced by up to 80 percent and carbon emissions will be lowered on average by 50,000 tons per year, a 15 percent reduction.

Energy Conservation and Green Building Committee

The Mayor's Energy Task Force Energy Conservation and Green Building (ECGB) Committee is responsible for developing recommendations to address improving energy efficiency and conserving city facilities; identifying ways to encourage private industries and residents to conserve; and developing demonstration projects for green building through public-private partnerships.

In Madison, the LEED (Leadership in Energy and Environmental Design) certification criteria have been utilized in measuring energy efficiency and sustainability in all new and existing city buildings, with plans to require it in the future for private-sector projects receiving tax increment financing. The city's first LEED-registered building was the Monona Terrace Community and Convention Center in 1995, which boasts a green roof, views and access to

daylight for 50 percent of its interior spaces, and an Energy Star rating of 75. To date Madison has three LEED-certified buildings and 21 LEED-registered projects awaiting certification.

The ECGB Committee recognized that an effective approach to reducing Madison's energy use and enhancing its building practices must:

- address both changes in end-user behavior and changes in city policy;
- involve city government, businesses and residents;
- provide a framework of specific tools and methods;
- lead to cycles of actions that take them closer to goals; and
- include measurements and reports to gauge and accelerate improvement.

The ECGB Committee also recommended that Madison:

- adopt a Sustainable City Program;
- develop a GRE2EN Commitment;
- implement High-Profile Green Initiatives, and
- adopt the Natural Step Framework.

(Mayor's Energy Task Force 2004)

Details of ECGB Committee Initiatives

During the research phase, Madison was able to compile a Government Green Building Program Inventory, a survey of 36 cities and their programs. City leaders used this information when developing their own programs and initiatives. The Mayor's Energy Task Force came up with many additional low-cost energy-saving programs while the "Information" section of the publication shared ideas for attaching energy information to rental leases, neighborhood-cooling centers, youth documentaries and lendable library materials. Other suggestions for energy saving included temperature sensors in refrigerators, using humidity meters and occupancy-sensitive power strips. Under the "Events, Contests and Promotions" section of the Government Green Building Program Inventory examples for energy efficiency included using outdoor CFL and LED lights with garden supplies, extended pool hours to discourage A/C use, etc. The "Exhibits and Displays" section suggested an alternate "parade of homes" featuring more energy-efficient homes. Lastly, the "Human Resources" section focused on using graduate students, professors and technical college students to conduct research projects and evaluations for the city, and using public works employment to demonstrate installation techniques for energy-efficient appliances.

Natural Step Framework

One of the main recommendations of the Mayor's Energy Task Force was to adopt a guiding principle for community sustainability. In response, the Energy Conservation and Green Building Committee recommended "The Natural Step" model to the mayor (Gruder 2005). The Natural Step "fits [a] need; it is a science-based approach to develop ecologically, economically and socially healthy communities for the long-term" (Gruder 2006).

The Natural Step (TNS) is designed to create a common language for groups of people to be able to focus on sustainability. Often individuals have differing ideas on what sustainability means, but by using this framework, a community can know that its different parts are working toward one goal (James, 2004). Gruder states, "The TNS framework promotes a shared understanding of city goals and objectives and facilitates development of strategic pathways for how to operate and implement sustainability based initiatives" (2006). Sometimes, one city department may have one plan in action that is working against another program in another department. Knowing that everyone is working toward the same objectives, much of this confusion is eliminated.

In 1989, a Swedish oncologist who was concerned with cancer rates in children developed the Natural Step. He was convinced that unsustainable practices were the reason for the increase in cancer (Hands 2007; James, 2004). Together with other scientists, he developed the Natural Step Framework that consists of four guiding objectives:

1. Eliminate our community's contribution to fossil fuel dependence and to wasteful use of scarce metals and minerals.
2. Eliminate our community's contribution to dependence upon persistent chemicals and wasteful use of synthetic substances.
3. Eliminate our community's contribution to encroachment upon nature (e.g., land, water, wildlife, forests, soil, ecosystems)
4. Meet human needs fairly and efficiently.

(James, 2004)

Since its inception, the Natural Step has proven itself to be a successful approach to sustainability. In Sweden, more than 60 small towns and cities have used TNS to change programs in their communities (James, 2004). These communities have worked to not only engage their city governments, but also to engage the citizens of their communities. TNS has rapidly spread outside Sweden and

is widely used by communities in other countries, including the United States and Canada (Gruder 2006). Through the common language of the Natural Step, they have been able to move toward their goals together.

Some citizens in Madison were familiar with the Natural Step prior to its recommendation to the Mayor's Energy Task Force. A nonprofit organization called Sustain Dane has already been working with the program for some time (Gruder 2006). They had used a program called "TNS for Communities" to train a hundred citizens and put on a seminar on the Natural Step for over 300 citizens in Dane County (Gruder 2005; Gruder 2006). The Natural Step Model was subsequently adopted in November 2005 as the guiding principle for sustainability in the city of Madison. Madison is the first community in the U.S. to train city employees in the program and is one of six that have adopted TNS as its guiding framework (Hands 2007).

Based on the four guiding principles from the Natural Step, Madison developed its own, very similar guidelines to allow the departments of city government to have shared objectives:

1. Because resources like fossil fuels, metals and minerals are finite and damage our environment if allowed to accumulate, the city will reduce its consumption of materials extracted from the Earth's crust.
2. Because the accumulation of pesticides, fertilizers and other persistent chemicals are harmful to people and the environment, the city will reduce its dependence on these kinds of synthetic chemicals.
3. Because ecosystems take a long time to recover from physical destruction (if they can at all), the city will mitigate its impact through wise land-use policies, low-impact maintenance practices and environmentally friendly design.
4. Because our community will not be truly sustainable unless our residents are healthy, safe and prospering, the city will continue to pursue policies and actions that minimize the barriers that get in the way of residents' ability to meet their basic needs.

(Department and Division Heads, 2006)

According to the mayor's efficiency auditor, Andrew Statz, city employee TNS training began September 1, 2006, and citywide programs began to be implemented in January 2007. Statz said the city of Madison recognized the city government as one of the largest consumers of utilities and possible producers of greenhouse gases (Statz 2007, pers. comm.). The city is the eighth-largest employer in the county, uses 2.3 million gallons of fuel and

operates more than 3.7 million square feet of office space (Department, 2006). The mere size of the operation gives it substantial opportunity to have a profound influence on its environmental impact. Statz says they saw it as their responsibility as officials to make a move toward sustainability. They are focusing their efforts in-house by implementing programs that promote sustainability among city employees and in all public buildings. Their goal is to become a model for the residents of Madison and surrounding communities. Statz says that the Natural Step works because it is not prescriptive; it allows for some flexibility for cities and governments and provides guidance (Statz 2007, pers. comm.).

Since January, Madison has been working to implement multiple sustainability projects. The Streets Division is now collecting cooking oil from local businesses and using it to fuel machines that work in the sewer. The city is looking at using alternative fuel for fire trucks and the mayor has stated that becoming more fuel-efficient is his number-one priority (Hands 2007). Statz provided a list of the top 10 projects that Madison is currently working to implement. This list demonstrates how Madison is using the Natural Step to accomplish change in the community with a systematic approach through:

1. Identifying energy wasters in city government.
2. Commuting incentive programs for city employees.
3. Reduce fuel consumption and emissions of the city fleet.
4. Green cleaning supplies and services.
5. Public housing.
6. Zoning code rewrite.
7. Solar panels and/or wind power at city facilities.
8. Biodiesel pilot project for engineering vehicles.
9. Garage door at Metro.
10. Bus wash and vacuum systems at Metro.

(Department and Division Heads, 2006)

It is still early in Madison's experience with the Natural Step, but enthusiasm seems to be high. Some of these projects also include a public-awareness component. According to Statz, the green cleaning supply project will include displays in the public library that explains what they are doing and some of the supplies they are using (Statz 2007, pers. comm.). Although none of the programs require that citizens change the way they are living, the city government is working to set an example for the community at large and they are looking into programs that may include incentives for citizens to decrease their consumption of natural resources as well.

Results

In interviewing various Madison affiliates, the question was asked, “What do you see as the biggest accomplishments of Madison’s efforts to reduce greenhouse gas emissions?” Responses varied among respondents and include: the city’s resolution to purchase 10 percent of its energy from renewable sources; LEED-certified renovations to many old city buildings; the involvement by citizens as well as the city government to challenge each other in making improvements; and the practicality and usability of the programs implemented to date (Joiner 2007, pers. comm.).

The Climate Protection Plan, Madison’s first initiative to reduce GHG emissions, was responsible for a decrease of 56,578 tons of CO², which is the result of early recycling and energy-savings programs (City of Madison 2002). Since that time, programs formulated by the Mayor’s Energy Task Force have been implemented and public-awareness campaigns have recently been launched to communicate these programs to the public.

Currently the principles of the Natural Step Framework are communicated and demonstrated to city officials so they can serve as experts in the process of becoming sustainable. Department chairs and city officials have become the local government’s driving force in implementing these new programs. They have been instrumental in not only the initiation of the programs, but also in continuous improvements in policy decisions.

Conclusion

Because Madison’s most recent and large-scale strategies to reduce GHGs are in their infancy, program results and impacts have not yet been measured. However, with continued determination by city government officials in educating residents and implementing programs, Madison is likely to reach its goal of becoming a “green capital city.” Many of our interview respondents emphasized that public awareness is key to a successful sustainable community program. We believe that Madison’s “best practices” in community sustainability to reduce GHG emissions will be useful in helping any community initiating a top-down, policy-oriented strategy for implementing sustainability programs.

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Fort Collins, Colorado

Kenneth Sturgis | Kristi Krueger | Luke Miller | Allison Falconer

Introduction

Cities and nations all across the world are becoming increasingly concerned with their ability to be more sustainable, given the context of global warming and climate change. Due to technological advances, society is now able to document the world's history and potential future paths. These future paths look dim in view of the current state of greenhouse gas emissions. However, many governments and other organizations are shifting toward a better future.

