

Memorandum



Date: November 10, 2008

To: Honorable Chairperson Natacha Seijas and
Members, Governmental Operations and
Environment Committee

From: George M. Burgess
County Manager

Subject: Climate Change Briefing Book

GOE
Agenda Item No. 7(G)

Pursuant to your memorandum of October 2, 2008, attached is a ***draft*** Climate Change Briefing Book prepared by the Office of Sustainability in conjunction with key County departments. This document will be finalized after discussion at the November 10, 2008 Government Operations and Environment Committee meeting.


Director,
General Services Administration



Miami-Dade County Climate Change Briefing Book

Miami-Dade County

November 2008

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EXECUTIVE SUMMARY

Miami-Dade County government will need to engage in a system-wide revision of priorities, policies, and procedures to effectively address the high level of social, economic, and environmental impacts that climate change will impose. In light of proposed Federal cap-and-trade legislation for reducing greenhouse gas (GHG) emissions and recently passed State of Florida legislation mandating climate-friendly land use and development, there is a risk of a growing monetary “carbon” liability connected to our reliance on carbon-based energy and fuel sources. This is happening at the same time that the County is facing rising costs for energy, water, and other basic resources and materials (electric utility rates alone will increase by 15% over the next two years). In addition, the County is vulnerable to impacts that are already occurring, such as sea level rise and increasing temperatures, as well as to projected impacts such as intensification of weather variability and severity. In fact, the Organization of Economic Cooperation and Development’s 2008 report *Ranking of the Worlds' Cities Most Exposed to Coastal Flooding Today and in the Future*, ranked the Miami metropolitan area as number one at risk worldwide for economic losses (“economic asset exposure”) resulting from a 1 in 100 year surge-induced flood event.

While County government can begin to refocus its strategic objectives and performance targets to lower climate change-associated risks, significant resources such as training for employees, enabling tools and capital investment in infrastructure will be required to make the transition quickly and effectively. For example, our facility managers will have to (1) keep up with the continuously evolving best practices for climate-friendly operations of buildings, (2) avail themselves of the necessary tools and technologies to manage and reduce energy consumption and shift to renewable energy resources and (3) invest in the major renovation and retrofit of equipment that runs our facilities. The same is true, relatively speaking, for our employees in those departments that purchase and use fuel, provide water and wastewater services, provide energy-efficiency improvements for low-income households, provide building permitting or transit services, or run the airport and seaport.

This Miami-Dade County Climate Change Briefing Book provides a snapshot of the County’s priorities and its unique vulnerability. It also reviews the progress that the County has made in terms of ongoing or planned mitigation and adaptation projects (or initiatives that combine both). Miami-Dade County has provided leadership and continues to do so when it comes to addressing climate change and sustainability challenges as exhibited in the list of climate change milestones below. We are now at a point where comprehensive and organization-wide efforts will need to be undertaken, not only to increase our awareness and planning for climate change, but also to implement the solutions necessary for a more climate friendly and resilient future.

Miami-Dade County Climate Change-related Milestones

| | |
|--|-------------|
| Established Climate Change Program | 1993 |
| Founding Member of the International Council of Local Environmental Initiatives (ICLEI) | 1993 |
| Urban CO2 Reduction Plan - Final Report | 1993-2006 |
| BCC establishes Climate Change Advisory Task Force (CCATF) | 2006 |
| MDC Mayor endorses US Conference of Mayors Climate Protection Agreement | 2007 |
| BCC adopts Sustainable Buildings Ordinance for County Buildings | 2007 |
| BCC Establishes of the Office of Sustainability | 2007 |
| BCC approves County membership in Chicago Climate Exchange for Direct Fuel-based Emissions | 2007 – 2010 |

TOP PRIORITIES

Below is a list of Miami-Dade County's top priorities in terms of institutional capacity, efforts to reduce greenhouse gas emissions (mitigation), and efforts to reduce vulnerability to potential impacts of climate change (adaptation). These projects will require immediate and critical additional support in terms of staff input and capacity, enabling infrastructure, and / or capital investment. The County's ongoing efforts and potential future activities across these climate change categories are further outlined in the Progress Report section of this document.

Institutional Capacity Priorities

- Integration of sustainability in 5 year Strategic Plan and Strategic Focus Areas
- Establish Strategic Senior Management Sustainability Team
- Resource-based greenhouse gas emissions targets: fuel, electricity, water, etc.
- Develop Sustainability Plan (to include climate change component)
- Initiation of a feasible 50 year comprehensive plan process
- Facility / department energy conservation technical teams
- Facility / department climate impact preparedness teams
- Increased staffing for climate change and energy management
- Climate and energy management training and professional development e.g. Certified Energy Managers (CEM), Leadership in Energy and Environmental Design (LEED), and other specialized training and continuing education
- Identification and monitoring of key climate change indicators

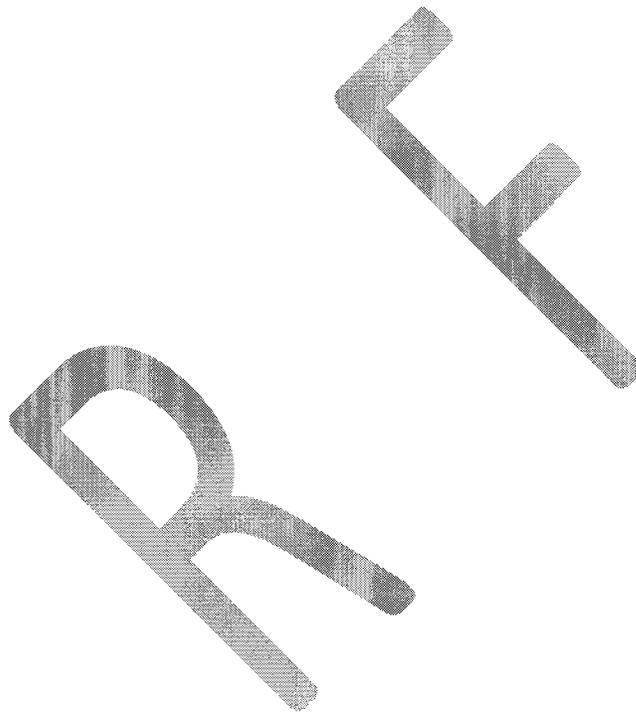
Mitigation Priorities

- Updated baseline assessment of government and community-wide greenhouse gas emissions
- Smart metering retrofits and related building / facility and equipment with building management systems for electricity use monitoring across County facilities - \$1,000,000
- Baseline assessment and automated real-time/regular reporting of building energy and fuel consumption
- Increased acquisition and use of sustainable sources of biodiesel fuel
- Sequestration of GHG waste streams from County operations
- Energy efficiency and renewable energy retrofits for County facilities
- Expansion of existing energy efficiency assistance program
- Innovation and partnerships for community-wide sustainability program
- Enhancement and updates of sustainable land use and development guidelines
- Define incentives for inspection and permitting procedures
- Roll-out of employee sustainable practices campaign
- Investment in zero or low-energy design and construction for all future capital projects including planned 36,000,000 kWh/ year power consumption for the South District Water Reclamation Plant

- Analysis of public finance strategies for investment in capital-intensive mitigation infrastructure and/or retrofitting of existing infrastructure

Adaptation Priorities

- Sea-level rise vulnerability assessment (socio-economic and environmental impacts)
- Development and adoption of capital improvement procedures that address projected climate change impacts
- Analysis of public finance strategies for enabling investment in adaptation infrastructure and / or retrofitting of existing infrastructure
- Research, development, and investment in technology and equipment that reduces vulnerability to County infrastructure



INTRODUCTION AND OVERVIEW

Miami-Dade County government has 28,000 employees and serves 2.3 million residents, making it the most populous county in Florida (and eighth largest in the United States). The land mass of Miami-Dade County encompasses 1,946 square miles. Miami-Dade County, anchored by its County managed and operated seaport and airport, remains the North American gateway to Latin America and the Caribbean. It is the only metropolitan area in the United States that borders two national parks, Biscayne National Park and Everglades National Park.

Climate Change presents unique challenges and opportunities for Miami-Dade's population, commerce and natural environment compared to other regions. The metropolitan area is built on porous limestone and has an average elevation of _____ above sea level.

THE NEED FOR A FUNDAMENTAL SHIFT IN OUR BUSINESS MODEL

The County's relatively major contribution to greenhouse gas emissions (GHGs) and its extreme vulnerability to the impacts of climate change necessitates a strategic inclusion of climate change in the business model of county government and its municipal counterparts. Moving to low or no-carbon government operations and encouraging / incentivizing the same in our community will not only be good for the planet and the well-being of our residents, an emerging green economy and the natural environment but will help the County address emerging GHG regulation at both the State (land use and development guidelines) and National (cap and trade regulation) levels. As the County is responsible for major county-wide infrastructure including water and wastewater services, transit, public works, airport, seaport and building code compliance, it is imperative that it begins to reduce the vulnerability of its infrastructure and operations and identify and implement initiatives to increase the community's overall resilience to potential impacts from climate change. Similar to the threat of terrorism, climate change induced severe weather events and expected sea-level rise can contribute to loss of life, damage to critical infrastructure, disruption of essential services, and cause severe economic losses.

