RESOLUTION NO. 09-268

A RESOLUTION OF THE CITY COMMISSION OF THE CITY OF KEY WEST, FLORIDA, ADOPTING THE CITY OF KEY WEST CLIMATE ACTION PLAN DATED OCTOBER 1, 2009; DIRECTING THE CITY MANAGER TO INITIATE THE RECOMMENDED IMPLEMENTATION PLAN; DIRECTING THE CITY MANAGER TO APPLY FOR ALL APPLICABLE POTENTIAL GRANT MONEY, INCLUDING EPA, DOE AND STATE OF FLORIDA TO FUND THE PLAN; PROVIDING FOR AN EFFECTIVE DATE

BE IT RESOLVED BY THE CITY COMMISSION OF THE CITY OF KEY WEST, FLORIDA, AS FOLLOWS:

Section 1: That the Climate Action Plan dated October 1st, 2009 and attached hereto is approved and adopted.

Section 2: That the City Manager is directed to implement the Plan.

Section 3: That the City Manager is further directed to investigate and apply for all potential applicable grant funding sources, including EPA, DOE and the State of Florida in furtherance of the Plan.

Section 4: That this Resolution shall go into effect immediately upon its passage and adoption and authentication by the

Signature of the presiding officer and the Clerk of the Commission.

Passed and adopted by the City Commission at a meeting held this 20 day of October, 2009.

Authenticated by the presiding officer and Clerk of the Commission on October 21, 2009.

Filed with the Clerk October 21, 2009.

CRAIG CATES, MAYOR

ATTEST:

CHERYL SMITH, CITY CLERK

GENERAL SERVICES DEPARTMENT MEMORANDUM

EXECUTIVE SUMMARY

TO: **Jim Scholl, City Manager**

FROM: **Annalise Mannix, P.E. Manager Environmental Programs**

VIA: **David Fernandez, Assistant City Manager**
Gary Bowman, General Services Director

DATE: **September 21, 2009**

RE: **Resolution Adopting the City of Key West Climate Action Plan; Directing City Manager to initiate the recommended Implementation Plan; approval of grant applications.**

ACTION STATEMENT: A RESOLUTION OF THE CITY COMMISSION OF THE CITY OF KEY WEST, ADOPTING THE CITY OF KEY WEST CLIMATE ACTION PLAN DATED OCTOBER 1, 2009; DIRECTING CITY MANAGER TO INITIATE THE RECOMMENDED IMPLEMENTATION PLAN; DIRECTING CITY MANAGER TO APPLY FOR ALL APPLICABLE STIMULUS EPA, DOE, AND STATE OF FLORIDA GRANT FUNDS POSSIBLE TO FUND THE PLAN.

STRATIGIC PLAN INITIATIVE
The City's Strategic Plan has 7 categories "that encompassed all of the priorities and concerns of our citizens": Community Enhancement; Economic Development; Environmental Management; Infrastructure; Mobility; Organizational Excellence; and Social Services. The completion and implementation of our Climate Action Plan ties closely to the Strategic Goals in each area, specifically:

We seek solutions to assure we maintain our neighborhoods for residential living so as to reflect our diverse population, community character, and protect and enhance our residential quality of life.

We seek to maintain quality service levels and a strong financial position by proactively working to better balance the residential and tourism components of the City's tax base, increase the value of the City services, and diversify the City's revenue base.

We seek to establish and maintain public infrastructure in a cost-effective manner to serve the needs of our citizens and visitors and protect our local environment.

We seek to provide a transportation and land use system for all people with an efficient and pleasurable choice for arriving at their destinations while protecting the historic and residential character and ambiance of Key West.

We seek the preservation, maintenance, and when possible enhancement of the physical environment of Key West and its nearshore waters.

We seek to become an ongoing, role model organization to transform the City into a highly performing municipal corporation that quickly and efficiently responds to the needs of its citizens.

We will strive to effectively support those social service organizations in our community that help local individuals and families seeking assistance to enable them become self-sufficient or successfully manage their day-to-day lives.

BACKGROUND:
Key West is one of the most vulnerable cities to the possible effects of climate change. Scientists suggest that escalating greenhouse gas emissions threaten to increase the Earth's temperature and raise sea levels. The City of Key West City Commission, observing high tides already at street level, has committed to take action here at home and to encourage the rest of the world to do so too.

Committing the city to action upon his election, Mayor Morgan McPherson signed the Mayors Climate Protection Agreement and on August 7, 2007 the City Commission passed resolution 07-160 committing to use the 5-milestone process to reduce carbon emissions. August 5, 2008, the Key West City Commission passed Resolution 08-067 setting the goal of reducing community greenhouse gas emissions by 15% of the 2005 levels by year 2015, directing staff to reduce municipal greenhouse gas emissions by 15% and directing staff to create a community climate action plan.

The City Manager directed Environmental Program staff create a report that was achievable and acceptable to the citizens and businesses of the city. Environmental Programs formed a working group of members to ensure the goals of the City Manager and City Commission was met. Since that time the Climate Action Team has been working almost every other week to create a Climate Action Plan that is achievable and would have community support. The team, made up of about 2 dozen members, created small focus groups to assist in addressing each initiative area to obtain expert opinion and gage community support. They also sought input from standing committees, like the Community Traffic Safety Team, to "piggyback" the long standing knowledge and recommendations of those groups.

The Environmental Programs Manager presents this report to the City Manager for approval and the City Manager presents this staff recommended plan to the City Commission for adoption.

The Climate Action Plan was considered by the City of Key West City Commission Sustainability Advisory Board which unanimously approved recommending adoption of the plan to the City Commission.

PURPOSE & JUSTIFICATION:
The purpose of the Climate Action Plan (CAP) is to reduce Greenhouse Gas Emissions by 15% by 2015 using 2005 as a base year. The reduction in emission correlates, almost directly, to a reduction in electric and fuel use and subsequent costs. The plan details how to reduce emissions in the community and in municipal government operations. It identifies projects, their

efforts, some costs, and benefits. The plan will reduce or offset equivalent carbon dioxide emissions from 400,000 tons to 340,000 tons by 2015. The five major action areas are:

- Energy Supply -Reduce 9831 tons per year of CO2e emissions;
- Solid and Sewage Waste – Reduce 7,055 tons per year of CO2e emissions;
- Transportation – Reduce 12,681 tons per year of CO2e emissions;
- Building Efficiencies – Reduce 30,258 tons per year of CO2e emissions; and
- Sustainability/Sequestration – Absorb 175 tons of CO2 per year.

The plan recommends staffing to implement the plan, a marketing program, some capital projects, and much alliance building to engage and inform the community about climate change and ways to reduce greenhouse gas emissions. Challenges to residents and businesses to measure, monitor and take steps to reduce their individual electric and fuel use are made so the plan may be realized. This Plan is expected to be implemented through 2015, while actions are monitored, measured and improved annually.

Adaptation to climate change is vital to the economic health of Key West and the quality of life of our citizens.

It is important that this plan be adopted, if acceptable, shortly. All federal stimulus DOE funds and many of the EPA funds require the city have an "Energy Efficiency and Conservation Strategy" (EECS) that is part of all grant applications. The use of the CAP is document is recommended as the blue print for the EECS. New funding opportunities are being advertised weekly and the Florida competitive 1.2 million dollar grants will be announced soon.

The City of Key West City Commission has been asked to be a part of the Regional Climate Change Summit in Fort Lauderdale on October 23. The summit will provide the platform for the 4 southeastern Florida counties to develop a partnership to address Climate Change in a regional approach. As 4 of the most affected counties in the country as sea level rises, it is in the City's interest to partner as a region to reduce costs, lobby for appropriate funding and encourage other communities to reduce dependence on non-renewable energy. Adoption of this CAP will cement our resolve to climate change issues locally and regionally and indicate a leadership position in this area.

Of additional import, is the security of our country. As Americans, the security of our county is a high priority. As the largest user of fossil fuels in the world we must ensure we have an energy plan and policy that can provide for stable fuel for the long term. "We" starts with every American town, the City of Key West included. Waiting to see if sea levels rise too far or if land and food shortage drive mass migration, may place America and Key West in defensive maneuvers. The time to start good energy and adaptation policy is now. Retired Army Gen. Gordon R. Sullivan, once said, "We never have 100 percent certainty. We never have it. If you wait until you have 100 percent certainty, something bad is going to happen...".

OPTIONS:
Approve the resolution, adopting the plan, directing finalization of an implementation plan and recommending staff seek grant funding.

Reject the plan and recommend modification to it.

Modify the plan and approve the resolution.

FINANCIAL IMPACT:
Mitigating Greenhouse Gas emissions will be costly over the long haul. The effects of unmitigated climate change will be much more costly to the residents and businesses of Key West. Due to the stimulus package there are numerous funding sources for quality projects that the City can apply for. The initial year in the plan, 2010, is expected to cost the city $144,000 (existing salaries and funded projects). Future years will be better defined through the implementation plan and our ability to fund recommended projects through grants. Alliances and partnerships for initiatives will be aggressively sought. The remaining year's budgets increase dramatically due to the installation of large renewable power sources and the installation of LED lighting that will save the city money over time, the largest with a ROI of 8 years if no grant funding is obtained. There will be no need to make a budget modification this year. The draft budget is explained through discussion of initiatives throughout the plan and is estimated in Appendix 5.

RECOMMENDATION:
Approve this resolution.

Climate Action Plan

October 1st, 2009

Executive Summary

Key West is one of the most vulnerable cities to the effects of climate change. Scientists suggest that escalating greenhouse gas emissions threaten to increase the Earth's temperature and raise sea levels. The City of Key West City Commission, observing high tides already at street level, has committed to take action here at home and to encourage the rest of the world to do so too.

It is widely accepted across the globe that carbon dioxide (CO2) and other greenhouse gases will have a progressively grave effect on the Earth's climate increasing the risk to municipal governments from extreme weather events, changing rainfall patterns, and even the migration of infectious diseases. Research shows that the combustion of fossil fuels releases greenhouse gases (GHG), namely carbon dioxide, and that organic waste releases methane gas, another more destructive GHG, into the atmosphere causing global surface temperatures to increase with related rising sea levels. The impacts on the city vary from reducing habitat for native species to less economic growth.

Local governments share a common duty to improve the quality of life of their citizens. Policies implemented by city governments affect the economic, environmental, and social conditions within the city so it is imperative that those policies are effective and suited to the particular city. Committing the city to action upon his election, Mayor Morgan McPherson signed the Mayors Climate Protection Agreement and on August 7, 2007 the City Commission passed resolution 07-160 committing to use the 5-milestone process to reduce carbon emissions. August 5, 2008, the Key West City Commission passed Resolution 08-067 setting the goal of reducing community greenhouse gas emissions by 15% of the 2005 levels by year 2015, directing staff to reduce municipal emission by 15% and directing staff to create a community climate action plan. This step toward a sustainable future is a leadership role amongst local governments which will surely help bring action here and encouragement to other communities which possibly may be less immediately affected by climate change. Key West, having an average elevation of about 2 feet above recent high tides, will be significantly impacted if GHG emissions are not reduced.

As a result of the Commission's Resolution, Environmental Programs Division was directed to work with the community to develop an action plan to serve as a roadmap to Key West's emissions goal. Community members were recruited to work diligently to develop a plan that is achievable through business, resident, and government agency action. The plan identifies projects, their efforts, costs, and benefits. The following plan will reduce or offset carbon emissions from 400,000 to 340,000 tons. The five major action areas are:

- Energy Supply -Reduce 9831 tons per year of CO2e emissions;
- Solid and Sewage Waste – Reduce 7,055 tons per year of CO2e emissions;
- Transportation – Reduce 12,681 tons per year of CO2e emissions;
- Building Efficiencies – Reduce 30,258 tons per year of CO2e emissions; and
- Sustainability/Sequestration – Absorb 175 tons of CO2 per year.

This Plan is expected to be implemented through 2015, while actions are monitored, measured and improved annually. The mid-term goals from 2015 through 2025 and long term goals through 2050 are expected to be developed by future action teams.

We would like to thank the many dedicated community and city government volunteers for their assistance in preparing this plan or providing much needed input. It will take the entire community to meet our goals and the dedication of the individuals who continuously provide input and support to community boards and committees will help ensure the goals are realistic and achievable. We have attempted to acknowledge everyone here but may have erroneously omitted a contributor, and apologize to any who were.

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1.0
INTRODUCTION

1.1
The Science of Climate Change

It is a well-researched fact that the combustion of fossil fuels releases greenhouse gases, namely carbon dioxide (CO2), into the atmosphere. In a series of lengthy reports, the Intergovernmental Panel on Climate Change (IPCC) found that atmospheric CO2 levels are increasing at an unprecedented and alarming rate due to human consumption of fossil fuels. As a result, the mean global surface temperature has risen during the last century. This increased temperature contributes to rising sea levels, more intense weather events, habitat disruption that could lead to species extinction, and other possible serious effects. It is unknown how successful humans, plants and animals will be at adapting to these relatively rapid changes. While how much the climate is warming, what effects can be predicted, and to what degree humans are responsible are avidly debated and research questioned, the vast majority of scientists agree that it is time to take strong precautionary measures to stabilize greenhouse gas emissions and slow global warming.

A carbon sink is a natural or manmade reservoir that accumulated and stores some carbon chemical compound for an indefinite period. The main carbon sinks are photosynthesis of algae and plants and absorption of CO2 by the oceans. Photosynthesis is a process that converts carbon dioxide into organic compounds using the energy from sunlight. Photosynthesis uses carbon dioxide and water releases oxygen as a waste product. Some carbon is stored in soils. The carbon in the oceans dissolve and in doing so creates a variety of compounds. IT is surmised that ocean acidification is occurring due to volume of CO2 being absorbed into the water.

In addition to carbon emissions themselves, additional greenhouse gasses remain in the atmosphere due to accelerated deforestation worldwide. The reduction of forests reduced photosynthesis which in turn reduces the volume of CO2 removed. This is especially true of salt water marshes, including mangrove habitat. Marshes are the best carbon sink of all natural sequestering options. Soil in Northern climates store large amounts of carbon. As these climates are seeing less frost, the carbon sink is decreasing.

1.2
Natural Warming

Energy from the sun radiates into the Earth's atmosphere and is absorbed into the Earth's surface, much of it radiates back into space, especially at night; this heating creates weather and climate. Some of this energy is trapped by naturally occurring greenhouse gases such as carbon dioxide and methane. GHGs are a necessary to keep the earths temperature relatively steady. As the concentration of GHGs continues to increase in the atmosphere, the Earth's temperature is

quickly rising above levels expected in such a short time frame. U.S. National Oceanic and Atmospheric Administration records indicate the Earth's average surface temperature has increased by about 1.2 to 1.4° Fahrenheit in the past 100 years. Eleven of the twelve years from 1995-2006 rank among the twelve warmest years in the instrumental record of global surface temperature (since 1850), with the warmest year being 2005. IPCC Fourth Assessment Report "Climate Change 2007: The Synthesis Report"

1.3
Earth's Climate is Affected by Human Activity

The Bush White House asked the National Academy of Sciences (NAS) to assess the scientific conclusions regarding climate change and projections of future change. The NAS report, *Understanding and Responding to Climate Change (2008)*, stated, "Climate changes observed over the last several decades are likely mostly due to human activities....and additional evidence collected over the past several years has increased confidence in this conclusion."

Some GHGs in the atmosphere is a natural part of the Earth's climate system and is beneficial to our environment. However, extensive combustion of fossil fuel and reduction of the world's forests over the past few hundred years has caused higher greenhouse gas concentrations in the Earth's atmosphere. GHG concentration has increased 70% since 1970. Twenty-four percent of this increase occurred between 1990 and 2004. Vehicular and electric power plant fossil fuel consumption along with deforestation resulted in 7.1 billion metric tons of CO2 emissions yearly.

Although there is great uncertainty on the exact increase in temperature and sea level rise and the timing of it, even among the scientist of the IPCC, climate models do predict and the scientists agree, there will be an increase in the Earth's surface temperature from 2.5 to 10.4° F by 2100 if emissions are not mitigated. The IPCC scientists are certain that human activities are changing the composition of the atmosphere and that in turn will cause other effects. The scientists agree one effect will be sea level rise.

Local and state governments can have a large impact on climate action. The President's Secretary of Energy, Steven Chu, lauded California "California has kept its emissions constant since 1970 while the rest of the US has increased their emissions by 40%."

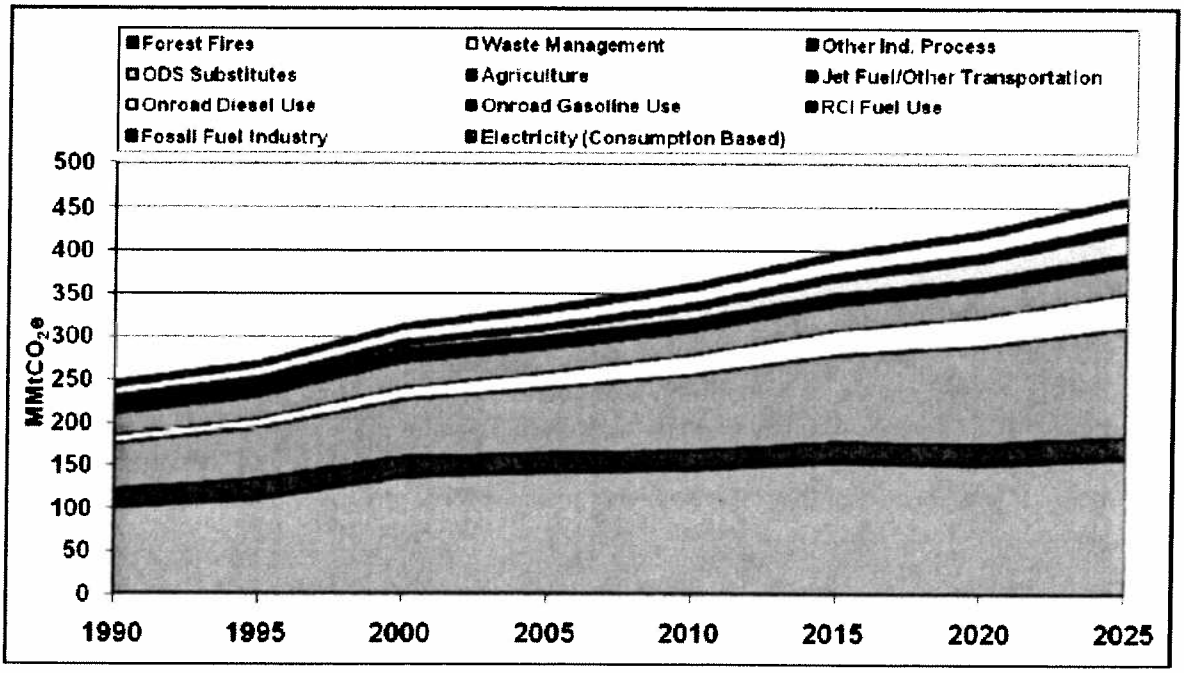
2.0
Florida's Emissions of Greenhouse Gases

In 2007 Florida Governor Charlie Christ created the Governor's Action Team on Energy and Climate Change to develop a series of recommendations for addressing climate change in Florida. A summary of the findings relating to climate change and the potential impacts on Florida is provided below. The team found that "There are numerous benefits, both environmental and economic, which accrue both to the State of Florida and the private sector, due to pursuing energy efficiency and investing in alternative energy technologies; with planning

these may be able override the negative impacts of climate change."* *Florida Governor's Action Team on Energy and Climate Change Final Report

In order to complete Florida's Energy and Climate Change Action Plan the FDEP and the Center for Climate Strategies prepared a state inventory and projections of GHG emissions. The plan stated "While climate science is complex and evolving, the scientific community has reached a strong consensus that warming is largely the result of carbon dioxide and other GHG emissions from human activities." Florida's emissions since 1990 are expected to almost double by 2025. Florida GHG emissions for transportation and electric emissions account for 81% of the states emissions.

The table below is an excerpt from the state plan.



*Florida Governor's Action Team on Energy and Climate Change Final Report

Figure 1 Actual and Projected Greenhouse Gas Emissions in Florida by Sector, 1990-2025

It is clear from the reports of the IPCC and the Governors Action Team on Energy and Climate Change that all Floridians should take action to reduce GHG emissions in an effort to minimize the subsequent climatic effects.

The State Action Team reported the impacts on Florida will include among other changes:

- Air temperature rise of 2.5 to 10.4 degrees Fahrenheit
- Sea level rise between 4 and 35 inches which could inundate wetlands and low lands
- Precipitation changes
- Tropical cyclone changes

- Decreased freshwater resources
- Increased sea water temperatures affecting fisheries can corals
- Increased ocean acidification affecting shellfish

Left unmitigated, Floridians will contribute to the very dangerous rise in sea level. By most nations acting immediately to reduce emissions the world may be able to avoid or minimize the negative effect of GHGs. Floridians can be encouraged into climate action through a cap and trade system, taxing energy or emissions, and other market–based solutions. Florida's Action Team recommended a regulatory, market-based cap-and-trade emissions limiting program that will be able to urge public and private sector to invest in new technology, and better construction which will stimulate economic development.

Florida's Governor's Action Team on Energy and Climate Change October 15, 2008 Phase 2 report contains over 50 policy recommendations and recommends the legislature "work to encourage the development of alternative energies to achieve the goals of:

- Mitigating the potential impacts to Florida from climate change;
- Further stimulating economic development in the state associated with the existing and emerging alternative energy industries; and
- Achieving energy security by reducing dependence on foreign fuels."

3.0
Key West Greenhouse Gas Emissions

ICLEI Local Governments for Sustainability, founded in 1990 is an international agency of over 1105 agencies. ICLEI USA, was launched in the United States in 1995 and has grown to more than 500 US cities and counties providing leadership on climate protection and sustainability development. It was formed of local governments to assist local governments in developing sustainable and practical solutions to global environmental problems. The ICLEI Cities for Climate Protection (CCP) Campaign focuses on global warming and climate change. CCP is a performance-oriented campaign that offers a framework for local governments to reduce greenhouse gas emissions and improve livability within their municipalities. The CCP Campaign achieves these results by linking climate mitigation with actions that improve local air quality, reduce local governments' operating costs, and address other existing municipal concerns.

The CCP Campaign involves a five-milestone process to achieve GHG emissions reductions:

- Milestone One: Conduct a baseline emissions inventory and forecast.
- Milestone Two: Set an emissions reduction target.
- Milestone Three: Develop a Local Action Plan for reducing emissions.
- Milestone Four: Implement policies and measures.
- Milestone Five: Monitor emissions reductions and verify results.

On August 7, 2007, the City of Key West adopted its resolution for climate protection and officially joined ICLEI's Cities for Climate Protection Campaign. This Climate Action Plan sees the City achieving milestone three of the process. A copy of the baseline inventory is

available in the appendix and on the City website under the Clean and Green portal which can be found at: www.keywestcity.com/department/board.asp?fDD_21-312

The inventory is based on accepted international protocols and keeps with a similar approach other cities with climate change objectives have used. It is not meant to be precise GHG accounting, but it does provide a high level examination of the City's GHG emissions. Utilizing the results of the Inventory enables the City to develop policies and programs that will create the greatest emissions savings.

The Key West emissions inventory was completed in 2008. The inventory's baseline year is 2005; 2007 provides an interim measure. The report indicates that the City of Key West community produced 399,592 tons of carbon dioxide emissions, equating to 16.7 tons of GHG emissions per capita for the city. A forecast of predicted emissions unmitigated by 2015 is 416,826 tons CO2e.

The top energy user in the city is the US Navy emitting about 45,000 tons of CO2e. The remaining top ten emitters are the Monroe County Detention Facility, the City of Key West, the hospital and college, as well as 4 hotels and one grocery store.

To put the use of energy in a very basic level US Dept of Energy Secretary Steven Chu, a Nobel Prize winner for physics, described America's energy use in units of caloric energy this way; "every person in the United States uses energy as if they had 100 personal servants at their beck and call" to clean, transport, and cook daily.

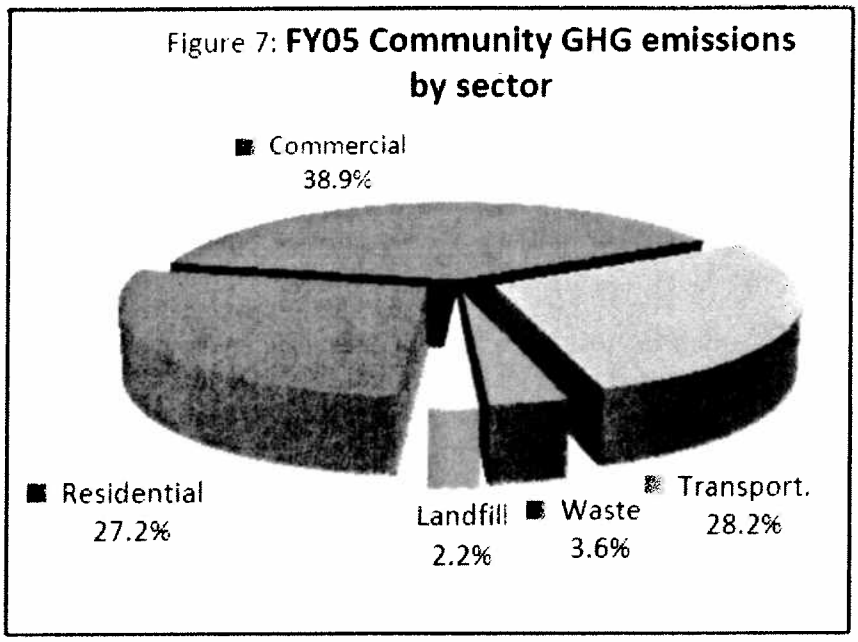
Keys Energy Services, Key West's electric provider obtains its electricity though the Florida Municipal Power Agency (FMPA). The FMPA purchases its energy from a variety of sources. Seventy percent of the power is derived from natural gas. Smaller percentages are coal and oil, with a slight purchase of nuclear, and shortly, solar will be added. Natural gas produces much less GHG than coal or oil.

The following table summarizes GHG emissions:

GHG Emissions by Sector – Key West 2005

Sector	Percent	TONS CO2e
Residential	27.2%	108,689 tons
Commercial	38.8%	155,322 tons
Transportation	28.2%	112,492 tons
Waste	3.6%	14,260 tons
Landfill	2.2%	8,800 tons

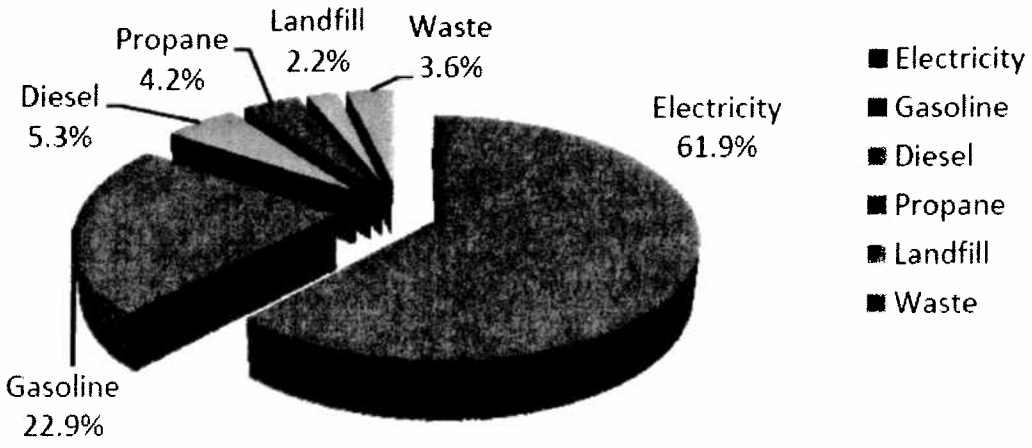
Table 1 - GHG Emissions by Sector – Key West 2005



Excerpted from City of Key West Green House Gas Emissions Inventory January, 2008

Figure 2 – FY05 Community GHG Emissions by Sector

Figure 12 - FY05 Community Inventory by Energy Source



Excerpted from City of Key West Green House Gas Emissions Inventory January, 2008

Figure 3 – FY05 Community Inventory by Energy Source

4.0
KEY WEST CLIMATE ACTION PLAN

This plan aims to identify potential projects of relevance to Key West and explore some possible financial and environmental impacts of proposed initiative. The overarching vision of the plan is to develop a sustainable energy future for Key West. It includes baseline data and emissions reduction strategies for all sectors – commercial, residential, public/federal, transportation, and solid waste. It also addresses city operations, water conservation and urban forestry.

The City's primary role will be to act as a facilitator, educator, and to promote market transformation for energy efficiency and renewable energy products and services. The plan outlines five primary strategies for reducing emissions: increase energy efficiency of buildings; reduce waste related emissions, reduce transportation related emissions, improve energy transmission/increase renewable energy options, and increase carbon sequestration. Each section outlines overarching strategies and potential actions the City and community are encouraged to take to reduce emissions. The plan concludes with an implementation plan that outlines specific actions to be implemented from 2009 through 2015 (with recommendations for funding, maintenance, and improvement) and quantifies the projected impacts, including estimated GHG reductions, private sector savings and the net cost per ton of carbon dioxide equivalents (CO2e) reduced.

The annual total budget for the City of Key West Government required to achieve this reduction ranges from $144,000 this year in mostly existing staff salaries to 1.7 millions in 2013 to fund alternative energy products. The plan assumes that funds for marketing, outreach, energy management and subsidies for critical services, such as energy audits, will comprise the majority of the operations budget. Capital expenses are required, however all have very positive returns on investment and grant opportunities are available. Significant funding for renewable energy purchases may be required in 2015 to cover an emissions reduction shortfall, thereby increasing the amount of funds needed in 2015 as compared to the average annual budgets for years 2010 to 2014.

Achieving the Key West goal requires not only a substantial financial commitment, but also the dedication of staff resources and political will. While the City recognizes that Key West's actions are far too small to impact global greenhouse gas emission trends and the progression of global warming, Key West *is* one of the most affected cities in the country.

The creation of this Local Climate Action Plan outlines the policies and measures recommended to enable Key West to achieve its 15% by 2015 reduction on baseline 2005 levels. This plan will need to be fully developed into an implementation plan to include a timeline, a description of financing mechanisms, and an assignment of responsibility to City departments and staff as well as other government agencies, business groups and community organizations. Cost estimates depend on what options are chosen to bring the community to the emissions reduction goal. Different options require different levels of investment. For example, implementing a wide array of energy efficiency measures would require significant amounts of capital, but also produces a return on investment, creates jobs, and institutes long-term improvements in the environment.

However, energy efficiency alone is unlikely to reach the goal. The City could also choose regulatory approaches that cost relatively little to implement and achieve full market penetration. While no regulatory strategies are being proposed for immediate implementation, the Climate Action Team has recommended that the options presented in the plan be considered in the future. It is likely that a combination of these options will be needed. This plan, as well as the implementation plan recommendations, attempts to assist staff in developing the appropriate mix of strategies and investments.

4.1
Criteria and Recommendations

In analyzing the wide variety of options available to reduce greenhouse gases, the Climate Action Team, made up of members of the public, utilities, commerce, tourism and local government agencies, applied the following criteria to their process of review and deliberation:
Viability – Is the proposed action financially, technologically, and politically viable?
Cost-effectiveness – Applying full cost accounting principles, as the distributions of costs and benefits equitable and reasonable?
Implementability – Is there a readiness to implement and are the potential barriers to implementation low?
Achievement of goals – Does the proposed action contribute to short and long-term reduction goals? Is there a cumulative impact over time?
Engagement – How can the impact potential of the proposed action be balanced with the potential for public engagement and education?