We chose Fort Collins, Colorado, for this case study on sustainable development and progress. Fort Collins is one of the leaders in greenhouse gas emission-reduction efforts, public incentive programs and awareness, and sustainable building and development.

Background

The city of Fort Collins is located on the Cache la Poudre River in northern Colorado. It was founded as a military outpost in 1864 to protect the Overland Mail Route. It has since grown to be the fifth most populous city in Colorado with a population of 128,000. A majority of residents (77%) have completed some college and the median family income is \$64,623. Because of its large, educated populace and high median income as well as a variety of other factors, Fort Collins was named "the best place to live" in the United States by Money magazine in 2006. Major employers include Colorado State University, Hewlett Packard, Eastman Kodak and Anheuser-Busch.

First Steps

Frequently, for change to come about there has to be some

precipitating event. The event itself does not have to be of critical importance, but there must be a basic cause for the resulting change in behavior and policy. A perfect example of this is the city of Fort Collins, which became involved in the reduction of air pollutants as a result of three main events. The first was when the U.S. Environmental Protection Agency classified the city as a nonattainment area under the Clean Air Act. This means the city had levels of carbon monoxide that were a risk to human health. Fort Collins' unique geography led to winter inversions consisting of a visible brown haze and associated health risks for residents. Because of these concerns, in 1984 the city of Fort Collins began to implement a natural resources group to focus on environmental issues (Woodruff 2007, pers. comm.).

The second event was the arrival of an Anheuser-Busch brewery that wanted to burn coal as its major source of power. As Brian Woodruff (2007) stated, this helped "galvanize the public as coal is seen as a dirty fuel and is subject to NIMBY (not in my back yard) effects."

Finally, during these events the majority of the city council was made up of environmentally conscious members. One member of the council and a member of the public played a large role in the forces that took action within the council. One member of the public held a position as a researcher at Colorado State University, and voiced her findings to the council through a series of letters.

At the same time, there was "no big public push," and after obtaining a grant from the International Council for Local Environmental Initiatives (ICLEI) and approval of the council, it mainly became a top-down strategy for beginning to clean up the city (Smith 2007, pers. comm.). Because of

these issues, the city council asked the staff of the natural resources group to create a plan for environmental action, which included air quality. Following the framework for environmental action, in 1993 an air-quality task force was convened to create an air-quality policy.

Programs

Air Quality Task Force

From the beginning, the air quality of Fort Collins was a cause for concern. Because of the new Anheuser-Busch plant, a new Air Quality Task Force started working with the company to switch from coal to natural gas as an energy source. The city then further investigated a new Air Quality Plan by hiring Brian Woodruff in 1992 and adopting the plan in 1993. An ongoing advisory council was created to make sure efforts were being carried out. Informing the public about air quality through marketing helped to get people thinking about ways to reduce carbon emissions. City worker Lucinda Smith credits “public television, commercials, brochures, the Internet, and public presentations” for helping spread knowledge and awareness. Raising various health and respiratory concerns also increased awareness about the city’s air quality. Carpooling was encouraged, along with the use of the local bus system as a way to promote the use of eco-friendly biodiesel fuels and public transportation instead of personal automobiles (Smith 2007, pers. comm.).

ClimateWise

The Air Quality Plan of 1993 set climate protection as a top priority. A former member of the Bureau of Land Management, Smith came to Fort Collins in 1996 with an already eco-friendly mindset. **She notes that ClimateWise is an innovative, voluntary program whereby businesses can sign up and receive a complementary environmental assessment by a consulting team provided by the city. The businesses then chooses how they would like to participate—water reduction, recycling, etc.—and the city quantifies the savings as benefits. Though it began in 2000 with only 15 companies, today it boasts over 60 and is responsible for 40 percent of the city’s carbon-reduction efforts. Additionally, Smith suggests that media promotion has been a vital part of the program’s success, with advertisements on local radio stations, a web site, an annual recruitment event, and public speeches by prominent officials.**

Track To Win

In 2006, a campaign called Track To Win was a public

incentive program pushing for citizen involvement in the realm of climate change. Over a period of six weeks, the program was mainly located on the Internet, and allowed the public to complete a form indicating where they believed they could help the city. The city quantified these actions into monetary value and then drew names for winners and gave away prizes. The quantification of the reduction of greenhouse gases was an important step in evaluating the city’s and the citizens’ impact on the reduction efforts. Unfortunately, despite a huge marketing effort, there was not a large response (Smith 2007, pers. comm.).

ZILCH

A program created to provide public incentives, ZILCH—Zero Interest Loans for Conservation Help—is a loan program for energy saving home-improvement projects. This easy and helpful program allows residents of Fort Collins to evaluate their “energy score” and decide how they can improve the quality of their home. The program funds those renovating energy, air and water systems. Special efforts are taken to remove wood-burning stoves, a large contributor to the “brown cloud” that surrounds Fort Collins. Other opportunities involve the purchasing of Energy Star appliances, radon-mitigation loans, and water service-line replacement or repair. This user-friendly program lets the citizens of Fort Collins take action into their own hands, thanks to the government’s willingness to fund programs such as this (Zilch 2007).

Energy Efficiency Program

Fort Collins has an Electric Energy Supply Policy that the city council approved in 2003. Up to 15 percent of its electricity is to be produced from renewable energy by 2015, funded with a 2 percent increase in rates on all utility bills for residents and businesses. The money from the rate increase was used to purchase wind energy and to implement energy-efficiency programs. It was also used to provide incentives for residents, including a clothes washer rebate, old refrigerator recycling, integrating renewable and conservation design into buildings, and lighting upgrades (Smith 2007, pers. comm.).

Platte River Power Authority

The Platte River Power Authority (PRPA) provides Fort Collins, as well as some of the city’s neighbors, with the majority of its electricity from sustainable wind energy. The headquarters is located in Fort Collins, appropriate for the city’s stature in sustainable design and energy efforts. The company has a “strong background of committed environmental stewardship” (PRPA 2007). Not only does

it supply energy from renewable sources, it has a program to develop its technology in wind turbines. Other company policies include “range management and conservation, integrated pest management, site reclamation and fugitive dust control” (PRPA 2007).

The city became involved with Platte River through the development of the Electric Energy Supply Policy of 2003 (Smith 2007, pers. comm.). Customers pay 1 percent more on their utility bill; however, they are aware that the proceeds go toward developing renewable energy technology and resources for the betterment of the city. The relationship has stayed strong and has proven to be successful in implementation and with the citizens (Wind 2007).

Fort Collins Public School System

In 1999, the Poudre School District began preparations to ask voters for a \$200 million bond to build new school during the next election in 2000. With the knowledge that the city of Fort Collins was making efforts to head toward a more sustainable community, the development team began looking into sustainable designs for the new construction to reduce the amount of energy used and to create a healthier environment within the schools.

Research on sustainable building design was initially conducted by “The Green Team,” a group of district maintenance staff for the existing schools. Each week they researched sustainable opportunities and met with the design and planning team each month to share their findings. Eventually, they broke into groups according to their interests and expertise to conduct more intensive research. After a year, all the information was collected and a consultant was hired to put together a 90-page document of sustainable guidelines. The voters approved the bond in 2000 and from there, the district’s planning, design, and construction team developed a competition for professional design teams to create a sustainable elementary school.

The complexity of systems required more specialists on design teams, which increased design costs by 1 to 2 percent compared to most clients. This extra cost was offset by support from the Fort Collins Utility Department with a \$30,000 grant that was set aside for design assistance costs. To help with development of systems, the utility department also appointed one of its engineers to sit in on the competition process, and he later became part of the design process. To offset even more project costs, the team went to the state with all of the research and was able to obtain more money to help pay design costs and fees.

Zach Elementary opened in 2002 and Bacon Elementary

opened in 2003. As the first schools completed under the new sustainable guidelines, they became prototypes for the Fossil Ridge High School. Using the elementary schools as models, the systems in place could be studied to determine the amount of efficiency created and then were improved and expanded upon for the new high school design. Since completion, Fossil Ridge High School has achieved LEED (Leadership in Energy and Environmental Design) status and has saved \$100,000 in energy costs in comparison to standard high schools of an equivalent size.

The most recent school to open, Kinard Junior High School, has become a prototype for others around the country. The school district has become a leader in the nation in terms of sustainable school design and gets many visitors annually from around the country to study the designs and effectiveness. By also putting together conferences, the district is able to share design tactics to create an overall awareness of sustainable design practices.

The community has also benefited from these schools. The science courses have been able to integrate some of the lessons from the building designs into the curriculum, thus teaching students who can then teach their families. Through this line of cross-generational communication, the community as a whole has become more aware of the entire city’s efforts to create a more sustainable Fort Collins. “It has been a slow burn, but once there were successful schools, then the community really began to realize the benefits,” observed Michael Spearnak (2007, pers. comm.), director of planning, design and construction for the Poudre School District.

TransFort

Because cars are the number-one source of pollutants in Fort Collins, the city took action by creating a public bus system. It needed to be extremely accessible and convenient, given that cars were the major mode of transportation within the city and to outside locations. There was no rail running between Fort Collins and Denver or other surrounding cities. According to Lucinda Smith (2007), carpooling was encouraged, but the use of this bus system could ensure that air quality would be less affected by the emissions. The buses run on eco-friendly biodiesel fuel and are twice as fuel efficient as private automobiles (TransFort 2007). These buses are the start of what could be a major transportation-system overhaul, but there is presently little funding or momentum in that direction (Smith 2007, pers. comm.).

Land Use Plan

Fort Collins began implementing organizations at various

levels, but one of the most important items put in place is the Land Use Plan of 1990. A primary means by which the city charted a new sustainable course was through the development of a comprehensive land-use plan which specified smart growth through higher density mixed-used communities with integrated transportation planning (Woodruff 2007). Fort Collins became concerned with the environment and land use in the 1970s, discouraging sprawl and promoting sustainable practices. People became involved with the sustainable land-use plan for a multitude of reasons, but Clark Mapes, Fort Collins city planner, believes that the public has a common interest to maintain and preserve the way of life in Fort Collins. The city benefits from a picturesque setting and an active population, and many of its residents moved to the community by choice. Consequently, they are more apt to take action to forestall the environmental decline of the city. Due to the proactive nature of the city of Fort Collins and its various governmental agencies in the creation of policies and environmental organizations, citizens are able to easily become involved in sustainable efforts. Additionally, it is therefore more likely that the long-term land-use plan is carried out effectively (Mapes 2007, pers. comm.).

