

MEETING M I N U T E S  
Monroe County Climate Change Advisory Committee  
January 23, 2013,  
Florida Keys Electric Cooperative Conference Room,  
Marathon, FL

Members Present

Annalise Mannix (Chair)  
Harry Appel  
Chris Bergh (Vice Chair)  
John Forrer  
Bob Glazer  
Bill Hunter  
Kelly McKinnon  
Don Riggs  
Chuck Sherman

Members Not Present

David Tuttle

Advisory Agency Representatives:

TJ Patterson, FL Keys Electric Cooperative  
Alison Higgins, City of Key West  
Vicki Boguszewski, MC Health Department

BOCC

Sylvia Murphy, Liaison

Staff present

Rhonda Haag, Sustainable Program Manager  
Alicia Betancourt & Doug Gregory, UF Extension  
Nat Cassel, Assistant County Attorney

Public Guests

Mellie Lewis, NOAA Climate Stewardship Program  
Beth Williams

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Annalise Mannix, Chair, called the meeting to order at 12:15 pm.

The **agenda (Attachment 1)** was adopted without change by a motion from Bill Hunter and seconded by Kelly McKinnon. The **November 15, 2012 minutes (Attachment 2)** were adopted without change by a motion from Bill Hunter and seconded by Kelly McKinnon.

**Direction for CCAC (Recap of June 2012 list of Post Climate Action Plan Suggestions)**

Since some members were still on route from a morning Key Largo meeting, it was decided to discuss the future direction of CCAC effort based on the list of items identified in the June 2012 meeting (**Attachment 3**). Concern was expressed that the County should move quickly toward implementation of the Climate Action Plan, addressing the top 6 priorities identified in the Plan. Concern was also expressed about the apparent lack of awareness by some of the local utilities of the need to incorporate anticipated sea level increases in new construction, like the Cudjoe Regional Wastewater Plant.

It was agreed that the next CCAC meeting should address two topics: 1) the status of the County's roads and bridges program with respect to incorporation of sea level rise considerations on maintenance and repair. Of particular interest to some members was the availability of data on the existing elevations of roads and bridges; and, 2) the status of evaluation and incorporation of the Adaptation Action Area concept in the County's Comprehensive Plan. County staff will be invited to the next meeting to address these two issues.

Approval of Dates for 2013 Meetings

March 7, May 7, July 16, and September 13. It was noted that additional meetings could occur if needed. The CCAC is scheduled to sunset on September 30 but the BOCC will likely be requested to extend the CCAC to address ongoing sustainability issues.

Introduction to the NOAA Climate Steward Program

Ms. Mellie Lewis, the volunteer Southern Regional Leader of the NOAA Climate Steward Program presented an overview of the program's effort to provide educational support to schools and community organizations. It is a volunteer effort that began in 2010 but now encompasses six regions throughout the US. The volunteers receive science training through a monthly tele-conference and each volunteer operates through a Community Support Action Plan. About 200 volunteers work in 40 different states; In Monroe County, the primary educational effort has been to use climate literature in the teach English instructions conducted through the Literacy Volunteers of America.

### Review of Draft Monroe County Community Climate Action Plan

The latest draft version of the CAP was well received with the current version being formatted to look more like a publication with numerous relevant pictures. The reformatting was done by Rhonda Haag and it greatly increased the documents appeal and readability. The main substantive comments were that the science section needed to be updated and the final “Next Steps” section should not include references to “Climatewise<sup>®</sup>” or any other proprietary program. It was noted that after BOCC acceptance of the CAP it would be further commented on by county staff and possibly by the public, if the FEMA public education grant money is awarded.

Bill Hunter moved: “The Climate Change Advisory Committee approves the Climate Action Plan and recommends the Monroe County Board of County Commissioners accepts the Climate Action Plan and directs County staff to develop an implementation strategy for approval by the BOCC by August 1, 2013.”

The motion was Seconded by Harry Appel and passed unanimously.

The meeting was adjourned at 3:30 p.m.

Attachment 1. January 23, 2013 CCAC Agenda

Attachment 2. November 15, 2012 CCAC Minutes

Attachment 3. Future Direction of the CCAC, June 2012

# Monroe County Climate Change Advisory Committee Meeting

January 23, 2013

Florida Keys Electric Cooperative Conference Room,

3421 Overseas Highway, Marathon

12:00 p.m. – 4:00 p.m.



- I. Review and Approval of Meeting Agenda and November Minutes– Mannix (12:00-12:10)
- II. Introduction to the NOAA Climate Steward Program – Mellie Lewis (12:10 – 12:30)
- III. Review of Draft Monroe County Community Climate Action Plan – Haag/Gregory/Betancourt (12:30-2:30)
- IV. Approval of Dates for 2013 Meetings – Haag (2:30 – 2:45)
- V. Direction for CCAC (Recap of June 2012 list of Post Climate Action Plan Suggestions) – Mannix (2:45-3:45)
- VI. Other Business (3:45-4:00)

## Appointed Members:

Harry Appel  
Chris Bergh (Vice Chair)  
John Forrer  
Bob Glazer

William Hunter  
Annalise Mannix (Chair)  
Kelly McKinnon  
Don Riggs

Chuck Sherman  
David Tuttle

## Staff / Office:

Nat Cassel / County Attorney  
Doug Gregory & Alicia Betancourt / Extension Service  
Rhonda Haag / Sustainable Program Manager  
Michael Roberts / Growth Management

***ADA ASSISTANCE: If you are a person with a disability who needs special accommodations in order to participate in this proceeding, please contact the County Administrator's Office, by phoning (305) 292-4441, between the hours of 8:30 a.m. - 5:00 p.m., no later than five (5) calendar days prior to the scheduled meeting; if you are hearing or voice impaired, call "711"***

MEETING M I N U T E S  
Monroe County Climate Change Advisory Committee  
November 15, 2012, Marathon Government Center, BOCC Chambers

Members Present

Annalise Mannix (Chair)  
Harry Appel  
Bob Glazer  
Bill Hunter  
Don Riggs  
Chuck Sherman  
David Tuttle

Members Not Present

Chris Bergh (Vice Chair)  
John Forrer  
Kelly McKinnon

Advisory Agency Representatives:

Julie Cheon, FL Keys Aqueduct Authority  
TJ Patterson, FL Keys Electric Cooperative

Alison Higgins, City of Key West  
Vicki Boguszewski, MC Health Department

BOCC

Sylvia Murphy, Liaison

Staff present

Rhonda Haag, Sustainable Program Manager  
Michael Roberts, Growth Management  
Alicia Betancourt & Doug Gregory, UF Extension  
Nat Cassel, Assistant County Attorney

Public Guests

Ron Cole  
Lisa Kaul, SALT Services

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Annalise Mannix, Chair, called the meeting to order at 12:05 pm.

The **agenda** (Attachment 1) and **minutes** (Attachment 2) from the June 25 meeting was adopted without change.

Election of Chair and Vice-Chair

Annalise Mannix and Chris Bergh were re-elected as Chair and Vice-Chair, respectively, by acclamation.

Approval of Dates for 2013 Meetings

The January meeting was set for January 23 to be held at the Florida Keys Electric Cooperative Conference Room at the regular time of noon till 4 p.m. and the setting of additional meeting dates was postponed until the January meeting.

Introduction to the FWC KeysMap Process

Bob Glazer, FWC biologist, presented an overview of the FWC KeysMap Process (Attachment 3) which attempts to address marine adaptation needs relative to anticipated climate change impacts. The approach is to first develop a set of “alternative futures” and examine their effects on natural resources. It then couples the expected outcomes against a number of adaptation strategies to plan for future conditions. Also the intent is to test the effectiveness of a set of potential management actions across this range of anticipated future conditions. The scenarios are tied to IPCC scenarios, and they also encompass a discrete set of potential management strategies.

Update on the MC Comprehensive Plan Process

Michael Roberts presented a summary of the previously recommended (see February 2012 Committee minutes) climate related measures from the Draft MC Community Climate Action Plan that were included in the Energy and Climate Element of the Draft MC Comprehensive Plan and handed out a draft of the Element (Attachment 4) to the Committee, noting that not all of the items or wording in the draft received from the consultants would make it in the final Comp Plan. He pointed out that this was a major step forward by the County to explicitly address climate issues in the Comp Plan. Concern was expressed by some Committee members that the 20-year time horizon for considering sea level rise was unrealistic too short a time frame, however, Michael Roberts reassured the Committee that even though the Comp Plans within the State of Florida were mandated to address a 20-year time horizon, any updated information on sea level rise could be easily incorporated.

Update on the SE Florida Climate Compact’s Climate Action Plan

Michael Roberts gave an overview of the recently released Regional Climate Action Plan produced by the SE Florida Climate Compact. He noted that it was going before the BOCC for consideration at their November meeting. The Regional Climate Action Plan is available at: <http://southeastfloridaclimatecompact.org/>.

## Overview of Two Climate Resiliency Grant Applications

Rhonda Haag presented a summary of two draft grant applications being developed in collaboration with the Geos Institute ([www.geosinstitute.org](http://www.geosinstitute.org)). One grant is for a \$35K FEMA related effort to take the MC Community Climate Action Plan to the general public for input and ideas that would coincide with the timeframe that county staff would be reviewing the document. The second grant is for a \$100K NOAA effort that will be used to hold detailed technical meetings to document Monroe County vulnerabilities that will then be presented to community leaders in an education venue to encourage mitigation and adaptation actions in local agencies, using the Regional and County Climate Action Plans and leadership as examples.

## Review of the Draft Monroe County Community Climate Action Plan (Attachment 4)

The Committee made some specific comments on the draft, as follows, but, in general, Committee members felt it would be ready for submittal to the BOCC after the next revision. It was anticipated that the final approval of the plan would occur at the January Committee meeting and that it should be formally submitted to the BOCC at the following Marathon BOCC meeting which would be in March.

The suggested changes included the use of specific examples of cost savings where possible. It was suggested the table on page 13 was not needed. Linkages to the Comp Plan and other pertinent County documents should be included. Include the missing percentages in the Built Environment section. And, change the Planning Horizon definitions to:

Short-term: 2013-2014

Medium-term: 2015-2016

Long-term: 2017-2020

Elaborate more in the Next Steps section by taking some information from the two Geos grant applications.

The meeting was adjourned at 3:30 p.m.

Attachment 1. November 15, 2012 CCAC Agenda

Attachment 2. June 25, 2012 CCAC Minutes

Attachment 3. KeysMAP Overview

Attachment 4. Draft Monroe County Community Climate Action Plan

# Monroe County Climate Change Advisory Committee Meeting

November 15, 2012

Marathon BOCC Meeting Room, 12:00 p.m. – 4:00 p.m.



- I. Review and Approval of Meeting Agenda and June Minutes– Mannix (12:00-12:10)
- II. Election of Chair and Vice Chair – Mannix (12:10 – 12:20)
- III. Approval of Dates for 2013 Meetings – Haag (12:20 – 12:30)
- IV. Introduction to the FWC KeysMap Process – Glazer (12:30 – 1:00)
- V. Update on MC Comprehensive Plan Process – Roberts (1:00-1:30)
- VI. Update on SE Florida Climate Compact Climate Action Plan – Haag (1:30 1:45)
- VII. Overview of Two Climate Resiliency Grant Applications – Haag (1:45-2:00)

BREAK (2:00 – 2:15)

- VIII. Review of Draft Monroe County Community Climate Action Plan – Gregory (2:15-3:45)
- IX. Other Business (3:45-4:00)

## Appointed Members:

Harry Appel  
Chris Bergh (Vice Chair)  
John Forrer  
Bob Glazer

William Hunter  
Annalise Mannix (Chair)  
Kelly McKinnon  
Don Riggs

Chuck Sherman  
David Tuttle

## Staff / Office:

Nat Cassel / County Attorney  
Doug Gregory & Alicia Betancourt / Extension Service  
Rhonda Haag / Sustainable Program Manager  
Michael Roberts / Growth Management

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MEETING M I N U T E S  
Monroe County Climate Change Advisory Committee  
June 25, 2012, Marathon Government Center, BOCC Chambers

Members Present

Chris Bergh (Vice Chair)  
Harry Appel  
Bob Glazer  
Bill Hunter  
Kelly McKinnon  
Don Riggs  
Chuck Sherman  
David Tuttle

Members Not Present

Annalise Mannix (Chair)  
John Forrer  
Tom Genovese

Advisory Agency Representatives:

TJ Patterson, FL Keys Electric Cooperative  
Alison Higgins, City of Key West

BOCC

Sylvia Murphy, Liaison

Staff present

Rhonda Haag, Sustainable Program Manager  
Alicia Betancourt & Doug Gregory, UF Extension  
Nat Cassel, Assistant County Attorney

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Chris Bergh, Vice Chair, called the meeting to order at 12:10 pm.

The **agenda** (Attachment 1) was adopted with the following changes by a motion from Chuck Sherman and seconded by Bill Hunter. Additions to the agenda included an Update on the SE Climate Compact Climate Action Plan and a discussion of the future direction of the CCAC after completion of the Community Climate Action Plan. The **minutes** from the May 17 meeting was adopted without change by a motion from David Tuttle and seconded by Bill Hunter.

Review of BOCC Action on Organic Waste Recommendation

Doug Gregory reported that the organic waste recommendation and resolution from the CCAC was accepted by the BOCC after a brief discussion where interest was expressed to having presentations to the BOCC similar to those we heard at our May meeting from Waste Management and the South Dade Soil and Water Conservation District. Kevin Wilson (MC Staff) assured the BOCC the proposals would be evaluated for implementation, including presentations to the BOCC, as appropriate.

A brief discussion followed regarding how best to collect yard and food waste effectively since most yard waste will come from residents and food waste from restaurants and grocery stores. Commissioner Murphy suggested the County start with yard waste and later add food waste to make the transition smoother. David Tuttle inquired if there would be a market for the compost. Chris Bergh responded that the analyses presented in May indicated a ready market was available.

Overview of the Energy Efficiency Conservation Block Grant

Rhonda Haag presented the EECBG progress to date. The grant activities are completed (November 2010-June 2012). The grant was written and obtained at the request of the Green Initiatives Task Force and involved 8 projects, including three municipalities (Islamorada, Key West, and Marathon). Three major amendments to the grant were required to accommodate changes in personnel and in-kind match dollars. Projects included installation of solar ball field lights in Islamorada, a greenhouse inventory and climate plan for Marathon, more efficient ball field lights for Key West, an updated air conditioning system for the Freeman Justice Center, purchase of 6 hybrid cars, installation of 15 solar water heaters on low income Habitat for Humanity homes on Big Pine Key, completion of a County Operations Energy Reduction Plan and production of a 15 minute educational video highlighting the sustainability efforts throughout the Florida Keys.

A phase II unmet needs funding opportunity may be available for those who managed their grants well. Chuck Sherman noted that he was quite familiar with the EECBG program and he applauded the County's success. David Tuttle suggested the CCAC assist in identifying unmet needs. Bill Hunter asked for guidance on identifying higher priority items and Bob Glazer asked that a copy of the RFP be forwarded to the CCAC when it becomes available.

Chuck Sherman indicated that the state granting agency will be looking for proven projects, probably something associated with commercial building retrofits to get the most energy savings possible.

Break 1:30 – 1:50 pm

Christa Marshall from the Climate Wire News Blog was introduced. She is in the Keys to do a story about the potential effects of sea level rise and wanted to interview available CCAC members.

### Change in September CCAC Meeting

The September meeting will be shortened because the meeting room will not be available till 1 pm and staff has to be in Key West for a 5 pm budget hearing. T.J. Patterson indicated that the FKEC meeting room would be available that day. Consequently, the group decided to hold the September meeting at the Florida Keys Electric Coop's Marathon office from noon till 3:00 pm Thursday September 13<sup>th</sup>. The address is: 3421 Overseas Hwy., Marathon, FL 33050 (305) 852-2431.