This plan draws two broad visions of the future; the first is for our business community and the second for our residential community. Each vision is made up of various components from the specific five target priority areas the CAT recommends to reach the 2015 Goal and also highlights areas to be targeted through educational efforts to assist residents and businesses to make relatively simple and affordable changes with long-term cost savings and reduced carbon emissions.

5.0
The Vision

The vision of the Climate Action Plan (CAP) is to guide Key West towards a sustainable future that dramatically reduces greenhouse gas emissions from current levels, while meeting the needs of present and future generations. Strategies presented in the CAP include increased energy efficiency, waste diversion, alternative transportation, building efficiencies, and sustainability/carbon sequestration. A report completed for the Sierra Club titled "Sustainable Cities: Best Practices for Renewable Energy and Energy Efficiency" by Ken Regelson, October, 2005 identifies the following key elements cities are using to become more sustainable:

- Leadership
- A Plan
- Efficiency Rebate -Programs
- Renewable Programs

- Funding
- Green Building
- Communications
- Multifamily Building Programs
- Training
- Income Qualified Programs
- Inspections, Audits, and Measurements
- Green Roofs

A summary of key findings drawn from four cities across the United States emphasized:
Leadership – most often the original impetus came from a mayor or commissioner.
A Plan – All had a master plan or roadmap to follow.
Funding – Funding for energy efficiency (EE) and renewable energy (RE) came from electric power rates, grants, state programs, and integration into normal city budgets. Investments lead to reduced energy costs.
Communications – Excellent websites include details on programs, customized fact sheets (e.g., on green building practices), reports, and case studies. All had award programs or on-line show cases for excellence in green building.
Training – Rather than emphasize EE and RE as topics themselves, resident and business training often focused on the human concerns of saving money, or sealing leaks for comfort, or on indoor air quality and health.
Inspections, Audits and Measurement – Free or low cost energy audits and inspections are provided. Measurements and analysis help insure that RE and EE investments are cost-effective and popular with residents. Commissioning of buildings verifies that RE and EE equipment is installed and operated properly.
Efficiency Rebate Programs – There were often targeted to specific reductions in peak electricity use, with efficiency rebates set as a fraction of the projected cost of building the next power plant.
Renewable Programs – Include both green energy purchasing programs and rebates for resident sited solar.
Green Building – Lead by example. Start with city-owned buildings to develop local expertise. Green building was then encouraged generally with assistance, rebates, grants, award programs, and some regulation.
Multi-Family Building Programs – Focused on the needs of renters and apartment owners.
Income Qualified Programs – Recognize that low income residents most need the comfort and money savings from EE, but can least afford it, so additional incentives for EE are provided.
Green Roofs – Chicago and Portland have green roof programs for the benefits of energy savings, urban heat island reduction, rainwater retention, air quality improvement, and beautification.

While the City recognizes that Key West's actions are far too small to impact global greenhouse gas emission trends, it also recognizes that the cost of inaction could be very high and that inaction represents a missed opportunity for saving money (costs of delay) and improving the economic environmental and social sustainability of the community. A sustainable energy future means the following changes for Key West:

- More efficient and healthier buildings that reduce community energy costs;
- Keys shuttles conveniently linking different neighborhoods and business districts;
- Wide availability of sustainable products, including green building materials, high efficiency building equipment and cars, alternative fuels, organic food, community composts, and more;
- Renewable energy and distributed generation systems to hedge against energy price volatility and electricity system vulnerabilities;
- Innovative, social programs ensuring that lower-income residents benefit from the shifts and changes brought about by the CAP;
- A vibrant economy and skilled workforce based on the demand for and provision of sustainable products and services; and
- An even stronger sense of community pride in Key West's efforts to protect the environment from the impacts of global warming.

6.0
Program Recommendations

The following recommendations, if fully implemented, will demonstrate Key West's commitment to addressing the problem of global warming by reducing greenhouse gas emissions by 15% by 2015 using 2005 baseline data. The current city-wide emissions are about 400,000 tons CO2e annually. Therefore the 15% reduction goal is a reduction of 60,000 tons of CO2e.

6.1
Energy – Key West will reduce annual greenhouse emissions by 10,731 tons by using renewable energy, conservation, and more efficient power.

1. Replace standard street lights with Solar LED lighting - 986 tons
2. Replace old fashioned lights with LED lighting - 540
3. Install LED lighting and solar generation system at City (Park n Ride Garage) -130 tons
4. Install alternative energy systems:
    a. Wind energy generator at Waste Water Treatment Plant (WWTP) and land fill - 500 tons;
    b. KES/FMPA/NOAA solar project, (37kw)
    c. KES/FMPA/NOAA wind project (6kW capacity)
5. City Commission to Partner with Utility Board of the City of Key West to develop a series of goals, timelines and benchmarks to reduce emissions by 6,814 tons CO2e through:
    a. enhanced program of purchasing electric power generated by low co2 emission fuels and non-combustible energy
    b. Energy demand or tiered/inverted rate incentive program to encourage conservation and fund improved energy audits or utility "green energy improvements".
    c. Encourage Keys Energy Services to continue to consider "smart grid" and "smart meter" systems.
    d. Encourage continued improvement of transmission and distribution systems to reduce line losses.

e. Partner in rebate and marketing program to promote conservation as cost effective "climate action".

6. Consider the advantage of taxing electric utility and propane use to encourage conservation; dedicate funding for a revolving loan fund for weatherizing and renewable energy projects. Tax at a level that simple conservation at the desired level will not increase current/expected rates. (note, increased cost during this economic climate may not be feasible by 2015)- (900 tons).

7. The City of Key West will monthly publish in a local newspaper the current and previous 24 month electric consumption by the City of Key West government in order for the citizens to judge the progress towards reducing consumption.

8. The Utility Board shall monthly publish in a local newspaper the current and previous 24 months the total and per customer electric consumption by all residences and businesses in order to for the citizens to evaluate progress towards the goal of reducing consumption.

6.2

Sewage and Solid Waste and Water Supply – Key West will reduce waste and water supply greenhouse gas emissions by 7,055 tons through water conservation, system conservation, alternative waste disposal and modified waste contracts

1. Establish multiple commercial recycling and waste vendors to increase competition and improve services. Ensure contracts have performance measures and quarterly and annual performance reviews.

2. Implement a pay as you throw trash initiative to incentivize composting, recycling, reducing and re-using.

3. Create a "solids" composting system for the waste water treatment plant and a composting system and mulch program for organic solid waste.

4. Implement an energy efficiency program, or ESCO for the waster water treatment system.

5. Partner with the FKAA to implement a reclaimed water system reducing the need for pumping fresh water from the mainland.

6. Partner with the FKAA to create a coordinated water conservation program.

"We have saved 40% of our waste costs by reducing, reusing, composting and recycling; that is an annual savings of $8,640" - Cindy DeRocher, General Manager, The Gardens Hotel

6.3

Transportation - Key West will reduce green house gas emissions by 12,681 tons by reducing vehicle miles traveled, conservation and increasing alternative transportation use.

1. Implement the full Bicycle/Pedestrian Plan as approved by the City Commission, along with recommendations listed in the actions section of this plan including curb cuts, safe sidewalks, increase bicycle parking and bike racks at every lower keys shuttle bus stop.

2. Establish sub-committee as an authority to oversea private and public sector assistance in promoting and enabling people to use alternatives to the car; carry out surveys of bus users and non-users and whether commercial interests could assist in promoting public transport such as "free pass to shop" at grocery outlets, employee incentives (the US Navy provides public transit passes to military and civilian employees),and pay not to park programs.

3. Promote "green" and "Smart Fleets" through incentives, driver training, creation of alternative fuel stations. Lead by example through greening of the city bus and vehicle fleet; commission a benefit analysis of using propane for local busses.

4. Promote car pooling, car pool website and electric car stations at all city parking lots; ensure public transit system has bus route timing that encourage commuting to work and back home.

5. Improve bus ridership through minor improvements including a simple to read map and schedule to be posted and maintained at every bus stop, shade, ADA access and weather protection at stops, a marketing campaign and improved bus pass and fare sales.

6. Require special events receiving permits from the City Commission to include a plan to promote transit, pedestrians, bicycles and shared rides. Such a plan would include alternative modes of travel in event publicity, providing additional bicycle parking, provide satellite locations for people to park and ride transit and adding temporary transit service to meet additional demand.

6.4

Buildings - Key West will increase energy efficiency of commercial, residential and government buildings to reduce 30,258 tons of green house gasses.

1. Hire a professional energy manager to work for city to develop energy efficiencies in all city-owned buildings, then assist the remaining top 10 electric users in energy efficiency measures, then work with commercial and residential users. Develop partnerships with all large electric users including Naval Air Station Key West.

2. Create an outreach program to reach every resident and business manager and educate them in using simple clear actions that will save money and reduce greenhouse gas emissions.

3. Implement green office audit for all City owned buildings with milestones, goals, and timelines – develop recognition system for staff. Share audit program with other public agencies.

4. City to create incentives if a permittee or developer uses alternative power, like increased density, reduced parking requirements, fast permitting, etc.

5. Implement ordinance to encourage building energy efficiency improvements in leased spaces, and request that all large building owners consider commissioning studies or an energy savings performance contracting program.

6. Create an alliance of city staff, contractors, planners, architects, engineers, the Monroe County Extension Service, FKCC and educators to encourage energy efficient building and renovations and institute contractor/designer/owner training programs.

> "In the two years since we opened our Personal Training Center, our efforts to go green have helped us save approximately $9,000 per year. Most projects gave us a positive cash flow within 90 days and the long term projects will pay off for more than 20 years. Our business is a classic example of how small companies can use green ideas to improve their customer experience, save money and the environment all at the same time."
>
> Dan Reynen - WeBeFit.com

7. Require all affordable housing to be green building certified by a recognized certification process (i.e. LEED) which will reduce monthly energy costs of tenants or owners on a continuing basis.

6.5

Sustainability/Sequestration – Key West will reduce1000 tons of greenhouse gasses through better land use planning, and increase the sequestration of 175 tons of carbon dioxide

1. Create a non-profit organization for the planting and maintenance of 10,000 trees, mangroves and other landscaping in Key West. This will provide for a reduction of the city's "heat island" effect an increase in shade on homes and businesses which reduces cooling bills, and an increase the walk-ability of the city.

2. Establish a certified "Carbon Offset" fund program for home and business owners, event organizers and visitors that accepts donated funds for the tree planting, operated by a non-profit agency and marketed by the City and agency.

3. Promote special events such as "carbon neutral" and "earth friendly" by incentivizing them through the City permitting process. Carbon neutral events may reduce their carbon footprint and then donate to a certified carbon offset fund, like the proposed tree planting fund, to create a neutral event.

4. Use "Smart Growth" principals for all developments and re-developments in Key West. Actively encourage the extensive use of green building techniques in all renovations and new construction.

5. Impart island pride and the ability to take action in every citizen, worker and visitor in Key West through continued marketing, education and outreach to all; apply the principles of total quality leadership to promote continuous commitment to improving the local environment and quality of life. The city and all its associates should serve as role models through deed and words.

"At MCC, we strive to be a completely 'polystyrene-free' venue. In this way we not only live out the principles of being 'green' but we ask those who use our space to do the same out of respect for our philosophy and the principles we hold dear. This measured approach simultaneously educates and encourages our sister-organizations (and all the individuals therein) to adopt these and other changes that may seem small, but ultimately impact the entire community in very substantial ways."
- Joe Mc Murray, Pastor

6. The City of Key West Planning and Building Departments will promote and suggest energy conservation measures when reviewing new developments and redeveloped properties such as shading buildings with native vegetation, adopting building shapes and orientation to reduce heat gain, shading parking lots with native vegetation around buildings, using white roofs to reduce heat gain, and providing more insulation than the minimum to requirement.

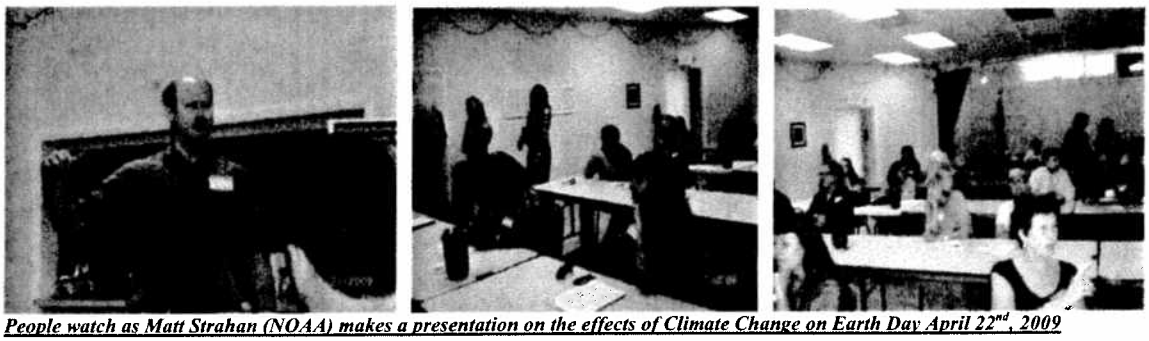
7. The City of Key West will revise the Architectural Guidelines in the Historic District to accommodate white roofs, wind power, solar electric panels and solar water heaters.

7.0
Operational Recommendations

The CAT is eager to see the City take a lead in implementing the above recommendations and would suggest tasking a full time "green coordinator" or "sustainability manager" to oversee and report on progress towards achievement of goals and initiatives. This would both avoid duplication of effort as well increase effective planning and evaluation of each element of the plan. The coordinator would work closely with residents, commerce, public and not-for-profit agencies to extend educational awareness initiatives and act as a "one-stop shop" contact point for all enquiries.

7.1
Key Educational Points/Responsibilities for Green Coordinator

An overarching educational plan is recommended as a way of obtaining economy of scale discounts on marketing and advertising costs. It is vital to enter partnerships with other community and government agencies to adopt a holistic approach to greenhouse gas reduction. Organizations that will be key to the success of the plan will include the Florida Keys Aqueduct Authority, Keys Energy Services, Naval Air Station Key West, Florida Keys Community College, City Tree Commission, Botanical Gardens Society, Garden Club, grocery stores, Hotel Motel Association, Inn Keepers Association, Monroe County, Chamber of Commerce, Key West Housing Authority, Monroe County School District, Florida Department of Transportation Technical Advisory Committee, and taxi companies.



People watch as Matt Strahan (NOAA) makes a presentation on the effects of Climate Change on Earth Day April 22nd, 2009

The four southeastern counties of Florida will be meeting in October, 2009 for the first Regional Climate Leadership Summit. The goal of the meeting will be to enter into a Southeast Florida Regional Climate Change Compact for the purpose of recognizing the need for immediate, collaborative and visionary action to mitigate for and adapt to the consequences of climate change. The Coordinator should meet with staff of these agencies aggregate resources, share successes, training expenses, create purchasing alliances for services and goods. Alliances with Monroe County and Keys municipalities in marketing and outreach can be built to reduce each agency's cost of many similar projects or programs. The TDC has budgeted for substantial funding for marketing the keys as a green destination to capture the socially conscious consumer. Alignment of CAP goals and tourism goals should be considered a priority.

The Green Coordinator will be required to maximize collaborative efforts to bring all initiatives to success under the umbrella program of carbon emission reduction:

- Seek alliance and partnership opportunities;
- Hire a marketing firm to work on project and develop objectives and performance measures:
- Finalize alliances and partnerships and objectives of each partner;
- Supervise marketing program and report on performance;
- Develop educational programs, objectives and performance measures;
- Supervise advertising program and measure performance;
- Recommend grant programs;
- Provide an annual report of the performance of the program and provide monthly updates to the City Commission.

The educational and outreach portion of this plan is the most important component. It includes outreach to partners, the development of alliances in the community and educational contact with all members of the community. The Coordinator will be responsible to ensure it is fully implemented. The recommended outreach program is detailed in the Education and Outreach Strategy section of the plan as well as in the Initiatives Section.

7.2
Education and Outreach Strategy

Each program area in the Climate Action Plan (CAP) has an educational component. The most important aspect of each CAP program is the educational component. Little societal change will occur if a substantial outreach and educational program is not initiated. This plan is intended to be as comprehensive as possible, including multiple areas impacting marketing communications, for the purpose of meeting the goals set by the City Commission. The program includes marketing assessment an outreach strategy and design concept media strategy that itemizes the best combination of outreach strategies to engage the community. The plan will pull together all the elements of the Climate Action Plan to clarify and make consistent the messages being expressed by the City to staff, citizens, decision-makers, customers and other key audiences.

The City of Key West should strive to be known as a community with solutions for climate change. Our position as a major tourist destination provides the community with the opportunity to become a marketing ground for innovation. The community should therefore approach innovators and offer locations to highlight new products to the visitors from around the world.

As the community continues to make progress, tourist marketing efforts should highlight that Key West is the Community with Solutions. This concept should be promoted through such marketing efforts as those by the Tourist Development Council, the Key West Chamber of Commerce, private businesses and the Florida Keys National Marine Sanctuary.

7.21

Marketing and Advertising

In order to be successful in reducing carbon emissions citizens have to make changes to lifestyle. It is difficult to modify ones lifestyle for ones personal benefit, none-the-less when people are asked to conserve desirable resources or spend money to make improvements. In order to educate people about climate change, and remove barriers to change a significant effort must be made in what is normally termed marketing and advertising. This plan is intended to be as comprehensive as possible, including multiple areas impacting marketing communications, for the purpose of meeting the goals set by the City Commission.

Marketing is the process of determining who the audience is, determining what the barriers to change are, and what motivates them to take action and not take action. This is not as simple as it seems since most people are not alike. Focus groups and surveys are typically used to assess the motivation in localized areas. The marketing assessment should uncover:

- Perceived barriers
- Perceived benefits
- Why is it in the best interest of the target audience to take action?
- How can the barriers be lowered and the benefits increased?
- What incentives can be offered to the target audience to take action?
- What is the target audience doing instead of the preferred action? And,
- What are the benefits they feel that they would be giving up?

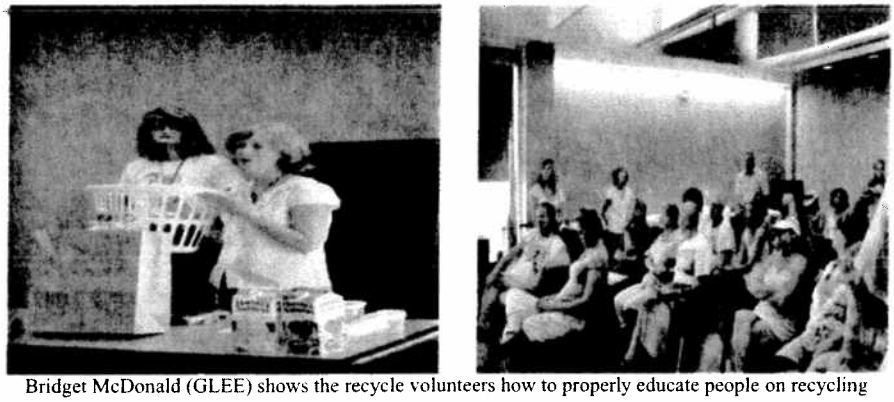
An education plan, or more specifically a communications plan, must be developed that creates an outreach strategy and design concept. The plan will determine target audiences; determine which barriers need to be lowered; which target areas need incentives; and what the best way to reach each target audience. The plan will include a media strategy that itemizes the best combination of outreach strategies to engage the community. It will also recommend which other groups in the city should be involved as partners to ensure a successful plan. The plan will pull together all the elements of the Climate Action Plan to clarify and make consistent the messages being expressed by the City to staff, citizens, decision-makers, customers and other key audiences.

A Brand Promise is the guaranteed deliverable that a brand or product provides to a consumer that matters to the consumer and differentiates the brand or product from its competitors. (For example: FedEx = peace of mind; Southwest Airlines = low fares) GLEE Green Business Certification = social conscience. Generally these are the characteristics by which products are identified and differentiated. Product attributes usually comprise features, functions, benefits, and uses. Our total program, we will call "Green Program" for ease of use in this the chapter, will be analyzed to find a thread of benefits, functions, etc. that connects all aspects of the program. We will include in all communications our attributes and inspirational attributes that will deliver the green program promise.

Of critical importance in our marketing communications is the positioning of the "product". This is the way consumers, users, buyers and others view competitive brands or types of products *relative to other brands or products*. Keeping all our citizens focused on the Key West plan as opposed to the many other green programs that are available will better performance and measurement for the CAP. The positioning of the Green Program will be determined. In order to fully live the new Green Program, it is important that we present voice and personality that is consistent with our attributes. This is how an organization expresses itself to give it character and personality, specifically, voice and personality can include:

- Words and language used
- Attitude and tone conveyed
- Ambiance and sound created

It's an important emotional connection for both employees and "customers" to hang on to, differentiating the Green Program from other climate programs or city services, which may cause confusion and subsequent inaction. It is also important that the program's voice and personality be repeated consistently through all communications. With repetition, it creates credibility and trust. It also sets a mood and expectation for the "Green" experience.



Bridget McDonald (GLEE) shows the recycle volunteers how to properly educate people on recycling

A value proposition is directed at customers/users/citizens and is that which sets green living apart, from the status quo. It incorporates the unique, real and credible benefits our plan provides. It should also be sharply defined. The Green Program probably has a number of value propositions, each addressed to a specific target audience. The communications plan will create our value proposition. Once a brand position is agreed upon, key marketing themes and tag lines will be created and deliverables for the program will be agreed upon.

An internal and external launch plan will be developed. It is important to have all of the City's staff on board with the green message. We will want to create passion among employees to act in a Green manner and challenge others to do so. We will ensure consistency of messages both in the media and from staff. Elements of the internal plan include:

- Communication and understanding;
- Top down support and modeling;
- Peer-to-peer support and modeling; and
- Reward system.

The external launch plan will include an awareness study to provide a baseline to measure achievement of awareness goals. Then a publicity/public relations plan will be developed, a kick-off event held to implement the new outreach strategy and then monitoring and evaluation of the strategy will occur. It is best to evaluate the process along the way to guide and shape the program. In order to be able to best evaluate the success of the program, it is important to set indicators and baselines during the planning stage so that new data can be compared to the baseline data.

The external launch plan will include the following education and outreach strategies:

- Designing websites, distributing electronic newsletters, email messages;
- Creating brochures, print ads, flyers, and postcards for direct mailings, writing newspaper articles;
- Holding/partnering/obtaining space in workshops, festivals or fairs; and
- Designing curriculum or lesson plans for grades K-12.

Components of the publicity/PR plan are divided into the following five areas:

- On-going media relations/publishing efforts;
- Presence/participation in key events;
- Charitable outreach;
- Leveraging partnerships; and
- Administration.

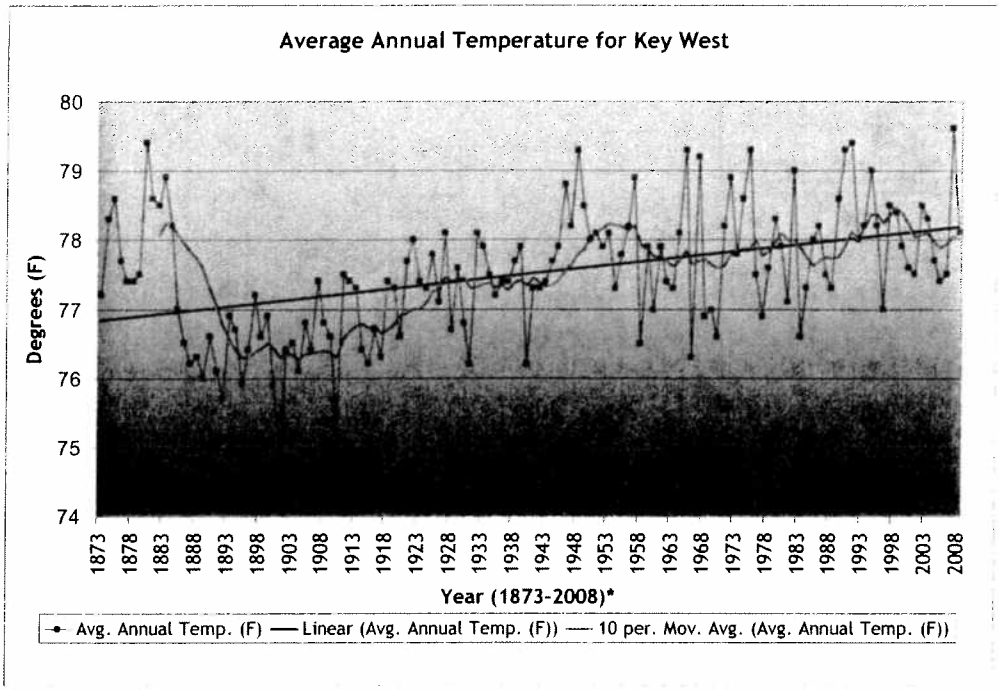
7.2.3
Program Costs

It is expected that a $30,000-$40,000 per year initial marketing and education budget is sufficient for the comprehensive program, which includes all aspects of the Climate Action Plan. The budget can be found from a variety of sources. The CAP includes water conservation efforts to reduce sewage plant emissions and alternative waste programs for solid waste and conservation of freshwater use overland and into storm drains to meet FDEP MS4 rules. The Solid Waste Utility fund may fund any waste related advertisements as well as a portion of the total program creation; the Sewer and Stormwater funds may do the same as well. The General Fund may be tapped and Stimulus grants sought for the program. Partnerships with Keys Energy, the FKAA, Monroe County, and other agencies may also assist in funding the program. Annual maintenance of the program will require funding for new commercials and air/media time/placements. An alliance with the TDC may help fund the program

The web based education program is expected to be in the range of $10,000 - $15,000 annually. This will develop an interactive one stop shop for all program elements; providing exceptionally easy instruction in greening homes, businesses, and other information required for us to meet our goals.

8.0
ADAPTATION

Climate Action is not just about mitigating current carbon use, but also about adapting to, or coping with, the consequences of climate change. Plans are needed for Key West to cope with the ever-rising water level and increasing temperature regardless if the rise remains at the rate it has been (8.76 inches in 100 years in Key West and 1.5 degrees Fahrenheit), or at the high end of the ICCP projection for the southeastern United States of 23 inches in water level and 4-6 degrees Fahrenheit increase in temperature. This almost 9-inch rise is the cause of frequent flooding on Front and Duval Streets which were designed 100 years ago when this rise was not anticipated. The photo to the right is the zero block of Duval Street at an extreme high tide in September, 2009. Imagine what will happen if high tide becomes another 9 inches higher; that will put high tide over the sidewalks and into the stores and restaurants. We must adapt now to be ready for this inevitable event.



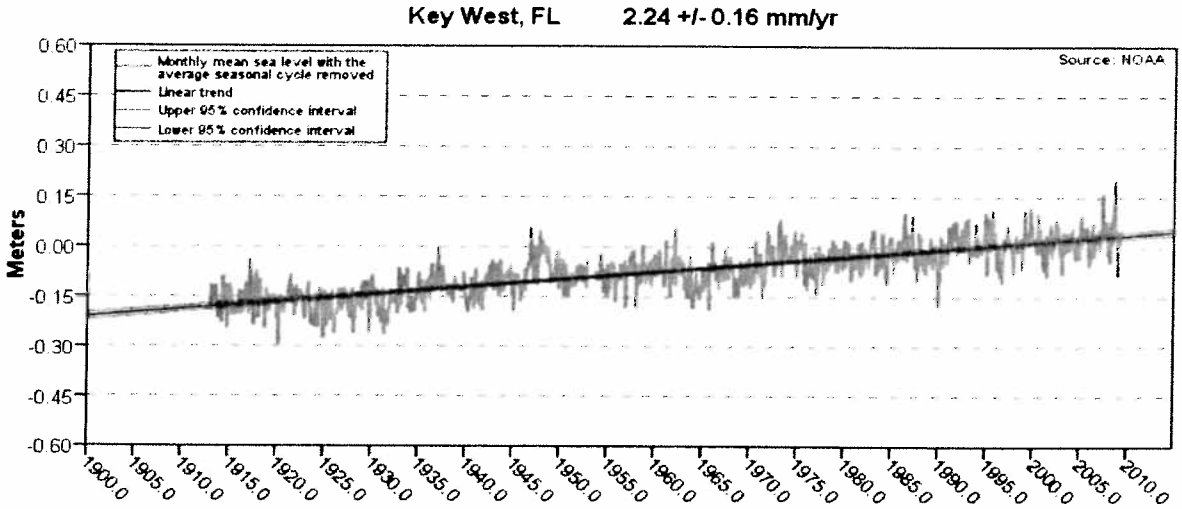
Courtesy of NOAA National Weather Service, Key West

Figure 4 – Average Annual Temperature for Key West 1873-2008

Humans have in the past had global emergencies that were successfully mitigated through infrastructure investments, technological advancements, and behavior change. For example, in the case of Ozone layer depletion; not only did behavior change (reduction in the use of aerosol spray), but the implementation of new refrigeration chemicals reduced the scope of the problem from imminent danger to a manageable life style change (i.e. the use of more sunscreen and spending less time in the sun.) Likewise, greenhouse gasses are causing changes that create a significantly warmer climate increasing risk of drought, flooding, fires, disease and sea level rise, so we must react through behavior change and new technologies.

Policy makers and emergency management staff have an opportunity to prepare today for the impacts of climate change. The topic has been discussed for over 30-years, the science of projecting impacts has been determined to be sound. Impacts are being observed and it is time to act on an adaptation strategy. We now know that some impacts are inevitable, probably at a minimum, a 9-inch rise in tide by 2100. We must help prepare the City of Key West and the citizens to adapt to climate change so we can manage the economic and ecological consequences. The actions we take will have significant impact for generations to come.

Mean Sea Level Trend
8724580 Key West, Florida



The mean sea level trend is 2.24 millimeters/year with a 95% confidence interval of +/- 0.16 mm/yr based on monthly mean sea level data from 1913 to 2006 which is equivalent to a change of 0.73 feet (8.76 inches) in 100years.