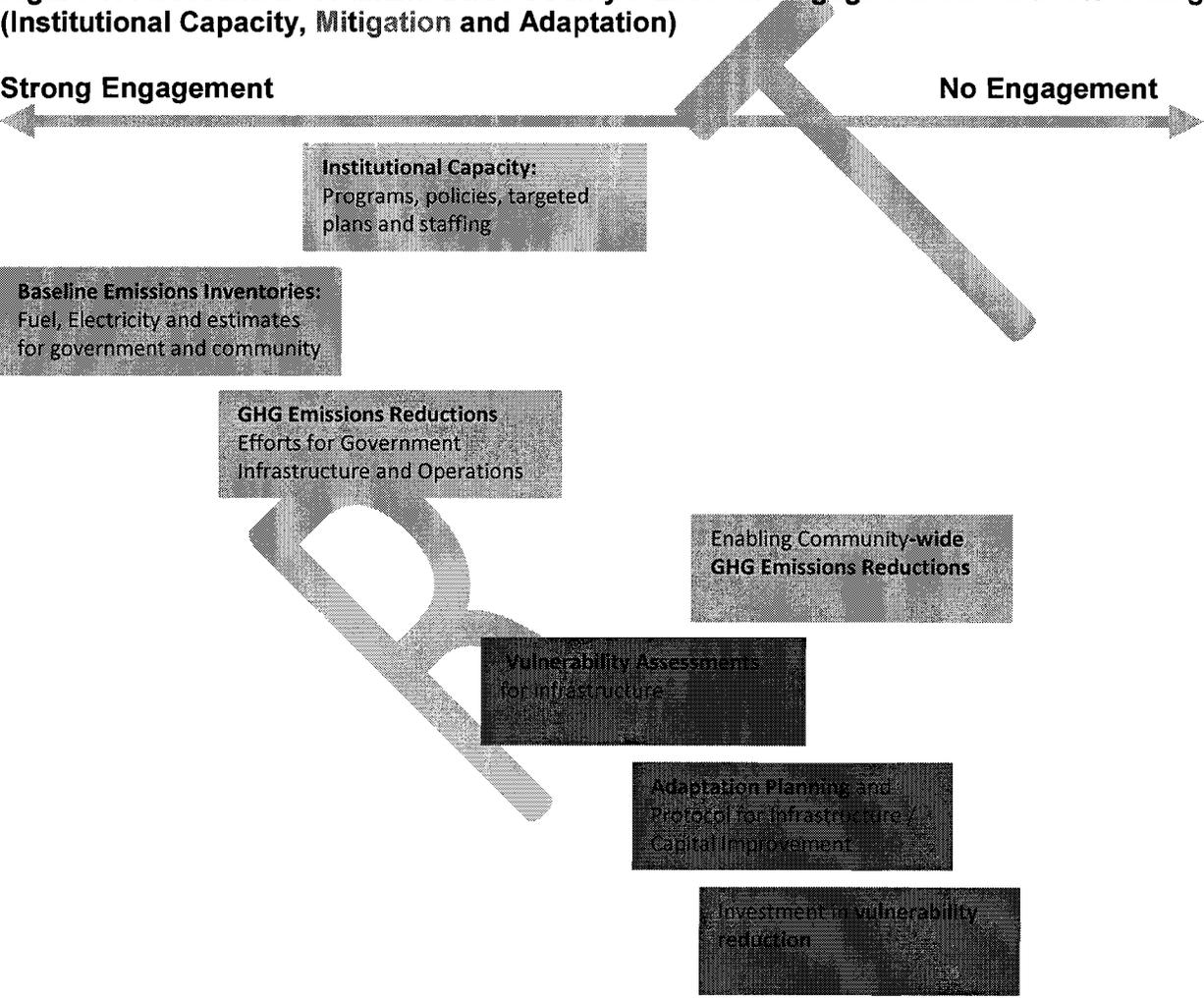
STEPS TOWARDS A SUSTAINABLE MIAMI-DADE COUNTY

Miami-Dade County has and continues to provide leadership in the area of sustainable government nationwide and the world over. The County was one of twelve original members of the International Council for Local Environmental Initiatives (ICLEI) and created a CO2 reduction plan in 1993. In 2007 the County made a legal commitment to reduce its fuel-based GHG emissions below year 2000 baseline levels at a rate of an additional 1.5% for every year of a four year attainment period (2007 – 2010) through its membership in the Chicago Climate Exchange (CCX). The County is CCX's only government member from the southeastern United States. The County also recently established a sustainable buildings ordinance and an Office of Sustainability to provide coordination and facilitation for transitioning the 28,000 employee organization to a more sustainable enterprise that will effectively integrate economic prosperity, environmental quality and social equity and plan for future challenges and opportunities across operations and service delivery. This Office is providing strategic oversight for county-wide issues such as climate change. With its sustainability focus, the County hopes to generate economic opportunities out of the major challenges it faces.

THE URGENT NEED FOR EFFECTIVE CLIMATE CHANGE MITIGATION AND ADAPTATION

This briefing book highlights our extreme vulnerability and lists ongoing County projects to address climate change. It also identifies those critical areas where intervention is still needed to enable the County to both effectively mitigate and adapt to climate change. The County will need to make critical investments in planning and related analyses as well as improvements and enhancements to infrastructure and operations and service delivery in order to achieve significant improvements in resource efficiency (energy, water and materials), the displacement of carbon-based energy sources (fuel and electricity) and the reduction of vulnerability to impacts of climate change for the entire community. A general assessment of the County's engagement across the spectrum of climate change focus areas is provided in Figure 1.

Figure 1: Assessment of Miami-Dade County's Level of Engagement on Climate Change (Institutional Capacity, Mitigation and Adaptation)



CLIMATE CHANGE RISKS AND OPPORTUNITIES FOR MIAMI-DADE COUNTY

There are both risks and opportunities that climate change presents to Miami-Dade County's economy, quality of life and treasured natural environment. While Miami-Dade County enjoys over 20 miles of sandy white beaches that are critical to the strong tourism industry, over ___ miles of our boundary is comprised of tidal coastline that exposes coastal communities to sea-level rise impacts. Sea level rise poses a threat to the western parts of the County, home to border Everglades National Park and numerous wetlands. At the same time the County has an opportunity to both stimulate long-term sustainable economic activity that both reduces our vulnerability to climate change impacts and decreases our dependence on carbon-based and foreign energy resources. The County will focus its efforts to promote solution that have mitigation-adaptation co-benefits.

UNIQUE VULNERABILITY AND RISKS

Miami-Dade County faces extreme and unique risks from climate change. A Pew Center report on global climate change impacts states that the southern United States, including Miami-Dade County, is at high risk from climate change compared to the northern United States. Miami-Dade is particularly vulnerable due to its low-lying coast, geographic proximity to the Gulf Stream, and subtropical climate. Over ___ miles of Miami-Dade's boundary is comprised of tidal coastline, one of the largest open borders (by sea) in the nation. These low-lying coastal areas will potentially face permanent inundation from sea level rise, beach erosion, and property damage if the intensity or frequency of tropical storms and hurricanes rise.

Over 70 percent of Miami-Dade County is directly vulnerable to climate change impacts. Over half of Miami-Dade County's population lives within five miles of the coast and one fourth of Florida's population considered vulnerable to sea level rise impacts reside in Miami-Dade County. The County's Climate Change Advisory Task Force has stated in their 2008 Recommendations to the Board of County Commissioners (BCC) that "Miami-Dade County will not be able to defend against the anticipated sea-level rise and must begin a responsible and serious re-evaluation of all aspects of its present laws and approaches to growth, development, permitting, zoning, infrastructure, waste disposal and pollution, adaptation, and natural area preservation."

NATURAL SYSTEMS TO UNDERGO SIGNIFICANT CHANGES

Climate Change impacts on the natural environment will be systemic and in some cases result in permanent ecosystem shifts. These shifts include changing atmospheric circulation and temperature patterns, changes in rainfall and severe weather, changes in biologic community distribution, increased extinction rates, changes in disease and pest distribution, and changes in sea level. While all these will significantly impact South Florida in the coming century, the primary concern for the region and Miami-Dade County will be rising sea level.

EXTREME ECONOMIC VULNERABILITY

The **Miami area is ranked number one among most vulnerable urban areas worldwide** according to a recent OECD report. This ranking is in terms of assets exposed if a 1 in 100 year surge-induced flood event were to happen today and predicts dramatic economic loss estimated at roughly \$416 billion. If current growth patterns persist, economic losses are estimated to

increase to \$3.5 trillion by 2070 for this type of catastrophic event. When considering climate change and projected sea level rise, the report lists Miami as **one of the top ten cities worldwide** for population exposure related to coastal flooding for present day conditions. The *Florida and Climate Change: the Costs of Inaction* report projects annual costs of inaction totaling \$92 billion by 2050 and \$345 billion by 2100, figures that constitute 2.8 percent and 5.0 percent of the state's projected Gross State Product respectively. These estimates only include economic costs from loss of tourism revenue, increased hurricane damages, at-risk residential real estate, and increased electricity costs and would be even larger if they included other sectors like agriculture, fisheries, insurances, transportation, water systems, and ecosystem damages.