### TNC's Keys Coastal Resilience Tool

Chris Bergh demonstrated the Interactive web tool for evaluating inundation vulnerabilities ([www.coastalresilience.org](http://www.coastalresilience.org)). It is still in the development stage but is expected to be helpful for adaptation decision making. The interactive vulnerability tool was first developed for the Long Island, NY area.

### Review of Draft Climate Action Plan

The timeline for the completion of the Monroe County Community Climate Action Plan was discussed. Members will have until July 6<sup>th</sup> to submit and changes to document version 4.6 (sent to them prior to meeting). Staff will incorporate changes and provide intro and background information as well as complete minor editing issues. This will be returned to members by August 24<sup>th</sup> for final review. Any comment or suggestion will be due back to staff by August 31<sup>st</sup>. The final report will be voted on at the September 13<sup>th</sup> meeting for inclusion on the October BOCC agenda which has an Oct. 2<sup>nd</sup> deadline.

**Chuck Sherman moved that “A draft completed CAP should be ready for distribution to the CCAC before the September meeting and upon approval at the September meeting the final Monroe County Climate Action Plan is to be put on the BOCC agenda for their October meeting. Motion was seconded by Don Riggs and approved unanimously.** There was some discussion about October being the anniversary of the CCAC but the CCAC was initially created by the BOCC in January 2011 and the first meeting was in April 2011.

### Other Business

#### Update on SE Florida Climate Change Compact Climate Action Plan

Rhonda Haag noted that the public comments were still being incorporated into the draft CAP and probably the most significant change would be inclusion of more information on the agricultural sector. The steering committee was to meet soon to finalize the document.

#### Future Direction of the CCAC

A lengthy discussion ensued about what the CCAC should address after completion of the Community Climate Action Plan and prior to their sunset date of October 2013. A variety of suggestions was presented, some of which are listed below:

- Community Education
- Coordinate with municipalities, utilities and businesses in addressing climate change issues
- Consider the role of the tourist community in addressing climate change issues.
- Review the state of the County's roads and bridges

Review the state of the County's water supply with FCAA

Review the County's Comprehensive Plan's Climate and Energy sections as they are developed.

Review staff progress in vetting and implementing the Community Climate Action Plan.

Review how the existing and proposed wastewater collection systems incorporate or function considering the potential impact of a 2 foot sea level rise by 2050.

Commissioner Murphy suggested a list be provided to the BOCC to give them and the public a sense of direction that the CCAC wanted to pursue.

#### Ranking of CAP Action Items (Not on Agenda)

At the end of the meeting it was suggested that CCAC members rank their top priority action items to provide the BOCC some sense of which ones were deemed most important. It was pointed out that the action items were already ranked but that a large number received the high ranking and thus may not be providing adequate guidance. It was decided that members should complete their action items rankings and get them to staff by June 6th. The six items that get the cumulative highest rankings will be submitted to the BOCC as priority items to be addressed. Members are to number those items 1-6 with 1 being their top pick. They can choose items from any category but it was mentioned that we should focus on things that could be started within the year. Staff will compile these rankings for discussion at the Sept. meeting.

Meeting adjourned at 4:10 pm

Attachment 1 = CCAC June 25, 2012 Agenda



## KEYSMAP (Florida Keys Marine Adaptation Planning)

### Overall Goal of Project

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This project develops a method which has proven successful in terrestrial ecosystem planning, but has not yet been adopted in marine planning contexts: spatial scenario simulation. This approach first develops a set of “alternative futures” and examines their effects on natural resources. It then couples these expected outcomes against a number of adaptation strategies to plan for future conditions then tests the effectiveness of a set of potential management actions across this range of conditions. The scenarios are tied to IPCC scenarios, and they also encompass a discrete set of potential management strategies.

In order to judge the effectiveness of these strategies, we have chosen a set of indicator species and associated habitats. These have been chosen to be tractable within a small study, and yet to represent a reasonable diversity of conditions within the region. Climate change variables that will be examined include sea level rise, ocean acidification, and changes to sea surface temperature. The habitats that have been selected include: 1) coral reef, 2) mangroves, and 3) beaches. The species that have been selected include: 1) Goliath grouper, 2) spiny lobster, and 3) loggerhead turtle. The spatial scope of the project includes the Florida Keys and southern peninsular Florida south of 25.25° north latitude. The westward boundary will be the islands west of Key West up to approximately the Marquesas although this may vary depending on data availability.

This project is being conducted by GeoAdaptive, Inc., a spin-off from Massachusetts Institute of Technology, and the Florida Fish and Wildlife Conservation Commission. For questions, please email [bob.glazer@myfwc.com](mailto:bob.glazer@myfwc.com).

### The Approach

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Three workshops will be conducted which will address specific parts of this project. All workshops will be convened in Marathon, Florida, except as noted. An additional set of pre-workshop meetings will be held to help validate the initialization assumptions for SLAMM inundation modeling for the Florida Keys and southern peninsular Florida region.

#### 1. **SLAMM Modeling meetings**

**When:** 23 May 2012 (upper Keys), 24 May 2012 (lower Keys), 25 May 2012 (southern Peninsular Florida)

**Who:** Individuals familiar with the respective regions’ coastal and terrestrial habitats

**Goal:** Validate habitat maps prepared by FWC that will be used in SLAMM inundation modeling to ensure accuracy.

**Outputs:** Geospatially accurate representations of habitat maps.

2. **Workshop 1:** Developing Scenarios (Part 1) and Assessing Climate Change Impacts on Habitats

a. Part 1: Scenario development.

**When:** 17 July 2012

**Who:** Natural resource managers (including those focused on ecosystems and species) and marine planners

**Goal:** identify climate change (i.e., IPCC scenarios) and human dimensions scenarios that will be most relevant for their future planning.

**Outputs:** Scenarios will be identified related to climate change and human/political/conservation/management change. These scenarios will be used in all the workshops and outputs from each workshop will be propagated to the next workshop.

b. Part 2: Impacts of Climate Change on Select Marine Habitats

**When:** 18 July 2012

**Who:** Climate Change Impact Experts and Habitat Specialists for the focal habitats

**Goal:** To identify what changes may be expected to occur to the focal habitats under different climate change scenarios. This will be accomplished with close interactions between the climate change experts and the habitat specialists.

**Outputs:** Information will be collected from which a series of maps will be created within a GIS. These maps will be used in Workshop 2.

3. **Workshop 2.** Estimating impacts to select species under changes to climate and human dimensions.

**When:** TBD

**Who:** Species experts

**Goal:** Using the maps produced from Workshop 1 outputs and the associated scenarios, the species experts will develop forecasts identifying effects on the focal species populations.

**Outputs:** Information will be collected from which a series of maps will be created within a GIS that will detail the anticipated effects on species populations under each scenario identified in Workshop 1, Part 1. . These maps will be used in Workshop 3.

4. **Workshop 3:** Identifying Adaptation Strategies

**When:** TBD

**Who:** Natural resources managers and marine planners

**Goal:** Using the maps produced from Workshop 1 and 2 outputs and the associated scenarios, the natural resource managers and marine planners will develop adaptation options and strategies that may be appropriate to deal with changes identified for each scenario.

**Outputs:** A number of potential strategies to deal with changes to habitats and species will be developed.

# Local Actions and Policies for Adapting to Climate Variability and Change in Monroe County, Florida

## Executive Summary

### INTRODUCTION

The Florida Keys are on the front lines of climate change impacts such as sea level rise and increased hurricane intensity. While greenhouse gas emissions produced within the Monroe County region constitute only a small percentage of national and global quantities, Monroe County, because of its unique vulnerabilities to sea-level rise and our international presence as a premier tourist destination, has an opportunity to demonstrate leadership on this global issue by implementing the critical policies, practices and investments that will eventually reduce greenhouse gas (GHG) emissions and prepare us for some unavoidable impacts of climate change. We clearly have the most to lose. If sea-level rise is not curtailed by immediate reductions in greenhouse gases, the Florida Keys may eventually become unlivable.

The burning of fossil fuels and deforestation are causing an increase in greenhouse gases in the Earth's atmosphere, and there is a consensus among climatology scientists that this is driving unprecedented climate change. Post-industrial human activity has cumulatively created an unprecedented negative impact on global climate processes resulting in accelerated changes in climate change patterns that could threaten the future security and stability of sovereign nations and human society. The consequences are dramatic and they are already being witnessed through increases in the melting of Arctic sea ice, an expansion of the tropical zone and the rate of sea level rise caused by melting glaciers, the heating (thermal expansion) of the oceans and melting ice sheets in Greenland and Antarctica. For instance, in the last 80 years, there has been an average 9-inch sea level rise in south Florida.

Numerous estimates of future sea-levels have been made on both global and regional scales with regional South Florida planning guidance available from a white paper on sea level rise projections developed by the Sea Level Rise Technical Ad Hoc Working Group of the Southeast Florida Regional Climate Compact entitled *A Unified Sea Level Rise Projection for Southeast Florida* available at (<http://southeastfloridaclimatecompact.org/pdf/Sea%20Level%20Rise.pdf>). The projection was an integration of similar analyses recently conducted by the US Army Corps of Engineers, the South Florida Water Management District, Miami-Dade Climate Change Task Force Science and Technology Committee, Broward County Climate Change Task Force Science and Technical Subcommittee and Florida Atlantic University.

Planning decisions for future public and private projects and adaptation efforts should recognize the need to address sea-level rise. The regional and local sea-level rise estimates provided to date cannot account for future increases in ice-sheet melting and it may be prudent to consider current estimates to be conservative and optimistic. Planning decisions should take into consideration medium to extreme sea level rise predictions.

The long-term costs of having to implement adaptation measures intended to help cope with climate change impacts due to inaction and the subsequent negative consequences to the economy, social structure and environment make it necessary to implement mitigation actions now to avoid or minimize long-term adaptation costs; even though mitigation may be costly in the short-term. We do have a chance now to prevent the worst impacts of climate change. If we act effectively, we should be able to limit both the magnitude of climate change and the severity of its impacts. The two major approaches to addressing the potential negative aspects of climate change are mitigation and adaptation. Mitigation involves actions to reduce GHG emissions to reduce the amount and speed of climate change. Adaptation involves actions to reduce the impacts of climate change on existing society and the environment. Both mitigation and adaptation strategies are contained within this document.

Given the overwhelming consensus that anthropogenic or “man-made” greenhouse gas emissions are causing global climate change, Monroe County, Florida is joining an increasing number of local governments committed to addressing climate change at the local level. The County recognizes the risk that climate change poses to its constituents, and is acting now to reduce the greenhouse gas (GHG) emissions, or “carbon footprint”, of both its government operations and the community at-large through the innovative programs laid out in this Climate Action Plan. Ultimately, local action is needed to reduce Monroe County, Florida’s contribution toward the problem of climate change and adapt to its current and future effects. This Climate Action Plan takes advantage of common sense approaches and cutting edge policies that our local government is uniquely positioned to implement – actions that can reduce energy use and waste, create local jobs, improve air quality, preserve our local landscape and history, and in many other ways benefit Monroe County, Florida for years to come.

## **The Policy Context of Climate Planning**

### **Florida**

Since 2006, the State of Florida has responded to growing concerns over the effects of climate change by adopting various legislation and plans to address emissions and sustainability in the public sector.<sup>1</sup>

In 2006, the Florida Legislature passed the Florida Energy Act (within Chapter 377, F.S.) which, among other things, created the Florida Energy Commission (“FEC”), and provided for renewable energy grants and a solar rebate program. In 2007, Governor Charlie Crist signed a series of executive orders aimed at reducing greenhouse gas emissions and establishing an Action Team on Energy and Climate Change. Other legislation was passed in 2007 directing the Florida Building Commission to create a model green building ordinance and in 2008, legislation was passed directing local governments to include GHG reduction strategies into their Comprehensive Plans. Legislation was also passed in 2008 that requires newly constructed government buildings to meet the rating requirements of the U.S. Green Building Council’s Leadership in Energy & Environmental Design (“LEED”) or the Florida Green Building

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<sup>1</sup> This section taken from: The City of Marathon, Sustainability and Climate Plan. May 2012. Pages 26-27. Energy Systems Group and Erin L. Deady, PA.

Coalition, or another comparable third party “green” building rating system. This provision was later amended to include the International Green Construction Code. In 2008, legislation was passed that mandates the Florida Building Code be significantly increased in its energy efficiency requirements. Finally, in 2010, legislation was passed that provides authority to local governments to create energy financing and retrofitting programs and that revises the state’s recycling targets to make them more aggressive.

In the 2007-2009 timeframe, the Florida Energy and Climate Change Action Plan was developed (pursuant to Executive Order 07-128). Phase I of the Report includes 35 findings and 30 recommendations. Among the categories covered are power generation, transportation and government recommendations to lower and diversify energy use and diversify energy sources as well as take steps to start planning for climate change impacts. It called for “organizing the state government for Florida’s energy future.” Phase 2 of the report detailed 50 separate policy recommendations to reduce GHG emissions and provide a framework for climate change adaptation strategies over the coming years and decades. Finally, in 2008 an important amendment to the Florida Forever legislation made properties subject to sea level rise eligible for state land acquisition funding. Section 259.105 (17)(d), F.S.

In recent 2011 revisions to Florida’s Community Planning Act, Chapter 163, F.S. local governments are permitted to establish “adaptation action areas” in their comprehensive plans where the community “identifies one or more areas that experience coastal flooding due to extreme high tides and storm surge, and that are vulnerable to the related impacts of rising sea levels for the purpose of prioritizing funding for infrastructure needs and adaptation planning.” Specifically, the law states:

“At the option of the local government, develop an adaptation action area designation for those low-lying coastal zones that are experiencing coastal flooding due to extreme high tides and storm surge and are vulnerable to the impacts of rising sea level. Local governments that adopt an adaptation action area may consider policies within the coastal management element to improve resilience to coastal flooding resulting from high-tide events, storm surge, flash floods, storm water runoff, and related impacts of sea level rise. Criteria for the adaptation action area may include, but need not be limited to, areas for which the land elevations are below, at, or near mean higher high water, which have a hydrologic connection to coastal waters, or which are designated as evacuation zones for storm surge.”

Other local governments across the country and Florida are addressing these issues through various efforts and in their requisite Comprehensive Plans. For instance, Smart Charlotte 2050, the County’s new Comprehensive Plan, (adopted in 2010) addresses climate change and sea level rise in the data and analysis generally. The Plan states that the County would, “Consider climate change in County decisions particularly along the coast”. Sarasota County also includes a discussion of sea level rise and climate change in the data and analysis of its Comprehensive Plan. Several cities, including Punta Gorda and Ft. Myers Beach also address these issues in their Comprehensive Plans, as previously stated, even though there is no state law requiring it.

## Southeast Florida Regional Climate Compact

The Southeast Florida Regional Climate Change Compact was executed by Broward, Miami-Dade, Monroe, and Palm Beach Counties in January 2010 to coordinate mitigation and adaptation activities across county lines. The Compact represents a new form of regional climate governance designed to allow local governments to set the agenda for adaptation while providing an efficient means for state and federal agencies to engage with technical assistance and support. The Compact calls for the Counties to work cooperatively to: 1) Develop annual Legislative Programs and jointly advocate for state and federal policies and funding; 2) Dedicate staff time and resources to create a Southeast Florida Regional Climate Action Plan to include mitigation and adaptation strategies; and 3) Meet annually in Regional Climate Summits to mark progress and identify emerging issues. (<http://southeastfloridaclimatecompact.org/>).

## Monroe County

Independent of the Southeast Florida Regional Climate Change Compact, Monroe County also has adopted resolutions and policies to advance climate change resiliency. The following list of actions demonstrates the commitment of the Monroe County Board of County Commission in addressing climate change challenges.

