RESOLUTION NO. 25833

A RESOLUTION ADOPTING THE CHATTANOOGA CLIMATE ACTION PLAN SUBMITTED BY THE MAYOR'S CHATTANOOGA GREEN COMMITTEE DATED JANUARY 2009, ATTACHED HERETO AND MADE A PART HEREOF BY REFERENCE.

WHEREAS, The City of Chattanooga and Community are in need of a plan for addressing Energy Efficiency, Healthy Communities, Natural Resources and Education Policy, and reducing Greenhouse Gas Emissions, and

WHEREAS, The City of Chattanooga recognizes its responsibility within the surrounding Region, these United States, and within the World, and

WHEREAS, In 2006, The Mayor of Chattanooga signed the U.S. Conference of Mayors Climate Protection Agreement, now numbering over 900 Mayors, and

WHEREAS, The Mayor of Chattanooga created the Chattanooga Green Committee (the "Committee") and appointed its fourteen members in November 2007 to develop a plan of action addressing the above issues; and

WHEREAS, the Community has participated in the public process and provided input to the Committee's final product, along with numerous Subject Matter Experts, and

WHEREAS, Local Governments for Sustainability (ICLEI) computer software has been used to analyze what actions would help the City of Chattanooga and Community achieve our goal of reducing Greenhouse Gas Emissions, and

WHEREAS, The Committee, along with their supporting Staff, has developed the Chattanooga Climate Action Plan ("the Plan") which provides forty-seven (47) recommendations for action that will help guide decision makers, and as such, does not automatically enact changes or guarantee funding for actions or recommendations contained therein; and

WHEREAS, The Committee has recommended the Plan be approved by the City Council.

NOW, THEREFORE,

BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF CHATTANOOGA, That the Chattanooga Climate Action Plan, attached hereto and made a part hereof by reference, be and is hereby adopted.

ADOPTED: February 24, 2009

/add

the Chattanooga

CLIMATE ACTION PLAN

Recommendations to
Mayor Ron Littlefield

the Chattanooga

CLIMATE ACTION PLAN

Recommendations to
Mayor Ron Littlefield

Submitted
January 2009
by the
Chattanooga Green Committee

The Chattanooga Climate Action Plan is available at
http://www.chattanooga.gov/chattanoogagreen

Adopted February 24, 2009

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This Climate Action Plan was prepared by:

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Brad McAllister, UTC Graduate Student, Environmental Science

Emily Garrigus, UTC Student, Environmental Science

Rozanne Brown, Administrative Assistant, RPA

Alma Knowles, Administrative Assistant, RPA

And the Chattanooga Green Committee

Graphic Design concept provided by the Regional Planning Agency - Winsetta Ford and Melony Collins. Climate Action Plan icons and logo are under copyright as of 2008, and for the sole use of the Chattanooga Green Committee, the Sustainability Office and Chattanooga Green.

"More than two years ago, on behalf of Chattanooga, I signed the U.S. Conference of Mayors Climate Protection Agreement. I'm proud to say that Chattanooga was one of the early cities committed to the cause of reducing greenhouse gases – there are now more than 900 cities nationwide.

I have appointed the Chattanooga Green Committee to advise and assist us in moving Chattanooga further toward the long-sought goal of sustainability and they have worked diligently towards this goal. It is important that we, as a community, determine the path we take as we continue to address environmental issues in Chattanooga."

Mayor Ron Littlefield

LETTER FROM THE CHAIR

Dear Mayor Littlefield,

In November, 2007 you appointed a committee of citizens to study the opportunities and challenges following the signing of the U.S. Conference of Mayors Climate Protection Agreement. This group of individuals represents a broad range of interests in the public, private, and university sectors. Both the fourteen-member strong Chattanooga Green Committee and the professional support staff took the mission seriously and have worked diligently to produce a document that represents the recommendations of the Committee and, to a larger extent, the will of the community. All involved are to be commended. The forty-seven action items presented in this document were derived from the visioning process, discussions with subject matter experts, and the thoughts of the committee. As is the case with such a large and diverse group of people, there was not total unanimity on all forty-seven items. However, I can say with confidence that all of the Committee approves of the majority of the items.

This Climate Action Plan can be considered a first phase of the task before us. There are still some details and incentives yet to be fleshed out and developed. Also, we must begin the process of educating our citizens on the importance of this initiative and what role individuals, organizations, and businesses can, and must, play if this movement is to be successful. There is obviously much work to be done.

The focus now shifts to implementation. The Chattanooga Green Committee is prepared to continue as a willing partner and guide as we move forward. I believe that we can begin the work of putting your priority actions into place while continuing to serve as a regional role model for sustainability.

Thank you for allowing us to provide a service to you and to our community on such a far-reaching and transformational project.

Gene Hyde, *Chair*
Chattanooga Green Committee
January 2009

Chattanooga's Climate Action Plan is the beginning of a continuing process. In 2006, Mayor Littlefield signed the Climate Protection Agreement put forward by the U.S. Conference of Mayors (http://www.usmayors.org/climateprotection). As a signatory, we committed to taking an inventory of our current greenhouse gas (GHG) emissions, setting targets for reducing those emissions, and enacting a number of specific actions aimed at achieving that goal. In late 2007, Mayor Littlefield appointed the Chattanooga Green Committee – 14 members representing private business, the public sector and educational institutions - to advise him on which actions our community should take. For the past year, the Committee and staff have been analyzing data, taking the community's pulse on priorities, meeting with subject matter experts, and developing a set of recommendations. The Chattanooga Climate Action Plan is the synthesis of that work.

As with all significant initiatives in this community, we started by asking citizens for their hopes and aspirations. Over 500 people attended a public meeting in April 2008 to express their ideas about how we could make Chattanooga a more sustainable, greener city. Many of the recommendations contained in this Climate Action Plan are a reflection of their values. Increasing recycling, providing transportation options, raising community awareness, conserving energy through green building initiatives, promoting alternative fuels, encouraging local food production, providing incentives for smart growth, and setting the example through City government policies and practices were all top vote getters.

Armed with this community input, the Committee and staff began to analyze what actions would help us achieve our goal of reducing GHG emissions. Software provided by *ICLEI – Local Governments for Sustainability* (http://www.iclei-usa.org) allowed us to determine our current carbon footprint and compare it to where we were in the accepted base year of 1990, using the best science available today and reliable local data. Additionally, the GHG-reducing potential of various recommendations contained in this plan has

"Few challenges facing America and the world are more urgent than combating climate change. The science is beyond dispute and the facts are clear. Sea levels are rising. Coast lines are shrinking. We've seen record drought, spreading famine, and storms that are growing stronger with each passing hurricane season. Climate change and our dependence on foreign oil if left unaddressed will continue to weaken our economy and threaten our national security."

Excerpted from an address by then President-elect Barack Obama to the bi-partisan Governors Global Climate Summit in Los Angeles, November 18, 2008.

been estimated, so that we can determine which actions are likely to be the most effective.

Based on the ideas gathered from citizens, the analysis of our carbon footprint, research into what other communities are doing, and advice from a number of subject matter experts, the Chattanooga Green Committee recommends 47 potential actions in the following areas.

Energy Efficiency
- Alternative Energy Sources
- Energy Conservation
- Green Building
- Recycling and Waste
- Sustainable Industry

Healthy Communities
- The Built Environment and Smart Growth
- Food and Agriculture
- Transportation

Natural Resources
- Air Quality
- Biodiversity
- Green Infrastructure
- Urban and Regional Forests
- Water Quality and Quantity

Education and Policy
- Community Awareness and Participation
- Business Participation
- Government Policy and Purchasing
- Schools

Some actions are the responsibility of local government; other recommendations are directed toward private business and industry. Everyone must be involved. Some initiatives can be implemented right away with almost immediate results, while other actions will require a sustained multi-year effort. Each of these actions must be weighed based on potential

effectiveness, community values and acceptance, costs, and potential savings. These considerations of "why" and "how" are included in the relevant sections of this Climate Action Plan.

Chattanooga is not starting from scratch. A number of initiatives are already underway in this community that will help reduce our carbon footprint. Some of them are described as Ongoing Accomplishments in Appendix E.

What are the next steps?

First, the Chattanooga Green Committee recommends that this Climate Action Plan be approved by the Mayor and subsequently by the City Council to provide our community with an official roadmap for reducing our carbon footprint.

Second, we recommend establishing an Office of Sustainability – a new resource within City government – charged with coordinating the implementing of this Climate Action Plan, developing partnerships, and raising community awareness. Some actions will require funding; other areas will require further research. We can't do everything at once, so priorities will need to be established. An office charged with transforming these recommendations into actions is needed.

The best science available tells us that these issues are critical. With new policies and incentives coming from the federal government, cities and counties are ideally positioned to affect change. We are not in this alone, yet we must do our part. We believe the recommendations articulated in this Climate Action Plan will help the Chattanooga area maintain a competitive economic edge, increase the quality of life for all citizens, and put us on a path to meeting our goal of reducing our carbon footprint as we move forward into the 21st century.

Chattanooga Green Committee
January 2009

"It has been estimated that cities, although covering only 1% of Earth's surface, are responsible for 80% of the global greenhouse gas emissions."

Peter H. Koehn, Global Environmental Politics, 2008

U.S. MAYORS CLIMATE PROTECTION AGREEMENT

"We are taking actions to reduce climate pollution in our communities, while at the same time improving quality of life and economic vitality for our residents and businesses. Our message – that we, as cities and as a nation, can and should cut our contributions to global warming pollution – is being heard around the country and the world."

Seattle Mayor Greg Nickels, 2005

Scientific evidence and consensus continues to strengthen the idea that climate disruption is an urgent threat to the environmental and economic health of our communities (*Scientific Assessment of the Effects of Global Change on the United States, May 2008*). Many cities, in this country and abroad, already have strong local policies and programs in place to reduce human-caused greenhouse gases (GHGs), but more action is needed at the local, state, and federal levels to meet the challenge. On February 16, 2005, the Kyoto Protocol - the international legislation to address global climate change - entered into force for the 181 countries that have ratified it to date. The U.S. did not ratify the Kyoto Protocol.

On that day, Seattle Mayor Greg Nickels launched a parallel initiative - the U.S. Mayors Climate Protection Agreement - to advance the goals of the Kyoto Protocol through leadership and action at the LOCAL level by American cities. With 85% of the world's population living in cities and metro areas, cities are in a unique position to confront many sources of greenhouse gas emissions and create truly effective and lasting solutions.

To date, 910 Mayors from the 50 U.S. states, the District of Columbia and Puerto Rico have signed the U.S. Mayors Climate Protection Agreement, representing a total population of 81,842,444 U.S. citizens.

Mayor Littlefield signed this Agreement on behalf of the City of Chattanooga in 2006. As of this writing, five other Tennessee cities have signed on – Cookeville, Crossville, Franklin, Nashville, and Signal Mountain. Under the Agreement, participating cities commit to take the following actions.

A. We urge the federal government and state governments to enact policies and programs to meet or beat the target of reducing global warming pollution levels to 7 percent below 1990 levels by 2012, including efforts to: reduce the United States' dependence on fossil fuels and accelerate the development of clean, economical energy resources and fuel-efficient technologies such as conservation, methane recovery for energy generation, waste to energy, wind and solar energy, fuel cells, efficient motor vehicles, and biofuels;

B. We urge the U.S. Congress to pass bipartisan greenhouse gas

U.S. MAYORS CLIMATE PROTECTION AGREEMENT

reduction legislation that includes 1) clear timetables and emissions limits and 2) a flexible, market-based system of tradable allowances among emitting industries; and

C. We will strive to meet or exceed Kyoto Protocol targets for reducing global warming pollution by taking actions in our own operations and communities such as:

1. Inventory global warming emissions in city operations and in the community, set reduction targets and create an action plan;

2. Adopt and enforce land use policies that reduce sprawl, preserve open space, and create compact, walkable urban communities;

3. Promote transportation options such as bicycle trails, commute trip reduction programs, incentives for car pooling and public transit;

4. Increase the use of clean, alternative energy by, for example, investing in "green tags," advocating for the development of renewable energy resources, recovering landfill methane for energy production, and supporting the use of waste to energy technology;

5. Make energy efficiency a priority through building code improvements, retrofitting city facilities with energy efficient lighting and urging employees to conserve energy and save money;

6. Purchase only Energy Star equipment and appliances for City use;

7. Practice and promote sustainable building practices using the U.S. Green Building Council's LEED program or a similar system;

8. Increase the average fuel efficiency of municipal fleet vehicles; reduce the number of vehicles; launch an employee education program including anti-idling messages; convert diesel vehicles to biodiesel;

9. Evaluate opportunities to increase pump efficiency in water and wastewater systems; recover wastewater treatment methane for energy production;

10. Increase recycling rates in City operations and in the community;

11. Maintain healthy urban forests; promote tree planting to increase shading and to absorb CO_2; and

12. Help educate the public, schools, other jurisdictions, professional associations, business and industry about reducing global warming pollution.

CHATTANOOGA GREEN COMMITTEE

David Wade***
Heather Adcox
Ray Childers
Roger Tuder

Alternative Energy
Energy Conservation
Green Building Practices
Recycling & Waste
Sustainable Industry

John Tucker***
Jill Bratina
Jim Frierson**
Teresa Groves

Built Environment/Smart Growth
Food & Agriculture
Transportation

June Coppinger***
Gene Hyde*
Bob Colby

Air Quality
Biodiversity
Green Infrastructure
Urban & Regional Forests
Water Quality & Quantity

Jeannine Alday***
Anj McClain
Sally Robinson

Community Awareness & Participation
Business Participation
Government Policy & Purchasing
Schools

** Chattanooga Green Committee Chairperson*
*** Chattanooga Green Committee Vice-Chairperson*
**** Task Force Chairperson*

CHATTANOOGA GREEN COMMITTEE

Mayor Ron Littlefield appointed the following 14 individuals to serve on the Chattanooga Green Committee and charged them with advising him on steps the City government, local business and industry, and individual citizens can take to make Chattanooga a more green and sustainable community.

Gene Hyde – Chair
City of Chattanooga,
Division of Urban Forestry

Jim Frierson – Vice Chair
Advanced Transportation Technology Institute,
Chattanooga Technology Council

Heather Adcox
US Green Building Council

Jeannine Alday
Hamilton County Government

Jill Bratina
Volkswagen Group of America, Inc.

Ray Childers
Chattanooga Manufacturers Association

Bob Colby
Chattanooga-Hamilton County
Air Pollution Control Bureau

June Coppinger
Chattanooga Tree Commission

Teresa Groves
Chattanooga Home Builders Association

Anj McClain
green|spaces,
US Green Building Council

Councilwoman Sally Robinson
Chattanooga City Council

Roger Tuder
Associated General Contractors of East Tennessee

John Tucker
University of Tennessee at Chattanooga
Department of Biological and Environmental Sciences

David Wade
Electric Power Board

Task Forces - To address the many facets of climate change, the Chattanooga Green Committee divided themselves into four Task Forces:

Energy Efficiency

Healthy Communities

Natural Resources

Education and Policy

Each Committee member served on a Task Force and each Task Force was charged with researching and crafting recommendations on a number of more specific topics as shown in the organizational chart on the facing page.

In determining the recommendations contained in this Climate Action Plan, the Chattanooga Green Committee relied on a number of Subject Matter Experts (SMEs) for technical advice. A list of those SMEs is contained in the Appendices.

Staff - The Chattanooga-Hamilton County Regional Planning Agency and the City's Urban Forester provided staff assistance to this Committee. In addition, two UTC graduate students in environmental science and sustainability, Sarah Rankin and Brad McAllister, were hired and assigned to work with the Committee during 2008. Emily Garrigus, a UTC undergraduate in environmental science, also worked with the staff.

CHATTANOOGA'S CARBON FOOTPRINT

In 1969, Chattanooga's air quality was labeled the worst in the nation by the EPA. While our carbon footprint encompasses many addtional elements, air quality remains a critical issue in the Chattanooga area.

Carbon Footprint: the sum of all greenhouse gases produced through human activities, measured in units of carbon dioxide equivalents (CO_2e).

Carbon Dioxide Equivalents (CO_2e): the measure of all greenhouse gases in terms of Carbon Dioxide. This allows gases with different Global Warming Potentials (GWP) to be added together and/or compared. All calculations in this document are presented in metric tons of CO_2e.

CHATTANOOGA'S CARBON FOOTPRINT

Chattanooga has a long and successful history of addressing environmental issues. In 1969, Chattanooga's air quality was labeled the worst in the nation. A local air pollution control ordinance was adopted and the Air Pollution Control Bureau was established to monitor compliance. It worked. Every major air pollution source in the county met the 1972 compliance deadline and, in 1989, Hamilton County was officially declared to be "in-attainment" of the ozone standard. The EPA's Director of the Office of Air Quality Planning and Standards, who visited Chattanooga that year, remarked "You all have done what has not been done in very many places in the United States."

We can do it again.

According to the *2008 State of Chattanooga Region Report on the Environment,* by the Ochs Center for Metropolitan Studies, "the per capita carbon footprint of the region is relatively large and growing." We have serious challenges facing us again today. This Climate Action Plan is a step toward meeting those challenges.

ICLEI – LOCAL GOVERNMENTS FOR SUSTAINABILITY

In 2006 the City of Chattanooga joined ICLEI (International Council on Local Environmental Initiatives) – now called "ICLEI - Local Governments for Sustainability." ICLEI is a membership organization that provides tools and support to local governments striving to set and achieve their local climate protection and sustainability goals. Currently there are over 1,000 local governments worldwide who are members, representing over 400 million people worldwide. ICLEI members include small rural towns, mid-sized cities and major metropolitan areas. Representation stretches from the Atlantic coast to the Pacific. Tennessee members include Chattanooga, Gatlinburg, Knoxville, Nashville, Oak Ridge and Signal Mountain.

To its members ICLEI supplies expertise; direct, on-call support; networking and innovative climate protection and sustainability tools. ICLEI is headquartered in Oakland, California and has six regional offices in Boston, Seattle, Denver, Houston, Chicago, and a new regional office that has just opened in Atlanta to help support the growing number of members in the Southeast.

Chattanooga Estimated GHG Emissions (Metric Tons CO_2e)

		1990	2006	% Change
		COMMUNITY AT LARGE		
Transportation		**1,320,067**	**1,704,219**	**29%**
Electricity		**2,099,089**	**2,530,529**	**21%**
By Sector:	Commercial	483,945	571,102	**18%**
	Industry	1,034,104	1,255,464	**21%**
	Residential	581,040	703,963	**21%**
Natural Gas		**549,653**	**655,715**	**19%**
By Sector:	Commercial	121,137	143,357	**18%**
	Industry	346,368	411,510	**19%**
	Residential	82,148	100,848	**23%**
Waste		**21,892**	**25,142**	**15%**
Other		**488,770**	**674,722**	**38%**
TOTAL		**4,479,471**	**5,590,327**	**25%**
		CITY GOVERNMENT		
Transportation		**13,285**	**9,439**	**-29%**
Electricity		**69,654**	**79,690**	**14%**
By Sector:	Buildings	53,761	65,197	**21%**
	Streetlights	15,893	14,493	**-9%**
Natural Gas		**2,953**	**3,631**	**23%**
By Sector:	Buildings	2,953	3,631	**23%**
Waste		**256**	**404**	**58%**
Sequestration by Street trees		**-18,766**	**-18,766**	**0%**
TOTAL		**67,382**	**74,398**	**10%**

Figure 1

CHATTANOOGA'S CARBON FOOTPRINT

WHY GREEN?

The health of our communities, our planet, and ourselves depends on how we plan, design, and construct the world and our buildings.

Green Community explores the origins of our precarious ecological situation and introduces communities large and small, where citizens, political leaders, planning and design professionals, developers, and government agencies are working together for a more sustainable future.

***What makes a community green?** A green community conserves its land, offers multiple options for transportation, provides open space for recreation and cultivation, and uses its natural and cultural resources wisely.*

***Green communities aren't a new idea.** In fact, for most of human history, "green" wasn't something special — it was simply how people lived. We arranged our days around the rising and setting of the sun and our years around the seasons. Healthy land resulted in healthy crops, which resulted in healthy people. Living in cooperation with nature wasn't a matter of choice; it was a matter of survival.*

*Previous generations may not have used terms like "sustainable development" or "smart growth" but they knew that healthy places had **clean air, fresh water, fertile soil, and viable ways to move goods and people around.***

As people invented new technologies, we changed how we live. Without the old constraints of nature, we can travel the world easily, use electricity to light up our nights and extend our days, and keep warm in the winter and cool in the summer. These conveniences, however, have had consequences for our personal health—and for the health of our civic spaces and our planet.

*It turns out that **living in cooperation with nature is still a matter of survival.** Humans, however, are still inventive and many communities are now investing in new technologies—as well as relooking at some old ideas—to create greener approaches to modern life.*

Credit: National Building Museum, Smithsonian, Washington, D.C., "Green Community" from the nbm.org website for an article written, October 23, 2008.

ICLEI has developed a 5-milestone process that serves as a roadmap for cities developing their climate protection and sustainability programs. The 5 milestones are:

Milestone 1: Conduct a Greenhouse Gas Emissions Analysis
Milestone 2: Establish a Reduction Target
Milestone 3: Develop a Climate Action Plan
Milestone 4: Implement the Climate Action Plan
Milestone 5: Monitor Progress and Report Results

Chattanooga has completed Milestone 1 and this Climate Action Plan, once adopted, represents Milestones 2 and 3. Now we have to implement it and monitor our progress.

Milestone 1: Greenhouse Gas Emissions Analysis
The first step in most any analysis is to determine where you are today. ICLEI's Clean Air and Climate Protection software (CACP) is the accepted protocol for cities inventorying and reporting their carbon footprint. This software has helped us estimate our 1990 and 2006 GHG emissions, project future emissions, and establish benchmarks for gauging our progress over time (See Figure 1).

While the CACP software is the widely accepted method of carbon emissions inventory and reporting in the United States, the software results are not pinpoint accurate. Carbon tracking and monitoring is new to science and just burgeoning in the urban environment. Because some of the data is not available for every year, certain assumptions have been made. It is important to note that the outputs of the CACP software are relative estimates of Chattanooga's carbon footprint. These numbers should be used to project future carbon emissions, estimate the potential benefits of specific actions and policies and monitor progress over time. The CACP data can be used as a relative measure that compares Chattanooga's carbon footprint to national and regional averages, however, the data should not be used to directly compare the overall sustainability of multiple cities.

Data used as input was obtained from a number of reliable local and national sources. Local utilities provided information on energy use. The Chattanooga-Hamilton County Regional Planning Agency supplied transportation data. Emission projections based on the anticipated impacts of the Volkswagen

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plant and related development have not been calculated. These impacts represent an area for future GHG emissions forecasting. When applicable, nationally accepted factors for various GHG emissions were used.

After inputting this data, the CACP software allowed us to measure carbon emissions at two levels: 1) city-wide and 2) within the operations of City government. According to the analysis, t**he majority of carbon emissions within Chattanooga's city limits can be attributed to electricity use and transportation**. Energy supplied by natural gas also plays a part in Chattanooga's footprint. Other factors include landfill waste decomposition and fuel-burning industrial processes that directly release GHGs into the atmosphere. (See Figure 2)

Milestone 2: Establishing a Reduction Target
The next step was to determine what GHG reductions we could achieve with various initiatives. A second software program produced by ICLEI allowed us to further analyze specific actions and measure their potential GHG reduction abilities. See "GHG Reduction Targets" on page 23 for more information.

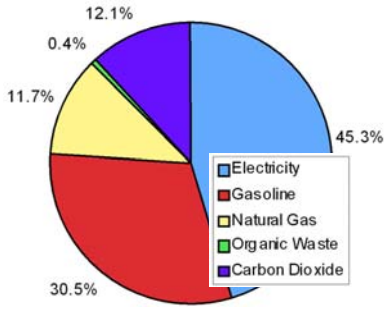
OCHS CENTER STUDY

Another local effort paints a similar picture of the Chattanooga region today. In October 2008 the Ochs Center for Metropolitan Studies released the *2008 State of Chattanooga Region Report on the Environment*. This report is part of an ongoing series of reports that examine important aspects of Chattanooga and the Hamilton County region. Past reports have included early childhood development, health care, crime and education.

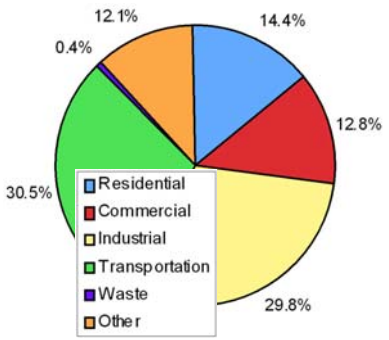
This detailed report on Chattanooga's environment examined two dozen indicators specifically chosen to paint a picture of the state of Chattanooga's environment. Indicators included in the report are carbon emissions, land use and conservation patterns, transportation miles and air and water quality. The report focuses on the 6 county metropolitan statistical area, Hamilton County and 36 sub regions within Hamilton County.

Figure 2

GHG Community Emissions

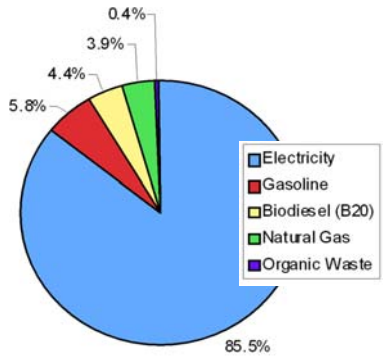


Community GHG Emissions by Source, 2006

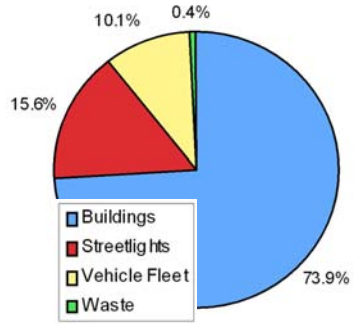


Community GHG Emissions by Sector, 2006

GHG Government Emissions



Govnernment GHG Emissions by Source, 2006



Government GHG Emissions by Sector, 2006

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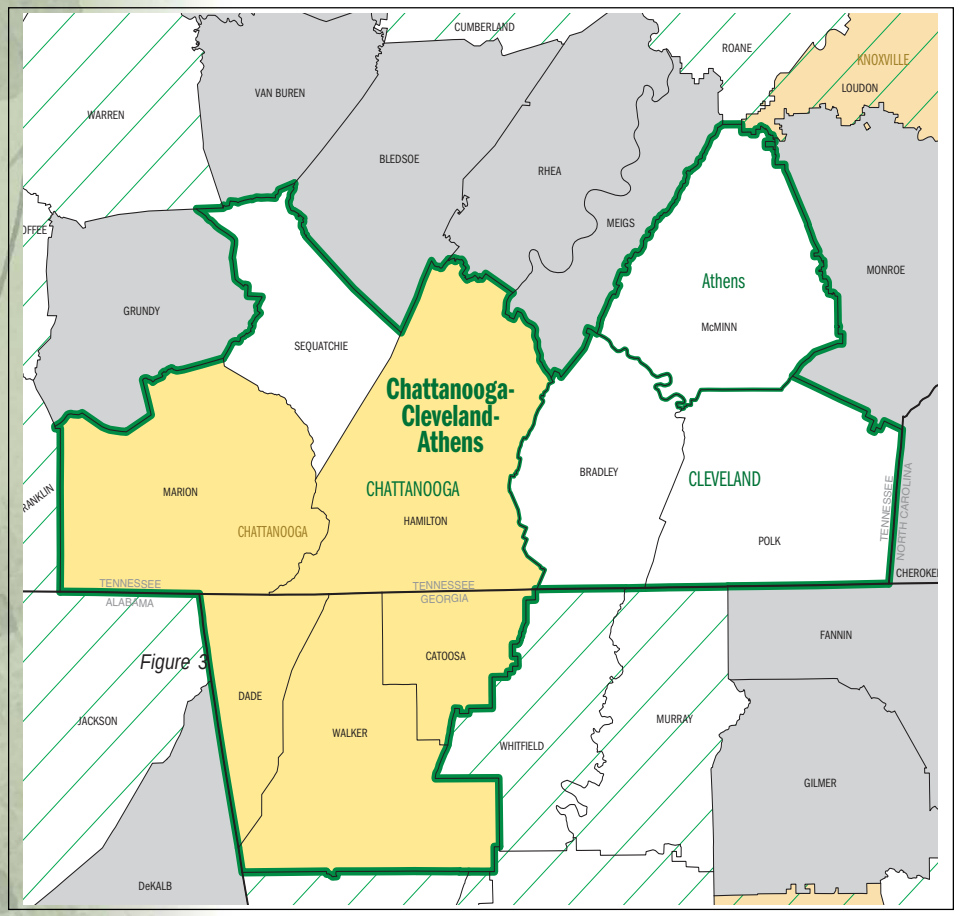


Figure 3

Figure 3: Chattanooga - Cleveland-Athens TN-GA Combined Statistical Area. The Chattanooga MSA includes Sequatchie, Marion, Hamilton, Dade, Walker, and Catoosa Counties. Map Source - U.S. Census Bureau

Currently, the Ochs Center plans to release a follow up environmental report in 2010. Significant findings within the 2008 report include:

82% of survey respondents stated that clean air was very important to their quality of life.

61% of survey respondents stated that parks and recreation were very important to their quality of life.

Low density development at the County's edge is the dominant land use pattern within Hamilton County. In 2005 and 2006, 47% of home sales were in unincorporated parts of the County.

County residents are heavily reliant on personal automobiles for transportation; 80% of residents rely on their own car for travel to and from work.

Only 2% of the county population utilizes public transportation, and within city limits less than 50% of residents live within ¼ mile of a bus stop.

Overall, Hamilton County has a high park space-to-resident ratio at nearly 70 acres per 1,000 residents. However, there are sub regions that have less than 1 acre of park space per 1000 residents.

Air quality ratings in Hamilton County have declined in recent years. In 2007, only 39% of measured days were rated as good; 61% were rated as moderate or unhealthy for sensitive groups.

75% of assessed stream miles in Hamilton County have been categorized as impaired. This represents 30% of total stream miles in Hamilton County.

In addition to assessing the current state of Chattanooga's environment, data within the Ochs report can serve as a baseline to monitor progress. Future studies that monitor changes in the indicator values over time will help Chattanooga understand the effectiveness of action items that are adopted from this Climate Action Plan. They will also help assess the need for future actions not yet researched.

CHATTANOOGA'S CARBON FOOTPRINT

BROOKINGS INSTITUTE STUDY

Other national studies have attempted to chart the carbon footprint of the urban environment. In May 2008, the Brookings Institute released a study that calculated the carbon footprint of the 100 most populated metropolitan areas in the United States. The end results were reported as the calculated per capita carbon footprint of each city based on highway transportation miles and residential energy use. Future Brookings reports will include commerce, manufacturing, air travel and waste.

The Brookings report ranked the 100 metropolitan statistical areas (MSA) by carbon footprint size. According to the study, the Chattanooga MSA had the 13th largest carbon footprint per capita. Other metropolitan areas of note in Tennessee include Nashville (6th largest footprint), Knoxville (10th largest footprint) and Memphis (24th largest footprint).