Citizen Action

Fort Collins' sustainability efforts started small. At first, the efforts were mainly top-down because of interested individuals in influential positions, and because of the lack of information available to most citizens. With advancements in technology and improvements in communication, the city is now able to provide better information and facilitate involvement. Initially, the Sierra Club tried to organize Fort Collins' citizens. In 2005, a small citizen group called the Fort Collins Sustainability Group was formed. This organization came together for the specific purpose of encouraging Fort Collins to reduce its greenhouse gas emissions.

Results

Fort Collins has come a long way from failing air-quality standards to dramatically improving its air quality. Under the Air Quality Plan, the ClimateWise program has made substantial gains in reducing carbon emissions by getting companies involved. In 2000, 15 companies took part in the program, and more than 60 are now involved. The program is responsible for 40 percent of the entire city's carbon reduction. So far, the program has documented a reduction of 50,612 tons/year of CO₂ from projects implemented by ClimateWise partners. The program has actually surpassed its 2010 goal of reduced carbon dioxide by more than

95,000 tons per year, which is equivalent to eliminating 1.4 million vehicle round trips from Fort Collins to Denver. The ClimateWise program has documented cumulative cost savings from partner projects that totaled \$1,743,034 by 2005. The program continues to expand. Because of this and a variety of other programs, Fort Collins has decreased its carbon monoxide levels substantially since the mid 1980s. It is now well below the federal standard for carbon monoxide levels.

Two other programs that also help reduce greenhouse gas emissions are the recycling and lawnmower rebate programs. In 2005, 13,650 tons of recyclables were collected, reducing emissions by approximately 11,350 tons. The lawnmower rebate program has provided 110 rebates for electric or reel mowers purchased. This program has reduced more than 2 tons of carbon just by convincing some people to switch to a non-gas-powered mower.

Energy-efficiency savings programs are extremely popular in Fort Collins. They reduced electricity consumption by over 8,700 megawatt hours per year in 2005. In 2005, per capita electric consumption was 3.6 percent lower than the 2002 base line. While funding has been decreased for the particularly popular ZILCH program, it has not run out of money and has had no problems with loan repayment.

The Wind Power Program in Fort Collins is a nationally recognized program that in 2004 won the WPA/APPA Public Power Wind Pioneer Award. The Wind Power Program has over 1,200 residential customers and over 70 commercial customers. It has grown steadily and continues to be an example for other cities.

The Fossil Ridge High School has seen amazing results in reducing its utility costs. In comparison to another, older high school in the area of about the same size, Fossil Ridge was able to save over \$100,000 in 2006. The high school has been a great example for other communities interested in building a similarly sustainable school. Visitors from all over have come to see how the school has been successful, and even kids have given tours.

According to a survey of Fort Collins citizens' views on sustainability, most residents believe air quality will actually get worse in the next five years, but they also believe that something can be done about air quality. Most said they would be willing to do something to help reduce air pollution, and many agreed that the current or planned programs would help air quality.

Although Fort Collins is moving in the right direction with sustainability efforts, its population growth is responsible for

slowing reductions in greenhouse gas emissions and energy usage and sometimes increasing sustainability indicators. Daily vehicle miles traveled have increased every year and continue to slowly rise. With a growing population, this is something that is difficult to control.

Another problem has been the perception of Fort Collins by outside residents. Fort Collins is very active in its sustainability efforts, but residents feel that surrounding cities and towns are not supportive or involved. The whole area is growing extremely quickly, and most adjacent cities lack sustainability practices. This could become a problem for the whole area, including Fort Collins. The interstate between Fort Collins and Denver has witnessed increased development in recent years, with construction occurring in several locations where there is no pre-existing town. Additionally, the interstate exits are hot spots for residential and commercial development. The suburb of Loveland has been growing at a steady clip, reaching large-city status due to its tremendous growth. The problem with this is that Loveland has no sustainability practices in place, and this has a very negative effect on Fort Collins. Many residents outside of Fort Collins view the sustainability practices as negative. For their part, they criticize Fort Collins and believe that Fort Collins is too politically correct and enforces too many regulations. This may become an increasing problem in the future.

Conclusions

Fort Collins, Colorado, is a leader among cities working toward a sustainable future. Other cities throughout the country can look to Fort Collins as a place where change started from within city government. City employees led the community in its initial efforts. Fort Collins is a city of educated residents and employees who have pushed to make Fort Collins a beautiful, sustainable city. Fort Collins treated its air-quality problem as an “early warning sign” that helped the city to begin establishing services. These services have addressed the interests of citizens and have had great success, particularly in terms of public incentive programs. If other cities follow the framework that has been established by Fort Collins, they too may achieve results that will help their community for head toward a sustainable future.

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Chattanooga, Tennessee

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Introduction

Air-quality issues are at the heart of Chattanooga, Tennessee's sustainability efforts. In 1969 the city's atmosphere was declared the "dirtiest air in America." The title **was** aptly applied, as the nitrogen oxide, particulate, carbon monoxide, and ozone levels rated as among the highest in the nation (apcb.org). Indeed, air pollution in the city valley not only made visibility difficult, which required drivers to turn on their headlights during the day, but also required car dealers and car owners to wash their cars daily in order to prevent permanent corrosion, forced citizens to change their shirts two or more times a day, and to fight respiratory problems at nearly eight times the national average. **In a published collection of planning success stories**, Anne Coulter, a resident and regional planner for Chattanooga, reminisced:

I can remember my mother hanging clothes on the clothesline and then bringing them in some days to dry in disgust. They were dirtier than when she put them in the washing machine and she had to start all over again because they were full of soot. Sometimes there would even be holes in them caused by the stuff in the air (Bunnell 2002).

Air pollution besmirched the community's image; the filth that blanketed the city detracted from the landscape and the development of the area. The city's government, business leaders and citizens knew that something had to be done to turn Chattanooga's image around. This is precisely what they did. From the establishment of the Hamilton County Air Pollution Control Bureau in 1969 to vehicle emissions testing, a public-outreach Clean Air Campaign, and a school bus-retrofitting program in 2006, Chattanooga has striven to become a "poster child for what could be done to control air pollution" (Crockett 2007, pers. comm.).

Background

Chattanooga, Tennessee, is located at the juncture of the states of Tennessee, Georgia and Alabama and is surrounded by the southern Appalachian Mountains and Cumberland Plateau. Nestled in the heart of the Tennessee River Valley, Chattanooga is home to more than 152,000 people and is part of Hamilton County, which supports a population in excess of 285,000 (United States Census 2005). The city's economic base includes a diverse group of businesses, including Coca-Cola, McKee Baking (Moon Pies), Brock Candies, Olan Mills, Unum Insurance, Dixie Yarns and numerous heavy-industry representatives.

Over the last 27 years, Chattanooga has undergone substantial changes with strong support from public/private campaigns. Government, business and civic leaders provided the basis for new community-enhancement programs through "Chattanooga Venture," a nonprofit organization designed to facilitate the community's involvement in the city's future. This tool has not only helped citizens address the important strategic issues for the community's vitality, but has also acted as a catalyst for change. Chattanooga Venture served as an incubator for major improvement programs such as Vision 2000, the Chattanooga Neighborhood Enterprise and the RiverCity Company.

What makes their turnaround effort so significant was the concerted effort between government, business organizations and the community to work together first on individual problems, then as part of a more coherent "vision" for Chattanooga's future. What became apparent during the late 1960s to early 1980s was that the citizens wanted not just change, but continuously maintainable development so

that protection of the environment incorporated economic growth and quality of life for all of Chattanooga.

First Steps

In 1983, members from the chamber of commerce and the city planning commission created Chattanooga Venture to galvanize community participation in improving the city’s environmental, social and economic status. The Lyndhurst Foundation, a local nonprofit organization, donated \$120,000 to Chattanooga Venture’s first project, “Vision 2000,” in which 1,700 community members spent four months developing projects and programs to promote sustainable living (epa.gov). Led by trained facilitators who employed Strategic Visioning and Nominal Group Technique (NGT), community members brainstormed ideas. From this series of meetings, participants set 40 goals and 223 projects and programs for Chattanooga to achieve by the year 2000, all at a cost of \$800 million.

During the Vision 2000 process, the Chattanooga News Bureau kept citizens informed about community meetings, projects and events. An online resource, the “Chattanooga Community Link,” also kept community members informed and allowed residents to share information and to research what sustainable measures other cities around the world were employing.

Ten years after the implementation of the original program, Chattanooga Venture reevaluated the community’s sustainable concerns through “Revision 2000.” This program employed town hall meetings at nine locations throughout Hamilton County to brainstorm new ideas. Over 2,600 citizens participated, identifying 122 recommendations and establishing 27 new goals for the city to achieve (sustainable.org).

Building Involvement

Jeff Pfitzer of the RiverCity Company suggests that a

collective consciousness has developed in response to public visioning and planning processes, and notes that there is a core group of individuals and institutions whose work is to implement that vision. The group is comprised of a diversity of actors, with representatives from city government, the private sector, and nonprofits. They are committed to a “principled redevelopment of the urban environment” and with sustained effort forge strong partnerships necessary to achieve their goals (Pfitzer 2007, pers. comm).

As part of developing this “collective consciousness,” Pfitzer believes it is important to engage the broadest possible population of interested and affected parties, and that civic leaders should pay attention to the results of these public planning meetings. He also said that one of the ways in which the RiverCity Company assists in building the vision is by recruiting sustainable energy industries.

Public involvement can also rise from grassroots efforts. An example of this occurred in the early 1990s when low-income residents in south Chattanooga petitioned city officials to “evaluate numerous abandoned hazardous-waste areas in their neighborhood” (clinton4.nara.gov). The administration responded by funding a health study, providing environmental grants, and creating a Superfund Jobs Training program. As a result, the concerned area is now on its way to “full restoration” (President’s Council on Sustainable Development, 2007).