### US Mayors Agreement on Climate Change - 2007 (Resolution 235-2007)

Resolution of the Board of County Commissioners of Monroe County, Florida endorsing the U.S. Mayors Climate Protection Agreement as amended to reduce global warming pollution; Authorizing full membership in the ICLEI local governments for sustainability and participation in the Cities for Climate Protection Campaign.

### Establish the Green Building Code Task Force - 2008 (Resolution 177-2008)

A resolution by the Monroe County Board of County Commissioners establishing a Green Building Code Task Force to recommend green standards for new building codes.

### Establish a sunset date for the Green Building Code Task Force - 2008 (Resolution 345-2008)

A resolution by the Monroe County Board of County Commissioners amending resolution number 177-2008 to change the terms and sunset date of the Green Building Code Task Force to October 1, 2010.

### Establish the Green Initiative Task Force - 2009 (Resolution 121-2009)

A resolution of the Board of County Commissioners of Monroe County renaming the Green Building Code Task Force to the Green Initiative Task Force; Changing that the recommendations be made to the Board of County Commissioners rather than the Building Department and that the Task Force provide recommendations not on local technical amendments but on green standards for implementation in Monroe County to improve local quality of life and create a more efficient government.

#### Establishment of the Monroe County Employee Green Team – December, 2009

The Monroe County Board of County Commissioners approved the establishment of an Employee Green Team to develop a government operations climate action plan.

#### Southeast Florida Regional Climate Compact - 2010 (Resolution 022-2010)

Resolution of the Board of County Commissioners of Monroe County Florida pledging their commitment to appropriate staff resources and expertise within budget constraints to participate in the regional climate team with Miami-Dade, Palm Beach and Broward counties toward the development of a Southeast Florida Regional Climate Change Action Plan.

#### Energy Efficiency & Conservation Block Grant – 2010

Development and Implementation of a \$3.2M grant in partnership with the Cities of Key West, Marathon and Islamorada. Accomplishments included installation of solar water heaters on low-income families, county-wide educational programs, installation of solar powered lighting, greenhouse gas inventory, hybrid vehicles, building retrofits and an energy conservation strategy for Monroe County government operations.

#### Greenhouse Gas Target for County Operations - 2010 (Resolution 067-2010)

Resolution of the Board of County Commissioners of Monroe County Florida adopting a goal for reduction of greenhouse gas emissions to 20% by 2020 as measured from a 2005 baseline inventory.

#### Florida Green Building Coalition Commercial Building Standard - 2010 (Resolution 147-2010)

Resolution of the Board of County Commissioners of Monroe County, Florida adopting the Florida Green Building Coalition's green commercial building standard for county buildings in addition to the Florida Building Code as the standard to be used for construction of all public buildings from the date of this resolution.

#### Support for Multi-jurisdictional Financing Energy Assessment grant – July 2010

Approval of letter of support to City of Lantana for application to the Environmental Protection Agency for the Climate Showcase Communities Grant to establish a multi-jurisdictional Financing Energy Assessment Program.

#### Climate Change Advisory Committee – January 2011

The Climate Change Advisory Committee was created to include a cross-section of community interests to develop a Community Climate Action Plan.

## Adoption of the SE Florida Climate Compact's Sea Level Rise Projections – 2011

The Monroe County Board of County Commissioners adopted the Compact's sea level rise projections as guidance for the Climate Change Advisory Committee in their determinations of potential sea level rise impacts.

## Monroe County Comprehensive Plan – 2012

Monroe County staff is currently developing a Climate and Energy Element for inclusion in the Monroe County Comprehensive Plan.

# **Purpose, Scope, and Process Behind the Climate Action Plan**

## **Purpose**

The purpose of the Monroe County Community Climate Action Plan (MCAP) is to outline a course of action for the County government and communities of Monroe County for a coordinated countywide strategy to minimize climate change impacts and to increase the sustainability of the communities within the Florida Keys. The MCAP is an attempt to mitigate future impacts by reducing community-wide greenhouse gas (GHG) emissions to 20% below 2005 levels by 2020 and to identify local adaptation needs for protection against future sea level rise. The MCAP has been designed to support three primary functions:

- Provide clear guidance to County staff regarding when and how to implement key provisions of the plan,
- Inspire residents and businesses to participate in community efforts to address climate change issues, and
- Demonstrate Monroe County's commitment to climate change mitigation and adaptation.

The scope of the MCAP is to reduce GHG emissions and adopt mitigation and adaptation strategies in municipal and community-wide activities. GHG reductions and Climate strategies will be achieved in the areas of building and community energy use, waste diversion, water conservation, natural areas, and transportation. The plan contains strategies, objectives, measures, and actions that will direct the County's efforts. By creating a clear course of action so that everyone can have a role in creating and achieving climate and sustainability goals, our Climate Action Plan drives and coordinates local efforts toward a reduction in GHG emissions of 20 percent below 2005 emission levels by 2020.

The Climate Action Plan is a framework for the development and implementation of actions that reduce Monroe County, Florida's GHG emissions. The Plan provides guiding objectives and strategies to realize Monroe County, Florida's GHG reduction goal.

## **Scope**

This Plan covers goals and strategies for GHG emissions resulting from local government and community-wide activities within the County. It addresses the major sources of emissions in Monroe County, Florida and sets forth goals and strategies in 8 focus areas that both the County and community can implement together to achieve greenhouse gas reductions:

- POLICY COORDINATION (P)
- IDENTIFY AND MONITOR RISKS AND VULNERABILITIES (M)
- EDUCATION AND BUSINESS DEVELOPMENT (E)
- NATURAL SYSTEMS (N)
- BUILT ENVIRONMENT (B)
- WATER AND WASTE WATER (W)
- RENEWABLE ENERGY (R)
- SOLID WASTE AND RECYCLING (S)

The plan also creates a framework for documenting, coordinating, measuring, and adapting efforts moving forward.

## Process

The process of development of the MCAP took several years and included input from County and community advisory groups, local leaders, stakeholders and staff. Outlines below are some of the major steps in the development process.

### A. Signatory to the US Mayors Climate Protection Agreement

In 2005, the U.S. Mayors Climate Protection Agreement was launched by Seattle Mayor Greg Nickels, and initially signed by 141 mayors from cities across the country. The Agreement was created for cities to take the lead on climate change mitigation, and encourage state and federal action on this issue. The primary goal set for the signatories of this Agreement is to meet or exceed the Kyoto Protocol goal of a 7% reduction in GHGs from 1990 levels by 2012.

Currently, the Agreement has 1,054 signatories.

(<http://www.usmayors.org/climateprotection/agreement.htm>)

In addition to cities, counties have signed on to the Agreement, including Monroe County in 2007. Although the County does not have baseline GHG data from 1990, it has set its baseline in 2005, and committed to reduce its GHG emissions 20% below 2005 levels by 2020 (Resolution No. 067-2010). The Agreement suggests certain actions that signatories can take to reduce their GHG emissions. For example, signatories are encouraged to increase the use and production of renewable energy while updating their building codes and increasing energy efficiency in public facilities, as well as increase the average fuel efficiency of their fleet through the incorporation of alternative fuel vehicles.

Monroe County has attempted to fulfill its obligations to this agreement by increasing awareness of climate change, creating an inventory of GHG emissions, working on near-term reduction efforts, and setting the GHG reduction target. The County has also committed to work with regional partners to develop a comprehensive CAP through participation in the Southeast Regional Climate Compact. Finally, the County developed an Energy Efficiency Conservation Strategy which helps the County work toward its goals by focusing efforts on reducing fossil fuel energy use, which contributes to the County's carbon footprint. (Add link to EECS)

### B. Membership in ICLEI

In 2008, Monroe County joined ICLEI, Cities for Climate Protection Campaign as a full member. ICLEI is an international association of over 1,220 local governments who have committed to sustainable development and practices ( <http://www.iclei.org> ). While Monroe County, Florida has already begun to reduce greenhouse gas emissions through a variety of actions, this plan is a critical component of a comprehensive approach to reducing Monroe County, Florida emissions. This approach, developed by the Cities for Climate Protection Campaign identifies the following 5 milestones in an effort to reduce GHG emissions associated with local government operations and the community at large:



**Milestone One:** Conduct a baseline emissions inventory and forecast

**Milestone Two:** Adopt an emissions reduction target for the forecast year

**Milestone Three:** Develop a local climate action plan

**Milestone Four:** Implement the climate action plan

**Milestone Five:** Monitor progress and report results

Monroe County has completed Milestone 1 with the assistance of ICLEI’s Clean Air and Climate Protection (CACP) 2009 Software by establishing a 2005 baseline of emissions for

County owned and/or controlled operations. In 2010, the County achieved Milestone 2 by approving its GHG emissions reduction target. This document will achieve Milestone 3, additionally Monroe County is working with regional partners to draft appropriate mitigation and adaptation strategies for a regional CAP and the County is already integrating some of these concepts and strategies into its Comprehensive Plan which is currently being updated. Once the CAP has been adopted and implementation has begun, the County is committed to monitoring and verifying its progress. This crucial step will allow the County to adapt its plan to changing conditions and new data as necessary, focusing its efforts and resources in areas that provide the largest GHG reductions.

### C. Formation of Community Advisory Committees

Green Building Code Task Force/Green Initiative Task Force (GITF): In 2008, the Green Building Code Task Force was charged with evaluating and recommending updates to the Monroe County building codes to increase community energy efficiency and overall sustainability. Comprised of 10 commission appointees, representatives from the 5 cities and 3 regional utilities, and 1 member from the U.S. Navy, the Task Force was renamed the Green Initiative Task Force (GITF) in 2009 and expanded its realm of responsibilities to include the development of the GHG emission reduction target, securing the EECBG Program funding, and drafting the County’s Sustainable Vision Statement. **(Add link to Sustainable vision Statement)**

The Sustainable Vision Statement serves as a qualitative sustainability strategy for the County, outlining areas that need improvement as well as opportunities for strategic development. This statement serves as the foundation for future planning and was used to aid in the development of the County’s CAP. Covering a broad number of topics related to County and community

sustainability, the Sustainable Vision Statement suggests actions which guide county operation and provide community guidance on climate change issues.

As a result of GITF initiatives, the County also adopted the Florida Green Building Coalition's green commercial building standard for all new construction of County-owned public buildings (**Resolution No. 147-2010**). It is important to note that this standard was not required in plans developed prior to the acceptance of this resolution or adoption of a Florida Statute requiring that such standards be implemented. Planning for new construction has not occurred since the adoption of this building standard.

Following the sunset of the GITF in October 2010, the CCAC was established by the BOCC in January 2011 as an expansion of the GITF to include representatives from a broader cross-section of the county. The CCAC is an external advisory group that is responsible for providing community input on all County-related climate initiatives, recommending climate change adaptation and mitigation strategies to the BOCC, developing a Community-wide CAP and providing input to this EECS.

(<http://fl-monroecounty.civicplus.com/index.aspx?NID=386&ART=1490&ADMIN=1>)

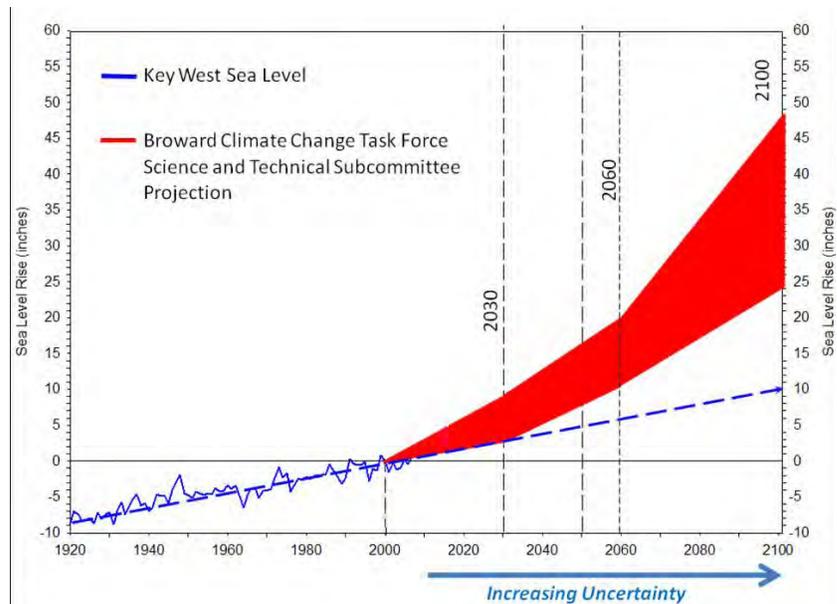
During 2011 and 2012, the CCAC developed this draft Community Climate Action Plan with recommendations for a coordinated countywide strategy in mitigating the causes, and addressing the local implications of climate change. The Monroe County Community Climate Change Action Plan contains 74 recommended actions to be brought before the Board for approval and implementation in 2013.

## The Science & Data

The CCAC determined early in their process that three types of information would be helpful to guide their recommendations. These included a projection of sea level rise that might be anticipated over time in Southeast Florida, a communitywide greenhouse gas inventory to understand the main sources of emissions in Monroe County and an analysis of the Counties vulnerability to sea level rise should no action be taken to address sea level rise.

### Sea Level Rise Projections

Sea Level Rise Projections -The Extension Service Staff assumed the task of reviewing literature on the subject of sea level rise. Rising seas will have four major impacts that need to be considered in comprehensive planning particularly as it relates to the management of public infrastructure: (1) inundation and shoreline recession; (2) increased flooding from severe weather



events; (3) saltwater contamination of ground water and surface water supplies; and (4) elevated water tables. The committee determined that based upon the review of the best available technical data and scientific modeling, a projection of 3-to-9 inches of sea level rise from the 2000 level by the year 2030 should be utilized in the development of Task Force immediate and short term recommendations. They further determined that a projection of 10-20 inches of sea level rise from the 2000 level by 2060 and a projection of 24-48 inches of sea level rise by the year 2100 should be utilized in the development of mid and long term recommendations.

## **Vulnerability Assessment**

Vulnerability Assessment – The “business as usual” scenario was developed by county GIS staff that provided analysis of vulnerability of major infrastructure at three sea level rise scenarios. A mapping exercise conducted by the Planning Department indicated major areas at risk of tidal flooding due to sea level rise. The mapping showed that 1 foot of sea level rise will substantially affect households, businesses and county infrastructure. Nearly (count) percent of developed land would be impacted by a one foot rise in sea level. With a two foot rise, the impact is multiplied (count) percent of developed land would be vulnerable. The three foot scenario shows impacts to (count) percent of infrastructure and developed land. The inundation models show that the cost of inaction would be tremendous.

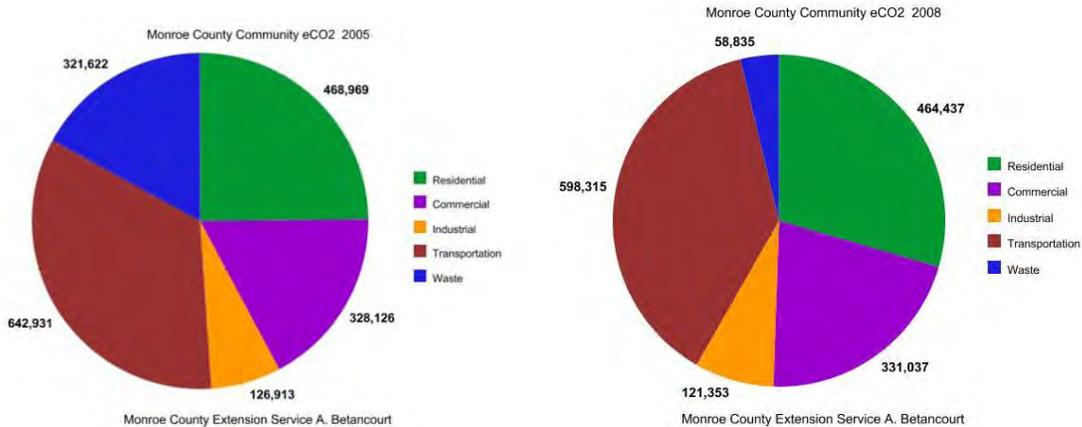
Local impacts related to climate change, especially sea level rise, are already occurring. Critical public infrastructure including beaches, roadways and especially storm water drainage treatment and conveyance systems have already begun to show vulnerabilities to the current rate of rise of sea level, extreme rainfall and seasonal high tides. Coastal communities have begun to seek infrastructure improvements to address mounting drainage concerns. The predicted accelerated rate of sea level rise will further exacerbate the impact of saltwater intrusion on our source of drinking water and on coastal habitats. Climate-related challenges currently exist suggesting action to address these issues is needed today.