The Brookings study reported that from 2000-2005 the Chattanooga MSA per capita carbon footprint increased 47.78%. The transportation portion increased 127.2% and the residential energy portion decreased 2.7%. Overall, the average Chattanooga resident emitted 3.110 tonnes of carbon per year.

Many observers have accurately noted the drastic difference in the output values of the Brookings report and those released by the Chattanooga Green Committee in the Interim Climate Action Plan of June 2008. The difference between the numbers reported by Brookings and the CACP software reflects differences in data collection methods and the sectors included. Of most important note is the output gas identified in the results of each study. The Chattanooga Green Committee, following protocol set by ICLEI, reported the city's carbon footprint in units of CO_2 equivalents (CO_2e). The Brookings Institute reported results in units of carbon. Since CO_2 has a molecular weight that is 3.67x greater than carbon, data supplied in the Brookings report must be multiplied by 3.67 before a direct comparison between the two studies can be made. Additional differences between the two studies are summarized in Figure 4.

The variance between the two studies highlights an important point - the need for a transparent, unified and widely understood protocol for GHG reporting and monitoring.

Figure 4

SUMMARY OF DIFFERENCES BETWEEN ICLEI CACP ANALYSIS AND BROOKINGS INSTITUTE STUDY

	ICLEI CACP	BROOKINGS
Reported Results	Overall City Footprint	Per Capita Footprint
Reporting Area	Chattanooga City Limits	Chattanooga MSA
Conducting Agency	City of Chattanooga	Brookings Institute
Sectors Included	Total vehicle miles traveled, Residential energy, Commercial energy, Industrial energy, Landfill decomposition, Specific industrial processes	Highway miles, Residential electricity
City Government Footprint Included	Yes	No
Comparative City Rankings	No	Yes
Estimates Future Emissions	Yes	No
Per Capita Footprint	No	Yes
Associated Years	Measured: 1990, 2006, Forecasted: 2012, 2020, 2050	2000, 2005
Units of Results	CO_2 e	C

"The majority of carbon emissions within Chattanooga's city limits can be attributed to electricity use and transportation."

Chattanooga CACP Analysis

PUBLIC INPUT

This Climate Action Plan, as with all important Chattanooga initiatives, began with community participation. Over 500 citizens helped answer the question: "How can Chattanooga become a greener, more sustainable city?"

PUBLIC INPUT

Chattanooga is known across the U.S. for its public visioning processes, which began with *Vision 2000* in 1984. Since then, we have repeatedly proven that when a community comes together to solve problems, bold results can be expected. Drawing on our previous successes, a public visioning process was held on April 24, 2008, to coincide with the week of Earth Day. The event, "Chattanooga Green," drew approximately 500 people.

Figure 5 shows general topics that were discussed by the participants of "Chattanooga Green" and provides the ranking that the public gave these items. A more complete list of public comments is contained in the Appendices. At the public meeting, participants were also asked to complete a survey with questions such as, "Have you made the Green Power Switch?" and "How do you get to work or school?" The survey was used to help gauge the community's "Green "IQ" and it also documented zip code locations of participants. *See the Chattanooga Green website for survey results.*

In developing the list of recommended actions in this Climate Action Plan, the Chattanooga Green Committee paid particular attention to this public input. Even though some ideas expressed by the community may not have direct potential in actually reducing GHG emissions, those ideas were still considered important.

PUBLIC INPUT RESULTS	
Overall Rank	TOPIC
1	Recycling & Waste
2	Transportation
3	Green Buildings
4	Community Awareness & Participation
5	Government Policy & Purchasing
6	Schools
TIE 7	Energy Conservation
TIE 7	Green Infrastructure
TIE 7	Water Quality & Quantity
8	Built Environment & Smart Growth
9	Food & Agriculture
10	Alternative Energy Sources
11	Urban & Regional Forests
12	Business Participation
13	Air Quality
14	Biodiversity
15	Sustainable Industry

Figure 5

VOLUNTEERS

During the April 24 Public Input meeting, over 220 people volunteered to help with the Chattanooga Green initiative. Citizens were invited to comment on the Interim Report of the Climate Action Plan, which was presented to Mayor Littlefield in June, 2008. Volunteers also assisted with the successful Smart Energy Odyssey held on October 3, 2008 in Miller Plaza.

In addition to providing feedback on this Climate Action Plan, other ideas for volunteer activities include establishing a Speakers Bureau and training volunteers to conduct basic home energy audits. Other volunteer opportunities will become available in the coming year as this Climate Action Plan is implemented. The list is potentially endless and anyone interested in volunteering should do so through the website at http://www.chattanooga.gov/chattanoogagreen.

CLIMATE ACTION PLAN: RECOMMENDATIONS

chattanooga green

GREENHOUSE GAS REDUCTION TARGETS

While the U.S. Mayors Climate Protection Agreement suggests an early goal of reducing GHG emissions to 7% below 1990 levels by 2012 and a number of related challenges designed to accomplish this goal, each city must develop its own carbon reduction targets, a timetable for achieving those targets, and a plan for how to get there. It should be noted that achieving such an aggressive reduction target will be extremely difficult, if not impossible, to meet at this late stage. This 2012 target is best used as a benchmark to monitor progress.

As with all "Plans," this Climate Action Plan is a general guide for our future. As new information and technology becomes available, this Plan will need to be updated. It is also important for the reader to remember that while specific actions are recommended, not all of them will necessarily be implemented. The Mayor, City Council and other stakeholders must establish priorities based on public input, costs and funding, community acceptance, and the potential ability of each action to effectively reduce our GHG emissions. Some recommendations fall to the City government to implement and others must be taken up by the private sector. The entire community must be involved for this Climate Action Plan to be successful.

GHG REDUCTION TARGETS

Instead of choosing one specific reduction goal, the Chattanooga Green Committee recommends using three widely accepted benchmarks as a comprehensive reduction goal that incorporates both short and long term visions.

The Chattanooga Green Committee recommends the following GHG reduction targets.

7% below 1990 levels by 2012
20% below 1990 levels by 2020
80% below 1990 levels by 2050

A short description of the origin of each goal follows.

1) The U.S. Conference of Mayors Climate Protection Agreement (MCPA) sets a goal of a 7% reduction in greenhouse gas emissions from 1990 levels by 2012. This reduction target was based on the international Kyoto Protocol.

GOAL: Reduce global warming pollution levels to 7 percent below 1990 levels by 2012.

U.S. Conference of Mayors, Climate Protection Agreement

GREENHOUSE GAS REDUCTION TARGETS

2) The European Union Council has established a goal of a 20% reduction in greenhouse gas emissions from 1990 levels by 2020. This target has been adopted by many municipalities in the United States who fear that meeting the MCPA goal by 2012 will be too difficult.

3) In a report released in 2007, the Multi-Governmental, Intergovernmental Panel on Climate Change (IPCC) warned that greenhouse gas emissions must be reduced by 80% from 1990 levels by 2050. According to the report, this goal must be met worldwide to mitigate the worst effects of global climate change. Many municipalities have adopted this reduction level as a long term goal. It is also supported by the Obama administration.

Figure 6 indicates the specific reductions necessary to reach Chattanooga's goals. Figure 7 graphically compares forecasted emissions to target emissions over time.

SPECIFIC REDUCTIONS NECESSARY TO REACH CHATTANOOGA'S GOALS

	Forecasted CO_2e (MTPA)	Target CO_2e (MTPA)	Reduction to Reach Target CO_2e (MTPA)	% Reduction from Forecasted
2012	6.062	4.166	1.896	31%
2020	6.797	3.584	3.213	47%
2050	10.666	.896	9.771	92%

Note: MTPA = Million Tons per Annum

Figure 6

GREENHOUSE GAS REDUCTION TARGETS

GHG REDUCTION CALCULATIONS

Using ICLEI's Climate and Air Pollution Planning Assistance (CAPPA) software, the Chattanooga Green Committee staff has made preliminary projections for the GHG reduction potential of some of the action items included in this report. The CAPPA program is currently in its beta version and an updated online version is forthcoming. To the knowledge of the Green Committee, no other community has attempted to use the program in as much depth as Chattanooga. In a sense, we are forging new ground. This serves to distinguish Chattanooga's newest efforts in sustainability, as well as, help guide other communities who are looking to take some of the same steps.

The CAPPA software provides many default values based on the experience of other local governments, peer reviewed studies and widely accepted warming potentials of GHGs. The software also makes several assumptions. The Chattanooga Green Committee staff has researched these default values and assumptions and, where more applicable local data has been found, it has been used in place of the ICLEI defaults. This regionalization makes the GHG reduction values and the estimated cost and savings in this document more reflective of Chattanooga's unique experience.

The ICLEI staff has been a valuable resource in the estimation of GHG reduction potentials. Assumptions and input values have been thoroughly documented in *Chattanooga Climate Action Plan GHG Reduction Support*. This report is available by contacting the Chattanooga Green Committee staff through the website at http://www.chattanooga.gov/chattanoogagreen.

GHG reduction numbers expressed in this document are the metric tons of CO_2e expected to be reduced in the third year of the program. This time frame is consistent with the "7% below 1990 by 2012" reduction target. If all programs are implemented in 2009 then the amount expected to be reduced in 2012 would be the sum of each individual program (See Figure 8). This assumption is a best case scenario and many issues may prevent implementation of all programs simultaneously. Individual annual reductions for each year, as well as a summed three year total, can be found in the *Chattanooga Climate Action Plan GHG Reduction Support* document.

While GHG reductions are presented as numerical values, the cost and savings

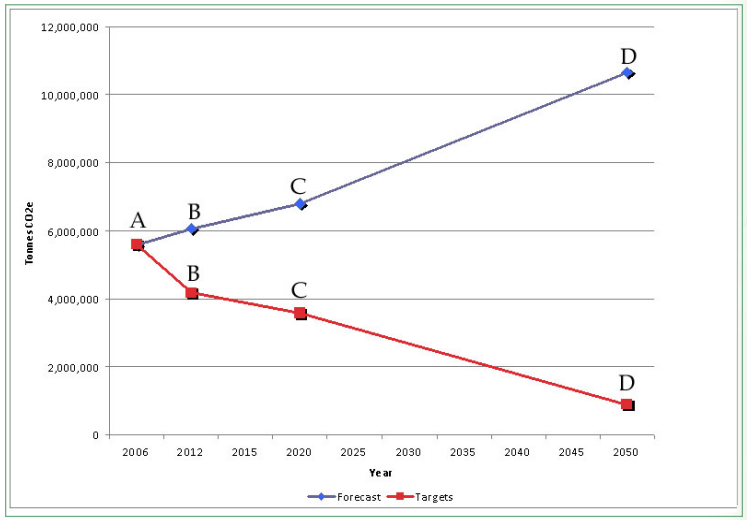


Figure 7

The blue line shows the forecasted emissions if we, as a community, continue with business as usual. Point A is the most recent baseline year of 2006. Points B, C and D represent projected business as usual emissions for 2012, 2020 and 2050, respectively. The red line shows the projected trend we will need to take if we are to reduce our emissions to 7% below 1990 levels by 2012 (B), 20% below 1990 levels by 2020 (C) and 80% below 1990 levels by 2050 (D).

GREENHOUSE GAS REDUCTION TARGETS

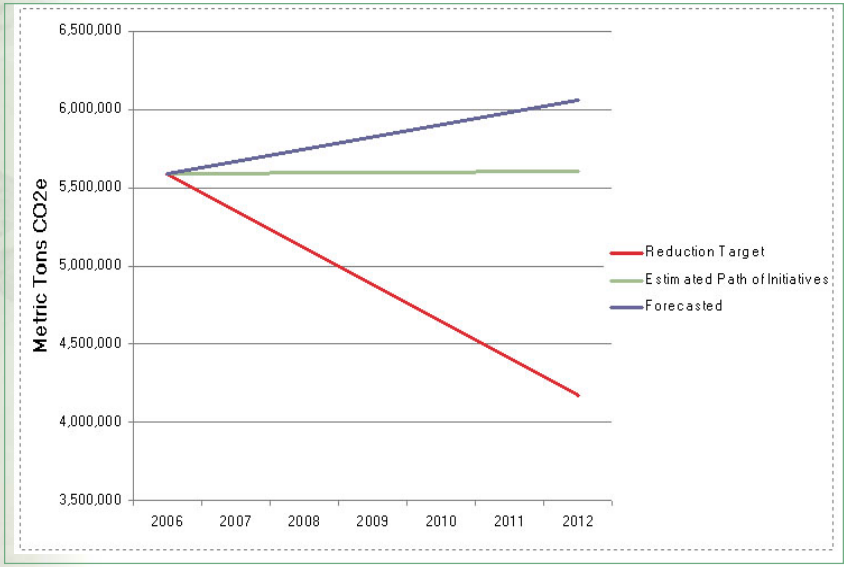


Figure 8

The above graph depicts the simultaneous implementation of all action items with identified carbon reduction potentials included in this document. The blue line represents estimated emissions based on current patterns of community activity. The red line is the reduction target based on the MCPA target of 7% below 1990 levels by 2012. The green line shows that the simultaneous implementation of the Potential Actions recommended in this document would, at best, return carbon emissions to 2006 levels by 2012. This graph only represents the items that have reduction potentials currently calculated. The reduction potential of other action items may be calculated in the future.

NOTE: All GHG projections and calculations in this document are in metric tons of CO_2e.

estimates have been presented in ranges. Because of the large degree of differences in government-specific measures and community-wide measures, different ranges for these two sectors have been used. For an explanation of the ranges used, see Figure 10 on page 29.

Estimated cost and savings numbers are total amounts expected over the entire three year period. They should be considered initial estimates. These estimates are, in part, derived from the experience of other local governments. They are also based on the ever-changing costs associated with various forms of energy and new technologies.

Not all potential actions and objectives have associated GHG reduction values presented in this document. Some of these action items will have GHG reduction potentials calculated as additional measures are added to the CAPPA software. Other action items do not directly reduce the city's carbon footprint, and thus, will not have calculations associated with them. However, these actions are no less important to the City's overall sustainability goals.

This Climate Action Plan is meant to indicate a direction, prompt feedback from elected officials and the community as a whole, and point to where more research and consideration is needed. With limited budgets, elected officials and the private sector will certainly need to weigh the costs and benefits of each recommendation before establishing priorities and taking action.

Based on 1) the public input, 2) the carbon footprint data gathered by staff using the CACP and CAPPA software, and 3) research and conversations with subject matter experts, the Chattanooga Green Committee also recommends the following general OBJECTIVES and more specific POTENTIAL ACTIONS designed to put our community and City government on the path to achieving the aforementioned targets.

The POTENTIAL ACTIONS recommended may be carried out in multiple ways by local government, private businesses, or individual citizens. Each one of us can help by instituting basic conservation measures in our everyday lives, but the community as a whole will need to take deliberate, proactive steps to meet our goals and reduce our collective carbon footprint.

ENERGY EFFICIENCY

Alternate Energy Sources
Energy Conservation
Green Building
Recycling and Waste
Sustainable Industry

The Energy Efficiency task force has created a set of recommendations that address alternative energy, energy conservation, green building, sustainable industry, and waste and recycling.

There is no greater opportunity to reduce the City's use of energy, and thus its carbon footprint, than through energy conservation measures and the use of alternative energy sources. Energy conservation initiatives represent a unique opportunity because these programs can be implemented with little or no changes in current utilities infrastructure. With proper planning and foresight, minor changes in everyday activities can lower the city's carbon footprint AND lessen the strain on budgets that are becoming more restricted.

In addition to being energy efficient, high performance green buildings have many environmental, social and economic benefits. Coupled with onsite energy generation, they can help support the energy needs of a growing city. Thanks to many architects, builders and other advocates, green buildings have been at the forefront of the sustainability movement. Popular opinion indicates that today's green buildings will be tomorrow's standards.

Chattanooga has a proud and distinguished history as a community that embraces industry and supports industrial growth. The belief that profitable industries and environmentally benign practices are mutually exclusive is no longer valid in today's economy. To be truly sustainable, industry, business and government must balance the interests of the economy, the environment and the community.

Finding sustainable and feasible solutions that address the large amounts of waste contained in landfills and the land they occupy has been an issue of concern for years. Reducing the waste being sent to area landfills will have a marked impact on the sustainability story of Chattanooga. Many other American cities have successfully reduced their landfill waste by diversifying and increasing their recyclable waste streams.

OBJECTIVE A: Increase the use of ALTERNATIVE ENERGY SOURCES.

Potential Action A1: Increase the community's use of renewable energy sources.

ALTERNATIVE ENERGY SOURCES

Chattanooga's Green Power Switch Program

The Electric Power Board (EPB) and the Tennessee Valley Authority (TVA) offer environmentally friendly electric power through the Green Power Switch program. Once enrolled, customers may purchase Green Power at a rate of just $4 per 150 kilowatt-hour block which amounts to about 12% of the typical household's energy use. The generated green power is then added to TVA's total power mix and shared by Tennessee Valley customers. It is estimated that these green power purchases annually offset carbon emissions by 2,622 tonnes in the residential sector and 2,719 tonnes in the commercial sector.

Sign up at http://www.epb.net or call 648-1EPB. Energy guides and audits are offered by both EPB and TVA. See http://www.energyright.com for an interactive home evaluation survey.

TVA EVERGY SOURCES FOR 2007

POWER SOURCE	MILLIONS OF KILOWATT-HOURS	PERCENT OF TOTAL	CHANGE IN KWH FROM 2006
Hydro	9,047	5.80%	-9%
Fossil	100,169	64.10%	1%
Nuclear	46,441	29.70%	2%
Combustion Turbine	705	0.50%	15%
Renewable	27	0.02%	-25%
Total	156,389	100.00%	

Source: TVA Annual Report , 2007

Figure courtesy of the Ochs Center of Metropolitan Studies 2008 State of Chattanooga Region: Environment Report

Figure 9

Why? Renewable energy presents a unique opportunity for partnerships with local and regional leaders to help bring about needed change. Traditional fuel sources (fossil fuels) are known to have many associated negative environmental impacts. Recently, they have also become more expensive, and fears that supply may be waning have increased. Because American cities rely heavily on these types of fuel sources, they are particularly vulnerable to supply disruption and high prices. A city that explores a diverse portfolio of alternative energy solutions prepares itself for the unpredictable future. Because energy use comprises a large portion of the city's carbon footprint, exploring alternative sources prepares the city for a natural or man made disaster. In the event of such an occurance that impairs the current electric grid, government buildings outfitted with alternative energy sources can serve as safe havens for residents.

How? Initially, it is recommended that the City purchase Green Power for City government operations (See Figure 12). Green Power is a partnership with TVA and EPB whereby a portion of the power purchased supports the development of alternative energy sources, such as solar, wind and methane gas sequestration from regional wastewater treatment plants. Identify City buildings that can be retrofitted with photovoltaic (PV) solar panels (See Figure 11). Identify and secure federal and state grants that will help offset the cost of the installation of diverse alternative energy sources for government buildings. The Chattanooga Green Committee recommends identifying areas where renewable energy generation can be implemented and reaching out to other organizations and the public to create valuable energy generation partnerships. Individuals, businesses and industry should be encouraged to purchase green power for their residences and establishments. For further information about the Green Power Switch program, please go to http://www.epb.net.

Potential Action A2: Become a TVA Generation Partner by generating energy that can be bought back by TVA.

Why? The City Government can take advantage of existing regional programs. These range from co-generation partnerships to federal funding sources. In addition to reducing traditional energy consumption, becoming a Generation Partner can provide economic benefits to the City.

How? By initiating the installation of solar panels, wind-turbines and methane

ENERGY CONSERVATION

gas sequestration devices on government buildings and land, the City Government can create its own energy. If more energy is produced than is used, this energy is purchased by the EPB, providing an income stream to the City Government.

Potential Action A3: Encourage individuals and businesses to produce their own clean energy sources.

Why? In 2006, activity within the commercial, industrial, and residential sectors accounted for 97% of the greenhouse gas emissions attributed to electricity use. To reduce this amount, and to increase the financial benefit to home and business owners, alternative energy can be supplied by individuals and businesses through solar panels, wind turbines, or other means. Energy not consumed will then be purchased by the EPB and can provide an income to the owner of the solar panel or wind turbine.

How? Create financial incentives for the purchase of solar panels. Current incentives include premium purchases for electricity generated, installation credits for grid-connected installations and tax credits. Other funding sources may also be explored.

OBJECTIVE B: Increase ENERGY CONSERVATION.

Potential Action B1: Reduce energy use per capita, engaging water, gas, and electric utilities.

Why? According to the CACP analysis, electricity and natural gas use comprise 57% of Chattanooga's greenhouse gas emissions. There is no greater opportunity to reduce the community's use of energy, and thus its carbon footprint, than through relatively simple energy conservation measures. Energy conservation initiatives represent a unique opportunity because these programs can be implemented with little or no changes to the current utilities infrastructure. They are often less costly than other initiatives and the materials necessary to carry out energy conservation measures are widely available. Conserving energy not only reduces greenhouse gas emissions but also represents an opportunity for cost savings over time. This has never been more apparent than in today's volatile energy market. With proper planning and foresight, minor changes in everyday activities can lower the city's carbon footprint AND lessen the strain on budgets. Financial gains

Figure 10 COST AND SAVINGS KEYS

Government Cost & Savings Key

Categories	Cost	Savings
> $2 million	$$$$$	★★★★★
$1 million-$2 million	$$$$	★★★★
$500,000-$1,000,000	$$$	★★★
$100,000-$500,000	$$	★★
$0-$100,000	$	★

Community Cost & Savings Key

Categories	Cost	Savings
> $10 million	$$$$$	★★★★★
$5.1 million-$10 million	$$$$	★★★★
$2.6 million-$5 million	$$$	★★★
$1 million-$2.5 million	$$	★★
$0-$999,999	$	★

FIGURE 11: USE SOLAR PHOTOVOLTAIC ENERGY

Sector	Estimated GHG Reduction (metric tons)	Estimated Cost	Estimated $ Savings
GOVERNMENT	1,938	$$$$$	★★★★
COMMUNITY	4,920	$$$$$	★★★

FIGURE 12: PURCHASE GREEN ELECTRICTY

Sector	Estimated GHG Reduction (metric tons)	Estimated Cost	Estimated $ Savings
GOVERNMENT	3,920	$$$	★
RESIDENTIAL	42,331	$$$$	★
COMMERCIAL	34,342	$$$$	★
INDUSTRIAL	75,495	$$$$$	★

ENERGY CONSERVATION

Lights Out at Night Policy

Lights Out Boston is a seasonal initiative developed through a partnership of the City of Boston, prominent local commercial building owners, and the Massachusetts Audubon Society. The program asks participating owners of large buildings over 30 stories to turn off their lights at night during the high migratory bird season. The first fall campaign was completed in October 2008 and there are plans to reinstate the program for the spring migration season. If success continues in the spring, the campaign may be extended year round. The program would be the first in the United States to enact a year long lights off at night policy. The program estimates light related energy savings of 25%.

Source: http://www.cityofboston.gov/environmentalandenergy/lightsoutboston_faq.asp#1

FIGURE 13: OUTDOOR LIGHTING PROGRAMS - COMMUNITY

Initiative	Estimated GHG Reduction (metric tons)	Estimated Cost	
LIGHTS OUT AT NIGHT POLICY (BUILDINGS)	8,507	$	★★★

FIGURE 14: INDOOR LIGHTING PROGRAMS

Initiative	Sector	Estimated GHG Reduction (metric tons)	Estimated Cost	Estimated $ Savings
LIGHTING OCCUPANCY SENSORS	GOVERNMENT	963	$$	★★
	COMMUNITY	6,126	$$	★★★
EFFICIENT LIGHTING RETROFITS	GOVERNMENT	860	$$	★★★
	COMMUNTIY	7,656	$$	★★★

from energy savings can be used to fund other, more expensive, initiatives recommended in this document. When combined with these other measures, the cost effectiveness and carbon savings are compounded.

There is wide scale support for energy conservation within the community, especially with today's fluctuating energy costs. Citizens have also become aware of the many environmental impacts related to energy use. Energy conservation was a recurring theme at the Chattanooga Green visioning event and related initiatives would likely be well supported within the community. It has been common practice for cities in the early stages of implementing a climate action plan to start with energy conservation measures.

It will also be important for the Chattanooga Green Committee and its staff to document the City and County savings related to the implementation of these energy efficiency measures, and explore using those savings to fund other Chattanooga Green initiatives.

How? Create an incentive program to make existing buildings, both public and private, more energy efficient and less consumptive, beginning with energy audits. Create a program to provide free or reduced-cost home energy efficiency upgrades for eligible families.

Potential Action B2: Reduce energy and monetary waste from lighting.

Why? Lighting, both inside and outside, contributes a significant amount of the energy consumption by the City Government and the community at large, and addressing this is a startlingly easy action to take (See Figures 13, 14 and 15)

How? Reduce hours that streetlights are on each day, balancing safety with environmental impacts and economic savings. Switch to low energy street lighting techniques for City-operated lighting, such as motion sensors and LED, metal halide and high pressure sodium fixtures. Building owners should be encouraged to turn off or dim the lights in unoccupied buildings at night. This not only conserves energy but also protects birds from their most fatal run-in with humans: flying into lit building windows at night.

GREEN BUILDING

FIGURE 15: OUTDOOR LIGHTING PROGRAMS - GOVERNMENT			
Initiative	Estimated GHG Reduction (metric tons)	Estimated Cost	Estimated $ Savings
REDUCE HOURS STREET LIGHTS ARE ON EACH DAY	1,542	$$$$	★★★
EFFICIENT STREET LIGHTS (OTHER THAN LED)	874	$$$	★★
LED STREETLIGHTS	211	$$$	★★
LIGHTS OUT AT NIGHT POLICY (BUILDINGS)	977	$	★★

Durham County's Green Building Policy

In October, 2008, the Durham County, NC Board of Commissioners adopted a High Performance Building Policy. This policy requires all new County buildings over 10,000 sq ft to earn at minimum LEED Gold certification and new buildings between 4,000 and 10,000 sq ft must earn at minimum LEED Silver certification. The policy also requires all County building renovations planned for 25% of the building to earn LEED certification.

OBJECTIVE C: Increase GREEN BUILDING practices.

Potential Action C1: Lead by example by making a City Government commitment to upgrade and build LEED certified and energy-efficient buildings.

Why? Like our neighbors in Atlanta, Chattanooga has begun to take the lead in sustainable building practices. A new resource center for green building methods and materials recently opened on Main Street. With $2 million in privately funded incentives, *green | spaces* has set an unprecedented goal of certifying 20 buildings in the downtown area to LEED standards over the next three years. The organization is well on its way to accomplishing this goal and, through education, creating an atmosphere for future green growth. The Chattanooga Green Committee recommends that the City Government lead this transformation by implementing the following actions.

FIGURE 16: SUSTAINABLE BUILDING PRACTICES				
Initiative	Sector	Estimated GHG Reduction (metric tons)	Estimated Cost	Estimated $ Savings
OFFER ASSISTANCE & INCENTIVES FOR GREEN BUILDINGS	COMMUNITY	1,440	NOT CALCULATED	★
REQUIRE GREEN BUILDINGS	COMMUNITY	4,794	$	★★
ENFORCE ENERGY CODE STANDARDS	COMMERCIAL	1,713	$	★
	RESIDENTIAL	2,517	$	★★
ENERGY EFFICIENCY RATING SYSTEM FOR HOMES	COMMUNITY	18,339	$$$$$	★★★★

GREEN BUILDING

Toledo Retrofits City Buildings

In order to reduce energy use and comply with air quality standards, Toledo, OH undertook comprehensive retrofits of 20 city buildings and facilities. The retrofits have saved 5,823,000 kWh and 5,250 tons of CO_2. In the first year alone the program saved $710,208. The program was made available through an innovative financing scheme. The city sold bonds to finance the program and the contracted systems control company guaranteed that the energy savings would pay back the bonds. Results have exceeded the anticipated savings.

Source: http://www.colorado.gov/energy/in/uploaded_pdf/Best_PracticesLocalGov.pdf

FIGURE 17: ENERGY EFFICIENT RETROFIT OF EXISTING BUILDINGS

Sector	Estimated GHG Reduction (metric tons)	Estimated Cost	Estimated $ Savings
COMMUNITY	6,978	$$$	★★★

How? Perform energy audits on all existing City buildings. Prioritize energy efficiency and other high performance building upgrades for City buildings. Possible candidates include the Development Resource Center, Tivoli Theater, Memorial Auditorium, City Hall and the City Hall Annex (See Figure 19).

Potential Action C2: Make sustainable building practices mainstream and increase the number of green buildings in Chattanooga.

Why? Buildings account for a third of society's energy use, a third of our greenhouse gas emissions, and also consume a vast amount of our energy resources. Green building practices have the ability to significantly reduce these numbers. In addition to being energy efficient, green buildings have many environmental, social and economic benefits. Most people spend the majority of their days indoors. Green buildings are durable and, through the use of natural lighting and low volatile organic compound (VOC)-emitting elements, healthier places to work and visit. Research has shown that patient recovery times can be decreased in "green hospitals" and test scores can be increased in "green schools." Because green building standards encourage regional sourcing of materials, they help boost the local economy. Reduced energy and water demand equals dollars saved. Coupled with onsite energy generation, it can help support the energy needs of a growing city.

Thanks to many architects, builders and other advocates, green buildings have been at the forefront of the sustainability movement. Comprehensive rating systems and certification programs, such as LEED, have set a baseline for the creation of green buildings. While much of the focus has been on new construction, it is important to remember the large number of existing buildings that will need to be retrofitted with energy efficient measures.

How? Offer incentives, such as streamlined permitting for LEED buildings, to facilitate the development approval process. Research and publicize residential and commercial financial incentives and grants for green buildings and energy efficiency. Develop incentives, using researched and secured grants and financial support, for green building projects within the City limits. Requiring green building practices to be followed in certain situations may even be considered (See Figures 16, 17 and 18).

Promote and enforce existing energy code standards. Continue to evaluate and update our building and energy codes to reflect the changing national

GREEN BUILDING

standards. Develop and adopt a green homes rating system similar to LEED, but specific to Chattanooga, that goes above and beyond standard design and construction. And perhaps most importantly, educate the general public about the benefits of high performance, green building. Make it mainstream.

FIGURE 18: COMMUNITY ENERGY EFFICIENCY UPGRADES			
Initiative	Estimated GHG Reduction (metric tons)	Estimated Cost	Estimated $ Savings
LOW-INCOME HOME WEATHERIZATION	528	$	★
ENERGY EFFICIENCY IMPROVEMENT LOANS	17,364	$$$$$	★★★★

FIGURE 19: ENERGY EFFICIENCY UPGRADES & GREEN BUILDINGS - GOVERNMENT			
Initiative	Estimated GHG Reduction (metric tons)	Estimated Cost	Estimated $ Savings
REQUIRE GREEN BUILDINGS	339	$	★★
RETROFITS OF EXISTING FACILITIES	1,570	$$$$	★★★

Nashville's Density Bonus

"On Feb. 22, 2007, the Nashville Planning Commission approved a density bonus for applying LEED to construction projects in certain neighborhood districts. In the downtown area, development is eligible to increase the Floor Area Ratio (FAR) cap from 15 to 17 if the project achieves LEED Silver. Projects in this district benefit from a FAR of 19 if the project achieves LEED Gold. In the SoBro neighborhoods, developments are eligible to increase the FAR cap from 5 to 7 if the project achieves LEED Silver. Projects in these neighborhoods benefit from a FAR cap of 9 if LEED Gold is achieved."