Another participatory project is a series of greenways, 25 miles long, which are being developed to link parks and neighborhoods throughout the city and to beautify the landscape. Citizen task forces along with the Trust for Public Land helped develop how and where these green areas would be located. Larry Zehnder, deputy administrator for parks and recreation, commented, “Citizens are driving this—they will make it happen, not us” (Parr 1998).

Vision 2000 Major Goals and Corresponding Programs	
<ul style="list-style-type: none"> Development of riverfront Revitalization of downtown Advancement in human relations Involvement in public education Affordable housing Improved cultural facilities City elections by district Environmental initiatives More job opportunities Positive image for the community 	<ul style="list-style-type: none"> Tennessee River Park Chattanooga Neighborhood Enterprise Family Violence Shelter Human Rights/Human Relations Commission Tivoli and Memorial Auditorium renovations Tennessee Aquarium Bessie Smith Hall Walnut Street Bridge restoration

Programs

Sustainability is a balancing act between environmental, economical and social issues. The people of Chattanooga well understand the importance of this balance and have initiated many programs to try to achieve and maintain it. While each of the programs discussed in this section may appear to fall into the separate categories of the environment, the economy, or social equity, each program bolsters the next, creating an integrated and vibrant community.

Air Pollution Control Bureau

Chattanooga's first true step toward sustainability occurred in 1969 due to the air pollution crises. Citizens, business members and government officials rallied together to address this environmental concern. On the advice of the Department of Health, Education and Welfare, the city established the Hamilton County Air Pollution Control Bureau (APCB). This organization, funded by a federal grant, employed air pollution-control experts to test air quality and to implement programs to decrease air pollutants throughout Hamilton County. At a cost of \$40 million, the APCB succeeded in attaining air emission standards on all major pollution sources by October of 1972. The success culminated that year in a community-wide "Clean Air Week" celebration (apcb.org).

Today the APCB continues to monitor air quality, following EPA standards. While much of the APCB's focus is on environmental data collection and analysis, the bureau understands the importance of public awareness and participation in reducing pollution. The APCB accomplishes this through workshops, seminars and information sharing. One example is the Pollution Solution program, which monitors air quality in the region and posts these results daily on the APCB Web page. On days that air quality is poor, the bureau encourages Chattanooga residents to voluntarily reduce their pollution impact through such means as carpooling, telecommuting and refueling vehicles after 6 p.m.

The bureau is also involved with a Clean Air Campaign, a public outreach program that promotes cleaner air and healthier living. As part of this campaign, elementary-grade students read selections of Dr. Seuss' "The Lorax" and ninth-grade students teach fourth- and fifth-grade students about air pollution. Air-quality education for children is further enforced through an art contest called "Art and Air." After working with local artists, fourth-graders create artwork based on the theme of "what my family and I can do to help keep the air clean." The winning artwork is then displayed on the sides of the city's electric buses (apcb.org).

The APCB also realizes that economics plays a vital role in air-quality concerns. The guiding principle of the bureau is that "companies will reduce emissions, if a competent, credible, professional staff can demonstrate that cost saving will result from doing so" (Best Practices). Indeed, the turnaround in air quality during the late 1960s and early '70s would not have been as successful without the support and innovation of local industries and businesses (led by the Chattanooga Manufacturers' Association). One such innovation is the development of an emissions-free "eco-industrial" zone, which encourages waste from one business to become fuel for another (rivercitycompany.com). However, perhaps one of Chattanooga's most innovative business endeavors is found in the creation of the city's fleet of electric buses.

Alternative Transportation

Tom Dugan, executive director of Chattanooga Area Regional Transportation Agency (CARTA) explains, "Transportation is not an end in and of itself; it follows land development and land use. The two are very closely linked as congestion follows development and development follows transportation" (Dugan 2007, pers. comm.). Such it was with the development of the city's electric bus fleet. During the 1980s when the community worked toward revitalizing Chattanooga's downtown and riverfront areas, transportation flow and parking availability became a problematic issue due to the long, narrow nature of the downtown district. In 1985, to avoid the demolition of buildings in order to create parking structures, the mayor approached CARTA and asked the agency to address the downtown's parking and transportation concerns. CARTA's first solution was to create parking facilities at either end of the downtown district and to use diesel buses to shuttle commuters and tourists into the area.

However, the city had a new attitude on sustainability and they wanted the transportation system to reflect it. After visiting an electric bus operation in Santa Barbara, California, CARTA decided to integrate a similar zero-emissions system into Chattanooga's downtown region. Chattanooga requested the assistance of Joe Ferguson, a retired manufacturer, to find a purchasing source for these alternative buses. Through his various contacts around the world, Ferguson determined that, while the technology existed, no manufacturer was currently producing the type of buses the city required. Ferguson took the initiative and founded Advanced Vehicle Systems (AVS), which developed, tested and produced the types of buses. In 1992 Chattanooga bought 12 electric buses from AVS.

Not all change is easy or welcome, however, and CARTA used training seminars to address maintenance crews' concerns about the safety and vitality of the electric buses. They also educated their bus drivers in how to address the concerns and questions of the bus system's passengers. In the grassroots fashion, CARTA strongly encouraged employees and patrons to voice their opinions about the buses or suggest ways to improve the design.

Another concern rose as CARTA was having problems keeping the buses charged to get back to the main base, which was six miles from the start of the shuttle. To remedy this situation, CARTA built an electric bus terminal downtown, with maintenance, battery change out, and battery chargers. The buses are now able to start at 6 a.m., change their batteries at noon and run for the rest of the day and evening. The batteries are charged during the night to avoid the peak costs of electricity. Further costs are absorbed, in part, through government funding and through the U.S. Department of Defense Advanced Research Projects Agency (DARPA) for whom CARTA develops and tests alternative-fuel vehicles for military applications. Parking fees also provide funds for the electric buses. In fact, Tom Dugan observes, "The parking garage pays for 75 percent of the shuttle costs." He adds that CARTA allows moviegoers at a theater complex downtown to get three hours of free parking, enough time to enjoy dinner and a movie, after which CARTA receives a portion of the revenues from the movie theater (Dugan 2007, pers. comm.).

Due to the success and innovation of the electric bus system, Chattanooga has become the headquarters of alternative-fuel transportation for the country. For several years the city provided a program which allowed municipalities to rent the electric buses and test them in their own communities. The University of Tennessee in Chattanooga continues research, as it encourages graduate students to study alternative fuels, and houses the Advanced Transportation Technology Institute (ATTI). ATTI is a nonprofit organization that researches alternative fuels, tests prototypes and also provides planning consultation for communities considering implementing alternative fuels. Dan Simpson, chief researcher for ATTI, says, "Many communities look at transportation as a tack-on at the end of their clean-energy planning. This is a huge, huge mistake. Transportation should be at the forefront because you must know the costs and benefits up front" (Simpson 2007 pers. comm.).

The development of the downtown not only jump-started the transportation system, but the new shuttle route also encouraged tourism. The electric bus became an attraction in itself. Today, between 700,000 and 1 million passengers ride

the electric buses each year, with a dramatic increase during the summer tourist season.

Downtown Densification

A prominent piece of the downtown redevelopment process has been creating better living conditions and encouraging more people to live closer to the core. This also reduces driving time and fosters density. Jeff Pfitzer from the RiverCity Company stressed that the goal of densifying the downtown is critical to achieving an economically viable and sustainable core. With a denser core, there is also less dependence on automobiles, resulting in lower pollution. About 10 years ago, a new school was built in the downtown that made a lot of sense for parents who were driving in from the suburbs to go to work. The school also acted as a community outreach center for environmental education, building awareness among the residents. It acted as "a sort of living laboratory of environmental consciousness" (Crockett 2007, pers. comm.).

Sustainable Building Initiatives

A partnership between the Chattanooga Housing Authority (CHA) and Honeywell resulted in a 12-year project that will reduce energy consumption at 18 housing authority sites while substantially decreasing emissions. The project, which involves energy- and water-saving retrofits performed under a \$10 million energy-savings performance contract between CHA and Honeywell, is expected to generate savings of more than \$1.25 million per year for the CHA and U.S. Department of Housing and Urban Development (HUD) (nema.org).

Under the contract, Honeywell will install energy-efficient lighting and programmable thermostats and replace electric-resistance wall heaters with high-efficiency heat pumps. Technicians will also install low-flow plumbing fixtures and more efficient appliances to reduce water consumption. Honeywell guarantees that the energy and water savings will completely fund the upgrades and will not change CHA operating budgets.

Recycling

The city's recycling program is another example of Chattanooga's attempts to address both environmental and social issues simultaneously. This program offers jobs to about 100 mentally challenged adults who sort through recycling material from nearly 6,000 homes and drop-off points. Not only does this program give an underutilized group of workers employment opportunities, but also allows for some 1 million pounds of recyclable material to be processed each month (Mehrhoff 2006).

Results

Chattanooga's sustainable accomplishments are numerous and are based on the hard work of local citizens, business leaders and government officials. These achievements have helped in reducing greenhouse gases, cut energy costs, created employment opportunities and fostered social connections and public engagement.

Among the goals accomplished in the Vision 2000 process are a revitalized downtown, a developed riverfront area, affordable housing for low-income families, and environmental education programs. At a total investment of \$793,303,813, Vision 2000 created 223 programs, 1,381 jobs and 7,3000 related construction jobs. The total number of people this program served is estimated at 1.55 million. Projects that arose from Vision 2000, such as the Tennessee Aquarium and the riverfront improvements, have also helped make Chattanooga a tourist attraction. In 1997 tourists spent \$466 million as they enjoyed the area's cultural and environmental amenities. While the natural beauty of Chattanooga's topography certainly helps draw these tourists, the beauty would not be enjoyable (nor indeed, viewable) without the stringent policies and programs that keep air pollution in check.