OVERVIEW OF IMPACTS: GENERAL AND SECTOR-SPECIFIC

The climate change-related impacts outlined below, predicted as "likely" by the Intergovernmental Panel on Climate Change (IPCC), assume a business as usual scenario where GHG emissions continue to grow over time. The nature of these impacts are such that primary impacts on natural systems bring about secondary and cumulative impacts across socio-economic sectors. More detailed descriptions of specific impacts to Florida are available in documents referenced in Appendix D particularly the *Florida and Climate Change: the Costs of Inaction* report which was utilized extensively for the summary below. It is worthy to note that the State of Florida Energy and Climate Action Team (Adaptation Technical Work Group) recently put together a document outlining a climate change adaptation strategy which identifies Florida's vulnerability and impacts.¹

General Climate Change Impacts

Sea Level Rise and Permanent Inundation

According to the Miami-Dade Climate Change Advisory Task Force's Statement on Sea Level in the Coming Century, sea level is anticipated to rise at least 1.5 feet over the next 50 years and a total of at least 3-5 feet by the end of the century. These projections are being utilized by Miami-Dade County to guide future climate change mitigation and adaptation policy although it is possible that these estimates could be exceeded. Sea level rise will most certainly continue at an accelerated rate into the following century.

Higher temperatures and heat waves

In the business as usual scenario, average annual temperatures are projected to be 5°F higher than today in 2050 and 10°F higher in 2100. The average "heat index" (temperature combined with humidity) in summer would be 15–20 percent higher in much of the state. In this scenario, Miami-Dade would become several degrees hotter and daily highs would exceed 90 degrees nearly two-thirds of the year. There would be a gradual decline in the nighttime cooling and heat waves will become more severe and more common.

Increased hurricane intensity

Traditionally, hurricanes have been identified as Miami-Dade County's biggest threat due to its proximity to the Atlantic Ocean and Caribbean Sea. Hurricanes have the potential to impact the entire county, depending upon their origin, makeup and path. Since 1904, 32 hurricanes and tropical storms have traveled within 75 miles and/or directly passed over Miami-Dade County and associated emergency declarations have cost the federal government billions of tax payers' dollars.

¹ The Florida Energy and Climate Action Team has since become the Florida Energy and Climate Commission

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As sea-surface temperatures rise, hurricane intensity is expected to increase, with a greater prevalence of Category 4 and 5 hurricanes. Climate change is likely to have important effects on the economic damages and deaths that result from hurricanes. Using a business-as-usual model case, damages costs and deaths would be on a much larger scale: hurricane damages of \$25 billion by 2050 and \$104 billion by 2100 and an average of 19 additional deaths from hurricanes per year in 2050 and 37 additional deaths in 2100.

Flooding

Because Miami-Dade County is located in a unique low-lying area, it is already susceptible to flooding from major rain events and storm surge from tropical weather. The county is surrounded by and interspersed with canals, lakes, rivers, the Everglades, the Atlantic Ocean and Biscayne Bay. Miami-Dade County lies close to sea level, and its water supply lies just below the surface of the ground. As of the last count, there were a total of 112,000 structures in the unincorporated area of Miami-Dade County that were located in *Special Flood Hazard Areas*. Nearly 135,000 are outside the legally defined floodplain, but are still vulnerable to flooding.

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Increasing hurricane intensity and higher sea level will make Miami-Dade County more vulnerable to severe storm surges. The effectiveness of storm-induced flood management would be challenged if drainage systems are already strained due to ambient higher water levels.

Less rainfall, More drought

Rainfall will vary more and may decrease by 10 percent, contributing to longer periods of drought. This would impact water supply and constrain demand for water in the agricultural, industrial (including energy and water utilities), commercial, and residential sectors.

Ocean warming and acidification

Ocean temperature and acidity levels will continue to increase, causing both bleaching and disease of coral populations and the ensuing harmful effects on the many marine species that depend on coral ecosystems. A weakened and declining population of coral will have significant impacts on Florida's tourism and fishing industries and infrastructure.

Macro-Ecosystem Changes: Flora and Fauna

The combined effects of higher average temperatures, sea level rise, reduced and variable precipitation, increased storm intensity, and increased ocean acidity and temperatures would result in cumulative and in some cases irreversible impacts for natural areas. Climate change threatens Miami-Dade's coral reefs, coastal wetlands, and endangered species, particularly those with limited range and mobility. Although species are expected to attempt to migrate northward and inland, it is unlikely that wetlands would be allowed to migrate and take over what are now dry lands. Therefore, many species endemic to our subtropical region may not persevere. This threat to natural ecosystems further compounds the stress that populations of flora and fauna are already experiencing due to ecosystem fragmentation, pollutant stress, and migration barriers (such as roads and canals). Thus, biodiversity is expected to contract and

species extinctions and ecosystem destruction seem likely without significant climate change mitigation.

Climate Change Impacts on Infrastructure

Transportation

Transportation infrastructure would be damaged by the effects of permanent inundation due to sea-level rise combined with damage from storm surges. Roads, railroads, airports, marinas, and the Port of Miami, all located in low-lying coastal areas, would be more vulnerable to flooding as water levels rise, storm surges reach farther inward, and coastal erosion accelerates. As a result, reduced drainage capacity would increase the susceptibility of most local roads to flooding during rainstorms. Even inland roads may be threatened, since road drainage systems become less effective as sea levels rise. Rapid sea-level rise would force more frequent rebuilding of docks and jetties, which must be built at optimal heights relative to existing water levels.

Electricity

High temperatures increase demands for electricity, primarily to supply air conditioning. Every additional degree of warming is projected to cost consumers an additional \$3 billion annually by 2100. The same temperature increases would also diminish the operational efficiency of power stations and transmission lines. The anticipated cost for additional power plants to provide for increased electricity demand is estimated to cost \$5 billion in 2050 and \$18 billion in 2100. Increasing electricity demand would drive additional demand for water needed to cool coal, oil, gas, and nuclear power plants.

Insert Table / Graph

Water Systems

Fresh water supplies are already being used at or beyond a sustainable level in Miami-Dade County. As a result, the County is already experiencing drinking water supply shortages and is under permanent water use restrictions. Hotter and drier conditions increase demand for fresh water for both agricultural and domestic users. Unfortunately, these same freshwater resources may be diminished due to salt water intrusion. In addition, reduced levels of precipitation may result in less recharge for Miami-Dade County's sole source freshwater Biscayne Aquifer. An increased demand for electricity would further tax our water resources as described above.

Real Estate/Buildings

Properties in low-lying areas of Miami-Dade would be inundated. Even properties that remained above water would be more vulnerable to storm damage, as higher sea levels would induce greater storm surges that would reach previously unaffected inland areas.

Table?? Miami-Dade County Housing Units Currently in Areas Vulnerable to 27 Inches of Sea-Level Rise by 2060 (adapted from *Florida and Climate Change: the Costs of Inaction*)

| | Number of housing units in vulnerable zone | County median value for owner-occupied homes (Millions of 2006 dollars) | Value of real estate in vulnerable zone (Millions of 2006 dollars) |
|----------------|--|---|--|
| All of Florida | 916,861 | \$118,478 | \$129,117 |

Climate Change Impacts on Industry

Development/Construction

Anticipated sea level rise and permanent inundation will significantly reduce the amount of habitable property in Miami-Dade County. The industry will likely have to shift its approach to (re)development including a new focus on climate-change impact resilient land use and construction approaches.

Tourism

Tourism is one of Miami-Dade's largest economic sectors and will be impacted heavily as area beaches, marinas, and the Everglades become inundated. Associated recreational activities such as fishing and diving will also be affected as coral reefs are impacted by rising ocean temperatures and ocean acidification.

Agriculture and Fisheries

Agriculture and fisheries will also suffer large losses as productive zones shift northward. Agriculture will be directly affected by changes in temperature and precipitation, and by ensuing effects on the distribution of pests and diseases and availability of water supplies for irrigation. At the same time that higher temperatures and more-irregular rainfall increase the demand for crop and livestock irrigation, freshwater supplies will become scarcer as saltwater intrusion contaminates them. The declining and weakened coral populations mentioned earlier will lead to harmful effects on the many marine species that depend on coral ecosystems. These effects will have significant impacts on Miami-Dade's tourism and fishing industries and infrastructure.

Insert Photo

Additional Societal Impacts

Human Health

Human health will be affected by increased risk of heat stress, potential increases in transmission of infectious diseases, and changes in extreme weather events such as floods. Sea level rise, an increase in average temperatures, salt water intrusion in fresh water bodies, and decrease in the level of fresh surface water bodies and wells may expand areas hospitable to disease-bearing organisms (vectors of disease) such as mosquitoes and rodents, thus increasing the risk of infectious diseases.