## **Greenhouse Gas Emissions**

Through the completion of a local emissions study, or “greenhouse gas inventory,” our County has determined emissions levels for the community as a whole and for Monroe County, Florida government operations. Community-wide emissions represent the sum total of emissions produced within County limits as well as emissions resulting from electricity use within the jurisdiction, even if said electricity is generated elsewhere. In this way, the community-wide figures represent all major emissions for which the community is responsible.

Communitywide Greenhouse Gas Inventory -Concurrent with the deliberation of the CCAC, the Monroe County Extension Service staff conducted a communitywide greenhouse gas emissions inventory. This inventory, based on emissions from 2005, 2008 and 2010, served as the basis the Greenhouse Gas reduction recommendations. The use of gasoline and diesel fuel in the Transportation sector accounts for 38% of the County’s current emission of greenhouse gas. The Residential sector (29.5%) and the Commercial sector (21%) represent the bulk of emissions due primarily to the use of electricity. The need for communitywide reductions in these sectors is

reflected in the recommendations. A 2011 inventory update will provide for a mechanism to measure progress and improve reduction strategies in the future.



Emissions from the County are embedded within the community-wide totals. For example, emissions from government buildings are included in the “Commercial” sector and emissions from County fleet vehicles are included in the “Transportation” figure above. Government operations are therefore a subset of total community emissions.

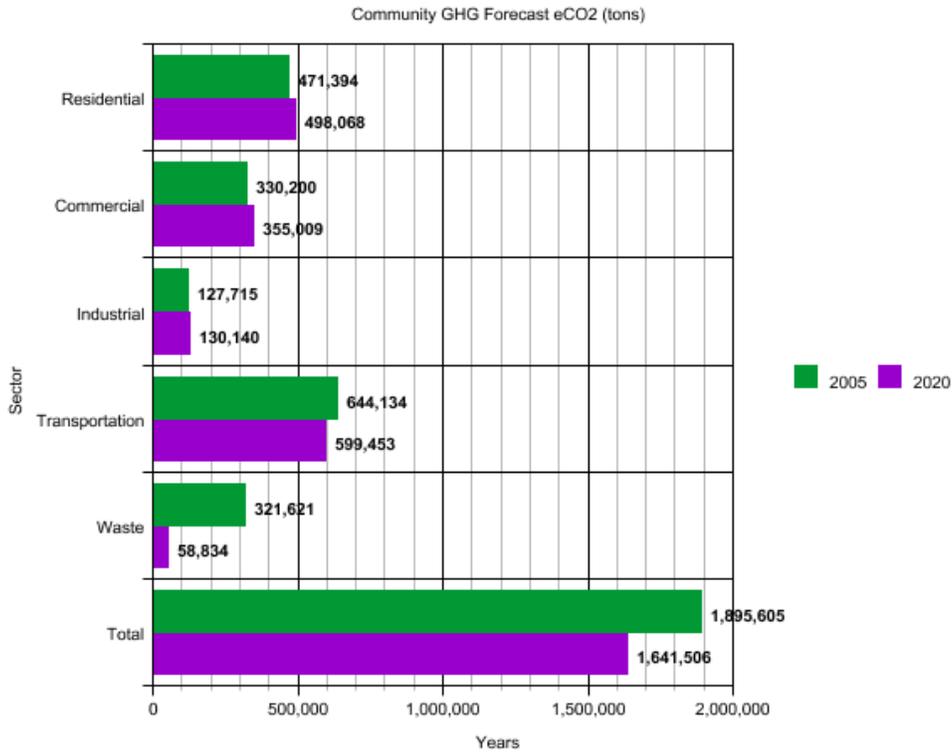
County Operations GHG Emissions:

The County has also estimate an emissions forecast based on projections of current data and expected future trends. The emissions forecast is a “Business As Usual” forecast, a scenario estimating future emissions levels if no further local action (i.e. projects within this Climate Action Plan) were to take place. The forecast indicates that for the purposes of this MCAP, Monroe County will experience little or no population growth between 2012 and 2020.

(<http://keyscompplan.com/system/wp-content/uploads/2011/04/Monroe%20County%20-%20Unincorporated%20Population%20Projections%20FINAL%20DCA%20approved%204-5-11.pdf>)

**Projected Growth in GHG Emissions**

For complete information regarding the emissions inventory and forecast, including methodology and supporting data, please reference the Monroe County, Florida GHG Emissions Inventory Reports located at **(link to county abb GHG report, Community abb GHG report including 2010 C-Cole update)**



## Monroe County, Florida's GHG Reduction Target

Monroe County, Florida has set targets to reduce its emissions to 20 percent below 2005 levels by 2020. The combination of measures that Monroe County, Florida has already implemented, is currently planned, and is presented through this Climate Action Plan is designed to achieve this target. Reductions rely on the best information currently available pertaining to population forecasts, future changes to building codes, and vehicle fuel efficiency standards among other information.

## The Monroe County, Florida Climate Action Plan

The summary table below identifies the focus areas within the Monroe County, Florida Climate Action Plan, the number of strategies within each focus area, and the contribution of each focus area toward the GHG reduction goal. Each focus area has a dedicated section within this document where specific actions (both new and those already employed) are described.

While the Monroe County, Florida local government cannot address climate change by itself, government policies and practices can dramatically reduce greenhouse gas emissions from a range of sources and help prepare Monroe County, Florida for the anticipated impacts of climate change. In addition, the County of Monroe County, Florida will assist residents and businesses in their endeavors to reduce emissions through programs explained in this Plan. By working together, Monroe County, Florida can not only do its part toward achieving a stable climate - we can reap the benefits of healthier air, lower costs for utilities and services, improved transportation and accessibility, a more vibrant local economy, and many other positive side effects of reducing our carbon footprint.

## Climate Change Advisory Committee Top 6 Ranked Recommendations

The committee took on the task of ranking the recommendations into three categories:

- High --Critical project, will not meet Task Force mission without it
- Medium --Important project with significant outcomes, worthy of consideration and resources
- Low --Important but mitigation and/or adaptation outcomes may not merit implementation with current resources; implement if resources allow.

The CCAC reviewed and approved 72 recommendations which were deemed critical and important to the meet the challenges of climate change. These recommendations represent a cross-section of natural, urban, local and regional interests reflective of the diversity of the County, its collaborative nature and regional focus.

Below you find 6 of the recommendations that the Climate Change Advisory Committee would like to move forward with in the next year. Some type of action has already been taken on (XX) of the 72 ranked actions.

Action P-2.1: Revise Monroe County Comprehensive Plan to address strategic planning related to climate change mitigation and adaptation needs.

Action P-1.1: Develop an implementation strategy for the Monroe County Community Climate Action Plan.

Action P-2.3: Create policies for future development to incorporate sea level rise inundation vulnerabilities for the life expectancy of the infrastructure.

Action M-2.2: Use improved inundation mapping to identify the sections of roadways, critical structures and natural areas that will be affected by sea level rise projections.

Action P-1.3: Provide advocacy and leadership for adoption of climate change policies and legislation with local, state, and federal entities.

Action P-2.4: Incorporate “Adaptation Action Area” designation into local comprehensive plans and regional planning documents to identify those areas deemed most vulnerable to sea level rise and other climate change impacts.

**Monroe County, Florida Climate Action Plan Summary Table – Focus Areas (need to determine)**

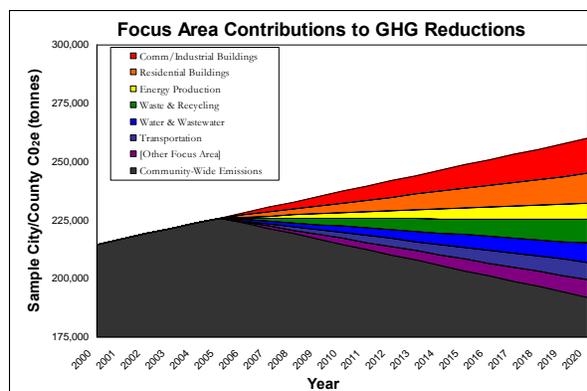
Focus Area	Description	Number of Distinct Strategies	Anticipated MTCO <sub>2</sub> e Reduction by 2020	Percentage of Total Reduction at 2020
Policy Coordination	Policies and actions that include leadership and long term planning to address climate adaptation and mitigation needs.	10	~14,900	22%
Identify and Monitor Risks and Vulnerabilities	Actions to identify and monitor the most vulnerable areas and facilities that will be affected by sea level rise in Monroe County.	7		
Education and Business Development	Actions that will Increase awareness of change impacts and promote local business development response.	6		
Natural Systems	Policies and actions to identify vulnerable natural landscapes and Increase resilience	7	~12,900	19%

Focus Area	Description	Number of Distinct Strategies	Anticipated MTCO <sub>2</sub> e Reduction by 2020	Percentage of Total Reduction at 2020
	through implementation of strategies.			
Built Environment	Policies and strategies to promote sustainable practices and efficiency, develop adaptation measures, and reduce GHG emissions.	15	~6,800	10%
Water and Wastewater	Policies and programs to reduce water demands protect supply and address wastewater treatment needs.	12	~10,200	15%
Renewable Energy	Policies and strategies to promote local renewable energy uses and development.	5	~8,100	12%
Solid Waste and Recycling	Policies and programs to reduce waste generation and, promote recycling.	12	~7,450	11%

\*MTCO<sub>2</sub>e (Metric tons of CO<sub>2</sub> equivalent)

## The Impact on Emissions

The summary figure below depicts forecasted GHG emissions from 2005 to 2010 and the estimated impact the Climate Action Plan will have on reducing these emissions over time. The reductions are expressed in terms of the estimated impact of each focus area. Taken together, the elements of the Climate Action Plan are capable of reaching Monroe County, Florida’s adopted reduction target – savings are projected to result in total reductions of 377,762 MTCO<sub>2</sub>e by 2020 or yearly emissions of 1,510,819 MTCO<sub>2</sub>e.



## Other Benefits of Climate Protection Measures

In addition to addressing climate change, measures taken to reduce greenhouse gas emissions have other important benefits. The most obvious of these is the potential for significant cost savings. In 2008, Monroe County, Florida spent over \$3,107,000 on energy to power buildings and fuel its vehicle fleet. Many of the measures in this plan “pay for themselves” quickly by reducing direct costs, such as fuel or energy used, and also indirect costs such as maintenance. For instance, a “right-sized” vehicle fleet is less expensive to purchase and fuel, while also being less costly to maintain. **Add information here about the expected monetary cost/benefit of Climate Action Plan projects.**

A key strategic side benefit of climate change mitigation activities is enhanced energy security through reduction in total demand. Climate protection measures can also spur business and job growth during the design, manufacture, and installation of energy efficient technologies. Climate change mitigation activities, particularly those related to transportation, help to clean the air by

reducing vehicle emissions. Finally, mitigation activities help to engender a greater degree of choice for Monroe County, Florida residents. For instance, more transit options combined with transit-oriented development practices make for a more vibrant, livable community.

In light of the compositional changes already made to Earth's atmosphere, we have already set the planet on a course for some degree of climate change. Many of the actions identified here to mitigate GHG emissions will also help government, businesses, and residents to adapt to a changing climate. For example, extreme and prolonged heat waves can put considerable strain on the reliability of energy delivery in peak periods; possibly leading to service disruption during times when cooling is most needed. By increasing efficiency across Monroe County, such service disruptions are less likely and the County will be able to better cope with those situations. Additional measures aimed solely at climate adaptation, such as modifying flood protection and heat emergency response programs will also be addressed in this Climate Action Plan.

Add Comp Plan info <http://keyscompplan.com/system/wp-content/uploads/2010/02/16.0-Energy-Conservation-and-Climate2.pdf>

## **CLIMATE ACTION PLAN FOCUS AREAS**

Each of the focus areas within Monroe County, Florida's Community Climate Action Plan is explored in the following pages.

In each focus area, goals with supporting strategies are explored. A "goal" is an objective, end result, or target that supports a focus area and an "Action" is a means of realizing the objective.

Each focus area draws on the actions of both the local government and Monroe County, Florida residents and businesses, although some areas may be largely one or the other.

### **Cross-Cutting Goals & Strategies**

Several focus areas are considered cross-cutting strategies because they are integral to successful implementation of the other focus areas. The first three focus areas; Policy Coordination, Identify and Monitor Risks, as well as Education and Business Development are cross-cutting focus areas which will build on the other focus areas. Given the broad reach and embedded nature of the goals for these focus areas, emission reductions were not calculated for these focus areas. Emission calculations are listed for actions in the other focus areas wherever possible.

Efficiency is a critical and common component of this plan. Energy, water and fuel efficiency strategies are woven into all of the focus areas.

### **Government Operations & Community Goals & Strategies**

Government operations strategies are specific to the internal operations of Monroe County, Florida. They apply to buildings Monroe County owns or leases, vehicles used to provide services, lighting of roadways, etc. Community strategies require involvement and participation from citizens. Each action is noted as one or both of these.

## Emissions Reductions

Calculating expected emissions reductions for each goal requires making assumptions about degree of implementation, technology, and individual behavioral changes several years into the future. The uncertainty associated with these assumptions makes it difficult to assign exact reduction totals to each goal or action item. To address this uncertainty and provide a simple but useful reference for reduction potential, a series of symbols and percentage ranges has been devised to represent the emission reductions associated with each goal and its strategies:

Specific implementation assumptions and GHG reduction estimates are listed in the Appendix.

## New and Existing Actions

This Climate Action Plan includes a combination of existing policies and programs as well as new ideas based on best practices from around the country. Whether an action item is new or existing is noted in the action item heading.

## Action Implementation Details

### Priority Rankings of Recommended Action Items

Priorities:

- **High** -- Critical project, will not meet Climate Action Plan mission without it
- **Medium** -- Important project with significant outcomes, worthy of consideration and resources
- **Low** -- Important but mitigation and/or adaptation outcomes may not merit implementation with current resources; implement if resources allow

### Planning Horizon:

Each action item has associated implementation actions, indicators to track progress, and timelines. Implementation timelines are broken down into three phases:

- **Short-term:** 2012-2013
- **Mid-term:** 2014-2015
- **Long-term:** 2016-2020

These periods sync with the 2020 target identified and makes the Plan consistent with the State timelines for implementation.

For each action, the County will assign performance targets that will provide guidance on the overall progress toward the goals. Staff will be responsible for communicating these in the Progress Indicator Timelines for each action item.





working group of employees the task of developing an implementation strategy for the Community Climate Action Plan for adoption by the BOCC.

Priority: High

Planning Horizon: Short-term

**Action P-1.6: Maintain a community BOCC Climate Change Advisory Committee**

Monroe County should maintain an advisory committee to assist and advise elected officials and the Office of Sustainability on climate related issues. An advisory committee similar to the existing one is an ideal forum for community coordination in the important area of addressing climate change needs in Monroe County.