NOAA, National Weather Service Forecast Office Key West, FL September, 2009

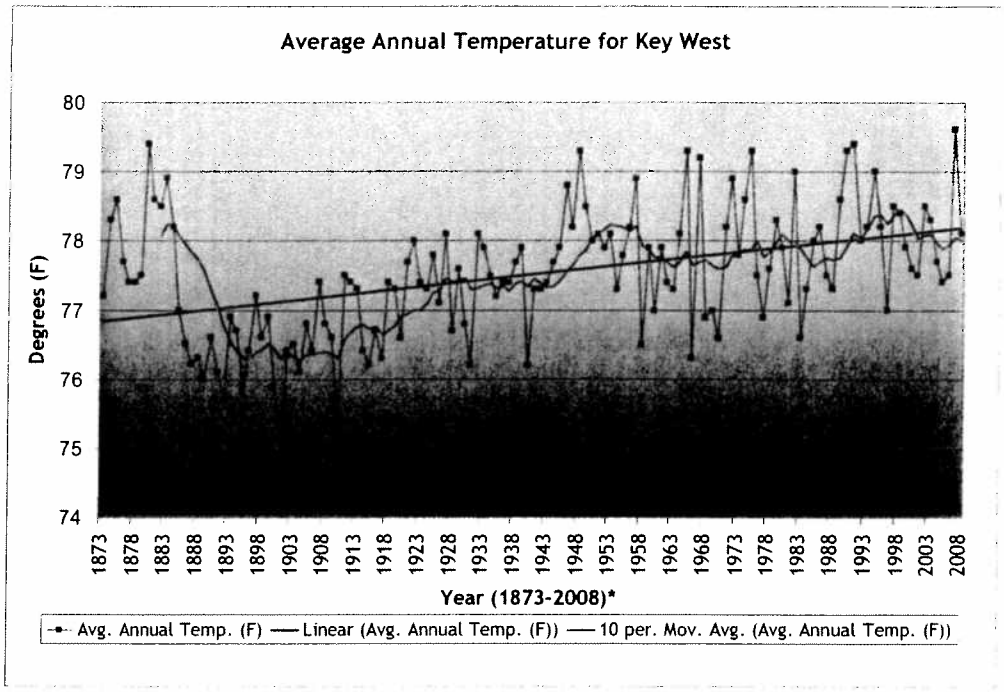
Figure 5 – Mean Sea level Trend Key West Florida 1913-2006

8.1
Resiliency

Many of the essential services our government provides needs to be responsive to climate changes today. We must excel at adaptation and mitigation because Key West and our water supply is "ground zero" for sea level rise, ocean warming and ocean acidification with all their consequences. This provides Key West an opportunity to transform the island's buildings into more sustainable structures and grow its economy through sustainable economic development. Even if greenhouse gasses are reduced significantly, climate change is going to continue long after; it takes tens of thousands of years for some greenhouse gas molecules to be broken down. It is inevitable that climate change will bring about negative economic consequences. With planning we may be able to create alternative economic opportunities that may benefit our city today and in the future.

> Making America the greenest country is not a selfless act of charity... it is now a core national security and economic interest.
> - Thomas L. Friedman

Preparing for climate change should be recognized as is a key element of the City's mission and strategic plan priorities which specify protecting the city, its quality of life and environment. We will need to anticipate the coming



Courtesy of NOAA National Weather Service, Key West

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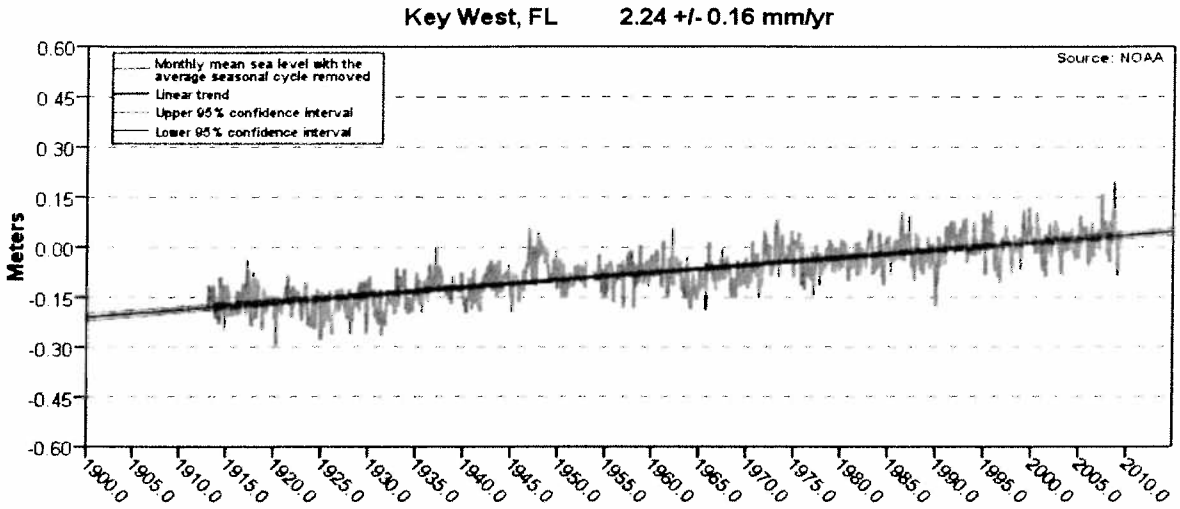

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> Making America the greenest country is not a selfless act of charity...it is now a core national security and economic interest.
> -Thomas L. Friedman

Preparing for climate change should be recognized as is a key element of the City's mission and strategic plan priorities which specify protecting the city, its quality of life and environment. We will need to anticipate the coming

changes and become climate resilient. We will do so by gathering and analyzing information to inform policy and projects through creation of a resiliency plan. Collective planning in all areas will be less costly as we may be able to anticipate impacts and seek funding years in advance of climate impact. No one knows more about Key West than the people who live here, and their ability to lead state, federal and county governments in the right direction early enough will ensure less desirable changes are not imposed upon us.

8.2

Getting Ahead of the Curve

Some programs in Key West are already in advance planning for adaptation: Florida Keys Aqueduct Authority is preparing for salt water intrusion in its mainland water supply wells; the City has plans to elevate roads (i.e. Northside Drive); and building new storm water systems that will help to meet the new demands (i.e. pump stations). Together the FKAA and City are seeking ways to reduce the need for fresh water from the mainland through reclaimed water use. Most of these programs have been significantly funded or completely funded by outside agencies because of the forethought put into planning efforts. Appropriate planning and construction can strategically reduce future risks, increase future benefits and add value to investments all providing a higher quality of life today, before climate change makes the need critical.

The adaptation section of this climate action plan outlines the planning process that is recommended. Similar to the process of the Climate Action Team the adaptation plan needs the support of the community and other governmental organizations and non-governmental organizations (NGO's). All areas of planning need to be reexamined through the lens of climate change. The plan needs to address ecologically sensitive land planning, flood plain planning, utility planning, zoning and build-back planning and shoreline hardening. The planning process will include vulnerability assessments and risk assessments, so that a climate resilient community with preparedness goals and preparedness action can be established.

The United States Army Corps of Engineers, the United States government's main engineering design department, has upgraded its 1975 policy on incorporating sea level rise in construction design and planning to a July 1, 2009 policy Circular No. 1165-2-211 which requires "incorporating the direct and indirect physical effects of projected future sea-level change in managing, planning, engineering, designing, constructing, operating, and maintaining USACE projects and systems of projects. Recent climate research by the Intergovernmental Panel on Climate Change (IPCC) predicts continued or accelerated global warming for the 21st Century and possibly beyond, which will cause a continued or accelerated rise in global mean sea-level. Impacts to coastal and estuarine zones caused by sea-level change must be considered in all phases of Civil Works programs." The new policy requires consideration of three possible scenarios; for projects with a 50 year life being built in 2010 the scenarios are 1.2 feet, 1.5 feet, and 4.9 feet. Prior to this policy the USACE worked with a projected rise of 0.8-foot (9.6 inches)* for 2050. *Adaptive response Planning to Sea Level Rise in Florida and Implications for Comprehensive and Public Facilities Planning; Deyle, Bailey and Matheny, Dept of Urban and Regional Planning, FSU, Sept, 2007.

It is recommended that the City use ICLEI's guide "Preparing for Climate Change" or a similar model as a tool to move forward. The creation of a climate change preparedness team is recommended. The consequences of climate change are broad and encompass inter-

departmental activity and extend to other local, state and federal agencies. The preparedness team will need to include City departments and local, state and federal agencies. For instance, the South Florida Water Management District must seriously consider allowing stormwater pump stations to outfall into near-shore waters so our streets and homes may be protected. We need to influence decisions of the FDOT where they are lowering rather than raising North Roosevelt Blvd. The local and state departments of emergency management and FEMA will need to re-address evacuations and increases in storm surge. The FDEP will have to re-address "wetlands" evaluations; the County will have to consider the elevation of the airport runways; the US Fish and Wildlife Service will have to consider habitat changes; and the state Historic Preservation Board will want to consider how to maintain historic structures that may be negatively impacted. The photo above is high tide on Green Street where salt water sometimes enters the historic buildings on the block.

The photos inserted in this section are photographs of the September 24, 2009 Perigean Spring Tides. Although these are extreme tides, they occur many days of the year. According to the National Weather Service Meteorologist Jon Rizzo, the tides were 3.2 feet above MLLW in Key West, which is approximately 2.3 feet above mean sea level. This is a serious threat to traffic, walking, and biking since more accidents can happen under such conditions. Asphalt is damaged at greater rates as is underground utilities.

Figure 6, the map on the next page, assists the reader to comprehend and appreciate the depth of impacts in the city, even for the small sea level rise scenario of 9 inches by 2100. A nine-inch rise brings the daily mean high tide to 3.24 feet NGVD (areas unmarked in white) and extreme high tides, which happen almost monthly to 3.94 feet NGVD (marked in Orange). Note the number of streets and recreational facilities impacted. The photo to the right depicts what will become an every day event under the IPCC best case scenario.

In addition to sea level rise an increase in temperature will increase the need for air conditioning and energy use, affect seniors and those with lung disease and even sports practices for school children.

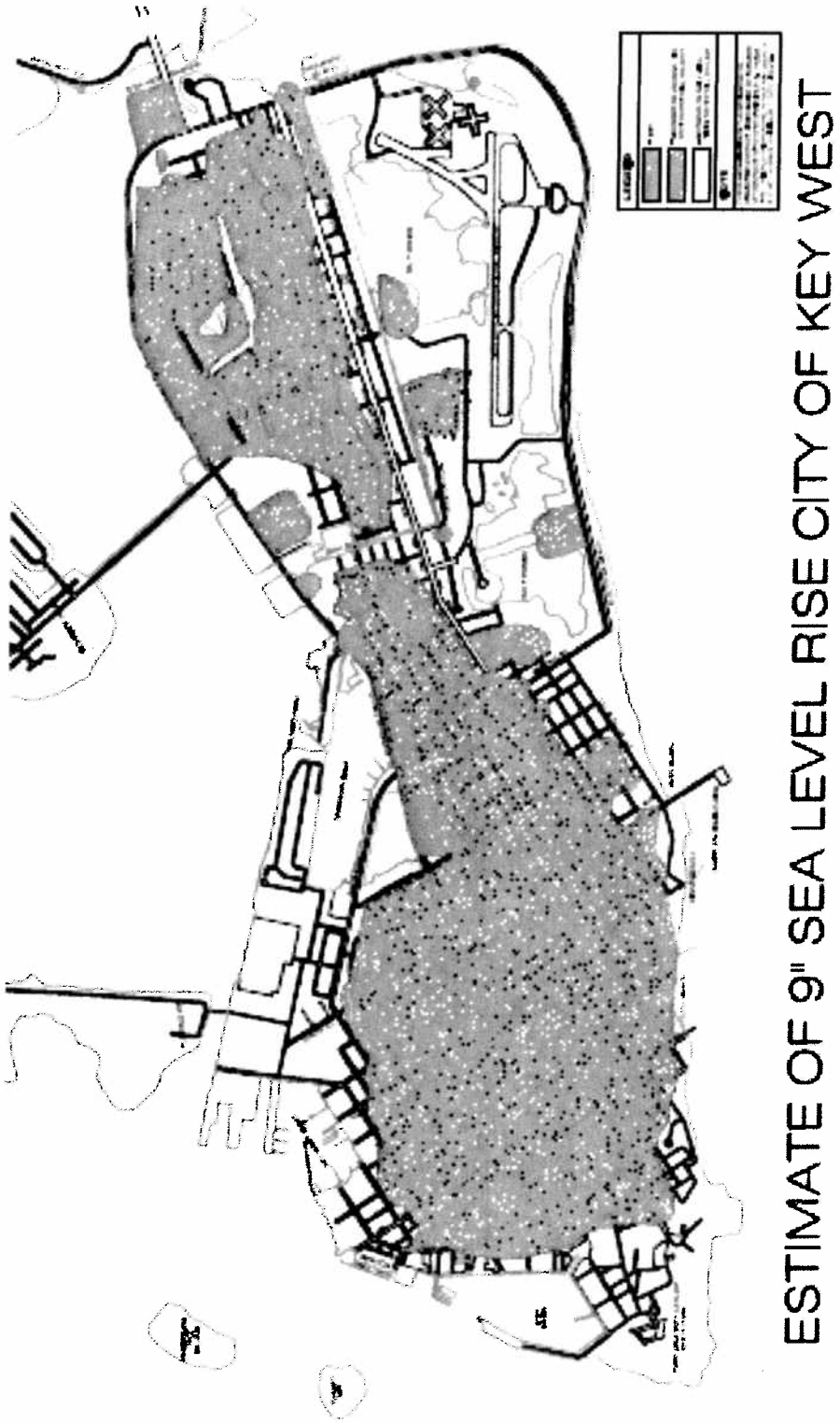


Figure 6
Note 1: See larger map in the Appendix 6
Note 2: Areas on the US Navy base, although white, were not surveyed and are not included in the rise estimate.

8.3
The Planning Process

Potential members of the climate change preparedness team will be talented and motivated people from Emergency Management, Community Services, Monroe County Health Department, Police Department, Port Department, Planning and Building Departments, General Services Department and some business/community leaders, non-profit organizations and federal agencies like NOAA's National Marine Sanctuary and the National Weather Service, and US Fish and Wildlife. NGO's like The Nature Conservancy and Botanical Gardens Society will also be required to create a well rounded plan. The members should be given substantial time to work on the program and be able to guide others across agency lines to ensure the plan is a success.

It is proposed that the team will initiate five major process steps:

1. Conduct a resiliency study;
2. Identify priority planning areas for action based on assessments of vulnerability and risk planning areas;
3. Set goals and develop a plan;
4. Implement the plan; and
5. Measure progress and update the plan.

The planning document will have to be updated from year to year depending on local and grant funding. A strong system will need to be in place to ensure that the program continues to meet goals, has robust community support, and can change as technology and conditions change.

Initially the group would identify major planning areas relevant to climate change and then complete a vulnerability assessment that will include a sensitivity analysis of the systems associated with the planning area identified. It will evaluate the adaptive capacity of the systems associated with the planning areas. A risk assessment of how vulnerable the systems in those planning areas are to the affects of climate change and a determination of our City's tolerance to the risk will be made.

Then the group would develop a vision and guiding principals for a climate resilient community. Goals would be set and prioritized action items developed including a cost to benefit analysis and recommended timeframe. The plan will list desired accomplishments, as well as which activities our government and every agency will undertake.

The implementation plan will need to provide authority and direction to city staff so that policy, planning and infrastructure changes can be implemented. The plan should be updated annually based on evaluation of goals and performance measures which will be qualitative and quantitative measures of resiliency.

8.4

Potential Areas of Concern

Virtually every aspect of government operations will be affected by adaptation requirements, from civil engineering road work, to citing of new facilities. Decisions to repair or reconstruct existing facilities, or improve stormwater, or sewer systems, or selection of planting materials will all have adaptation in the decision matrix.

Table 2 lists locations and infrastructure areas of concern to be addressed in sea level rise planning:

Location	Damage as result of Climate Change
McCoy Indigenous Park	inundation and tree deaths
Landfill	as sea levels rise more waste may become soluble in near-shore water
Seawalls	walls will need reconstruction
Beaches	will be reduced in size
Salt Ponds Habitat	will enlarge, salt water will cause destruction of less saltwater tolerant plants
Berg Park	Greater erosion of the beach and damage to the decking, continued loss of less salt tolerant trees
Kitsos Park	Greater erosion of the beach and damage to the decking, continued loss of less salt tolerant trees
Gravity sewer system	Increased salt water infiltration
Sewer Pump Stations	Inundation of some wet wells
Stormwater system	Reduced functioning of systems
Botanical Gardens	Destruction of less salt water/heat tolerant trees
Little Hamaca Park	Destruction of less salt water tolerant trees reduced park land mass
Hawk Missile Site	Reduced park land mass
Garrison Bight	Dock modifications
Key West Bight	Dock modifications
Staple Ave Bridge	Accelerated deterioration
M.C. Airport	More frequently flooded tarmac
City Pool	Additional flooding of building
Cemetery	Collapse of grave sites
Aquarium	Additional flooding of building
Clinton Square	Street inundation traffic
Access to College Road	Roadway inundation

Table 2 – Location and Possible Affects of Climate Change

Although mitigation projects worldwide may offset sea level rise at the high end of the IPCC modeling spectrum (23-35 inches in the Keys), planning efforts must consider the entire spectrum. The Table 3 below lists streets portions of which will be inundated at high tide if a 9-inch sea level rise is realized. This information, as well as the map in Figure 6 is useful to generally determine if additional consideration is required for upcoming infrastructure projects. For instance, installation of wells on streets below 3.94 feet may become conduits for salt water intrusion.

Roadways in Key West expected to have tidal water with a 9-inch tide rise

Donald Avenue	Dennis	Leon Street
Front Street	Venitia	Ashby Street
Duval Street	Blanch	George Street
Elizabeth Street	Patterson	Washington Street
Green Street	Fogarty	Eaton Street
James Street	Harris	Catherine Street
Front Street	Seidenburg	Amelia Street
Wall Street	Staples	Eisenhower Drive
Ann Street	Linda	Petronia Street
Simonton Street	Juanita	Jose Marti Dr.
Thompson Street	Flagler	Duncan Street
Telegraph Lane	Laird	United Street
Wolkowski Lane	Rose Patricia	1st
Fitzpatrick Street	Atlantic	2nd
Tifts Alley	Stephens	3rd
Atlantic Boulevard	Sirugo	4th
Exchange Street	White	5th
Caroline Street	Josephine	6th
Seminary Street	Bertha	7th
South Street	10th	8th
Riviera Drive	11th	20th

Table 3 – List of Streets Which will have Portions of Roadways Inundated by Salt Water

Clearly, any capital projects to be considered in the city must reflect consideration of temperature and sea level rise.

8.5

Adaption Success Planning

In Summary, over the years there have been dramatic changes on the island in the delivery of water, the delivery of sewer services, in our industry, and caused by hurricanes, fires, etc. All previous generation's ability to adapt to change made Key West successful. This generation now has the opportunity to step forward and plan to provide an acceptable home to those in the future. Climate Change in Key West is an opportunity to transform the island to a more sustainable community. Planning to adapt to that future now will help us realize a vibrant Key West in the future.

9.0
CAT Implementation Plan

The below proposed initiatives will assist in the completion of an implementation plan recommended to be complete by May, 2010. There are five program initiatives to be marketed, each with a number of goals. They include the Commercial Climate Challenge, Residential Climate Challenge, Incentivize Energy Conservation, Key West Transit Challenge, and Bicycle/Pedestrian Challenge. Each have recommended progress indicators.

9.1
Commercial Climate Challenge

This program will engage Key West's business community to reduce their greenhouse gas emissions. The City will act as a catalyst developing alliances and partnerships throughout the community, funding organizations, non-profit and other governmental agencies to assist local businesses in meeting their goals. Appendix 7 exhibits two showcase examples of local businesses engaging in high quality reduction measures. It is expected a variety of organization will provide education and materials and the City will provide an interactive web site collating all required information needed to easily select emissions reduction measures and report results. Some measures require city policy changes, action and purchases or infrastructure modifications. Initiative includes:

9.1.1: Expand employee commuter benefits. Commuter benefits with the largest potential impact on greenhouse gas emissions are transit subsidies, vanpools, and cash in lieu of parking. Other commuter benefits include tele-working, virtual working, bike lockers and showers, preferred car pool parking, compressed work schedules, shuttles, and rideshare matching. National studies show 0.5 mtCO2e saved for every employee covered by the EPA's "Best Workplace for Commuters" program;
9.1.2: Increase green fleets Expected Outcome: 200 Hybrid vehicles; 200 EV;
9.1.3: Implement green building improvements such as green roofs, landscaping, etc Expected Outcome: 100 White roofs, 200 trees for shade, 200 weatherization 5% reduction CO2e x 200;
9.1.4: Tie the agencies CEO salary to the energy savings;
9.1.5: Encourage large user agencies to use shared savings/performance contracting;
9.1.6: Every commercial building to perform self energy audit building commission audit;
9.1.7: Reduce paper consumption (less haul down, create, haul out less purchasing costs);
9.1.8: Work will all government agencies to implement green office audit for all public offices with milestones, goals, timelines, produce recognition system to staff (2% red x 600);
9.1.9: Partner for use of GLEE's Green Business Certification as part of challenge for continued annual improvement;
9.1.10: Require all Businesses that are leased to be energy star profile rated to encourage owners to improve leased buildings;
9.1.11: Offer workplace recycling, 4 mtCO2e saved per ton of waste recycled. Expected outcome: recycle 4,000 tons (-16 mtCO2e);

9.1.12: Pay as you throw trash (incentivize composting, recycle, reduce) offer electronic waste, lamp waste, battery waste;

9.1.13: Plastic beer mugs;
9.1.14: Provide a commercial revolving loan fund for weatherization;
9.1.15: Establish an energy museum to provide viewing of green businesses and building initiatives;
9.1.16: Provide green purchasing guide lines to businesses including energy star equipment;
9.1.17: Partner with USN to reduce electric use by 10%;
9.1.18: Encourage use of LED Christmas lights; and
9.1.19: Awards will be given to businesses that take the challenge and report energy savings.

Progress indicators: reduction in commercial energy use

- Number of bus passes
- Number of bike tax credits reported
- Increase in commercial recycling accounts
- Number of commercial alternative energy permits issues
- Number of white roofs reported

Expected Outcome: Reduce energy use by 15% in 600 businesses

9.2
Residential Climate Challenge
This program will engage Key West residents to reduce carbon emissions through a program of education in the areas of home energy use and transportation. Homeowners will be encouraged to use clean energy through installation of residential alternative energy systems or purchase of clean power from Keys Energy Services.

9.2.1: Create a model in home energy display system which will enable families to see home energy use and cost in real time on electric displays. Expected outcome: 7,000 residents will reduce home energy use by 10%;
9.2.2: Residents will be challenged to "turn it up a notch". Each degree one raises on A/C thermostat there A/C energy use goes down 3%;
9.2.3: Create a marketing program to reach every resident to promote green issues;
9.2.4: Create partnerships with Keys Energy Services to provide enhanced home energy audits and installation of limited weatherization items;
9.2.5: Partner with the Florida Keys Aqueduct Authority and South Florida Water Management District to reduce water use by 10% through education, grants, rain barrels and other measures;
9.2.6: Promote walking and bike riding to work and school;
9.2.7: Initiate a revolving loan fund weatherization projects;
9.2.8: Promote use of Key West Transit;
9.2.9: Promote white roof program;
9.2.10: Promote "ClimateCulture.com" to K-12 children;
9.2.11: Promote use of LED holiday lights;
9.2.12: Promote recycling and enforce the code; and
9.2.13: Awards will be given to residents who enter the challenge and show excellent progress.
9.2.14: Consider Ordinance requiring rental unit owners transfer leases with clean a/c filter and no leaking faucets and toilets

Progress Indicators:

- Increase in recycling rate
- Reduction in residential energy use
- Increase in bus ridership
- Increase in bike use
- Number of permitted solar and wind energy installations

Expected Outcome: 15% reduction in residential energy use in 7,000 homes; 5% reduction in 2000 homes.

9.3

Incentivize Energy Conservation

This program aims to create the conditions under which energy users will be able to use and purchase energy with greater choice and efficiency. It is proposed energy conservation measures will be sought out by energy users since it is cost effective or socially inviting. This will be accomplished through showcasing alternative energy systems and providing incentives to reduce energy use.

9.3.1 Monroe County School District will install 25KW wind power generator;
9.3.2 Keys Energy Services will partner with NOAA to install wind generators;
9.3.3 Install two 250kw wind energy generators;
9.3.4 Keys Energy Services will partner with NOAA to install solar project;
9.3.5 Implement a tiered rate for electricity consumption for homes and businesses that consume above average amounts of electricity. Develop means to avoid the inequitable impacts on low-income residents. Use additional fund balance to fund alternative energy projects;
Create a peak time energy system that reduces construction of new power plants and encourage energy savings;
City to create incentives if a developer uses solar, or wind energy;
Consider a utility tax for electric and propane which will provide a revolving loan fund and incentivize conservation;
Encourage the FKAA to enhance its rate structure to disincentivize water use,
Develop an alliance of building and education professionals to promote green building technologies and needed education; and
Create an energy museum to show visitors energy savings initiatives.

Progress Indicators:

- Decrease in energy consumption rate
- Number of wind turbine systems installed
- Number of alliances actively working
- Number of energy audits requested
- Additional funding realized and invested in alternative energy and conservation

Expected Outcome: 4,000 residents will seek energy audits, 400 permits for solar or wind installations will be issued.

9.4

Key West Transit Challenge

This project will enhance the usability of the City bus system and encourage the use of it over personal motor vehicles.

9.4.1 Establish a sub committee as an authority to oversee private sector and public sector help in promoting and enabling people to use an alternatives to the car;
9.4.2 Create a spectacular marketing program;
9.4.3 Provide sufficient bike rack at bus;
9.4.4 Bike storage/ service centers (sears town and old town garage);
9.4.5 Bike racks at all Keys Shuttle stops;
9.4.6 Install bike enclosure at KEYS shuttle stops as requested (install 4 as trial units);
9.4.7 Upgrade all bus stops;
9.4.8 Install schedules and maps at each bus stop;
9.4.9 Install rain/shade covers at each stop;
9.4.10 Ensure all stops are ADA accessible;
9.4.11 Bike storage/ service centers (sears town and old town garage);
9.4.12 Initiate free bus weeks in coordinated with reduced parking weeks or days in old-town;
9.4.13 Consider outsourcing a fixed down town route to a franchise train/trolley type vendor; and
9.4.14 Create bus training school field trips.

Progress Indicators:

- Number of bus riders

Expected Outcome: Increase ridership by an average of 100 commuters daily

9.5

Bicycle Pedestrian Challenge:

This project will promote walking and biking to reduce vehicle miles traveled by enhancing the walk-ability of the island, through programs and improved bike trails, routes and sidewalk infrastructure.

9.5.1 Provide sufficient bike racks at bus stop;
9.5.2 Increase bicycle parking around city;
9.5.3 Establish a sub committee as an authority to oversee private sector and public sector help in promoting and enabling people to use an alternatives to the car;
9.5.4 Install bike enclosure at KEYS shuttle stops;
9.5.5 Complete the bicycle pedestrian plan(authorized by Commission resolution);
9.5.6 By 2011, install handicap ramps at all existing sidewalks on the bicycle pedestrian plan, trim trees and bushes away from sidewalk so that pedestrians and young cyclers can use sidewalk;

9.5.7 Re-write the city ordinance to make it clear that the homeowner is responsible to maintain the trees in front of the property and to ensure that the trees do not protrude into the sidewalk;
9.5.8 Maintain all marking on path and bicycle lanes; improve as needed;
9.5.9 Provide a repair inventory for all sidewalks with cracks greater then 1/25 of an inch and maintain on annual basis;
9.5.10 TV shows and commercials encouraging people to ride bikes throughout town;
9.5.11 Bicycle link on website to show all the bicycle and pedestrian routes in town;
9.5.12 Quarterly walk/ bike to work day;
9.5.13 Have continuous safe routes to schools programs for all grade school children encouraging children to ride there bikes and walk to school;
9.5.14 Have schools provide extra credit or gifts to children who get their parents to walk/bike with them to school;
9.5.15 Ensure all bicycle racks are installed to meet the City Code and developments requirements for bicycle parking;
9.5.16 Remove stop signs where unwarranted, limit new stop sign placement to those that comply with the state warrant for traffic control, have licensed professionals determine the need for stop signs;
9.5.17 Driver education program wrt bicycling on the city television station and PSA,s;
9.5.18 Maintain all intersections with trees and objects clear between 30 inches and 10 feet in height;
9.5.19 Provide an annual update of sidewalk repair program;
9.5.20 In the LDR requirements for automobiles with the corresponding increase in bike/ moped requirements;
9.5.21 Creation of a new bike path/routes filling of gaps in the existing bike path/routes;
9.5.22 Improvements in current bike path/ routes. Curb cuts, directional signage, street marking, signals – the list is not all-inclusive;
9.5.23 Portable trailer for large bike racks for festivals and TDC to promote Key West as a bike friendly town;
9.5.24 Bike storage/ service centers (sears town and old town garage);
9.5.25 More or better ways to rack bikes;
9.5.26 Comprehensive traffic planning to improve bike traffic flow(connecting routes to popular destinations ensuring the shortest bike route possible); and
9.5.27 Removal of excess stop signs or marked crossing and replacing them with traffic calming devices.

Progress Indicators:

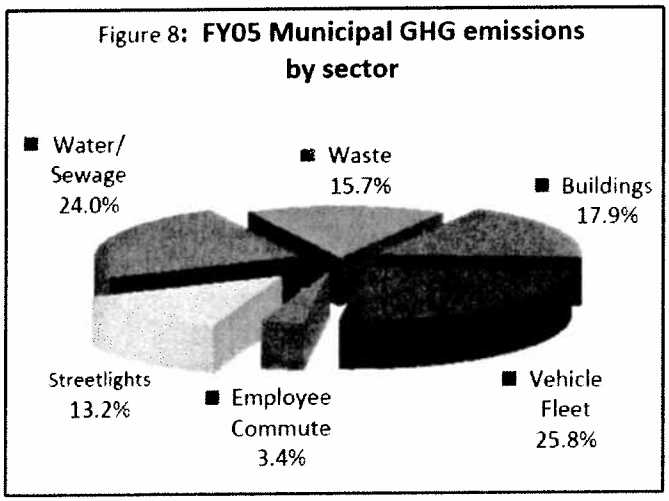
- Number of bikes on trails/routes
- Number of bikes in racks
- Value of savings on pay not to park programs

Expected Outcome: Increase the number of bikes commuting to work and school by 200

10.0
City Government Operations

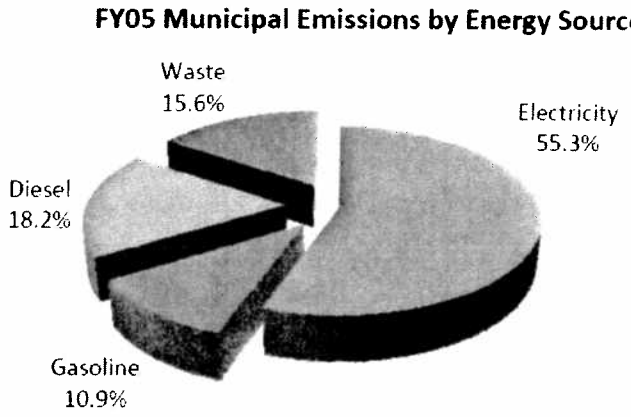
City government operations are 4.4% of the community GHG emissions totaling 17,596 tons, and the City is the third largest user of commercial energy. The cost of energy (fuel and electric) for the city operations in 2005 was $3.1 million (not including Waste Management waste hauling and most staff commuting). Meeting the goal of reducing emissions by 15% will have a significant affect on the operation costs for the general fund, utilities and other funds since conservation and investment in zero fuel renewable energy are the key objectives of this action plan. A 15% reduction in energy expenses would save the city $473,648. It is well documented that simple energy conservation programs can easily save 10% of older facilities' energy costs. The investment in a strict energy management program with direct reporting to the City Manager is the key element to achieving the City Commission's goal. The program is expected pay for itself in one year.

The Greenhouse Gas Emission Inventory charts below indicate the municipal GHG emission by sector and energy source. Figure 7 indicate that fleet operation is the City's primary GHG emitter by sector, however when looked at from the perspective of energy source electricity is largest sink.



Excerpted from City of Key West Green House Gas Emissions Inventory January, 2008

Figure 7 - FY05 Municipal GHG Emissions by Sector



Excerpted from City of Key West Green House Gas Emissions Inventory January, 2008

Figure 8 – FY05 Municipal Emissions by Energy Source

Table 4, below, lists the tons of energy of operation by use by sector, indicating the tons emitted and fund spent. The 15% goal that the City Commission mandated will enable a reduction of GHG emissions by 2,639 tons.