This constant commitment helps Chattanooga continue to be at the forefront of air-quality improvement and awareness. In the fall of 2006, the EPA determined that Chattanooga is one of only 14 U.S. cities to be ahead of schedule in ground-level ozone requirements, and has extended the city's compliance date to April 15, 2008. EPA officials said, "The progress these cities have made under the Early Actions Compacts program puts them on track to meet clean air requirements one to two years sooner than required" (Berry 2006).

Housing projects, such as the partnership between Chattanooga Housing Authority and Honeywell, will further help in reducing pollution and water consumption. This program is annually anticipated to save:

- 57 million gallons of clean drinking water
- 11 million kilowatt-hours of electricity
- 16.8 million pounds of carbon dioxide emissions
- 82,700 pounds of sulfur dioxide emissions
- 39,000 pounds of nitrogen oxide emissions
- 122 grams of mercury emissions

The amount of electricity saved could power more than 1,000 homes on average per year. In addition, the reduction in carbon dioxide is equivalent to taking 1,400 cars off the

road—both significant results. The project also provides long-term employment and training opportunities for residents, and includes the participation of local minority and female-owned businesses (honeywell.com).

Conclusion

The case study of Chattanooga, Tennessee, is one of a metamorphosis. Literally rising from the soot and smog of 1969, Chattanooga transformed its image from that of America's dirtiest city to one of the nation's leading communities in air quality and sustainability. As greenhouse gas emissions and global warming issues heighten, Chattanooga continues to strive to stay at the forefront of air-quality concerns. In 2006, Mayor Ron Littlefield joined some 275 U.S. mayors in signing the "U.S. Mayor's Climate Protection Agreement." This program seeks to reduce CO² pollution to 7 percent below the 1990 levels by using cleaner cars, efficiency practices and renewable energy.

While reducing air pollution was the catalyst for Chattanooga's transformation, the city understands that environmental concerns are only one part in achieving a healthy, livable and sustainable community. People are what make a community; therefore, public participation is essential to sustainable development.

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Austin, Texas

Mike Cady | Andrew Martin | Nathan Martin | Tim Youngquist

Introduction

The city of Austin is at the forefront of efforts to achieve sustainability in the United States. Realizing that sustainability is a process, not a destination, the city continually implements groundbreaking new programs to help reduce its overall greenhouse gas emissions. The city has focused a great deal of its effort on programs concerning renewable energy, green building, water and food. According to current research, successful sustainable urban development requires alterations of the physical structure of the city, changes in the behavioral attitudes of the citizenry, and progressive action by the government (Curwell, Deakin and Lombardi 2006). The successful integration of these elements has helped Austin experience tremendous success in implementing new greenhouse gas-reducing programs.

Background

The city of Austin, located in central Texas, has a population of nearly 700,000. This population is highly educated: 40.4 percent of Austin's residents have attained a bachelor's degree or higher, well above the national average of 24.4 percent (United States Census Bureau 2003). This can be attributed to several factors, including its position as a state capital and the highly educated population associated with state government. Austin is home to one of the top research universities in the world, the University of Texas. The university has a combined student and faculty population of over 70,000. According to the Sustainability Officer of Austin, Fred Blood, Austin has experienced tremendous growth in the last 10 to 15 years. With strong local leadership and support from residents, the city of Austin has been able to move toward becoming a "green city."

First Steps

Austin is known for being—and believes itself to be—at the forefront of sustainable thinking and movements. In the 1960s, the city had many environmentalists pushing for greater awareness. From preserving parks to protecting wildlife, Austin has long been concerned about the environment and sustainability. Naturally, the push for sustainability has not been easy, and there have been some serious challenges that tested the community's resolve.

Austin has a long tradition of awareness of environmental quality and its tie to the economics of daily life. Citizens formed the Austin Organic Gardeners Association during the 1950s. The success of the association helped foster the creation of the Sustainable Food Center (SFC), founded in 1993. The SFC was established in reaction to Austin's land-use pattern, as the region is losing productive farmland to development faster than anywhere else in the United States (Sustainable Food Center 2007).

According to Jose Beceiro, a sustainability worker for the Greater Austin Chamber of Commerce, the technology bust that occurred in the 1980s was a significant eye-opener for the city of Austin. The technology boom had brought a young and energetic population to the city, and technology workers and companies were responsible for a period of prosperity. With the technology bust, Austin realized it could not have its entire economy dependent on the technology sector. Austin had to diversify its economy (Beceiro 2007, pers. comm.).

Building Involvement

For Austin, water has been a key problem. In 2000, the area

experienced a drought and the water level in Lake Travis was at a record low. The people of Austin could easily see that their source of drinking, irrigation and bathing water was substantially lower than it had ever been. This drought served as a catalyst for the creation of the Conservation Task Force through collaborative efforts between city officials and concerned citizens. Analyses of usage showed that households were the biggest users and wasters of water. During the drought, many people who continued to water lawns as they would any other year were fined. This was a real wakeup call to those who had to pay the bills, but the task force knew that this was only a temporary fix. They knew that social change needed to happen. With this in mind, the task force took the lead through education programs and initiatives to reduce water consumption in homes, which were the biggest users and wasters of water. The task force implemented education programs to help people realize that water was a valuable resource and that the supply of fresh, clean water is not endless. Financial aid programs were developed and implemented to help people solve conservation problems.

The events of September 11, 2001, were also a catalyst for change in Austin. Suddenly, people were much more aware of the United States' dependency on fossil fuels and foreign oil. The people of Austin were motivated to achieve sustainability in living as well as in energy. Following September 11, the city felt a strong desire to explore to possibilities of energy production (Beceiro 2007, pers. comm.).

Currently, the Sustainable Food Center (SFC) serves to help the city create a food-secure community, increase equity, reconnect people to the food that they eat, and teach sustainable gardening techniques to young and elderly residents alike. The SFC involves the youth of Austin by going into public schools to educate the students about the positive aspects of living a sustainable lifestyle (Sustainable Food Center 2007).

Public education plays a major role in increasing citizen involvement in Austin's sustainability efforts. Their website is easy to navigate and offers a wealth of information concerning sustainability and how citizens can increase their level of involvement.

Citizen involvement has been an integral part in another of Austin's programs, the Green Building Program. According to Mary McLeod, over time the program has developed many different ways to continually listen to and educate citizens about the Green Building Program. The program is primarily volunteer-based, so the people that are involved are

very motivated and inspired by what they do. The program is advertised in newspapers, newcomers' guides, publications and project photographs. These advertisements keep people informed and aware of current happenings in the Green Building Program, McLeod said. She herself became involved with the Green Building Program from her roots as a design/build homebuilder. She liked the idea of a healthier building and was inspired by the thought of sustainability in housing. Starting out as a teacher, she decided to shift focus to the Green Building Program, which allows her to reach a much larger audience. Every community member has a different and unique reason for his or her involvement, whether it was spawned from touring green residential homes, attending committee meetings or finding information on the Austin energy website (McLeod 2007, pers. comm.). Regardless of the reason, the Green Building Program continues to grow and thrive in the city of Austin.

The high level of citizen involvement in Austin, according to Fred Blood and Jose Beceiro, is due to the city's having a large, intelligent population with one of the top research universities in the nation, the University of Texas. Beceiro also mentioned a program called Austin Clean Energy Incubator, which gives incentives to companies that show a promise and commitment to sustainability, to encourage them to make Austin their home. Beceiro said eight companies are currently involved in the Austin Clean Energy Incubator program (Beceiro 2007, pers. comm.; Blood 2007, pers. comm.).

Dan Stroub of the Conservation Task Force believes that many people in Austin are concerned with sustainable community living and are relatively well involved in the programs offered. The Conservation Task Force of Austin was started by people involved in local government, such as the city council and a few concerned citizens. In his opinion, the support of the Conservation Task Force was overwhelming when they started these programs. Lots of people wanted to know how to lower their water consumption whether for sustainability or monetary worth (Stroub 2007, pers. comm.).

Austin's Water Conservation Task force has many programs to educate its citizens. The city starts educating young people early with school programs such as "The Dowser Dan Show" and the "Water in Our World" program. For adults, they provide WaterWise Seminars periodically to the general public to offer ways to conserve water with simple tasks.

The WaterWise program issues a free monthly newsletter about the happenings of water-conscious citizens. One interesting new initiative that WaterWise is doing is

implementing a new graphic-friendly bill that lets citizens know how their current usage compared to last year as well as to other customers throughout the city. Other programs include free toilet giveaways, 20 percent water-reduction pledge to challenge consumers to be water-conscious with their usage, and rebates on energy- and water-saving clothes washers. Though the free toilet giveaway program has run into difficulties in acquiring toilets from the contractor, the water-saving clothes washer rebate program remains one of the most popular and utilized programs ever implemented by the city. (Stroub 2007, pers. comm.).

Programs

The city of Austin and its citizens, through various organizations, have a multitude of programs and activities directed toward sustainability in general as well as reducing global greenhouse gas emissions in particular. For our purposes, we focus on four major components that contribute to sustainability. These components—sustainable food, green building, renewable energy, and air/water conservation—have influenced much of how the people of the city of Austin live and can be examples for other cities to follow.

Sustainable Food Center

The Sustainable Food Center seeks to be a visible part of Austin's effort to increase sustainability. The mission of the SFC is simple, yet the effects the organization has on the community are rich and diverse.

The SFC fosters a sustainable, local food system by bringing food grown within 150 miles of Austin into the city center; empowering local community members to grow their own food; and teaching families how to prepare fresh, healthy food. By supporting and participating in the local food system, citizens not only eat better but also boost the local economy, build community, preserve the environment, improve health, and develop an appreciation for local flavors (Sustainable Food Center 2007).

Equity is an important concern for Austin, which is reflected in the annual membership dues for the Austin Organic Gardeners Association. At only \$8 per family, membership is possible for those of all income levels. All of Austin's food programs seek to decrease the impact that the local food system has on our natural resources. By decreasing the size of the food system, thousands of transportation miles are saved annually. In addition, by encouraging organic gardening techniques, the use of harmful chemicals is decreased as well. Like the "Slow Food" movement, Austin's SFC seeks to regain and enrich the experience of food, the taste of food,

and the place of food within our social and environmental lives.