Priority: High

Planning Horizon: Short-term

***Goal P-2: Comprehensive Plan-Integrate climate change planning into Monroe County's Comprehensive Plan and climate change adaptation and mitigation strategies into the Land Development Regulations.***

**Action P-2.1: Revise Monroe County Comprehensive Plan to address strategic planning related to climate change mitigation and adaptation needs.**

The Monroe County Comprehensive Plan should include strategies to address the impacts of climate change. Adaptive management principles should be used to continually review and revise climate mitigation and adaptation policies, objectives, and Land Development Regulations. Revisions to the Plan should include:

- Creating a Climate Change Element within the Monroe County Comprehensive Plan which can be a model to other local government efforts.
- Address greenhouse gas reduction and energy conservation strategies that promote compact, bicycle and pedestrian-friendly development; increase public transportation; reduce reliance on automobiles, the construction of energy efficient buildings; and address the potential effects of rising sea levels, and other climate change issues.
- Consider climate change impacts as a factor in determining appropriate levels of development in vulnerable areas.
- Include climate change mitigation and adaptation in all relevant elements of the Comprehensive Plan including; future land use, transportation, infrastructure, coastal management, conservation, recreation and open space, intergovernmental coordination, and capital improvements.

Priority: High

Planning Horizon: Short-term

**Action P-2.2: Advance livable communities as identified in the Communi-Keys Master Plan through adoption of LDR policies.**

Monroe County should continue to support the livable communities concept which promotes functional, walk-able mixed use development designs and projects by providing flexibility in

development review for these projects, revising the zoning and land development codes to allow and encourage these projects, establishing incentives for this type of development, and adopting specific goals in the Monroe County Comprehensive Plan to support and establish sustainable development patterns ([www.monroecounty-fl.gov/DocumentView.aspx?DID=173](http://www.monroecounty-fl.gov/DocumentView.aspx?DID=173)).

Priority: Low

Planning Horizon: Long-term

**Action P-2.3: Create policies for future development to incorporate sea level rise inundation vulnerabilities for the life expectancy of the infrastructure.**

1. Require one or two feet of freeboard (depending on the life expectancy of the structure) on all structures typically designed to the NFIP 100-year flood elevation. (This also provides significant discount on flood insurance)
2. Require all new commercial buildings to be elevated to NFIP standards plus 1 or 2 feet of freeboard, or elevate flood proofed buildings to a minimum of 2 feet above the road elevation.
3. All new and significantly renovated roads parks, pump stations, filled lots, towers, etc. shall have the grade elevated to above the land's projected sea level for the expected life of the infrastructure.
4. All stormwater infrastructures shall be designed with the assumption that MHW and MLW is the highest projected sea level during the expected life of the infrastructure.
5. All flood proofed buildings shall be designed for buoyancy based on the highest projected sea level during the life expectancy of the structure.
6. All new residential homes and commercial structures shall have 50% of the lot filled to the level of the highest projected sea level for the life expectancy of the structure
7. All new commercial parking lots shall be designed, at a minimum, to the level of the highest projected sea level for the life expectancy of the structure.

Priority: High

Planning Horizon: Short-term

**Action P-2.4: Incorporate “Adaptation Action Area” designation into local comprehensive plans and regional planning documents to identify those areas deemed most vulnerable to sea level rise and other climate change impacts.**

"Adaptation action area" or "adaptation area" means a designation in the coastal management element of a local government's comprehensive plan which identifies one or more areas that experience coastal flooding due to extreme high tides and storm surge, and that are vulnerable to the related impacts of rising sea levels for the purpose of prioritizing funding for infrastructure needs and adaptation planning.” §163.3164(1), F.S. (2011),

Adaptation Action Areas will include the built environment as well as natural areas and be used as a development tool to guide policies and regulations that will serve to reduce future risk and economic losses associated with sea level rise. Adaptation Action Areas will account for both existing and needed infrastructure. Vulnerable natural areas can be protected by directing development to non-vulnerable areas.

Priority: High

Planning Horizon: Short-term



**Action M-2.1: Improve inundation mapping and modeling.**

Improve current analysis and mapping capabilities to identify areas of the county vulnerable to sea level rise by utilizing the best available LiDAR (Light Detection and Ranging) elevation data, GIS, aerial photography and other appropriate data, including direct observation at spring high tides. Initial analyses should focus on levels of sea level rise projected by the Southeast Florida Regional Climate Change Compact Counties, Technical Working Group report, “A unified sea level rise projection for South Florida”, April 2011. Those projections included a range of sea level rise of 3-7 inches by 2030 and 9-24 inches by 2060. Similar ranges have been adopted by the USACOE and the SFWMD.

Priority: High

Planning Horizon: Short-term

**Action M-2.2: Use improved inundation mapping to identify the sections of roadways, critical structures and natural areas that will be affected by sea level rise projections.**

Now that airports, hospitals, schools etc. have been mapped, expand the mapping of potential sea level rise impacts to the natural and built environments. Identify critical elements of our residential and business community infrastructure (natural areas, county roads, community centers, shopping areas, etc.) that will be affected by the increased flooding caused by sea level rise impacts during regular and extreme high tides.

Priority: High

Planning Horizon: Short-term

**Goal M-3: Create a countywide sea level rise monitoring and adaptation process.**

**Action M-3.1: Develop a monitoring program to evaluate and observe climate change impacts and responses on the natural and built environments within Monroe County.**

An ongoing monitoring program to document climate change related impacts on the built and natural area is needed to identify best management practices for improving adaptation responses to protect both the natural and built environments. Particular emphasis, obviously, will be on monitoring the amount and rate of sea level rise, but temperatures, rainfall and drinking water availability are also important. Monroe County should seek data being collected by other agencies and supplement it, where needed, with in-house monitoring.

Priority: High

Planning Horizon: Mid-term

**Action M-3.2: Develop plans with service providers for the delivery of routine and emergency services to areas impacted by each of the current SLR projections.**

Maintain a database of critical roads and infrastructure vulnerable to sea level rise according to the various sea level rise projections. To maintain maximum functionality within the communities of Monroe County as sea levels increase, Monroe County needs to provide leadership to the business community in developing strategic plans for the delivery of routine and emergency services.

Priority: Medium

Planning Horizon: Mid-term

**Action M-3.3: Create a framework to evaluate vulnerabilities and prioritize them for adaptation actions.**

Effective adaptation options will be limited, as will the funding necessary to implement them. Some vulnerability will severely impact the residential quality of life and sustainability of business. These should be prioritized and adaptation options should be planned.

Priority: Medium

Planning Horizon: Short-term

## **Education & Business Development**

The Education and Business Development section contains two goals on education and business and workforce development with 2 and 4 supporting strategic action items, respectively. **Need to provide a summary of the overall vision, types of actions included in the focus area, and its importance to the overall Plan.**

***Goal E-1: Increase awareness and understanding of potential climate change impacts as well as mitigation and adaptation needs.***

**Action E-1.1: Promote climate change education regarding the potential impacts of climate change and sea level rise on the County's built and natural environments and potential mitigation and adaptation strategies to minimize those impacts.**

An active communication and education strategy is needed to help the general public understand the need for mitigation and adaptation responses to climate change. The potential for harm to the built environment and declines in the local environment critically require rational responses. A first step would be to educate residents and commercial interests on existing rules, ordinances, etc., and promote Florida-Friendly Landscaping (<http://www.floridayards.org>) along with national and international programs with appropriate non-governmental organizations. Information is needed, as well, for residents and business owners to learn the potential impacts of sea level rise on the existing built environment and the county's roadways, properties and critical infrastructure.

Priority: High

Planning Horizon: Short-term

**Action E-1.2: Develop education programs to highlight the differences between storm surge and SLR and the appropriate hazard mitigation & adaptation techniques for each.**

Storm surge and sea level rise are related subjects in that both can and will cause flooding but they result from different natural phenomena and have relatively different impacts. It is important for people to understand the similarities and differences in developing adaptations to both while recognizing that while sea level rise is a gradual and permanent phenomenon whereas storm surges are infrequent and temporary but extreme events.

Priority: Medium

Planning Horizon: Mid-term

***Goal E-2: Business & Workforce Development--Expand local green workforce and business opportunities through training and business development initiatives.***

**Action E-2.1: Develop green workforce capability within the County.**

Local tradesmen and contractors need training in green technologies if appropriate construction techniques are to be implemented. Green industries grow the local economy. Therefore, green job training and retraining must be priority issues for the County.

Monroe County should look for technical training opportunities to enhance the local workforce. This enhancement can be accomplished directly through collaboration with the FKCC and the MC School Board to develop green job training. Funding opportunities exist to support curriculum development to train students in energy management and installation of renewable energy systems.

Local green workforce enhancement can also be accomplished indirectly by requiring green job skill development for the appropriate county employees in Engineering, Project Management and Public Works, by requiring green credentials and outcomes into RFP proposals.

Priority: Medium

Planning Horizon: Mid-term

**Action E-2.2: Require climate change adaptation training for contractors to learn green building practices and to protect the natural shoreline against sea level rise.**

The Monroe County Building Department should consider training requirements for contractors to remain informed of the best management practices for green building practices and protection of private property against sea level rise effect while maximizing protection of the natural shoreline.

Priority: Low

Planning Horizon: Short-term

**Action E 2.3 Enhance Sustainability of Existing Businesses**

Existing businesses should be encouraged when possible to retrofit existing infrastructure and practices to reduce their carbon footprints through a green business certification program. Furthermore, Monroe County should encourage through policy sustainable practices with particular sensitivity to and focus on businesses of historical and cultural significance (for example, working waterfronts.)

Priority: Medium

Planning Horizon: Mid-term

**Action E-2.4: Enhance Sustainable Development of New Businesses.**

Initiate a sustainable business development effort to encourage growth of new green businesses. This could include evaluation of opportunities to provide incentives for green business development and to create economic and similar other incentives to encourage environmental (green) businesses to relocate to the county. Coordinate and partner with local chambers of commerce to establish “green” initiatives.

Priority: Medium

Planning Horizon: Mid-term

## **Natural Systems**

The Natural Resource Section contains three goals on vulnerability, adaptation and resilience with 2, 1 and 3 supporting strategic action items, respectively. **Need to provide a summary of the overall vision, types of actions included in the focus area, and its importance to the overall Plan.**

***Goal N-1: Vulnerability-- Identify vulnerability of natural resources (i.e. natural areas, species, groundwater) to coastal hazards and climate change impacts including storms, sea level rise, drought and rainwater flooding.***

**Action N-1.1: Coordinate with state, regional and national strategic planning efforts to evaluate the vulnerabilities of the natural environment to climate change impacts.**

Monroe County should coordinate with other state, regional and national strategic planning efforts to prepare for climate variability and change. For example, the SE Florida Climate Change Compact’s regional Climate Action Plan, the Florida Fish and Wildlife Conservation Commission/Fish and Wildlife Research Institute’s species vulnerability assessment, the U.S. Fish and Wildlife Service/Landscape Conservation Cooperative scenario planning, the Florida Keys National Marine Sanctuary management planning, the South Florida Water Management District water supply planning, and the NOAA “Coastal and Marine Spatial Planning” under auspices of the National Ocean Policy.

Priority: Medium

Planning Horizon: Mid-term

**Action N-1.2: Evaluate and support protections and restoration programs in potential climate change affected natural habitats.**

Some habitats and other resources of concern include the Keys’ freshwater lenses (i.e., groundwater), freshwater wetlands and pine forests as well as coastal wetlands. Protecting and restoring these wetlands should help reduce saltwater intrusion driven by sea level rise, storm surges and the highest tides of the year. Wetlands will also help to retain and filter storm water reducing potential pollution from the built environment. Restoration may include filling or plugging ditches, installing culverts to allow storm surge to run off, and fire management to create or maintain high frequency, low intensity fire regimes in fire-dependent uplands and wetlands of the lower Keys which will slow succession from pine and herbaceous species to broadleaf species dominance.

Priority: High

Planning Horizon: Mid-term

***Goal N-2 Adaptation – Develop strategies that promote the adaptive capacity of natural systems to changing environmental conditions resulting from climate change***

**Action N-2.1 – Promote and encourage policies that provide adaptive capacity to species and habitats to respond effectively to changing conditions, especially to those that are particularly vulnerable to climate change.**

The ability of coastal species and habitats to respond effectively to sea level rise is dependent upon their ability to migrate inland with rising waters. This ability may be facilitated by adopting strategies that provide migration corridors. For example, approaches that conserve beach berms and/or discourage shoreline hardening should be considered when appropriate. The Land Development Regulations, Tier System, Habitat Conservation Plan for Big Pine and No Name Key and other rules and regulations do these things and should be retained and improved upon as conditions evolve.

Some species of fish, wildlife and/or plants are particularly sensitive to changing climate in the Florida Keys. For example, loggerhead turtles depend on beaches for nesting and sea level rise predictions suggest that Keys beaches are likely extremely vulnerable to increasing sea level rise. Policies that encourage conservation and restoration of key habitats and landscape features should be encouraged to provide opportunities for these species to successfully survive and adapt. The Land Development Regulations, Tier System, Habitat Conservation Plan for Big Pine and No Name Key and other rules and regulations do these things and should be retained and improved upon as conditions evolve.

Priority: Intermediate                      Planning Horizon: Long-term

***Goal N-3: Resilience-Increase the resilience of the natural and urban landscapes to climate change through implementation of mitigation and adaptation strategies.***

**Action N-3.1: Identify, protect, restore and enhance sites where ‘green infrastructure’ (e.g. mangroves, natural beaches, freshwater wetlands, coastal berms, coral reefs), alone or in combination with built infrastructure.**

A healthy green infrastructure not only increasing resilience to natural systems but it also protects people and the built environment from coastal hazards and climate change impacts including storms, sea level rise, drought and rainwater flooding. In addition, maintain functional green infrastructure provides corridors for migration of shoreside habitat inland as sea level rises.

Priority: High                                      Planning Horizon: Long-term

**Action N-3.2: : Ensure that Monroe County Land Authority continues to place a high priority on purchasing natural areas for conservation purposes and support efforts of**

**federal, state, municipal and private interests to purchase natural areas for conservation purposes.**

This action item reinforces and helps to put in action the protection of existing green space for maintaining a healthy green infrastructure.

Priority: High

Planning Horizon: Short-term

**Action N-3.3: Support the recommendations of the Florida Reef Resilience Program’s “Climate Change Action Plan for the Florida Coral Reef System 2010-2015” through participation in recommended management, education and research areas, as appropriate.**

Protection of the marine environment surrounding Monroe County is critical to maintaining a productive fishing and tourist economy. The Florida Reef Resilience Program’s Climate Action Plan’s vision is to achieve: 1) increased resilience to global climate change impacts via active management of local reef impacts; 2) enhanced communications and awareness about climate change impacts on reefs and reef users; and 3) targeted research about those impacts. More detailed information is available at: <http://frp.org/SLR%20documents/FL%20Reef%20Action%20Plan-WEB.pdf>

Priority: High

Planning Horizon: Short-term

## **Built Environment**

Energy consumed in residential buildings accounts for [XX]% of Monroe County, Florida’s total GHG emissions. Improving the efficiency of our residential building stock will contribute significantly to achieving Monroe County, Florida’s greenhouse gas reduction target, while saving residents money on utility bills and reducing the need for new infrastructure. This chapter focuses on opportunities to retrofit existing residential buildings, increase the quality of new construction, and to ensure that future activities in these sectors are compatible with our community’s climate protection goals.

Emissions from transportation are a common sight to nearly everyone in Monroe County, Florida. Besides emitting greenhouse gases, transportation fossil fuels also produce a host of criteria air pollutants when combusted, reducing local air quality and affecting our health. Transportation accounts for [X]% of Monroe County, Florida’s total GHG emissions. This chapter focuses on programs and policies to reduce emissions from transportation and includes design-oriented approaches as well as expansion of alternate modes such as walking, biking, or public transportation to and from the most common destinations in Monroe County, Florida.