FY05 Government Emissions by Sector	***Equiv CO2 (tons)***	***Equiv CO2 (%)***	***Energy (MMBtu)***	***Cost ($)***
Buildings	*3,158*	*17.9*	*17,493*	*591,076*
Vehicle Fleet Total	*4,532*	*25.8*	*58732*	*605,387*
City vehicles	*2,482*	*14.1*	*28,864*	*605,387*
Waste hauling	*2,050*	*11.7*	*29,868*	-
Employee Commute	*602*	*3.4*	*7,070*	-
Streetlights	*2,331*	*13.2*	*12,914*	*461,925*
Water/Sewage	*4,217*	*24.4*	*23,363*	*752,219*
Waste	*2,756*	*15.7*		*717,062*
Total	*17,596*	*100*	*119,572*	*3,157,659*

Excerpted from City of Key West Green House Gas Emissions Inventory January, 2008

Table 4 - FY05 Municipal Government Emissions, Energy use and Cost

Reduction Initiatives

Reduce municipal operation emissions by 15% by 2015 through energy conservation and increased non fossil fuel energy use. Following are the specific recommendations:

10. 1. Transportation

10.1.1. Increase Ridership on Existing Routes through:

10.1.1.1. 76 degree busses
10.1.1.2. Clean bus stops (trash containers, cigarette butt dispenser, weekly clean by street sweeper with vacuum)
10.1.1.3. Shaded stops
10.1.1.4. Weather protection
10.1.1.5. Clear bus route map posted
10.1.1.6. Schedule posted
10.1.1.7. Clear notice on days bus does not run
10.1.1.8. Spanish schedules and maps
10.1.1.9. Creole schedules and maps
10.1.1.10. Bike racks at bus stops (especially at all keys shuttle routes);
10.1.1.11. Bike closets (lower keys shuttle routes);
10.1.1.12. All stops to be ADA accessible;

10.1.2 Advertising and Promotion:

10.1.2.1 Alliances with business to provide reduced fares (bulk discount) and pay not to park program;
10.1.2.2 Install a pay station for bus ticket purchases at the airport and ferry terminal;
10.1.2.3 Promote the US Navy bus fare rebate;
10.1.2.4 Have a free, well promoted bus week;
10.1.2.5 Have bus field trips with elementary schools;
10.1.2.6 Bike storage/facilities at lower keys departure points in Key West;

10.1.3 Employee Service Center - promote incentives city and businesses- pay not to park;
10.1.4 Partner with businesses to provide bike rentals @ lower keys shuttle stops;
10.1.5 Create alliance with businesses to give out discounted or free bus tickets to people;
10.1.6 Maintain a commuter route that stops downtown;
10.1.7 Create shuttle bus from Front Street to Truman Waterfront, Southernmost Point to Reynolds Street down United to Simonton and back to Front LPG on hybrid;
10.1.8 Establish a subcommittee as an authority to oversee private sector and public sector help in promoting and enabling people to use mass transit; and
10.1.9 Install a solar panel farm above the proposed tour bus parking facilities which will power electric plug in so busses will not idle.

10.2 Bicycle/ Pedestrian Transportation

10.2.1 Install showers at City Facilities to promote biking to work;
10.2.2 Pay not to park program;
10.2.3 Partner with bike shops to teach people how to fix bikes and rider safety;
10.2.4 Enhance grade school bike education;
10.2.5 Offer adult bike riding lessons;
10.2.6 Create more and interesting bike racks;
10.2.7 Use pay not to park profit for bike education program; and
10.2.8 Consider seriously promoting bike licensing through licensing department.

10.3 Other Transportation

10.3.1 Promote car pooling on carpooling website;
10.3.2 Partner with FDOT for van rideshare program;

10.3.3 Promote alternative vehicle fleets (hybrids & electric cars);
10.3.4 Phase out city fleet and phase in hybrid and electrical vehicles and bicycles;
10.3.5 Seek zip car firm to move into City of Key West;
10.3.6 Incentivize electric residential vehicles by free parking spots for electric cars on some spots around Duval Street;
10.3.7 Promote 1 car families;
10.3.8 Provide incentives for hybrid/ electric taxi's;
10.3.9 Install electric car charging stations @ all city garages and in streets with limited driveways;
10.3.10 Create and anti-idling program;
10.3.11 Track City fleet vehicle idling;
10.3.12 Consider Fire Department food shopping by use of watch Commander Vehicle; and
10.3.13 Provide pressure indictor caps for tires.

10.4. Waste Systems

10.4.1 Decrease waste hauled from the city through:
10.4.1.1 Increased home composting;
10.4.1.2 Create a community compost center;
10.4.1.3 Community recycling in the city limits;
10.4.1.4 Increase R4 education;
10.4.1.5 Improve waste management customer satisfaction by becoming more customer orientated;
10.4.1.6 Have a performance based waste management contract;
10.4.1.7 Increase number of commercial recycling contracts;
10.4.1.8 Decrease in number of recycling complaints;
10.4.1.9 Promote commercial recycling and group recycling on streets;
10.4.1.10 Create mandatory commercial recycling (currently as low as for $2.50/ month);
10.4.1.11 Provide for adequate recycling @ all city facilities;
10.4.1.12 Require recycling in all city leagues and sports agreements;
10.4.1.13 Commercial recycling rates lower than trash rates;
10.4.1.14 Provide E-Waste drop off in the city limits and promote it;

10.4.2 Reduce greenhouse gas emissions through:
10.4.2.1 Provide hazardous waste drop off 12 times per year;
10.4.2.2 New waste contract cannot stipulate minimum volume of waste or all waste available to vendor;
10.4.2.3 New waste contract should require use of a waste to energy facility;
10.4.2.4 New waste contract to accept CFC's and fluorescent bulbs curbside;
10.4.2.5 Promote waste reduction strategies; green business certifications, recycling, hazardous and E-Waste drop off, light bulb drop off;
10.4.2.5 Promote product stewardship though mandatory commercial take-back programs;
10.4.2.6. Require staff to consider packaging waste in purchases (forcing the supplier to use less packaging, purchase in bulk);
10.4.2.7 Purchase only Energy Star electric products and Epeat (www.epeat.net) electronics;
10.4.2.8 Analyze the flaming of methane gas from the landfill, if it reduces significant emissions install it; and

10.4.3 Add greenhouse gas emissions as waste product that falls under the Solid Waste Utility to fund emission reduction and sequestration.

10.4 Sustainability

10.4.1 Become Green City Certified;
10.4.2 Enhance bike theft prevention though licensing, searching for stolen bikes and prosecution;
10.4.3 Create solar protection ordinance so new larger buildings do not shade solar systems;
10.4.4 Require all city leases to have requirements that lessees are to be green business certified and portfolio manager certified and have recycling;
10.4.5 Consider an ordinance to require new construction have solar pool and water heaters;
10.4.6 Consider reducing the required number of parking spaces and increasing the number of bicycle spaces or employee showers as incentive for wind and solar energy use;

10.5 Waste Water Treatment

10.6.1 Install diffused air system at plant;
10.6.2 Have full A/C system designed for current high efficiency standards by HVAC engineer;
10.6.3 Have an ESCO for the full waste water system;
10.6.4 Change facility lights to exterior lights to LED's;
10.6.5 Add wind powered 250 kw energy to generator unit;
10.6.6 Change fleet to alternative energy vehicles;
10.6.7 Install cistern water systems for vacuum truck;
10.6.8 Installation of compost system for solids;
10.6.9 Install chlorine system and provide FKAA water for reclaimed H2O Systems.
10.6.10 Look into digester gas recovery; and
10.6.11 Develop partnership with FKAA and SFWMD to reduce water use by 10% .

10.7 Planning and Building

10.7.1 Do not approve a variances for reduced open spaces and reduced pervious surface;
10.7.2 Modify code to disallow pervious pavement and "pervious bricks" without a healthy grass volume;
10.7.2 Modify the comprehensive plan to include the wide array of green incentives into the City of Key West;
10.7.3 Indentify all capital projects and have them reviewed for green building construction elements;
10.7.4 Incentivize alternative transportation for all City facilities and planning department approvals;
10.7.5 Incentivize green building components (reduced building fees, faster inspection...);
10.7.6 Encourage LED exterior lighting;

10.7.7 Enforce bike rack installation at city property and private property;
10.7.8 Consider changing parking ratio for less car parking and more bike parking;
10.7.9 Require waste contractor to approve waste recycle area for all DRC approvals;

10.8 City Commission

10.8.1 Direct City Manager to allocate 25% of energy savings (fuel and electric) to staff bonus;
10.8.2 Create mandatory reduction, reuse and recycling programs for all city facilities;
10.8.3 Enforce existing and improve codes that require building owner to maintain the sidewalks and right of way in front of their building. This will reduce city maintenance and landscape as well as contractor vehicle emissions (and contractor costs);
10.8.4 Add greenhouse gas emissions a waste product that falls under the Solid Waste Utility to fund emission reduction and sequestration;
10.8.5 Promote product stewardship though mandatory commercial take-back programs;
10.8.6 Only give grants to organization which are green certified and for construction projects, that have green components projects;
10.8.7 Create an education and outreach program with the assistance of a marketing and advertising firms that meets the goals of the Climate Action Plan;
10.8.8 Create an ordinance that all flat roofs must be highly reflective, and
10.8.9 Have the City Manager report on City government goal progress.

10.9 Facilities

10.9.1 Perform commercial grade energy audits of all City owned buildings;
10.9.2 Implement the cost effective audit recommendations initially;
10.9.3 Hire an energy manager to perform energy audits;
10.9.4 Have written Standard Operating Procedures for the management of every building owned by the city;
10.9.5 Phase out the use of desk top PC's and use thin clients by 2015;
10.9.6 Install central surge protectors to eliminate the need for at desk systems;
10.9.7 Hire an ESCO make recommendation for the waste water treatment system;
10.9.8 Install electric charging stations at all utility parking city with electric metering;
10.9.9 Create and train associates on paper reduction program;
10.9.10 Enforce existing "Green Policies" in all facilities;
10.9.11 Obtain GLEE Green Business certification for all buildings;
10.9.12 Have all city buildings EPA energy portfolio certified;
10.9.13 Require all electronics and electronic equipment in city buildings to be energy star rated;
10.9.14 Create a building and departmental tracking system to track energy, money and carbon saved by departments and develop a recognition system;
10.9.15 Install more and accessible bike racks at all city facilities;
10.9.16 Trim all plants to make a walkway and bikeways accessible at all city buildings;
10.9.17 Apply for water and energy conservation grants;
10.9.18 Change park and ride to LED & solar power;
10.9.19 Replace street and parking lot lights with LED's;
10.9.20 Create cisterns at all large city facilities to supply street sweepers and water buffalos;

10.9.21 Install occupancy sensors in selected offices bath and conference rooms;
10.9.22 Install insulation in un-insulated conditioned spaces;
10.9.23 Paint all roofs that are dark, white (ROI 1.5 yrs);
10.9.24 The City shall publish monthly the energy use for the last 24 months in a local publication;
10.9.25 Install window film or shade covers on select city windows on west face; and
10.9.26 Install shade trees on west side of buildings; and
10.9.27 Ensure all exit signs are lighted by LED's.

11.1

APPENDIX 1

Resolution 07-160- Kyoto Protocol; Directing a Sustainability Plan

RESOLUTION NO. 07-160

A RESOLUTION OF THE CITY COMMISSION OF THE CITY OF KEY WEST, FLORIDA, URGING PRESIDENT BUSH TO SIGN THE KYOTO PROTOCOL TO THE UNITED NATIONS AND CALLING FOR IMMEDIATE LOCAL AND NATIONAL ACTION TO ADDRESS GLOBAL WARMING; SUPPORTING IMPLEMENTATION OF SARASOTA COUNTY, FLORIDA'S ROADMAP TO SUSTAINABILITY IN THE CITY OF KEY WEST; PROVIDING FOR AN EFFECTIVE DATE

WHEREAS, the citizens of Key West are concerned about the effects of global warming on the planet, and specifically on their vulnerable, low-lying island home; and

WHEREAS, the United States is the largest single emitter of carbon dioxide from the burning of fossil fuels; and

WHEREAS, the Kyoto Protocol, an agreement negotiated through the United Nations, and ratified by 169 international governmental entities to date, seeks to control and reduce greenhouse gases on a global scale; and

WHEREAS, President Bush has declined to submit the Kyoto Protocol for ratification by United States Congress, citing economic concerns, and an exemption granted to the nation of China, the second-largest emitter of carbon dioxide; and

WHEREAS, it is imperative that the United States and its leaders take prompt action to ensure our future well-being; and

WHEREAS, the City of Key West calls upon President Bush and his Administration to ratify the Kyoto Protocol, and to take immediate action to address the issue of global warming, to

preserve and protect the health, safety and welfare of the citizens of Key West, the United States, and the entire world;

WHEREAS, Sarasota County, Florida has developed a "Roadmap to Sustainability" incorporating principles of the Protocol on a local level that can be instructive to the City of Key West;

NOW, THEREFORE, BE IT RESOLVED BY THE CITY COMMISSION OF THE CITY OF KEY WEST, FLORIDA, AS FOLLOWS:

Section 1: That President Bush is hereby urged to submit the Kyoto Protocol for ratification, and to lead the United States in the necessary efforts to reduce global warming.

Section 2: That the City Manager is encouraged to develop a similar "roadmap", or utilize the principles of the Sarasota County Plan, to ensure the City of Key West takes an environmentally sustainable approach to the operation of City business.

Section 3: That the City Clerk is hereby authorized to transmit certified copies of this Resolution to President George Bush, Vice President and Senate President Richard Cheney, House Speaker Nancy Pelosi, Senators Nelson and Martinez and Representative Ros-Lehtinen.

Section 4: That this Resolution shall go into effect immediately upon its passage and adoption and authentication by the signature of the presiding officer and the Clerk of the Commission.

Passed and adopted by the City Commission at a meeting held this 1 day of May, 2007.

Authenticated by the presiding officer and Clerk of the Commission on May 2, 2007.

Filed with the Clerk May 2, 2007.

MORGAN McPHERSON, MAYOR

ATTEST:

CHERYL SMITH, CITY CLERK

11-2

APPENDIX

Resolution 07-273 – Undertake 5 Milestone Plan for Carbon Reduction

RESOLUTION NO. 07-273

A RESOLUTION OF THE CITY COMMISSION OF THE CITY OF KEY WEST, FLORIDA, COMMITTING TO PARTICIPATION IN THE "CITIES FOR CLIMATE PROTECTION CAMPAIGN"; PROVIDING FOR AN EFFECTIVE DATE

WHEREAS, a scientific consensus has developed that carbon dioxide and other greenhouse gases released into the atmosphere have a profound effect on the Earth's climate; and

WHEREAS, 162 countries, including the United States, pledged under the united Nations Framework Convention on Climate Change to reduce its greenhouse gas emissions; and

WHEREAS, energy consumption, specifically the burning of fossil fuels, accounts for more than 80% of U.S. greenhouse gas emissions; and

WHEREAS, local government in Key West and the Florida Keys can influence local emissions by exercising legislative powers over land use, transportation, construction, waste management and energy management; and

WHEREAS, local government actions taken to reduce greenhouse gas emissions and increase energy efficiency provide local benefits by decreasing air pollution, creating jobs, reducing energy expenditures and saving money for government, local businesses, and residents as well; and

WHEREAS, the City Commission believes that committing to five milestones to reduce greenhouse gas and air pollution emissions,

set forth in the International Council for Local Environmental Initiatives (ICLEI)'s Cities for Climate Protection Campaign, would serve to protect the health, safety and welfare of the citizens and visitors of Key West;

NOW, THEREFORE, BE IT RESOLVED BY THE CITY COMMISSION OF THE CITY OF KEY WEST, FLORIDA, AS FOLLOWS:

Section 1: That the City of Key West will undertake the Cities for Climate Protection Campaign Program five milestones to reduce both greenhouse gas and air pollution emissions throughout the community. The five milestones are:

1. Conduct a greenhouse gas emissions inventory and forecast to determine the source and quantity of greenhouse gas emissions in the jurisdiction.
2. Establish a greenhouse gas emissions reduction target.
3. Develop an action plan with both existing and future actions which, when implemented, will meet the local greenhouse gas reduction target.
4. Implement the action plan.
5. Monitor to review progress.

Section 2: That the City of Key West hereby requests assistance from the ICLEI's Cities for Climate Protection Campaign as it progresses through the milestones.

Section 3: That this Resolution shall go into effect immediately upon its passage and adoption and authentication by the signature of the presiding officer and the Clerk of the Commission.

Passed and adopted by the City Commission at a meeting held this 7 day of August, 2007.

Authenticated by the presiding officer and Clerk of the Commission on August 7, 2007.

Filed with the Clerk August 8, 2007.

MORGAN McPHERSON, MAYOR

ATTEST:

CHERYL SMITH, CITY CLERK

11.3

APPENDIX

Resolution 08-067- Setting Goal of 15% less Greenhouse Gas Emissions

RESOLUTION NO. 08-067

A RESOLUTION OF THE CITY COMMISSION OF THE CITY OF KEY WEST, FLORIDA, DIRECTING CITY STAFF TO REDUCE THE CITY'S MUNICIPAL OPERATIONS GREENHOUSE GAS EMISSIONS BY 15% BY 2015; AND FURTHER SETTING A GOAL OF REDUCING GREENHOUSE GAS EMISSIONS THROUGHOUT THE JURISDICTION OF THE CITY OF KEY WEST BY 15% BY 2015; PROVIDING FOR AN EFFECTIVE DATE

WHEREAS, in Resolution 07-273, the City Commission committed to five milestones to reduce greenhouse gas and air pollution emissions, set forth in the International Council for Local Environmental Initiatives (ICLEI)'s Cities for Climate Protection Campaign, in order to protect the health, safety and welfare of the citizens and visitors of Key West, and the planet; and

WHEREAS, the first milestone completed was the City of Key West Greenhouse Gas Emissions Inventory Report, which provides a baseline inventory of City energy use and emissions in FY 2005; and

WHEREAS, the second milestone is to set a target for emissions reductions and the third step is to create a Local Climate Action Plan; and

NOW, THEREFORE, BE IT RESOLVED BY THE CITY COMMISSION OF THE CITY OF KEY WEST, FLORIDA, AS FOLLOWS:

Section 1: That the City staff is hereby directed to reduce municipal operations' greenhouse gas emissions by 15%, by the year

2015, based upon the 2005 baseline data contained in the City of Key West Greenhouse Gas Emissions Inventory Report.

Section 2: That City staff is hereby directed to work to develop a Climate Action Plan for reducing greenhouse gas emissions within the jurisdiction of the City of Key West by 15% by the year 2015.

Section 3: That this Resolution shall go into effect immediately upon its passage and adoption and authentication by the signature of the presiding officer and the Clerk of the Commission.

Passed and adopted by the City Commission at a meeting held this 4th day of March, 2008.

Authenticated by the presiding officer and Clerk of the Commission on March 5, 2008.

Filed with the Clerk March 5, 2008.

MORGAN McPHERSON, MAYOR

ATTEST:

CHERYL SMITH, CITY CLERK

11.4

APPENDIX 4

City of Key West Greenhouse Gas Emissions Inventory

(For electronic version see separate file)

City of Key West

Greenhouse Gas Emissions Inventory Report

Prepared by:

Jody Smith Williams
Program Assistant,
Cities for Climate Protection
Campaign

January, 2008

Table of Contents

Executive Summary

The debate is over. The overwhelming scientific consensus is that human-induced climate change is among the most pressing environmental problems facing this generation and those to come.

The time to act is.now. Never in the past 1000 years has the planet warmed at a faster rate than during the 20th century, and the most recent decade has been the warmest ever on record. Allowing this trend to continue could result in increased catastrophic weather events such as hurricanes, forest fires, drought and floods; degradation of eco systems and wildlife; decreased agricultural output; and displacement of entire populations due to rising sea levels. As a coastal community living only a few feet above sea level, Key West is extremely vulnerable to the potential consequences of climate change.

Key West must do its part. Although the United States accounts for a mere 4% of the world's population, it produces 25% of the world's greenhouse gases. Key West released nearly 400,000 tons of greenhouse gas emissions (CO_2e) in fiscal year 2004-2005 and is projected to emit 4.3% more in 2015. However, on August 7, 2007, the Key West City Commission voted unanimously to become the first municipality in Monroe County to become a member of ICLEI – Local Governments for Sustainability, and to join over 350 cities and counties nationwide that have made a commitment to embark on ICLEI's 5-Milestone *Cities for Climate Protection (CCP) Campaign.* The Commission took this bold step in recognition of the fact that the effects of global climate change will have a severe impact in the Florida Keys, and that local governments can and must play a part in implementing solutions and measures to reduce our carbon footprint. In so doing, we have committed to ICLEI's Five Milestone Process to combat global warming:

Milestone 1: Conduct a baseline emissions inventory and forecast
Milestone 2: Adopt an emissions reduction target
Milestone 3: Develop a Climate Action Plan for reducing emissions
Milestone 4: Implement policies and measures
Milestone 5: Monitor and verify results.

We have the opportunity to make Key West a model community. The city is committed to reducing its contribution to global climate change by taking local action to reduce greenhouse gas emissions. To do so we must focus on getting the entire community engaged and keeping it involved. Municipal leadership is an imperative step, but significant change will require the participation of the community as well. City government actions will serve as a catalyst for that participation, by leading the way and setting an example.

I. Introduction

A. Introduction to Climate Change Science

Global Warming: the facts are in

Global warming -- a gradual increase in planet-wide temperatures -- is now well documented and accepted by scientists as fact. A panel convened by the U.S National Research Council, the nation's premier science policy body, in June 2006 voiced a "high level of confidence" that the Earth is the hottest it has been in at least 400 years, and possibly even the last 2,000 years. Studies indicate that the average global surface temperature has increased by approximately 0.5 - 1.0°F (0.3 - 0.6°C) over the last century. This is the largest increase in surface temperature in the last 1,000 years and scientists are predicting an even greater increase over this century. Eleven of the last twelve years (1995-2006) rank among the twelve warmest years in the instrumental record of global surface temperature (since 1850).[1] This warming is largely attributed to the increase of greenhouse gases (primarily carbon dioxide and methane) in the Earth's upper atmosphere caused by human activities: burning of fossil fuels, industrial activities, farming, and deforestation.

The basics of global warming can be summarized as follows. Energy from the sun enters the atmosphere as light, and heats the earth's surface. The heat is radiated back into space, especially at night. Atmospheric greenhouse gases naturally present in the atmosphere trap some of the outgoing energy, retaining heat somewhat like the glass panels of a greenhouse and prevent an extreme dip in temperature. The earth normally sheds heat into space at approximately the same rate it absorbs the energy from the sun. This process is depicted in Figure 1 below.

The Greenhouse Effect

Problems arise when the atmospheric concentration of greenhouse gases increases and upsets the equilibrium of these gases naturally present in the atmosphere. Global warming refers to the increasing warming of the earth because of the increase in greenhouse gases in the atmosphere.

Scientists believe that the burning of fossil fuels, the destruction of forests and other human activities are the primary reason for the observed increased concentration of carbon dioxide in the atmosphere. Energy burned to run cars and trucks, heat homes and businesses, and power factories is responsible for about 80 percent of society's total carbon dioxide emissions. Human industrial activities annually emit the equivalent of 8.3 billion tons

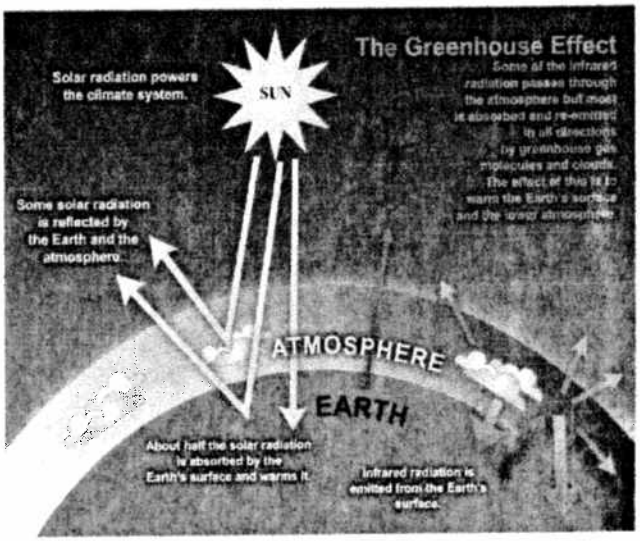


FIGURE 1: THE GREENHOUSE EFFECT

[1] IPCC Fourth Assessment Report " Climate Change 2007: The Synthesis Report"

of carbon dioxide into the atmosphere. Trees, plants, and oceans reabsorb 60 percent of this carbon. However, the remaining 40 percent increases the atmospheric level of greenhouse gases, magnifying the planet's natural warming mechanism and increasing temperature worldwide.

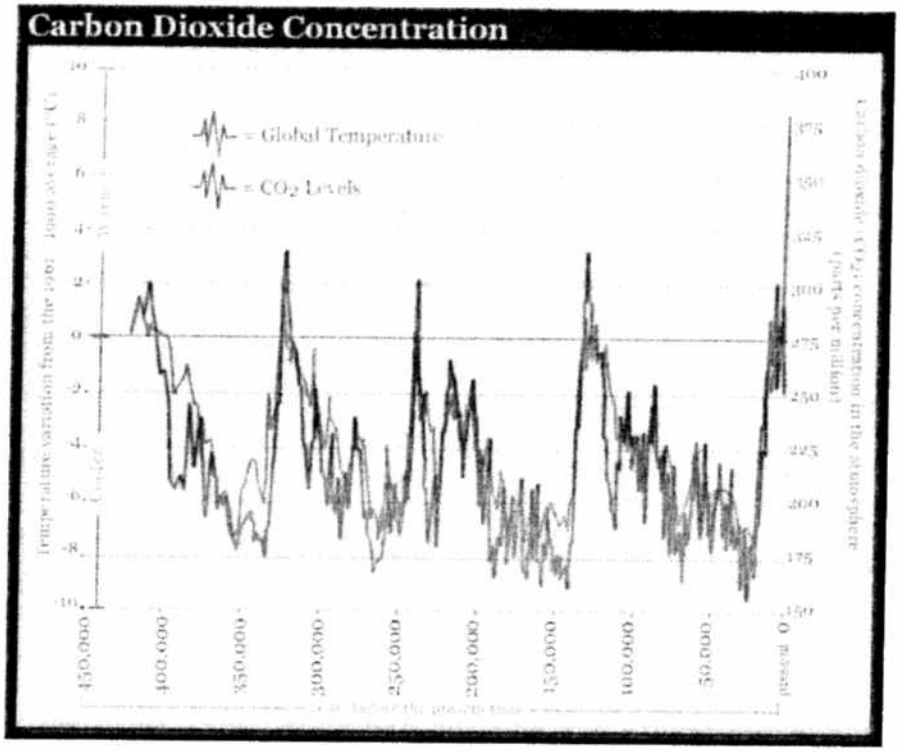


FIGURE 2: IMAGE BASED ON DATA FROM NOAA

Over the past 425,000 years, cool periods have coincided with times when the CO_2 concentration in the atmosphere was lower. When there is less CO_2 in the atmosphere, the greenhouse effect is reduced and the world cools, as depicted in Figure 2 above.

B. Effects & Impacts of Climate Change

Average global temperatures may increase by 2.4 - 6.4°C (that's 4.3 - 11.5° F) by the end of the 21st century. [2] Although the numbers sound small, they can trigger significant changes in climate. (The difference between global temperatures during an Ice Age and an ice-free period is only about 5°C.)[3] Besides resulting in more hot days, many scientists believe an increase in temperatures may lead to changes in precipitation and weather patterns. Warmer ocean water may result in more intense tropical storms and hurricanes. Sea levels are also expected to increase by 0.09 - 0.88m (0.3 – 2.9 feet) in the next century, mainly from melting glaciers and expanding seawater. Global warming may also affect wildlife; species that cannot survive in warmer environments may become

[2] Global Climate Projections. In: Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [Solomon, S.,D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor and H.L. Miller (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.
[3] Stanford Solar Center, 2007.

extinct. Finally, human health is also at stake, as global warming may result in the spreading of certain diseases such as malaria, the flooding of major cities, a greater risk of heat stroke for individuals, and poor air quality.

The Intergovernmental Panel on Climate Change (IPCC), co-recipient of the 2007 Nobel Peace Prize, has re-confirmed in its most recent Fourth Assessment Report of November 17, 2007 that human-induced climate change is indeed a reality. It can no longer be dismissed as a theoretical, academic concept. Over 2,500 of the world's most renowned climate science experts have concluded the following:

> **"Warming of the climate system is unequivocal, as is now evident from observations of increases in global average air and ocean temperatures, widespread melting of snow and ice, and rising global mean sea level."**[4]

If we want a real chance of keeping the global average temperature from exceeding 1.1°C (2° F) above 2000 levels – an important threshold to prevent complete melting of the Greenland ice sheet and other dangerous climate impacts – we must stabilize the atmospheric concentration of carbon dioxide at 450 ppm (parts per million) or lower (Figure 3.) In order to stabilize at 450 ppm, global emissions of greenhouse gases must begin to decline by 2020, reaching one-half their current levels by 2050 and one-quarter of current levels by 2100. Because the United States contributes over one-fifth of total global emissions with only one-twentieth of world population, U.S. emissions would have to decline 80 percent by 2050 in order to meet these goals. [5]

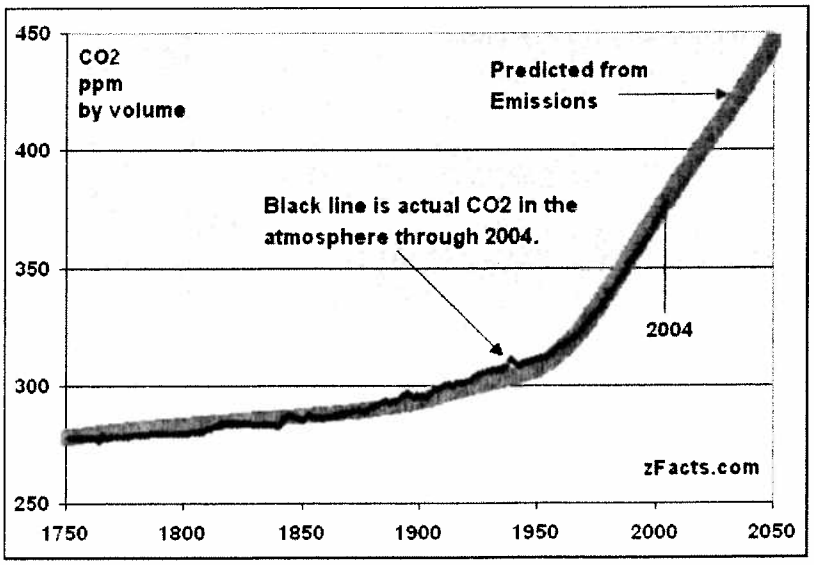


FIGURE 3: CO2 PPM FORECAST

[4] IPCC Fourth Assessment Report "Climate Change 2007: The Synthesis Report"
[5] Tufts University report "Florida Climate Change: The Costs of Inaction" November, 2007.