VULNERABILITY ANALYSIS AND NEEDS ASSESSMENT FOR MIAMI-DADE COUNTY CRITICAL ASSETS

Apart from the impacted sectors identified above, there are specific critical assets upon which Miami-Dade County residents, businesses and visitors depend upon for their day-to-day routine. The table below identifies critical assets and describes the specific vulnerability facing these assets or the functions they provide. A general assessment of the community's needs and opportunities to address these vulnerabilities follows. The *Top Priorities* identified at the

beginning of the document are program and project-level interventions that align with these needs and opportunities.

Table ?? : Spotlight on Specific MDC Critical Assets, Vulnerability and Opportunities

| Critical Miami-Dade County Assets | Vulnerability / Threat Description (both Gradual and Sudden) | Needs / Opportunities |
|--|--|--|
| <p>Water Utility - Supply and Treatment</p> <p>Miami-Dade County Water and Sewer Dept is 6th largest public utility in the USA</p> <p>Sole source Biscayne Aquifer, aquifer recharge areas, holding facilities, pipelines and other water distribution systems, filtration, cleaning and treatment systems, cooling systems, and other delivery mechanisms that provide for domestic and industrial applications, including systems for dealing with wastewater, and firefighting.</p> | <ul style="list-style-type: none"> • Inoperability of delivery systems due to sea-level rise • Hotter and drier conditions creating higher demand for fresh water for both agricultural and domestic users. • Rising energy costs associated with increased water delivery demands • Carbon liability of fossil-fuel powered operations • Salt water intrusion / contamination of existing fresh water drinking water supplies, thereby diminishing drinking water supply. • Reduced precipitation and associated freshwater recharge • An increased demand for electricity to cool local power plants • Increased vulnerability to extreme weather events | <ul style="list-style-type: none"> • Development/implementation of climate adapted and friendly alternative water supply / treatment e.g. on-site / decentralized systems • Investment in infrastructure improvements • Investment in water conserving infrastructure • Investment in water conservation education • Use of reclaimed water for power plant cooling |
| <p>Stormwater Utility</p> <p>Holding facilities, pipelines and other water distribution systems, filtration and discharge systems.</p> <p>Primarily operates on gravity-induced drainage through canal system.</p> | <ul style="list-style-type: none"> • Inoperability of drainage systems due to sea-level rise and inundation. • Increased vulnerability to extreme weather events | <ul style="list-style-type: none"> • Development / implementation of alternative flood management systems • Investment in infrastructure improvements |
| <p>Electrical Utility</p> <p>Turkey Point Nuclear Power Plant, operated by Florida Power and Light (FPL), is the largest electric utility in Florida, serving about half of the population of Florida.</p> <p>Generation stations, transmission and distribution networks that create and supply electricity to end-users, storage of fuel essential to system.</p> | <ul style="list-style-type: none"> • Higher temperatures will increase demands for electricity, primarily to supply air conditioning. • Reduced efficiency of power stations and transmission lines due to temperature increases. • Carbon liability of fossil-fuel generated electricity • Associated need for additional water to cool local power plants. • Increased vulnerability to extreme weather events | <ul style="list-style-type: none"> • Intensive investment in energy efficiency infrastructure and education • Development / implementation of decentralized, renewable energy systems. |
| <p>Fuel Delivery and Storage</p> <p>Holding, refining and processing, and distribution facilities and systems.</p> | <ul style="list-style-type: none"> • Inoperability of distribution systems due to sea-level rise and inundation. • Fuel supplies (shipments) vulnerable to extreme weather events • Carbon liability of fossil-fuel powered operations | <ul style="list-style-type: none"> • Investment in infrastructure improvements • Investment in fuel conservation infrastructure and |

| | | |
|---|---|--|
| | | <ul style="list-style-type: none"> education Development / implementation of decentralized, alternative and renewable fuel systems. |
| <p>Transportation</p> <p>Four local airports, related infrastructure, aircraft, aircraft hangars; roads and highways, trucking and personal vehicles, transportation signage and lighting; ports and waterways and associated vessels; mass transit buses and Metrorail trains; freight and long haul passenger rail; and delivery services.</p> <p>Among US Airports, Miami International Airport it ranks 1st in International Freight, 3rd in International Passengers, and 3rd in Total Freight and Cargo.</p> <p>The Port of Miami is the world's leading cruise port and is also one of the busiest container ports on the eastern seaboard. The Miami River is the fifth busiest port in the state of Florida.</p> | <ul style="list-style-type: none"> Increased vulnerability during extreme weather events Rising energy, water acquisition, and development costs Carbon liability of fossil-fuel based energy generation | <ul style="list-style-type: none"> Development / implementation of decentralized and renewable energy systems Financing, technology and infrastructure |
| <p>Government Facilities, Services and Operations</p> <p>The County owns and operates hundreds of facilities including an airport, seaport, water plants, courthouses, and a morgue to meet the needs for essential services to the public</p> <p>The County is also home to several U.S. operations, including: Secret Service Headquarters Office, U.S. Attorney's Office, Regional Office of the Federal Bureau of Investigation, U.S. Regional Coast Guard Base, Federal Courthouses and Prisons, and more.</p> | <ul style="list-style-type: none"> Rising energy, water, and material costs Carbon liability of fossil-fuel powered operations Buildings and service routes inundated by sea-level rise Increased vulnerability to extreme weather events | <ul style="list-style-type: none"> Energy efficiency / renewable energy retrofits Strategy and procedures for adaptation-based capital improvement process, including design, construction, financing, insurance, etc. |
| <p>Telecommunications</p> <p>Computing and telecommunications equipment, and software that supports the processing, storage, and transmission of data and information.</p> | <ul style="list-style-type: none"> Facilities inundated by sea-level rise Increased vulnerability to extreme weather events | <ul style="list-style-type: none"> Investment in infrastructure improvements Investment in disaster preparedness |
| <p>Banking/Finance</p> | <ul style="list-style-type: none"> Facilities inundated by sea-level rise Increased vulnerability during extreme | <ul style="list-style-type: none"> Investment in infrastructure |

| | | |
|--|--|--|
| <p>The County is home to over 700 commercial banks, thrift institutions, investment institutions, foreign bank agencies, trading houses, and a branch of the Federal Reserve Bank of Atlanta.</p> <p>Critical infrastructure such as operational and storage buildings and telecommunications infrastructure</p> | <p>weather events</p> | <p>improvements</p> <ul style="list-style-type: none"> Investment in disaster preparedness |
| <p>Emergency Services</p> <p>Medical, public health, police, fire, and rescue systems, largely institutional vehicles, emergency response vehicles, telecommunication devices, and medical and other emergency supplies.</p> | <ul style="list-style-type: none"> Facilities inundated by sea-level rise Increased vulnerability during extreme weather events Increased demand for services during extreme weather events | <ul style="list-style-type: none"> Investment in infrastructure improvements Investment in disaster preparedness |
| <p>Schools & Educational Facilities</p> <p>The Miami-Dade County School Board operates a public school district includes a total of 415 schools and special education centers, serving over 385,000 students. It is the largest school district in Florida and the fourth largest in the United States. Approximately 400 private schools and educational centers also serve Miami-Dade County residents.</p> | <ul style="list-style-type: none"> Facilities inundated by sea-level rise Increased vulnerability during extreme weather events | <ul style="list-style-type: none"> Investment in infrastructure improvements Investment in disaster preparedness |
| | | |

PROGRESS REPORT: CURRENT AND POTENTIAL CLIMATE CHANGE EFFORT HIGHLIGHTS

There are a full range of ongoing and potential actions that will together reduce the risk climate change presents to Miami-Dade County both in terms of greenhouse gas emissions and anticipated climate change impacts. Some of the County's high priority ongoing and potential programs, policies and initiatives are highlighted below under the categories of institutional capacity, mitigation or adaptation. Where applicable, mitigation-related activity is coded by its potential eligibility under the proposed federal *Energy Efficiency Community Block Grant* (EECBG) funding (see Table __). A full listing of Miami-Dade County Climate Change relevant activities is provided in Appendices A and B.

Table __: EECBG Climate Change Mitigation Strategies

| Eligible Activities of the Energy Efficiency and Climate Protection Strategy under EECBG | Strategy # |
|---|------------|
| Determination of 1990 and present levels of greenhouse gas emissions | 1 |
| Conducting energy audits and weatherization programs | 2 |
| Creation of financial incentive programs for energy efficiency retrofits | 3 |
| Development and implementation of building and home energy conservation programs | 4 |
| Development and implementation of transportation fuel conservation programs | 5 |
| Development and implementation of alternative fuel technologies and infrastructure that result in significant greenhouse gas emission reductions | 6 |
| Development and implementation of building codes and inspection services for public, commercial, industrial, and residential buildings to promote energy efficiency | 7 |
| Development and promotion of land use guidelines that result in energy efficiency and greenhouse gas emission reductions | 8 |

INSTITUTIONAL CAPACITY HIGHLIGHTS

Integration of Climate Change in County Planning Efforts

While climate change directly or indirectly is addressed in planning efforts for capital improvement, maintenance and operations, strategic business planning for County departments, comprehensive master planning, land use and development, open space etc. there is opportunity to further integrate climate change into these and other plans. It is also critical to build accountability into plans with for example milestones, targets and staffing of initiatives. With the establishment of the County's new Office of Sustainability which exists to facilitate and coordinate an organization-wide sustainability transformation, discussions are underway to work with the International Council for Local Environmental Initiatives (ICLEI) to develop a sustainability plan. A sampling of major ongoing and potential planning initiatives where climate change will play a important role are listed below in Table __.