Broadly speaking, the use of fossil fuels for energy (including electricity, heating, transportation, and other uses) is the single largest contributor to greenhouse gas emissions and climate change. While Florida is a strong leader among US states in terms of implementing low or no carbon energy sources, fossil fuels still supply a considerable share of energy for electricity, heating, transportation, and other energy-producing uses. Emissions from fossil fuel combustion for energy, including transportation, represent [XX]% of the community’s total GHG emissions. Energy Production is a cross-cutting focus area in that nearly all activities that take place in the

community require energy of some sort. While [Local Utility] is working hard to increase the percentage of electricity generated through renewable sources, opportunities also exist for citizens and Monroe County, Florida local government to produce small-scale renewable energy or fuels, offsetting the need for fossil fuels. This focus area is limited to energy production exclusively – goals and strategies that focus on end use energy efficiency are included in other focus areas. The programs and projects within this focus area are designed to spur local government and community investment in renewable energy sources including those that produce electricity, heat, and mobile fuels.

A resilient vehicle transportation infrastructure is a must in Monroe County to maintain our quality of life while adapting to sea level rise. Early identification of areas that require improvements and integrating them into the current planning process will help to sustain our neighborhoods and economy. Early identification of needed improvements also minimizes needed expenditures and enables the County to take advantage of state and federal funds. The overall vision is to have a functional mass transportation system and ride sharing program throughout Monroe County for island to island travel and low-carbon transportation alternatives for travel within each of the island communities. As the shift to alternative fuel vehicles occurs, most cars will include electric engines, either wholly or as a plug-in hybrid. Commuter parking areas with electric charging stations at each island community center will help facilitate a transition to electric vehicles for both “drive down” tourists and residential commuters.

Ground level commuter parking areas should be raised several feet equal to or higher than the height of the adjacent US1 highway to protect against SLR, and where possible storm surge. As the shift to electric vehicles occurs these small limited distance vehicles will be less likely to be used for storm evacuation.

As an alternative to removing multiple vehicles per household from a storm’s path (burdening evacuation times) we should encourage the use of one conventional fueled vehicle for the entire family while leaving the commuter vehicle in these relatively safe commuter parking areas.

The more the County is able to encourage mass transit use, the less people will be dependent on cars, which will result in a reduction in CO2 emissions. Economic and energy savings for travelers will occur because dependency on oil for personal transportation will be reduced.

The Built Environment section contains four goals, landscape, adaptation, mitigation and transportation with 2, 1, 2, and 6 supporting strategic action items, respectively.

***Goal B-1: Landscape-Promote the conservation of native species and sustainable landscape practices.***

**Action B-1.1: Promote Florida-Friendly Landscaping principles that encourages native flora and discourages the spread of invasive exotics species (<http://www.floridayards.org>).**

Florida-Friendly Landscaping promotes resilient landscapes that require minimal fertilizer and pesticide applications and is more adaptable to natural rain cycles, thus also minimizing the need for artificial irrigation. Native landscaping is a good mitigation and adaptation practice for landscapes within the built environment.

This action will also increase carbon sequestration and to help reduce energy costs. Review current buffer requirements to encourage a balance of trees, understory, shrubs, and groundcover. Reduce pea-rock and turf grass on rights of way whenever possible and replace with native ground cover, plants, and trees.

The development of strategies to respond to potential increases in undesirable exotic and invasive species is critical. Emphasis on prevention of new invasions through education, early detection of and rapid response to new invasions and control of well-established invasive species populations that have particular impacts on climate change vulnerability (e.g. Australian pines are bad in any natural area but on dunes they promote coastal erosion which can reduce resilience of the dune itself and therefore everything landward of the dune, to waves, storm surges and rising sea levels. The Florida Keys Invasive Exotics Task Force needs to review their existing policies and activities in context of climate change and sea level rise (<http://www.floridainvasives.org/Keys/>).

Priority: Low

Planning Horizon: Short-term

**Action B-1.2: Encourage creation of new community gardens and produce markets.**

Community gardens and produce markets are great ways to encourage healthy eating. Monroe County should adopt policies to encourage community gardens by reducing barriers and cost. Look for opportunities to use public spaces for establishment of community gardens and produce markets.

Priority: Low

Planning Horizon: Short-term

***Goal B-2: Built Adaptation-Incorporate adaptation to climate change impacts, especially sea level rise and storm surge in building codes, the planning of developments and provision of services, as appropriate.***

**Action B-2.1: Develop and implement adaptive planning and zoning policies, regulations and programs to ensure that appropriate land use, construction and redevelopment activities address the potential impacts of sea level rise on Monroe County's infrastructure.**

Monroe County will ensure that new, renovated and replacement residential and commercial buildings are designed in a manner which takes into consideration the impacts from global climate change, including rising sea level and storm surge, to assure resilience and sustainability.

Establish an ongoing process to review local and regional zoning and building code requirements implemented by other counties, determine their applicability to Monroe County, and adopt as a local code when appropriate regarding the need for resilience of existing and proposed structures in areas at risk to inundation and climate change.

Priority: Medium

Planning Horizon: Mid-term

***Goal B-3: Built Mitigation-Identify measures to reduce greenhouse gas emissions through changes in building codes and practices.***

**Action B-3.1: Consider Land Development Regulations to increase energy efficiency, promote renewable energy systems, and other green construction practices, as well as storm readiness in excess of existing building codes for new and remodeled residential and commercial structures.**

Monroe County typically does not adopt building codes that are more stringent than those enacted by the State of Florida because it is a cumbersome process that must be repeated each time the state building codes are updated. An alternative means for incorporating new green building standards that are applicable to Monroe County is through land development regulations. The State of Florida has indicated that while it will adopt the 2012 International Building Codes it will not be adopting the 2012 International Green Construction Code recently developed by the International Code Council. The Florida State Green Building Model Ordinance provides guidance on incentives for green building and adaptation for climate change ([www.southernbuildings.org/resources/pdfs/Model\\_Green\\_Building\\_Ord.pdf](http://www.southernbuildings.org/resources/pdfs/Model_Green_Building_Ord.pdf)).

Homeowners, businesses and builders need guidance and assistance in creating homes and offices that minimize the use of non-renewable energy. The creation of near net-zero buildings is a goal for Monroe County residents that can only be facilitated by appropriate policies and assistance from local governments, their departments, and the local utilities.

Incorporate energy efficient design, construction, maintenance and waste reduction standards through the use of regulation, education and incentives. Monroe County should encourage greener, more efficient, and more durable construction practices locally by establishing an ongoing process to address local zoning and building code requirements that recommend the following:

1. Encourage builders to construct all new and renovated buildings to meet green building standards to be developed in the green building ordinance;
2. Encourage each municipal building department to have at least one "green" accredited official on staff within a two-year time frame;
3. Encourage licensed personnel in each building department to have continuing education units (CEUs) of emerging energy efficiency and renewable energy technologies with the next two-year cycle;
4. Incorporate RFP specifications that will require accredited individuals on design teams and incorporation of green building practices.

**Action B-3.2: Reduce impervious surfaces to reduce storm water runoff.**

Impervious surfaces have proven to reduce storm water runoff in the built environment and need to be expanded to reduce pollution to the near shore environment. Ongoing consideration is needed for incorporation of impervious asphalt and concrete in appropriate situations.

Priority: Medium

Planning Horizon: Mid-term

***Goal B-4: Transportation - Encourage the use of public transportation, ride sharing, and a shift to fossil fuel efficient and electric commuter vehicles through the provision of the appropriate infrastructure. This goal has an adaptation element – ‘to build resilience into our transportation infrastructure,’ and a mitigation element ‘to reduce the current level of vehicle miles travelled thus the amount of carbon emissions.***

A resilient vehicle transportation infrastructure is a must in Monroe County to maintain our quality of life while adapting to sea level rise. Early identification of areas that require improvements and integrating them into the current planning process will help to sustain our neighborhoods and economy. Early identification of needed improvements also minimizes needed expenditures and enables the County to take advantage of state and federal funds.

The overall vision is to have a functional mass transportation system and ride sharing program throughout Monroe County for island to island travel and low-carbon transportation alternatives for travel within each of the island communities. As the shift to alternative fuel vehicles occurs, most cars will include electric engines, either wholly or as a plug-in hybrid. Commuter parking areas with electric charging stations at each island community center will help facilitate a transition to electric vehicles for both “drive down” tourists and residential commuters.

Ground level commuter parking areas should be raised several feet equal to or higher than the height of the adjacent US1 highway to protect against SLR, and where possible storm surge. As the shift to electric vehicles occurs these small limited distance vehicles will be less likely to be used for storm evacuation.

As an alternative to removing multiple vehicles per household from a storm’s path (burdening evacuation times) we should encourage the use of one conventional fueled vehicle for the entire family while leaving the commuter vehicle in these relatively safe commuter parking areas.

The more the County is able to encourage mass transit use, the less people will be dependent on cars, which will result in a reduction in CO<sub>2</sub> emissions. Economic and energy savings for travelers will occur because dependency on oil for personal transportation will be reduced.

**Action B-4.1: Encourage a functional county wide public transportation system and coordinate transportation-related adaptation policies across jurisdictional boundaries.**

1. Pursue funding opportunities for public mass transit, at the local, state and federal level.

2. Coordinate with the municipalities and the South Florida Regional Transportation Authority to improve the mass transit system functions on a regional level to allow Keys residents effective mass transit within the entire county and to the mainland.
3. Encourage vehicle ride sharing where mass transportation is not practical.
4. Provide the infrastructure and support facilities to encourage and enhance the use of mass transportation and ride sharing.
  - a. Establishing commuter-parking facilities in each island community.
  - b. Provide electric charging stations (preferably solar powered) at each of these parking facilities.
  - c. Raise parking facilities above high water levels.

Priority: High

Planning Horizon: Long-term

**Action B-4.2: Enhance bicycle and pedestrian safety, and promote their use to reduce miles driven.**

1. Develop a countywide bicycle/pedestrian plan integrated with the FDEP Overseas Heritage Trail and the commuter parking areas.
2. Provide more bicycle routes and bike racks throughout the County.
3. Provide bicycle and pedestrian ways for connecting residential areas to recreational areas, commuter parking, schools, shopping areas and employment areas.
4. Promote a bike share program.

Priority: Medium

Planning Horizon: Short-term

**Action B-4.3: Promote the infrastructure and encourage use of alternative fuels and alternative fuel vehicles.**

Alternative fuels such as biodiesel, propane, and eventually hydrogen can reduce dependence on fossil fuels but such alternatives need government support or encouragement. Grant funding should be sought to fund evaluation pilot projects. One method of encouraging the needed transition is for the local governmental entities to acquire and use such fuels whenever possible. Other possible approaches include:

1. Encouraging the establishment of alternative fueling/charging stations.
2. Working with the MC School Board and FKCC to create / expand training programs.
3. Introducing alternative fueled vehicles when replacing county vehicles. Encourage municipalities to do so as well.

Priority: Medium

Planning Horizon: Mid-term

**Action B-4.4: Encourage creation of a Florida Keys Electric Highway.**

The installation of fast-charging stations throughout the Florida Keys along US 1 would facilitate the increase use of electric vehicles by both residents and tourists. The creation of a Florida

Keys Electric Highway would greatly complement the current designations of the Florida Keys Scenic Highway and the Overseas Heritage Trail. Promote electric vehicles or shuttle services for within island transportation and provide leadership by adopting electric vehicles in the Monroe County fleet. Encourage accessible “plug in” locations for electric vehicles in new development projects or major renovations. Install electric fast-charging stations at all the major county facilities

Priority: Medium

Planning Horizon: Mid-term

**Action B-4.5: Develop raised commuter parking at transportation hubs to provide support for increased mass transit usage and to protect parked vehicles from SLR and storm surge.**

The Livable CommuniKeys Plans envision Community Centers throughout the Keys where commercial activity will be centralized. The centers lend themselves to bicycling and walk able communities, and provide a focal point for commuter parking. These commuter parking areas should be elevated (with fill) above the projected sea level rise. Where possible, they should also be elevated higher to protect against storm surge. Such elevated areas will provide safe parking for short range commuter vehicles that will not be used for evacuation, thus encouraging the transition to alternative fuel vehicles.

Elevated commuter parking areas are defined as areas where the parking level is raised to heights equal to or above that of the adjacent US1 roadway and are sufficient in size to provide reasonable access for the nearby community. Multimodal infrastructure (e.g., raised commuter parking) and support facilities (e.g., electric charging stations) are needed to encourage the use of electric vehicles for on-island transportation and the use of mass transportation for inter-island transportation. Sites throughout the County along the US1 corridor are needed to provide commuter parking at ground levels equivalent to the adjacent highway to provide protection from anticipated sea levels and the concomitant increases in extreme tides and storm surges.

Priority: High

Planning Horizon: Long-term

**Action B-4.6: Establish video conferencing facilities to allow residents and employees to participate in advisory and commission meetings without having to drive long distances.**

The three primary county meeting facilities (Murray Nelson, Marathon, and Harvey Government Centers), will be equipped and staffed to provide Keys-wide video teleconferencing by the public and county employees during BOCC (and other) meetings. This action would significantly reduce miles traveled within the county and travel costs for both residents and employees. The time saved would also increase government and business productivity.

Priority: Medium

Planning Horizon: Short-term

## **Water Resources & Wastewater**

The Water Resources & Wastewater section includes three goals on drinking water, water quality protection and alternate water source with 5, 2, & 5 supporting strategic action items,



Promote partnerships and consistent conservation policies and reduced per-capita-use goals with all users within the County including homeowner's and condominium associations.

Priority: High

Planning Horizon: Short-term

**Action W-1.4: Endorse partnerships with FKAA and all county wastewater utilities to implement energy efficiency measures.**

It takes a lot of energy to treat and distribute water. It is important for our wastewater and water systems to reduce energy consumption and greenhouse gas emissions.

Priority: High

Planning Horizon: Short-term

**Action W-1.5: Require installation of a rain detection device on all automatic or timer-controlled irrigation systems to cease irrigation during periods of rainfall.**

Irrigation of landscape should be curtailed during rainy periods. Rain-detection systems should be installed in any automatic (timer controlled) irrigation system.

Priority: Medium

Planning Horizon: Short-term

***Goal W-2: Water Quality Protection-Implement measures to protect nearshore water quality.***

**Action W-2.1: Protect Wastewater Treatment Plants and collection systems from infiltration and inflow.**

Monroe County should work in coordination with all utilities and municipalities to maintain infrastructure protection and adaptation through infiltration and inflow program development to prevent loss of groundwater and reduce the need for additional treatment requirements.

Priority: Medium

Planning Horizon: Long-term

**Action W-2.2: Complete conversion of wastewater systems in the Keys to Advanced Wastewater Treatment (AWT).**

Advanced wastewater treatment is necessary to protect nearshore water quality from septic tank and cesspit pollution.

Priority: Medium

Planning Horizon: Short-term

***Goal W-3: Alternative Water Supply-Encourage the Development/Expansion of Alternative Water Supply Systems (AWS) for the Florida Keys.***

**Action W-3.1: Evaluate the reclamation and reuse of treated wastewater relative to potential benefits in addressing climate change impacts.**

Monroe County should work in coordination with all utilities and municipalities to evaluate current plans for utilization of treated wastewater for reclamation and reuse. Reuse reduces total water withdrawals from the aquifer well fields. Wastewater infrastructure should utilize the most energy efficient technology available and feasible. The County should also evaluate technologies to better utilize wastewater byproducts to produce renewable energy.

Priority: Medium

Planning Horizon: Short-term

**Actions W-3.2: Encourage the conversion of abandoned septic tanks to non-potable rainwater collection cisterns in accordance with Florida Department of Health procedures.**

A very substantial number of stormwater-sequestering containers exist throughout the Florida Keys in the form of soon-to-be-abandoned septic tanks are a valuable resource for reducing overall water consumption at minimal cost. Rainwater harvesting should be fully encouraged to diminish stormwater effects and to increase the supply of secure, widely distributed fresh water.