(The above was taken directly from http://www.cleanaircoolplanet.org/for_communities/green_building_ordinances.php)

GREEN BUILDING

Austin Zero Energy Homes Program

Late in 2007, the Austin City Council approved an innovative and aggressive program to make all new homes within the City zero energy capable by 2015. The program relies on a series of code changes that will incrementally increase home efficiency. With the addition of solar panels and other onsite energy production technologies, the homes will be able to generate more energy than they consume. The city estimates that the program will save homeowners $125 million on utility bills and remove 200,000 cars worth of GHGs from the atmosphere.

(Source: http://www.ci.austin.tx.us/news/2007/zeh_program.htm)

A

B

C

D

These local examples incorporate green building practices:

A) River Street Architecture Office

B) Greenlife and Two North Shore

C) Jefferson Heights Housing

D) green|spaces

RECYCLING AND WASTE

OBJECTIVE D: Increase RECYCLING and reduce WASTE.

Potential Action D1: Develop recycling options for older televisions before the "Switch to Digital" in February, 2009.

Why? Since there will be an increase in the number of televisions disposed of, a plan to effectively respond to this increase should be quickly put in place.

How? Due to the hazardous content in Cathode Ray Tube (CRT) television sets, a specific program will need to be created. The City government should seriously explore what this will require. The use of incentives appears to be the most effective method of securing and enforcing desired sustainable actions. Identifying incentives that are cost-neutral to taxpayers will require creative, out-of–the-box thinking. Perhaps the use of discount coupons redeemed by restaurants and other retail establishments could attract recyclable-product owners to use publicized collection schedules and drop-off centers.

Potential Action D2: Reduce the amount of waste per capita going to landfills.

Why? Landfills generate substantial amounts of methane, a potent greenhouse gas. Concern about the large amounts and types of waste landfills contain and the land they occupy has been an issue for years. Landfills are also very expensive to create and maintain. Some waste is transported long distances for disposal, adding carbon emissions and cost.

How? Many other American cities have successfully reduced their landfill waste by diversifying the types of recycling programs offered, increasing the types of materials accepted for recycling, and boosting recycling participation community-wide (See Figures 20, 21 and 22).

Examples:

- Create a program to incentivize residential and business recycling. Local closed-loop recycling facilities and participants should be supported and promoted.

Portland Recycles

Portland, Oregon has long been a leader in waste reduction and recycling. Through various methods Portland residents currently recycle 63% of their waste with participation rates as high as 90%. For most cities this is satisfactory, however Portland is not resting on their success. In 2007 Portland's city council passed the ambitious Portland Recycles! plan. Goals for the plan include zero growth in the city's waste stream and increased recycling rates to 75% by 2015. In 2008 the council adopted a final portion of the plan that approves a strategy that recognizes the necessity to work closely with the commercial sector to reduce waste and reach the city's goals.

(Source: http://www.portlandonline.com)

FIGURE 20: COMMUNITY WASTE REDUCTION

Initiative	Estimated GHG Reduction (metric tons)	Estimated Cost	Estimated $ Savings
'PAY AS YOU THROW' PROGRAM	77,986	NOT CALCULATED	NOT CALCULATED
EXPAND CURB-SIDE RECYCLING PROGRAM	35,745	NOT CALCULATED	NOT CALCULATED
INCENTIVIZE CURBSIDE RECYCLING PROGRAM	77,955	NOT CALCULATED	NOT CALCULATED

RECYCLING AND WASTE

Orange Grove Recycling

Chattanooga's complete recycling "loop" benefits from a unique partnership that is a fundamental feature of the local product handling stream. Clients of the Orange Grove Center with cognitive disabilities receive gainful employment under a contract with the City for sorting and bundling of materials received through both curbside collection and the newer drop-off centers. Revenue from sale of these items supports the contract, insuring that this sustainable solution offers social benefits along with an economic return.

Public sentiment favors a more aggressive curbside recycling program and educational effort. The Green Committee urges city officials to explore incentive-based approaches such as the RecycleBank system recently adopted by Oak Ridge that would reward public participation. Yet we recognize that much higher volumes of recyclable waste are generated not by households but by institutional, commercial, and business facilities. A balanced set of policies should reflect the combined potential of all these local waste material streams, offer positive incentives, and protect (or even expand) the unique benefits of the Orange Grove Center's role as a service provider, jobs provider and educational outreach partner.

- Create recycle drop off centers at all grocery stores and other neighborhood sites.

- Require recycling at major community events and festivals.

- Research the use of plastic bags and enact policies that promote market based solutions. This may include public education about alternative forms of bags, plastic bag fees or incentives for store owners to provide environmentally friendly disposable bags, such as those made from biodegradable, petroleum-free materials.

- Explore the feasibility of charging for garbage pick-up by weight.

- Explore the potential to allocate funding for receptacles and curb-side pickup.

- Hold recycling competitions to boost participation, offering the winning organization exposure and formal recognition.

Improve government recycling participation by:

- Establishing recycling programs in all government buildings.

- Requiring recycling at major government functions.

- Collecting worn-out or unused athletic shoes for conversion into products used in the construction of publicly-funded playgrounds, basketball and tennis court surfaces, soccer fields, and running tracks.

Potential Action D3: Make recycling more economically feasible for the City.

Why? The most successful recycling efforts will be those that are economically feasible for all participants. We must emulate the successful practices of other cities who are leaders in recycling. At the same time, we must share our successes with others.

RECYCLING AND WASTE

How? Compare the costs and benefits of all alternatives including continued (or increased) curbside recycling, neighborhood drop-off centers, and private incentive programs for collection and processing.

Chattanooga's waste comes from multiple sources and the solutions must also be multi-faceted.

Figure 21

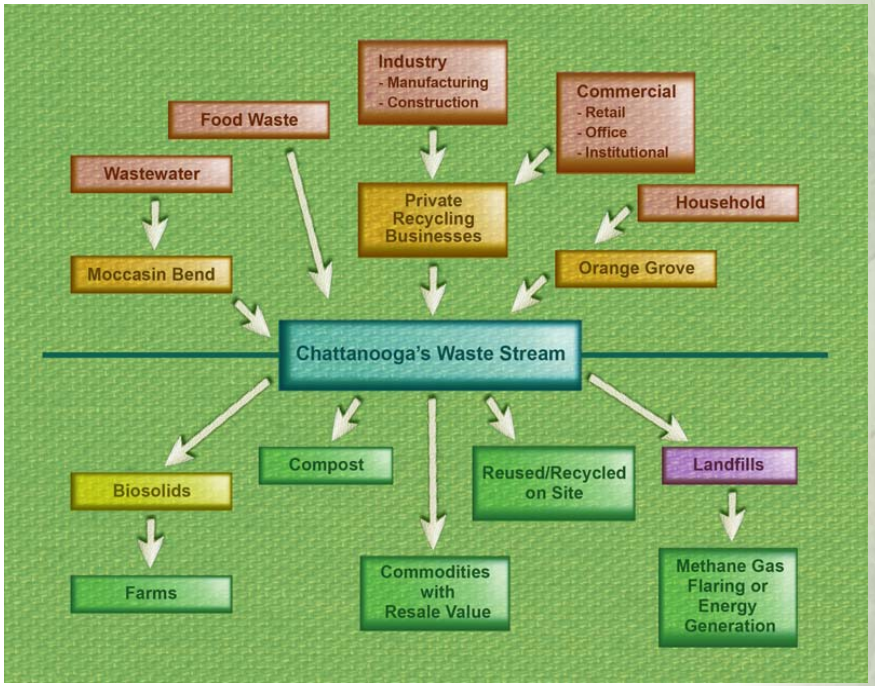


FIGURE 22: GOVERNMENT WASTE REDUCTION

Estimated GHG Reduction (metric tons)	Estimated Cost	Estimated $ Savings	
489	NOT CALCULATED	NOT CALCULATED	

SUSTAINABLE INDUSTRY

"Climate change is shaping up to be the biggest environmental strategy issue the business world has ever faced. The potential effects are both broad and substantial. The need to rethink strategy with an eye on climate change impacts and regulatory constraints is fast becoming a corporate imperative…. Companies that fail to track regulatory developments risk serious competitive disadvantage.

Marketing the green aspects of a product can be a tough proposition. Most successful green marketing starts with the traditional selling points – price, quality, or performance - and only then mentions environmental attributes. "

Daniel C. Esty and Andrew S. Winston, Green to Gold

OBJECTIVE E: Make Chattanooga a leader in SUSTAINABLE INDUSTRY.

Potential Action E1: Promote sustainable industry and operations through ongoing development and recruitment.

Why? Chattanooga has a proud and distinguished history as a community that embraces industry and supports industrial growth. The belief that profitable industries and environmentally benign practices are mutually exclusive is no longer valid in today's economy. To be truly sustainable, industry, business and government must survive while balancing the interests of the economy, the environment and the community. Government and industry must explore initiatives to support growth in ways that will conserve tomorrow's resources while permitting industry to continually improve competitiveness at all levels.

How? Business and industry-wide education and outreach are central to the future of the city and the environment. The first step we can take is to create positive recognition for industries that achieve or surpass environmental standards. We would also like to see the creation of incentives for existing Chattanooga industries to adopt sustainable practices.

"Aerisyn (which manufactures the up to 300 foot tall tower structures for wind turbines) is a substantial addition to Chattanooga's existing high-tech manufacturers that support the community's efforts to assume a leadership role in energy conservation enterprises." Source: Chattanooga area Chamber of Commerce, February 2005

HEALTHY COMMUNITIES

The Built Environment and Smart Growth
Food and Agriculture
Transportation

Healthy communities provide for the economic, social and environmental needs of a community. The arenas of smart growth, transportation and food and agriculture are crucial to consider when developing a sustainable vision for the region.

From a climate perspective, the best development is highly accessible to existing urban centers, served by transit, and is dense, diverse, and well-designed. On the other hand, low-density, sprawling development keeps communities dependent on cars and undermines public expenditures on transit, pedestrian, and bicycle facilities.

It is imperative to provide a range of transportation choices throughout the community, enabling citizens to make their transportation decisions based on their personal needs as well as on implications related to climate change. To reach our climate protection goals, progress will be required in three areas of transportation: vehicle efficiency, fuel type, and vehicle miles traveled (VMT).

Furthermore, it is recognized that through the diversification of food sources, benefits will be reaped in the local economy, our sense of community, nutritional health and the environment.

Objective F: Reduce sprawl by recognizing the environmental implications of the BUILT ENVIRONMENT and promoting SMART GROWTH practices.

Many definitions can be found for Sprawl and Smart Growth, but most of them can be summarized by Figure 23 that compares and contrasts the features of each.

"…growth that emphasizes reinvestment and prosperity in the urban core may have the power to enhance not just the overall competitiveness of a region but the economic health of all its parts."

Robert W. Burchell, et al.,
Sprawl Costs: Economic Impacts of Unchecked Development

THE BUILT ENVIRONMENT AND SMART GROWTH

"For communities to limit greenhouse gas emissions, boost resiliency to future climate conditions, and meet the changing needs of residents, current development patterns must be altered soon and significantly. Planning and zoning policies still favor single-use development patterns that mandate automobile dependency, strict segregation of residential and commercial uses, and low density residential building."

- "A Model for Sustainable Development in Arizona's Sun Corridor," Land Lines, Lincoln Institute of Land Policy, July 2008

SPRAWL	SMART GROWTH
Car dependent	Walkable
Scattered subdivisions of single-family homes	Diversity of housing types in many neighborhoods
Cul de sacs and wide roads that funnel traffic onto a few highways choked with traffic	Connected street network that distributes traffic throughout the system
Low density	Higher average densities around commercial centers
Little public open space	Network of parks, greenways, and natural areas
Spread out	Compact centers
Single use office parks and shopping centers surrounded by parking lots	Mixed use centers (shops, offices, housing, restaurants, schools,) served by transit
Limited or no transit service	Frequent and convenient transit service

Figure 23

The benefits of Smart Growth over Sprawl are many, but most of them are the result of driving less. They include shorter commutes and therefore more time to spend with family, fuel savings, better air quality, more preservation of natural areas, improved public health because people walk or bike more, and most relevant to this Climate Action Plan - a reduction in greenhouse gas emissions.

The potential costs of sprawling development patterns have been widely documented by noted economist Robert Burchell, and by organizations such as the Urban Land Institute, Smart Growth America, and locally by Chattanooga's Ochs Center for Metropolitan Studies.

Potential Action F1: Engage the community in smart growth decision making.

Why? Suburban sprawl has been with us since the end of WWII and will not be easy to change. Many of our patterns of daily living are heavily influenced by it and policies and regulations have been created over the years that reinforce our car-dependent culture. An informed and engaged citizenry will be necessary to reverse this pattern.

Chattanooga has a nationally known reputation for public participation and that community input has served us well. We need to adopt a collective vision for how and where we want to grow in the future, particularly with the 21st century challenges of climate change, rising fuel prices and declining resources.

How? At the macro scale, initiate a public input process that engages many citizens throughout the region in determining where and how we want to grow. At the micro scale, continue to encourage developers of large projects to hold public meetings that engage citizens in the planning and design process early on.

Potential Action F2: Determine the best areas for growth and conservation.

Why? As we move into the 21st century, we need a plan – a roadmap – for both growth and conservation. The addition of the Volkswagen plant to our community presents an unprecedented opportunity to do just that. We need to inventory our existing infrastructure and commercial, industrial and

THE BUILT ENVIRONMENT AND SMART GROWTH

residential properties to determine which areas can best accommodate additional growth. We also need to map critical natural resources that need to be protected and areas that should be set aside for open space and recreation.

How? Initiate a regional planning process that takes an inventory of our existing resources, compares the costs of different patterns of development, and identifies areas for both growth and conservation. Such a process should be regional in scope and adopted by all cities within Hamilton County as well as our neighboring counties to be truly effective.

Potential Action F3: Increase infill in already developed communities and where infrastructure is well established.

Why? Promoting infill in already developed areas takes advantage of the existing roads, transit, sewers, sidewalks, schools, and public services without having to fund costly new infrastructure, and it reduces the need to develop open space and agricultural lands. New homes can be built on vacant lots and new, mixed use neighborhoods can rise on land currently occupied by declining shopping malls and strip commercial centers.

How? Create incentives to encourage the reuse and renovation of existing buildings. Revise zoning regulations to accommodate infill development that is compatible with the architecture of the existing homes and businesses. Produce a handbook that illustrates housing typologies and commercial building designs that are most suitable for infill developments.

Potential Action F4: Review and evaluate the zoning codes and subdivision regulations to encourage projects that incorporate smart growth features.

Why? Zoning and subdivision regulations determine where and how land is developed in Hamilton County. While incentives that encourage smart growth are certainly preferable to regulations, some rules will always be necessary. The Comprehensive Plan for Hamilton County, adopted in 2006, establishes different types of development patterns that are appropriate for different parts of the county, but our existing zoning codes and subdivision regulations do not always support those desired patterns. We need to remove the regulatory obstacles and adopt new standards that will preserve our unique

Envision Utah

Thousands of Utah residents participated in Envision Utah. *Critical technical information helped citizens analyze the potential impacts of growth on transportation, air quality, land use, water, and infrastructure costs. Through the exhaustive involvement of the public, local and state elected officials, the business, civic, and religious communities, and other key stakeholders,* Envision Utah *gathered information about what their residents valued and how they thought growth should be accommodated. Based on this information,* Envision Utah *identified primary goals to protect their environment and maintain their economic vitality and quality of life as they accommodated new growth.*

www.envisionutah.org

Reinvesting in established neighborhoods is a primary tenant of smart growth.

THE BUILT ENVIRONMENT AND SMART GROWTH

Intown neighborhoods, like this North Chattanooga example, are desirable because of transit, parks, shopping and schools that are within walking distance for residents.

"Five acres are being made to do the work of one, and do it very poorly . . . And it is unnecessary. . . it is not too late to lay down sensible guidelines for the communities of the future."

William H. Whyte, Jr., The Exploding Metropolis: A study on the Assault on Urbanism and How our Cities Can Resist It, 1958

communities while allowing infill development and smart growth.

How? Review our current development regulations and remove obstacles that prevent smart growth. Incorporate incentives, such as density bonuses near existing commercial centers, to developers who exceed compliance or achieve smart growth objectives. Consider programs such as the transfer of development rights (TDR) and greenbelt initiatives to preserve existing open space and agricultural lands.

Potential Action F5: Increase the supply of affordable, workforce housing near jobs.

Why? According to the Union of Concerned Scientists (UCS), the average American is responsible for about 20 tonnes of CO_2 per year. Much of these annual emissions come from transportation. The UCS also estimates that for every gallon of gas burned in an automobile 24 lbs of CO_2 enter the atmosphere. If more people in our community lived close enough to walk, ride a bike, or take transit to work, we could significantly reduce our GHG emissions.

How? Allow accessory units, such as garage apartments, on single-family lots and give density bonuses to developers in return for providing affordable housing.

Potential Action F6: Continue to encourage the reuse of Brownfields.

Why? Brownfields are real property, either land or buildings, which have been previously developed and have the potential to contain hazardous substances, pollutants, or contaminants. Many of these Brownfield sites can be put back into productive use however, with appropriate environmental remediation. This reuse of Brownfields both improves the environment and decreases pressure to develop open land.

How? Two serious impediments to the reuse of Brownfields are the cost and the liability faced by the current property owner. Reducing this liability and providing incentives is critical to the continued clean up of these sites. Grants may be obtained from the EPA. The City should continue to apply for State and Federal funding to redevelop Brownfields.

THE BUILT ENVIRONMENT AND SMART GROWTH

The reuse of former manufacturing facilities takes advantage of existing streets, sewers, utilities and buildings and conserves undeveloped, natural areas.

EPA BROWNFIELDS GRANT AWARDS FOR THE CITY OF CHATTANOOGA:

2006 – Alton Park Community-wide Brownfields Assessment Project: a $200,000 grant for performing Environmental Site Assessments and developing cleanup and redevelopment plans.

2008 – A $200,000 Community-wide Assessment Grant for the Central City.

2008 – A $200,000 Cleanup Grant for the former Chattanooga Glass Company disposal site at Ohls Avenue.

(Source: http://www.chcrpa.org)

"Brownfields are real property, the expansion, redevelopment, or reuse of which may be complicated by the presence, or potential presence, of a hazardous substance, pollutant, or contaminant. Cleaning up and reinvesting in these properties takes development pressures off of undeveloped, open land and both improves and protects the environment."

U.S. EPA, 2008

FOOD AND AGRICULTURE

Local food production, community gardens, and farmers markets provide multiple benefits to a community - boosting the local economy, reducing transportation costs and emissions, improving the health of the population, promoting community spirit and social interaction, and providing educational opportunities.

Objective G: Strengthen the local FOOD AND AGRICULTURE infrastructure.

Potential Action G1: Promote local growers and farmers markets.

Why? A bite of food in the U.S. travels an average of 1,500 miles before it reaches our dinner plates. By diversifying our food sources, benefits will be reaped in the economy, our sense of community, nutritional-health and the environment. Localizing the food economy could enable each average household to achieve around a 4-5% reduction of GHGs traditionally attributed to the transport of food (Weber and Matthews, 2008).

How? Establish a local Food Council that coordinates public outreach, determines best management practices for community farms, and identifies opportunities for growers, purchasers and suppliers. Encourage alternative farming systems that use sustainable food practices, such as Community Supported Agriculture (CSA). Community Supported Agriculture consists of a community of individuals who pledge support to a farm operation so that the farmland becomes, either legally or spiritually, the community's farm, with the growers and consumers providing mutual support and sharing the risks and benefits of food production. – USDA

Potential Action G2: Promote the use of fresh, locally-procured foods and educate citizens about the health benefits.

Why? Childhood obesity has skyrocketed over the last several years, as have the number of cases of Type II Diabetes in adults.

How? The downtown district of Chattanooga is strikingly devoid of grocery stores and a targeted recruitment effort is needed. Additionally, it will be helpful to establish policy allowing the acceptance of food stamps at local farmers markets so families of lower income have access to local, fresh fruits and vegetables. Another innovative idea is to create a pilot local-foods cafeteria program at the Environmental Science magnet school, with the hope that the program will spread to other schools in the future.

FOOD AND AGRICULTURE

Potential Action G3: Increase the number of community farms and accommodate low intensity farming in the city and surrounding residential areas.

Why? Allowing communities access to the use of vacant land for urban gardening provides both recreation and employment for local growers and merchants, and accommodates urban wildlife.

How? Establish a target acreage per capita metric for community farms. Amend zoning and land use regulations to accommodate low intensity farming in the city and surrounding residential areas. Locate and allocate available water resources for community gardening. Designate land for community gardening initiatives.

Buy Fresh Buy Local Program

A national program aimed at engaging consumers in the purchase of locally grown foods and expanding local farmer access to profitable markets. Crabtree Farms has begun a local Chattanooga region chapter of the program and has identified a target foodshed of a 100 mile radius around the city. According to a study by the Ochs center, diverting just 5% of total Chattanooga spending on food products to local purchases would increase area revenue by $100 million. Increasing local food purchases is a truly sustainable practice and positively benefits the environment, the local population's health and the local economy.

TRANSPORTATION

DAILY VMT, CHATTANOOGA MSA, 2005-2007

	2005	2005 PER CAPITA	2006	2006 PER CAPITA	2007	2007 PER CAPITA
Hamilton	9,929,836	30.7	9,989,856	30.47	9,986,801	30.25
Marion	1,881,145	67.81	1,843,324	65.87	1,892,547	64.55
Sequatchie	365,490	28.76	533,807	40.88	392,886	29.39
Catoosa	2,197,265.14	36.78	2,226,819.43	36.57	2,206,657.44	35.45
Dade	1,008,334.71	63.46	984,381.42	61.52	1,004,519.22	62.4
Walker	1,639,421.7	25.93	1,618,304.32	25.34	1,595,362.02	24.71
TOTAL	17,021,492.55	33.86	17,196,492.17	33.74	17,078,772.68	33.11

Source: Tennessee and Georgia Departments of Transportation

Figure courtesy of the Ochs Center for Metropolitan Studies 2008 State of Chattanooga Region: Environment Report.

Figure 24

Vehicle Miles Traveled (VMT) – the number of miles that residential vehicles are driven.

FIGURE 25: INCREASE BUS RIDERSHIP			
Estimated GHG Reduction (metric tons)	Estimated Cost	Estimated $ Savings	
877	NOT CALCULATED	NOT CALCULATED	

FIGURE 26: EDUCATION ON LOW-CARBON TRANSPORTATION OPTIONS			
Estimated GHG Reduction (metric tons)	Estimated Cost	Estimated $ Savings	
12,751	$	★★★★	

Objective H: Address TRANSPORTATION as a major contributor to greenhouse gas emissions and increase transportation options for all residents.

Potential Action H1: Support CARTA's operations through diverse funding from public and private sources.

Why? Public transit plays an essential role in enhancing mobility for underserved segments of the population and as a convenient alternative to private automobile use. It also meets other community needs, some of them mandated by law – such as on-demand paratransit for individuals with disabilities. In no American city, however, does transit currently pay its own way solely from fare revenue. A primary focus of the Chattanooga Green Committee has been to identify transportation options that can offer greenhouse gas reduction opportunities and fuel savings. (See Figure 25)

How? City and County governments, employers and retailers benefit from improved accessibility and could contribute to ongoing public transit operations, regardless of episodic fuel cost gyrations. It is encouraging that in late 2008, we experienced a healthy 10% annual increase in public transit ridership. Equally positive is the response of local businesses to help fund the downtown shuttle by adopting and branding electric vehicles. But sustaining adequate funding is likely to be an ongoing challenge. The community needs to make CARTA funding a priority in future years, reflecting the true value of enhanced mobility and choice.

Potential Action H2: Decrease overall community Vehicle Miles Traveled.

Why? To reach our climate protection goals, progress will be required in three areas of transportation: increasing vehicle efficiency, developing alternative fuels, and decreasing vehicle miles traveled, or VMT (See Figure 24). Numerous national studies show that the third element – reducing VMT – while the most difficult to implement, may offer the highest yield. Metropolitan areas are ideally positioned to impact VMT through land use changes and establishing new priorities for transportation funding through the Transportation Planning Organization (TPO).

TRANSPORTATION

How? Restructure transit routes to provide frequent, convenient scheduled transit service to areas that have the residential density to support it (typically 12 units per acre or more) and to major destinations. Develop a communication network to coordinate carpooling, ridesharing and transit use. Encourage employers to implement 4-day work weeks, telecommuting, and other programs that reduce VMT. Encourage private businesses to offer vouchers for the use of public transit and carpooling as an alternative to paying for employee parking. Expand the use of Intelligent Transportation Systems (ITS) by CARTA and other transportation providers to make transit more responsive to real-time demand and truly a convenient option.

Potential Action H3: Promote and develop alternative transportation and the related infrastructure.

Why? If a wide range of transportation options is available throughout the community, citizens will be able to make choices based on personal needs as well as the implications for climate change. Higher gas prices have already caused individuals and businesses to look for transportation alternatives, but alternatives are not always readily available. We need to facilitate those choices through community policies and programs.

How? Continued exhibits, such as the recent Smart Energy Odyssey at Miller Plaza, allow public and private fleet managers to explore, and potentially adopt, alternatives such as biofuels, electric vehicles, hybrids, and plug-in hybrids. Urge the EPB and TVA to dedicate marketing resources to the use of electricity as a transportation "fuel" that can serve as an alternative to gasoline and diesel for private vehicles and fleets. Provide plug-in parking meters for daytime recharging of electric vehicles. Establish priority parking spaces for energy efficient and Low Emission Vehicles (LEV). Continue to pursue a high-speed rail system, such as Mag-Lev, to connect Chattanooga to surrounding cities (See Figures 26, 27 and 28).

Potential Action H4: Continue to develop pedestrian and bicycle facilities as a viable means of transportation.

Why? Human-powered mobility is an ideal mode of transportation, with the most significant benefits for individual health and community wellness, energy savings, air quality and our carbon footprint. Cities do not become pedestrian

"Since 1980, the number of miles Americans drive has grown three times faster than the U.S. population, and almost twice as fast as vehicle registrations."

Federal Highway Administration, Highway Statistics 2005

"Riders can be 'choice' riders, those who decide to ride to save money or help protect the environment," said Tom Dugan, CARTA's Executive Director. "Other riders are those who do not have a car and ride for economic reasons," he said.

Chattanooga Times Free Press, Oct. 19, 2008

TRANSPORTATION

Maglev

For the past decade, leaders and planners in Chattanooga, Atlanta and the region have jointly studied the feasibility of truly high-speed ground transportation – a route that would be served by magnetic levitation (maglev) technology. Skeptics have become believers after experiencing the rush of a 285 mph ride on the one existing commercial route in Shanghai.

This advanced mode of transportation, with an admittedly long lead time for development, nevertheless promises multiple benefits: dramatically quicker intercity connections, new multimodal service to the two airports, reduced automobile traffic on I-75, a more energy-efficient way of moving passengers, zero local emissions and enhanced national security. The resulting carbon reductions would go well beyond the scope of our city.

Chattanooga is already committed to pursuing federal designation and eventual funding. The Green Committee encourages the efforts of the Mayor and City in working to position our region at the forefront of this next-generation solution.

Ann Arbor Go!Pass

In an effort to address downtown traffic issues, the City of Ann Arbor, Michigan, partnered with various stakeholders including the Ann Arbor Transportation Authority, the Chamber of Commerce and the Downtown Development Authority to provide bus passes for downtown employees. The "go!pass" program offers bus passes to all downtown businesses for $5 per pass. To date over 300 businesses participate in the program offering bus passes to 5000 employees. In 2003 the program saved more than 700 tons of CO_2 and over $300,000 in fuel, parking and other related costs.

The "go!pass" program is part of Ann Arbor's larger "getDowntown" program. The "getDowntown" program serves as a resource to downtown business and their employees, and educates on clean-commuting options such as biking, walking and carpooling.

(Source: http://www.iclei-usa.org/library/documents/action-center-phase1-051308/AnnArbor_Discount_Bus_Passes_Nov05.pdf)

and bicycle-friendly by accident, but through thoughtful planning and balanced development standards.

How? Incentivize the installation of sidewalks and greenways as an integral part of new developments. Adopt pedestrian-friendly site and building design standards, including reduced setbacks, limited curb-cuts and reduced parking requirements. Incorporate recommendations from the publicly adopted Bicycle Master Plan in all new street construction projects. Complete the Greenway Plan and expand the number of greenway connections (See Figures 29 and 30).

"Building partnerships to identify smarter transportation and stationary energy technologies is our country's most urgent task. Educating citizens on the options they have is our best way of accelerating the change we need."

–Jonathon Overly, Executive Director, East Tennessee Clean Fuels Coalition

TRANSPORTATION

FIGURE 27: ALTERNATIVE VEHICLES

Initiative	Sector	Estimated GHG Reduction (metric tons)	Estimated Cost	Estimated $ Savings
ELECTRIC VEHICLES	GOVERNMENT	32	$$	★
	COMMUNITY	120	$	★
COMPRESSED NATURAL GAS	GOVERNMENT	69	$$	★★
	COMMUNITY	4,314	$$$$	★★★★
FLEET CONVERSION TO BIODIESEL (B20)	GOVERNMENT	391	$$	NOT CALCULATED
	COMMUNITY	782	$	★
HYBRID VEHICLES	GOVERNMENT	609	$$	★★
	COMMUNITY	4,935	$$$$	★★★
ETHANOL VEHICLES	GOVERNMENT	85	NOT CALCULATED	★★
	COMMUNITY	1,761	NOT CALCULATED	★★★

FIGURE 28: ALTERNATIVE TRANSPORTATION OPTIONS TO DECREASE VMT

Initiative	Sector	Estimated GHG Reduction (metric tons)	Estimated Cost	Estimated $ Savings
PROMOTE TELECOMMUTING	GOVERNMENT	480	NOT CALCULATED	★★★
	COMMUNITY	6,784	NOT CALCULATED	★★★
PROMOTE CARPOOLING & VANPOOLING	GOVERNMENT	520	NOT CALCULATED	★★★
	COMMUNITY	7,358	NOT CALCULATED	★★★
PARKING VOUCHERS	GOVERNMENT	1,254	NOT CALCULATED	★★★★
	COMMUNITY	17,731	NOT CALCULATED	★★★★
BICYCLES FOR EMPLOYEES	GOVERNMENT	320	$$	★★
	COMMUNITY	1,551	$$	★★
BIKE SHARE PROGRAM	COMMUNITY	524	$	★

"Deal with transportation and land use, or you may as well stop now."

Post Carbon Cities: Planning for Energy and Climate Uncertainty

TRANSPORTATION

In the Ochs Center surveys of 1,000 Hamilton County residents, the percentage of respondants who stated that a short commute time is very important to quality of life increased from 46.5% in 2006 to 51.8% in 2008.