Table __ : Highlight - Ongoing and Potential Planning Efforts

| Plan Title | Ongoing | Potential |
|--|---------|-----------|
| 5 year Organization-wide Strategic Business Plan Sustainability Plan | X | |
| 50 year Comprehensive Development Master Plan | | X |
| EPA Assistance for Urban Development Boundary Analysis | X | X |
| Open Space Master Plan | X | |
| Business Plans of Infrastructure and Energy-Intensive Departments | X | X |
| Climate Action Plan(s) | X | X |

Climate Change Policy Formulation

In 2006, the Board of County Commissioners established the Miami-Dade County Climate Change Advisory Task Force. Through the volunteer efforts of critical community stakeholders from academia, business, civil society and government, this Task Force provides policy recommendations across the spectrum of climate change policies for the County. The task force has six focus areas that are managed by separate committees including *Built Environment Adaptation, Science, Natural Systems Adaptation, Intergovernmental Affairs, Greenhouse Gas Reduction/Mitigation and Economic, Social, and Health Adaptation*. The initial set of recommendations is available on the Miami-Dade County website at: http://www.miamidade.gov/derm/climate_change.asp

MITIGATION HIGHLIGHTS

Baseline Emissions Inventories (EECBG Strategy 1)

The County is currently undergoing its 2nd baseline inventory process for Government and Community-wide emissions based on established protocols. The first baseline was part of "A Long Term Co2 Emission Reduction Plan for Miami-Dade County." In addition, the County has recently invested additional staff time and resources in baseline inventories for both (1) fuel-based carbon emissions as part of its membership in the Chicago Climate Exchange and (2) building energy consumption as part of its participation in the EPA's Energy Star Portfolio Manager energy performance and greenhouse gas emissions benchmarking and an overall energy performance monitoring strategy. Aside from staff and software tools, the County could benefit from updated metering infrastructure for energy consumption in its facilities in order to enable emissions reductions strategies including internal social marketing campaigns and real-time tracking and assessment of retrofit activities.

Table??: Emissions Inventories (Table to be verified)

| SECTOR | 1988 Equivalent Million Estimated Tons of CO ₂ | | 2005 Equivalent Million Estimated Tons of CO ₂ | | Difference Million Tons of CO ₂ |
|-------------------|--|------|--|------|---|
| Residential | 0.196 | 1% | 0.227 | 1% | 0.031 |
| Commercial | 1.022 | 4% | 0.681 | 2% | -0.341 |
| Industrial | 1.297 | 6% | 1.554 | 5% | 0.257 |
| Transportation | 10.449 | 45% | 14.057 | 44% | 3.608 |
| Electrical Usage* | 10.459 | 45% | 15.448 | 48% | 4.989 |
| Others | 0 | 0% | 0 | 0% | 0 |
| Total | 23.423 | 100% | 31.967 | 100% | 8.544 |

* The CO₂ emissions factor for Miami-Dade County, which is published by FPL every year, is used for emissions calculations.

Energy Efficiency and Renewable Energy Retrofits – County Operations and Infrastructure (EECBG Categories 2,3 and 4)

The County has been able to access the services of Energy Service Companies (ESCOs) to provide energy-efficiency and retrofit solutions that are paid for through resulting savings. In the ten years since it commenced in June 1998, the County has successfully utilized ESCO contracts to perform approximately \$50 million in energy conservation improvements in County facilities. These improvements have already or will, upon completion, result in a reduction in consumption of approximately 73 million kilowatt hours of electricity and 71 million gallons of water. While beneficial, there are potential opportunities for conservation, efficiency gains and renewable energy retrofits that are not applicable under the performance-based contracting guidelines or the expertise of the firms that the County can access. Finally, departments have implemented low or no-cost energy-efficiency measures in areas such as computer power management and moving forward the County would like to ensure that best practices are implemented County-wide (see Appendix A for full listing of mitigation activities by department).

The County's Sustainable Building Ordinance promotes energy efficiency in new construction and major/minor renovation of County buildings / facilities. The ordinance requires a minimal LEED-NC (Leadership for Energy and Environmental Design – New Construction) Silver

certification for applicable new construction.² As part of the full implementation of the Ordinance, County staff is in the process of developing protocols for “green” capital improvements to ensure that energy and general resource efficiency are maximized in certifiable green capital projects. Additional staff support and resources would aid in the development and implementation of these protocols and similar protocols for non-certifiable projects.

The County’s water conservation efforts naturally conserve energy that would otherwise be used to deliver water to end users. As water conservation is an adaptation measure as well, a list of water conservation measure the County has undertaken or could potentially implement is provided in the Adaptation Highlights section that follows.

Energy Efficiency and Renewable Energy Retrofits – Existing Buildings in the Community (EECBG Categories 2, 3, 4 and 7)

The County through its Community Action Agency has an aggressive home energy efficiency / renewable energy retrofit program for low-income households which provides assistance on high return on investment interventions including weatherization, insulation, water efficiency measures, and limited solar thermal installation. This program would benefit from financial incentives for homeowners and/or funding support for the Community Action Agency. At a larger scale there is the opportunity for the County to engage in a public-private partnership with other municipalities, trade associations, permitting authorities, vendors, financiers and foundations such as the Clinton Climate Initiative to improve access (availability and cost) to integrated energy audits, efficiency interventions and renewable energy systems for all residential and commercial existing buildings in the community. Initial discussions of this opportunity which would also kick-start a transition to a green economy, provide for green jobs as well as revive a slumping building industry have taken place.

Maximizing Community-wide Residential Recycling

Miami-Dade County’s new curbside recycling program provides for convenient "single-stream" recycling, to ensure greater participation. Under the new program, residents will be able to co-mingle recyclables and can now recycle more types of paper products.

Incentives / Code and Inspection Service Improvements for Energy-Efficiency and Sustainable Construction (EECBG 7)

The County currently offers a mix of incentives, inspection capacity building, and code update interventions that contribute to improved energy efficiency in buildings that are permitted across the County. There is however a lot of opportunity to expand these efforts through additional staff support, resources/tools and policy/procedure updates. A list of existing and potential policy interventions and code update actions is provided below in Table__:

Table __: Overview of Enabling Interventions for Energy-Efficiency and Sustainable Construction

| Incentive, Code, or Inspection Service Update | Existing Program (EP) / Further Investigation Needed (FI) |
|---|---|
| Visibility for green builders / developers | FI |
| Expedited building permitting | EP |
| Transit-oriented development: bonus density | EP |

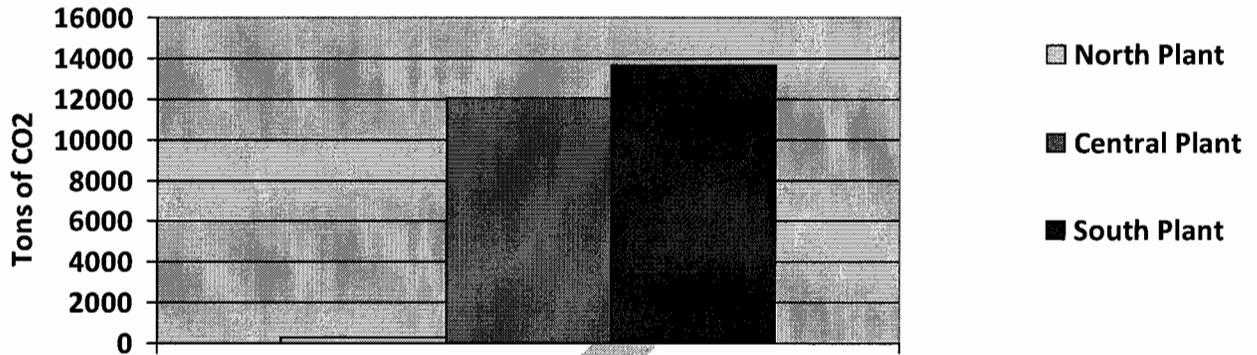
² The US Green Building Council created and administers the third-part certified LEED rating system

| Incentive, Code, or Inspection Service Update | Existing Program (EP) / Further Investigation Needed (FI) |
|---|---|
| Affordable housing financing preference for affordable + green development | EP |
| Revised water efficiency standards (adopted 2008) | EP |
| Optional points for green certification on affordable housing projects via RFP process for design +/- construction (based on sustainable buildings ordinance guidelines) | EP |
| Optional points for green attributes of capital projects that cannot qualify for Green Certification for design +/- construction teams | EP |
| Continuing education for over 30 municipal building officials on inspection and permitting of green building technology e.g. green roofs, renewable energy systems, etc. | EP |
| Pro-active actively working through code obstacles that prevent the use of green building technology e.g. Building Code Compliance Office recently created a rainwater catchment ordinance for details and design of collection surfaces, initial conveyance, first flush devices, roof washers, holding tanks / cisterns, distributions and fixtures | EP |
| Green building technical education for contractors | FI |
| Permit fee reduction | FI |
| Bonus density for green certified projects (incremental increases based on level of certification: certified through <i>platinum</i>) | FI |
| Impact-fee reductions | FI |
| Tax rebates and credits | FI |
| Pre-permitted green retrofit interventions where applicable e.g. solar thermal, insulation, cool roofs, etc. | FI |

Greenhouse Gas Emissions (GHGs) Capture and Sustainable Reuse

The County has and continues to examine the potential of mitigating GHGs from County-owned / operated emissions point sources. Currently, methane is collected and destroyed (converted to less potent GHG: CO₂) at Landfills and the County is actively pursuing a contract with a private vendor to capture and utilize this methane. Some landfill gas will also be piped to the Water and Sewer Department's South District Wastewater Treatment Plant (SDWWTP) to generate energy. The County is also in the process of examining how to capture and CO₂ from its wastewater treatment and resource recovery facilities. Specifically, the County is assessing how to select and/or partner with the appropriate enterprises that might produce biodiesel (for County purchase) and secure carbon credits from this process of capturing and reusing CO₂.