Local Climate Change in Florida

Global warming's real-world effect on life in Florida and the Florida Keys cannot be underestimated or ignored. With over 1,300 miles of coastline in the state, our coastal communities are at ground zero to experience the impacts of global warming. Florida's sea level is already rising 7-9 inches per century along much of Florida's coast [6]. The predicted sea level rise for this century due to climate change is a staggering 8-30 inches. A 12-inch increase in sea level will flood or erode between 100 and 1000 feet of coastal real estate. With most of Key West within one foot of extreme high tides[7], we have no time to wait.

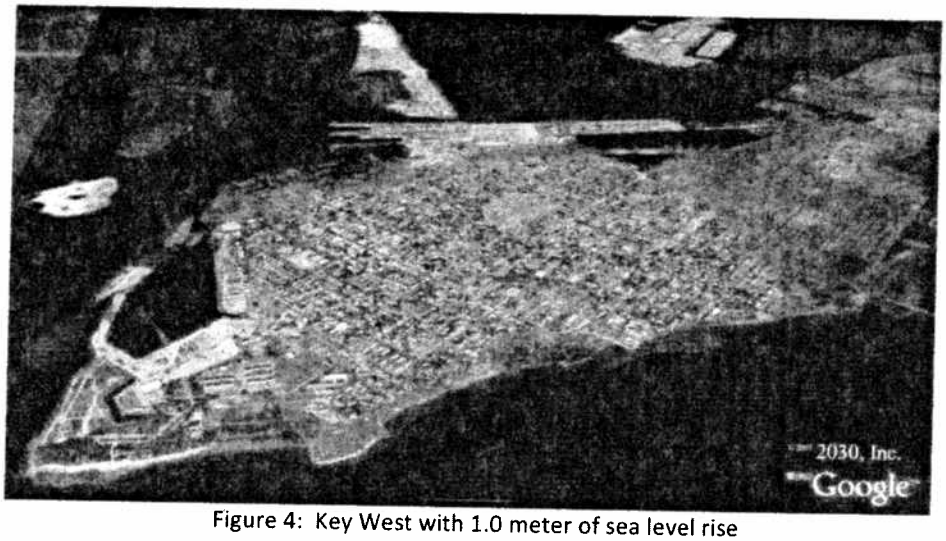


Figure 4: Key West with 1.0 meter of sea level rise
Source: Architecture 2030

Some of the potential effects of global warming that Florida may experience in the future were explained in a report entitled "Feeling the Heat in Florida: Global Warming on the Local Level,"[8] prepared by the Florida Climate Alliance and the National Resources Defense Council. Among the threats global warming poses for Florida's people and resources:

- As glaciers melt and warming waters expand, sea levels will rise anywhere from eight inches to two-and-a-half feet over the next century. In Florida, seawater will advance inland, flooding shoreline homes and hotels, limiting future development, and eroding the state's beloved beaches.

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[6] "Climate Change and Florida" EPA 230-F-97-008i, 1997
http://yosemite.epa.gov/OAR/globalwarming.nsf/UniqueKeyLookup/SHSU5BUKSV/$File/fl_impct.pdf

[7] Key West stormwater engineer Annalise Mannix

[8] Florida Climate Alliance & the Natural Resources Defense Council, Feeling the Heat in Florida: Global Warming on the Local Level, New York, New York, October 2001. http://www.nrdc.org/globalwarming/florida/florida.pdf

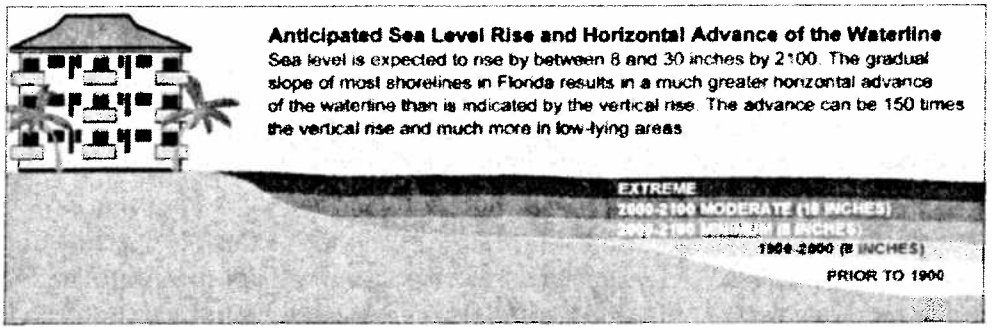


FIGURE 5. SOURCE: NATIONAL RESOURCE DEFENSE COUNCIL

- Tourism will likely suffer. Coral reefs ecosystems, a cornerstone of the Keys' appeal as a tourist destination, are extremely sensitive to climate change. The increased sea temperatures caused by a warming world contribute to severe coral bleaching events and render corals more susceptible to diseases. Also, the burning of fossil fuels releases carbon dioxide which acidifies the chemical balance of the oceans, weakening coral skeletons.

- As salt water encroaches inland, freshwater supplies feeding Florida's cities, agriculture, and tourist centers will be at risk of saltwater contamination.

- Saltwater encroachment will also likely inundate coastal wetlands, gravely threatening the lower Everglades and its wildlife.

- Sea level rise, climbing temperatures, and alterations in rainfall will combine to damage beaches, the Everglades, coral reefs and other unique ecosystems that make Florida such an appealing tourist destination.

- Global warming will pose specific health threats to Florida's citizens, likely increasing the incidence of heat-related illness, exacerbating poor air quality, and perhaps even making it easier for infectious diseases to spread through the increase of insect vectors. Florida's seniors will be particularly susceptible to these effects.

- The impact of global warming on agriculture may not be felt at first; indeed, it is possible that climate and water conditions will help some commercial crops in the short run. But it's likely that climate changes will lead to lower yields of such important cash crops as citrus, sugarcane and tomatoes.

- Forest wildfires are very likely to be more common, and do more damage -- the result of higher temperatures and more intense droughts -- although the magnitude of this effect will depend on overall changes in rainfall. Also, global warming may increase the threat to forests from invasive species and pests.

Financial Impacts for Florida:
According to a November, 2007 Tufts University report titled "Florida and Climate Change: The Cost of Inaction," climate change could cost Florida an additional $27 billion by 2025 and $345 billion by 2100 if carbon dioxide and other greenhouse gas emissions continue to increase at current rates. The report estimates losses to tourism, increased costs for energy, the cost of hurricanes and the loss of property as the climate warms, sea levels rise and storms worsen.

The study examined two potential climate change scenarios and the effects of those scenarios on Florida's economy:

1) The *rapid stabilization* scenario portrays the most optimistic view of the lowest emissions under discussion today – that is, the best future that we can expect if the world enters into a robust program of climate mitigation.
2) The *business-as-usual* scenario represents the worst of what the IPCC calls its "likely" projections, with atmospheric concentrations of carbon dioxide exceeding the critical threshold of 450 ppm by 2030 and reaching 850 ppm by 2100.

The study concludes that while taking the necessary action to reduce carbon emissions to the necessary level of 80% reduction by 2050 undoubtedly requires some significant financial investment, the cost of doing *nothing* to mitigate and adapt to the effects of climate change will have a far greater negative impact on Florida's future, economic and otherwise.

C. *Action Being Taken on Climate Change*

International Action
The international response to climate change was launched in 1992, at the Earth Summit in Rio de Janeiro, with the signing of the United Nations Framework Convention on Climate Change (UNFCCC). The Convention established a long-term objective of stabilizing greenhouse gas concentrations in the atmosphere "at a level that would prevent dangerous anthropogenic interference with the climate system." It also set a voluntary goal of reducing emissions from developed countries to 1990 levels by 2000 - a goal that most countries did not meet.

As evidence of climate change has mounted, groups at the international, federal, state and local level have responded with ways to confront the impending threat. Recognizing the problem of potential global climate change, the World Meteorological Organization (WMO) and the United Nations Environment Programme (UNEP) established the Intergovernmental Panel on Climate Change (IPCC) in 1988 to assess on a comprehensive, objective, open and transparent basis the scientific, technical and socio-economic information relevant to understanding the scientific basis of risk associated with human-induced climate change, its potential impacts and options for adaptation and mitigation, releasing its most recent assessment in 2007.[9]

In 1997, 10,000 international delegates, observers and journalists gathered in Kyoto, Japan to participate in the drafting and adoption of the Kyoto Protocol, which sets binding targets to reduce

[9] Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report: "Climate Change 2007: The Synthesis Report."

emissions 5.2 percent below 1990 levels by 2012 [10]. As of February, 2006, 162 countries have ratified the Protocol, with the United States and Australia most notably absent from the list.

Most recently, representatives from over 180 nations met in Bali, Indonesia, in December, 2007, Indonesia to negotiate new climate change agreements beyond the Kyoto Protocol. The conference culminated in the adoption of the Bali roadmap, which charts the course for a new negotiating process to be concluded by 2009 that will ultimately lead to a post-2012 international agreement on climate change. Over the next two years, industrialized countries need to agree to deep emission cuts, and to leverage new funding and support for technology transfer, finance and adaptation.

State and Federal Action

Though adequate attention and action related to combating climate change has been lacking at the federal level, Florida has taken significant steps at the state level. With Governor Charlie Crist at the helm, Florida has been leading the charge on combating climate change through legislation:

On July 13, 2007, Governor Crist set a new direction for Florida's energy future by signing a groundbreaking set of Executive Orders during the Serve to Preserve Florida Summit on Global Climate Change. The orders will guide Florida to reduce greenhouse gases, increase energy efficiency and pursue more renewable and alternative energy sources, such as solar and wind technologies, ethanol and hydrogen. Governor Crist signed Executive Order 07-126, titled "Leadership by Example: Immediate Actions to Reduce Greenhouse Gas Emissions from Florida State Government"; Executive Order 07-127, "Immediate Actions to Reduce Greenhouse Gas Emissions within Florida"; and Executive Order 07-128, "Florida Governor's Action Team on Energy and Climate Change."

At the close of the Summit, Governor Crist appointed an Action Team on Energy and Climate Change. The Action Team has already completed the Phase One report and will continue to develop a strategy to protect our state from the effects of climate change.

Local Action

A great deal of work is being done at the local level on climate change as well. The first greenhouse gas reduction target adopted by any level of government was put forward by Toronto, Canada in 1989. That city's actions helped inspire the first formal municipal program for climate protection, the Urban CO_2 Reduction Project, which was launched in 1991 by the International Council for Local Environmental Initiatives (ICLEI). This program ultimately developed into the international Cities for Climate Protection (CCP) Campaign, which enlists local governments in developing targets, timelines and implementation strategies for reducing their emissions. The CCP Campaign now represents more than 770 local governments on six continents. In the United States, 350 cities, towns and counties participate in the CCP Campaign, representing 66 million people, or 22 percent of the American population.

ICLEI also works in conjunction with the U.S. Conference of Mayors to track progress and implementation of the U.S. Mayors Climate Protection Agreement, launched in 2005, which more than 700 mayors have signed to date pledging to meet or beat the Kyoto Protocol target of a 7%

[10] 5.2% is the Kyoto reduction target for the majority of developed countries; the US target, signed but not ratified, is 7%

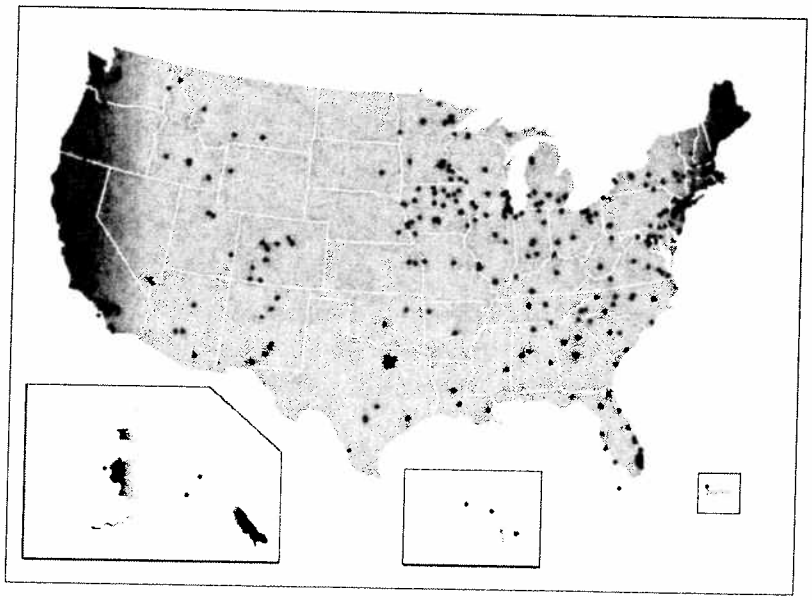
reduction in emissions from 1990 levels by 2012 in their own communities. As seen by the southernmost dot on the map in Figure 6.1, Key West is a proud signatory of the agreement.

In Florida, there are some fine examples of local governments' action on climate protection:

Miami, FL: TREE CANOPY REMEDIATION AND REPLENISHMENT
In 2002 Miami launched a comprehensive and aggressive environmental program to reverse decades of neglect; the aim is to improve climate protection and the City's livability by implementing sustainable urban design principles. Tree canopy remediation and replenishment are key components of this effort. The City is working to increase its tree canopy to 30 percent from its current seven percent and conducting a comprehensive analysis of the tree canopy in partnership with American Forests. Working with community groups, the private sector, and various government agencies, Miami is well on its way to meeting its goals.

North Miami, FL: GREEN HOUSING REHABILITATION GUIDELINES
The first "green" procurement ordinance in South Florida was created in North Miami. It offers preference points to vendors supplying green products or services and contains an administrative regulation which requires City staff to purchase only green products – cleaning products and recycled paper, for example – and to send correspondence electronically. The City maintains a Green North Miami Web site and publishes a Green North Miami Guide, both of which provide residents and business owners with tips on the steps they can take to reduce greenhouse gas emissions.

FIGURE 6: MAP OF MUNICIPAL SIGNATORIES OF US MAYOR'S CLIMATE PROTECTION AGREEMENT



D. ICLEI and the Cities for Climate Protection Program

ICLEI's mission is to improve the global environment through local action. The Cities for Climate Protection® (CCP) Campaign is ICLEI's flagship campaign designed to educate and empower local governments worldwide to take action on climate change. ICLEI provides resources, tools, and technical assistance to help local governments measure and reduce greenhouse gas emissions in their communities and their internal municipal operations.

ICLEI—Local Governments for Sustainability has been a leader on both the international and local level for more than ten years, representing over 770 local governments around the world. ICLEI was launched in the United States in 1995 and has grown to more than 350 cities and counties providing national leadership on climate protection and sustainable development.

Cities for Climate Protection (CCP) Campaign

ICLEI was formed to assist local governments in developing sustainable and practical solutions to global environmental problems. The Cities for Climate Protection (CCP) Campaign focuses on global warming and climate change. CCP is a performance-oriented campaign that offers a framework for local governments to reduce greenhouse gas emissions and improve livability within their municipalities. The CCP Campaign achieves these results by linking climate change mitigation with actions that improve local air quality, reduce local governments' operating costs, and address other existing municipal concerns.

The Cities for Climate Protection Campaign involves a five-milestone process to achieve GHG emissions reductions. The five milestones are as follows:

Milestone One: Conduct a baseline emissions inventory and forecast.

Milestone Two: Set an emissions reduction target.

Milestone Three: Develop a Local Action Plan for reducing emissions.

Milestone Four: Implement policies and measures.

Milestone Five: Monitor emissions reductions and verify results.

On August 7, 2007, the city of Key West adopted a resolution to take action for climate protection and officially joined ICLEI's Cities for Climate Protection Campaign. The city has completed Milestone One and will proceed by formally setting an emissions reduction target and developing a Local Action Plan in the coming months.

While it is not possible for Key West to unilaterally end global warming, it is also not possible for the problem to be solved without effective and meaningful leadership at every level of government, no matter how small. Citizens and governments in developed nations and in the United States in particular, have a responsibility to consider both their own role in causing this global problem and their relative capacity to solve it. Due to our country's high per capita contribution to global-warming and high ability to respond or make changes (relative wealth) we have a responsibility to take a leadership role in the solution to this problem.

But perhaps more compelling than questions of consequence, need, and responsibility, is the increasingly well-documented fact that actions to reduce global-warming pollution have net positive effects on budgets and the economy. These benefits include:

- Job creation
- Reduced energy costs
- Improved health
- Decreased vulnerability to fossil fuel market fluctuations
- Decreased vulnerability to future carbon pollution regulations
- Reduced traffic congestion
- Improved livability and quality of life
- Energy-efficiency and renewable-energy investments keep our energy dollars circulating in the local economy.

Achieving a significant and meaningful reduction target will require some investment on the part of city government. The mounting consequences of global warming are appearing first as local problems, so it is appropriate that the global solution will also begin to appear at the local level. The longer we wait, the more pollution accumulates in the atmosphere. On the other hand, actions taken now will begin to pay for themselves. Payback and environmental benefits can be quickly realized and eventually the clean energy industry will become an economic factor in our region.

Overall Goal:
To reduce the emissions of gases and air pollutants that contribute to global climate change and local air quality degradation.

Key West Specific Objectives:

1. Improve and protect Key West's quality of life in the future.
2. Raise awareness of global climate change and the sources of greenhouse gases.
3. Implement public programs to increase energy and transportation efficiency as well as solid waste reduction in order to reduce Key West's contribution to the global problem of climate change.
4. Develop practices to reduce the emission of greenhouse gases and increase operational cost efficiency in municipal operations.

II. Greenhouse Gas Emissions Inventory

In order to forecast and measure progress towards future reductions, the city committed to establishing an inventory of energy use and emissions for a baseline year. From October through December, 2007, this inventory was conducted and the findings are summarized later in this report. The inventory used the city's fiscal year 2005 (Oct, 2004 through Sept, 2005) as its baseline year. An interim year of fiscal year 2007 (Oct, 2006 through Sept, 2007) was also measured. The total energy consumption and greenhouse gas emissions of all municipal government facilities and operations in FY 2005 were measured and recorded. Energy cost, as available, was also inventoried in order to better measure the costs and benefits of future proposed changes in energy use.

The next step is to create a Local Climate Action Plan. This document is the first step in the development of the plan, which will set a target for emissions reductions. The plan will outline the policies and measures that the city will take to achieve the emissions reduction target. This plan will be fully developed to include a timeline, a description of financing mechanisms, and an assignment of responsibility to City departments and staff. The plan will incorporate public awareness and educational efforts. The development of the Local Climate Action Plan will include public input and involvement in order to build consensus among stakeholders required to implement measures.

A. Methodology

1. CACP Software

To facilitate local government efforts to identify and reduce greenhouse gas emissions, ICLEI developed the **Clean Air and Climate Protection** (CACP) Software package with Torrie Smith Associates. This software estimates emissions derived from energy consumption and waste generation within a community. The CACP software is also useful as a planning tool to calculate the energy, money, and greenhouse gas savings from both existing and proposed greenhouse gas reducing policies and measures. The CACP software determines emissions using specific factors (or coefficients) according to the type of fuel used. Emissions are aggregated and reported in terms of equivalent carbon dioxide units, or CO_2e. Converting all emissions to equivalent carbon dioxide units allows for the consideration of different greenhouse gases in comparable terms. For example, methane is twenty-one times more powerful than carbon dioxide in its capacity to trap heat, so the model converts one ton of methane emissions to 21 tons of CO_2e. Additionally, the program measures the production of other criteria air pollutants and this data has been included as appendices to this report (APPENDIX E-6 and E-7).

The emissions coefficients and methodology employed by the software are consistent with national and international inventory standards established by the Intergovernmental Panel on Climate Change (1996 Revised IPCC Guidelines for the Preparation of National Inventories) and the U.S. Voluntary Greenhouse Gas Reporting Guidelines (EIA form1605).

The CACP software has been and continues to be used by over 350 U.S. cities and counties to reduce their greenhouse gas emissions. However, it is worth noting that, although the software provides a sophisticated and useful tool, calculating emissions from energy use with precision is difficult. The model depends upon numerous assumptions, and it is limited by the quantity and quality of available

data. With this in mind, it is useful to think of any specific number generated by the model as an approximation, rather than an exact value.

2. Inventory Sources and Creation Process

The creation of an emissions inventory required the collection of information from a variety of sectors and sources. These data were entered into the software to create a **community emissions inventory** and a **municipal emissions inventory**. The community inventory represents all energy use within Key West and its contribution to greenhouse gas emissions. The municipal inventory is a subset of the community inventory, and includes energy use and emissions derived from internal government operations.

There are two main reasons for completing separate emissions inventories for community and municipal operations. First, the government is committed to action on climate change, and has a higher degree of control to achieve reductions in its own municipal emissions than those created by the community at large. Second, by proactively reducing emissions generated by our own activities, the Key West government takes a visible leadership role in the effort to address climate change. This is important for inspiring local action in Key West as well as for inspiring other communities.

The data collected do not include all emissions that could be identified or quantified. Rather, the focus is on those areas over which the city government has the most influence. For example, data regarding Key West Airport was not collected even though, on a per capita basis, air travel is often one of the most significant sources of greenhouse gas pollution. City government holds relatively little influence over individual residents' air travel choices, and much of that travel is combined with other, larger regional airports. The accuracy of any attempt to quantify such emissions would be highly questionable, and its usefulness as a policy tool would be relatively minimal. The following sources of emissions are not included in this data set:

- Air travel
- Non-road fuel use (riding lawn mowers, off-road vehicles, construction vehicles, etc.)
- Water travel [11]
- Upstream energy from consumer products and food
- Other greenhouse gases including N2O, CFCs and SH6

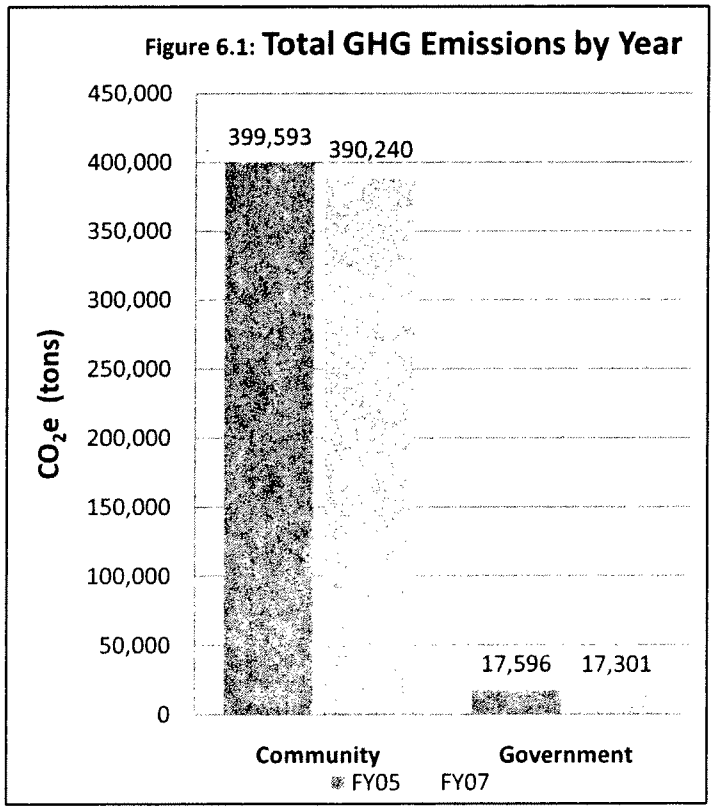
[11] Water travel and marine fuel consumption are significant in Key West, due to its island geography. Recreational and commercial boating, as well as the large Navy and Coast Guard presence, contribute to the community's GHG emissions from marine fuel. An attempt was made to collect data on marine fuel from private marinas, Navy and Coast Guard; however, complete data was not provided in a timely manner to allow inclusion in this inventory. It may be useful to amend the report once this data is available and to include potential reduction measures related to water travel in the Local Action Plan.

B. Emissions Inventory Results Summary

Greenhouse gas emissions were inventoried for the baseline year of fiscal 2004-2005 (October '04 through September '05; hereinafter referred to as FY05) and an interim year of fiscal year 2006-2007 (October '06 through September '07; hereinafter referred to as FY07.) The inventory measures emissions for the community as a whole, with a more detailed look at municipal government operations as a subset of the community emissions. Each of these categories is further broken down by **sources** and **sectors:**

> ***Sources*** are the fuel or energy that is the basis of the emissions. In this inventory the main sources considered are **electricity, propane, diesel, gasoline, landfill gas** and **CO_2**.
>
> ***Sectors*** are the categories of the community or government operations which contribute the emissions. In the community analysis the sectors considered were **residential, commercial, transportation** and **waste.** In city operations the sectors considered are **buildings, vehicle fleet, employee commute, streetlights, water/sewer** and **waste.**

Figure 6.1 depicts the total emissions for the community as a whole and also the municipal government emissions for the baseline and interim years measured.



In FY05, total emissions for the city of Key West were calculated to be 399,593 tons of carbon dioxide equivalents (CO_2e) and in FY07, the total emissions measured 390,240 tons CO_2e, representing a 2.3% decrease. Unlike many places in the country which have experienced rapid growth in population and emissions over the past several years, several factors contribute to the fact that Key West's emissions have remained relatively static. Lack of significant new construction, combined with an increase of seasonal second home owners rather than full time residents, and heavy hurricane activity during the summers of 2004 and 2005, have contributed to a slight decrease in population and energy use since the 2000 census [12].

[12] According to the U.S. Bureau of the Census, as prepared by the South Florida Regional Planning Council, Key West population in 2000 was 25,478 and the estimated population in 2006 was 25,319.

The city government's operations in FY05 accounted for 17,596 tons of GHG emissions, or 4.4% of total community emissions. As a comparison, most municipal inventories fall within 2-5% of the total community inventory. From FY05 to FY07, government emissions showed a slight decrease of 1.7%.

According to this inventory, per capita emissions for Key West in FY05 were 16.7 tons CO_2e, as compared to the national average of approximately 26.7[13] tons per capita.

The largest contributor of emissions in the community inventory in FY05 came from the commercial sector, at 38.9 % of total emissions. Adding emissions from the residential sector (27.2%) gives a total for the "built environment" of 66.1% of total community emissions.

In the government analysis, the vehicle fleet sector (25.8%) and the sewage/water sector (24%) were the two largest contributors of emissions.

Figure 7: **FY05 Community GHG emissions by sector**

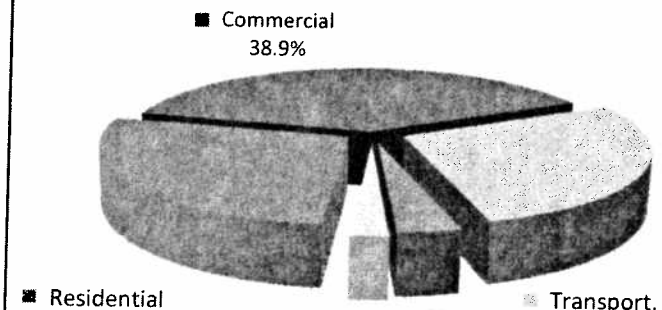


Figure 8: **FY05 Municipal GHG emissions by sector**

The inventory is intended as a tool to focus policy makers' and community attention on the areas with the largest room for improvement.

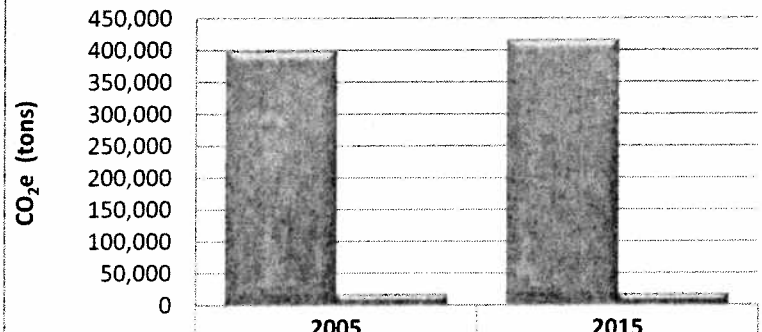
Clearly defining the scope and nature of the problem allows us to direct our attention where efforts will have the most effect.

[13] US DOE Energy Information Administration: ftp://ftp.eia.doe.gov/pub/oiaf/1605/cdrom/pdf/ggrpt/057306.pdf. Metric tons were converted into US tons of CO_2e.

When the question is examined of where emissions reductions are possible, there will be a different set of options for city-owned facilities and operations than for private sector emissions. For example, the city might implement a procurement policy requiring that certain vehicles in the city fleet be replaced by hybrid vehicles, whereas in the private sector an education program about hybrids or an incentive program would be appropriate. These two segments work in concert as the city's leadership helps establish its credibility as a messenger, and public education provides increased public support for continued city action.

A forecast of predicted Community and Government emissions by the year 2015 was included in the inventory. The forecast measures expected emissions under a "business as usual" scenario; meaning if the city takes no action toward reduction of GHG emissions. By 2015, Key West community emissions are expected to increase to 416,826 tons CO_2e, a 4.3% increase over baseline FY05 levels. Tools and methodology used to arrive at forecasted numbers for the Community Inventory included projections for the South Atlantic region in residential and commercial per capita electricity use, as provided by the U.S. Department of Energy's EIA *(Energy Information Administration)*, as well as waste projections provided by the city's Public Works Department. Population was assumed to hold constant, due to the limitations of land and growth as explained earlier.

Figure 8.1 ***Baseline & Forecasted Emissions***



	2005	2015
Community	399,593	416,826
Municipal	17,596	17,596

Forecasted emissions for the Municipal Inventory were assumed not to change significantly by the target year of 2015 under a business-as-usual scenario. According to the Planning Department, there are no new government buildings or facilities officially planned. There has been discussion about a new City Hall being built; however, the details of those plans are not available and thus, this potential change in operations and the effect on overall government GHG emissions cannot adequately be analyzed or anticipated at this time. The Fleet Department reports no expected changes to vehicle type composition, mileage or fuel efficiency. The municipal solid waste forecast from Public Works does not include any change in the amount of "non-billable tons" of waste, that which is allocated to city government operations.

Additionally, any potential increase in electricity use (which accounts for 55.3% of total government emissions) would likely be offset by the increased efficiency in the electric grid by the year 2015.

The second Milestone in the Cities for Climate Protection program is to establish a reduction target.

A quantifiable goal will provide an objective for which to strive and against which to measure progress. Based on the findings of the inventory, an examination of existing and possible measures and a review of other community's targets, a Climate Protection Task Force will recommend reduction targets for municipal operations and for the entire community. The target should be both ambitious and achievable, and must take into account expected increases of emissions under the business-as-usual scenario when setting a goal for overall emissions reductions. In other words, the expected 4.3% increase in community emissions by 2015 must be overcome in addition to targeted reductions below FY05 levels in order to achieve the overall reduction goal.

1. Municipal Emissions Profile

In order to complete Milestone One, a Program Assistant (Jody Smith Williams, author of this report) was hired to conduct the GHG emissions inventory. A city staff liaison (Annalise Mannix, Environmental Programs Manager) was assigned to facilitate communications among staff, to provide historical information on city operations and to oversee the work of the Program Assistant. The first step was to contact all department heads and to request data for the six different sectors:

- Buildings
- Vehicle Fleet
- Employee Commute
- Street Lights (including Traffic Signals and Parks)
- Water and Sewer
- Waste

Key West conducted a detailed study of two fiscal years: FY05 (October 2004 through September 2005) as the baseline year, and FY07 (Oct. 2006 through Sept. 2007) as an interim year by which to measure any changes since the baseline year. Data was developed from department staff in the form of historical records and individual expertise.