FIGURE 29: PEDESTRIAN-FRIENDLY NEIGHBORHOODS			
Estimated GHG Reduction (metric tons)	Estimated Cost	Estimated $ Savings	
2,826	NOT CALCULATED	★★	

FIGURE 30: TRANSIT ORIENTED DEVELOPMENTS			
Estimated GHG Reduction (metric tons)	Estimated Cost	Estimated $ Savings	
7,350	NOT CALCULATED	★★★	

Alternative forms of transportation and alternative fuel vehicles are both necessary components of Chattanooga's strategy to reduce the community's carbon footprint.

NATURAL RESOURCES

Air Quaility
Biodiversity
Green Infrastructure
Urban and Regional Forests
Water Quality and Quantity

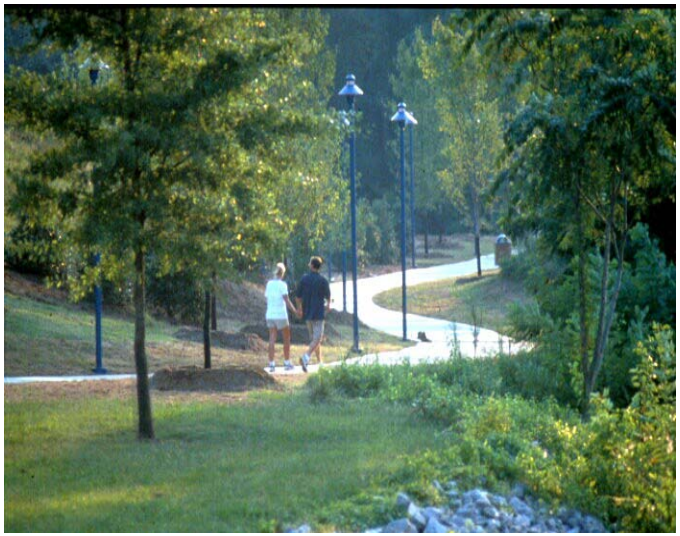
The natural resources of the Chattanooga area are valuable assets and should be protected, conserved and used wisely. A sustainable community action plan should address air quality, biodiversity, green infrastructure, urban forests and water quality and quantity.

Chattanooga has a long history of dealing with air quality due to the unique topography of the area as well as being an industrial and transportation hub. Named by the U.S. Department of Health, Education, and Welfare to be the most polluted metropolitan area in the country from 1961 to 1965, Chattanooga embarked upon a journey to improve air quality – a journey that continues as federal air quality standards are tightened on a regular basis.

Chattanooga is blessed with the Tennessee River, numerous creeks and streams, as well as a beautiful setting of mountains and ridges. These areas support a rich biodiversity of species, flora and fauna and provide habitat for wildlife, such as the birds and insects that are crucial to many agricultural and landscape processes. Protection measures for native ecosystems should strive to balance the built environment with nature. Promoting Chattanooga as a tourism destination for outdoor activities is only possible if we protect these diverse biological resources.

A critical element for healthy living and a clean environment lies in a community's green infrastructure. Our community has taken pride in regional parks such as Coolidge Park and Greenway Farm. Furthermore, tree plantings have a significant impact on reducing GHGs and cleaning our air. Increasing our tree canopy and forested areas is an achievable goal.

Human activities can result in diminished water quality. We need to pay more attention to the natural systems that cleanse and replenish this critical resource. Improving our water quality has surfaced repeatedly as a top community priority. Adequate water quantity is also essential to continued economic growth. A comprehensive approach must be taken with regard to the overall state of water in our region.



"When we try to pick out anything by itself, we find it hitched to everything else in the universe."

John Muir

AIR QUALITY

Air Quality and GHGs

In "Massachusetts v. Environmental Protection Agency" (2007), the Supreme Court ruled that the EPA must regulate GHG emissions from automobiles. Prior to the decision GHGs were not considered air pollutants. However, the landmark case found that GHGs, although naturally occurring, are indeed air pollutants and that the EPA's refusal to regulate automobile emissions was a violation of the Clean Air Act. This landmark case was the first to legally link GHGs to air quality and may set the foundation for future regulation.

OBJECTIVE I. Build on previous successes and continue to improve AIR QUALITY.

Potential Action 11: Reduce vehicle miles traveled in order to reduce pollutants being emitted into the atmosphere.

Why? Chattanooga succeeded in meeting total suspended particle standards in the mid 1980's. It became one of the first areas in the eastern United States to achieve the 1-hour ozone standard and be designated as "in attainment" in December 1989. Faced more recently with the prospect of being designated "non-attainment" for the 8-hour ozone standard adopted by the U.S. EPA, Chattanooga opted to enter into a voluntary Early Action Compact with EPA to achieve the standard quicker than it would have under the prescribed federal timeline. This compact allowed Chattanooga to continue pursuing economic development opportunities and achieving cleaner air sooner for its citizens.

Over the last decade, many programs such as vehicle emissions testing, gasoline vapor recovery from service stations, a seasonal open burning ban, and lowering truck speed limits have been implemented to improve air quality. The local Air Pollution Control Bureau monitors pollutants and allergens and works with local industries to ensure compliance with regulatory requirements. We have reached attainment under current EPA requirements for the 8-hour ozone standard adopted in 1997. However, EPA adopted a tighter 75 parts per billion particulate standard which we do not currently meet. Any local or regional reductions in greenhouse gas emissions will help in meeting these more restrictive ozone standards since fuel combustion is the largest contributor to both ozone and fine particle formation.

How? Actively promote the use of alternative forms of transportation, public transportation, car and van pooling, flexible work scheduling by employers where possible, alternative fuels, and alternative-fueled vehicles. (See Figure 27 on page 49) This will require participation from the entire community, especially City government and businesses.

Potential Action 12: In the short term, Government entities should take the lead in achieving and staying in attainment with EPA PM2.5 and Ozone standards; in the long term, strive to exceed those standards.

AIR QUALITY

Why? Healthy air is the cornerstone of a healthy community. Chattanooga has direct experience with this concept and should continue to make cleaner air a priority.

How? Government owned fleets should be retrofitted with diesel oxidation catalysts or particulate traps/filters. Private fleets should be encouraged to do so as well. The use of ultra low sulfur diesel at community events that require onsite power generation from fossil based fuels can be required. The use of cleaner alternatives as they become available in the market can be promoted. The use of Roundabouts in the design of new streets and renovation of existing streets can be increased. Traffic signals should be efficiently timed to reduce unnecessary idling. The local anti-idling ordinance should be more strongly enforced (See Figure 31).

Potential Action 13: In the short term, residential and industrial businesses should strive to assist Chattanooga in attaining and staying in attainment with EPA PM2.5 and Ozone standards; in the long term, strive to exceed those standards.

Why? Activities affecting air quality come from sources that are both local and from the greater region (coal fired power plants). Local contributions include vehicle emissions (both on-road and off-road), construction and excavating equipment, landscape maintenance equipment, and energy inefficiency in buildings. Additionally, the heat gain problems presented by our region's topography and its inversion aspects, along with an abundance of impervious surfaces, all contribute to the air quality challenges faced by our community.

How? Industrial best management practices to reduce impacts should be whole-heartedly continued, and potential new solutions should be studied. A lawn-mower exchange program to incentivize property owners to replace gasoline mowers with cleaner alternative mowers, including electric, battery and push mowers, should be investigated.

The free electric shuttle in Downtown Chattanooga is a convenient form of alternative transportation that not only helps improve our air quality but also reduces our dependence on fossil fuels.

FIGURE 31: LIMIT IDLING OF HEAVY DUTY VEHICLES

Sector	Estimated GHG Reduction (metric tons)	Estimated Cost	Estimated $ Savings
GOVERNMENT	801	NOT CALCULATED	★★★
COMMUNITY	572	NOT CALCULATED	★

BIODIVERSITY

OBJECTIVE J. Protect our region's natural BIODIVERSITY.

Potential Action J1: Protect native wildlife and plant species.

Why? The City includes a diverse community of biological resources that are sometimes overlooked and underappreciated in the urban environment. Chattanooga is truly blessed with a wonderful blend of mountains, ridges, rivers, creeks, and streams. In addition, Chattanooga's geographic location lends to the mixing of northern and southern flora and fauna. The Southern Appalachian region is well known as possessing one of the most diverse biological populations in the world. Maintaining this diversity provides habitat for native plants and wildlife as well as beauty and interest in natural settings. The promotion of Chattanooga as a livable city, a tourism destination, and a mecca for outdoor activities is greatly enhanced if we protect these biological resources.

How? Incentivize the inclusion of biodiversity assets in the existing pre-construction review of development plans. Developers should be encouraged to retain high quality trees (See Potential Action L-2). Reflection Riding, CALP, and other organizations should be engaged to educate residents on the benefits of utilizing native species where appropriate. (See Figure 32) Local nurseries should be encouraged to promote native species. Develop incentives for the use of bioretention and erosion control systems that incorporate native species instead of rip rap along rivers and streams. Encourage the use of either natural methods or benign herbicides for roadside vegetation control while discouraging the use of harsh chemicals, such as persistent soil sterilants and other herbicides listed as moderately toxic or stronger.

Potential Action J2: Initiate an urban ecosystems analysis.

Why? In its simplest form, an Ecosystems Analysis is the cataloging of natural resources, mostly vegetation, in any prescribed geographic area. In many cases it is possible to assign monetary benefits to the services which plants and trees provide.

BIODIVERSITY

Performing an ecosystems analysis accomplishes several things:

1. It provides a baseline of crown cover which can be used to measure the deforestation as it occurs as a result of development.

2. It provides a measure of the monetary benefits associated with the various functions carried out by natural systems. These include stormwater retention and runoff, air pollution removal, carbon sequestration and storage, and energy savings.

One of the most powerful aspects of this action is the ability to analyze alternate scenarios. Starting with a current landcover map, the effects of future landcover change can be calculated before those changes are made. It is also useful to see how things have changed over time, by comparing landcover maps from earlier periods, such as 10 or 20 years ago. This becomes an important decision-making tool as our community balances the natural environment with growth and development choices.

How? Apply for grants and partner with TVA, UTC, the Chattanooga Area Landscape Professionals (CALP), and the UT Extension Office to develop a holistic urban ecosystems analysis.

Biodiversity Assets are the inherent goods and services supplied by a healthy natural system. Some of the benefits they provide are to naturally clean air and water, promote food production and create habitat. Such biodiversity assets include, but are not limited to agricultural lands, aquatic flora and fauna, floodplains, groundwater recharge areas, native vegetation, rivers and stream buffers, and wetlands.

FIGURE 32: BIODIVERSITY INITIATIVES TO REDUCE GREENHOUSE GAS EMISSIONS

Initiative	Sector	Estimated GHG Reduction (metric tons)	Estimated Cost	Estimated $ Savings
LOW - MAINTENANCE LANDSCAPING	GOVERNMENT	30	NOT CALCULATED	★★
	COMMUNITY	4,242	NOT CALCULATED	★★★★★

GREEN INFRASTRUCTURE

Invasive Plant Species Control:
Use of Goats to Combat Kudzu Infestations

Chattanooga's multi-year pilot program to combat kudzu infestations with goats in rough terrain areas not especially favorable to manual, chemical or mechanical means has demonstrated that this method is effective, and environmentally friendly. The goats are contained within the specific area where control of unwanted vegetation is desired by a solar-powered electric fence, and protected from predators by specially-bred guard dogs.

The goats consume a wide variety of brush species, most of which are considered as undesirable or invasive species, including kudzu, privet, poison ivy and multi-flora rose. Unlike chemical applications the unwanted vegetation is totally consumed, allowing the land manager to fully assess the situation which heretofore was hidden beneath several feet of vegetation.

The control area is self-fertilized by the goats, and their hoofs disturb the soil sufficiently that both the goat pellets and rainwater are absorbed into the ground. After an area is sufficiently controlled, desirable brush species, ground cover and trees may be planted to re-vegetate the area to both occupy the site and to provide competition for the kudzu.

OBJECTIVE K: Expand the network of effective GREEN INFRASTRUCTURE throughout the city and the region.

Potential Action K1: Develop a comprehensive green spaces plan that identifies important areas that should be preserved as open space, greenways, and parks and provides a connected system of green spaces throughout the area.

Why? A critical element for healthy living and a clean environment lies in a community's green infrastructure. A good foundation has been put in place by area land trusts and by City programs that have built parks, conserved land and provided recreation over the last few decades. Our community has taken pride in regional parks such as Coolidge Park, Greenway Farm, and the Tennessee Riverpark. In order to realize the full potential of these spaces, we must increase access, connections, and corridors. Ideally, as we develop and build our community, we can connect to a network of green infrastructure that provides not only cooling effects and carbon sequestration, but also provides corridors for wildlife movement and promotes walking or biking. A fractured system of isolated spaces will not serve wildlife, plants or human occupants efficiently. Green areas provide health benefits for city dwellers; parks enhance our lives and increase the value of adjacent properties, forested areas help to cool the city and our natural habitat provides opportunities for recreation. (See Figures 33 and 34)

How? Identify and map existing open space and opportunities for future acquisition. Establish incentives for developers to dedicate new land as public open space.

Potential Action K2: Provide green infrastructure within walking distance of homes and businesses.

Why? The health and well being of individuals that engage in exercise on a regular basis is well documented. These benefits include:

- Weight Management
- Controlling blood pressure
- Decreasing the risk of heart attack

GREEN INFRASTRUCTURE

- Boosting "good" cholesterol
- Lowering the risk of stroke
- Reducing the risk of breast cancer and type II diabetes
- Avoiding the need for gallstone surgery
- Protecting against hip fracture

The United Press International reports that a new study by researchers from the Indiana University School of Medicine indicates that children living in greener neighborhoods experienced a slower increase in body mass index (BMI) during a two-year period.

Many urban dwellers do not spend enough time in nature in ways that nurture them psychologically and spiritually. When people live their lives cut off from nature, they lose a great source of richness and vitality. Connecting with nature can serve to renew and enrich the lives of people of all ages and walks of life.

How? Explore and establish dedicated public funding to enhance the efforts of private land trusts, foundations and public grants for the conservation, purchase, and maintenance of critical areas identified in the recommended green spaces plan.

Green Infrastructure is the interconnected network of parks, greenways, wetlands, natural areas and forest preserves found in a community. Benefits of green infrastructure include reduced flooding, stormwater management, and improved water quality. These natural systems also typically costs less to install and maintain than engineered solutions.

Environmental Benefits of Green Infrastructure:

- *Increased Carbon Sequestration*
- *Improved Air Quality*
- *Improved Human Health*
- *Increased Land Values*
- *Additional Wildlife Habitat and Recreational Space*
- *Urban Heat Island Mitigation and Reduced Energy Demands*
- *Reduced and Delayed Stormwater Runoff Volumes*
- *Enhanced Groundwater Recharge*
- *Stormwater Pollutant Reductions*
- *Reduced Flooding*

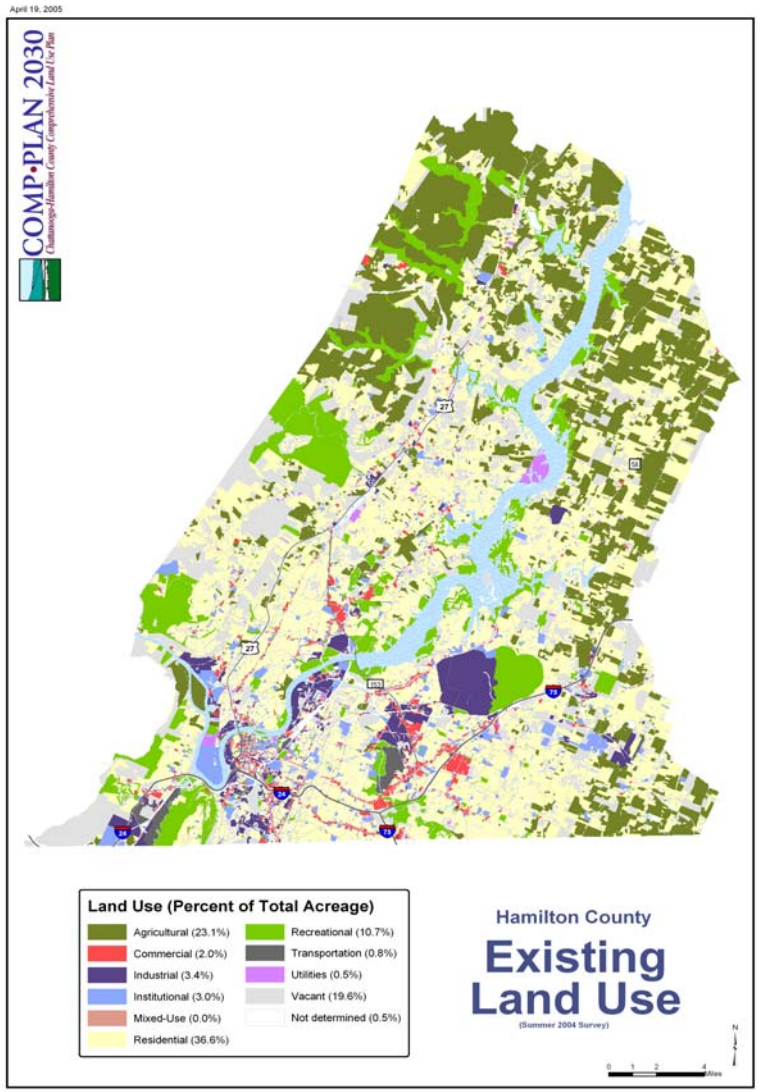


Figure 33: Recreational green space accounts for 10.7% of all land in Hamilton County.

GREEN INFRASTRUCTURE

HAMILTON COUNTY NEIGHBORHOODS WITH LESS THAN 1% OF TOTAL ACREAGE PRESERVED AS PARK OR OPEN SPACE

	% OF TOTAL ACREAGE PARKS
Woodmore/Dalewood	0.00%
Lupton City/Norcross	0.00%
Westview/Mountain Shadows	0.00%
Hixson	0.06%
Brainerd	0.14%
Apison	0.32%
Tyner/Greenwood	0.34%
Glenwood/Eastdale	0.36%
Collegedale	0.37%
Birchwood	0.65%
Downtown	0.89%
Red Bank	0.90%
Hickory Valley/Hamilton Place	0.95%

Table courtesy of the Ochs Center for Metropolitan Studies 2008 State of Chattanooga Region: Environment Report

Figure 34

URBAN AND REGIONAL FORESTS

OBJECTIVE L: Expand and maintain healthy URBAN and REGIONAL FORESTS.

Potential Action L1: Strive to obtain ideal tree canopy cover in Chattanooga.

Why? Tree plantings have a significant impact on reducing GHGs and cleaning our air (See Figure 35). Increasing the tree canopy and forested areas of the community is an achievable goal. Many practices have been put into place including a working Tree Commission, a City urban forestry program and streetscape improvements in the downtown. However, we have room to improve and should continue the greening of our community by engaging both the private and public sectors in programs such as "Take Root" and urban forestry awards that acknowledge participation. Additional economic benefits are provided as the desirability and attractiveness of the community are enhanced with tree plantings. The following crown cover amounts are recommended by *American Forests* as a minimum for community health:

15% in the Downtown
25% in urban residential areas
50% in suburban residential areas
40% overall

How? Expand the Take Root initiative to new areas of the community. Analyze the Landscape Ordinance to increase the number of trees in new developments, renovations and parking lots. This will also require an ecosystems analysis, to be performed by the City, to determine the existing canopy cover and other metrics we can use as benchmarks to track our progress.

Potential Action L2: When new development occurs, encourage the retention of existing high quality trees rather than removing them and replanting with younger trees.

Why? According to a STRATUM Analysis conducted in 2007, Chattanooga's street tree population removes 18,143 metric tons of CO_2 from the atmosphere

Street trees provide shade, reduce urban heat build up, sequester carbon and increase property values.

URBAN AND REGIONAL FORESTS

FIGURE 35: INCREASE URBAN FOREST			
Estimated GHG Reduction (metric tons)	Estimated Cost	Estimated $ Savings	
63	$	★	

FIGURE 36: MODIFY LANDSCAPE ORDINANCE TO RETAIN TREES			
Estimated GHG Reduction (metric tons)	Estimated Cost	Estimated $ Savings	
501	NOT CALCULATED	★	

per year. The City Forester projects that the entire tree population within the city absorbs 1.81 million metric tons of CO_2 and provides the following approximate benefits: Energy savings - $128 million; Stormwater - $297 million; Air quality - $31 million. It is clear that trees offer many valuable services that can now be quantified.

How? Amend the landscape ordinance to create incentives to retain existing trees rather than removing trees and replanting in new developments. (See Figure 36) Educate and encourage builders and developers to follow the procedures prescribed by the "Tree Protection Best Management Practices (BMPs) for Contractors and Builders" in order to conserve as much high quality tree canopy as reasonably possible, especially when it is technically sound to do so.

Potential Action L3: Maintain ridges and hillsides as forested areas with limited development.

Why? Tree cover on hillsides and ridges contribute to the natural beauty of this region. These green spaces also cool the city, clean the air, and reduce erosion.

How? Analyze regulations addressing clear-cutting and erosion control for these areas to determine their effectiveness.

OBJECTIVE M: Improve current WATER QUALITY and protect WATER QUANTITY.

Potential Action M1: Implement changes to Chattanooga's current codes and regulations to address current water quality issues.

Why? Human activities can result in diminished water quality. Rooftops, paved streets and parking lots lessen the natural ability of the land to absorb stormwater. Secondarily, impervious surfaces receive (from human activities) pollutants such as oils, trash, and contaminated sediments. During storm events, exposed pollutants are directly transported into receiving streams if no structural control is in place for mitigation. Improper construction activities

WATER QUALITY AND QUANTITY

can increase the amount of sediment in our rivers and streams. We need to pay more attention to the natural systems that cleanse and replenish this critical resource. Disturbance of the floodplains and riparian areas can shift waters to cause flooding or unnatural erosion. Many of the area's streams and creeks have been listed as impaired according to the Clean Water Act's 303(d) list, and they are highly sensitive to any further misuse and pollution (See Figure 37). Warnings signs about human contact with water and consumption of fish are clear indicators that our watersheds need increased protection. The City has made progress in identifying Best Management Practices during development.

How? Address the problems associated with the stormwater detention pond at the Development Resource Center. Continue the Sanitary Lateral Assistance Program (SLAP) to identify and eliminate sanitary waste discharges into the stormwater system. Establish Low Impact Development (LID) as the Best Management Practice to reduce runoff volume and flow velocity for stream channel and floodplain protection. Require LID for all City-governed projects. Develop retrofitting plans for improving water quality in impaired watersheds by incorporating green stormwater controls, such as rain gardens, and Best Management Practices in places where insufficient or no stormwater control exists. Adopt measures to limit development in groundwater recharge areas and an ordinance establishing a stream bank protection program (including natural buffers).

Anticipate upcoming EPA mandated sedimentation control requirements that may target activities around impaired streams. This may include improved erosion and sedimentation control, site monitoring and maintenance. Proactive implementation will help reduce long term costs associated with meeting federal requirements. Incentivize the use of pervious pavement in parking lots and appropriate driving areas. Modify the Chattanooga City Code to allow the use of graywater in toilets and landscape irrigation systems.

Potential Action M2: Work with the appropriate agencies to develop a long-term, regional conservation plan and strategy to protect our water supply.

Why? A comprehensive approach must be taken with regard to the overall state of water in our region. Although Chattanooga is situated along the Tennessee River and we currently find adequate aquifers and recharge areas in place, we should not have a false sense of abundance. We could easily find ourselves in a period of crisis if there are drastic weather changes or usage

Green roofs, parking lot landscaping, and natural streambank buffers all help protect our water quality.

WATER QUALITY AND QUANTITY

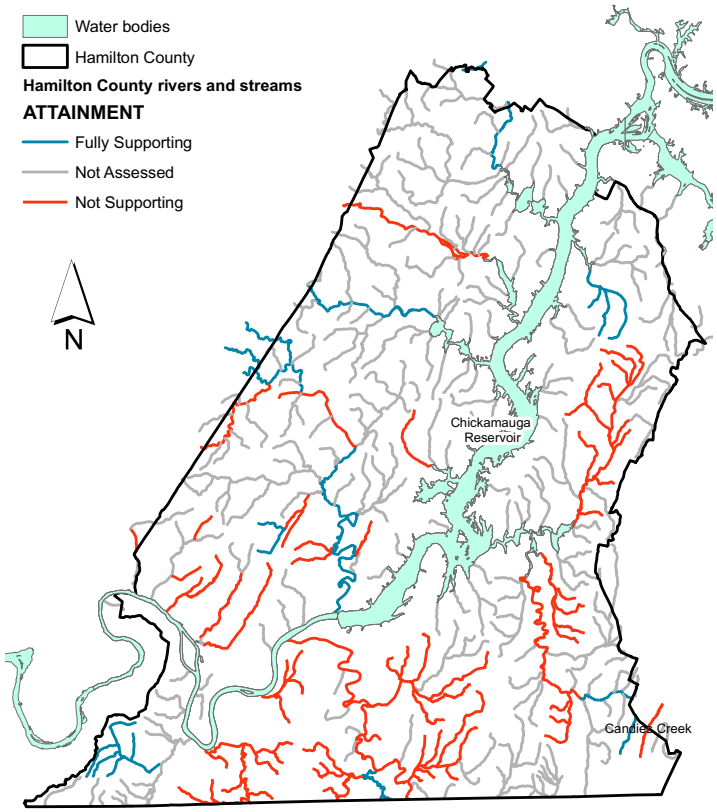


Figure 37: Hamilton County Impaired Streams map

should shift. Unlike other southern cities facing water shortages and drought conditions, our community can avoid these problems with deliberate planning for water conservation. Adequate and well managed water quantity is essential to continued economic growth as well as our goal of a truly sustainable community.

How? Support the development and adoption of the City of Chattanooga Watershed Plan. Determine capacity and develop a plan that assures an adequate quantity of water to meet future needs (See Figure 38).

Potential Action M3: Preserve the 100-year flood zone and riparian zones in a naturally-healthy state.

Why? Floodplains and riparian zones support particularly rich ecosystems. The surge of nutrients left when the floodplain is covered with water causes both microscopic organisms and larger species to thrive. Floodplains and riparian areas reduce flooding by absorbing the floodwater. Impervious surfaces, filling of the floodplain, and removing vegetation from streambanks reduce this natural absorbing ability. Floodplains are ideal for public open space, parks and greenways. Smart land use planning can reduce the amount of paving, tree destruction and soil disturbance during urban development. Reclaiming disturbed sites through urban soil and tree management can significantly increase infiltration conditions thereby reducing the volume of stormwater runoff.

How? Require natural buffers of sufficient width along stream banks to filter runoff. Limit development in the 100-year floodzone. Adopt regulations to further guide development in these areas. Adopt new measures to maintain stream base flows and reduce flooding potential.

FIGURE 38: WATER CONSERVATION ORDINANCE			
Estimated GHG Reduction (metric tons)	Estimated Cost	Estimated $ Savings	
2,722	NOT CALCULATED	★★★★★	

EDUCATION AND POLICY

Community Awareness and Participation
Business Participation
Government Policy and Purchasing
Schools

The three previous sections – Energy Efficiency, Healthy Communities, and Natural Resources – focus primarily on specific actions that can help us reduce our community's carbon footprint, such as conducting home energy retrofits, decreasing the amount of driving we do every day, or planting more trees. Each of the recommendations contained in those three sections is important, but in most cases implementation will require broad participation from the entire community. Businesses and industry, governments, schools and religious institutions, non-profits, neighborhoods, families and individuals must work together.

For these reasons, the Chattanooga Green Committee concludes its recommendations with a focus on public education and government policy. Providing every citizen with good information about sustainability and the resources available will facilitate the changes that are necessary. Implementation of our recommended actions will require a combination of grassroots support, effective management and transparent leadership. This plan does not hide the fact that it will be difficult to reach our carbon footprint reduction goals. Without the community's involvement, the goals become even more distant.

This Climate Action Plan was developed as much for our successor generations as for ourselves. Our children and grandchildren are ultimately more threatened by non-sustainable habits. If properly equipped, it will be they who lead the City to the achievement of our long-term goals. The development and use of a locally grounded environmental curriculum will aid their understanding of complex ecological issues and phenomena. What they learn in school they can bring home, helping to educate their parents.

Business is the life-blood of our society and is a powerful source of innovation, inspiration and communication. It has been proven time and time again, no entity moves faster than the free market. If we are to reach our target we will need to embrace the market's efficiency.

National trends show that the environmental conscience of the business community is broadening. This is apparent in the increase in Corporate Social Responsibility (CSR) reports and the more common partnerships among the public, private and non-profit sectors. The business community has helped shape the initiatives articulated in this document. There are

COMMUNITY AWARENESS AND PARTICIPATION

many programs and certifications currently available that can simultaneously increase profits and protect the environment. This information should be made widely available. Consumers must be armed with sufficient knowledge of green products and options to make changes in their purchasing habits.

At our public visioning session in April 2008, the citizens that the city government serves made it clear that government should set the example. Because government has such high visibility, actions that are implemented here have the possibility to ripple through all sectors of community life. Government and businesses must promote policies that support growth in ways that will conserve tomorrow's resources while building the local economy.

OBJECTIVE N. Increase and stress the importance of COMMUNITY AWARENESS and PARTICIPATION.

Potential Action N1: Create a Sustainability Office, with the Chattanooga Green Committee serving as a long-term advisory board.

Why? Making a commitment to become a more sustainable city is only the first step in a long process. Cities around the nation are establishing dedicated sustainability offices whose function is to implement various green initiatives and coordinate efforts between the public and private sectors. The Chattanooga Green Committee recommends such an office for this community. The Committee strongly urges staffing this office with at least two people: one focused on City operations and increasing business participation, and the other focused on community education.

How? Acquire approval for funding this office.

Potential Action N2: Develop an extensive environmental curriculum for use by churches, businesses, civic organizations, and local media.

Why? Community awareness and education is an important facet to becoming a more sustainable community. (See Figure 39) Information found in national media sources can be overwhelming and confusing for individuals or businesses wanting to purchase "green" products or initiate sustainable practices. A

COMMUNITY AWARENESS AND PARTICIPATION

well informed citizenry also supports better government policy.

How? Partner with organizations and businesses like green|spaces, the Tennessee River Gorge Trust, the EPB, Tennessee American Water Company and Chattanooga Gas Company to create campaigns focused on the initiatives in this Climate Action Plan. Design contests could be hosted by UTC, businesses or community organizations to generate ideas for annual environmental campaigns.

The following campaigns would be the most important to prioritize in the first year:

- Increase public awareness about easy solutions to improve home energy efficiency.
- Educate the general public and political leaders about the benefits of infill development and higher housing densities.
- Educate business and home owners about the benefits of reducing their use of outdoor lighting and using low energy indoor lighting fixtures.
- Focus on the relative costs and benefits of recycling.
- Educate about the local anti-idling ordinance.
- Develop a public relations and marketing campaign to teach gasoline savings.
- Increase public awareness of local and organic food sources.
- Adopt an education program to promote water conservation and efficiency in homes and businesses.
- Increase public awareness about the negative impacts of driving and sprawling development patterns.