Figure __: Annual CO2 Emissions from MDC Wastewater Treatment Plants



Renewable, Low/No-Carbon Fuel Acquisition and Development (EECBG Category 6)

The County is evaluating both acquisition and development of alternative fuel resources. Specifically the County is currently evaluating the purchase and use of biodiesel for County operations (mass transit, solid waste services, etc.) taking into account fuel quality and sustainability criteria. The Transit Agency has completed a 3rd party evaluation of biodiesel performance in one of its bus engines with respect to engine performance and emissions. An effort is underway to query fuel suppliers about the sustainability of their biodiesel offerings across production, delivery and fuel use life-cycle. The County recently submitted a grant for the testing of the efficacy of conversion waste oil (yellow grease) to biodiesel possibly utilizing current County infrastructure and facilities. Community-wide yellow grease capture and conversion to fuel is also a potential win-win opportunity for the Water and Sewer Department's waste-oil / grease induced wastewater pipe blockages and fuel for operation of its own vehicles. Finally, the County is evaluating the potential purchase of locally produced algae biodiesel that is produced through the capture and use of CO₂ that currently is released from various County operations / facilities. All of these efforts could use additional financial support (research, enabling infrastructure and capital investment) as well as increased staff resources.

Reduced / Avoided Fuel Consumption (EECBG Category 6)

As the County is a member of the Chicago Climate Exchange for direct emissions from the consumption of fuel, there are a variety of ongoing and potential policy and procedure interventions that will reduce and/or avoid fossil fuel consumption. One example of a departmental effort to reduce fuel consumption is the Inspection Efficiency Initiative that the Environmental Resources Management Department's Office of Pollution Regulation and Enforcement launched in 2007. This pilot program involved the (1) assignment of field staff to work in the geographical area close to their homes, (2) the use of tablet PCs equipped with wireless cards for the entry and submission of inspection results, (3) minimized travel to the central office for meetings and hard copy document submission. Starting January 2009, the pilot project will be adopted as standard operating procedure and closer monitoring of actual savings will be explored in order to better assess the benefits to the environment from this endeavor. The Building Department engages in similar policies and procedures. Appendix A provides a thorough listing of these types of initiatives by department.

Insert graph

Social Marketing for Improved Resource Efficiency

The Office of Sustainability and Government Information Center are collaborating on social marketing efforts to reduce waste and improve general resource efficiency (energy, fuel, materials, etc.). The plan intends to combine the use of employee pledges to change behavior, reminder prompts and the creation of a County-wide intranet that will provide feedback to employees on fuel consumption, building energy consumption, material use by department or facility where applicable. Social marketing research has empirically proven that the right combination of awareness and commitment to behavior change can result in meaningful and effective behavior change and new social norms in the long-run.

ADAPTATION HIGHLIGHTS

Vulnerability Assessment – Sea-level Rise Impacts

The County is undertaking a variety of efforts at understanding the impacts that sea-level rise will have on its own infrastructure and the community at large. Department of Environmental Management (DERM) staff are developing potential sea level rise maps with currently available data and determining what land elevation data is still missing for the Miami-Dade County area. Beyond the mapping, a terrain model will be developed and sea level rise scenarios will be evaluated in order to adjust county flood criteria maps, as necessary. These maps and terrain models will help identify areas and infrastructure more susceptible to flooding as a result of sea level rise and severe storm events, and will assist County decision makers in their climate change adaptation planning efforts. Meanwhile, the Water and Sewer Department (WASD) has contracted with the United States Geological Survey (USGS) to develop peer-reviewed surface and ground water flow models. With this information, the County will study the effects of climate change and potential sea level rise on water resources, such as salt water intrusion, impacts on public drinking water supply, flood protection, and infrastructure impacts. The County could benefit from increased staff resources for these assessment activities and financial resources for baseline data acquisition.

Insert graph

Investment for More Climate-Resilient Infrastructure / Capital Improvement Processes

As it ranks number one for climate change impact exposure of economic assets, the Miami area will require investments in comprehensive retrofitting of infrastructure and application of new technologies. As mentioned in the institutional capacity section, the County, which is responsible for major infrastructure including maintenance of roadways and bridges, water / wastewater services, building permitting, land use planning, airport and seaport, will have to first develop and implement a strategy around climate adapted infrastructure. The County has begun this process through its disaster mitigation preparation efforts (*see below under Local Mitigation Strategy*) This effort and the investment and capacity building for reworking infrastructure will require innovative research, staff and external human resources along with significant capital investment.

There are proactive climate change adaptation strategies underway including the County's efforts to replenish the groundwater to augment the water supply. WASD is planning to create southward flow of fresh water through the ecosystem that will help counteract rising seas in the very shallow wetlands.

Local Mitigation Strategy

The County's Emergency Management and Homeland Security Department coordinates the Local Mitigation Strategy (LMS) Working Group. The LMS Working Group is made up of representatives from Miami-Dade municipalities, county departments, state and federal agencies, schools, colleges and universities, hospitals, and private for profit and not-for-profit organizations. The LMS Working group is in charge of creating and updating (semi-annually) the County's Local Mitigation Strategy (LMS).³ The main goal of the LMS is "reduce vulnerability to natural, technological and societal hazards from all sources but especially, in South Florida, from hurricanes, tornadoes, major rainfall and other severe weather events." As of June 30, 2008, there are over 300 completed mitigation projects at a value exceeding \$250 million. Additionally, there are nearly \$17 million in Pre-Disaster Mitigation (PDM) program projects that have now been completed and millions more in Hazard Mitigation Grants Program (HMGP) still pending. Currently, the LMS group is collaborating with Florida International University and the South Florida Regional Planning Council to assess the impact of rising sea level on building codes and finished floor elevations.

Ensuring the County's Future Water Supply – Conservation and Reclaimed Water

With both projected water demand increases and uncertainty of water supply from potential climate change impacts such as reduced rainfall, the County has initiated conservation programs and has adopted code changes to facilitate the utilization of water saving technologies. The County is also making significant capital investments in facilities to reclaim water. Water conservation efforts are representative of those actions that provide both climate change mitigation and adaptation benefits -- saving water also saves energy.

Existing and Potential Water Conservation Efforts: Climate Change Mitigation and Adaptation

Implementing a 20-Year Water Conservation Plan. Implementation of the Plan's best management practices has resulted in the FY-2007 savings of 1,156,446 gallons of water and nearly 1,400 KWH of energy per day. The 20 year savings is projected to be 19.62 million gallons per day (MGD)

Implementing a Water Loss Reduction Program that is expected to produce water savings of 14.25 MGD per day over the next 20 years

Florida Yards and Neighborhoods Homeowners Association Irrigation Retro-fit Program will save 2,893,860 gallons/yr.

Maximizing Methane gas production and delivery from sludge processing at South and Central wastewater treatment plants

Developing a Biosolids Master Plan to include improving the quality of biosolids to a higher grade of soil conditioner

Reducing groundwater infiltration through the Pump Station Optimization Program by allowing the sewage level in the wet well to rise and thus reducing the groundwater infiltration when substantial flow increases occur due to RDII (rainfall dependent infiltration/inflow). This results in approximately 2% annual energy saving.

Ongoing design and development of reclaimed water facility that will recycle up to 40% of treated wastewater

Consider adoption of the gray water recycling appendix of the Florida Building Code to facilitate gray water recycling in homes and commercial buildings; consider assisting building owners in obtaining such recycling systems through a public-private partnership

³ Disaster mitigation plans use the term "mitigation" which is equivalent to climate change adaptation

NEXT STEPS

Since its initial engagement on climate change in the early 1990s, Miami-Dade County has raised awareness and engaged critical stakeholders regarding climate change planning. Now, in 2008, the unique and severe vulnerability of this County to climate change impacts are much more clear and apparent. In the face of potential and very possible abrupt changes in climate, gradual and incremental improvements to existing policies, programs, delivery of service and infrastructure would be inadequate. Therefore, it is imperative that the County begin rapidly implementing solutions that prepare the County for all possible climate change scenarios and diminish the risk that climate change presents to Miami-Dade County's economic prosperity, integrity of natural systems, and health and well-being of its population. Federal financial and other support is essential to facilitate the quick transition that Miami-Dade County government has to make in terms of training for employees, acquisition and use of transition-enabling tools, and capital investment in infrastructure. Federal funding would provide a high rate of return on taxpayers' dollars because the funding will directly increase our region's capacity to mitigate and prepare for climate change impacts.