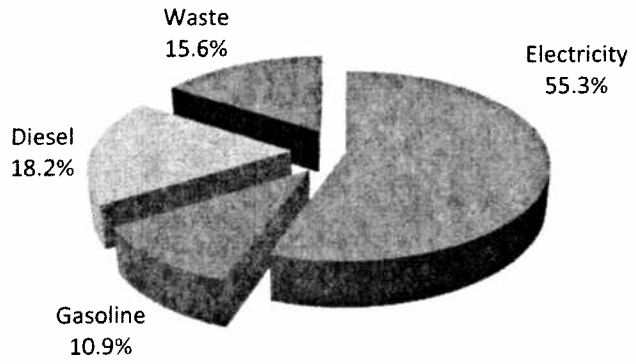
All electricity information was supplied by the city Finance Department and by Keys Energy Services in the form of an Excel spreadsheet. Cost information was also supplied by Keys Energy Services and city staff.

The Municipal Government Emissions Profile shows that in FY05, government operations produced a total of 119,572 MMBtus (million British Thermal Units [14]) of energy consumption and 17,596 tons of CO_2e emissions, which accounted for 4.1% of total community energy consumption and 4.4% of total community greenhouse gas emissions as measured in CO_2 equivalents (CO_2e.)

[14] British Thermal Unit - a standard unit of measurement for heat energy created by burning any material

Figure 9 below displays the breakdown of government emissions by energy source. Electricity is clearly the largest source of CO_2e emissions (55.3%), followed by diesel fuel (18.2%), waste (15.6%) and gasoline (10.9%).

Figure 9
FY05 Municipal Emissions by Energy Source



BREAKDOWN BY SECTOR

The municipal profile is divided into the following sectors: Buildings, Vehicle Fleet, Streetlights, Water/Sewer, Employee Commute, and Waste. The breakdown of greenhouse gas emissions associated with these sectors is described in Figure 9.1 and Table 1 below:

Figure 9.1
FY05 Municipal Profile by Sector

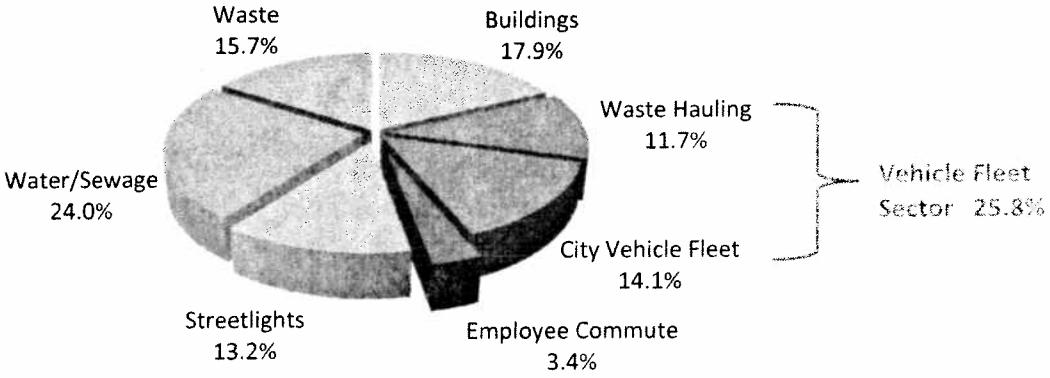


Table 1

FY05 Government Emissions by Sector	***Equiv CO2 (tons)***	***Equiv CO2 (%)***	***Energy (MMBtu)***	***Cost ($)***
Buildings	*3,158*	*17.9*	*17,493*	*591,076*
Vehicle Fleet Total	*4,532*	*25.8*	*58732*	*605,387*
City vehicles	*2,482*	*14.1*	*28,864*	*605,387*
Waste hauling	*2,050*	*11.7*	*29,868*	-
Employee Commute	*602*	*3.4*	*7,070*	-
Streetlights	*2,331*	*13.2*	*12,914*	*461,925*
Water/Sewage	*4,217*	*24.4*	*23,363*	*752,219*
Waste	*2,756*	*15.7*		*717,062*
Total	*17,596*	*100*	*119,572*	*3,157,659*

Buildings & Facilities

The Buildings sector includes buildings and facilities which are owned or leased by the city. In FY05 this sector represented 17.9 % of total CO_2e emissions for government operations. Data was gathered through electric bills from the city Finance Dept. and also from Keys Energy Services. Many of these bills had duplicate service location names and were not easily identified as belonging to a particular department or building. City staff was consulted to identify as specifically as possible what each account was associated with; however, there is no facilities manager for the city who maintains records and oversees bills associated with each department. All electric bills go directly to the Finance Department and are not seen by individual department heads. Therefore, department heads are not familiar with electric meters, accounts and energy consumption which fall under their jurisdiction.

Keys Energy Services allocates many electric accounts to city operations which are not paid by the city. Most of these pertain to non-profit offices such as Wesley House, Florida Keys Outreach Coalition, etc. which are city owned buildings that are leased. According to Keys Energy Services, the city most likely set up the accounts to avoid connection and service charges, but the bills are passed through to the tenants and therefore, are not maintained within the Finance Department's records. Most of these accounts have been classified in the "Other" category. Also included as 'Other' are accounts related to city operations that could not be identified with a particular department or use. All 'Other' accounts are included as part of the inventory since the city maintains some jurisdiction and influence over the operations of these facilities and has the ability to affect changes that may reduce associated emissions.

Overall energy use and emissions for buildings decreased by 3.6% between FY05 and FY07 while at the same time, the electricity cost for these buildings increased by 13.6%.

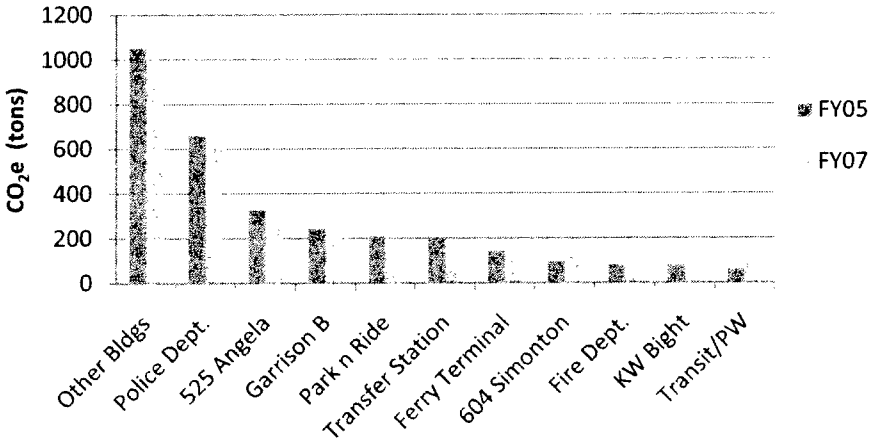
There have been many changes and moves among departments and buildings over the past several years due to displacements from Hurricane Wilma and other factors. For this reason it was not

feasible to separate energy use by each department. Table 2 and Figure 10 below demonstrate the breakdown for those buildings, facilities or departments which were clearly identified.

Table 2: City Buildings & Facilities

Building/Facility	Equiv CO2 (tons)		Energy (MMBtu)		Equiv CO2 (%)		Cost ($)	
	FY05	FY07	FY05	FY07	FY05	FY07	FY05	FY07
Other Buildings/ Facilities	1,051	995	5,821	5,712	33.28%	33.46%	$204,526	$228,091
Police Dept.	662	662	3,669	3,799	20.96%	22.27%	$116,650	$136,564
525 Angela – City Hall	328	290	1,816	1,663	10.39%	9.75%	$56,948	$61,255
Garrison Bight	242	223	1,342	1,282	7.66%	4.98%	$44,986	$48,721
Grinnell Park n' Ride	209	186	1,157	1,067	6.62%	6.26%	$34,479	$36,735
Transfer Station	204	176	1,128	1,013	6.46%	5.91%	$38,239	$40,006
Ferry Terminal	143	157	790	900	4.53%	5.28%	$25,560	$33,735
604 Simonton St. – City Hall Annex	96	124	534	712	3.04%	4.17%	$17,686	$25,943
Fire Dept.	82	74	452	424	2.60%	2.49%	$14,357	$15,198
KW Bight	80	66	445	379	2.53%	2.22%	$22,431	$23,934
Transit/Public Works	61	96	339	550	1.93%	3.23%	$15,214	$21,295
Total Buildings	**3,158**	**3,048**	**17,493**	**17,501**	**100%**	**100%**	**$591,076**	**$671,477**

Figure 10: **City Buildings & Facilities**



As a result of the inventory process, it was discovered that there is at least one leased building for which the city has been paying substantial electric bills for several years, even though the lease agreement states that the tenant is responsible for paying for electricity. This most likely has occurred due to the lack of a closed system of oversight for city buildings and associated utility accounts, and presents an opportunity to streamline operations in order to avoid similar scenarios in the future.

Vehicle Fleet

The city vehicle fleet currently consists of 290 vehicles, of which 15 are transit buses. Data was received from the Fleet Department with a breakdown of fuel use by vehicle type (e.g., mid-size, heavy truck, bus, etc.) for FY07 only. Hurricane Wilma in October, 2005 destroyed the department's TRAK computer system, and all records prior to that date were lost. The Finance department was able to provide total gasoline and diesel fuel usage for both FY05 and FY07; therefore, the percentage breakdown by vehicle type from FY07 was extrapolated and applied to FY05 in order to arrive at estimated gasoline and diesel use by vehicle type, with the exception of transit (bus) use. Actual figures for transit fuel were available from Finance for both FY05 and FY07.

Total vehicle fleet emissions amounted to 4,528 tons of CO_2e during FY05. This represents the largest contributing sector to municipal emissions at 25.7%. City department vehicles contributed 14.1% of the total and the other 11.7% of CO_2e emissions attributed to fleet operations came from hauling municipal solid waste (MSW) 200 miles each way out of the county. While MSW hauling is handled by a private contractor, the associated emissions are the result of the current waste system in place, a decision which is in the hands of the city to either maintain or change. For that reason it is included in the municipal inventory.

Table 3

Vehicle Fleet FY05	*Equiv CO2 (tons)*	*Energy (MMBtu)*	*Cost*
City Vehicle Fleet	2,482	28,864	$605,387
Waste Management haul-out	2,046	24,817	-
Total	4,528	53,681	$605,387

In October, 2005, the city expanded its transit operations to include service from Key West to Marathon, an increase of 45 miles each way. Due to this expansion, diesel fuel and associated emissions for transit increased by approximately 60%. During FY07, ridership on this new route totaled 82,466 one-way trips. Assuming that those riders would have otherwise driven in single passenger vehicles, and furthermore assuming that all riders would have completed the full 45-mile journey in their cars, the amount of CO_2e displaced by the increase in transit service was 2,432 tons[15]. By contrast, the additional mileage for the expanded bus service produced an additional 508 tons of CO_2e emissions, for a net *decrease* in total community emissions of 1,924 tons.

There are two ways to reduce carbon emissions in the vehicle fleet: 1) reduce energy consumption and 2) use alternative fuel sources. For certain departments which use heavy and light trucks, such as Public Works or Fire, poor gas mileage is inevitable. However, many departments using light trucks/SUVs and full size cars also experience poor gas mileage. Energy consumption reductions may be achieved through better fuel efficiency, proper sizing of vehicles for the task performed, and ensuring that vehicles are not consuming fuel while idle.

[15] Calculation to achieve displaced emissions from would-be drivers: 82,466 trips x 45 miles = 3,710,970 VMT. Using the CACP software coefficients for passenger vehicles, this equates to 2,432 tons of CO_2e emissions which would have been produced without the transit system in place. Transit emissions of 508 tons CO_2e were subtracted to arrive at the net displacement figure of 1,924 tons.

In November, 2007, the city began using B20 biodiesel (80% petroleum diesel and 20% biofuel) for its entire fleet, including transit buses. This change is expected to reduce emissions by 338 tons CO_2e per year by the target year of 2015, for an overall emissions reduction in the municipal sector of 1.9%.

Employee Commute

In FY05, the city had 472 full time employees. Of those, 123 used city take-home vehicles for commuting to and from work. Emissions pertaining to those vehicles are already included under the Vehicle Fleet sector.

Surveys regarding employee vehicle miles traveled (VMT) to and from work, and vehicle type, were sent to all current city employees. 132 surveys were returned by employees who had been employed during FY05, representing a statistically significant 38% of all employees who did not drive take-home vehicles. An average VMT per employee was calculated (2,210 miles per year) and a breakdown by vehicle type was extrapolated to arrive at a total VMT by vehicle type for the 349 employees who did not drive city vehicles.

Total emissions contributed by employees' commuting was 602 tons of CO_2e, or 3.4% of total government emissions. Some interesting findings from the survey include:

- 14.4% of those surveyed either walked or bicycled to work and therefore contributed no emissions.
- 34.8% of those surveyed who did not walk or bicycle commuted less than 2 miles round trip.
- Zero respondents stated that they took the bus to work.
- One respondent stated that he/she carpooled to work.

This information presents some possible opportunities for emissions reductions through encouragement and incentives for employees to walk, bike, carpool or take public transportation to work.

Streetlights

Streetlighting accounted for 13.5% of the government emissions in FY05. The Streetlight sector includes four categories: overhead streetlights; other lights such as memorial lighting and old fashioned streetlights; traffic lights; and parks and recreational facilities.

Overhead streetlights accounted for 47.3% of total streetlighting. As the intensity of street lighting is generally a function of other factors (such as safety and physical location), the best opportunity for reducing emissions associated with street lighting is to replace older technology with more efficient bulbs, such as sodium vapor. The majority of the city overhead streetlights are already sodium vapor lights of 100 or 200 watt capacity, with less than 15% remaining of older mercury vapor lights. All 400 watt bulbs are being phased out in favor of 100 or 200 watt bulbs, and the city and Keys Energy Services have begun changing the globe style to a cut-off optic style of the same wattage, for the purposes of allowing "dark skies" and focusing the light where it is most needed.

Figure 11: FY05 Streetlighting

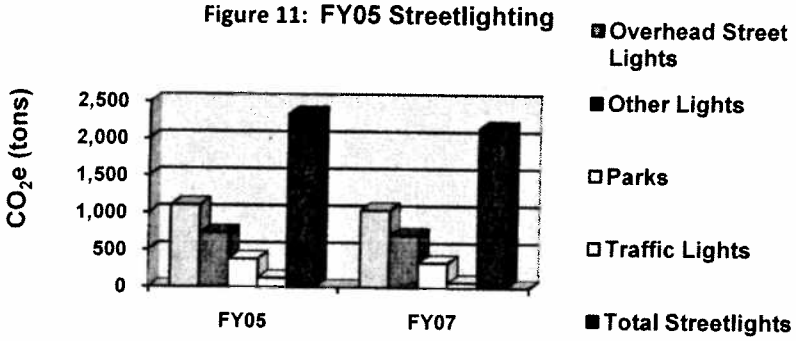


Table 4

Streetlighting	*Equiv CO2 (tons)*		*Equiv CO2 (%)*		*(MMBtu)*		*Cost ($)*	
	FY05	FY07	FY05	FY07	FY05	FY07	FY05	FY07
Overhead Street Lights	1,102	1040	47.28%	48.5%	6,105	5,973	$232,525	$261,697
Other Lights	730	700	31.32%	32.6%	4,043	4,019	$145,665	$162,891
Parks	376	335	16.13%	15.62%	2,084	1,924	$91,010	$85,758
Traffic Lights	123	68	5.28%	3.17%	681	389	$22,705	$14,961
Total Streetlights	**2,331**	**2,144**	**100%**	**100%**	**12,913**	**12,306**	**$491,905**	**$525,307**

Traffic Lights

The city began replacing incandescent traffic lights with much more efficient LED (light emitting diode) bulbs in December of 2001. Currently all traffic lights within the city limits have been replaced with LEDs. Between the baseline year of FY05 and FY07, this conversion reduced annual energy consumption from traffic lights by 42.8%, and CO_2e was reduced by 55 tons (44.7%). This has resulted in a cost savings to the city of $7,244 (despite increased electricity rates as mentioned above.) These bulbs also last up to 10 times longer than incandescent bulbs, which will significantly reduce staff maintenance time and costs.

Sources: City Finance records provided account information for overhead streetlights and traffic lights, each of which has its own account. Parks and other lighting information was gleaned from Finance and Keys Energy Services account records; as stated under the Buildings sector, there were many accounts which were not clearly defined and there is no city staff person who is responsible for oversight of street lighting. Therefore, a best estimate was made as to the allocation of accounts included as other lighting and parks, based on conversations with various city staff.

Wayne Davila and Matthew Alfonso from Keys Energy Services provided details on the number and types of streetlights and traffic lights, and the conversion history for replacements.

Water/Sewer

The annual output of the Key West Waste Water Treatment Plant (WWTP) is currently 1,752 million gallons of water. Although there is no specific data available on output for FY05, the output is very consistent over the last several years, according to OMI supervisor Greg Smith. Energy was used by the water treatment plant at a rate of 11.3 MMBtu (or 3,311 kWh) per million gallons produced.

The Waste Water Treatment Plant was the second largest individual user of energy in FY05, contributing 24% of total emissions for the government operations. Given the nature of its work, the high energy consumption and associated emissions is understandable. It also presents an excellent opportunity, as even small increases in efficiency and water conservation can create substantial energy savings. In FY05, the WWTP accounted for 19,799 MMBtu of energy use and 3,574 tons of CO_2e emissions, at an annual cost of $602,618.

There are 24 pumping stations throughout the city, which consumed a total of 3,563 MMBtu of energy in FY05 and contributed 643 tons of CO_2e at a cost of $149,601.

Table 5

Water/Sewage FY05	*Equiv CO2 (tons)*	*Energy (MMBtu)*	*Cost*
Waste Water Treatment Plant	3,574	19,799	$602,618
Pump Stations	643	3,563	$149,601
Total	4,217	23,362	$752,219

Waste

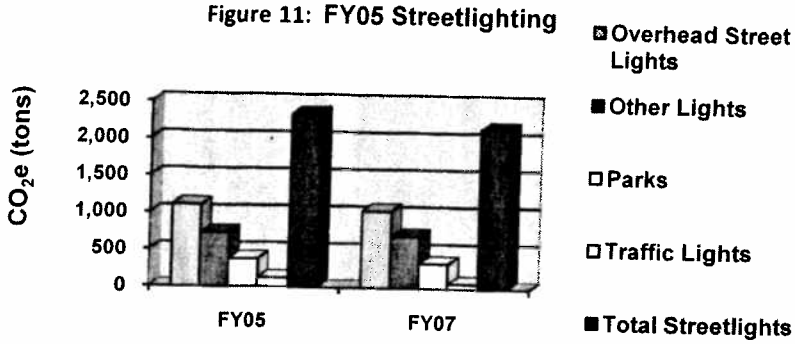
In FY05, municipal solid waste (MSW) allocated to city government operations totaled 11,759 tons, approximately 19.4% of total community waste. While this number represents a seemingly high percentage, it represents all waste over which government has some control or influence – that which is not paid for by residential or commercial customers, named "non-billable tons" by the Public Works department. This includes all waste from government facilities, city cans in public places, street sweeping and debris removal, and trash collected by city trucks, including special events. Due to the high amount of tourism in Key West, we have much more "non-billable" waste from public cans and special events than one would expect in a less touristed city.

Emissions contributed by the hauling of waste to the mainland are not included in the Waste sector, but rather as part of the Vehicle Fleet sector as explained in the previous section. If considered as part of the waste stream, total Waste sector emissions would equal 4,806 tons of eCO_2, nearly double that which is currently allocated to waste.

Since 2002, all city and community waste has been hauled to a waste-to-energy incinerator in Broward County. GHG emissions associated with government waste (incineration only) in FY05 totaled 2,756 tons of CO_2e, or 15.9 % of total government emissions. The cost to the city for hauling and disposal in FY05 was $717,062.

Recycling operations are not directly included as part of the municipal or community GHG emissions inventories. However, since total municipal solid waste includes any recyclable materials that are currently part of the waste stream, it is important to note that any increase in recycling activities would lead to a net reduction in

Figure 11: FY05 Streetlighting



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overall waste and associated emissions. With current recycling rates below 7%, there is great opportunity to reduce emissions through diversion of recyclables from the waste stream. Likewise, 31% of the waste stream composition is attributed to organic waste. Any portion of this which would be converted to mulch and/or compost and remain in the city would reduce emissions not only from avoiding the incineration process, but also by decreasing emissions from hauling these materials 200 miles to the mainland.

2. Community Emissions Profile

In FY05, the Key West community produced 399,592 tons of carbon dioxide emissions. This amount equates to 16.7 tons of GHG emissions per capita for the city, compared to a national average of 26.7 tons[16].

Figure 12 - FY05 Community Inventory by Energy Source

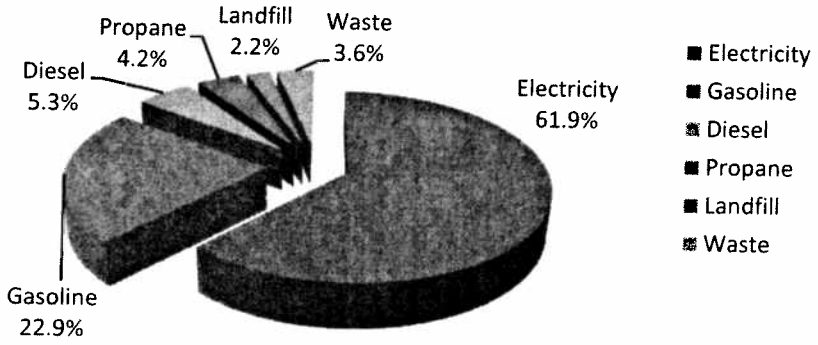
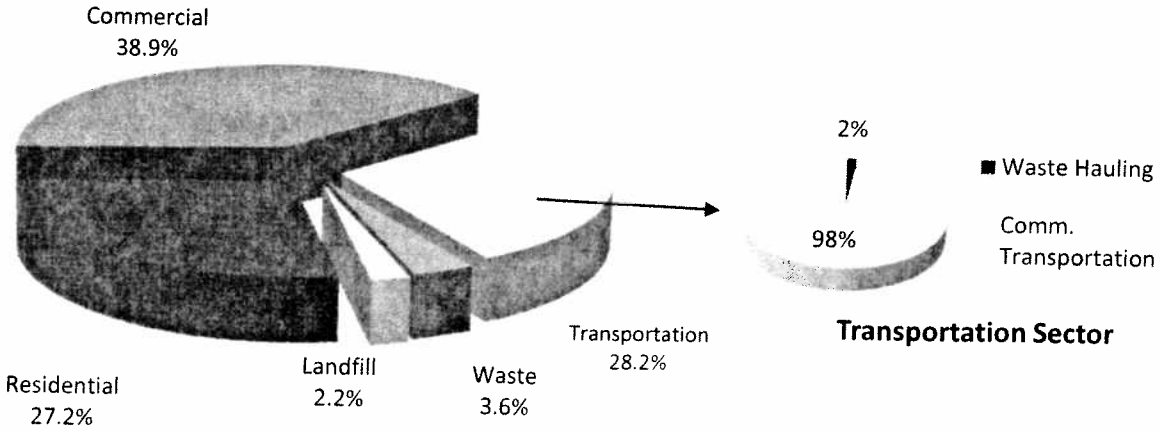


Figure 12 presents the Community Inventory by energy source for FY05. The figure shows that electricity is by far the foremost contributing source of GHG emissions (61.9%) with gasoline (22.9%) and diesel (5.3%) vehicle fuel second and third, respectively. The figure draws attention to the importance of addressing electricity consumption and exploration of alternative electricity sources, in order to reduce GHG emissions. The figure also highlights, to a lesser extent, the need to deal with emissions resulting from vehicle fuel.

Figure 13- **FY05 Community Inventory by Sector**



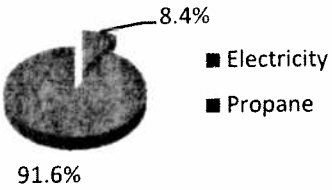
[16] US DOE Energy Information Administration: ftp://ftp.eia.doe.gov/pub/oiaf/1605/cdrom/pdf/ggrpt/057306.pdf. Metric tons were converted into US tons of CO_2e.

BREAKDOWN BY SECTOR

Commercial Sector

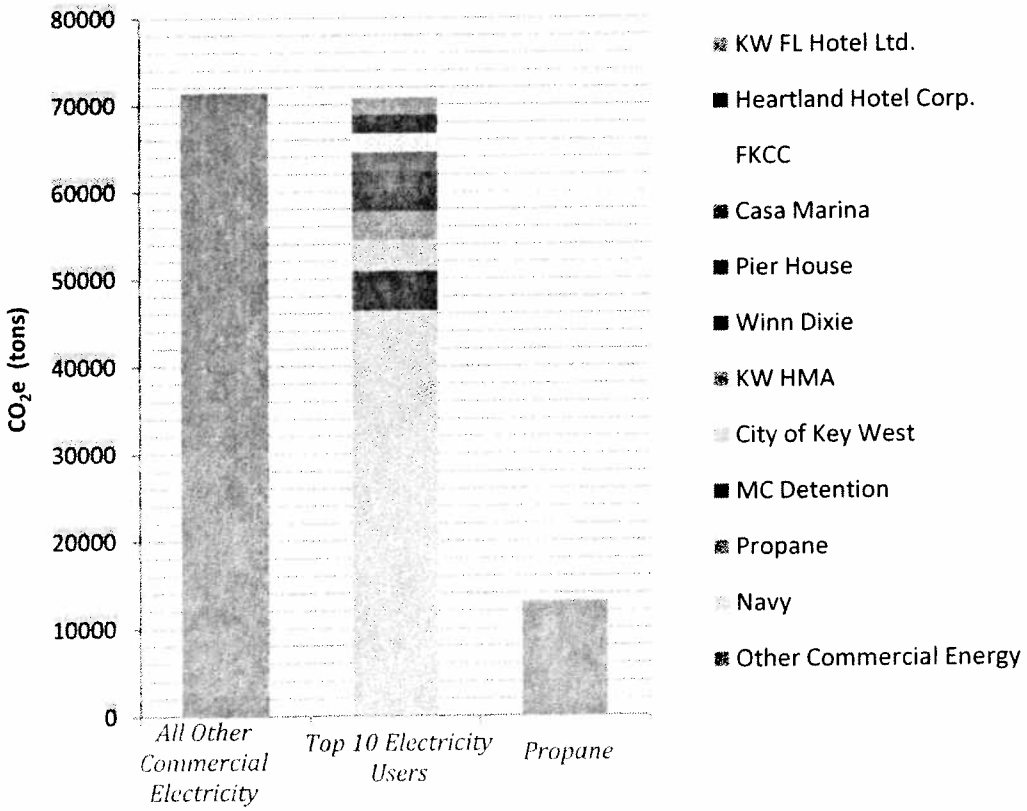
Energy use from the commercial sector comprised approximately 38.9% of all greenhouse gas emissions in the Key West community in FY05 and is the highest source of emissions. Activities in the commercial sector resulted in 155,322 tons of CO_2e. Within the commercial sector itself, electricity accounts for 91.6% of emissions, while propane use makes up the other 8.4%. Data on commercial electricity use was provided by Keys Energy Services. Propane data was gathered through private sector propane companies which serve the Key West community.

Figure 14:



Keys Energy Services keeps data on the highest 10 commercial consumers of electricity in the city per year. Figure 15 breaks down the top 10 commercial users in FY05 (column 2) relative to all other users of electricity (column 1) and all commercial propane use (column 3.)

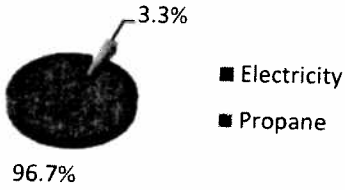
Figure 15: **FY05 Commercial Energy**



Residential Sector

27.2% of all community CO_2e emissions in FY05 were produced by the Residential sector, making this sector the third largest contributor of GHG emissions, just slightly behind the Transportation sector. 96.7% of residential energy use was attributed to electricity, and the remainder to household propane use for cooking, hot water heating, generators, etc. Total households in Key West according to the 2000 census were 13,306, amounting to a per household emission rate of 8.2 tons CO_2e.

Figure 16:
Residential Sector



Transportation

The Transportation sector was the second highest contributor of GHG emissions in FY05, comprising 28.2% of total community emissions. Total emissions from the transportation sector were estimated as 112,492 tons[17] of CO_2e.

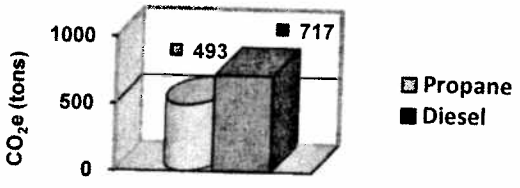
Emissions from vehicles were calculated using annual average daily traffic (AADT) data generated by the Florida Department of Transportation (FDOT.) The FDOT keeps a database for roads based on monitoring sites at certain points on these roads. The database includes 32.75 miles of roads in the city of Key West while total road miles equal 80.1. Although the calculation does not include all roads, it does include the major arteries of US1, State highway A1A (South Roosevelt Blvd.) and Flagler Avenue and therefore it is considered a reasonable estimate for AADT. This result was then multiplied by 365 in order to arrive at annual vehicle mile traveled (VMT) for all roads in Key West. This VMT data is used in combination with average data for vehicle fuel efficiency and vehicle types provided by the software defaults to calculate total fuel use.

Subsectors included in transportation were:

- total community VMT (as explained above);
- vehicle miles traveled by the city's waste hauler to transport solid waste to the incinerator in Broward County. Since these trips originate at the Stock Island transfer station (the very edge of the city limits) and continue 200 miles each way to the incinerator, they are not accounted for in the state's AADT figures. This service contributed 2,042 tons CO_2e emissions in the transportation sector, and 0.5% of total community emissions.

Tourist trains and trolleys which travel through city streets run on propane gas. Although these vehicles are already included in the total VMT estimates and are not considered as a separate sector, it is interesting to note the comparison in actual emissions from these vehicles in FY05 versus emissions that would have been created by the same vehicles running on diesel fuel: 493 tons eCO_2 for propane versus 717 tons for diesel fuel, a 45% difference.

Figure 17: Trains and Trolleys



[17] FDOT data on VMT was only available for calendar year 2006. This same figure was applied as the best estimation for FY05.

Waste

Historically, municipal solid waste (MSW) from Key West was sent to a landfill on Stock Island from 1932 until approximately 1987, at which time the Southernmost Waste to Energy (SWTE) plant was installed at the Stock Island site. From 1987 until approximately 1994 the ash generated from the SWTE was put into the landfill site. The landfill was permanently closed and capped per Florida Department of Environmental Protection (FDEP) consent order in two phases between 1992-1994. The SWTE facility continued to operate until 2002, at which time the City Commission voted to close it down rather than pay for retrofits to bring it up to current federal emissions regulations.

Since 2002, a transfer station has been in operation at the Stock Island site, and all municipal solid waste (MSW) is transported 200 miles to an incinerator in Pompano Beach, FL. A new and larger transfer station on Rockland Key (MM 10) was approved by the City Commission in 2007 and is currently being built.

Total community waste generated in FY05 was 60,835 tons, as provided by the city Public Works department. This represents 14,260 tons of CO_2e emissions created from the waste disposal technology of incineration, or 3.6 % of total community emissions.

If we were to add the emissions associated with hauling the waste to the mainland, as explained in the Transportation sector, total Waste emissions would equal 16,302 tons. Since we have already included these emissions under the Transportation sector, they are not counted again under the Waste sector.

As noted in the Waste section of the Municipal Government Inventory, any increase in recycling, composting and/or mulching activities would divert these materials from the waste stream and thereby reduce emissions associated with incineration and in the case of organic waste, transportation emissions from hauling to the mainland as well.