Potential Action N3: Develop an information clearinghouse within the community that serves as a resource center for green program information.

Houston's Power to the People Campaign

On May 19, 2007, Houston, TX launched the city's Power to the People Campaign. The campaign was first envisioned and staffed by dedicated volunteers who went door-to-door handing out 10,000 compact fluorescent light bulbs and educating the community about home energy conservation. The program has since grown and now includes displays at retail locations and a website that offers efficiency tips, energy calculators and information on available incentives. Funding for the program comes from the City's general fund and corporate sponsorship from Walmart and CenterPoint, the local transmission company.

Houston also offers homeowners weatherization assistance through the Residential Energy Efficiency Program, or REEP. In the program's first year more than 600 homes were weatherized. This represented 44% of homes in a neighborhood that had one of the highest kWh per square foot ratios in the city.

(Source: http://www.usmayors.org/climateprotection/documents/2007bestpractices-mcps.pdf *and* http://www.houstonpowertopeople.com/)

COMMUNITY AWARENESS AND PARTICIPATION

FIGURE 39: COMMUNITY EDUCATION CURRICULUM			
Initiative	Estimated GHG Reduction (metric tons)	Estimated Cost	Estimated $ Savings
COMMUNITY EDUCATION EST. TOTALS*	49,500	$$$$	★★★★★

Curriculum Topic	Estimated GHG Reduction (metric tons)
ENERGY EFFICIENCY	39,676
WATER EFFICIENT SHOWER HEAD	2,919
ENERGY STAR COMPUTERS	1,694
ENERGY STAR REFRIGERATORS	1,386
IRRIGATION CONTROL SENSORS	888
ENERGY STAR PRINTERS	634
CFL DISTRIBUTION	526
WATER SAVING FAUCETS	519
HIGH EFFICIENCY TOILETS	450
ENERGY STAR DISHWASHERS	477
ENERGY STAR CLOTHES WASHER	331

** Note: These are not all of the possible options that could be included in a community education program.*

Why? *green|spaces* is a newly established resource center for green building practices and materials. The recommended Sustainability Office should also serve as a resource center for other aspects of "green" communities highlighted in this Climate Action Plan.

How? Work with the Chattanooga Times Free Press to create a quarterly "Green" newspaper insert. Develop displays in publicly accessible buildings, like the new Outdoor Chattanooga office in Coolidge Park. Create a website or handbook that offers advice to residents about green practices for the home and workplace.

BUSINESS PARTICIPATION

OBJECTIVE O. Increase and stress the importance of BUSINESS PARTICIPATION.

Potential Action O1: Provide local businesses with information about green practices and promote partnerships to effectively implement green initiatives.

Why? In an ideally-balanced community, economic success and environmental stewardship go hand in hand. The belief that profitable businesses and environmentally benign practices are mutually exclusive is no longer valid in today's economy. To be truly sustainable, business, industry and government must balance the interests of the economy, the environment and the community. Government and businesses must promote policies that support growth in ways that will conserve tomorrow's resources while building business.

How? Institute a program to promote energy efficiency in the business workplace, such as allowing "business casual" dress codes to reduce energy consumption from air conditioning. (See Figure 40) Expand an awards and recognition program for businesses. Work with the Chattanooga Area Convention and Visitors Bureau and local tourism and lodging destinations to create more sustainable tourism options. Provide information about economically successful and sustainable industry initiatives to the media and community leaders. Develop a Green Goals handbook for business owners. Create a speakers forum about sustainable industries.

"...finding (environmental) opportunities to cut costs, and reduce risk, drive revenue, and enhance intangible value...(builds) deeper connections with customers, employees and other stakeholders...reveal(ing) a new kind of sustained competitive advantage..."

- Daniel C. Esty and Andrew S. Winston, Green to Gold

Chattanooga Green Lodging

The Greater Chattanooga Lodging Association has endorsed the creation of a "Chattanooga Green Lodging Program." The voluntary, standards-based certification reflects the best ideas from three leading programs in the hospitality sector — Green Seal, Florida's Green Palm and Virginia's Green Lodging programs. Hotel ratings will feature progressive levels of environmental performance and attainment. The addition of some unique local assets will continue to define Chattanooga as a pioneering city and add to the draw for convention attendees and savvy tourist groups, many of who are making travel decisions based on these performance criteria. Appropriately, Tom Cupo, General Manager of the city-owned Chattanoogan Hotel and Conference Center, is the leading advocate and will chair the new committee, with full support from the Convention and Visitors Bureau.

FIGURE 40: BUSINESS PARTICIPATION

Initiative	Estimated GHG Reduction (metric tons)	Estimated Cost	Estimated $ Savings
ENERGY EFFICIENCY EDUCATION TARGETED AT BUSINESSES	12,163	$$$	★★★
GREEN BUSINESS PILOT PROGRAM	1,232	$	★

GOVERNMENT POLICY AND PURCHASING

Carbon Trading

Local government and businesses anticipate new federal policy changes in 2009 that may move the country toward a mandatory "cap and trade" regulatory system in which carbon reduction credits from an established baseline are calculated, verified and given an economic value. However, even under the existing voluntary markets for trading of these credits, other local governments are successfully harvesting the economic benefits of energy efficiency, carbon reduction and sequestration measures taken since 1999.

Nearby Catoosa County in North Georgia demonstrates convincingly that the use of methane gas (a particularly potent greenhouse gas) from a county landfill can generate an appreciable economic return to local government, offsetting fixed costs. In the case of Hamilton County, landfill methane gas could be captured for industrial energy generation, banked as an offset for unavoidable carbon emissions or sold on the Chicago Climate Exchange.

OBJECTIVE P: Set the standard and provide leadership in sustainable GOVERNMENT POLICY and PURCHASING programs.

Potential Action P1: Adopt green policies for government buildings, products purchased and employee programs.

Why? In America today, buildings consume more than 70% of our electricity. They emit nearly 40% of our CO_2 and more than 30% of greenhouse gases. Building new and retrofitting old buildings to be more energy efficient is the first step in reducing these numbers and meeting our goals for greenhouse gas reduction.

How? Build all City facilities to green standards, such as LEED. Leading by example, institute a program to promote energy efficiency in the City Government workplace, such as allowing "business casual" dress codes to reduce energy consumption from air conditioning. Adopt a City of Chattanooga green purchasing program. (See Figure 41) Government is a major purchaser and consumer, and thus has the potential to influence the local market in a significantly 'greener' way. Support the creation of continuing education and credits for city professionals to learn about sustainable practices.

Potential Action P2: Create an 'Alliance for Growth' with the surrounding counties to network for combined brainstorming and problem solving.

Why? According to the Energy Information Administration, transportation accounts for 1/3 of CO_2 emissions. Less dense and single use suburbs require residents to travel further to get to places of work, recreation, commerce and worship, thus increasing CO_2 emissions. Strategic planning for the future to incorporate compact, walkable, mixed use neighborhoods and more options for transportation can help us decrease our carbon footprint.

How? Initiate a regional planning effort. Work with green|spaces, the Ochs Center, and other organizations to bring speakers and smart growth experts into town as resources.

Potential Action P3: Explore the potential of carbon cap and credit trading for the City.

GOVERNMENT POLICY AND PURCHASING

Why? The new Presidential Administration has stated that they support enacting a mandatory cap and trade system for carbon. Being ahead of the trend will set Chattanooga up to be a leader in the region for this requirement.

How? Continue to work with local consultants to establish metrics and mechanisms to break into the cap and trade business, starting with the methane capture at the local landfill. Local public works officials and major industries should acquire a deeper understanding and expertise in this rapidly evolving field of carbon trading.

Potential Action P4: Create job functions within the various departments of City government to accomplish initiatives contained within this Climate Action Plan.

Why? Several of the recommendations in this report will struggle if they do not have the proper staff support in the appropriate departments.

How? As initiatives are selected, work with the various City departments to establish job descriptions that take into account the various recommended initiatives.

FIGURE 41: GOVERNMENT PURCHASING PROGRAM - ENERGY STAR

Estimated GHG Reduction (metric tons)	Estimated Cost	Estimated $ Savings	
252	$	★★★	

SCHOOLS

"Education is the most powerful weapon which you can use to change the world."

- Nelson Mandela

OBJECTIVE Q. Stress the importance of dynamic environmental education in SCHOOLS.

Potential Action Q1: Support the development of an extensive environmental curriculum and use in schools.

Why? Becoming a sustainable region requires the involvement of the younger generations in dynamic and meaningful ways. Providing them with the knowledge and tools for sustainable practices will help ensure a healthy future for this region.

How? Work with the Hamilton County Department of Education to create a primary school curriculum. Identify local High Schools to cooperate in the creation of environmental education programs for the secondary schools. Work with "Environmental Education in Tennessee" to create a Chattanooga Green School Program, which includes measurement tools to gauge success. Work with local universities and colleges to create a curriculum in sustainable living, as well as adult education, with partnerships for demonstration projects and podcasts.

Potential Action Q2: Create a physical and tactile demonstration experience for elementary and middle-school-aged children at a central, and preferably, free-access location.

Why? Children are more likely to seek out learning experiences that are fun and interesting. They are also more likely to retain knowledge gained through visual means and hands-on activities rather than through more traditional methods.

How? Work with the local library, malls, and the Creative Discovery Museum to establish learning models that demonstrate the advantages of green living. Provide assistance for each organization, but ensure that each is responsible for the maintenance and provision of that display or interactive tool. Provide incentives such as cooperative marketing to participating organizations.

PRIORITIES

As with any Plan, the proof of its success is in its implementation. Chattanooga citizens provided input that helped formulate a collective vision for a "green" Chattanooga. This document identifies some steps to help us achieve our sustainability goals. Now we must go about turning those goals into reality.

We won't be able to accomplish everything at once. Elected officials and private sector partners will have to establish priorities. Funding will need to be secured for many initiatives. Community volunteers, local businesses and industry, schools, and other civic organizations will need to be engaged. Further research will be needed in some areas. The Implementation Matrix in the Appendices provides a summary of all the recommendations contained in this Climate Action Plan and identifies potential partners and a general timeframe for carrying out each action. Additionally, estimates of the potential greenhouse gas reductions, cost ranges, and savings associated with various actions are included throughout this document.

Of the 47 specific actions recommended in this document, no one item stands out as more important than another since all are linked to achieving the desired end goal of reduced greenhouse gas emissions and a more sustainable community. The 14 member Chattanooga Green Committee does, however, recommend some key steps be taken to ensure the implementation of this Climate Action Plan.

The committee strongly believes in a necessary First Step:
Establishing and staffing an Office of Sustainability that reports directly to the Mayor and City Council. The Office should be accessibie to the public, as its community education role will be a constant.

"Due to the effects of climate change, it is predicted that increasing populations in urban areas will place additional burdens on the social and environmental aspects of the planet, specifically impacting, among other things, energy demand and available supplies of clean water and food."

- Petra Tschakert et al., Global Environmental Change, 2008

PRIORITIES

Other priorities should fall into place as follows:

Second Step: Determine those short-term Action Items that can be accomplished within six to twelve months, providing an early demonstration of traction and boosting community confidence in the longer-term tasks ahead.

Third Step: Prioritize Action Items that involve measurable opportunities for significant carbon reduction. These are the larger-scale projects that will require sustained commitments of time and effort, but the "yield" is high.

Fourth Step: Identify opportunities for working partnerships and funding. Within Chattanooga, this would include the 500 citizens who contributed ideas to the visioning process, city departments, local businesses, universities, utilities, and others. External partners would include like-minded "Climate Communities," as well as organizations and state and federal agencies that offer grant programs.

The Green Committee anticipates that its new role will be one of advising the new Office of Sustainability and local government officials in crafting the most advantageous strategy for enacting the Action Items.

The Green Committee further understands that each Action Item must ultimately be weighed and judged on its own merits, and will be acted upon as funding and staff time are available. Improved understanding about greenhouse gases will be acquired, new national policies on carbon reduction will emerge, and external circumstances will continue to change. Yet we have confidence in the ability of the Chattanooga community to adapt, to evolve with those changes and to lead.

chattanooga green

SUSTAINABILITY OFFICE

As the Chattanooga Green Committee considered many potential actions that could make Chattanooga a more "green" city, one recommendation rose to the top of the list. The Committee recognized the need to establish a permanent entity within City government with the primary responsibility of carrying out the other recommendations of the Climate Action Plan. Someone needs to wake up every morning and go about the task of implementing the plan. Establishing a Sustainability Office would signal the City's commitment to sustainability and serve as a model and catalyst for other public and private entities.
The primary responsibilities of this new office would be to:

Coordinate implementation of the Climate Action Plan.

Partner with local business and industry.

Develop a public education campaign.

Coordinate green initiatives within City government.

To accomplish these tasks, the Sustainability Office must foster relationships with other governments at local, state, regional and national levels. All of the tasks described in this Next Steps section can be coordinated by such an office. It can conduct ongoing research into best sustainability practices and promote those practices within local government and the private sector. It can monitor the community's progress in reducing greenhouse gas emissions through use of the CACP and CAPPA software and provide regular updates for local elected officials.

While establishing a new City initiative is difficult during times of tight municipal budgets, the Sustainability Office should be seen as an investment in our city's future. As with other sustainability offices being established across the country, the salaries and operating expenses can be offset with the energy savings and cost reductions resulting from green initiatives.

The staff of this Sustainability Office should report directly to the Mayor and City Council, working closely with all City departments. The Sustainability Office should have a high profile location with good public access and should provide a welcoming environment for the general public. A ground floor storefront, such as the current Outdoor Chattanooga office in the Development Resource Center, would be an excellent location.

ADDITIONAL RESEARCH AND MONITORING

The Chattanooga Green Committee has worked diligently over the past year to create a robust and valuable document. The Committee has researched the best practices of other communities, become familiar with valuable tools, involved Chattanooga's citizens and solicited the expertise of local, regional and national subject matter experts. However, there is plenty of work that remains to be done. A city does not meet its GHG reduction goals and develop a sustainable future through a single report alone. The need for additional research will be ever present, particularly within the context of the goals expressed in this Climate Action Plan.

SUSTAINABILITY INDICATORS

Indicators are quantifiable values that help a community determine where it currently is, where it is going, and monitor progress towards the defined goals. There are several hundred types of indicators available for use and many organizations - from the EPA to privately funded organizations - support the use of indicators. Indicators are available on various scales, from neighborhoods to governments, and should be customized to fit the needs and desires of all stakeholders.

Possible sustainability indictors include:

Amount of waste generated within a community.

Amount of renewable energy consumed.

Amount of green space protected.

Indicators must be developed with the needs of the community in mind. They are only valuable if they are monitored over time. It will be important to partner with other organizations to develop a comprehensive set of indicators. The Chattanooga-based Ochs Center for Metropolitan Studies has begun research on indicators and that organization's expertise will be a valuable resource in monitoring Chattanooga's path towards sustainability.

FUTURE GHG MONITORING

It will be important for GHGs to be monitored over time as the recommendations in this document are implemented. Depending on available resources, it would be ideal to recalculate the city's footprint annually. Continuing to forge strong relationships with utilities and other organizations who will

ADDITIONAL RESEARCH AND MONITORING

supply pertinent data will be important to streamlining the process. Additionally, thorough documentation of methods, sources and assumptions will be necessary. Fortunately, as software and methods become more universal, this difficult process will become easier over time.

In addition to periodically monitoring changes in the City's carbon footprint, it will also be necessary to calculate the GHG reduction potential of action items that could not be calculated for this report. This can be done as more potential initiatives are added to ICLEI's CAPPA software.

Finally, it will also be important to monitor how accurate GHG reduction estimates in this document prove to be over time. As mentioned before, Chattanooga has forged new ground in its attempt to estimate how much GHGs may be reduced through actions recommended in this document. As actions are implemented, pertinent information will need to be collected so the accuracy of estimations can be verified. This will not only assess Chattanooga's progress, but will also help other communities and organizations develop climate action plans with the best available data possible. This type of informational partnership will be important in forging a sustainable future for all cities.

REGIONAL CHANGES DUE TO CLIMATE CHANGE

Environmental changes associated with rapid variations in climate temperatures are anticipated to increase. These changes vary greatly depending on region. It is anticipated that some areas will receive increased rainfall while others will experience severe drought. Coastal communities may experience increased flooding due to a rise in sea levels. Climate changes may adversely affect land fertility and the crop yields that farming communities are reliant upon. Each community will be affected by climate change in different ways. It will become important to reasonably anticipate what climate change means to Chattanooga's environment and the local economy. Will climate change increase regional temperatures to unhealthy levels? Will this lead to unhealthy air quality? Will the renowned biodiversity of the region be impacted as environmental conditions reduce the livability of the region? Will water shortages begin to plague Chattanooga as they have some of our neighbors? Will residents be burdened with increased costs associated with home heating and cooling needs? Currently the effects that climate change will bring to the region are speculative. However, the region is blessed with an intelligent community of individuals interested in the science of climate change. It will be important to tap these minds, and the minds of others outside the region that have developed regional change assessment, to clearly determine what climate change means to the region. This will become especially important if the need to adapt to climate change becomes more pressing than the attempt to mitigate it.

SURVEYING THE PUBLIC

On April 24, 2008, nearly 500 residents joined the Chattanooga Green Committee to voice their concern for Chattanooga's environment and hope for the future. It is important that the public continue to be involved in the development of a sustainable city. Future public meetings and surveys can help gauge the public's needs. New information technologies, such as interactive websites and social networks, are valuable tools that can be utilized. In addition to helping the community voice their concerns and hopes, these technologies will also help to engage the community in important initiatives.

FUNDING AND PARTNERS

Implementing and managing Chattanooga's Climate Action Plan should be a high City priority in the coming years. Balancing environmental integrity with economic prosperity and social vibrancy will certainly keep Chattanooga at the top of the list of best cities in America.

Comments and inquiries about this Climate Action Plan should be directed to: http://www.chattanooga.gov/chattanoogagreen.

While many of the objectives and action items presented in this document will save Chattanooga and its residents money over time, many have an initial implementation cost. Fortunately, funding for GHG reduction and sustainability programs is growing as these issues gain public support. For example, although the Energy Independence and Security Act of 2007 authorized $2 billion annually for the Energy Efficiency and Conservation Block Grant (EECBG), funds for this program have yet to be appropriated. Support for appropriation has been growing within all levels of government and signs point to support from the upcoming Obama administration.

The story of the EECBG highlights an important point. Research into funding opportunities and grant-writing will be necessary to ensure adequate funding for Chattanooga initiatives. Partnerships will also need to be established to implement many of the actions recommended in this Climate Action Plan. Government can not be expected to go it alone. Public/private partnerships will be necessary. Fortunately, the Chattanooga community has an excellent track record of just such partnerships.

REGIONAL COOPERATION

On October 14, 2008, Governor Phil Bredesen hosted the first ever Governor's Summit on Clean Energy. At this meeting the Chattanooga Green Committee sponsored a break out session with other Tennessee signatories of the Mayors Climate Protection Agreement and ICLEI. A regional representative from ICLEI was also in attendance. This was the first time that participating Tennessee communities were invited to sit together to discuss efforts related to GHG reduction and sustainability. The meeting proved to be particularly successful for all participants. Regardless of each community's current stage of planning there was valuable information available.

Conducting future regional meetings will be extremely important to all community efforts to reduce GHGs and achieve a pattern of sustainable growth throughout the state. It will be paramount to develop supporting relationships with other local communities with similar goals. Ongoing meetings with other communities will help forge these important relationships.

APPENDICES

Public Input Results - Appendix A.

Implementation Matrix - Appendix B.

Holistic Matrix - Appendix C.

Subject Matter Experts - Appendix D.

On-going Accomplishments - Appendix E.

Addtional Resources and Partners - Appendix F.

Glossary of Terms - Appendix G.

Suggested Reading - Appendix H.

PUBLIC INPUT RESULTS

Total Quality Points determined by weighting the top responses.
A #1 table rank = 3 points, a #2 table rank = 2 points and a #3 table rank = 1 point.

Overall Topic Rank	Total Topic Quality Points	Topic
1	**86**	**Recycling & Waste**
Weighted Points	Original Public Ranking	**Public Suggestion**
3	1	Door to door recycle program that actually works
3	1	Charge for the amount (per pound) of garbage used. "Pay as you throw." Penalty for those who use more
3	1	Bring back curbside recycling
3	1	Fully supported City recycling program. Education and leadership by the City are key.
3	1	Curbside recycling citywide; public common area recycling hubs.
3	1	More recycling center - in every community (apartments, office parks, schools)
3	1	Recycle: 1) Drop off locations at grocery stores for convenience, 2) Pay to throw away. Weight, whatever - trash, 3) Sign-up and pay for Recycle Service, 4) More regular curbside pick-up, 5) Business' recycle - specifically downtown restaurants (bottles, cans)
3	1	Recycling trucks come every week like garbage trucks
3	1	Recycle stations at grocery stores (access 24/7) instead of where located now
3	1	Would like weekly recycling back.
3	1	Would like a bin system for recycling collection.
3	1	Reinstate weekly recycling.
3	1	Curbside recycle - make it more frequent and figure out an easier calendar to follow
3	1	Get rid of phone books (use internet), plastic bottles, etc. and statewide Bottle Bill (Eco Legislation)
3	1	Mandatory separation of recyclables; weekly pickup

PUBLIC INPUT RESULTS

3	1	Mandatory recycling - if you receive City garbage services - you must recycle
3	1	Recycle - re-use fiberfill; fabrics; dog toys; try to use everything
3	1	Prohibit plastic shopping bags.
2	2	Recycling for restaurants/bars -- specifically glass -- also paper for businesses and cleaning for businesses and city facilities.
2	2	Mandatory curbside recycling.
2	2	Make Chattanooga a zero waste city (homes and outdoor events - including Riverbend)
2	2	"Pay as you throw" garbage policies -- require monthly/annual payment for different volumes of trash per household/business to incentivize recycling
2	2	Mining landfills.
2	2	Mandatory recycling, including mining landfills
2	2	Make recycling easier.
2	2	City buildings and businesses should recycle.
2	2	Reinstate weekly curbside recycling
2	2	Recycle plastic 1 - 7 levels
2	2	Weekly curbside recycling
2	2	Make recycling more convenient. Put drop-off centers at grocery stores, other central spots in neighborhoods.
1	3	Public hospitals set up recycle stations next to trash cans throughout public areas, then cooperate with public schools to pick up and sell cans and other materials to assist with funding.
1	3	Make recycling more robust: (1) in public buildings and parks; (2) hazardous waste recycling to include CFL's; (3) pickup reinvigorated; (4) tax trash and make recycling free.
1	3	Provide recycling bins and pick up weekly.
1	3	Free and timely recycling. Pick up on a weekly basis and provide bins.
1	3	Weekly curbside pickup
1	3	Separate food waste for composting, restaurants and schools
1	3	Recycling program on a weekly basis (profitable recycling program).
1	3	Recycle construction waste.

PUBLIC INPUT RESULTS

Overall Topic Rank	Total Topic Quality Points	Topic
2	76	Transportation
Weighted Points	Original Public Ranking	Public Suggestion
3	1	Privately-funded alternative transportation pilot projects (e.g. work with US Express on alternative fuels - testing)
3	1	More sidewalks -- not just for walking but also for easier/safer access to mass transportation.
3	1	Improve transportation infrastructure; provide more public transportation options; and improve the ability to commute via bicycle (bike paths).
3	1	Public transportation with partnering cities
3	1	Promote and develop alternative transportation resources (bike paths, sidewalks, greenways).
3	1	Light rail system for commuters
3	1	20-year moratorium on all road expansion.
3	1	Improve public transportation: (1) look (aesthetic appeal); (2) access (especially mountains).
3	1	Eliminate road widening efforts.
3	1	Safe way for bikers/walkers to get from Southside to Northside - get across the city
3	1	Car free zone in part of downtown - permanent market / pedestrian plaza
3	1	CARTA buses can use leftover grease from restaurants for fuel.
2	2	Make CARTA 100% alternative / green fuels.
2	2	Institute a smart meter policy for electricity use.
2	2	Waive parking fees for hybrid / alternative fuel vehicles
2	2	More pedestrian friendly sidewalks
2	2	Convert buses to B20 diesel.
2	2	Provide parking spaces where electric cars can plug in (green powered)
2	2	Rail System! Chattanooga is known for its trains - we already have the infrastructure - let's use it! Electric train / rail system creates jobs, etc.

2	2	Improve bus transportation in all neighborhoods - more routes, more frequency, more access
2	2	Increase sidewalks throughout the city
2	2	Better use of public transportation. Have parking lots where people can park and ride. Have "bus lanes."
2	2	Increase access to public transportation -- provide more routes, larger coverage area, more sheltered stops park and ride, variety of bus sizes to fit need (small, medium and large).
2	2	Promote better bicycling routes: safety issue and to make cycling more appealing
2	2	Double public transportation in the next 10 years.
2	2	Mass transit express system for communities like Soddy Daisy and Cleveland.
2	2	Incorporate light rail transit into and out of city.
2	2	Sidewalks and bike lanes in every neighborhood especially to connect to arteries. All arteries should have broad sidewalks to encourage pedestrians and bicycles.
1	3	Improve alternate travel; more facilities; dedicated bike lanes, more bike racks
1	3	Utilize more hybrid utility trucks.
1	3	Open the Riverwalk 24 hours
1	3	Incentivize public transit
1	3	Support mag lev train
1	3	Better funding so CARTA can better serve.
1	3	Expand Electric Shuttle.
1	3	More access to public transportation in and out of the city for commuters from Cleveland, Soddy, Dayton, etc.
Overall Topic Rank	Total Topic Quality Points	**Topic**
3	**24**	**Green Buildings**

PUBLIC INPUT RESULTS

Weighted Points	Original Public Ranking	Public Suggestion
3	1	Change building to make it green; create our own.
3	1	Require all new industrial development to use green construction practices and be sustainable.
3	1	Tax incentives for "green" building for builders and individuals.
2	2	Income tax / property tax breaks for greening of personal homes
2	2	Provide tax incentives for LEED certified projects.
2	2	Requiring LEED certification for everything that is built (or comparable certification).
2	2	"Green" building codes.
2	2	Promote more "green roof" in commercial establishments
1	3	Green roof program
1	3	Develop a variety of incentives for green building.
1	3	Promote use of Siberian Larch wood products.
1	3	All public buildings shall be green (City policy)
1	3	Look for government buildings to create green roofs
Overall Topic Rank	Total Topic Quality Points	Topic
4	**23**	**Community Awareness & Participation**
Weighted Points	Original Public Ranking	Public Suggestion
3	1	More local advertising on TV and radio to promote mass transit, green living, and overall environmental education, outreach, and incentives
3	1	Better market and advertising for public about recycling in Chattanooga
3	1	Education on greening in newspapers, radio, TV, and media outliets

PUBLIC INPUT RESULTS

3	1	Education of green tips: newspaper, radio, TV, media outlets
3	1	Education for cyclist and motorist through a billboard signage campaign
2	2	Public service announcements can be used as free advertising to educate the public on steps they can take (change light bulbs . .)
2	2	Develop "immediate result options" (i.e., no travel day, mass transit days, changing out light bulbs, waterless/low flow urinals/showers).
2	2	Ongoing education for the general public with media partners
2	2	Public education - little things make a big difference; stay in shower less; light bulb change; raise awareness
1	3	Have speakers bureau speak to clubs, groups, churches, etc.
1	3	Public displays (signage) of City's environmental values - encourage resident and tourist participation
1	3	State and County need to FUND outdoor and environmental education.
Overall Topic Rank	Total Topic Quality Points	**Topic**
5	**21**	**Government Policy & Purchasing**
Weighted Points	Original Public Ranking	**Public Suggestion**
3	1	City of Chattanooga should take a leadership role and budget resources for Green initiatives
3	1	City should use "green" cleaning supplies by putting their "money where mouth is", lead by example
2	2	Create a Sustainability Office/City Department to oversee: (1) green building codes; (2) development of public transport; (3) support of local food shed by city and county organizations; (4) conservation and natural resources; (5) publicizing/education.
2	2	Require government offices to use environmentally friendly products i.e. bamboo, cleaning, paper

PUBLIC INPUT RESULTS

2	2	See people who talk about the environment (like the Green Committee) pick up trash, clean up the city. (Those who are knowledgeable should visibly demonstrate what needs to be done; set an example.)
2	2	Institute a smart meter policy for electricity use.
1	3	Publicly fund a bicycle coordinator: Publicly fund a bicycle Plan
1	3	Establish MUCH higher goals for C02 reduction and ANY environmental goal! 7% below is not sufficient; make it 50% or HIGHER
1	3	Look for government buildings to create green roofs
1	3	Adopt policy to discourage development of steep slopes and floodplains to discourage cutting trees on slopes in floodplains and on developing properties.
1	3	Look at best practices in other cities -- see what is working and can be replicated here.
1	3	Institute a "Cool Biz" policy (82 degrees in all buildings in the summer - with reasonable dress codes)
1	3	All public buildings shall be green (City policy)
Overall Topic Rank	Total Topic Quality Points	**Topic**
6	**20**	**Schools**
Weighted Points	Original Public Ranking	**Public Suggestion**
3	1	Educate us! Young people in elementary, middle and high school. It's our future.
3	1	Establish curriculum in the schools so children can learn about the environment and how to protect it.
3	1	Elementary to college education of recycling and green life style, nutrition, healthy/wellness, active lifestyle
2	2	Educate the kids - through schools and partners like the Tennessee Aquarium to be good environmental stewards and influence their parents.

2	2	More environmental education in high school, middle school, and elementary school; specifically Calvin Donaldson Elementary as an environmental science magnet school, as a way to empower the community
2	2	Schools should focus on teaching younger kids (beginning in kindergarten) about the environment, as part of the curriculum, along with math and language; include a class on gardening.
2	2	Eco fundraisers for schools (no more magazines and contests) Have eco contests for students! (Get ideas)
1	3	Increase environmental education throughout school system, public parks.
1	3	Develop alternative energy and "green jobs" programs at high school and college level.
1	3	Every school should have a garden, use as corrective behavior and also yearly/biyearly to the dump to see waste
Overall Topic Rank	Total Topic Quality Points	**Topic**
TIE 7	**15**	**Energy Conservation**
Weighted Points	Original Public Ranking	**Public Suggestion**
3	1	Institute local energy codes and ENFORCE THEM!
2	2	Develop alternative building codes to rehab older buildings more feasible; stagger schedule for meeting building code; keeping older buildings in long run is good preservation; energy and recycling (Knoxville example; New jersey section for adaptive reuse, flexible building code)
2	2	Provide incentives to reduce energy use in both new construction and existing buildings
2	2	Light bulb exchange program
2	2	Tax credits for commercial energy efficiency upgrades.
2	2	City to lobby state for a tax-free day for energy efficient product purchases -- in conjunction with Earth Day.