The County has critical needs that have to be met with respect to institutional capacity for, mitigation of, and adaptation to climate change. A select list of high-priority initiatives and needs that could benefit from additional support has been outlined in this document. Overall, the County will have to engage in target-oriented sustainability planning, improve the ability of staff to understand, develop and implement climate-friendly and climate-resilient policies, programs and services, and make significant capital investments to reduce the community's climate change risk.

Miami-Dade County has unique needs and issues. The risk of climate change threatens this uniqueness and further exacerbates the challenges that Miami-Dade County is already facing. Because the County's mission is to deliver excellence, the County has already begun to utilize available resources to integrate sustainability and climate change into its strategic planning process and will continue to make institutional changes to provide better service to the community every day.

APPENDIX A: COUNTY MITIGATION PROJECTS

Mitigation efforts include activities that attempt to slow the process of global climate change by lowering the level of greenhouse gases [GHG] in the atmosphere, such as reducing fossil fuel consumption.

| Organization | Project Title | Existing Project | Future Project | EECBG Applicable |
|---------------------|--|------------------|----------------|------------------|
| Aviation Department | | | | |
| BCCO | Prepare uniform guidelines for the installation of rainwater catchment systems. | | X | |
| BCCO | Explore the local adoption of the gray water recycling appendix of the Florida Building Code, Residential. | | X | |
| BCCO | Uniform enforcement of the Florida energy conservation codes. | X | | |
| BCCO | Explore and pursue inclusion of solar reflectance, emissivity and Solar Reflectance Index (SRI) values into roof system product approvals. | | X | X |
| BCCO | Establish and recruit a Building Code Compliance Office Energy Code Specialist position. | | X | X |
| BCCO | Review the building code and explore integration of reflective and green roofs into the body of the code. | | X | X |
| BCCO | Review the building code and explore integration of a/c duct sealing tests into the body of the code. | | X | X |
| BCCO | Review the building code and explore integration of renewable energy systems into the body of the code. | | X | X |
| BCCO | Submit modifications to the building code which will incorporate green/sustainable concepts and energy conservation measures into the Code. | | X | X |
| BCCO | Expedite product approval process for green/sustainable construction products. | | X | X |
| BCCO | Focus on Green/Sustainable seminars for all Miami-Dade County code enforcement personnel during the 2009 educational effort. | | X | |
| BCCO | Continue to provide green/sustainable workshops for design professionals, industry, building officials and trade groups. | X | X | |
| BCCO | Develop appropriate promotional material for employees and general public regarding climate change and green sustainable initiatives. | X | | |
| Building Department | Adoption of County Ordinance 5-115 "Expedited Plan Review and Approval of Building Permit Applications for Green Buildings" as an incentive to encourage construction of green buildings | X | | |
| Building Department | Enforcement of County Ordinance 94-154 relating to grey water disposal systems | X | | |
| Building Department | Enforcement of County Ordinance 8-14 relating to water use efficiency standards starting January 1, 2009. | X | | |
| Building Department | Continue to provide free workshops for members of construction industry that include energy and water conservation regulations. | X | X | |
| Building Department | Developed a paperless Building Code Enforcement System | X | | |
| Building Department | Developed an electronic plan review and permitting system | X | | |
| Building Department | Distribution of re-usable water containers and discontinued purchase and daily distribution of bottled water to inspectors | X | | |
| Building Department | Work with GSA to implement Energy Management System at MDPIC building. | X | | X |

| | | | | |
|---------------------|---|---|---|---|
| Building Department | Potential participant of the 4X10 week pilot program | | X | X |
| Building Department | Adoption of additional incentives to encourage construction of green buildings | | X | X |
| CAA | Weatherization Assistance Program for low-income homeowners | X | | X |
| CAA | Solar weatherization for low-income homeowners. | | X | |
| CAA | Senior Energy Conservation and Rehabilitation Program. | X | | X |
| CAA | Replacement of regular toilets for high efficiency toilets (HET) for homesteaded senior homeowners. | X | | |
| DERM | Purchase, management, and protection of vulnerable habitats through Environmentally Endangered Land (EEL) Program | X | X | |
| DERM | Adopt-a-Tree Program - Increase tree canopy through educational program which provides free trees to homeowners. | X | X | |
| DERM | Stratospheric Ozone Protection Program - permitting and compliance activities to prevent the release of ozone-depleting compounds (ODCs). The program was established in response to the 1990 Clean Air Act Amendments and is one of very few such programs in the country. | X | X | |
| DERM | Inspection Efficiency Initiative - pilot project to more efficiently manage inspections for permitted facilities; initiative includes reduction in VMT and implementation of paperless documentation system. | X | X | X |
| DERM | EPA certified "Energy Star" equipment purchasing | X | | |
| DERM | Internal DERM Sustainability Policy - commitment to maintaining a comprehensive pollution prevention and energy conservation policy to ensure that departmental activities contribute to environmental resource sustainability. | X | X | X |
| DPZ | Comprehensive plan guidance for more sustainable land-use and development | X | | X |
| GSA | Purchasing Ethanol (10%) for County light fleet | X | | |
| GSA | Fleet and Fuel Consumption Reduction | X | | |
| GSA | ESCO Energy Efficiency Building Retrofits | X | X | X |
| GSA | Biodiesel Assessment Pilot Project (grant application) | | X | |
| GSA/OOS | Energy Consumption Building Baseline | X | | X |
| OOS | Coordination of County's membership in Chicago Climate Exchange | X | | |
| OOS | Coordination of County's Sustainable Buildings Ordinance | X | | |
| MDPR | Conducted energy audits | X | | X |
| MDPR | Implemented a plan to reduce overall fuel (both gas and diesel) usage by 10%. | X | | |
| MDPR | Pilot project exploring use of solar powered golf carts | X | | |
| MDPR | MDPR began analyzing the use of propane and purchased a propane fueled lawnmower. | X | | |
| MDPR | Looked into and applied for a grant to purchase solar powered trash/recyclable garbage can that minimizes manpower, plastic liner and vehicular usage. By compacting the reduction of pick-ups is reduced by as much as 75%. | X | | |
| MDPR | Open Space Master Plan finalized | X | | X |
| MDPR | Using in-house warehouse staff to purchase (larger quantity) distribute, and collect (recycle) its supplies by controlling and limiting the number of (special) deliveries and combining delivery | X | | |

| | | | | |
|------|---|---|---|---|
| | and pickup of supplies and recyclables to reduce VMT. | | | |
| MDPR | Procurement of mulching lawnmowers. Xeriscaping and low and reduced flow irrigation currently being utilized in some areas. | X | | |
| PWD | Survey of existing PW buildings and facilities to determine where potential energy conservation measures could be initiated. | | X | X |
| PWD | Retrofitting traffic signal by replacing Incandescent Bulbs with Light Emitting Diodes reducing energy and maintenance costs. | X | X | X |
| PWD | Pilot program with pedestrian signal crossing signals powered by solar energy. | X | X | X |
| PWD | Public Works implemented a plan to reduce overall fuel usage by 10%. | X | | |
| PWD | Explore replacement of heavy equipment with high efficiency models when service life of existing equipment ends. | | X | |
| PWD | Ongoing roadway and intersections improvements to improve capacity and roadway resurfacing projects to reduce friction and help residents reduce fuel use and emissions. | X | | |
| PWD | Installation of ATMS (Automated Traffic Signalization Systems) and updating the sequencing of traffic signalization to reduce travel time and fuel consumption caused by slow traffic flow. | X | | X |
| DSWM | Resources Recovery – waste disposed of through waste-to-energy process which offsets other fuel use and reduces landfill disposal of waste and associated methane emissions. | X | | |
| DSWM | Resources Facility Recycling - ferrous metals recovery | X | | |
| DSWM | Resources Recovery RTI/Yard Trash/Biomass project – Produces a fuel from yard trash and displaces fossil fuels for energy production | X | | |
| DSWM | Resources Recovery propane tank recycling | X | | |
| DSWM | Resource Recovery facility water reuse - reuse within facility reduces necessary treatment and energy consumption | X | | |
| DSWM | Methane collection and destruction at landfills - converts very potent GHG, methane, to less potent GHG, carbon dioxide | X | | |
| DSWM | Restored coastal and fresh water wetlands at South Dade, Old South Dade, Resources Recovery and 58 th Street Landfills (potential carbon sequestration) | X | | |
| DSWM | White Goods collection at neighborhood Trash and Recycling Centers | X | | |
| DSWM | Landfill segregation and scrap metal recycling programs | X | | |
| DSWM | CFC Extraction from discarded refrigerators and air conditioners to reduce GHG emissions. | X | | |
| DSWM | Residential Curbside Recycling Program including public education component to increase participation / efficiency rates | X | | X |
| DSWM | Enhanced Multi-Family & Commercial Recycling Education & Enforcement Initiative | X | | X |
| DSWM | Household Hazardous Waste (HC2) recycling program | X | | |
| DSWM | E-waste Recycling | X | | |
| DSWM | self-contained Oil Conditioning System continuously purifies engine oil, eliminating the need to change oil) | X | | |
| DSWM | Methane collection and use at landfills for energy generation | | X | X |
| DSWM | Developing a project using alternative fuels | | X | |
| DSWM | Researching reforestation opportunities for carbon sequestration | | X | |
| DSWM | Researching use of recycled tires as drainage element in landfills | | X | |
| DSWM | Researching use of nitrogen in tires | | X | |
| DSWM | Researching hybrid garbage trucks for a pilot initiative | | X | |
| DSWM | Researching Truck Hydraulic Launch Assist for a pilot initiative | | X | |
| DSWM | Researching use of ash in roadbed and/or asphalt | | X | |