Stock Island Landfill

Although closed and capped since 1994, the Stock Island Landfill was considered as a contributing source of total community of greenhouse gas emissions, since methane produced in landfills is a potent greenhouse gas 21 times stronger than carbon dioxide. While some landfills have a methane recapture system in place to recover these emissions by either burning them off or in some cases, generating electricity with the methane, the Stock Island landfill has no such system in place.

The landfill was completely unregulated since its opening in 1932 until the 1970s, and therefore the composition of its lifetime contents is difficult to estimate. CH2MHill, the project engineering company responsible for closing the landfill, provided methane and carbon dioxide estimates for 2005 (calendar year) using the USEPA LandGem model (v 3.02.)

Emissions from the landfill totaled 8,800 tons CO_2e, or 2.2% of total community emissions. Since the landfill has been closed for so many years, and since the calculations were based on very rough estimates of waste composition and tonnage, the continuing yearly amount of emissions is assumed to be constant unless measures are taken to recapture methane.

C. *Forecast & Target*

A forecast was conducted of emissions predicted between the baseline year of FY05 and the target year of 2015 for both the municipal and community inventories. Forecasting methodology and accuracy, by definition, is a "best guess" estimation. 2015 was chosen as the forecast year, to offer a prediction that was far enough in the future to allow time to plan and implement changes, yet soon enough to impress the fact that action must be taken sooner than later if we are to achieve our stated goals. A target goal of 15% below baseline levels by 2015 is recommended for both the community and municipal action plan.

IPCC and other research mentioned earlier in this report suggests that we would need to achieve as much as an 80% reduction by the year 2050 in order to reverse global warming and stabilize the climate. The Sierra Club has developed the "2% Campaign" which states a goal of reducing emissions 2% per year for the next 40 years in order to achieve the necessary 80% reductions by 2050. Key West's 15% by 2015 goal is close to this strategy and yet slightly more aggressive – consistent reductions of 2.8% per year will be required to meet the target goal. Using this strategy, interim goals may be employed prior to 2015 as a means of monitoring progress, as well as more far ranging goals to strive for beyond 2015.

1. Community Forecast

Given that Key West's population has stagnated and actually declined slightly since the 2000 census, and the fact that there are strict limitations on available land and permits for new development, we do not expect any measureable increase in population by the target year. Development that has occurred recently and will likely continue to occur involves "re-development" of existing structures as opposed to building from scratch. This trend may indeed have an impact on predicted GHG emissions as well as the influence that city government can have on potential reduction measures. Re-developments tend to be larger square footage containing more energy intensive amenities, leading to a per capita increase in city-wide energy consumption and associated emissions. The only known potential new developments are buildings proposed for the Florida Keys Assisted Care Coalition, the Bahama Conch Community Land Trust at the Truman Waterfront, and any new affordable housing units that may be built in the city.

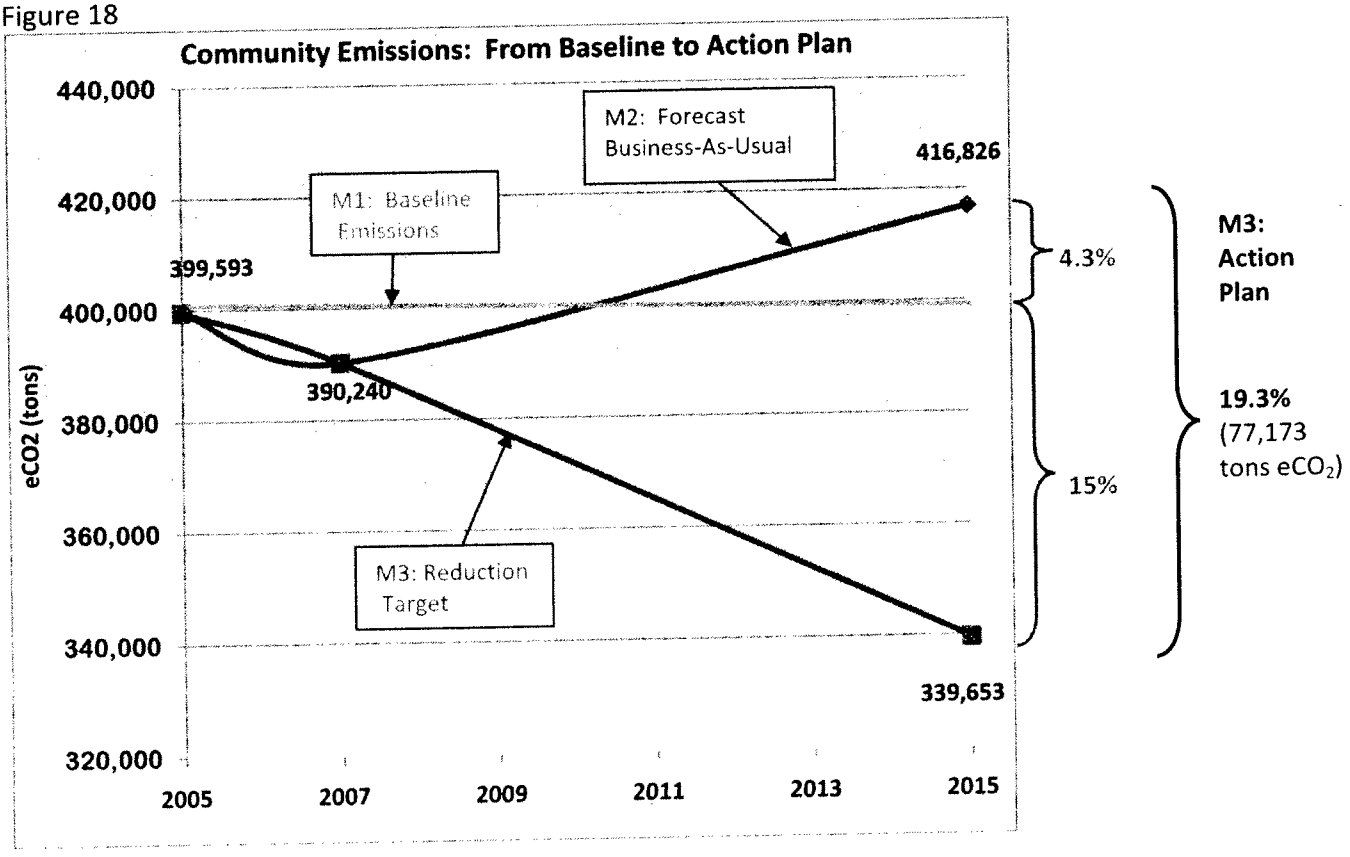
The community forecast was calculated using the U.S. Energy Information Administration's predictions of changes in per capita energy electricity use in the commercial and residential sectors for the south Atlantic region, as well as per capita fuel use for gasoline and diesel. The city Public Works Department was also consulted for predictions of waste disposal. For details on these calculations, please see Appendix D.

Using these data sources, it is predicted that without taking any steps to reduce greenhouse gas (GHG) emissions, the city will be responsible for emitting 416,826 tons of CO_2e by the target year 2015, an increase of 4.3 % from the baseline FY05. Taking a straight annual percentage increase from FY05 to 2015 produces total expected emissions of 426,179 tons; however, our analysis of the interim year FY07 showed an actual decrease of 9,352 tons of emissions. Therefore, this amount was deducted from the projected 426,179 tons in order to arrive at the net projection of 416,826 tons.

The interim year of FY07 was measured in order to show any changes in emissions since the baseline year of FY05. It may seem contradictory that projected emissions are expected to rise by 2015 when the last two years have shown an actual decline. However, this may be an anomalous trend, and not indicative of what is likely to occur in the future. In October, 2005, the month following the close of the baseline year FY05, Hurricane Wilma hit Key West, flooding over 50% of homes and vehicles and severely impacting the city's infrastructure. Many people found themselves unable to live in their homes for months and even years while repairs were being done. Hotels, businesses and tourism were also affected by this event. Another contributing factor may be the real estate "boom and bust" scenario that has occurred over the past few years. Many properties were bought on speculation with the intention to re-sell, and due to the declining real estate market as well as the effects of the hurricane, many of these properties have stagnated on the market and/or foreclosed, and consequently have remained empty. Therefore, it is difficult to attribute the decrease in emissions between FY05 and FY07 as a general trend that will continue in the future.

Figure 18 below illustrates the difference between baseline FY05 emissions (M1) and the forecasted "business-as-usual" projection by 2015 (M2). M3 shows the necessary reductions if we are to achieve a recommended target goal of 15% below FY05 levels by 2015. A total reduction of 19.3% is necessary to overcome forecasted increases in addition to the 15% target goal. This amounts to a total reduction goal of 77,173 tons of CO_2e emissions.

Figure 18

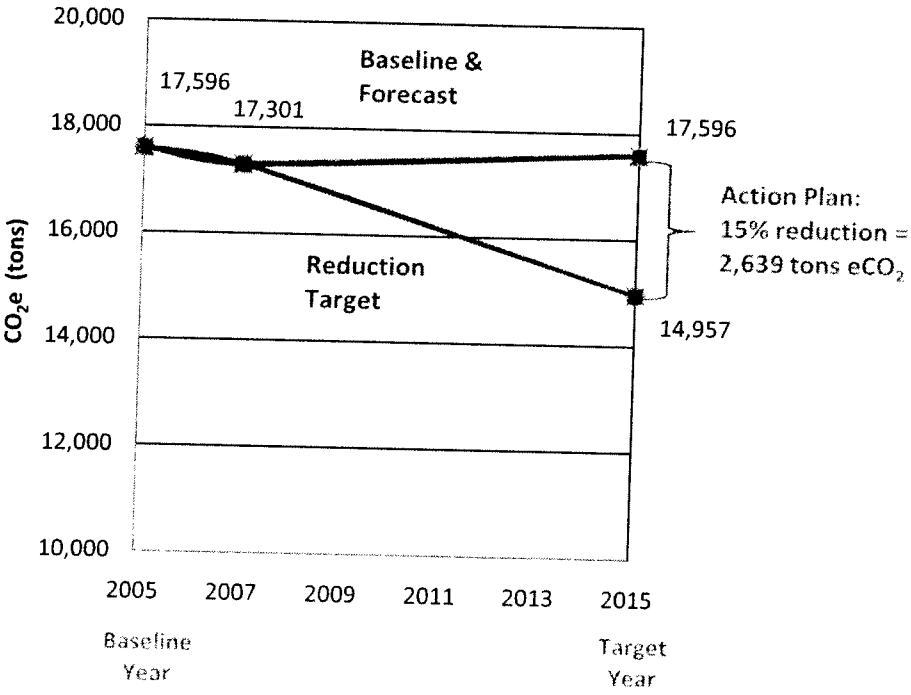


2. Municipal Forecast

As stated earlier in this report, the forecasted business-as-usual emissions from municipal government activities are not anticipated to change substantially by 2015. Given that the community's population is not expected to increase, it follows that government operations and infrastructure which serve the community would also not change substantially. Moreover, the average grid electricity emissions factors programmed into the CACP software account for expected increases in efficiencies to the electricity grid for our region, which serves to reduce the GHG emissions per kilowatt hour of electricity use. Given that over 50% of our municipal emissions come from electricity use, any potential increases in overall municipal energy use would likely be off-set by factoring in the cleaner fuel mix of the electricity grid. Based on these assumptions, the FY05 baseline of 17,596 tons of CO_2e was used as the forecasted total emissions for the target year of 2015, as seen in Figure 19 below.

Using the same target reduction figure that was used for the community inventory - 15% below baseline levels by 2015 - the municipal government emissions must be reduced by 2,639 tons of CO_2e to achieve that goal. This equates to a 2.2% reduction per year, or 377 tons.

Figure 19: **Municipal Emissions Forecast & Reduction Target**



III. Conclusions and Next Steps

Investment into greenhouse gas reduction methods benefits the city through both direct savings in electricity and fuel purchase costs, and by contributing to overall reduction of greenhouse gas and local air pollution.

The vast majority of greenhouse gas emissions from the city are from the activities of private residential and commercial entities. The influence of the City on these emissions varies depending on the source of the emission. Through policy decisions about land use and development, investments in public transit, energy-efficient building practices, waste reduction and recycling programs, the City can influence the behavior of non-City entities both directly and indirectly.

In order to drive the Cities for Climate Protection (CCP) Campaign forward through Milestones 2-5, a Climate Protection Task Force should be developed. This inventory report concludes a recommended community reduction target of 15% by 2015, as outlined above, which is determined to be an ambitious yet realistic and achievable goal. The Climate Protection Task Force may wish to revise this goal and/or set additional targets for both municipal and community reductions.

Due to the individualized nature of the CCP Program, the timeframe for which Key West develops its proposed Climate Protection Task Force and Local Action Plan is completely determined by the city. This process will be influenced by the amount of time the task force is able to commit to planning, the amount of resources needed and available for the planning process, and the priority the city places on this campaign relative to other proposed projects and activities. Some cities are able to develop their Local Action Plan within a few months; others take up to, and sometimes more than, one year. The City of Key West will need to evaluate the factors affecting the planning process in this city, and keep in mind that this is a dynamic process that will change with other changes in city operations.

The most important element to remember is that incorporating CCP initiatives and planning strategies into established projects and other proposed initiatives is usually the best way to ensure its continuation and success.

A. Key West's Progress through the CCP Milestones

Milestone 1 – Conduct a Greenhouse Gas Emissions Analysis: Baseline Inventory and Forecast of Emissions Growth

The emissions inventory for the City of Key West began in early October 2007 and was completed in January 2008. A detailed analysis for both Community-wide and Municipal sectors has been calculated for a baseline year of FY05 as well as an interim year of FY07. Electricity and fuel consumption, as well as waste data was entered into the CACP software program developed by Torrie Smith Associates. Forecasting data provided by the U.S. Department of Energy and also the Key West Public Works Department has been used to estimate business-as-usual growth projections for energy usage and carbon dioxide production into the year 2015.

Milestone 2 – Set a Reduction Target

This milestone propels the CCP Campaign forward, in that the city will not only be continuing to evaluate its current situation, but also look to the future and plan for sustainability. Strong task force development is key in this process, as is good, working communication between city departments and different sectors of the community to establish priorities and set goals.

The reduction target is the specific greenhouse gas (GHG) emissions reduction goal that Key West will aim to achieve by the year 2015. If Key West decides to follow the recommended 15% reduction below baseline levels as suggested in this report, the city will campaign to reduce GHG emissions community-wide from the FY05 baseline of 399,592 tons of CO_2e per year, to less than 339,653 tons of carbon dioxide equivalents per year by 2015. Likewise, the city government will strive to reduce 2,639 tons of CO_2e from government operations to meet the recommended 15% reduction target.

There are several issues involved in setting a reduction target. Key West will need to allow for enough time to implement the measures in its Local Action Plan, but note that the farther out the target year is, the more emissions Key West might be pledging to reduce due to a longer period of accumulated growth in emissions. A more distant target year gives the city more time, but also increases the amount that needs to be reduced.

Milestone 3 – Develop a Local Action Plan for Key West

The Local Action Plan is a description of actions – policies, programs, measures – that Key West has already taken and plans to take to meet its GHG reduction target.

The Local Action Plan may include:

1. The results of:
   - The baseline emissions inventory (Milestone 1)
   - The emissions forecast (Milestone 1)
   - The emissions reduction target stating the reduction goal for Key West (Milestone 2)
2. The set of GHG reduction actions:
   - Existing actions that will be continued (streetlight and traffic light upgrades; use of biodiesel in city fleets, etc.)
   - New or proposed actions that together with existing programs will reach the GHG reduction target
3. Implementation strategies:
   - Identifying costs, responsibilities, schedules, funding sources
   - Procedure for monitoring the progress made toward the achievement of the target and the status of implementation of the GHG reduction actions

Step 1 – Quantify GHG Reductions of Existing Measures

Any actions the city has taken since the baseline year of FY05 which have an effect of reducing GHG emissions, whether or not that was the primary motivation for implementing the action, should be counted and quantified. Quantifying the GHG reduction benefits helps analyze how close the existing measures are bringing Key West towards its emissions reduction target. Data collection forms are provided in the CCP Toolkit, and information needed includes the type of fuel affected and the amount of energy saved from each measure implemented. Entering the

data into the CACP software 'Measures' section will calculate GHG reductions and cost savings achieved from each measure.

Step 2 – Compare to the Target
After quantifying the emissions reductions achieved from existing measures, Key West must determine how far it has come in approaching its target and how far it still has to go. Reports generated from the software automatically perform this step by displaying the GHG reductions achieved from each measure and comparing it against the baseline emissions and the reduction target.

Step 3 – Choose New Measures
Results from the GHG inventory and forecast will be used to look for the best areas and opportunities for reaching Key West's reduction target. Identifying where big numbers occur, and also information on end-use energy consumption will help to further identify opportunities for emissions reductions. Since electricity is the main source of GHG emissions in the Community inventory, it will be important for Key West to focus action around reducing electricity consumption in private residences and commercial establishments. Determining what the electricity is used for (end-use consumption), whether it is lighting, air conditioning, pool heating, or other purposes, will help show what measures need to be taken to reduce consumption. Investments and opportunities to create locally produced clean energy, through increased solar, wind or hydro power, will also play an important role in reaching or exceeding the target reductions.

Vehicle use, transportation planning, and the current system of waste disposal should also be considered when identifying opportunities for reducing emissions. Promotion of alternative fuels, improved public transit systems and enhancement of bicycle and pedestrian facilities, as well as waste reduction and increased recycling efforts, will all positively impact the carbon footprint of the city. Many of these measures will have co-benefits of improving livability and quality of life for Key West residents and visitors.

In the case of the Municipal inventory, electricity for buildings, lighting, water and sewer management comprise the largest share of emissions. For all of these sectors, implementation of a comprehensive system of tracking and oversight related to energy consumption will reveal the best opportunities for energy conservation, emissions reductions and cost savings associated with energy use. Likewise, a detailed analysis of the city's vehicle fleet, and government contracted waste system may provide insight into the best opportunities for reductions in these sectors. *Again, the task force will be important for brainstorming a list of potential projects and programs, and evaluating the ICLEI-suggested measures for feasibility in Key West.* Not all of the measures need to produce big emissions reductions. Some may be included primarily for their educational value or for other reasons that make sense for Key West.

Additional criteria that can be used to rate potential measures include:

- Cost vs. savings
- Staffing requirements
- Political and public support
- Impact on raising public awareness
- Co-benefits such as improving air quality, reducing traffic congestion, creating jobs and other economic opportunities, and saving money.

Step 4 – Quantify GHG Reductions of New Measures

Data collection forms in the CCP Toolkit help gather the necessary information to estimate GHG reduction potential for each proposed measure. These sheets, along with the CCP software and help from appropriate departments, will guide the task force in their recommendations for a strong, attainable Local Action Plan.

Step 5 – Create the Final Action Plan Report

Once steps 1-4 are complete, a report of the Local Action Plan will be created. A draft of the Action Plan will be sent out for peer review and community comment, and a final draft will be presented and ultimately adopted by the City Commission.

Milestone 4 – Implementing the Local Action Plan

It is important to ensure the effective accomplishment of Milestone 4 so that the measures and programs selected for Key West's Local Action Plan will be implemented effectively and produce the desired results. Suggestions of how to include details for implementation such as schedules, budgets, identification of funding sources, assignment of responsibility to agencies and staff, and methods for monitoring and evaluating progress follow in the next section.

Key areas of the implementation section:

1. Administration and Staffing

- Overall program management (project facilitator(s))
- Communication and coordination (task force)
- Adequate resources (volunteers/student interns)
- Ensuring implementation of existing measures (follow-through)
- Coordinator position may be specified in Local Action Plan

2. Financing and Budgeting

- What actions can be made part of existing projects or expenditures? (e.g. policies favoring bicycles and pedestrian transit over motor vehicles)
- What actions will require new expenditures?
- Can funds be found from the existing municipal budget?
- Energy-saving measures will likely provide enough financial savings to fund implementation of other measures in the Plan, if the savings are designated
- Where to go when municipal resources fall short (loans, grants, public-private partnerships, etc.)

3. Developing a Timeline

- Overall schedule should meet reduction target date
- Integrate schedule with existing processes and responsibilities
- Provide ample time for external review and input

4. Public Involvement in the Implementation Process

- Creating a sense of ownership
- Recruit volunteers/interns to assist in presenting the Plan to the public
- Invite public comment

Milestone 5 – Monitor Progress and Report Results

This is an ongoing process that needs to be built into the implementation of the Local Action Plan. It is important to monitor the progress being made toward the target and the status of implementing the GHG reduction actions so the community can feel proud and motivated by its accomplishments, and adjustments can be made to keep on track. Collecting data on all implemented measures and running them through the CACP software on a regular basis is the best way to create progress reports.

B. Developing a working Climate Protection Task Force for Key West

Putting together a Climate Protection Task Force

Forming a task force is the most effective way to define and delegate the tasks that go into developing and implementing the Local Action Plan. A task force can also be an effective means to involve parties such as residents, businesses, and community groups in the process. The success of a strong Local Action Plan is largely dependent on the structure and organization of those developing it. Formal city commission and mayoral resolutions adopting the emissions reduction target help get the momentum going, but bringing all the necessary and appropriate representatives from the community to the table is critical to the process.

There are a number of models and approaches to learn from when thinking about task force and Plan development. Some involve primarily city staff, while others tap heavily into community resources.

Brief Examples:

Austin, TX created an interdepartmental task force with city staff from the Planning, Environmental and Conservation Services Department, including a planner, an economist, an air quality manager, a demand side management program manager, and an editor.

Fort Collins, CO hired a private consultant to assist city staff in developing the technical and logistical aspects of their Local Action Plan and to work with a Project Advisory Committee that oversaw development of the Plan. Fort Collins' Project Advisory Committee was formed to build consensus and ensure that programs were coordinated. It was comprised of council members, interested citizens, and key staff from Facilities, Fleets, Light and Power, Natural Resources, Parks and Recreation, Transportation Planning, and Traffic Operations departments.

Minneapolis and St. Paul, MN combined efforts to produce the Minneapolis – St. Paul Urban CO2 Reduction Plan in October 1993. An Executive Steering Committee made up of key decision-makers was created to direct the development of the Plan. The committee included mayors and other elected officials from both cities, representatives from Hennepin and Ramsey County Boards of Supervisors, executives from Northern States Power utility and other local businesses, and representatives from community and environmental organizations. Because of this inclusive committee process, stakeholders derived a feeling of ownership with the project. As a result, Northern States Power entered into an agreement with the City of St. Paul to provide capital for a comprehensive municipal energy-efficiency retrofit project at zero percent financing.

Portland, OR set up a Technical Team – comprised of city, utility and state energy office staff – to assist with the technical aspects of the work. It also set up a Policy Committee with representatives from utilities, the transit agency, METRO, State Energy Office, Mayor's Office and local businesses. Members of both committees accompanied the lead staff in presenting the final plan to the planning commission and at council hearings.

Involve Key Players and the Community

Whatever route Key West chooses to take, it is important to involve relevant players and ensure the cooperation and buy-in of appropriate departments and other entities. Key players include department heads and elected officials, who will be involved in plan preparation and be responsible for plan approval and implementation. The success of Key West's Local Action Plan will more than likely depend on strong community support. With the majority of GHG emissions coming from the commercial sector, and a large percentage from private residences, it is important to build community support and public participation.

Strategies to ensure effective citizen involvement:

1. Identify key individuals, businesses, institutions, and decision makers to be brought in, e.g. public officials, major employers, utilities, environmental and neighborhood organizations, Chamber of Commerce
2. Establish a community task force to work with municipal staff and elected officials
3. Utilize volunteers from the community to consult in formulating the plan and in presenting it to the public

Probable Stakeholders in Key West:

- Keys Energy Services
- Florida Keys Community College
- Monroe County School District
- Chamber of Commerce
- Navy and Coast Guard
- Monroe County Extension Service
- Monroe County Housing Authority
- National Marine Sanctuary
- Keys Hydro Power
- Lodging Association
- Developers/building trade

Get the Word Out

As with monitoring progress, this step is really an ongoing process. Publicizing Key West's commitment to climate protection can help gain public support at an early stage, and might also help identify people willing to volunteer their services.

Effective means of outreach include:

- Public Forums and Town Meetings
- Lecture series
- Earth Day Activities
- Media Coverage/bi-weekly or monthly newspaper article
- Awareness/education in schools
- Awards to local businesses for energy-efficiency and innovative carbon reduction initiatives
- Public Education displays in libraries, city buildings, etc.

Questions for Key West to think about while going through the Milestones:

- Which Milestones or other steps can be finished in the next six months?
- What does the task force/city need to achieve this goal?
- What barriers might arise in reaching Plan completion and implementation?
- What ideas do we have to get past these barriers?
- How do we get political and staff buy-in and generate concrete assistance for this work?
- What existing planning processes might this work be able to be integrated into?
- How do we get the community involved in our climate protection effort?
- How can we build public awareness for climate protection?
- How might recognition and celebration of successes be built into the process?

IV. Appendices

APPENDIX A

List of Figures & Tables

APPENDIX B

Glossary of Terms & Abbreviations

Anthropogenic - effects, processes, objects, or materials that are derived from human activities, as opposed to those occurring in natural environments without human influences.

Average Grid Electricity Emissions Factors - These emission factors specify the emissions per kilowatt-hour of the annual average kilowatt-hour produced in the electricity region specified. Default values are provided for 1990 through 2020. Essentially, these average kilowatt-hour factors have been derived by dividing emissions in each NERC region by end use electricity. Average grid electricity emission factors are the average of emissions generated per kilowatt-hour over an entire year, taking into account fuels used and generating and emission control technologies in use in each plant.

Atmosphere—The atmosphere is the gaseous envelope surrounding a planet. The Earth's atmosphere consists primarily of nitrogen (79.1% by volume) and oxygen (20.9% by volume), with carbon dioxide (CO_2) representing approximately 0.03%. In addition, the atmosphere contains traces of argon, krypton, xenon, neon, and helium, plus water vapor, traces of ammonia, organic matter, ozone, various salts, and suspended solid particles.

Biodiesel - is a domestically produced, renewable fuel that can be manufactured from vegetable oils, animal fats, or recycled restaurant greases. Biodiesel is safe, biodegradable, and reduces greenhouse gases and other air pollutants such as particulates, carbon monoxide, hydrocarbons, and air toxics. Blends of 20% biodiesel with 80% petroleum diesel (B20) can generally be used in unmodified diesel engines; however, users should consult their OEM and engine warranty statement. Biodiesel can also be used in its pure form (B100), but may require certain engine modifications to avoid maintenance and performance problems and may not be suitable for wintertime use. Users should consult their engine warranty statement.

Carbon Dioxide—Carbon dioxide, abbreviated CO_2, is essential to living systems and released by animal respiration, decay of organic matter and fossil fuel burning. It is removed from the atmosphere by photosynthesis in green plants. The amount of CO_2 in the atmosphere has increased by about 25% since the burning of coal and oil began on a large scale. Atmospheric carbon dioxide varies by a small amount with the seasons, and the ocean contains many times the amount of the gas that exists in the atmosphere.

Climate—The term climate represents average weather together with its variability of representations of the weather conditions for a specified area during a specified time interval (usually decades or longer).

Criteria Air Pollutants (CAPs)—The term criteria air pollutants refers to pollutants that are regulated under the U.S. Clean Air Act. As with carbon dioxide, the major sources of these pollutants are fossil fuels. Most measures that reduce carbon dioxide emissions also reduce criteria air pollutants. Criteria air pollutants include nitrogen oxides (NOx), volatile organic compounds (VOCs), carbon monoxide (CO), sulfur oxides (SOx), and particulate matter smaller than ten microns in diameter (PM-10). The CACP software provides estimated emissions of CAPs as well as GHGs for emissions analyses and reduction benefits of measures.

FDEP - Florida Department of Environmental Protection - The Department of Environmental Protection is the lead agency in state government for environmental management and stewardship and is one of the more diverse agencies in state government, protecting our air, water, and land.

FDOT – Florida Department of Transportation

Equivalent Carbon Dioxide (CO_2e)—Equivalent carbon dioxide, abbreviated as CO_2e and also known as global warming potential (GWP), is a unit that allows emissions of greenhouse gases of different strengths to be added together and framed in terms of comparative units. For carbon dioxide itself, emissions in tons of CO_2 and tons of CO_2e are identical, whereas for methane, an example of a stronger greenhouse gas, one ton of methane emissions has the same GWP as 21 tons of CO_2. Thus 1 ton of methane emissions can be expressed as 21 tons CO_2e.

GHG (Greenhouse Gas) Emissions and the Greenhouse Effect—The Earth's climate is determined by a delicate balance between the solar energy that arrives from space and the heat energy that the Earth creates from the sun's rays. The energy that arrives from space should always equal the energy that the Earth emits back to space. When something disturbs this balance, our climate adjusts by cooling or warming the Earth to return things to normal. A portion of outgoing heat energy is absorbed in the atmosphere by greenhouse gases such as water vapor, carbon dioxide, methane, and nitrous oxide. If these trace gases were not present, the average temperature on the Earth's surface would be -32 degrees Fahrenheit, and life as we know it would not have evolved here. But the natural greenhouse effect keeps the average global surface temperature at a comfortable 59 degrees Fahrenheit.

Today, the atmospheric concentration of the most important greenhouse gas, carbon dioxide, is higher than it has been in the past 650,000 years. Scientists participating in the British Antarctic Survey have succeeded in charting the atmospheric concentration of carbon dioxide over the last 800,000 years. Their research has shown that temperature unfailingly rises and falls in response to carbon dioxide levels. This increase is the result of an increased reliance on fossil fuels and deforestation, which has caused an imbalance between the absorption and release of carbon dioxide by vegetation. Other greenhouse gases, also found in the atmosphere in increasing amounts, are methane, nitrous oxide and the chlorofluorocarbons (CFCs).

Global Warming—Global warming describes the recent trend of increasing average global surface and tropospheric temperatures that scientists believe is caused by increased emissions of human-induced greenhouse gases. The greenhouse gases (CO_2, methane, nitrous oxides and CFCs) are emitted into the atmosphere and increase the atmosphere's "entrapment" of heat.

ICLEI – Local Governments for Sustainability is an international association of local governments dedicated to solving local, regional, and global environmental problems through cumulative local action. There are over 600 ICLEI members comprising cities, towns, counties, and their associations from around the world.

IPCC—Intergovernmental Panel on Climate Change—The Intergovernmental Panel on Climate Change (IPCC) was jointly established in 1988 by the World Meteorological Organization and the United Nations Environment Programme to:

- Assess available scientific information on climate change;
- Assess the environmental and socio-economic impacts of climate change; and
- Formulate response strategies.

It has emerged as the predominant international forum for the development of scientific knowledge and policy advice on matters related to climate change. Its periodic Assessment Reports are relied upon by governments to guide policy making on this issue. The IPCC's Fourth Assessment Report in 2007 projects that the Earth's average surface temperature will increase between 4.3° and 11.5°F (2.4°-6.4°C) between 1990 and 2100 if no major efforts are undertaken to reduce the emissions of greenhouse gases (the "business-as-usual" scenario). Furthermore the Fourth Assessment Report also found that "Warming of the climate system is **unequivocal**" and "Most of the observed increase in globally averaged temperatures since the mid-20th century is *very likely* due to the observed increase in **anthropogenic** greenhouse gas concentrations."