PUBLIC INPUT RESULTS

1	3	Change building codes to require energy efficiency in all new infill construction. The City and County should lead the way.
1	3	(1) Convert gas residential lamp posts to solar; (2) replace mercury vapor/sodium with LED; (3) Require green roofs on all commercial buildings; (4) Establish a marquee project that becomes the "signature" of the Chattanooga Green Movement.
Overall Topic Rank	Total Topic Quality Points	**Topic**
TIE 7	**15**	**Water Quality & Quantity**
Weighted Points	Original Public Ranking	**Public Suggestion**
3	1	Educate to conserve water with gardening; landscaping (xeriscape); use native plants and drought tolerant
3	1	Individuals should harvest rainwater, etc.
3	1	Copy Seattle stormwater runoff concept (permeable pavement, treat at source)
3	1	No more stormwater management ponds.
1	3	More restriction on building on slopes
1	3	Pass laws to stop building and development in floodplains and riparian zones
1	3	Change Building Codes / train officials; Update codes to be specific to making Chattanooga Green. Plumbing, building, etc. (i.e. to allow rainwater to be used to flush toilets); Train and educate our codes officials!
Overall Topic Rank	Total Topic Quality Points	**Topic**
TIE 7	**15**	**Green Infrastructure**

PUBLIC INPUT RESULTS

Weighted Points	Original Public Ranking	Public Suggestion
3	1	Increase the number of greenways to connect all neighborhoods in the city.
3	1	Cajole and restrict development to achieve significantly higher green space/bio-mass to concrete/asphalt ratio
3	1	The city should acquire Stringer's Ridge and then turn it into a park.
3	1	Implement the Greenbelt Master Plan that has already been developed.
2	2	Lower or no property taxed for land acquisition only -- preserve, not develop; create more open spaces, instead of chicken houses.
1	3	Utilize power line easements for greenways ("Power Walk")
Overall Topic Rank	**Total Topic Quality Points**	**Topic**
8	**14**	**Built Environment & Smart Growth**
Weighted Points	Original Public Ranking	Public Suggestion
3	1	Change building and zoning codes to allow for uses in close proximity to each other; Physical design has to be appropriate; walkable; sustainable neighborhoods; private partnerships
3	1	Smart growth approach to local zoning.
3	1	Give developers incentives in zoning - reduce carbon footprint and they can build higher or denser - or brownfields
2	2	Institute urban growth boundary.
1	3	Clean up foundry sites at Moccasin Bend, US Pipe/Wheland Foundry. It is the front door to our city.
1	3	Work with city ordinances to promote green development
1	3	Connect all residential areas to food, stores, daily needs, by sidewalks and bike paths.

PUBLIC INPUT RESULTS

Overall Topic Rank	Total Topic Quality Points	Topic
9	10	Food & Agriculture
Weighted Points	Original Public Ranking	Public Suggestion
3	1	Encourage local / organic food sources that are affordable. Local Farmers Markets, small/community gardens.
2	2	Community farms - allocate City land to shared garden space
2	2	More urban food production, gardening program, composting, etc. (vacant lots)
1	3	Promote local farms
1	3	Stronger system of local food production
1	3	Local farmers market = daily market for commercial and public use and local neighborhood public gardens.
Overall Topic Rank	Total Topic Quality Points	Topic
10	9	Alternative Energy Sources
Weighted Points	Original Public Ranking	Public Suggestion
2	2	Use solar hot water collectors and photo voltaic panels on all Chattanooga city owned roof tops, as practical.
2	2	Provide subsidies for alternative energy and/or tax incentives (businesses and individuals).
2	2	Use throw away items and recycle into renewable energy (i.e. cooking oil, bottles)
1	3	Tax incentives for alternative energy (solar and wind) for new buildings and retrofits.
1	3	All buildings have solar panels.

1	3	Provide city/state tax rebates/programs for homeowners using solar or other energy efficiencies.
Overall Topic Rank	Total Topic Quality Points	**Topic**
11	**8**	**Urban & Regional Forests**
Weighted Points	Original Public Ranking	**Public Suggestion**
3	1	Adopt "steep slope" ordinance that will maintain the trees on slopes. *For single-family residences. Also include "view shed" and "stormwater run-off"
2	2	When designing buildings use existing trees -- (no clear cutting) -- no slash and burn -- don't cut down wind breaks. Be aware of the environment -- as little destruction as possible.
1	3	Require a minimum standard of old/mature trees to remain on properties being newly developed.
1	3	Offer incentives to owners of big box stores to give up parking areas for trees
1	3	Adopt policy to discourage development of steep slopes and floodplains to discourage cutting trees on slopes in floodplains and on developing properties.
Overall Topic Rank	Total Topic Quality Points	**Topic**
12	**7**	**Business Participation**
Weighted Points	Original Public Ranking	**Public Suggestion**
3	1	Make Chattanooga a green jobs training leader in the Southeast.
3	1	Put together a fun business challenge i.e. business have carbon footprint challenge: bike, turn off lights, what you can do at home, at work - Green Business Award
1	3	Institute a "Cool Biz" policy (82 degrees in all buildings in the summer - with reasonable dress codes)

PUBLIC INPUT RESULTS

Overall Topic Rank	Total Topic Quality Points	Topic
13	5	Air Quality
Weighted Points	Original Public Ranking	Public Suggestion
3	1	Utilize "Ethos" to reduce emissions (by 30%), increase mileage and lower maintenance for Chattanooga vehicles.
2	2	Use of engine brakes on commercial trucks in city. Bar jake brakes.
Overall Topic Rank	Total Topic Quality Points	Topic
14	4	Biodiversity
Weighted Points	Original Public Ranking	Public Suggestion
2	2	Require xeriscaping on all new building projects and encourage it for landscape renovation projects.
2	2	Consider impact on wildlife from windmills, especially bats
Overall Topic Rank	Total Topic Quality Points	Topic
15	1	Sustainable Industry
Weighted Points	Original Public Ranking	Public Suggestion
1	3	Attract more alternative green businesses (e.g. and Amory Lovins type car)

PUBLIC INPUT RESULTS

Citizen input gathered from the 500 participants at the April 2008 Chattanooga Green meeting provided the basis for most of the recommendations contained in this Climate Action Plan.

IMPLEMENTATION MATRIX

OBJECTIVES / POTENTIAL ACTIONS		LEAD AGENCY	PARTNERS *	TIMEFRAME		
		* A list of abbreviations used can be found at the end of this Implementation Matrix.		SHORT	MID	LONG
ENERGY EFFICIENCY						
Objective A. Increase the use of ALTERNATIVE ENERGY SOURCES.						
A1. Increase the community's use of renewable energy sources.						
How?	Purchase green power for City government operations.	Mayor's Office	Sustainability Office, EPB, TVA	✓	✓	✓
	Encourage individuals to purchase green power for their residences.	Sustainability Office	EPB	✓	✓	
	Encourage commercial businesses to purchases green power.	Sustainabiity Office	EPB	✓	✓	
	Encourage industrial businesses to purchases green power.	Sustainability Office	EPB	✓	✓	
	Identify City buildings that can be retrofitted with photovoltaic (PV) solar panels.	Sustainability Office	Big Frog Mountain, EPB, TVA	✓		
	Identify & secure federal and state grants that will help offset the cost of the installation of diverse alternative energy sources for government buildings.	Sustainability Office	Chattanooga General Services Dept	✓	✓	
A2. Become a TVA Green Power partner by generating energy that can be bought back by TVA.						
How?	Install solar panels, wind-turbines and methane gas sequestration devices on government buildings and property.	Sustainability Office	TVA, EPB General Services		✓	✓
A3. Encourage individuals and businesses to produce their own clean energy sources.						
How?	Create financial incentives for the purchase of solar panels.	Mayor's Office, Council	Sustainability Office, TVA, EPB, Lyndhurst Fdn, Green Spaces		✓	
Objective B. Increase ENERGY CONSERVATION.						
B1. Reduce energy use per capita, engaging water, gas, and electric utilities.						
How?	Create an incentive program to make existing buildings more energy efficient and less consumptive, beginning with energy audits.	Sustainability Office	AIA-COTE, ASHRAE, EPB, TVA, USGBC, GreenSpaces, Lyndhurst Fdn, Chattanooga Gas, TAWC	✓	✓	✓
	Create a program to provide free or reduced-cost home energy efficiency upgrades for eligible families.	Chattanooga Neighborhood Services Dept, Sustainability office	Lyndhurst Fdn, GreenSpaces, Benwood Fdn, CHA, EPB, TVA, IPL, local churches, local home improvement stores, City Human Services Dept	✓	✓	✓
B2. Reduce energy and monetary waste from lighting.						

IMPLEMENTATION MATRIX

OBJECTIVES / POTENTIAL ACTIONS		LEAD AGENCY	PARTNERS *	TIMEFRAME		
				SHORT	MID	LONG
How?	Reduce hours that streetlights are on each day, balancing safety with environmental impacts.	City Engineer	EPB	✓	✓	
	Switch to LED or other low energy streetlighting fixtures for city operated lighting	City Engineer	EPB		✓	✓
Objective C. Increase GREEN BUILDING practices.						
C1. Lead by example by making a City commitment to upgrade and build LEED certified and energy-efficient buildings.						
How?	Perform energy audits on all existing City buildings.	EPB	Sustainability Office, General Services	✓		
	Prioritize energy efficiency/green building upgrades for City buildings. (Possible candidates include: Development Resource Center, Tivoli Theater, Memorial Auditorium, City Hall and City Hall Annex).	Sustinability Office	EPB, General Services	✓	✓	✓
C2. Make sustainable building practices mainstream and increase the number of green buildings in Chattanooga.						
How?	Promote and enforce existing energy code standards.	LDO	AIA-COTE, USGBC, AGC, Mayor's office, ASHRAE	✓	✓	✓
	Continue to evaluate and update our building and energy codes to reflect the changing national standards.	LDO	Sustainability Office, AIA-COTE, USGBC, AGC	✓	✓	✓
	Offer incentives, such as streamlined permitting for LEED buildings to facilitate the development approval process.	Chattanooga Public Works Dept	Sustainability office, AIA-COTE, USGBC, AGC, Home Builders, GreenSpaces	✓	✓	
	Research and publicize residential and commercial financial incentives and grants for green buildings and energy efficiency.	Sustainability Office	GreenSpaces, USGBC, Home Builders	✓		
	Develop incentives, using researched and secured grants and financial support, for green building projects within the City limits.	Sustainability Office	AGC, Home Builders, Lyndhurst, Benwood		✓	
	Consider requiring green building practices in certain situations.	LDO	USGBC, Home Builders	✓	✓	
	Develop and adopt a green building rating system similar to LEED, but specific to Chattanooga, that goes above and beyond standard design and construction.	USGBC	Sustainability Office, AIA-COTE, Home Builders	✓	✓	
Objective D. Increase RECYCLING and reduce WASTE.						
D1. Develop recycling options for older televisions before the "Switch to Digital" in February, 2009.						
How?	Identify incentives that are cost-neutral to taxpayers.	Public Works	Orange Grove, Sustainability Office, Recycle Right	✓		
D2. Reduce the amount of waste per capita going to landfills.						
How?	Improve recycling participation community-wide.	Public Works	Local marketing company, Orange Grove, CPB, Rock Tenn	✓		✓

IMPLEMENTATION MATRIX

OBJECTIVES / POTENTIAL ACTIONS			LEAD AGENCY	PARTNERS *	TIMEFRAME		
					SHORT	MID	LONG
	Examples:	Create a program to incentivize residential and business recycling.	Public Works	Local businesses	✓	✓	
		Support and promote local closed-loop recycling facilities and participants.	Sustinability Office	Local businesses, private recyclers			✓
		Create recycling drop-off centers at all grocery stores and other neighborhood sites.	Public Works	Neighborhood Services, grocery stores, Downtown Partnership, faith-based organizations, Orange Grove		✓	✓
		Require recycling at major community events and festivals.	City Council	Friends of the Festival, Downtown Partnership, Orange Grove	✓	✓	✓
		Research and then enact policies that promote market based solutions for decreasing the use of plastic bags. This may include public education about alternative forms of bags, incentives for store owners to provide environmentally friendly disposable bags, or a plastic bag fee.	Sustainability Office	Local Businesses, Chamber, Mayor's Office, City Council	✓	✓	✓
		Expolre the feasibility of charging for garbage pick-up by weight	Sustainability Office	Public Works, other municipalities who have already implemented	✓	✓	✓
		Allocate funding for receptacles and curb-side pickup.	Public Works	Sustainability Office, Mayor's Office	✓		
		Hold recycle competitions, offering the winning organization exposure and formal recognition.	Sustainability Office	Public Works, Orange Grove, neighborhood associations, businesses, Mayor's Office	✓	✓	
How?		Improve government recycling participation.	Mayor's Office	City Council, Sustainability Office	✓	✓	✓
	Examples:	Establish recycling programs in all government buildings.	Sustainability Office	Orange Grove, City departments, BOMA	✓	✓	✓
		Require recycling at major government functions.	City Council	Friends of the Festival, Downtown Partnership, Orange Grove	✓	✓	✓
		Collect worn-out or unused athletic shoes for conversion into products used in the construction of playgrounds, basketball and tennis court surfaces, soccer fields, and running tracks.	Sustainability Office	Chattanooga Parks & Recreation Dept	✓	✓	
D3. Make recycling more economically feasible for the City.							
How?		Compare the costs and benefits of all alternatives including continued (or increased) curbside recycling, neighborhood drop-off centers, and private incentive programs for collection and processing.	Public Works	Sustainability office, Orange Grove, private recycling companies	✓	✓	
Objective E. Make Chattanooga a leader in SUSTAINABLE INDUSTRY.							
E1. Promote sustainable industry and operations through ongoing development and recruitment.							
How?		Create positive recognition for industries that achieve or surpass environmental standards.	Sustainability Office	CMA, Mayor's Office, Chamber, local media	✓	✓	✓

IMPLEMENTATION MATRIX

	OBJECTIVES / POTENTIAL ACTIONS	LEAD AGENCY	PARTNERS *	TIMEFRAME		
				SHORT	MID	LONG
	Create incentives for existing Chattanooga industries to adopt sustainable practices.	Sustainability Office	Mayor's Office, CMA, Chamber, Public Works	✓	✓	✓
THE BUILT ENVIRONMENT AND SMART GROWTH						
Objective F. Reduce sprawl by recognizing the environmental implications of the BUILT ENVIRONMENT and promoting SMART GROWTH practices.						
F1. Engage the community in Smart Growth decision-making.						
How?	Initiate a public input process that engages many citizens throughout the region in determining where and how we want to grow.	SETDD, RPA	Mayor's office, surrounding counties, TPO	✓	✓	✓
	Continue to encourage developers of large projects to hold public meetings that engage citizens in the planning an design process early on.	RPA	City Council	✓	✓	✓
F2. Determine the best areas for growth and conservation.						
How?	Initiate a regional planning process that takes an inventory of our existing resources, compares the costs of different patterns of development, and identifies areas for both growth and conservation.	SETDD, RPA	Mayor's Office, surrounding counties, TPO	✓	✓	✓
F3. Increase infill in already developed communities and where infrastructure is well established.		RPA/LDO	AIA, Homebuilders, GreenSpaces; AGC; RiverCity Co., TDEC, UTC, TPL, HCDE, TWR, neighborhood associations	✓	✓	✓
How?	Create incentives to encourage the reuse and renovation of existing buildings.	City & County	GreenSpaces, Sustainabilitiy Office	✓	✓	✓
	Revise zoning regulations to accommodate infill development that is compatible witih the architecture of the existing homes and businesses.	RPA	Homebuilders, AGC, Realtors	✓	✓	✓
	Produce a handbook that illustrates housing typologies and commercial building designs that are most suitable for infill developments.	RPA	Homebuilders, Sustainability Office		✓	
F4. Review and evaluate the zoning codes and subdivision regulations to encourage projects that incorporate smart growth features.					✓	✓
How?	Review our current development regulations and remove obstacles that prevent smart growth.	RPA	LDO, AGC, Homebuilders		✓	✓
	Incorporate incentives, such as density bonuses near existing commercial centers, to developers who exceed compliance or achieve smart growth objectives.	RPA	City Council, LDO, Homebuilders		✓	✓
	Consider programs such as the transfer of development rights (TDR) and greenbelt initiatives to preserve existing open space and agricultural lands.	RPA	LDO, TPL, local land trusts, Homebuilders		✓	✓
F5. Increase the supply of affordable, workforce housing near jobs.						
How?	Allow accessory units, such as garage apartments, on single-family lots and give density bonuses to developers in return for providing affordable housing.	RPA	LDO, neighborhood associations		✓	
F6. Continue to encourage the reuse of Brownfields.						
	Continue to apply for State and Federal funding to redevelop Brownfields.	Enterprise Center	RPA, Public Works	✓	✓	✓

IMPLEMENTATION MATRIX

OBJECTIVES / POTENTIAL ACTIONS		LEAD AGENCY	PARTNERS *	TIMEFRAME		
				SHORT	MID	LONG
Objective G. Strengthen the local FOOD AND AGRICULTURE infrastructure.						
G1. Promote local community growers and farmers markets.		Food Council	Convivia (Slow Food), Crabtree Farms, The Village Market (Collegedale), Ochs Center, Ag Ex, Greenlife, Food Bank, Neighborhood Services	✓		
How?	Establish a local Food Council that coordinates public outreach, determines best management practices for community farms, and identifies opportunities for growers, purchasers and suppliers.	Mayors Office	Convivia (Slow Food), Crabtree Farms, The Village Market (Collegedale), Ochs Center, Ag Ex, Greenlife, Food Bank, Neighborhood Services	✓		
	Encourage alternative farming systems that use sustainable food practices, such as Community Supported Agriculture (CSA).	Sustainability Office	Ag Ex, Master Gardeners	✓	✓	✓
G2. Promote the use of fresh, locally-procured foods and educate citizens about the health benefits.		Sustainability Office	Food Council	✓		
How?	Initiate a targeted recruitment effort for a downtown grocery store.	Chamber	RiverCity Co, Food Council	✓		
	Allow the acceptance of food stamps at local farmers markets.	Sustainability Office	Food Council, USDA		✓	✓
	Create a pilot local-foods cafeteria program at the Environmental Science magnet school.	HCDE	Local CSA, Greenlife		✓	
G3. Increase the number of community farms and accommodate low intensity farming in the city and surrounding residential areas.						
How?	Establish a target acreage per capita metric for community farms.	Sustainability Office	Ochs Center, RPA		✓	
	Amend zoning and land use regulations to accommodate low intensity farming in the city and surrounding residential areas.	RPA, LDO	Sustainability Office	✓		
	Locate and allocate available water resources for community gardening.	Sustainability Office	Public Works	✓		
	Designate land for community gardening initiatives.	Food Council	Sustainability Office, LDO	✓		
Objective H. Address TRANSPORTATION as a major contributor to greenhouse gas emissions and increase transportation options for all residents.						
H1. Support CARTA's operations through diverse funding from public and private sources.				✓		
How?	Make CARTA funding a priority in future years.	City, County	CARTA	✓	✓	✓
	Continue to secure private sponsorships to offset opearating costs.	CARTA	Chamber, local businesses	✓	✓	✓
H2. Decrease overall community Vehicle Miles Traveled.		Sustainability Office	City Traffic Engineering, TDOT, TPO, BCBS	✓		
How?	Restructure transit routes to provide frequent, convenient scheduled transit service to areas that have the residential density to support it (typically 12 units per acres or more) and to major destinations.	CARTA	RPA		✓	✓
	Develop a communication network to coordinate carpooling, ridesharing and transit use.	CreateHere	Chattanooga Times Free Press	✓		

IMPLEMENTATION MATRIX

	OBJECTIVES / POTENTIAL ACTIONS	LEAD AGENCY	PARTNERS *	TIMEFRAME		
				SHORT	MID	LONG
	Encourage employers to implement 4-day work weeks, telecommuting, and other programs that reduce VMT.	Businesses	SHRM (human resources)	✓	✓	
	Encourage private businesses to offer vouchers for the use of public transit and carpooling as an alternative to paying for employee parking.	Businesses	SHRM (human resources), Chamber of Commerce, TVA	✓		
	Expand the use of Intelligent Transportation Systems (ITS) by CARTA and other transportation providers to make transit more responsive to real-time demand and a tryly convenient option.	CARTA	UTC, CETE, TPO, HCDE	✓		
H3.	**Promote and develop alternative transportation and the related infrastructure.**					
How?	Encourage public and private fleet managers to explore, and potentially adopt, alternatives such as biofuels, electric vehicles, hybrids, and plug-in hybrids.	City Fleet Manager City Public Works	ATTI, CETE, UTC, East TN Clean Fuels Coalition		✓	✓
	Urge the EPB and TVA to dedicate marketing resources to the use of electricity as a transportation "fuel" that can serve as an alternative to gasoline and diesel for private vehicles and fleets.	Sustainability Office	EPB, TVA, UTC, ATTI	✓		
	Provide plug-in parking meters for daytime recharging of electric vehicles.	Public Works	Sustainability Office; EPB		✓	✓
	Establish priority parking spaces for energy efficient and Low Emission Vehicles (LEV).	Public Works	Sustinability Office, CARTA, Republic Parking	✓		
	Continue to pursue a high-speed rail system, such as Mag-Lev, to connect Chattanooga with surrounding cities.	Mayor's Office	Enterprise Center, Sustainability Office, TDOT, GDOT, other cities	✓	✓	✓
H4.	**Continue to develop pedestrian and bicycle facilities as a viable means of transportation.**					
How?	Incentivize the installation of sidewalks and greenways as an integral part of new developments.	City & County	Homebuilders, RPA, Sustainability Office	✓	✓	✓
	Adopt pedestrian-friendly site and building design standards, including reduced setbacks, limited curb-cuts and reduced parking requirements.	RPA, LDO	Sustainability Office	✓	✓	✓
	Incorporate recommendations from the publicly adopted Bicycle Master Plan in all new street construction projects.	City Parks & Rec	Bicycle Task Force	✓	✓	✓
	Complete the Greenway Plan and expand the number of greenway connections.	City Parks & Rec	TPL		✓	✓
NATURAL RESOURCES						
Objective I. Build on previous successes and continue to improve AIR QUALITY.						
I1.	**Reduce vehicle miles traveled in order to reduce pollutants being emitted into the atmosphere.**					
How?	Actively promote the use of alternative forms of transportation, public transportation, car and van pooling, flexible work scheduling by employers where possible, alternative fuels, and alternative-fueled vehicles.	TPO	UTC, CETE, CARTA, Chamber, Air Pollution Control Bureau	✓	✓	✓
I2.	**In the short term, Government entities should take the lead in achieving and staying in attainment with EPA PM2.5 and Ozone standards; in the long term, strive to exceed those standards.**					

IMPLEMENTATION MATRIX

OBJECTIVES / POTENTIAL ACTIONS		LEAD AGENCY	PARTNERS *	TIMEFRAME		
				SHORT	MID	LONG
How?	Government owned fleets should be retrofitted with diesel oxidation catalysts or particulate traps/filters. Private fleets should be encouraged to do so as well.	City Fleet Manager	Public Works, Sustainability Office	✓		
	Require ultra low sulfur diesel at community events that require onsite power generation from fossil based fuels. Promote the use of cleaner alternatives as they become available in the market.	City Council	Friends of the Festival, CVB, Air Pollution Control Bureau	✓	✓	✓
	Increase the use of Roundabouts in the design of new streets and renovation of existing streets.	City Traffic Engineer	RPA	✓	✓	
	Time the traffic signals to reduce unnecessary idling.	City Traffic Engineer	Sustainability Office	✓		
	Enforce the local anti-idling ordinance.	Air Pollution Control Bureau	Times Free Press, other local media, City Police	✓	✓	✓
I3. In the short term, residential and industrial businesses should strive to assist Chattanooga in attaining and staying in attainment with EPA PM2.5 and Ozone standards; in the long term, strive to exceed those standards.						
How?	Continue to use industrial best management practices to reduce impacts and study potential new solutions.	Air Pollution Control Bureau	local home improvement stores, TDEC, Health Department	✓		
	Investigate a lawn-mower exchange program to incentivize owners to replace gasoline mowers with cleaner alternatives such as electric, battery and push mowers.	Air Pollution Control Bureau	Industrial Facilities, CMA	✓	✓	✓
Objective J. Protect our region's natural BIODIVERSITY.						
J1. Protect native wildlife and plant species						
How?	Incentivize the inclusion of biodiversity assets in the existing pre-construction review of development plans.	LDO	Urban Forestry, AGC, RPA, UTC, Ag Ex	✓	✓	
	Encourage developers to retain high quality existing trees.	LDO	Public Works, AGC, Homebuilders, City Council, CALP, Ag Ex, Master Gardeners, UTC	✓	✓	✓
	Educate residents on the benefits of utilizing native species where appropriate.	Sustainability Office	Tree Commission, Ag Ex	✓	✓	✓
	Encourage the use of either natural or benign herbicides for roadside vegetation control, while discouraging the use of harsh chemicals, such as persistent soil sterilants and other herbicides listed as moderately toxic or stronger.	Sustainability Office	Tree Commission, Ag Ex, Public Works	✓	✓	✓
	Encourage local nurseries to stock and promote native species.	Tree Commission	Master Gardeners, CALP, Ag Ex	✓		
	Develop incentives for the use of bioretention and erosion control systems that use native species, instead of riprap along rivers and streams.	Public Works	Sustinability Office, TDEC		✓	
	Encourage buildings over two stories to turn off or dim their lights at night.	Sustainability Office	City Government, business owners	✓	✓	
J2. Initiate an urban ecosystems analysis.		Public Works	TVA, UTC, RPA, CALP, Lyndhurst, Tree Commission, UTC, other private funding support	✓		

IMPLEMENTATION MATRIX

OBJECTIVES / POTENTIAL ACTIONS		LEAD AGENCY	PARTNERS *	TIMEFRAME		
				SHORT	MID	LONG
How?	Apply for grants and partner with the TVA, UTC, the Chattanooga Area Landscape Professionals (CALP), and the UT extension office.	Public Works	Tree Commission, private funding support	✓	✓	
Objective K. Expand the network of effective GREEN INFRASTRUCTURE throughout the city and the region.						
K1. Develop a comprehensive green spaces plan that identifies important areas that should be preserved as open space, greenways, and parks and provides a connected system of green spaces throughout the area.						
How?	Identify and map existing open space and opportunities for future acquisition.	RPA, TPL	UTC, TN River Gorge Trust, Lyndhurst, Parks and Rec, Tree Commission, NPS, Ag Ex, Public Works	✓		
	Establish incentives for developers to dedicate new land as public open space.	Sustainability Office, Mayor's Office	TPL, RPA, Homebuilders		✓	✓
K2. Provide green infrastructure within walking distance of homes and businesses.		Parks and Rec	HCDE, TPL, TDEC, Local businesses		✓	
How?	Explore and establish dedicated public funding to enhance the efforts of private land trusts, foundations and public grants for the conservation, purchase, and maintenance of critical areas identified in the recommended green spaces plan.	Parks and Rec	Utilities, TPL, CVB, City Council		✓	✓
Objective L. Expand and maintain healthy URBAN and REGIONAL FORESTS.						
L1. Strive to obtain ideal tree canopy cover in Chattanooga.						
How?	Expand the Take Root Initiative to new areas of the community.	Public Works	Tree Commission, Create Here, Volkswagon	✓	✓	✓
	Analyze the Landscape Ordinance to increase the number of trees in new developments, renovations and parking lots.	RPA, LDO, Tree Commission	CALP, Master Gardeners, AGC, Home Builders	✓	✓	
L2. When new development occurs,encourage the retention of existing high quality trees rather than removing them and replanting with younger trees.						
How?	Educate and encourage builders and developers to follow the procedures prescribed by the "Tree Protection Best Management Practices (BMPs) for Contractors and Builders" to conserve existing tree canopy.	RPA, LDO, Tree Commission	CALP, Master Gardeners, AGC, Home Builders	✓	✓	
	Amend the Landscape Ordinance to create incentives to retain existing trees rather than removing trees and replanting in new developments.	RPA	LDO, Tree Commission, Sustainability Office, AGC, Homebuilders	✓	✓	
L3. Maintain ridges and hillsides as forested areas with limited development.						
How?	Analyze regulations addressing clear-cutting and erosion control in these areas to determine their effectiveness.	RPA, Public Works	UTC, Homebuilders, AGC	✓		
Objective M. Improve current WATER QUALITY and protect WATER QUANTITY.						
M1. Implement changes to Chattanooga's codes and regulations to address current water quality issues.						