| | | | | |
|----------------------|--|---|---|---|
| DSWM | Researching opportunities for tire recycling | | X | |
| MDT | Biodiesel Pilot Project | | X | |
| MDT | Hybrid Bus Acquisition | X | X | |
| MDT | Providing mass transit (bus and train) to residents | X | | |
| MDT | Installation and maintenance of solar powered bus shelters Almost all conventionally powered bus shelters in unincorporated MDC have been replaced with solar powered shelters. | X | X | |
| WASD | Implementing a 20-Year Water Conservation Plan. | X | | |
| WASD | Implementing a Water Loss Reduction Program that is expected to produce water savings of 14.25 MGD per day over the next 20 years | X | | |
| WASD | Maximizing methane gas production and delivery from sludge processing at South and Central wastewater treatment plants | X | | |
| WASD | Piping of landfill gas to SDWWTP to generate energy | X | | X |
| WASD | Developing a Biosolids Master Plan to include improving the quality of biosolids to a higher grade of soil conditioner | X | | |
| WASD | Reducing groundwater infiltration through the Pump Station Optimization Program by allowing sewage level in wet wells to rise and thus reduce groundwater infiltration when substantial flow increases occur | X | | |
| WASD | Supporting the County Ordinance adopting new water use efficiency requirements of the Florida Building Code. | X | | |
| WASD | Energy surveys | X | | |
| WASD | Determination of lighting and controls appropriateness for WASD facilities | | X | |
| WASD | Technology utilization, i.e., electronic meter reading meter, on-line pump station design and construction specification | | X | |
| WASD | Purchase of solar powered Movement of Traffic (MOT) equipment | | X | |
| WASD | EPA certified "Energy Star" equipment purchasing | X | | |
| WASD | Process improvement Team (PIT) formation to look for more ways to reduce energy consumption | X | | |
| Multiple Departments | Staff encouraged to power down or turn-off non-emergency equipment and lights when not in use to conserve energy | X | | |

| | | | | |
|--|--|--|--|--|
| | <p>Analysis of fleet to remove under-utilized and under-performing vehicles; replacing regular size trucks with compact trucks and replacing existing vehicles with hybrids or more fuel-efficient vehicles when due for retirement</p> <p>Automatic Idle Shutoff programs</p> <p>Inspection/routes analyzed to reduce VMT and fuel consumption; trip chaining encouraged; employees encouraged to carpool or use teleconferencing to meetings, trainings, and presentations</p> <p>Purchase and track procurement of recycled and environmentally preferable items</p> <p>Paper reduction efforts; electronic submittals for plan reviews, permitting, etc. and employees encouraged to use e-mail</p> <p>Recycle printer cartridges and mixed paper, metals, other equipment and materials</p> <p>Silver LEED certification for all new construction and major remodeling projects that meet criteria of Sustainable Buildings Ordinance</p> <p>LEED certification of department staff</p> | | | |
|--|--|--|--|--|

DRAFT

Appendix B: County Adaptation Projects

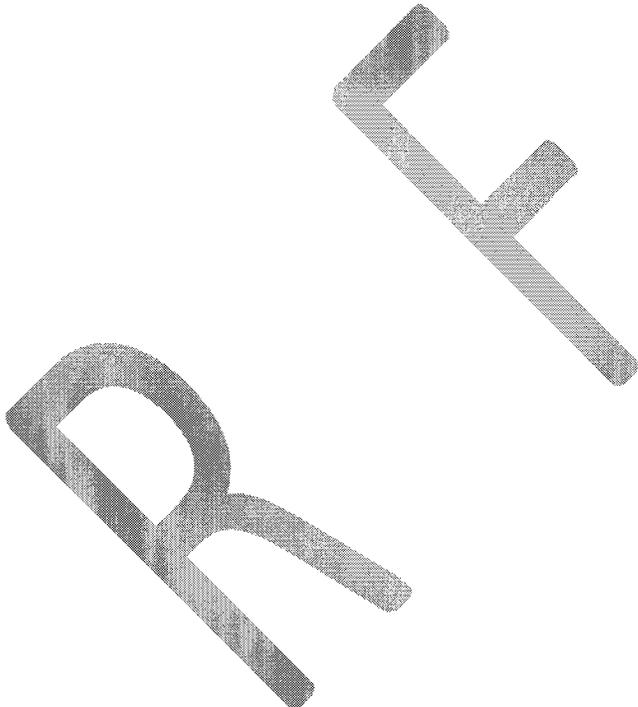
Adaptation efforts include proactive steps that can be taken to make the County more resilient to climate change impacts that we are likely to experience.

| Organization | Brief Project Description | Existing Project | Future Project |
|---------------------|--|------------------|----------------|
| BCCO | Explore the local adoption of the gray water recycling appendix of the Florida Building Code, Residential. | X | |
| BCCO | Prepare uniform guidelines for the installation of rainwater catchment systems to allow for development of supplementary decentralized water supply. | | X |
| Building Department | Enforcement of special code regulations for structures built seaward of the coastal construction line. | X | |
| Building Department | Adopt more stringent regulations of the high-velocity hurricane zones contained in the building code. | X | |
| Building Department | Enforcement of County Ordinance 94-154 relating to grey water disposal systems | X | |
| Building Department | Enforcement of County Ordinance 8-14 relating to water use efficiency standards starting January 1, 2009. | X | |
| Consumer Services | Florida Yards and Neighborhoods Homeowners Association Irrigation Retro-fit Program - will save 2,893,860 gallons/yr. | X | X |
| DERM | Miami-Dade County Beach Erosion Control and Hurricane Surge Protection Project | X | |
| DERM | Sea Level Rise Scenario Mapping and Terrain Model Development | X | |
| EM&HS | Local Mitigation Strategy | X | |
| EM&HS | Collaborating with FIU and SFRPC to assess impact of rising sea level on building codes and finished floor elevations | X | |
| EM&HS | Collaborate with Building Department to evaluate potential changes in finished floor elevation determinations and their impact on future construction of all structures, public and private, especially critical infrastructure in Miami-Dade County | | X |
| EM&HS | Evaluate evacuation routes to identify roadways that may be affected by inundation due to the rise in sea level | | X |
| EM&HS | Review county-wide climate change mitigation and adaptation proposals to assess their consequences relative to public safety emergency management operations | | X |
| MDPR | Explore alternative decentralized energy sources such as solar powered lighting and heating for marinas, parks, and golf courses. | | X |
| Public Works | Pilot program utilizing decentralized solar electricity source to power pedestrian signal crossing | X | |

| | | | |
|--------------|--|---|---|
| Public Works | Revision to the minimum standards in the PW Manual focusing on possible changes to design storm frequency for different road classifications. Incorporation of revised flood criteria to reflect new flood elevations | | X |
| Public Works | Revision to criteria and minimum standards in the PW Manual focusing on flood criteria map to include establishing new street grade and building first floor elevation requirements that exceed current County and FEMA standards (for both municipal and County projects) | | X |
| Public Works | Revision to the minimum standards in the PW Manual focusing on drainage standards to address possible changes to municipal zoning designations, South Florida Water Management Drainage Manual, FDOT, Department of Environmental Regulation and DERM. | | X |
| WASD | WASD is working with the USGS to study the effects of climate change and potential sea level rise on water resources, such as salt water intrusion, impacts on public drinking water supply, flood protection, and infrastructure impacts. | X | |
| WASD | The County's 20-Year Water Use Permit requires WASD to replenish the groundwater to augment the water supply. A southward flow of fresh water will be created through the ecosystem that will help counteract rising seas in the very shallow wetlands. | | X |

Appendix C: Acronyms

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| BCC | Miami-Dade Board of County Commissioners |
| GHG | Greenhouse gases |
| GSA | Miami-Dade General Services Administration |
| MDC | Miami-Dade County |
| MDPIC | Miami-Dade Permitting and Inspection Center |
| OECD | Organization for Economic Cooperation and Development |
| DERM | Miami-Dade Department of Environmental Resources Management |



Appendix D: References

DATA