Kyoto Protocol—The Kyoto protocol was adopted by consensus at the third session of the Conference of the Parties (COP-3) in December 1997 in Kyoto, Japan. When ratified by a certain percentage of participating countries, it contains legally binding emissions targets for developed countries in the post-2000 period. By arresting and reversing the upward trend in greenhouse gas emissions that started in these countries 150 years ago, the Protocol promises to move the international community one step closer to achieving the Convention's ultimate objective of preventing "dangerous anthropogenic [human-induced] interference with the climate system."

According to the Protocol, developed countries commit themselves to reducing their collective emissions of six key greenhouse gases by at least 5%. This group target will be achieved through cuts of 8% by Switzerland, most Central and East European states, and the European Union (the EU will meet its target by distributing different rates among its member states); 7% by the US; and 6% by Canada, Hungary, Japan, and Poland. Russia, New Zealand, and Ukraine are to stabilize their emissions, while Norway may increase emissions by up to 1%, Australia by up to 8%, and Iceland 10%. The six gases are to be combined in a "basket", with reductions in individual gases translated into "CO_2 equivalents" that are then added up to produce a single figure. In 2005, the Kyoto Protocol went into effect after 141 industrialized countries signed on to the agreement.

LED: Light Emitting Diode - A Light Emitting Diode (LED) is a semiconductor device which converts electricity into light. Each diode is about 1/4 inch in diameter and uses about ten milliamps to operate at about a tenth of a watt. LEDs are small in size, but can be grouped together for higher intensity applications. LEDs are better at placing light in a single direction than incandescent or fluorescent bulbs. Because of their directional output, they have unique design features that can be exploited by clever designs. LED lights are more rugged and damage-resistant than compact fluorescents and incandescent bulbs. LED lights don't flicker. They are very heat sensitive; excessive heat or inappropriate applications dramatically reduce both light output and lifetime.

Methane—Methane, abbreviated CH_4, accounted for about 8.6% of U.S. GHG emissions in 2005. Methane is produced by anaerobic decomposition of solid waste in landfills and sewage treatment facilities, wetlands and rice paddies, as a byproduct of fossil fuel energy production and transport and also

from outgassing in livestock. It is also the principle constituent of natural gas and can leak from natural gas production and distribution systems and is emitted in the process of coal production. The methane concentration in the atmosphere has been rising steadily for several centuries, keeping pace with the increase in the world population and expansion of the world economy.

MMBTU- million British Thermal Units - A standard unit of measurement used to denote both the amount of heat energy in fuels and the ability of appliances and air conditioning systems to produce heating or cooling. A BTU is the amount of heat required to increase the temperature of a pint of water (which weighs exactly 16 ounces) by one degree Fahrenheit. Since BTUs are measurements of energy consumption, they can be converted directly to kilowatt-hours (3412 BTUs = 1 kWh) or joules (1 BTU = 1,055.06 joules). A wooden kitchen match produce approximately 1 BTU, and air conditioners for household use typically produce between 5,000 and 15,000 BTU.

Municipal Solid Waste (MSW) - The U.S. Environmental Protection Agency defines MSW to include durable goods, containers and packaging, food wastes, yard wastes, and miscellaneous inorganic wastes from residential, commercial, institutional, and industrial sources.

PPM – Parts per million

US EPA LandGem Model - The Landfill Gas Emissions Model is an automated estimation tool with a Microsoft Excel interface that can be used to estimate emission rates for total landfill gas, methane, carbon dioxide, nonmethane organic compounds, and individual air pollutants from municipal solid waste landfills.

APPENDIX C

Information Sources

Both sections of the inventory involve collecting data and other technical information from utility companies, regional planning agencies, municipal utility billing records, and some Internet sources. The following is a comprehensive list of the data sources used for the inventory and forecast. Individuals with questions pertaining to this information can either contact:

Jody Smith Williams, Program Assistant
Phone: 305-304-2064
Email: kwjody@yahoo.com or

Annalise Mannix, Environmental Projects Manager, City of Key West
Phone: 305-809-3747
Email: amannix@keywestcity.com

or direct correspondence to the below listed persons or websites.

ICLEI - Local Governments for Sustainability, USA Inc.
436 14th Street, Suite 1520
Oakland, CA 94612
Phone (510) 844-0699
Fax: (510) 844-0698
e-mail: iclei-usa@iclei.org
Website: www.iclei.org/us
Contacts: Wesley Look, Susan Ode, Katherine Jarvis-Shean

Torrie Smith Associates
95 Beech Street
Ottawa, Ontario K1S 3J7
Phone: (613) 238-3045
Fax: (613) 238-8776
Website: www.torriesmith.com

C-1 Community Inventory Data Sources

Community Electricity Data
Lynne Tejeda, General Manager
Organization: Keys Energy Services
P.O. Box 6100, Key West, FL 33041-6100
Phone: (305) 295-1040
Email: Lynne.tejeda@keysenergy.com

Peggy Walls, Assistant Director of Finance
Phone: (305) 295-1016
Email: Peggy.walls@keysenergy.com

Community Propane Data
Name: John Acquaviva, General Manager
Organization: Suburban Propane (the only company to supply trains and trolleys)
Address: 726 Catherine Street, Key West, FL 33040
Phone: 305-296-2411

Name: Mimi and Ernie Oskey, owners
Organization: All Keys Gas Service
Address: P.O. Box 420060, Summerland Key, FL 33042
Phone: 305-745-1122

Name: Chuck (last name unknown), Manager
Organization: *AmeriGas*
Address: 1718 N. Roosevelt Blvd, Key West, FL 33040
Phone: 305-294-3527

Name: Joe Moyer
Organization: Historic Tours of America, Fleet Manager
Phone: 305-304-4684

Community Road Transportation
Name: Gordon Morgan, Transportation Statistics
Organization: Florida Department of Transportation (FDOT)
Phone: 850-414-4730
Email: Gordon.Morgan@dot.state.fl.us

Name: Tina Hatcher
Organization: Florida Department of Transportation (FDOT)
Phone: 850-414-4706
Email: Tina.Hatcher@dot.state.fl.us

Website: http://www.dot.state.fl.us/planning/statistics/default.htm

Community Waste Transportation
Name: Greg Sullivan, District Manager
Organization: Waste Management, Inc.
Phone: 305-296-8297
Email: gsullivan@wm.com

Community Marine Transportation
Name: Richard Brevaldi, Manager
Organization: Garrison Bight Marina
*Phone:*305-294-3093

Name: Roger Greene
Organization: King's Pointe Marina (formerly Conch Harbor)
Phone: 305-294-4676 ext. 103
Email: roger.greene@kingspointemarina.com

Name: Mark (last name unknown), Manager
Organization: A&B Marina *
Phone: 305-294-2535
Name: Joanna (last name unknown)
Organization: Sunset Marina
Phone: 305-296-7101

Name: Helen Stanley, Emergency Planning Program Manager
Organization: US Navy *
Phone: 305-293-2060

Name: Lieutenant Michael Bell, Public Information Officer
Organization: US Coast Guard *
Phone: 305-292-8805
Email: Michael.s.bell@useg.mil

Name: Mark Tait
Organization: City of Key West, City Marina Manager
Phone: 305-293-8370
Email: mtait@keywestcity.com

* Data was requested from these marinas but not received in time to include in the inventory. However, this information may be useful to include in the future once all data is received.

Community Waste Data
Name: RB Havens, Public Works Director
Organization: City of Key West
Phone: 305-809-3751
Email: rbhaven@keywestcity.com

Community Landfill Data
Name: Bo Bruner
Organization: CH2MHill
Phone: 352-335-5877 ext. 52305
Email: Bo.Bruner@CH2M.com

Name: Tom Kraemer
Organization: CH2MHill
Email: Tom.Kraemer@CH2M.com

Name: Bill Krumbholz
Organization: Florida Department of Environmental Protection (FDEP)
Phone: 239-332-6975 ext. 155
Email: Bill.Krumbholz@dep.state.fl.us

Community Indicator Data
Variable: Population
Publication Title: South Florida Region Municipal Population and Rates of Growth 1980-2006
Source: South Florida Regional Planning Council/US Bureau of the Census and Bureau of Economic and Business Research

Variable: Households
Publication: US Census 2000
Source: US Census Bureau
Website: http://quickfacts.census.gov/qfd/states/12/1236550.html

Variable: Commercial Establishments
Publication: Active Business Licenses
Name: Buzz Wagner, Director of Research
Organization: Key West Chamber of Commerce
Phone: 305-294-2587
Email: research@keywestchamber.org

Variable: Commercial Square Footage
Name: Rob Shaw
Organization: Monroe County Property Appraiser's Office
Phone: 305-292-3420
Email: rshaw@mcpafl.org

Community Forecasting Data
Variable: Growth for all fuel types for all sectors available
Publication: Supplement Tables to the Annual Energy Outlook
Website: http://www.eia.doe.gov/oiaf/aeo/supplement/supref.html

Variable: Waste production growth
Name: RB Havens
Organization: City of Key West, Public Works Director
Phone: 305-809-3751
Email: rbhaven@keywestcity.com

C-2 Municipal Inventory Data Sources

Municipal Electricity Data
Name: Connee Gates
Organization: City of Key West, Finance
Phone: 305-809-3809
Email: cgates@keywestcity.com

Name: Ben Gibson
Organization: City of Key West
Phone: 305-293-6435
Email: bgibson@keywestcity.com

Name: Peggy Walls, Assistant Director of Finance
Organization: Keys Energy Services
Phone: 305-295-1016
Email: Peggy.walls@keysenergy.com

Name: Matthew Alfonso, Engineering Services Supervisor (Streetlights contact)
Organization: Keys Energy Services
Phone: 305-295-1055
Email: Matthew.alfonso@keysenergy.com

Name: Kevin Hawthorne, Customer Service Supervisor
Organization: Keys Energy Services
Phone: 305-295-1078
Email: Kevin.hawthorne@keysenergy.com

Name: Wayne Davila, Substation Supervisor (Traffic lights contact)
Organization: Keys Energy Services
Phone: 305-295-1194
Email: Wayne.Davila@keysenergy.com

Municipal Fleet Data
Name: Steve Schipper
Organization: City of Key West Fleet Supervisor
Phone: 305-809-3905
Email: sschippe@keywestcity.com

Name: Myra Wittenberg
Organization: City of Key West, Director Department of Transportation
Phone: 305-809-3918
Email: mwittenb@keywestcity.com

Name: Margaret Scanlan
Organization: City of Key West, Finance
Phone: 305-809-3816
Email: mscanlan@keywestcity.com

Name: Greg Sullivan, District Manager
Organization: Waste Management, Inc. (Waste Hauling)
Phone: 305-296-8297
Email: gsullivan@wm.com

Municipal Sewer/Water Data
Name: Greg Smith
Organization: CH2MHill OMI Manager
Phone: 305-292-5102
Email: Greg.Smith@CH2M.com

Municipal Waste Data
Name: RB Havens, Public Works Director
Organization: City of Key West
Phone: 305-809-3751
Email: rbhaven@keywestcity.com

APPENDIX D

Assumptions/Calculations

The following information provides a detailed explanation of how data was compiled and calculated, and what was included/excluded in the analysis.

D-1 Community Inventory Assumptions/Calculations

Community Electricity Data
Keys Energy classifies its customers according to residential or commercial status, with sub categories for large or small commercial users, churches etc. For the purposes of the inventory, community electricity was divided only into residential or commercial. Everything other than residential households (city government, hospital, institutions, military) was considered as commercial use. There is no industrial activity in Key West.

Estimations for the amount of carbon dioxide emitted from electricity consumption are based on the default coefficients in the CACP software for Region 8 – Southeast. Actual billing records with yearly consumption were provided by Peggy Walls from Keys Energy Services.

Inputs for FY05:

Residential Sector:	170,545,467 kWh
Commercial Sector	232,709,667 kWh*

*The total commercial sector use was provided by Keys Energy Services. Actual inputs into the software were broken down into records for each of the Top 10 Commercial users (also provided by Keys Energy Services and available as public information on their website); the difference between the Top 10 and the total was entered as a separate record "Other Commercial Energy."

Electricity Coefficients
The default coefficients for electricity that are in the CACP software for the Southeast Region were used. This was because Keys Energy was unable to produce more detailed data on this subject. Keys Energy buys its power from the Florida Municipal Power Agency (FMPA), which is a wholesale power company owned by municipal electric utilities. FMPA generates its power from several sources, as outlined below:

FMPA Fuel Mix:

Coal:	20.1%
Natural Gas:	26.7%
Distillate:	0.3%
Interchange:	43.0%
Nuclear:	9.5%
Renewables	0.3%

Defining the sources of the "interchange" category is difficult and imprecise and for that reason, it was decided that using the default coefficients in the software would be the most accurate estimation of the fuel mix.

As explained by Keys Energy Services, the "interchange" category includes power purchased directly by FMPA's All-Requirements Project (ARP), as well as existing purchase power contracts of individual ARP members that were entered into prior to the member joining the ARP. Purchase power generation includes capacity and energy received from other suppliers, such as Progress Energy Florida, Florida Power and Light, Lakeland Electric, Calpine and Southern Company. Some of the fuel sources are known to be natural gas, such as Calpine and Southern. Some purchases are system purchases, such as Progress Energy, FPL and Lakeland, where we cannot specify a fuel source.

Community Propane Data

Propane is sold only through three local commercial providers. Data provided for Key West were best estimates provided by each of the three companies since all three supply the entire Keys. Two of the three companies provided estimated data for calendar year 2005 rather than the fiscal year. Total propane use (minus transportation for trains and trolleys) for FY05 was 1,931,200 gallons.

Community Road Transportation Data

Emissions from personal and commercial vehicles were calculated using annual vehicle miles traveled (VMT) data generated by the Florida Department of Transportation (FDOT.) The most complete and accessible data available was for calendar year 2006; therefore, this data was used to extrapolate the baseline year FY05 and also the interim year FY07.

The FDOT keeps a database for roads based on monitoring sites at certain points on these roads. The database includes 32.75 miles of roads in the city of Key West while total road miles equal 80.1. Although the calculation does not include all roads, it does include the major arteries of US1, State highway A1A (South Roosevelt Blvd.) and Flagler Avenue and therefore it is considered a reasonable estimate for AADT.

AADT was multiplied by the length of the road segments to calculate daily vehicle miles traveled (457,540). This result was then multiplied by 365 in order to arrive at a total of 167,002,100 annual vehicle mile traveled (VMT) for all roads in Key West for 2006. Using the EIA's data for fuel use consumption for the South Atlantic Region, a multiplier of -.32% (a weighted average of the EIA's estimates of gasoline and diesel use) was applied to the 2006 data. The resulting change of 534,400 miles was added and subtracted from the 2006 total, respectively, to estimate FY05 and FY07. Total fuel use for FY05 was determined by using the total VMT in the CACP software default calculations; gasoline: 7,897,254 gallons; diesel: 1,801,105 gallons.

Data on propane use for trains and trolleys was gathered but not entered as a separate record since the default Transport Assistant in the CACP software was used to calculate total fuel consumption for the city. Information comparing the emissions from propane trains and trolleys to potential emissions if they were run on diesel was included in the inventory report as an "informational item" although not included as part of the inventory inputs or outputs.

Waste Hauling Data

Monthly data on hauling municipal solid waste (MSW) to the incinerator in Broward County was provided by Greg Sullivan, Regional Manager for Waste Management, Inc., the company contracted to handle waste collection and disposal for the city. The round-trip mileage to the incinerator is 400 miles. Data for the calendar year 2005 was provided rather than the fiscal year 05; for 07 data was supplied for the fiscal year October 06 through September 07.

In 2005, total mileage for waste hauling was 1,057,540 miles, a total of 2,783 round trips. In FY07 total mileage was 976,800, a total of 2,442 round trips. Waste Management trucks use B5 biodiesel, which is 95% petroleum diesel and 5% biodiesel. Since there is no category in the CACP software for B5, the total was broken down into 95% diesel and 5% B100.

Community Marine Data

An attempt was made to include marine fuel use in the transportation sector analysis, due to the large boating community among recreational, commercial, Navy and Coast Guard. Data was collected from 3 of 4 private marinas; and requests are still pending with the Navy, Coast Guard and the 4th private marina as of the completion of the inventory. Therefore, it was considered not worthwhile to include data for this sector until complete data is collected.

Community Waste Data

Most of the waste data for the GHG inventory came from R.B. Havens, Director of Public Works. Total tonnage of waste was provided as well as cost per ton for hauling and disposal. Total tons in FY05 amounted to 60,835 at a rate of $60.98 per ton. In FY07, total tons were 55,953 at a rate of $62.86 per ton. Mr. Havens also provided the most recent waste composition study data from 2003. The categories used in the Key West study varied from the categories in the CACP software; Wesley Look and ICLEI staff were consulted to extrapolate the composition breakdown into the proper categories required by the software.

Key West waste composition	
31.1%	Wood/yard waste
24.5%	Paper
11.5%	Plastic
9.7%	Glass
8.1%	Metals
5.7%	Other (furniture, appliances)
4.1%	Misc. (Fines, Dirt, etc.)
3.3%	Clothes/Textiles
2.0%	Consumer Goods

CACP Software waste composition	
31.1%	Plant Debris
24.5%	Paper
0%	Food Waste
6.3%	Wood/Textiles
38.1%	Other:
	11.5% Plastics
	9.7% Glass
	8.1% Metals
	2.7% Other (construction, etc.)
	2.0% Consumer Goods
	4.1% Misc. (Fines, Dirt, etc.)

Landfill Data

The Florida Department of Environmental Protection (FDEP) was consulted to gather data on the history of the Stock Island landfill closing, and any measurements related to composition and estimated GHG emissions. R.B. Havens was also consulted. These inquiries led to contact with Bo Bruner from CH2MHill, the engineering company which oversaw the closing of the landfill in 1992-1994. According to Mr. Bruner and his colleagues, the methane emissions from the Stock Island landfill in 2005 are calculated as 374 US tons (340 metric tons) per year. Additional emissions of 1,026 US tons (933 metric tons) of CO2 were also calculated.

Calculations were done using the USEPA LandGem model (v. 3.02), using the default parameters: k = 0.05/yr, Lo = 170 cu m/Mg, and assumed 50% methane, 50% CO2 by volume.

Community Indicator Data

All measurements of CO_2e emissions are measured in US tons, or "short tons." The US EIA and other agencies report units in metric tons. 1 metric ton CO_2 = 1.1023 short tons.

Community Forecasting Data

Growth multipliers for fuel and electricity consumption projections reflect regional trends. Forecasts for the residential, commercial, and transportation sectors for electricity, diesel and gasoline, are based on U.S. Department of Energy projections found in the Regional Energy Consumption and Prices by Sector report published by the Energy Information Administration available at http://www.eia.doe.gov/oiaf/aeo/supplement/supref.html. This report provides information on anticipated energy use by sector for each year between 2005 and 2030. Table 5 for the South Atlantic Region applies to Key West. Using 2015 as the target year, a calculation of per capita change per year was made between 2005 and 2015 in the following sectors; the total change was divided by 10 to achieve an average yearly per capita change.

Sector	Avg. Annual % change
• Residential Electricity	0.64%
• Commercial Electricity	1.34%
• Gasoline	-0.36%
• Diesel (called "distillate fuel")	1.0%

These figures were entered into the forecast builder in the CACP software in order to calculate forecasted emissions by the target year of 2015.

Community solid waste was forecasted using the *Solid Waste Rate Study Projections of Tonnages* report provided by R.B. Havens from Public Works. The projections provided were for FY08 through FY28. The projections indicate an 1% increase per year between FY08 until FY14, which goes down to .68%, for one year from FY14 to FY15. However, we accounted for the actual decrease in tonnage between FY05 tonnage and FY07 tonnage. Total tons projected by 2015 are 62,674, a difference of 1,839 tons over the baseline tonnage of 60,835. This averages to a 0.298% annual increase which was used as the forecast figure entered into the CACP software.

D-2 Municipal Inventory Assumptions/Calculations

Municipal Electricity Data

The information used to estimate annual consumption of electricity and natural gas by municipal facilities was derived from Excel spreadsheets provided by the city's Finance Department and Keys Energy Services. The spreadsheets provided by the city contained approximately 162 electric accounts paid by the city and indicated costs of the accounts but not consumption (kWh.) Keys Energy Services Finance Department provided spreadsheets which included consumption and costs for some 219 accounts. Inquiries to determine why this discrepancy existed were difficult to answer. Keys Energy Services had many accounts which they allocated to the city but which did not pass through the Finance Department. It appears that these accounts are primarily for buildings owned by the city which are leased to other agencies or entities. Keys Energy Services surmised that they were set up under the city's jurisdiction to

avoid set-up and connection fees, of which the city is exempt. The city Finance Department had no awareness of these accounts.

Many electric accounts had duplicate or non descript names for the service location and function of the account, making it difficult to allocate them to different city departments and uses. Some, such as the sewage treatment plant and traffic lights were discreet accounts and easy to identify. Others, such as old fashioned street lighting and port facilities, were not clearly identified. Department heads and staff were consulted, but accounts remain that are not specifically identified. Department staff does not oversee energy consumption or billing for facilities in their department; all bills go directly to Finance. Therefore, department staff were unfamiliar with accounts and electric meters.

A best attempt was made to allocate the bills to different departments or uses based on the information available. The Buildings sector includes actual department facilities as well as area lighting at Key West Bight, Mallory Square and Garrison Bight. Its total electricity consumption in FY05 was 5,125,423 kWh. Streetlighting totals likewise were difficult to allocate in some cases. The streetlight sector includes all overhead streetlights, other lighting such as old fashioned streetlights, traffic lights, and park lighting. The total consumption for this sector in FY05 was 3,783,806 kWh. Electricity used in Water/Sewage divisions amounted to 5,801,250 kWh.

Municipal Vehicle Fleet Data

Total vehicle fleet gasoline and diesel consumption and cost was collected from fuel purchase records maintained by Margaret Scanlan in the Finance Department. To determine a breakdown by vehicle type, Steve Schipper from Fleet provided a list of vehicles and fuel use. Steve indicated which vehicle type category applied to each vehicle based on the CACP software categories of: Full Size (FS), Midsize (MS), Sub Compact (SC), Light Truck/SUV (LT), Heavy Truck (HT), Motorcycle (MC), and Transit Bus.

These records were only available for FY07 due to Hurricane Wilma in Oct. 2005 and the destruction of the TRAK computer system used to track this data. Therefore, a "backcast" was performed to estimate FY05 consumption by type. According to Finance records, there was a total fuel consumption decrease of 11.5% for vehicles other than transit. This decrease was applied for each vehicle type percentage (except transit bus) to achieve the estimate for FY05, as follows:

Gasoline	06-07 gals	04--05 gals *
FS	37,864	42,275
MS	5,439	6,073
SC	3,084	3,443
HT	1,289	1,439
LT	62,621	69,916
MC	439	490
Totals	**110,735**	**123,635**

Diesel	06-07 gals	04--05 gals*
FS		
MS		
SC		
HT	19,926	23,033
LT	4,905	5,668
MC		
Transit**	128,630	80,591
Totals	**153,461**	**109,292**

* based on 11.65% decrease in total fuel use from 05 to 07

Finance was able to provide actual fuel consumption for the transit fleet for both FY05 and FY07, so actual figures were used rather than the backcast estimate of the other vehicle types. The large increase in transit fuel is due to the expansion of the transit system from Key West to Marathon which began in October, 2005. Myra Hernandez, Director of DOT, provided information on the transit history.

Average yearly cost for gasoline and diesel was provided by Margaret Scanlan. In FY05, average gasoline cost was $2.66 per gallon and diesel was $2.53 per gallon. In FY07, gasoline was $2.64 and diesel was $2.82.

Off-road vehicles and equipment such as lawnmowers and backhoes were considered in the "heavy truck" category, per recommendations by ICLEI support staff.

Municipal Waste Data

R.B. Havens, Director of Public Works, provided details on municipal waste. The figure for non-billable tons was allocated to government operations, which includes waste from government facilities, city cans, street sweeping and debris removal, and trash collected by city trucks, including special events. In FY05 the total non-billable tons amounted to 11,759 and in FY07 it was 13,063 tons.

APPENDIX E

CACP Software Reports

11.5

APPENDIX 5

Draft Budget

Preliminary Budget - Climate Action Plan
City of Key West Proposed Projects
(2010 is expected to be able to be funded with little or no over existing approved budget)
Note: Alliances and Partnerships will be sought to share funding; Infrastructure projects have good ROI

	2010		2011		2012		2013		2014		2015		Total 5-Year cost
	Funding		Funding		Funding		Funding		Funding		Funding		
	Operations	Construction	Operations	Construction	Operations	Construction	Operations	Construction	Operations	Construction	Operations	Construction	
Broad Marketing of Energy Conservation and Transit													
Write RFP (staff time)	$ 500												$ 500
Write RFP (staff time)	$ 500												$ 500
Award RFP													
Web Based Marketing			$ 15,000		$ 10,000		$ 10,000		$ 10,000		$ 10,000		$ 60,000
Creative Logo/Theme Campaign			$ 75,000		$ 25,000		$ 25,000		$ 25,000		$ 25,000		$ 175,000
Replace Street Lights with LED lights/solar power													
Feasibility Study (staff time)	$ 5,000												$ 505,000
*Proposed grant application				$ 500,000									
Energy Savings Performance Contracting													
Feasibility Study (staff time)	$ 5,000												$ 5,000
Energy Improvements*													
Stimulus Grant - Solar Park and Ride Training, Transit				$275,000		$ 300,000							$ 575,000
*Proposed grant application													
City Facilities Energy Optimization/Conservation													
Lighting, Timers, Thermostats, Insulation etc (Maintenance budget)		$ 3,000		$ 50,000									$ 53,000
Solid Waste Alternatives Study													
Community Composting, Bio-mass, etc (staff time)	$ 5,000												$ 5,000
Implementation				$ 300,000									$ 300,000
Wind Power Proto Types (2)*			$ 10,000			$ 100,000		$ 1,400,000					$ 1,510,000
*Grant available for 50%													
A/C Optimization Sewer Plant ** Replacement Already Funded 2009		$ 10,000											$ 10,000
A/C Optimization Police Dept ** Replacement Already Funded 2009		$ 10,000											$ 10,000
Carbon Sequestration Project													
Develop Non-Profit			$ 5,000										$ 5,000
Develop Marketing Plan			$ 5,000										$ 5,000
Support Non-profit			$ 5,000		$ 10,000		$ 10,000		$ 10,000		$ 10,000		$ 45,000
Re-Lamp Grinnell St Parking Garage				$ 75,000									$ 75,000
*Proposed grant application													
Carbon Credit Purchase (20,000 mt if needed)												$ 200,000	$ 200,000
Vehicle Miles Traveled Reduction													
Bus Ridership Signage, shade, trash				$ 10,000		$ 10,000		$ 10,000		$ 10,000			$ 40,000
Traffic Calming and Bike Facility Improvements (BW budget)		$ 30,000		$ 100,000		$ 100,000		$ 100,000		$ 100,000			$ 430,000
Commuter Safe bicycle storage				$ 15,000		$ 15,000		$ 15,000		$ 15,000			$ 60,000
Commuter Zip-Bike Rental Program				$ 10,000		$ 5,000		$ 5,000		$ 5,000			$ 25,000
Airport/Ferry/Cruise Ship/Street bus ticket sales kiosk machine				$ 15,000									$ 15,000
Transit Enhancement Project: Electric Plug ins*				$ 50,000		$ 50,000							$ 100,000
*Proposed grant application													
Environmental Programs Manager - implementation **	$ 75,000												$ 75,000
Staffing Energy Manager & Green Coordinator*			$ 170,000		$ 170,000		$ 170,000		$ 170,000		$ 170,000		$ 850,000
*Proposed grant application													
** 75% of existing position													
Operations and Construction Total	$ 91,000	$ 53,000	$ 285,000	$ 1,400,000	$ 215,000	$ 590,000	$ 215,000	$ 1,530,000	$ 215,000	$ 130,000	$ 420,000	$ 200,000	
Grand Total		$ 144,000		$ 1,685,000		$ 795,000		$ 1,745,000		$ 345,000		$ 620,000	$ 5,134,000

11.6

APPENDIX 6

9 inch Sea Level Rise, 11x17

(For electronic version see separate file)

Note:

1. Areas on the US Navy base, although white, were not surveyed and are not included in the rise estimate.
2. College Road and north Stock Island was not surveyed and are not included in the rise estimate.

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11.7

APPENDIX 7

Commercial Climate Challenge Showcase Businesses

Commercial Climate Challenge Showcase Businesses

The following businesses are examples to our community on how energy conservation and other "green" measures can help save the earth and the bottom. These businesses and ones like them will be used in alliances to promote the Climate Action Plan initiatives and meet the City's Goals.

Help Yourself! Organic Restaurant

Help Yourself! restaurateur Charlie Wilson's business model seeks diners who have a social conscience and wish to take care of themselves with organic food and the Earth by minimizing their impact on it. As with all downtown businesses space is an expensive commodity but it is important to them and their customers that their foot print on Earth is friendly, so additional square feet are used to collect rainwater, a/c condensation, collect recyclables and compost.

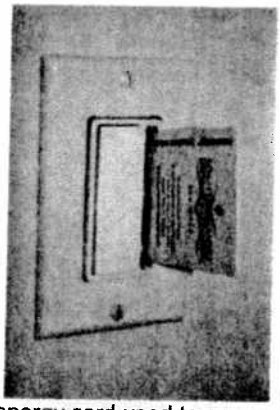
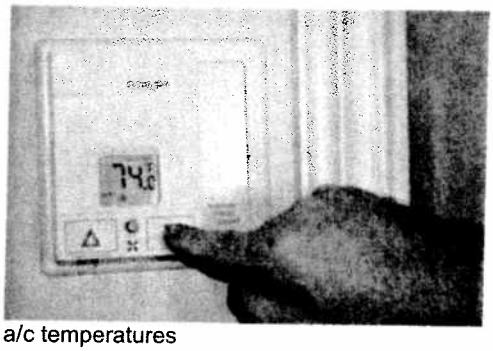
Water collection from A/c Units to water plants

Composter to create high quality soil for organic gardening

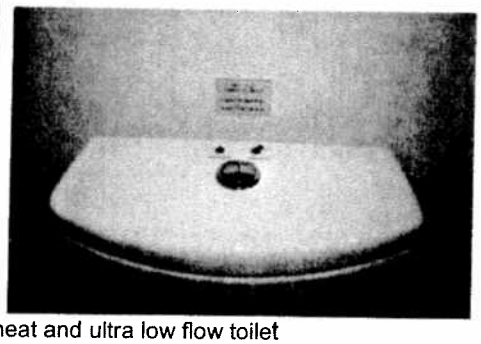
Separate waste receptacles are offered to diners to recycle, compost, and reduce trash leaving the keys

Southernmost Resorts

Southernmost Hotel, Southernmost on the Beach and La Mer Hotel & Dewey House have all received the prestigious "One Palm Designation" by the Green Lodging Association of Florida. Green lodging is required for any state employees using lodging or hotel conference centers. The resort uses a variety of energy and water conservation measures as well as sustainable development features like salt water tolerant grass since they are water front, ultra low volume toilets and pervious pavement. They may be the first in Key West to use the energy conservation features that are all the rage in Europe, Enter-gize. This system can preset a/c and lighting components of rooms, At Southernmost on the Beach only when the door key is used can the a/c be increased to the desired temperature of the occupant. This save many hours of energy wasted in unoccupied rooms.

Salt tolerant grass and room energy card used to access a/c temperatures

White roofs that reflect 65% of the suns radiant heat and ultra low flow toilet

A solar pool heating system harnesses the suns energy.