IMPLEMENTATION MATRIX

	OBJECTIVES / POTENTIAL ACTIONS	LEAD AGENCY	PARTNERS *	TIMEFRAME		
				SHORT	MID	LONG
How?	Address the problems associated with the stormwater detention pond at the Development Resource Center.	General Services	Sustainability Office	✓		
	Continue the Sanitary Lateral Assistance Program (SLAP) to identify and eliminate sanitary waste discharges into the stormwater system.	Public Works	Mocassin Bend Wastewater Treatment	✓		
	Establish Low Impact Development (LID) as the Best Management Practice to reduce runoff volume and flow velocity for stream channel and floodplain protection.	Public Works	AIA- COTE, AGC, Homebuilders, USGBC, Engineering firms, County Stormwater Division		✓	
	Require LID for all City-governed projects.	Public Works	Parks and Rec		✓	
	Develop retrofitting plans for improving water quality in impaired watersheds by incorporating green stormwater controls, such as rain gardens, and Best Management Practices in places where insufficient or no stormwater control exists.	Public Works	Parks and Rec, HCDE, General Services, Hamilton County Stormwater Division	✓	✓	✓
	Adopt measures to limit development in groundwater recharge areas.	RPA, Public Works	Utility districts		✓	
	Adopt an ordinance establishing a stream bank protection program (including natural buffers).	City Council	RPA, Public Works, AGC, Homebuilders		✓	
	Anticipate upcoming EPA mandated sedimentation control requirements that may target activities around impaired streams.	Public Works	AGC, Home Builders	✓	✓	
How?	Incentivize the use of pervious pavement in parking lots and appropriate driving areas.	Public Works	LDO, Sustainability Office, AIA-COTE, AGC	✓		
	Modify the Chattanooga City Code to allow the use of graywater in toilets and landscape irrigation systems.	City Council	LDO, City Attorney, GreenSpaces	✓	✓	
M2. Work with the appropriate agencies to develop a long-term, regional conservation plan and strategy to protect our water supply.		TDEC			✓	✓
How?	Support the development and adoption of the City of Chattanooga Watershed Plan.	Public Works	City Council, Sustainability Office, UTC	✓	✓	✓
	Determine capacity and develop a plan that assures an adequate quantity of water to meet future needs.	TDEC	RPA, TVA, Utility districts		✓	
M3. Preserve the 100-year flood zone and riparian zones in a naturally-healthy state.						
How?	Require natural buffers of sufficient width along stream banks to filter runoff.	Public Works	TDEC, Sustainability Office	✓		
	Limit development in the 100-year floodzone.	Public Works	RPA, TDEC, Homebuilders	✓	✓	
	Adopt regulations to further guide development in these areas.	City Council	Public Works, Sustainability Office, AGC, Homebuilders, GA EPD		✓	
	Adopt new measures to maintain stream base flows and reduce flooding potential.	Public Works	City Council			✓

IMPLEMENTATION MATRIX

OBJECTIVES / POTENTIAL ACTIONS		LEAD AGENCY	PARTNERS *	TIMEFRAME		
				SHORT	MID	LONG
EDUCATION AND POLICY						
Objective N. Increase and stress the importance of COMMUNITY AWARENESS and PARTICIPATION.						
N1. Create a Sustainability Office, with the Chattanooga Green Committee serving as a long-term advisory board.		Mayor's Office	City Council, Chattanooga Green Committee	✓		
How?	Acquire approval for funding for this office.	Mayor's Office	City Council, Chattanooga Green Committee	✓		
N2. Develop an extensive environmental curriculum for use by churches, businesses, civic organizations, and local media.						
How?	Partner with organizations and businesses to create campaigns focused on the initiatives in this Climate Action Plan.	Sustainability Office	GreenSpaces, TN River Gorge Trust, EPB, TAWC, Chattanooga Gas Company	✓	✓	✓
	Host design contests to generate ideas for annual environmental campaigns.	Sustainability Office	UTC, Chamber, civic organizations	✓		
N3. Develop an information clearinghouse within the community that serves as a resources center for green program information.		Sustainability Office	Marketing firms, EPB, GreenSpaces, CreateHere	✓		
How?	Work with the Chattanooga Times Free Press to create a quarterly "green" newspaper insert.	Sustainability Office	Times Free Press	✓		
	Develop displays in publicly accessible buildings (like the new Outdoor Chattanooga office in Coolidge Park).	Sustainability Office	Green/Spaces, CreateHere	✓		
	Create a website or handbook that offers advice to residents about green practices for the home and workplace.	Sustainability Office	GreenSpaces, Create Here	✓		
Objective O. Increase and stress the importance of BUSINESS PARTICIPATION.						
O1. Provide local businesses with information about green practices and promote partnerships to effectively implement green initiatives.						
How?	Institute a program to promote energy efficiency in the business workplace, such as allowing "business casual" dress codes to reduce energy consumption from air conditioning.	Sustainability Office	Chamber, local businesses	✓	✓	
	Expand an awards and recognition program for businesses.	Mayor's Office	Sustainability Office, Chamber	✓	✓	✓
	Work with the Chattanooga Area Convention and Visitors Bureau and local tourism and lodging destinations to create more sustainable tourism options.	Sustainability Office	CVB, GreenSeal	✓	✓	
	Provide information about economically successful and sustainable industry initiatives to the media and community leaders.	Sustainability Office	CMA	✓		
	Develop a Green Goals handbook for busines owners.	Sustainability Office	Chamber	✓	✓	
	Create a speakers forum about sustainable industries.	Sustainability Office	CMA	✓		
Objective P. Set the standard and provide leadership in sustainable GOVERNMENT POLICY and PURCHASING programs.						

IMPLEMENTATION MATRIX

OBJECTIVES / POTENTIAL ACTIONS		LEAD AGENCY	PARTNERS *	TIMEFRAME		
				SHORT	MID	LONG
P1. Adopt green policies for government buildings, products purchased and employee programs.						
How?	Build all City facilities to green standards, such as LEED.	General Services	GreenSpaces, AIA-COTE	✓		
	Institute a program to promote energy efficiency in the City government work place, such as allowing "business casual" dress codes to reduce energy consumption from air conditioning.	Mayor's Office	Sustainability Office	✓		
	Adopt a City of Chattanooga green purchasing program.	Mayor's Office	City Purchasing Dept, Sustainability Office	✓		
	Support the creation of continuing education and credits for city professionals to learn about sustainable practices.	Sustainability Office, City Personnel Dept	County Government, Chamber of Commerce	✓		
P2. Create an Alliance For Growth with the surrounding counties to network for combined brainstorming and problem solving.						
How?	Initiate a regional planning effort.	SETDD, RPA	Mayor's Office, County Mayor, TPO, surrounding counties and cities	✓	✓	
	Partner with green/spaces, the Ochs Center and other organizations to bring smart growth experts to Chattanooga as resources.	Sustainability Office	GreenSpaces, Ochs Center, local foundations	✓	✓	
P3. Explore the potential of carbon cap and credit trading for the City.						
How?	Continue to work with local consultants to establish metrics and mechanisms to break into the cap and trade business, starting with methane capture at the local landfill.	Sustainability Office	Public Works, other communities	✓	✓	
P4. Create job functions within the various departments of City government to accomplish initiatives contained within this Climate Action Plan.						
How?	As initiatives are selected, work with the various City department heads to establish job descriptions that take into account the various recommended intiatives.	Sustainability Office	City Human Resources Dept	✓		
Objective Q. Stress the importance of dynamic environmental education in SCHOOLS.						
Q1. Support the development of an extensive environmental curriculum for use in schools.				✓	✓	
How?	Work with the Hamilton County Department of Education to create a primary school curriculum.	Sustainability Office	HCDE, CSTHEA, private schools	✓		
	Identify local High Schools to cooperate in the creation of environmental education programs for the secondary schools.	Sustainability Office	HCDE, private schools, Society of Women Engineers	✓	✓	
	Work with "Environmental Education in Tennessee" to create a**Chattanooga Green** School Program, which includes measurement tools to gauge success.	Sustainability Office	HCDE, private schools		✓	
	Work with local universities and colleges to create a curriculum in sustainable living, as well as adult education, with partnerships for demonstration projects and podcasts.	Sustainability Office	UTC, Chattanooga State	✓	✓	
Q2. Create a physical and tactile demonstration experience for elementary and middle-school-aged children at a central, and preferably, free-access location.		Sustainability Office	Schools; HCDE; Private Schools	✓	✓	

IMPLEMENTATION MATRIX

OBJECTIVES / POTENTIAL ACTIONS		LEAD AGENCY	PARTNERS *	TIMEFRAME		
				SHORT	MID	LONG
How?	Work with the local library, malls, and the Creative Discovery Museum to establish learning models that demonstrate the advantages of green living.	Sustainability Office	GreenSpaces, Creative Discovery Museum, Public Library	✓	✓	

ABBREVIATIONS

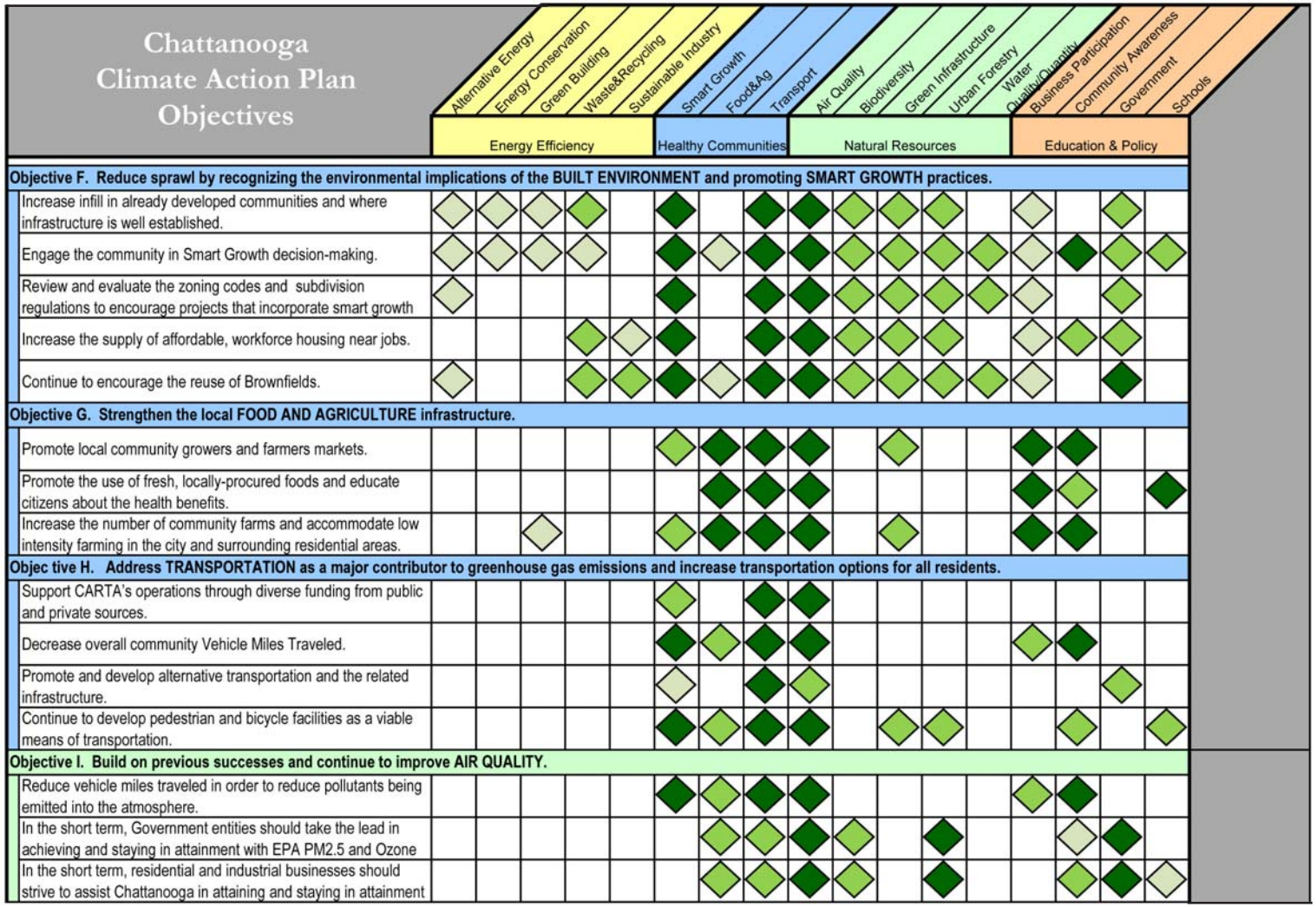
Ag Ex		UT Agricultural Extension Office
AGC		Associated General Contractors
AIA-COTE		American Institute of Architects - Committee on the Environment
ASHRAE		American Society of Heating, Refrigeration and Air Conditioning
ATTI		Advanced Transportation Technology Institute
BCBS		Blue Cross Blue Shield of Tennessee
BOMA		Business Owners and Managers Association
CALP		Chattanooga Area Landscape Professionals
CARTA		Chattanooga Area Regional Transportation Authority
CETE		Center for Energy, Transportation and the Environment (UTC)
CHA		Chattanooga Housing Authority
CMA		Chattanooga Manufacturers Association
CPB		Chattanooga Paper Board
CSA		Community Supported Agriculture
CSTHEA		Chattanooga Southeast Tennessee Home Education Association
CVB		Chattanooga Area Convention and Visitors Bureau
EPB		Electric Power Board
GA EPD		Georgia Environmental Protection Division, Department of Natural Resources
HCDE		Hamilton County Department of Education
IPL		Interfaith Power and Light
LDO		Chattanooga Land Development Office
NPS		National Park Service
RPA		Chattanooga-Hamilton County Regional Planning Agency
SETDD		Southeast Tennessee Development District
SHRM		Society of Human Resource Managers
TAWC		Tennessee American Water Company
TDEC		Tennessee Department of Environment and Conservation
TPL		Trust for Public Land
TPO		Transportation Planning Organization
TVA		Tennessee Valley Authority
TWRA		Tennessee Wildlife Resources Agency
USDA		U.S. Department of Agriculture
USGBC		U.S. Green Building Council
UTC		University of Tennessee at Chattanooga

HOLISTIC MATRIX

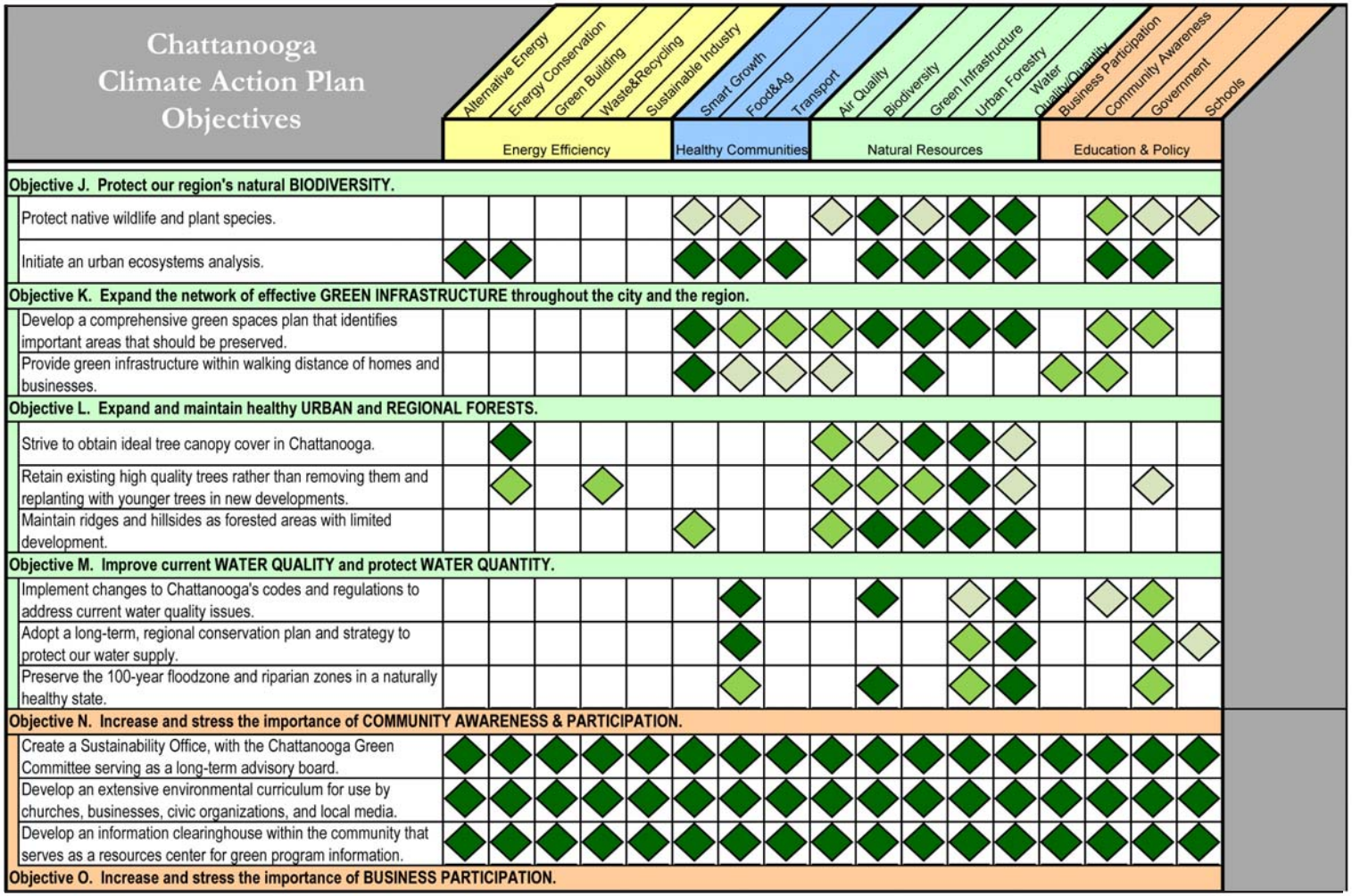
This positive impact matrix compares each of the recommendations in this Climate Action Plan with the other topics, assuming that each recommendation is done in a way that will not negatively impact other areas. The green diamonds indicate varying levels of positive impact. The darker the green, the greater the impact.

Chattanooga Climate Action Plan Objectives	Alternative Energy	Energy Conservation	Green Building	Waste&Recycling	Sustainable Industry	Smart Growth	Food&Ag	Transport	Air Quality	Biodiversity	Green Infrastructure	Urban Forestry	Water Quality/Quantity	Business Participation	Community Awareness	Government	Schools
	Energy Efficiency					Healthy Communities			Natural Resources					Education & Policy			
Objective A. Increase the community's use of ALTERNATIVE ENERGY SOURCES.																	
Increase the community's use of renewable energy sources.	◆	◆			◇								◇	◆	◇	◇	
Become a TVA Green Power partner by generating energy that can be bought back by TVA.	◆				◇								◇	◇	◆		
Encourage individuals and businesses to produce their own clean energy sources.	◆				◇								◇	◆	◇	◇	
Objective B. Increase ENERGY CONSERVATION.																	
Reduce energy use per capita, engaging water, gas, and electric utilities.		◆			◇	◇			◆				◇	◇	◆	◆	◇
Reduce energy and monetary waste from lighting.		◆							◆				◇		◆	◆	
Objective C. Increase GREEN BUILDING practices.																	
Make sustainable building practices mainstream and increase the number of green buildings in Chattanooga.		◆	◆	◆	◇				◇				◇	◇	◇		◇
Lead by example by making a City commitment to upgrade and build LEED certified and energy-efficient buildings.		◆	◆	◆	◇				◇				◇	◇	◇	◇	◇
Objective D. Increase RECYCLING & reduce WASTE.																	
Develop recycling options for older televisions before the "Switch to Digital" in February, 2009.				◆									◆		◇		
Reduce the amount of waste per capita going to landfills.				◆										◇	◆	◆	◆
Make recycling more economically feasible for the City.				◆				◇						◇	◆	◆	◇
Objective E. Make Chattanooga a leader in SUSTAINABLE INDUSTRY.																	
Promote sustainable industry and operations through ongoing development and recruitment.	◆	◆	◆	◆	◆	◆			◆	◆	◆	◆	◆	◆	◆	◆	

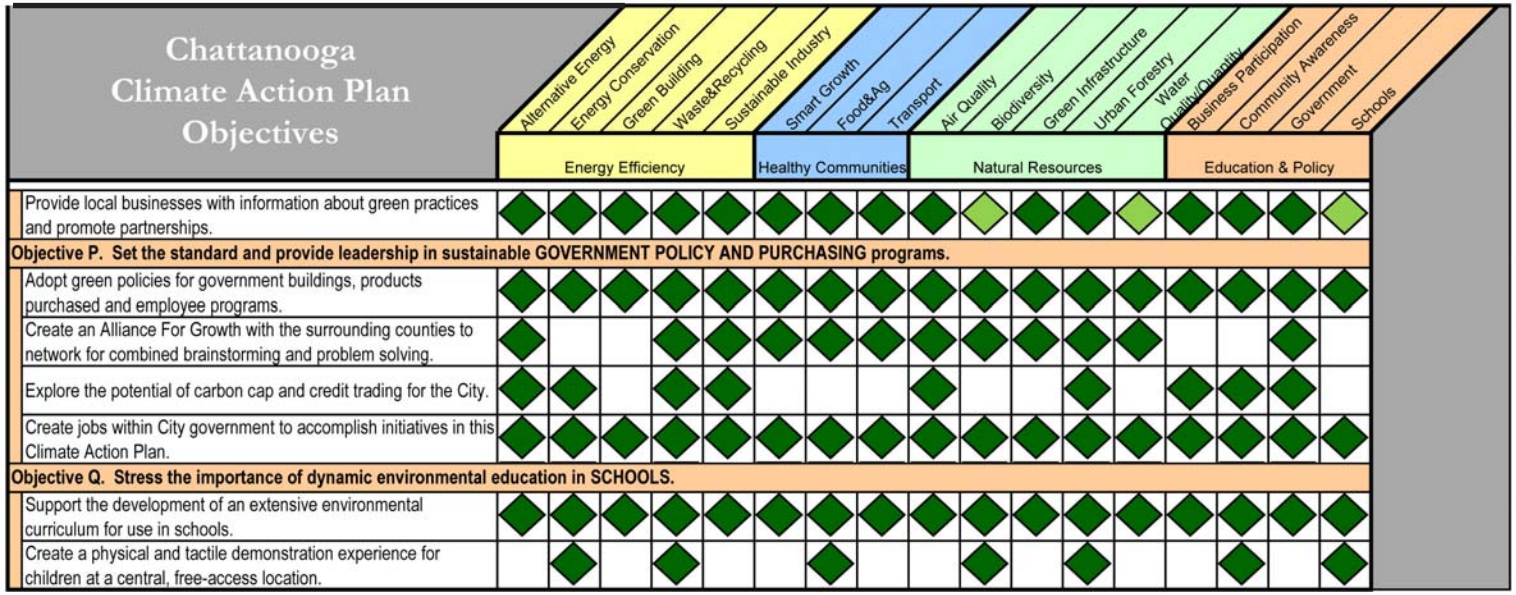
HOLISTIC MATRIX



HOLISTIC MATRIX



HOLISTIC MATRIX



SUBJECT MATTER EXPERTS

Realizing the need to gather reliable information about greenhouse gas emissions and potential solutions, the Chattanooga Green Committee enlisted the help of several "Subject Matter Experts (SMEs)," as they have come to be called. These experts, most of whom are located in the Chattanooga area, have knowledge and experience in various "green" technologies, business and industry, academics, as well as existing government programs. In recognition of the assistance they have provided, we acknowledge and thank the following people:

Energy Efficiency Task Force

Name	Association	Expertise
Bach, Frank	Chattanooga Paperboard	Recycling
Bailey, Blythe	River Street Architecture, AIA-COTE	Green buildings, LEED
Bowers, Taylor	River Street Architecture AIA-COTE	Green buildings, LEED
Brock, Don PhD	Aztec Engineering	Green industries
Bullock, Diana	EPB	Economic development, gov. relations
Cannon, Jeff	green/spaces	Green buildings
Collier, Ethan	Collier Construction	Green building
Gehrke, Rick	ACE AmBiental	Energy, carbon credits
Gibby, Tiffany	TVA	Energy, green power
Gordon, Joe	UtiliFlex	Smart meters, energy technologies
Heath, Marcia	Hamilton County Government	Recycling
Henry, Jim PhD	UTC	Alternative and advanced fuels
Hilbert, Gary	Chattanooga Land Development Office	Building codes, permitting
Jett, Austin	Orange Grove	Recycling education and outreach
Johnson, Beverly	Chattanooga Neighborhood Services	Housing, neighborhoods
Kurtz, Sandy	Urban Century Institute, Interfaith Power and Light	Community advocacy
Leach, Steve	Chattanooga Public Works	Public Works
McCluney, Ross PhD	Retired energy expert, Author	Energy
McMahon, Mike	Chattanooga Paperboard	Recycling
Morris, Carey	Chattanooga Public Works	Codes, construction
Norris, Lee	Chattanooga Public Works	Waste, recycling
Overly, Jonathan	East TN Clean Fuels Coalition	Alternative fuels, fleet management
Palmer, Thomas	Palmer Built Environments, USGBC	Green buildings, LEED
Pritchard, Ken	Clerestory	Green buildings, sustainable industries
Pruett, Chuck	Greenlife	Recycling, green business
Ramsey, David	Earthscapes	Recycling, erosion control, greenroofs
Smith, Martin	Orange Grove	Recycling education and outreach

SUBJECT MATTER EXPERTS

Spence, Scott	EPB	Energy, data collection
Thomas, Tricia PhD	UTC	Alternative fuels
Townsend, Terry	Townsend Engineering, Inc.	Building efficiency, ASHRAE standards
Tripp, Thomas	Big Frog Mountain	Green industries, solar energy
Waters, Gary	Hamilton County Schools, Auxiliary Service	Energy, school construction
Zimmerman, David	TVA	Sustainable energy

Natural Resources Task Force

Name	Association	Expertise
Aborn, David PhD	UTC	Ecosystem management, biodiversity
Andrews, Shelley	Friends of Moccasin Bend	Open Space, land conservation
Benge, Shawn	National Park Service	Open Space, land conservation
Carroll, Andy	UTC	GIS, green infrastructure mapping
Duncan, Jeff PhD	National Park Service	Biodiversity, land conservation
Galbreath, Dodd	Lipscomb University	TN watershed policy, education
Gray, Bob PhD	Appalachian National Scenic Trail Association	Natural resource management
Grymes, Phillip	Outdoor Chattanooga	Open space, outdoor recreation
Harris, Linda	TVA	Water Quality
Hutsell, Richard	Public Works, Chattanooga	City Codes
Minkara, Mo PhD	City of Chattanooga	Water quality and quantity
Ogden, Jim	National Park Service	Open Space, land conservation
Putman, Edward	AquaShield	Stormwater management
Richards, Sean PhD	UTC	Toxicology, environmental chemistry
Spratt, Henry PhD	UTC	Ecosystems management, ecology
Stebbins, Tom	Hamilton County Extension Service	Food and agriculture
Stewart, Jerry	Moccasin Bend Wastewater Treatment Plant	Wastewater treatment
Urban, Dick PhD	TDEC	Water quality
Whorton, Randy	Earthscapes	Erosion control, greenroofs, yard waste
Williamson, Kelly	AquaShield	Stormwater management
Wood, Rick	The Trust For Public Land	Green Infrastructure, land conservation
Zehnder, Larry	Chattanooga Parks and Recreation	Parks, green infrastructure

SUBJECT MATTER EXPERTS

Healthy Communities Task Force

Name	Association	Expertise
Arnsdorff, Steve	CS & Associates, LLC	LEED certified retail development
Bailey, Ron	UTC - CETE	Alternative transportation
Clark, Bruz	Lyndhurst Foundation	Philanthropy
Coddington, Jon	River City Company	Urban planning
Cole, Ed	TDOT	Transportation, planning
Coppinger, Jim	Hamilton County Commission	County government, education
Cunningham, Storm	Revitalization Institute	Redevelopment
Dugan, Tom	CARTA	Transit
Ellis, Richard PhD	Advanced Waste Management Systems	Environmental consulting
Fazio, Robin	Baylor School	Education
Ford, Dawn	County Health Department	Public health
Hairr, Mark	UTC - CETE	Transportation, alternative fuels
Haynes, Greg	Regional Planning Agency	Zoning, subdivision regulations
Henry, Jim PhD	UTC	Alternative fuels
Hudson, David	Artech, American Institute of Architects	Built environment
Jacobson, Dan	BlueCross BlueShield of Tennessee	Business, large LEED building project
Levitt, Karna	Levitt & Mills Associates	Landscape architecture, site planning
McCright, Betsy	Chattanooga Housing Authority	Housing development
Mercer, Vanessa	Crabtree Farms	Urban farming
Minhas, Naveed	Chattanooga Housing Authority	Housing development
Moon, Don	Homebuilders Association	Built environment
Morgan, Sarah	Lyndhurst Foundation	Urban neighborhood redevelopment
Othman, Majdi PhD	Geosyntec Consultants	Carbon reduction credits
Pfitzer, Jeff	River City Company	Urban development
Pruett, Chuck	Greenlife Grocery	Organic foods, business
Pugliese, Phil	Bike Chattanooga	Biking, alternative transportation
Rennich, Karen	Regional Planning Agency	Planning
Shaw, Sue	Chattanooga Area Realtors Association	Built environment
Sloan, Paul	Tennessee Dept. of Environment and Conservation	Green infrastructure
Taylor, Melissa	Regional Planning Agency	Planning, transportation
Thomas, Tricia PhD	UTC	Alternative fuels
Wilhelm, Randy	Wilhelm Resource Company	Carbon reduction credits

SUBJECT MATTER EXPERTS

Education and Policy Task Force

Name	Association	Expertise
Bennett, Linda	Chattanooga City Council	Local government policy
Chilcot, Anti	Ooltewah High School	Education, marketing
Cupo, Tom	The Chattanoogan Hotel & Conference Center	Green lodging program
Eichenthal, David PhD	The Ochs Center for Metropolitan Studies	Community surveys, research, indicators
George, Anna PhD	Tennessee Aquarium Research Institute	Environmental research, education
Glasenapp, Aaron	University of Colorado, Math Department	Mathematical modeling
Keil, Mark	Chattanooga Information Services	Information services
Ledford, Hayes	Chattanooga Chamber of Commerce	Business development
McFadden, John	Tennessee Environmental Council	State environmental policy
Mescon, Jed	WRCB-TV	Media
Nagahama, Nobuhide	City of Kitakyusgu, Japan Trade Promotion Division	Sustainable business development, International partnerships
Quillen, Lori	The Ochs Center for Metropolitan Studies	Community surveys, research, indicators
Rentschler, Mark PhD	Green Seal, Inc.	Green lodging and procurement standards
Richards, Dawn PhD	Baylor School	Environmental science, education
Saleed, Dan	Hamilton County Government	County Government
Smith, Chris	Howard High School	High school education and athletics
Song, Mark	Maycreate Design Lab	Multi-media design
Takemoto, Shoko	City of Kitakyushu, Japan, New Business Creation Group	Sustainable business development, International partnerships
Waterhouse, Albert	Waterhouse Public Relations	Marketing
Yamada, Yoshiyuki	City of Kitakyusgu, Sustainable Design Group	Sustainable business development, International partnerships

SUBJECT MATTER EXPERTS

Society of Conservation Biology (SCB)- The Committee also benefited from a conference of the Society of Conservation Biology held in Chattanooga in July, 2008. Several members of this international organization met with the Chattanooga Green Committee and staff specifically to discuss our local challenges. A dynamic round-table discussion focused on the following four questions: 1) What biological indicators can tell us when the impacts of human development are stressing the integrity of our natural resources? 2) Why are these the best early warning indicators? 3) What actions or public policies should be adopted to protect these resources? 4) What is most critical? How should we prioritize our policies and actions? For results of the SCB meeting, contact the Chattanooga Green Committee at http://www.chattanooga.gov/chattanoogagreen.

SCB members provided input that drew from their experience in applying natural and social science to land-use planning for urban and exurban areas worldwide. They also commented on management and policy responses to natural and anthropogenic environmental change. This diverse group of scientists, politicians, urban planners, policy analysts, lawyers, architects, urban foresters and other experts from around the world gave the Chattanooga participants a clear sense of the range of perspectives in the conservation community on issues related to climate change and its economic impacts, including water availability and urban ecology, metrics and planning paradigms. The dialogue among the Chattanooga Green Committee and the Society of Conservation Biology served as motivation for all participants to engage more fully with their communities and regions.

Society of Conservation Biology

Name	Association	Expertise
Abrams, Ron	Dru Associates, INC	Land use, natural resources
Abrams-Drusinsky, Marilyn	Dru Associates, INC	Socio-economic analysis
Fitzgerald, John	Society of Conservation Biology	Policy director
Fleishman, Erica	National Center for Ecological Analysis and Synthesis	Indicators, climate change adaption
Forbes, Bill	Stephen F. Austin State University, Texas	Conservation incentives, regional planning
Granillo, Kathy	U.s. Fish & Wildlife Service, Southwest region	Regional habitat conservation, species monitoring
Manolis, Jim	Minnesota Department of Natural Resources	Strategic ecosystems planning
Meffe, Gary	Author, *Conservation Biology*	Ecosystem management, environmental education
Morley, Craig	Department of Conservation, New Zealand	Endangered and invasive species, education
Naicker, Kiruben	Department of Environmental Affairs and Tourism, South Africa	Ecotourism
Pergams, Oliver	University of Illinois, Chicago	Economics and sociology of conservation
Robinson, John	Wildlife Conservation Society	International conservation policy and planning
Scott, Mike	U.S. Geological Survey	Ecosystem and species protection by gap analysis
Theobald, Dave	Colorado State University	Landscape change effects on wildlife habitat and biodiversity

ON-GOING ACCOMPLISHMENTS

CRITICAL ISSUES - In the Interim Report, the Committee discussed several critical issues that they felt needed to be addressed as soon as possible. Some of these issues have since been crossed off the list of priorities because they can now be considered success stories.