Priority: Medium

Planning Horizon: Short-term

**Action W-3.3 Support legislation and ordinances that encourage rain water harvesting.**

Recognition of the potential and encouragement of the practice of rainwater harvesting to supplement non-potable and potable water supply should be encouraged by all levels of government. While decreasing demand through water efficiency and conservation are the primary means to protect the aquifer and reduce the associated energy consumption, harvesting rainwater can and should be fully exploited to increase the supply of water.

Priority: Medium

Planning Horizon: Short-term

**Action W-3.4: Work with FCAA to plan for the eventual expansion of the reverse osmosis plant in Florida City to increase the capacity to treat water from the Floridan Aquifer.**

As salt water intrusion into the Biscayne Aquifer continues with SLR the need for RO treated water from the Floridan Aquifer will increase and expansion of the existing facility may be the most cost-effective means of maintaining the water supply for Monroe County in the mid-range time frame.

Priority: Medium

Planning Horizon: Long-term

**Action W-3.5: Work with FCAA to evaluate the long-range feasibility of developing new or upgrading/expanding existing desalination plants in the Keys.**

In the long-term time horizon, advances in SLR may require that more of the Monroe County's water supply be provided by desalination. Technological improvements probably will make desalination more cost effective.

Priority: Medium

Planning Horizon: Long-term

## **Renewable Energy**

The Renewable Energy section includes a single goal with 5 supporting strategic action items.

Energy consumed in commercial buildings and industrial processes account for [XX]% of Monroe County, Florida’s total GHG emissions. Improving the efficiency of our commercial building stock and reducing the energy intensity of the local industrial sector will contribute significantly to achieving Monroe County, Florida’s greenhouse gas reduction target. The use of fossil fuels for energy (including electricity, transportation, and other uses) is the single largest contributor to greenhouse gas emissions and climate change. Emissions from fossil fuel combustion for energy, including transportation, represent [XX]% of the community’s total GHG emissions. Opportunities exist for citizens and Monroe County government to produce small-scale renewable energy, offsetting the need for fossil fuels. This focus area is limited to energy production exclusively – goals and strategies that focus on end use energy efficiency are included in other focus areas. The programs and projects within this focus area are designed to spur local government and community investment in renewable energy sources including those that produce electricity, and mobile fuels.

***Goal R-1: Support the expansion of renewable energy sources and remove the barriers to projects that support sustainability.***

**Action R-1.1: Support legislation to establish a minimum 20% renewable portfolio standard.**

Monroe County should support state legislation which is consistent with the 2008 Florida Energy and Climate Change Action Plan to establish a 20% renewable portfolio standard for 2020. Additionally support a “carve out” of a certain percentage of the Renewable Portfolio Standard for distributive and solar energy as “Renewable Distributive.”

Priority: High

Planning Horizon: Short-term

**Action R- 1.2: Implement a Property Assessed Clean Energy (PACE) or similar program for Monroe County residents and businesses.**

In 2010, the State of Florida established the framework for dependent special districts, municipalities and county governments to implement low-interest PACE (Property Assessed Clean Energy) financing programs to advance implementation of renewable energy, energy efficiencies, and hurricane mitigation measures on homes and businesses through HB 7179, amending Chapter 163, F.S. A PACE program in Monroe County would significantly create local jobs, increase property values and reduce greenhouse gas emissions within the county.

Priority: Medium

Planning Horizon: Short-term

**Action R-1.3: Incentivize solar water heating systems and the installation of electrical generating renewable energy systems on all new construction.**

This effort could involve collaborations with utilities or other agencies.

Priority: Medium

Planning Horizon: Short-term

**Action R-1.4: Encourage the electrical utilities, Florida Keys Electric Cooperative and Keys Energy Services to adopt practices to increase use of renewable energy.**

The current fuel source percentages for Keys Energy electrical output consists of about 50-65% natural gas, 10-25% coal, and 11-13% nuclear with the remainder coming from pooled resources (taken from Florida Municipal Power Agency, *3 Phase Times* newsletter, March 2010). The current fuel source percentages for the Florida Keys Electric Cooperative electrical output consists of about 72% natural gas, 21% nuclear, 6% coal, 1% oil, 0.1% solar (T.J. Patterson, personal communication).

The utilities should be encouraged to implement incentive programs to increase the use of renewable energy within the county and minimize the use of fossil fuels, especially coal, as a fuel source. Of all the available fossil fuels used for electrical generations, coal emits the most greenhouse gases. Recognize and support local utilities which build their own renewable energy facilities such as Florida Keys Electric Cooperative's Simply Solar program (<http://www.fkec.com/Green/SimpleSolar.cfm>).

Priority: Medium

Planning Horizon: Mid-term

**Action R-1.5: Encourage local alternative energy studies to evaluate their feasibility in achieving the County's greenhouse gas emissions goals.**

Solar energy is well documented as a viable source of renewable energy but national wind studies indicate the wind potential for Monroe County is limited and wave or hydro turbine technologies are still at the research and development stages. A more detailed evaluation of wind potential in Monroe County is needed because many residents believe our proximity to the prevailing ocean breezes may make both onshore and offshore wind energy feasible. Work cooperatively with municipalities and other agencies to develop consistent permitting requirements for renewable energy projects.

Priority: Medium

Planning Horizon: Mid-term

## **Solid Waste & Recycling**

Need to provide a summary of the overall vision, types of actions included in the focus area, and its importance to the overall Plan.

**Goal S-1: Create a Solid Waste/Recycling Action Plan to achieve zero waste by 2025.**



Evaluate performance and progress of measures in the County Solid Waste/Recycling Action Plan.

Evaluate reduction achievements in the Comprehensive plan.

Priority: High

Planning Horizon: Short-term

**Action S-1.4: Implement ordinances that encourage economic opportunities for recycling/reuse business ventures and reevaluate existing ordinances to remove restrictions that may discourage recycling.**

Examples of implementing activities include: 1) Support regional bottle bills and inexpensive disposal options; 2) Incorporate business opportunity measures in the County Solid Waste/Recycling Plan; and 3) Incorporate reduction goals into the Comprehensive plan.

Priority: Medium

Planning Horizon: Mid-term

**Action S-1.5: Monroe County should create an action plan to handle storm related solid waste.**

The action plan should include means for composting as much debris as possible as well as its use in the waste-to-energy plant.

Priority: Medium

Planning Horizon: Mid-term

**Goal S-2: Implement specific recycling plans for the residential, business, institutional and construction sectors.**

We are 5 years now from base line of 2005 and are at a 21% recycling rate countywide. (For annual recycling rates in Monroe County and throughout the state visit the FDEP Solid Waste Management in Florida website:

[http://www.dep.state.fl.us/waste/categories/recycling/SWreportdata/10\\_data.htm](http://www.dep.state.fl.us/waste/categories/recycling/SWreportdata/10_data.htm).. To further improve recycling rates, Monroe County should consider the following Action Items, including those which ensure consistency with Monroe County's Comprehensive Plan Solid Waste element ([www.monroecounty-fl.gov/DocumentView.aspx?DID=32](http://www.monroecounty-fl.gov/DocumentView.aspx?DID=32)).

More on the latest statewide recycling information can be found in the following 2010 75% Recycling Goal Report to the Legislature:

[http://www.dep.state.fl.us/waste/quick\\_topics/publications/shw/recycling/75percent/75\\_recycling\\_report.pdf](http://www.dep.state.fl.us/waste/quick_topics/publications/shw/recycling/75percent/75_recycling_report.pdf)

**Action S-2.1: Develop goals, objectives and policies to expand local capacity to process recycled materials and promote development of reuse, recovery, and light manufacturing activities.**

Expanding local capacity to process and use recycled materials has the potential to reduce the GHG emissions associated with transporting materials elsewhere as well as create local jobs in

the waste management sector. The County should adopt goals which expand the types of materials that are collected for local reuse and recycling, in order to increase waste diversion.

Incentive programs need to be designed to decrease the export of waste out of the County, increasing climate change mitigation efforts. Expanding local capacity to process recycled materials has the potential to reduce the GHG emissions associated with transporting materials elsewhere as well as create local jobs in the waste management sector. The County's goal should be to expand the types of materials that are collected for local reuse, in order to increase waste diversion.

Priority: Medium

Planning Horizon: Mid-term

**Action S-2.2 Consider a Pay-As-You-Throw residential solid waste program.**

A pay-as-you-throw program will encourage residents to recycle and to conduct at-home yard waste and composting to avoid user fees for excessive solid waste or organics. An accompanying educational effort can greatly assist residents adapt to the program. The County can use the composted material in conjunction with construction debris for fill in sea level rise adaptation efforts.

Priority: High

Planning Horizon: Mid-term

**Action S-2.3 Evaluate the use of existing transfer stations for a community organics compost program.**

Food and yard waste are around 40-45% of our County's waste stream. Monroe County should determine best composting and/or fuel production methods for managing organic waste and evaluate programs for adoption in Monroe County.

Conduct a feasibility study that results in recommendations regarding the design of a rebuilt Transfer Station and material recovery facility as well as recommendations regarding what types of waste processing equipment and material recovery systems to incorporate.

Explore Waste Prevention, Recycling and Composting Option from 30 US Cities:

<http://www.epa.gov/epawaste/consERVE/downloads/recy-com/toc.pdf>

Compost Use in Florida (IFAS Contributor)

[http://www.dep.state.fl.us/waste/quick\\_topics/publications/documents/compost.pdf](http://www.dep.state.fl.us/waste/quick_topics/publications/documents/compost.pdf)

Priority: High

Planning Horizon: Short-term

**Action S-2.4. Develop a program for mandatory recycling for commercial (i.e. non-residential) businesses, government, agencies, and organizations.**

In 2009 only 14% of commercial units/properties in Monroe County participated in scheduled recycling.

[http://appprod.dep.state.fl.us/www\\_rcra/reports/WR/Recycling/2009AnnualReport/AppendixG/Monroe.pdf](http://appprod.dep.state.fl.us/www_rcra/reports/WR/Recycling/2009AnnualReport/AppendixG/Monroe.pdf)

In 2010 only 19% of commercial units/properties participate in scheduled recycling;  
[http://appprod.dep.state.fl.us/www\\_rcra/reports/WR/Recycling/2010AnnualReport/AppendixB/13B.pdf](http://appprod.dep.state.fl.us/www_rcra/reports/WR/Recycling/2010AnnualReport/AppendixB/13B.pdf)

Information on waste management for public buildings can be found at:  
<http://www.dep.state.fl.us/waste/categories/hazardous/pages/state.htm>.

The following measures should be considered.

1. Provide a range of container sizes and types for all commercial recycling accounts, priced accordingly to minimize the amount of solid waste generated. Pricing must provide comparisons for equivalent size/type/ collection frequency of recycling containers versus trash collection.
2. Commercial recycling and trash collection rates to be incorporated into all franchise agreements.
3. Provide education about tax credits to businesses for recycling of all end-of-life products like furniture, appliances, fixtures, electronics to appropriate end of product life handlers and recyclers.
4. Expand low cost hazardous and electronic waste program for commercial users with convenient drop off locations and hours.
5. Provide comprehensive commercial recycling education opportunities.

Priority: High

Planning Horizon: Short-term

**Action S-2.5: Develop goals, objectives and policies to increase recycling of recoverable waste from all construction sites throughout Monroe County.**

The DEP has best management practices, reports and legislation related to C & D recycling;  
<http://www.dep.state.fl.us/waste/categories/recycling/cd/canddmain.htm>

1. Encourage pre-processing of C&D in franchise/license agreements, building permits or ordinances with possible incentives (fee rebates).
2. Incentivize C&D recycling (on-site or off-site), and the use of recycled building materials.
3. Develop a partnership with in-county recycling companies to keep most construction debris in county for use in adaptation efforts to combat sea level rise.

Priority: Medium

Planning Horizon: Long-term

**Goal S-3: Expand efforts to eliminate waste at its source.**



These prerequisite actions include:

- Creating citizen advisory groups for programs that require considerable community engagement.
- Gathering bids for contracted services and equipment.
- Making necessary changes to local policies or existing programs, including staffing.

# Appendix I

## Climate Change Science

### The Debate on Climate Change is Over

The Intergovernmental Panel on Climate Change (IPCC)'s Fourth Assessment Report affirms that "warming of the climate system is unequivocal, as is now evident from increases in global average air and ocean temperatures, widespread melting of snow and ice and rising global average sea level."<sup>1</sup>

The IPCC report also concluded it is *extremely unlikely* that global climate change of the past 50 years can be explained without external forcing and *very likely* that it is not due to known natural causes alone.

The burning of fossil fuels and deforestation are causing an increase in greenhouse gases in the Earth's atmosphere that is driving unprecedented climate change. Post-industrial human activity has cumulatively created a negative impact on global climate resulting in accelerated changes in climate change patterns that could threaten the future security and stability of sovereign nations and human society.<sup>2,3</sup> The consequences are dramatic and they are already being witnessed

through increases in the melting of Arctic sea ice<sup>4</sup>, an expansion of the tropical zone poleward<sup>5</sup> and the rate of sea level rise caused by melting

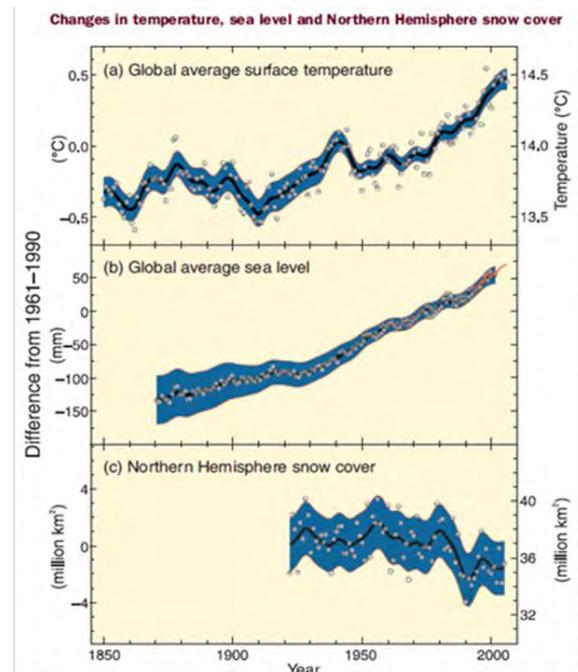


Figure 1. Observed changes in (a) global average surface temperature; (b) global average sea level from tide gauge (blue) and satellite (red) data; and (c) Northern Hemisphere snow cover for March-April. All differences are relative to corresponding averages for the period 1961-1990. Smoothed curves represent decadal averaged values while circles show yearly values. The shaded areas are the uncertainty intervals estimated from a comprehensive analysis of known uncertainties (a and b) and from the time series (c).

glaciers, the heating (thermal expansion) of the oceans and melting ice sheets in Greenland and Antarctica<sup>6</sup>. For instance, in the last 80 years,

<sup>1</sup> IPCC, 2007: Climate Change 2007: Synthesis Report. Contribution of Working Groups I, II and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, Pachauri, R.K and Reisinger, A. (eds.)]. IPCC, Geneva, Switzerland, 104 pp.

<sup>2</sup> Global Business Network. 2007. Impacts of climate change: A system vulnerability approach to consider the potential impacts to 2050 of a mid-level greenhouse gas emissions scenario. Copies available at [www.gbn.com/climatechange](http://www.gbn.com/climatechange).

<sup>3</sup> The CNA Corporation. 2007. National security and the threat of climate change. Available from [www.securityandclimate.cna.org](http://www.securityandclimate.cna.org).