Green Building Program

The Green Building Program has developed in Austin over the past 15 years. It was built on the base provided by an earlier program called Energy Star in 1990. Energy Star was a program that rated houses nationally. Mary McLeod indicated that the idea to expand to greater ventures was actually brought up by community members. Energy Star was a well-known and respected program in the community. Active citizens decided that they needed to tackle more issues and get more involved with other aspects of green building. McLeod stated that the roots could basically be traced back to only a few people, who encouraged others to get involved. These green building activists created task forces and committees to implement these various programs. The Green Building Program in Austin has had strong support from the community (McLeod 2007, pers. comm.).

The Green Building Program encompasses many different initiatives that aid citizens in living healthier lives. These programs include residential rebates, commercial rebates, free home energy improvements and loan programs. The main concept for these programs is to provide financial backing for implementing different sustainable systems for businesses and residents. These systems are primarily solar photovoltaic systems, solar water heaters, thermal energy storage, duct diagnostics, refrigerator recycling and installation of solar screens. Through the Green Building Program, people are encouraged and educated about the usefulness of all of these systems. What results is a well-educated and greener community that can pass along and inform neighbors and the future generation of the greater city of Austin.

Fred Blood, sustainability officer for the city of Austin, and Jose Beceiro of the Austin Chamber of Commerce both mentioned one primary goal the city of Austin is trying to accomplish: 30 percent of all energy used by the city will be renewable by the year 2020. Both Blood and Beceiro said Austin currently uses just over 6 percent renewable energy sources, and is moving toward its goal. One of the biggest factors that makes this goal attainable is the fact that the city owns Austin Energy, the main energy supplier of Austin. After buying Austin Energy in 1983, the city has been able to move forward with much legislation and voice about the importance of sustainability and renewable energy. However, this idea of sustainability and being environmentally friendly is not something new for Austin (Beceiro 2007, pers. comm., Blood 2007, pers. comm.).

Many of Austin's sustainability programs and organizations were created in the late 1990s and early 2000, while other organizations that began much earlier have shifted their focus to sustainability. For example, the Texas Water Development Board was started in 1957 and has been responsible for overseeing all of the state's water usage. Like many organizations that deal with natural resources, they appear to have gained significant momentum in the early 2000s. Two programs that they help oversee have had a substantial influence in Austin are the Austin Clean Water Program and Austin's Water Conservation Task Force.

Austin Clean Water Program

The Austin Clean Water Program started in 2001 as a result of a major flood in the early part of that year. This catastrophe served as a catalyst for the people of Austin to push them to operate a sustainable water usage system that would not upset the forces of nature. The cost of water that is funded by water sales and other services is 94 percent of the total budget (\$342.1 million for the state of Texas). The majority of water that the city of Austin uses comes from Lake Travis, which was created in 1937 by damming up the Colorado River.

Dan Stroub, staff for the Water Conservation Task Force for the city of Austin, said in his opinion one of the biggest accomplishments for water conservation in Austin has been the mapping out of the top 1,000 water users using GIS mapping systems. They could pinpoint the residents that use the most water through aerial photography and then would divide the maps by using symbols such as shade and sunshine to better understand the usage of water in the residential zones. Afterwards, they would go out and talk to the high water-use homeowners and give them tips on conserving water. Landscaping techniques such as xeriscaping (landscaping in ways that do not require additional irrigation), planting certain types of grasses and plants in shade, and using better irrigation systems have been some of the more popular tips that have made an impact and increased awareness among homeowners who are using considerable amounts of water (Stroub 2007, pers. comm.).

Another goal of the Water Conservation Task Force was to implement aggressive water conservation techniques by reducing peak day usage by 1 percent per year for 10 years. These are tangible goals that can be measured and they help city officials mark the city's progress.

The city of Austin's population is steadily increasing and as the city grows, it requires more water. This growth has led the city to build a new water treatment plant on Lake Travis. This caused discontent within the environmental

community because the site is immediately adjacent a nature preserve with endangered species. The land was set aside for this construction a number of years ago and is needed only now because of the city's phenomenal rate of growth. They worked hard to minimize their impact on the site with a smaller footprint and have worked with environmentalists to do the least amount of damage to the site. Through these steps as well as some educational programs and town meetings many community members are now supportive of the water conservation project.

Results

The community has had an overwhelmingly positive reaction to many of the city's programs. Mary McLeod says the Green Building Program is experiencing a turning point in which citizens are now coming to them with new ideas. The Green Building Program started by introducing an idea to one person at a time and slowly it has grown from there. Now they have meetings scheduled every month with various stakeholders. There are also workshops for the general public and they are always well attended and occasionally sell out. The project load is also increasing dramatically. At this point, the Green Building Program receives about 100 commercial projects and 1,000 residential projects each year. McLeod stated that she first realized its potential when she was shopping at a whole foods store and thought that people might take the same stance for healthy homes as they do toward healthy food. McLeod was right; the community is overwhelmingly in support of the programs and is very well educated. The support of the Austin's mayor, Will Wynn, has also been a considerable help. McLeod says that if you have the mayor's support you are in good hands. The mayor's speeches and influence tend to receive more response than the average persons' (McLeod 2007, pers. comm.). Mayor Wynn is a very strong voice for sustainability and as long as he remains the decision maker, much will be done for sustainability (Beceiro 2007, pers. comm.). One person can make a dramatic difference. Nonetheless, it is crucial to reach out and get citizens involved.

Conclusion

The city of Austin, Texas, has taken numerous commendable steps to achieve its goal of becoming a green and sustainable city. As one of the nation's leaders in sustainability, Austin has been employing many systems of renewable energy that have consequently made them a precedent for other cities to follow. Wind, solar and even water energy are just some of the many renewable energy systems used in Austin. With reflection and additional research, one can learn much from the city's experiences. Jose Beceiro believes that Austin, Texas

wants to become the number-one Green Energy community in the nation (Beceiro 2007, pers. comm.). Austin wants to let everyone know they believe in and practice environmentally friendly living in their city.

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Portland, Oregon

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Introduction

Sustainability requires that global warming and global climate change be addressed. With a near consensus globally among scientists, the scientific evidence showing climate change is no longer in question. People of the United States are starting to act and demanding action to stop global warming. April 14, 2007, marked “the greatest day of citizen action against global warming in our nation’s history” (Step It Up 2007). Over 1,400 rallies were held across the country in all 50 states to ask Congress to “step it up” and “cut carbon 80% by 2050” (Step It Up 2007). Portland, Oregon, held six of these events, which is not surprising for a city that has been leading the nation in climate-change actions.

Portland’s efforts to lower the environmental impacts of urbanization began with the enactment of Oregon’s 1973 Senate Bill 100. Although this bill was not specifically targeted at reducing greenhouse gas (GHG) emissions, it forced cities to do extensive planning and consider where they wanted to be in future decades (State of Oregon 1973). This eventually led Portland to incorporate GHG-reducing strategies in their city plans.

In the late 1980s and early 1990s Portland began to take specific action against global warming. The city released multiple GHG reduction plans in the early 1990s (Armstrong 2007, pers. comm.), including the 1993 “Global Warming Reduction Strategy” that made Portland the first city in the U.S. to adopt a plan to reduce CO₂ emissions (Sten et al. 2001). After the 1993 document, a revised plan was adopted in 2001, the “Local Action Plan on Global Warming” (LAPGW). Portland and Multnomah County track their efforts through the use of indicators and issue progress reports (Rojo De Steffey et al 2005).

Today, Portland has a wide variety of programs established to reduce GHG emissions and abate the effects of global climate change. The current goals are set to reduce GHG emissions 10 percent below 1990 levels by 2010 (Sten et al. 2001). The rest of this chapter will summarize the means by which Portland was able to develop and implement these plans.

Background

Located in the northwest corner of Oregon, near the Pacific Ocean, Portland is known as the “City of Roses” due to its International Rose Test Garden and many other rose gardens, and as “Stumptown,” which stems from its long history as a port for loggers. Situated in an area of temperate rainforest, Portland averages between 40 and 50 inches of rain each year, along with 70 inches of snow during the winter months. The city also boasts a collection of beautiful parks that make up about 15 percent of its area. Notable among these is Forest Park, a 5,000-acre park in the heart of the city. With a growing population of about 530,000 people, Portland claims to be one of the “greenest” cities in the United States. With help from outside organizations, the City of Portland government protects the city’s environment and lowers its overall environmental impact, making Portland a model city for the rest of the country.

In 1993, Portland became the first city in the United States to formally begin to reduce its carbon and greenhouse gas emissions. Its downtown and metropolitan area are unified with the surrounding environment through controlled-growth boundaries that promote a sustainable place to live and work.

Despite all the precipitation, citizens of Portland are physically active, and Portland is one of the most bicycle-friendly cities in the United States. The city government sponsors local tax initiatives to encourage Portland residents to ride their bikes, use mass transit or carpool to work to cut down on traffic congestion and GHG emissions.

The city's mayor, Tom Potter, has been a leader in promoting sustainability in Portland. Through his efforts, the city has encouraged citizens to buy 10 percent of their food locally, provided by Portland's 13 farmers' markets. Portland also leads the country in sustainable architecture, claiming 16 LEED (Leadership in Energy and Environmental Design) accredited buildings. A \$2.5 million fund for LEED construction recently was passed, demonstrating the city's continued commitment to sustainability. As a city that receives fresh water from the nearby Mount Hood and fresh sea air from the Pacific, Portland is clean, comfortable and a prime example of what a green city could be.

First Steps

The people of Portland have been very involved in the development of climate-change plans and policies, but government leaders have been the ones to push first for land-use planning and then for climate-change policy. The initial impetus for the development of Portland's planning framework can be attributed to Governor Tom McCall, who held office from 1967 to 1975. In a famous opening address to the 1973 Legislative Assembly, Governor McCall said,

We are in dire need of a state land-use policy, new subdivision laws and new standards for planning and zoning by cities and counties. The interests of Oregon for today and in the future must be protected from grasping wastrels of the land. We must respect another truism: that unlimited and unregulated growth leads inexorably to a lowered quality of life (Oregon Department of Land Conservation).