Success Story 1:
The Interim Chattanooga Climate Action Plan was released on July 11, 2008, and at that time there were no safe disposal options for compact fluorescent light bulbs (CFLs). On July 24, 2008, The City of Chattanooga announced the expansion of its commitment to the environment by offering tubular and compact fluorescent bulb recycling at the following City recycling convenience centers: Warner Park, John A. Patten Recreation Center and Access Road at DuPont Parkway. "More than 670 million mercury-containing bulbs are put in landfills across the country each year," said Mayor Ron Littlefield. "These bulbs are more energy efficient than standard light bulbs; however, when they are discarded, many break and put mercury into our environment. I encourage all citizens of Chattanooga to bring their fluorescent light bulbs to convenience centers so that they are kept out of our landfill and properly disposed."

Success Story 2:
When the Interim Report for this Climate Action Plan was released, many people were under the mistaken impression that the water tower at the corner of Market and 17th Streets was not functioning as designed. This turned out to be an urban myth. In fact, stormwater is collected in a large tank under the Battle Academy parking lot and is then pumped into the tower. This "graywater" is then gravity released to irrigate street trees in the Southside and used by the City Parks and Recreation Department to water other landscape installations. City engineers are currently studying ways to increase the use of this recycled stormwater and the possibility of creating similar water recycling systems in other parts of the downtown.

Success Story 3:
During the spring of 2008, there was concern that some of the downtown electric shuttle service would be lost due to funding problems. After meeting with a group of downtown stakeholders, CARTA began to develop revenue enhancement strategies to support the nearly $1 million annual budget for the electric downtown shuttle program. Three separate measures were taken: (1) Sponsorships were sought allowing the sponsors to wrap a shuttle bus with their personal message or advertisement for a one-year period. To date, 8 shuttles have been sponsored. (2) Parking rates were increased for the on-street parking meters in the downtown area. (3) Donation fare boxes have been added on each electric shuttle bus and at the three downtown garages allowing riders to contribute to help maintain this unique transportation system.

Other outstanding critical issues from the Interim Climate Action Plan are discussed in their appropriate sections.

ON-GOING ACCOMPLISHMENTS - In addition to these three successes, a number of other initiatives are already underway in this community that will help reduce our carbon footprint. The following list highlights some of them. While some may seem to be small steps, every bit helps. Cumulatively, these initiatives add up to a much larger whole and have the potential to permanently change the way we do business in Chattanooga.

Clean Air - Chattanooga has a history of being proactive to meet federal health-based air quality standards. A vehicle emission testing program, instituted to reduce pollutants going into the air, has resulted in reduced greenhouse gas emissions due to fuel-savings. A seasonal burning ban which prohibits burning between May 1 and October 1 has reduced greenhouse gas emissions through alternative methods of disposal for yard waste and debris. According to the Air Pollution Control Bureau, reduced speeds for heavy-duty diesel trucks on limited access highways throughout Hamilton County has resulted in less fuel being burned and, thus, lowered greenhouse gas emissions.

Electric Shuttle - Since 1992, Chattanooga has employed battery-powered electric buses on its free downtown shuttle route, serving a million riders annually and operating on seven-minute intervals. With no diesel engine and zero tailpipe emissions, electric buses are by far the least carbon-consumptive mode of mass transportation available.

City Fleet - The City government has already taken some steps to reduce its greenhouse gas emissions including the purchase of 12 hybrid vehicles and over 300 flex-fuel vehicles. In addition, diesel burning vehicles in the city fleet now use a 20% biodiesel fuel.

Hamilton County School Buses - Hamilton County government has retrofitted 105 school buses with diesel oxidation catalysts.

ON-GOING ACCOMPLISHMENTS

UTC Environmental Fee - UTC students adopted a $10 Green Fee as part of their college fees and tuition. The purpose of the Green Initiative is to help UTC save energy and become more environmentally conscious through initiatives such as recycling bins, occupancy sensors to turn off lights when classrooms are not in use, and the hiring of a Recycling Coordinator.

Green Roof in Renaissance Park - This 5,000 square foot, open-air pavilion was constructed to be environmentally unique and serves as the gateway to Renaissance Park. In addition to its green roof, the pavilion features energy efficient fluorescent lights that use 50-80% less energy than incandescent lights and waterless no-flush urinals in the restrooms. A "green roof" is a roof that is partially or completely covered with vegetation and soil, planted over a waterproofing membrane. Benefits include stormwater management, reduced energy costs, and reduction of the urban heat island effect common in most cities. Green roofs also extend roof life and provide effective sound insulation. A collaborative effort between the Tennessee Department of Environment and Conservation, Chattanooga Parks and Recreation and the Tennessee Department of Agriculture, the pavilion serves as a gathering place to educate visitors about Renaissance Park and Chattanooga's sustainability initiatives.

Living Wall - The City is using Filtrexx "socks" to control erosion and renew vegetation on the steep slope at the foot of the Walnut Street Bridge. Mesh tubes are filled with organic compost consisting of yard waste diverted from the City's landfill, and are then staked to the ground. Because growing vegetation sequesters carbon, this erosion control method also reduces our carbon footprint. Furthermore, diverting the yard waste from the landfill acts to reduce the amount of methane emissions, a potent greenhouse gas.

15% Tree Canopy Required in Downtown Zoning - In urban areas with an abundance of paved surfaces, the heat island effect typically raises temperatures 8-10 degrees higher than surrounding areas. Trees are an outstanding remedy that improve air quality and supply shade, which in turn lowers temperatures, and reduces air-conditioning related energy use. Studies by American Forest and other conservation organizations indicate a minimum of 15% tree canopy cover is required in urban areas to provide this benefit. Currently, downtown Chattanooga only has an 8% canopy cover. Zoning regulations for the downtown now require one tree for every 5 parking spaces in new parking lots, which equates to a 15% canopy cover.

"Take Root" - Take Root is a program to further increase the tree canopy in the downtown area by planting 1,500 trees through local donations. Current research by Chattanooga's Division of Urban Forestry reveals that 1,500 trees will reduce carbon dioxide emissions by approximately 64 metric tons in ten years and by 113 metric tons in twenty years.

City and County Vehicle Use - In May 2008, City officials asked employees driving City vehicles (with some exceptions in the Fire and Police Departments) to cut back on fuel usage by turning off vehicles if they idle more than 30 seconds. Turning off and restarting a vehicle uses about the same amount of gas as idling for 10 seconds (http://www.dailyfueleconomytip.com). The City will also review requests for new vehicle purchases by comparing expected gas mileage of the old and new vehicle being requested. By policy, City vehicles are replaced every five years, which has proven to save gasoline since new cars are more efficient. Hamilton County Emergency Medical Services is also trying to cut fuel usage for non-critical situations. Employees are asked to leave their station only once for a meal in a 24-hour period, possibly pick up food while returning from a call, and training and supplies are being delivered to the station instead of having employees travel to them. (Chattanooga Times Free Press, Jacqueline Koch, June 23, 2008).

Methane Collection at the Landfills - Methane is collected and used to generate 2 megawatts of electricity at the Summit Landfill.

Traffic Signals - Converted from Incandescent Bulbs to LED - After installation, the electricity bills dropped from $12,000 per month to approximately $5,000 per month.

Jefferson Heights - Jefferson Heights is an in-town neighborhood with restaurants, shops and one of the city's newest elementary schools nearby. More than 20 eco-friendly, EarthCraft certified houses (with more planned) makes it one of the greenest communities in the city with prices ranging from $130,000-$200,000. Jefferson Heights is also included in the national LEED-ND (Neighborhood Development) pilot program aimed at expanding the rating system for individual buildings to entire neighborhoods.

Green Buildings - Two North Shore, the River Street Architecture office on Cherry Street, the new Blue Cross Blue Shield campus on Cameron Hill, the proposed new UTC campus library, and other local developments are striving

ON-GOING ACCOMPLISHMENTS

for LEED certification. These buildings incorporate sustainable practices and materials such as natural daylighting, water conservation, paint with no volatile organic compounds (VOCs), formaldehyde-free adhesives, drought resistant landscaping, recycling of construction materials and even the reuse of construction materials from nearby sites. According to the U.S. Green Building Council, development projects throughout the country are proving that the up front costs of achieving LEED certification are typically only 3 – 5% more than comparable non-LEED projects and, in some cases, costs are comparable.

green|spaces is a two-part initiative: 1) incentive funding of $2 million for 20 commercial development projects to be built and certified green in 3 years and, 2) a resource center showcasing the best eco-friendly building materials and methods. The new *green|spaces* resource center is located on Main Street and their website is http://www.greenspaceschattanooga.com.

Green Power Switch - Green Power is an environmentally friendly electric power option from EPB and TVA supporting the use of renewable energy resources like wind, solar power and methane gas (resources that create less waste and less pollution, and are located in the Tennessee Valley). Residential customers may purchase Green Power at a rate of just $4 per 150 kilowatt-hour block. Each block amounts to approximately 12% of the typical household's energy usage. The generated Green Power is then added to TVA's total power mix, which is shared by customers in the Tennessee Valley. Adding $8 (two 150 kilowatt-hour blocks) to a monthly residential or business bill provides the same environmental benefit as recycling 240 pounds of aluminum, recycling 880 pounds of newspaper or planting an acre of trees. For as little as about 5% of its monthly electric power bill, a business can support the use of renewable energy resources. Contact EPB at 423-648-1372. Source: http://www.epb.net

ATTI – Hydrogen Fuel Cells Research - In June, 2006, TVA gave its 52 acre electric vehicle test track to the University of Tennessee at Chattanooga (UTC) and the Advanced Transportation Technology Institute (ATTI), a nonprofit organization that advances clean transportation technology. At UTC, engineers, professors and students research and develop alternative-fuel vehicles including electric, hybrid and clean fuel vehicles like those powered by the hydrogen fuel cell. Hydrogen is the simplest and most abundant element in the universe. As fossil fuel pollutes the air and costs rise (along with dependency on foreign oil), a fuel-cell project and the newly acquired test track will assist in the quest for alternative energy strategies and have a positive impact on these issues. All levels of government collaborated with the UT SimCenter at Chattanooga to bring Ion America of Silicon Valley's fuel cell to the UTC campus for testing. Solid-oxide fuel-cells will be able to make electricity to heat and cool homes without transmission lines, and operate automobiles. A limited-liability company (EVamerica) has been created to design, develop, manufacture and assemble medium to heavy-duty electric, hybrid-electric and fuel-cell vehicles and has a strong working relationship with ATTI. Source: http://pr.utk.edu and http://www.nrel.gov/hydrogen.

Electric Power Board Building - The EPB's new headquarters was built on a Brownfield site. All windows open to create air flow and allow for more natural light, and carpets and wallpaper are made of recycled materials. There are three air compressors per floor for more efficient heating and cooling and fans are in place to evacuate smoke in case of fire in the large atrium. A recycling program for paper, plastic and aluminum is in place.

Moccasin Bend Wastewater Treatment Plant - The Moccasin Bend Wastewater Treatment plant is by far the city's largest recycling operation, measured in tonnage. In 2007, it diverted 93,205 wet tonnes of processed organic materials into biosolids land application on 5,612 acres of productive farms in Tennessee and Alabama. This established recycling program saves local landfill space worth an estimated $2.84 million annually (over one year of capacity). The use of this nitrogen-rich material replaces synthetic fertilizer, which is typically produced using natural gas as a primary energy source. At the current rate of application, the Moccasin Bend program avoids the use of 59,642,000 cu. ft. of natural gas and eliminates 3,759 metric tons of carbon emissions. These savings are associated with the upstream use of natural gas in fertilizer production and do not take into account GHG emissions due to transportation and application of biosolids.

Star Community - In conjunction with the U.S. Green Building Council (USGBC), and with support from the EPA, ICLEI is developing a sustainable community rating. Similar to the Leadership in Energy and Environmental Design (LEED) system developed by USGBC, which rates individual buildings, the Star Community rating will give recognition to communities who meet specified criteria. ICLEI has asked Chattanooga to participate in the development of this rating.

Invasive Plant Species Control - Kudzu-eating goats consume a wide variety of brush species, most of which are considered as undesirable or invasive species, including kudzu, privet, poison ivy and multi-flora rose. Unlike chemical applications the unwanted vegetation is totally consumed without harmful runoff and pesticide use. The program has received national acclaim for its innovative use of natural methods. It has been in place since 2006.

ADDITIONAL RESOURCES AND PARTNERS

The following list highlights a number of local, state and national organizations that can provide resources or serve as potential partners for many of the ideas and initiatives discussed in Chattanooga's Climate Action Plan. This list of resources is organized by topics. A more detailed list can be found at http://www.chattanooga.gov/chattanoogagreen.

AIR QUALITY

Air Pollution Control Bureau
http://www.pollutionsolution.org

Clean Air Fleets
http://www.cleanairfleets.org/

EPA Idling Enforcement
http://www.epa.gov/ne/eco/diesel/idling.html#enforcement

BIODIVERSITY

Chattanooga Nature Center
http://www.chattanature.org

COMMUNITY AWARENESS

Guide to Community Energy Efficiency Program
http://www.energyfinder.org/images/other/CEOF_GuideToEnergyEff.pdf

Low Carbon Diet Program
http://www.empowermentinstitute.net/lcd/

Consumer Guide to Home Energy Savings.
http://www.aceee.org/consumerguide/

COMMUNITY GARDENS

Baylor School
http://www.baylorschool.org

Chattanooga Area Food Bank
http://www.chattfoodbank.org

ENERGY CONSERVATION

DOE Weatherization Assistance Program
http://apps1.eere.energy.gov/weatherization/

DOE Energy Efficiency Loan Program
http://apps1.eere.energy.gov/states/alternatives/loans.cfm

San Francisco Green Home Rating System
http://www.builditgreen.org/greenpoint-rated

Portland, OR "Block by Block" program
http://www.smartcommunities.ncat.org/success/block.shtml

EPA Green Power Partnership
http://www.epa.gov/greenpower/

Database of State Incentives for Renewables
http://www.dsireusa.org/

GREEN BUILDINGS

American Institute of Architects – Committee on the Environment (COTE)
http://www.aiachatt.org

green|spaces
http://www.greenspaceschattanooga.com

City of Chattanooga – Land Development Office
http://www.chattanooga.gov

Arlington, VA Green Building Incentive Program
http://www.arlingtonva.us/departments/EnvironmentalServices/epo/EnvironmentalServicesEpoIncentiveProgram.aspx

US Green Building Council Initiatives in Government and Schools
http://www.usgbc.org/DisplayPage.aspx?CMSPageID=1852

EPA Green Buildings
http://www.epa.gov/greenbuilding/

Building Code Assistance Project
http://www.bcap-energy.org/

GREEN INFRASTRUCTURE

City of Chattanooga – Parks and Recreation Department
http://www.chattanooga.gov

LANDSCAPING

Chattanooga Association of Landscape Professionals (CALP)
http://www.chattanoogalandscapers.com

EPA Beneficial Landscaping
http://www.epa.gov/greenkit/landscap.htm

ADDITIONAL RESOURCES AND PARTNERS

Natural Landscaping for Public Officials
http://www.epa.gov/glnpo/greenacres/toolkit/

LIGHTING

Guide to Effective Energy Efficient Street Lighting
http://www.rpi.edu/dept/lrc/nystreet/how-to-planners.pdf

Federal Energy Management Program's Federal Lighting Guide
http://www1.eere.energy.gov/femp/pdfs/fed_light_gde.pdf

PURCHASING

EPA Environmentally Preferable Purchasing Database
http://www.epa.gov/epp/database.htm

Green Seal
http://www.greenseal.org

RECYCLING AND WASTE

Recycle Right (Chattanooga)
http://www.recycleright.org

EPA Waste Conservation Tools
http://www.epa.gov/epawaste/conserve/tools/

Recyclebank
http://www.recyclebank.com/

SCHOOLS

Chattanooga State Technical Community College
http://www.chattanoogastate.edu

University of Tennessee at Chattanooga
http://www.utc.edu

SMART GROWTH & BUILT ENVIRONMENT

Chattanooga-Hamilton County Regional Planning Agency
http://www.chcrpa.org

Smart Growth America
www.smartgrowthamerica.org

SUSTAINABILITY INDUSTRY

Chattanooga Area Chamber of Commerce
http://www.chattanooga-chamber.com

Chattanooga Manufacturers Association
http://www.cma.com

Green Business Guide for Governments
http://www.business.gov/guides/environment/

TRANSPORTATION

Advanced Transportation Technology Institute (ATTI)
http://www.atti-info.org

Chattanooga Bicycle Task Force and Chattanooga Urban Area Transportation Planning Organization (TPO)
http://www.chcrpa.org

Outdoor Chattanooga
http://www.outdoorchattanooga.com

Chattanooga Area Regional Transportation Authority (CARTA)
http://www.carta-bus.org

Victoria Transport Policy Institute
http://www.vtpi.org/

Employer's Commuting Guide
http://www.sfbike.org/?employers

Chapel Hill, NC Community Bicycle Loan Program
http://www.recyclery.info/blue_urban_bikes

Alternative Fuel and Advanced Vehicles Data Center
http://www.afdc.energy.gov/afdc/fuels/electricity.html

List of State and Federal Incentives for Hybrids
http://go.ucsusa.org/hybridcenter/incentives.cfm

Portland Smart Trips Program
http://www.portlandonline.com/TRANSPORTATION/index.cfm?c=ediab

Walking info.org
http://www.walkinginfo.org/

TREES

Guidelines for Developing and Evaluating Tree Ordinances
http://www.isa-arbor.com/publications/tree-ord/resources/treeord.pdf

URBAN AND REGIONAL FORESTS

Take Root
http://www.chattanooga.gov

ADDITIONAL RESOURCES AND PARTNERS

Chattanooga Tree Commission
http://www.chattanooga.gov

WATER

Chattanooga Engineering Department / Stormwater Management
http://www.chattanooga.gov

EPA Water Sense Program
http://www.epa.gov/watersense/

GLOSSARY OF TERMS

A

Alternative Fuel - Any non-petroleum source fuel (i.e., vegetable oil, hydrogen, ethanol).

B

Best Management Practices (BMPs) – Innovative, dynamic and improved practices applied to a problem.

Biodegradable Waste – Type of waste, typically from plant or animal sources, which can be broken down by other living organisms. Unmanaged in a landfill, it produces landfill gas which, if not harnessed, escapes into the atmosphere as methane, a more potent greenhouse gas than carbon dioxide. Through proper waste management, it can be converted into valuable products by composting or by waste-to-energy processes such as anaerobic digestion (breakdown producing biogas) and incineration, both of which can be used to generate electricity.

Biodiesel - Diesel fuel made with animal fat or vegetable oil.

Biomass - Organic matter (living or recently dead) used to generate electricity or produce biofuel, including biodegradable wastes that can be burned as fuel. Industrial biomass can be grown from numerous plant types including switchgrass, hemp, corn, sugarcane, and some types of trees.

Biomimicry – A new science studying nature's models (what we can learn from nature) and taking inspiration from them to solve human problems (i.e, solar cell inspired by processes within a leaf).

Body Mass Index (BMI) – Measures ideal body weight based on height and weight for men and women. (Source: http://www.nhlbisupport.com/bmi/).

Business As Usual (BAU) – If no action is taken to cause change.

C

CACP - Clean Air Climate Protection Software developed by ICLEA - Local Governments for Sustainability (formerly International Council on Local Environmental Initiatives) used to calculate, project and track CO_2 emissions for the community of Chattanooga in the Chattanooga Climate Action Plan.

CAPPA – ICLEA software used to calculate individual reduction measures in the Chattanooga Climate Action Plan.

Carbon Credits – Credits voluntarily traded to offset carbon dioxide (CO_2) emissions. Cap and Trade is the term used for government allocation of pollution credits and rewarding of entities which are able to reduce their emissions below the set standards (cap). Those individuals who do reduce below the standards can sell or trade their credits to individuals who are unable to meet limits as efficiently.

Carbon Footprint – Measures (in units of carbon dioxide) the impact of human activities on the environment (greenhouse gases produced). A carbon footprint can be calculated in many ways (individual, household, business, event, city or county, government, community or country). The amount of carbon dioxide emitted by any of these entities can be reduced by becoming informed about the impact our energy consumption has on the environment, and by changing our day-to-day habits (reducing use).

Clean Energy – Energy from constantly renewable sources (wind, solar, biomass, etc.).

CO_2 – Chemical formula for carbon dioxide (greenhouse gas).

Compact Fluorescent Light Bulb (CFL) – An energy saving light bulb lasting 8 to 15 times longer than incandescent bulbs. Ensure bulbs are Energy Star approved.

Conservation - Saving from loss or depletion (minimizing or eliminating waste).

D

Diversion of Waste – the process of preventing waste from entering the landfill through recycling and composting.

E

Energy Star – A joint program of the U.S. Environmental Protection Agency (EPA) and the U.S. Department of Energy (DOE) helping all to save money and protect the environment through energy efficient products and services (more than 50 categories).

Ethanol (E85) – A fuel made from plants (mainly corn in the U.S.) consisting of 85% ethanol and 15% gasoline that can be used in vehicles with modified engines.

Ethanol fuel (ethyl alcohol) can be made from common plant materials (sugar cane, corn).

GLOSSARY OF TERMS

F

Floodplain (**Flood Plain**) – A strip of relatively flat (plain) and normally dry land alongside a stream, river or lake that is covered by water during a flood.

Floodway – Part of a floodplain (see above) otherwise leveed, reserved for emergency diversion of water during floods; channel of a river or other watercourse referred to as "regulatory floodway;" channel for an overflow of water caused by flooding.

Flood (**100 year**) - A one-hundred-year flood is a statistical calculation indicating there is a 1-in-100 chance that a flood this size will happen during any year. Source: U.S. Geological Survey

Fossil Fuels – Non-renewable sources of energy formed from plants and animals that lived many years ago (coal, oil and natural gas). Found in deposits beneath the earth, most of our energy demands are met by the burning of fossil fuels. Although their origin may have been organic, their carbon has been out of the carbon cycle for a very long time, thus their combustion disturbs the carbon dioxide content of the atmosphere.

G

Geothermal – The term is derived from the Greek words geo (earth) and therme (heat), thus geothermal energy is "heat from within the earth" (steam or hot water) that can be used to heat buildings or generate electricity. Since water is replenished by rainfall and heat is continuously produced inside the earth, geothermal energy is a renewable energy. Direct use and heat applications have almost no negative impact on the environment. Geo power plants do not burn fuel to generate electricity, so their emissions are very low (less than 1% of carbon dioxide over fossil fuels and 97% less acid rain). Source: http://www.eia.doe.gov.

Greenhouse Effect (atmospheric) – Increased concentrations of the greenhouse gases in the atmosphere, causes heat to be trapped and reduces radiation loss.

Greenhouse Gases (**GHG**) – Naturally occurring constituents of the atmosphere (including water vapor, carbon dioxide, methane and nitrous oxide) that can also be emitted by human activities. Although essential to maintaining the temperature of the Earth, the atmospheric carbon dioxide concentration is increasing, and a health concern at some levels. The U.S. EPA ranks the major greenhouse gas contributing end-user sectors as: Industrial, transportation, residential, commercial and agricultural (*U.S. Greenhouse Gas Inventory – U.S. Greenhouse Gas Inventory Reports – Climate Change – Greenhouse Gas Emissions – U.S. EPA).*

Greening – The process of adding sustainability principles into the planning process of an event or operation.

H

Hydrogen – The simplest element known to man (with only one proton), and the most plentiful gas in the universe. In the sun's core, hydrogen atoms combine to form helium atoms (fusion), giving off radiant energy which sustains life on earth. The National Aeronautics and Space Administration (NASA) is the primary user of hydrogen as an energy fuel today (lifting shuttles into space). **Hydrogen batteries** (fuel cells) power the shuttle's electrical systems creating only one by-product – pure water used on board for drinking. Since hydrogen fuels cells are relatively expensive yet to build, smaller ones are being used to provide backup to laptops, cell phones, military operations and approximately 400-500 hydrogen-fueled vehicles in the United States. Hydrogen has great potential as an environmentally clean energy source, but we will need it to be more economical, and will need facilities to make it, store it, and move it – and education to safely use it.

I

ICLEI – Local Governments for Sustainability (formerly International Council on Local Environmental Initiatives). With over 1,028 cities, counties and their associations worldwide as members (including the City of Chattanooga), ICLEI is an international association reporting to the global community founded in 1990. They provide technical consulting, training, information, and computer software (CACP and CAPPA to calculate, project and track CO2 emissions) to their members.

Intelligent Transportation System (**ITS**) – Efforts to add information and communications technology to transport infrastructure and vehicles in order to better manage factors that are at odds with each other (i.e., vehicles, routes) to improve safety, and reduce vehicle wear, travel times and fuel consumption. ITS's vary in technologies applied, from basics to advanced.

J
K
L

Landfill (**Dump or Tip**) – A site for the disposal of waste materials by burial - the oldest form of traditional waste treatment. Proper waste management practices

GLOSSARY OF TERMS

are essential to prevent adverse impacts (i.e., contamination of groundwater or aquifers, off-gassing of methane, pests, etc.).

LED Lighting (**Light-Emitting Diodes**) - Bulbs that last 15 times longer than regular incandescent bulbs, do not become hot, and use less energy. They are tiny light bulbs, thus making them widely used in electronics. However, unlike regular (incandescent) bulbs, they do not have a filament to burn out. They are illuminated solely by the movement of electrons in a semiconductor material which last as long as a transister.

LEED – Leadership in Energy and Environmental Design, developed by the U.S. Green Building Council (USGBC), provides a suite of standards for environmentally sustainabile development. It is an open and transparent process where technical criteria proposed by the LEED committees are publicly reviewed for approval by more than 10,000 USGBC member organizations. Buildings may be rated (scored) by LEED as Certified, Silver, Gold, or Platinum, depending on points attained for different sectors of the building industry (Sustainable sites, water efficiency, energy and atmosphere, materials and resources, indoor environmental quality, innovation and design process). Professionals can become LEED accredited through the LEED Accredited Professional Exam, enabling them to participate in ratings of buildings with various LEED systems. (Source: http://en.wikipedia.org).

LEED-ND – Leadership in Energy and Environmental Design-Neighborhood Development. A new LEED category currently in the pilot stage.

Low Impact Development (**LID**) – An approach to land development (or re-development) that works with nature, balancing growth with environmental integrity.

M

Methane Gas (**CH_4**) – A colorless, odorless gas widely present in nature (including ocean floors), and principal component of natural gas. In the atmosphere, it is eventually oxidized producing CO_2 and water. Methane is a relatively potent greenhouse gas but has a relatively short atmospheric lifetime. It is emitted by human-influenced sources including landfills, natural gas and petroleum systems, agricultural activities, coal mining, stationary and mobile combustion, wastewater treatment, and certain industrial process. Methane capture (gathering) is sometimes employed in these processes, which can then be used for electrical generation.

N

Native Plant Species – Plants that generally occur naturally in a certain growing zone rendering them to be more low maintenance and more easily sustainable.

Non-Toxic Cleaners – Do not contain harmful chemicals (chorine, ammonia, etc.).

O

P

PM2.5 - Particulate matter is the term for particles found in the air including dust, dirt, soot, smoke, and liquid droplets. PM is caused, in part, by vehicles, plants and burning. Particles can be suspended in the air for long periods of time. Some particles are large or dark enough to be seen as soot or smoke. Others are so small that individually they can only be detected with an electron microscope. Particles less than 10 micrometers in diameter (PM_{10}) pose a health concern because they can be inhaled into and accumulate in the respiratory system. Particles less than 2.5 micrometers in diameter ($PM_{2.5}$) are referred to as "fine" particles and are believed to pose the greatest health risks. Because of their small size (approximately 1/30th the average width of a human hair), fine particles can lodge deeply into the lungs causing health problems (especially for some sensitive groups). (Source: http://www.epa.gov). PM2.5 is monitored daily in Hamilton County.

Photovoltaic (**PV**) – A clean source of energy, PV is technology and research related to the application of solar cells for energy by converting sunlight directly into electricity.

Q

R

Recycling – Turning material into a usable raw material at the end of its life, thus diverting it from the waste stream (landfill).

Renewable Energy (**Clean Energy**) – Family of energy sources (solar, hydro, biomass, geothermal, hydrogen, wind) derived from renewable sources (natural processes that are replenished constantly).

Repurpose – Converting an item from one form (or one use) to another, bypassing the waste stream.

Reuse - Objects or goods used multiple times (cloth shopping bags).

GLOSSARY OF TERMS

S

Sanitary Lateral Assistance Program (SLAP) – Program to assist and encourage residents to regularly clean and maintain their sewer lateral, thereby preventing sewer backups and spills. Homeowners are responsible for the entire sewer lateral from the building to the point of connection (including the connection) with the District main line.

Solar Array – Panel of photovoltaic cells generating electricity.

Solar Powered – Powered by solar (sun) energy harnessed from solar panels located nearby.

Stratum – Horizontal layers of similar material (i.e., rock).

Subject Matter Expert (SME) - A person who is an expert in a particular area.

Sustainability (Sustainable Development) - While your definition of sustainability is affected by who you are and what you find to be important, most agree that "making development sustainable to ensure that it meets the needs of the present without compromising the ability of future generations to meet their own needs" fairly defines sustainability. "...economic development, social development and environmental protection are interdependent and mutually reinforcing components of sustainable development, which is the framework for our efforts to achieve a higher quality of life for all people." (Source: http://www.citnet.org).

Sustainable Energy – An energy system that sustains human and ecological health (i.e., from clean energy sources).

T
U
V

Vehicle Miles Traveled (VMTs) – The number of miles that residential vehicles are driven. A key data for highway planning and management, and a common measure of roadway use (traffic patterns/volumes). Along with other data, VMT are often used in estimating congestion, air quality, and potential gas-tax revenues, and can provide a general measure of the level of the nation's economic activity. (Source: http://www.bts.gov).

VOC Paints – Low in volatile organic compounds (VOCs), available as low-VOC and zero-VOC; often with Green Seal certification.

W

Waste Stream - The flow of all solid waste (homes, businesses, manufacturing and institutions) that is recycled, burned, or disposed of in landfills, residential waste stream or recyclable waste stream. Post-consumer waste is produced at the end of a material cycle (i.e., household waste). Pre-consumer waste comes from a manufacturing process (paper production trimmings, damaged cans, etc.) that goes back into the manufacturing process (bypassing waste or recycle).

Wind Power – Electricity generated from wind turbines and producing no pollution. Producing only about 1% of the world's energy, it is the fastest growing form of renewable energy.

X

Xeriscape – A type of low-maintenance landscaping that does not require supplemental irrigation. Long used in desert areas, it is more widely used now to save water.

Y
Z

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http://www.demconvention.com/green-glossary.

See Also Suggested Reading / Works Cited – Chattanooga Climate Action Plan

SUGGESTED READING

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