<sup>4</sup> National Snow & Ice Data Center, <http://nsidc.org/>

<sup>5</sup> Seidel, D.J., Q. Fu, W. J. Randall, T. J. Reichler. 2008. Widening of the tropical belt in a changing climate. *Nature Geoscience* 1:21-24

<sup>6</sup> Bindoff, N.L. and others. 2007. Observations: Oceanic climate change and sea level. In *Climate change 2007: The physical science basis. Contributions of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*. Solomon, S. and others (eds.) Cambridge University Press.

there has been an average 9” sea level rise in south Florida.<sup>7</sup>

According to most scenarios, continued human emissions of greenhouse gases at current and projected levels will lead to more dramatic and accelerated, potentially even catastrophic, changes in the Earth’s natural climate patterns. Given the continued rate of emissions and the atmospheric lifetime of those emissions, global temperatures are expected to rise and climate change is expected to worsen even if we stopped emitting greenhouse gases immediately and completely. Specifically, as reported by the Intergovernmental Panel on Climate Change (“IPCC”)<sup>8</sup>, a warming of about 0.2°F per decade is expected for the foreseeable future, and even if greenhouse gases had been “kept constant at year 2000 levels, a further warming of about 0.1°F per decade would be expected.”

While historic evidence of climate change (global warming), is well understood and documented, the uncertainty about potential future impacts is large. Although it is clear that human produced greenhouse gases is causing unprecedented warming of our atmosphere and oceans, it is more uncertain, however, what the rate and magnitude of this trend will be into the future because it is dependent on both complex feedback loops (ice sheet degradation, methane releases from permafrost and the deep ocean and albedo effects) and on how quickly global greenhouse gas emissions are reduced. Vermeer

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<sup>7</sup> Miami-Dade County Climate Change Task Force, Science and Technology Committee. 2008. Statement on sea level in the coming century. 9 pages.

<sup>8</sup> Bindoff, N.L. and others. 2007. Chapter 5. Observations: Oceanic climate change and sea level. In *Climate change 2007: The physical science basis. Contributions of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*. Solomon, S. and others (eds.) Cambridge University Press.

and Rahmstorf concluded that emissions reductions early in this century will be much more effective in limiting sea-level rise than reductions later on.<sup>9</sup>

The long-term costs of having to implement adaptation requirements due to inaction or too little action today and the subsequent negative consequences to the economy and social structure makes it necessary to implement mitigation and adaptation actions now to prevent or minimize these long-term costs; even while recognizing it may be more costly in the short-term.

Unusual droughts, Arctic sea ice disappearance, complete melting of the surface of the Greenland ice sheet and glacial discharges from Greenland and Antarctica are unprecedented events that indicate we are already witnessing the initial disruptive effects of climate change.

### Temperatures & CO<sub>2</sub> Increasing Globally

Human induced atmospheric carbon dioxide levels now exceed 390 part per million, greater than any time in the past 350,000 years (Figure 2)<sup>10</sup> It is noteworthy that temperature and CO<sub>2</sub> increase concurrently and that present levels of CO<sub>2</sub> will lead to temperatures greater than human civilizations have to date experienced at any time in the past. The time for action to reduce greenhouse gas emissions is now if we want to avoid catastrophic disruptions to the health and well being of future generations.

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<sup>9</sup> Vermeer, M. and S. Rahmstorf. 2009. Global sea level linked to global temperature. *PNAS* 106(5):21527-21532.

<sup>10</sup> National Academy of Sciences. 2008. *Understanding and Responding to Climate Change*. <http://dels-old.nas.edu/basc/climate-change/basics.shtml>

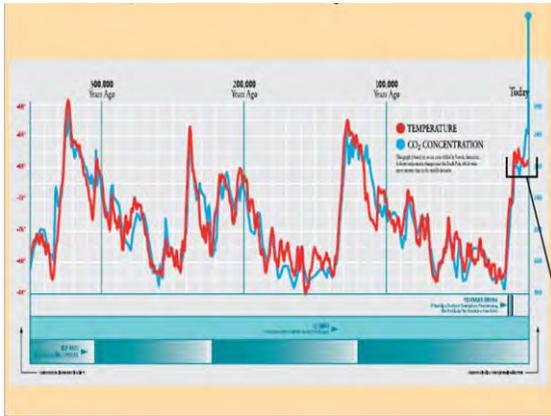


Figure 2. Changes in CO2 (blue) and Temperature (red) for past 350,000 years.

Analysis by NASA's Goddard Institute for Space Studies shows that global average surface temperatures in 2010 “tied” 2005 as the warmest on record.<sup>11</sup> The next hottest years, also with very close average temperatures, are 1998, 2002, 2003, 2006, 2007, 2009 and 2011. The period from January 2000 to December 2009 is the warmest decade on record, followed by the 1990’s, then the 1980’s respectively. These remarkable yearly and decadal trends, based on the Goddard Institute’s global average surface temperature analysis, GISTEMP, are tracked from 1880 to 2011 (Figure 3).

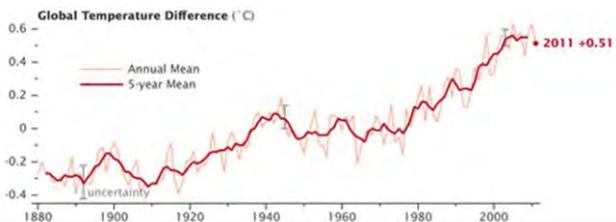


Figure 3. Annual and 5-year average global atmospheric temperature trend in degrees Celsius.

## Arctic Sea Ice

Increasing summer temperatures are causing substantially above normal Arctic Sea ice melting<sup>12</sup>. The September 2012 minimum was significantly below the 1979 to 2000 average minimum, representing an area nearly twice the

size of the state of Alaska. This year’s minimum is 18% below 2007 and 49% below the 1979 to 2000 average.

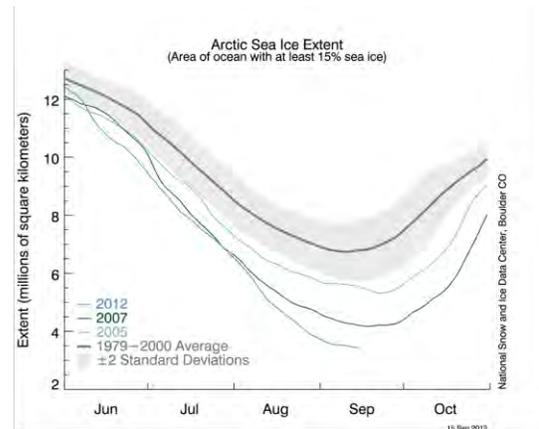


Figure 4. Arctic sea ice extent as of September 17, 2012, along with daily ice extent data for 2007 and 2005, the previous record low years. 2012 is shown in blue and 2007 in green. The gray area around the average line shows the two standard deviation range of the data. From National Snow and Ice Data Center: <http://nsidc.org/arcticseaicenews/>

The six lowest seasonal minimum Arctic Sea ice extents in the satellite record have all occurred in the last six years (2007 to 2012).

The steady increase in average temperatures is significant and expected to continue if action is not taken to reduce greenhouse gas emissions.

## Sea Level

Although floating ice, like Arctic Sea Ice, does not contribute to sea level rise, the melting of land-based glaciers and continental ice sheets (Greenland and Antarctica) do. To date most of the observed sea level increases has been due to thermal expansion of the existing oceans as ocean temperatures have increased. However, the rate of sea level rise is increasing and is expected to be due to greater melting of glaciers and ice sheets. Projections of future sea level rise is predicted on increased land-based ice melting and on how quickly civilization can curb and reduce CO2 emissions.

<sup>11</sup> Goddard Institute for Space Studies, <http://www.nasa.gov/topics/earth/features/2011-temps.html>  
[Jurisdiction] Climate Action Plan

<sup>12</sup> National Snow & Ice Data Center, <http://nsidc.org/>

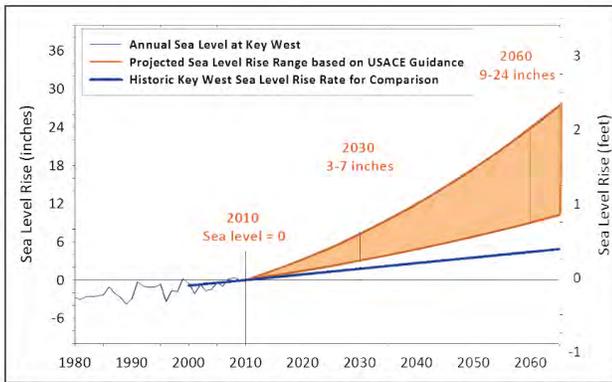


Figure 1: Unified Southeast Florida Sea Level Rise Projection for Regional Planning Purposes. This projection uses historic tidal information from Key West and was calculated by Kristopher Esterson from the United States Army Corps of Engineers using USACE Guidance (USACE 2009) intermediate and high curves to represent the lower and upper bound for projected sea level rise in Southeast Florida. Sea level measured in Key West over the past several decades is shown. The rate of sea level rise from Key West over the period of 1913 to 1999 is extrapolated to show how the historic rate compares to projected rates. Methods are described in a supporting document, "A Unified Sea Level Rise Projection for Southeast Florida" available online at: [www.southeastfloridaclimatecompact.org](http://www.southeastfloridaclimatecompact.org).

## Regional and Local Impacts

Because the impacts of climate change vary geographically, it is important to know what effects are specifically expected for South Florida and the Florida Keys. According to the U.S. Global Change Research Program, the Southeast region of the United States should expect the following impacts from climate change to occur in the coming years<sup>13</sup>:

- Projected increases in air and water temperatures will cause heat-related stresses for people, plants, and animals.
- Decreased water availability is very likely to affect the region's economy as well as its natural systems.
- Sea-level rise and the likely increase in hurricane intensity and associated storm surge will be among the most serious consequences of climate change.
- Ecological thresholds are likely to be crossed throughout the region, causing major disruptions to ecosystems and to the benefits they provide to people.
- Quality of life will be affected by increasing heat stress, water scarcity, severe weather events, and reduced availability of insurance for at-risk properties. Cities and agriculture face increasing risks from a changing climate.

<sup>13</sup> Global Climate Change Impacts in the United States, Thomas R. Karl, Jerry M. Melillo, and Thomas C. Peterson, (eds.). Cambridge University Press, 2009. And [www.globalchange.gov](http://www.globalchange.gov)

In terms of Florida-specific impacts, the Florida Energy Commission (CEC) issued a report in 2006 detailing anticipated changes for the state. The report details specific impacts related to several sectors and finds that "climate change impacts will affect all of the sectors considered in this report: sea level rise, agriculture, snowpack and water supply, forestry, wildfire risk, public health, and electricity demand and supply."<sup>14</sup> The report analyzed low, mid, and high emissions scenarios, noting that "all climate models show increases in temperature, with the aggregate of several model runs containing a range of warming from 2000 to 2100 from about +2°C to about +6°C (+3.6°F to about +10.8 °F). Increases in temperature alone would impact the Florida hydrological cycle, with consequences upon the state's water supply, hydroelectric power supply, agriculture, recreation, and ecosystems." Additionally, "Climate change could produce compounding impacts—for instance, in the South Florida area, heightened sea levels can jeopardize our drinking water supply in periods of prolonged droughts and threaten flooding during periods of increased rains."

## What Impacts Can we Anticipate in Monroe County?

The Florida Keys are on the front lines of climate change impacts such as sea level rise and increased hurricane intensity. While GHG emissions produced within the Monroe County region constitute only a small percentage of national and global quantities, Monroe County, because of its unique vulnerabilities to sea-level rise and our international presence as a premier tourist destination, has an opportunity to demonstrate leadership on this global issue by

<sup>14</sup> Scenarios of Climate Change in Florida: An Overview. Dan Cayan, Amy Lynd Luers, Michael Hanemann, Guido Franco, Bart Croes, (eds.). <<http://www.energy.ca.gov/2005publications/CEC-500-2005-186/CEC-500-2005-186-SF.PDF>>.

implementing the critical policies, practices and investments that will eventually drive reductions of GHG emissions and plan for the impacts of climate change. We clearly have the most to lose. If sea-level rise is not curtailed by immediate reductions in greenhouse gases the Florida Keys will eventually become unlivable.

Transforming of our global economy to use power sources that do not cause GHG emissions takes political will and time. Currently, major sources of these gases include electric generation, transportation, manufacturing, construction, and residential and commercial heating processes.

While climate change is the most important challenge facing our world and region today, our realization of the problem now represents a significant opportunity for leadership and a change to insure a sustainable future. Thus, this Climate Action Plan (“CAP”) carries an even stronger message of optimism than a work plan limited only to addressing the worst impacts of climate change. The vision behind this CAP is one of a better future for the Monroe County community, economy and environment.

#### *Increases in Hurricane Intensity*

With a warmer atmosphere and ocean, hurricane frequency in the Atlantic Ocean is expected to decrease but the intensity of hurricanes is expected to increase<sup>15</sup> as heat is the main driving force for hurricane intensity.

### Greenhouse Gas Emissions Must be Reduced

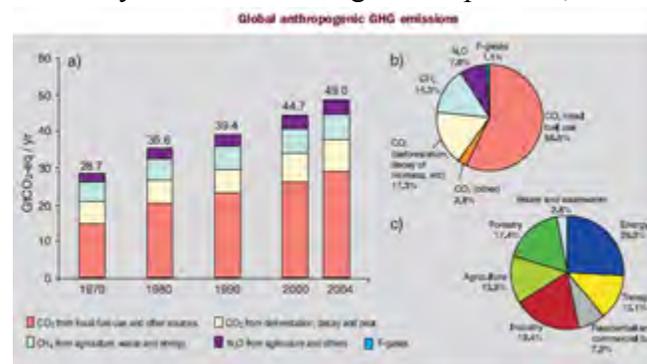
The recent and massive buildup of greenhouse gases in our atmosphere is conceivably even more extraordinary than changes observed thus

<sup>15</sup> Knutson, T. R., and others. 2010. Tropical cyclones and climate change. *Nature Geoscience* 3:157-163.

far regarding temperature, sea level, and snow cover in the Northern hemisphere in that current levels greatly exceed recorded precedent going back much further than the modern temperature record. The latest monthly average atmospheric CO<sub>2</sub> concentration, for December 2010, as measured at Mauna Loa Observatory, Hawaii, was 389.69 parts per million (ppm).<sup>16</sup>

### Global Greenhouse Gas Emissions

According to the Director of the Goddard Institute, Dr. James Hansen, “If the warming trend continues, as is expected, if greenhouse gases continue to increase, the 2010 [temperature] record will not stand for long.”<sup>17</sup> In response to the problem of climate change, many communities in the United States are taking responsibility for addressing emissions at the local level. Since many of the major sources of greenhouse gas emissions are directly or indirectly controlled through local policies, local



governments have a strong role to play in reducing greenhouse gas emissions within their boundaries. Through proactive measures around land use patterns, transportation demand management, energy efficiency, green building, and waste diversion, local governments can dramatically reduce emissions in their communities. In addition, local governments are

<sup>16</sup> NOAA/ESRL, Dr. Pieter Tans. 2011, 18 Jan. <<http://www.esrl.noaa.gov/gmd/ccgg/trends/>>.

<sup>17</sup> Goddard Institute for Space Studies, “Research Finds 2010 Tied for Warmest Year on Record,” 2011, 18 Jan. <<http://www.nasa.gov/topics/earth/features/2010-warmest-year.html>>.

primarily responsible for the provision of emergency services and the mitigation of natural disaster impacts. While this Plan is designed to reduce overall emissions levels, as the effects of climate change become more common and severe, local government adaptation policies will be fundamental in preserving the welfare of residents and businesses.

## **Future Direction of the CCAC**

**(Identified by the CCAC in June, 2012)**

What the CCAC should address after completion of the Community Climate Action Plan and prior to their sunset date of October 2013.

- Community Education
- Coordinate with municipalities, utilities and businesses in addressing climate change issues
- Consider the role of the tourist community in addressing climate change issues.
- Review the state of the County's roads and bridges
- Review the state of the County's water supply with FCAA
- Review the County's Comprehensive Plan's Climate and Energy sections as they are developed.
- Review staff progress in vetting and implementing the Community Climate Action Plan.
- Review how the existing and proposed wastewater collection systems incorporate or function considering the potential impact of a 2 foot sea level rise by 2050.