Senators Ted Hallock and Hector MacPherson acted as the chief sponsors for the "state land-use policy" that was Senate Bill 100. Before the end of 1973, Senate Bill 100 was adopted by the legislature to create Oregon's Statewide Planning Program (Oregon Department of Land Conservation and Development, no year). From Governor McCall's address, we see that while the people of Oregon considered themselves to be environmentally aware at the time, it took a great leader to step forward and initiate change.

Accounts from current government employees in Portland indicate the same is true for the initial push for climate-change policy. According to Michael Armstrong, the

operations manager for the Portland Office of Sustainable Development, the actual impetus for climate-change policy came from city commissioner Mike Lindberg (Armstrong 2007, pers. comm.). Portland had adopted strategies to reduce energy use due to the first oil embargo and oil crisis during the 1970s, but Lindberg pushed Portland to focus on reducing GHG emissions, not just energy use. This initiative came in the late 1980s and early 1990s. During Lindberg's terms as city commissioner, the 1993 Global Warming Reduction Strategy was developed and implemented. Again, government officials played a large part in Portland's development of a GHG-reduction plan (Armstrong 2007, pers. comm.).

The people of Portland have participated in GHG-reduction planning. During the development of the Local Action Plan on Global Warming (LAPGW), citizen commissions were created to guide the development of five of the six sections. Seventy-five citizens were contacted directly and asked to participate because of their knowledge on the subjects; approximately eight to 15 citizens comprised each committee. In addition, all meetings were advertised to the public for their attendance and involvement (Tooze 2007, pers. comm.).

Government officials have been the leaders inciting for climate change policy and action. However, the community of Portland was already environmentally minded and accepting of the environmental leaders. The community was also given a large role in developing GHG-reduction plans, which ensures they will find them valuable and worth their attention and commitment. Therefore, it seems likely that Portland was successful in starting GHG-reduction strategies because of an environmentally minded community supported the government officials who pushed for action against global climate change.

Building Involvement

Portland residents have been involved in developing the GHG-reduction plans; even more community involvement has been spawned by programs laid out in the LAPGW. Three times a year, Portland hosts a Fix-It Fair which educates community members on how to solve common problems found in the home. Some topics of the fair include recycling, energy efficiency, weatherization, gardening and home finance (Tooze 2007, pers. comm.).

Portland's transportation department has taken steps to reduce air pollution downtown by promoting programs that encourage citizens to utilize transportation options other than driving. Their main program, Smarttrips, encourages different modes of transportation by personally delivering

“kits” informing the community on biking, walking and mass-transit programs. The community has taken to these programs with great enthusiasm, contributing to a 25 percent participation rate of the biking programs.

Portland also participates in green building practices and has set up a few programs as a vehicle for this area of sustainability. The first of these programs was the Green Investment Fund (GIF), which was set up to generate funds for green building projects and awarded a total of \$800,000 dollars in building grants in its first two years. There is also the annual Build It Green (BIG) tour of homes, which helps promote green building techniques and services. The Solar Energy Association of Oregon helps with the BIG tour of homes to introduce and educate people on solar energy.

The city also works with the Energy Trust of Oregon to act as brokers by calling residential building owners to explain the benefits of better weatherization and to arrange contractors to provide these services. Last year they reached their goal of weatherizing 8,000 units. The state also gives incentives to contractors who use green building technologies in new buildings. Other incentive programs help build participation. One incentive program through the Oregon Department of Energy provides an income tax credit for as much as 35 percent of the project cost. The projects eligible for the tax credit are only “high-efficiency products and strategies ... designed to push the envelope for ultra-high energy-efficient products.” Such products would include solar panels but not increased insulation (Tooze 2007, pers. comm.).

Programs that encourage participation, offer education and provide incentives are all very important in building community involvement. Even in a city like Portland that is known for its environmental efforts and for the level of public demand for care of the environment, it is imperative that programs are structured to get citizens involved. These programs act as motivators and reminders to both very environmentally aware and marginally aware citizens.

Programs

Portland’s current plan for reducing GHG emissions sets a goal to promote a sustainable future by reducing GHG emissions 10 percent from 1990 levels by 2010. The City of Portland and County of Multnomah have identified six elements to use in reduction of GHGs. These elements are:

1. Policy, Research and Education
2. Energy Efficiency in Building
3. Transportation, Telecommunications and Access

4. Renewable Energy Resources
5. Waste Reduction and Recycling
6. Forestry and Carbon Offsets

(Sten et al. 2001)

Policy, Research and Education

The Policy, Research and Education objectives ensure that policy decisions at all levels—government, business, and individual—seek to reduce global warming impacts. The city of Portland and Multnomah County will take on strong leadership roles to help with the reduction of GHG emissions. The city and county will offer high-quality and timely information that is essential to implementing these policies successfully. The city and county have promised to ensure that the Portland community has access to the necessary information and becomes increasingly aware of global warming and the impacts residents and businesses have on greenhouse gas emissions (Sten et al. 2001).

Energy Efficiency in Building

In Energy Efficiency in Building there are three main initiatives. The first is to reduce GHG emissions from city and county facilities by 10 percent below 1990 levels by 2010 through energy-efficiency measures. The second is to reduce forecasted GHG emissions in the residential sector by 10 percent by 2010. The final initiative is to cut forecast GHG emissions in the commercial, industrial, public and nonprofit sectors by 10 percent by 2010.

The city and county also adopted a set of principles to guide action while reducing building energy use:

1. Benefit all neighborhoods and socioeconomic groups, with particular attention to low-income residents.
2. Promote energy, economic, environmental and social benefits, including developing active, healthy neighborhoods.
3. Consider community values along with a broad definition of cost effectiveness that includes total costs to individuals and all resource savings.
4. Minimize lost opportunities, such as new residential and commercial construction.
5. Emphasize education and outreach value.
6. Support local businesses and expand local infrastructure for delivering energy-efficiency services.

(Sten et al. 2001)

The Office of Sustainable Development (OSD) and

Department of Sustainable Community Development (DSCD) are to promote energy conservation as the preferred energy resource. OSD and DSCD will take leading roles to develop energy-saving programs and build partnerships with city and county agencies, other governments, nonprofit organizations, utilities and private-sector businesses to implement energy programs and policies (Sten et al. 2001).

Transportation, Telecommunications and Access

The city and county intend to pursue energy-efficient transportation that provides convenient, affordable access to goods, jobs, education, leisure and information with reduced environmental impact. The Transportation, Telecommunications and Access programs have four objectives. First, the city and county will improve the quality, convenience, affordability and awareness of walking, bicycling, teleworking, public transit, ridesharing and vehicle sharing. The second objective is to make the private cost of driving reflect the full costs to society. The third objective is to increase the use of highly fuel-efficient and alternative-fuel engines in on- and off-road vehicles as well as stationary applications. The fourth and final objective is to change the pattern of urban development to be more compact and bicycle- and pedestrian-friendly, to provide for mixed uses, and to offer a range of mobility choices. The city has also listed four principles for reducing transportation emissions. These principles are:

1. Reduce the need for trips by using telecommunications and remote access whenever possible.
2. Encourage people who must travel to do so on foot, by bicycle, on transit, or as part of a rideshare.
3. Implement mechanisms to ensure that people who drive pay the full social cost of driving.
4. Improve access to alternative-fuel and highly fuel-efficient vehicles.

(Sten et al. 2001)

Renewable Energy Resources

The fourth element of the City and County Local Action Plan is Renewable Energy Resources. The city and county will support environmentally acceptable, sustainable energy sources such as solar, wind, geothermal, biomass and small hydroelectric power plants and meet all growth in electricity demand since 1990 with new, zero-carbon dioxide sources of electricity. This will be achieved by acquiring 170 average megawatts of new renewable energy resources by 2010 (Sten et al. 2001).

Waste Reduction and Recycling

The fifth element is Waste Reduction and Recycling. It has five principles for reducing emissions from solid waste. These principles are:

1. Reduce the generation of solid waste, including source prevention and reduction in ing and other excess materials.
2. Recover materials from the waste stream from direct reuse and remanufacture unto new products.
3. Reuse products whenever possible
4. Recycle materials whenever possible
5. Purchase recycled-content products

(Sten et al. 2001)

The city states that reducing waste, reusing products and materials and recycling reduce greenhouse gas emissions in three important ways. First, preventing waste at the source and reducing extraneous materials like packaging reduces the need for raw materials and energy throughout the lifecycle of manufacturing, transportation, reuse and eventual disposal. Second, using recycled materials in manufacturing processes typically requires substantially less energy than using virgin materials. Third, decreasing the amount of waste sent to landfills reduces emissions of methane, a potent greenhouse gas (Sten et al. 2001).

Forestry and Carbon Offsets

The last element in the Local Action Plan is Forestry and Carbon Offsets. Trees can be an effective tool for sequestering carbon dioxide, a major greenhouse gas, and have important benefits for storm water management, urban temperature control and water quality. The Forestry and Carbon Offsets section outlines four principles for enhancing CO₂ Sequestration and Mitigation. These four principles are:

1. Achieve a net gain in the size, health and diversity of local forests, encouraging native species wherever practical.
2. Plant the right tree in the right place to achieve the greatest functional benefit and longevity.
3. Ensure community understanding of an appreciation for forest both as a vital part of Portland's character and as a greenhouse gas-reduction strategy.
4. Pursue carbon-offset strategies to complement but not substitute for local emissions-reduction strategies.

(Sten et al. 2001)

The Forestry and Carbon Offsets program has three action items to help achieve this concept. The city and county will actively support statewide efforts to reforest un- and under-

stocked timberland and reduce the use of non-sustainable harvested timber. They will also promote local tree planting and preserve and improve maintenance of existing trees. In addition, they will actively partner with other communities and organizations to secure greenhouse gas emission offsets (Sten et al. 2001).

Within each of the six elements, the city and county have broken down the larger action goals into implementable actions. Responsibility for these actions—whether community or government—is also specified. The city and county have also specified timelines for actions: some are to be taken by 2003 and others by 2010. The plan also estimates the potential emissions reduction of each action, approximately quantifying the impact of actions in metric tons of emissions reduction per year (Sten et al, 2001).

Results

The City of Portland and Multnomah County have shown their commitment to sustainability and decreasing their GHG emissions through a variety of programs. Through these programs Portland has had many successes but also faced some challenges. In assessing progress toward results, the City of Portland and Multnomah County have achieved the following (Rojo De Steffey et al. 2005):

Energy Efficiency and Green Building

- Decreased per capita building energy use by 7 percent
- Provided energy-efficiency incentives to over 200 businesses and 14,000 households
- Generated millions of dollars in savings for local businesses and residents
- Provided energy-efficient updates in 10,000 multifamily units
- Converted traffic lights to LED bulbs (saving 5 million kWh and \$500,000)
- Adopted high-performance, green building criteria for all county-funded building projects

Transportation, Telecommunications and Access

- Central city streetcar and TriMet's light rail lines opened
- Improvements to bicycling and walking infrastructure emphasizing pedestrians
- City's diesel vehicles converted to run on a 20 percent biodiesel blend
- Multnomah County converted diesel fuel to biodiesel (reduce emissions over 70 percent)

Renewable Energy Resources

- Named EPA Green Power Partner of the Year for 2005
- Portland General Electric rank second and PacifiCorp fourth in a national survey of utility green power suppliers
- 6 percent of the utilities Portland customers purchase is green power
- City added green tags representing nearly 44 million kWh of wind power
- 11 percent of Portland's electricity is contributed to green power

Waste Reduction and Recycling

- Launched commercial food waste collection program
- Multnomah County established resource management contract, which creates incentive for waste haulers to increase recycling recovery rates
- Recycling participation among businesses has increased; firms are using more sustainable practices.
- OSD working to boost rate of residential recycling with a focus on low-participating neighborhoods and apartment buildings

Forestry and Carbon Offsets

- Has begun preliminary work on inventorying and valuing its forest canopy
- Pursuing an aggressive tree planting policy
- Bureau of Environmental Services and Parks and Recreation planted over 600,000 trees

Portland is a special place that has developed a unique culture of planning and environmental responsibility over a period of 30 years (Hovey 2003). Relative to other cities, Portland is sometimes viewed as strangely unique, as if Portlanders themselves were significantly different from other city dwellers. The achievements of Portland, however, came about gradually through long years of effort by many committed individuals. Committed individuals exist everywhere, and people in other places can learn from Portland's experiences and build a culture of public collaboration and commitment in their own communities.

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Conclusions

Many local communities are acting to reduce their greenhouse gas emissions and encourage more sustainable practices, from food systems to water use to waste reduction and recycling. The communities we chose for our case studies have moved well beyond “compliance” with state and federal regulations concerning air and water pollution control, and the safe handling and storage of hazardous and solid waste. These communities are working to broaden choices in renewable energy sources, transportation modes and local food networks. Over time, these communities have built local consensus and a culture of environmental responsibility, through public education and collaborative and participatory processes. As it builds, this local culture often supports the use of the powerful programmatic and regulatory mechanisms that local governments have at their disposal: new forms of land-use regulation, transportation investments, and better protection and conservation of natural resources.

The communities we chose for our case studies were Austin, Texas; Cambridge, Massachusetts; Chattanooga, Tennessee; Clifton, New Jersey; Fort Collins, Colorado; Madison, Wisconsin, and Portland, Oregon. The cities range from suburbs to larger central cities with populations from 80,000 to 600,000. The programs that these communities have in place cover public education, new building codes, changes in purchasing and city/town building requirements, new forms of land-use regulation, recycling and waste-treatment improvements, water conservation, and public housing improvements. Most of these communities are building sustainability by working to improve economic, social and environmental aspects simultaneously.

What’s so special about these communities?

People in other communities wonder, what makes them able to accomplish so much? We researched the basic descriptions such as population, industries and income, and we asked people in each community about the role of key leaders, key issues and local culture.

Most of our case study communities are currently relatively prosperous. However, they were not all prosperous when they began working to improve their social and environmental quality.

While we did not set out to select “university towns,” we found that our selection included a large proportion of communities in which universities were important. Clifton is located near Montclair, home to Montclair State. Harvard and MIT both played a role in Cambridge’s success, from providing graduate student assistance to participating in Cambridge’s facilities improvements. In Fort Collins and Madison, the presence of Colorado State University and the University of Wisconsin, respectively, were very important. University extension personnel are very involved locally in Madison’s programs and documentation. The University of Texas makes up too low a proportion of the population to call Austin a “university town,” but along with state government offices seems to affect the nature of Austin’s population as a whole. Chattanooga and Portland are not university towns.

We felt factors that might explain the predominance of “university towns” among our case study communities were:

- that there is typically a larger proportion of the population that is highly educated and potentially interested in innovation;

- that we were attempting to choose a range of city sizes, with smaller cities represented, and among these, university towns are more environmentally active; and/or
- that student groups were selecting the communities to study, and we might have found these places more interesting because they are more like where we live.

In almost all cases, we found that universities were involved in some way, either through extension personnel, graduate students, faculty, staff and students in their roles as community members, or through the large “physical plant” impact that universities have. We felt that any community moving toward greater sustainability, whether reducing GHG impacts or some other initiative, would do well to involve the resources available through their universities.

Key Issues: ‘Felt Problems’ and ‘Felt Solutions’

We asked about the role of “felt problems” in motivating action. According to sociological and political ideas, “felt problems” are distinct from “problems” not in their existence, but in how people feel about them. “Felt problems” are problems that people feel are serious, or urgent, or in some way priorities for action.

The case studies relate “felt problems” in several of the communities. In Fort Collins, becoming a “nonattainment area” for air quality motivated some people to action. In Austin, problems with the water supply during a drought year motivated action.

Sometimes the perception of a problem as a “key motivating issue” seemed to relate to local conditions, other times to national trends. In the Cambridge study, the Cambridge community experienced global warming as a “felt problem” before most communities in the United States.

When we presented our initial findings to the Des Moines Mayor’s Task Force, one of the task force members pointed out that people needed to see the availability of solutions as well as the urgency of problems. While we hadn’t included this question of public perception in our study, we hope that this report might be used to demonstrate that people can do things locally to lower their impacts. Cumulatively, local communities can make a huge difference.

Other towns and cities have many of the same problems. Somehow, for the communities in our case studies, these problems became “felt problems,” or problems worthy of action. And for these places, action seems both possible and relevant. The way that problems become “felt problems” is usually explained through leadership, through some combination of individuals and groups taking a leadership

role, and through media attention.

Key Leaders

Most of the communities did not wait for (or experience) an overwhelming social consensus prior to taking action. In most communities, key individuals played a very important part in beginning the process. In Fort Collins, individuals in local government were important in beginning action and still are important in explaining the range of local programs that are available.

Similarly, in Madison, individuals within local government and with non-governmental or volunteer organizations have been influential in making changes in programs, and in influencing community opinion over time.

In Chattanooga, we see that a groundswell of participation took place. Reading between the lines, we might see that someone was organizing meetings in the early years. But along with key leaders, broad public involvement took place and helped Chattanooga accomplish many things over the years.

Local Culture

In some of these communities, local action and involvement has been a factor for long enough that the local culture of participation, engagement and environmental action is now different from other places. Chattanooga, Austin and Portland could all be read as relatively large places with distinctive and engaged cultures of sustainability. Global warming is just another challenge in a long list of initiatives they have taken on.

Other community leaders may see these places as too different from their own experience to emulate. Portland is frequently cited as an example of what planning can do, yet many others feel that the people in Portland are actually different from the people in their places, in the way that they support planning and environmental initiatives. Austin represents itself as distinct, as we see in the “Keep Austin Weird” bumper stickers and T-shirts. And as we learn from the case study, Fort Collins can be perceived by its regional neighbors as “too politically correct.”

In this way, it is important to continue to keep the history of those places in mind. Portland did not always have a culture of active engagement in urban and environmental issues. Chattanooga had some of the nation’s dirtiest air.

It is also important not to discount the importance or longevity of a local culture. Madison still sees itself as influenced by its identification with Aldo Leopold and

natural resource conservation, for many reasons. And, people attracted by a developing distinctive local culture such as Portland's or Austin's will move there and help perpetuate that culture. However, over periods of decades, it does seem to be the actions of individuals over time that build these local cultures into something that becomes distinctive, engaging and effective.

Local communities can do many things to slow global warming. In fact, as local government decision-making structures many of the basic systems—such as transportation, building efficiency, and land-use relationships—it is actually local governments that have the greatest role to play, the most power to make change, and the greatest changes to make.

Appendices

Appendix A: List of Common Acronyms

GHG Greenhouse Gases

LEED Leadership in Energy and Environmental Design Building Certification Program organized by United States Green Building Council

ICLEI Local Governments for Sustainability (previously, International Council for Local Environmental Initiatives)

Appendix B: Further Resources

See cities' and related organizations' websites for other programs

Austin, TX , <i>many programs listed</i>	www.ci.austin.tx.us
Cambridge, MA , Climate Protection Plan	www.cambridgema.gov
Chattanooga, TN	www.chattanooga.gov
• Chattanooga Chamber of Commerce	www.chattanoogachamber.com
• River Valley Partners	www.rivercitycompany.com
Clifton, NJ , Recycling and Tree Programs	www.cliftonnj.org
Fort Collins, CO , <i>many programs listed</i>	www.ci.fort-collins.co.us
Madison, WI , Climate Protection Plan and programs	www.ci.madison.wi.us
Portland, OR , Global Warming Reduction Strategy,	www.portlandonline.com
-Local Action Plan on Global Warming,	
-Progress Reports for the Local Action Plans	
• Portland Office of Sustainable Development	www.portlandonline.com/osd

Sustainable Communities and Global Warming
Solutions Resources

Sustainable Communities Network (Case Studies)	www.sustainable.org
Environmental Protection Agency (Visioning Models)	www.epa.gov
Local Governments for Sustainability	www.iclei.org

Most environmental organizations have Web sites with great resources for individuals and for organizing action on global warming.