Southeast Florida Regional Climate Compact

Regional Greenhouse Gas Emissions Inventory
Baseline Period: 2005 - 2009

Produced by the Regional Compact GHG Inventory Working Group

November 2011

SOUTHEAST FLORIDA REGIONAL COMPACT CLIMATE CHANGE

Credits and Acknowledgements

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Executive Summary

In October 2009, Broward, Miami-Dade, Monroe and Palm Beach Counties announced the creation of the Southeast Florida Regional Climate Change Compact with mutual commitments to coordinate their respective energy and climate public policy positions, work together to create a Regional Climate Action Plan and to meet annually in Regional Climate Summits to mark progress. One specific commitment of the Compact Counties - the development of a Regional Greenhouse Gas Emissions (GHG) Inventory - is completed with the publication of this document. This report highlights the findings of the GHG emissions inventory and provides an emissions baseline against which future progress in reducing emissions across Southeast Florida can be measured.

The formation of the Regional Climate Compact occurred in the immediate aftermath of the Great Recession of 2008-2009, presenting a challenge in establishing a baseline year for regional emissions for Southeast Florida. This analysis presents emissions data from the period 2005 – 2009, a period that includes two years of robust economic activity and three years of recessionary and modest recovery activity from which an average annual emissions profile can be obtained. Data collection focused on four main areas of regional emissions: Residential, Commercial, Industrial and Transportation.

Regional emissions, across all scopes, were approximately 64.9 million metric tons of CO_2e ($MMTCO_2e$) in 2009, down from 69.7 $MMTCO_2e$ in 2005 (Table ES1). As is evident in Figure ES1 and Table ES1, all sectors included in the Regional Inventory peaked in total emissions in 2006 and declined in the following three years, consistent with the performance of the national and regional economies during this period.

Figure ES1: Regional Emissions by Sector 2005 - 2009

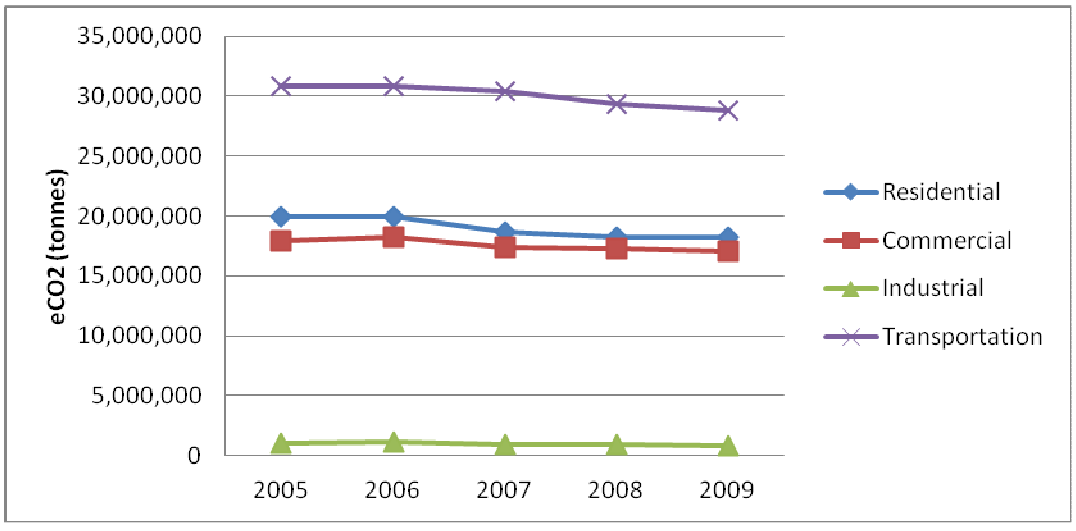


Table ES1: Regional Emissions by Sector (metric tons CO_2e)

Sector	2005	2006	2007	2008	2009
Residential	19,963,638	19,989,441	18,685,833	18,186,886	18,237,990
Commercial	17,884,892	18,212,352	17,356,620	17,314,930	17,083,809
Industrial	1,075,979	1,103,572	961,883	888,111	811,016
Transportation	30,793,879	30,853,046	30,373,200	29,300,926	28,784,969
Totals	69,718,390	70,158,412	67,377,537	65,690,854	64,917,785

Figure ES2: Emissions by Sector - 2005 vs. 2009

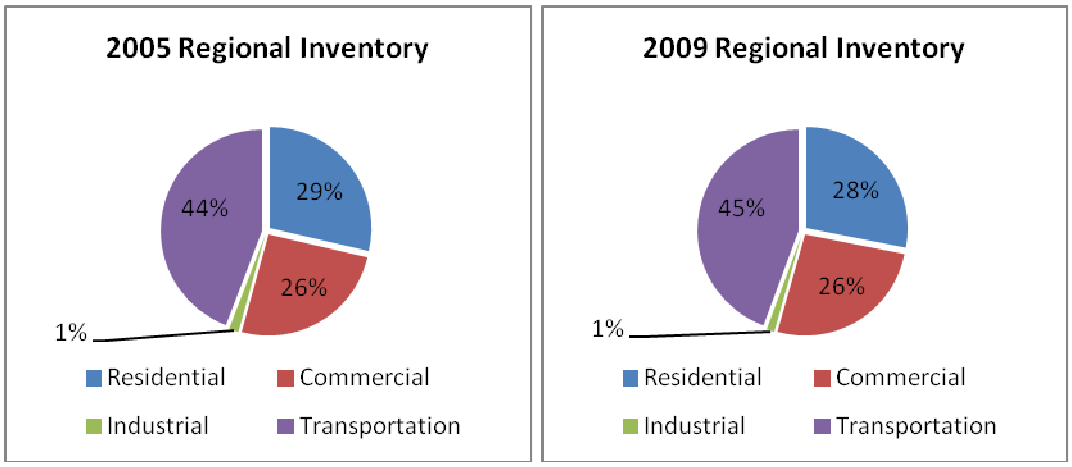


Figure ES2 provides an overview of the contribution of each sector examined to total emissions in 2005 and 2009.

In addition to projects already implemented or underway within the four Compact Counties or the more than 100 municipalities within Southeast Florida, the Compact Counties will consider additional emission reduction strategies for inclusion in its forthcoming Regional Climate Action Plan. The Regional GHG Inventory Team will continue to update this inventory as additional data become available and use these studies to measure the Compact's progress in reducing regional GHG emissions.

Introduction

The parties to the Southeast Florida Regional Climate Change Compact [Broward, Miami-Dade, Monroe and Palm Beach Counties] recognize that greenhouse gas (GHG) emissions from human activity are catalyzing profound changes in climate and weather, the consequences of which pose substantial risks to the future health, wellbeing, and prosperity of the planet. In response, the Compact Counties have taken action to understand the sources of these emissions across the Southeast Florida region through the completion of a GHG emissions inventory. The results of that study are included in this report. By acting quickly to reduce GHG emissions, Southeast Florida stands to benefit by reducing the impacts of climate change. The detailed findings of this report provide a profile of emissions sources across the region, information that is key to guiding local reduction efforts. This inventory is also useful in establishing a benchmark or emissions baseline Compact Counties can later use to evaluate efforts by comparing GHG emission levels over time.

The Southeast Florida Regional Climate Change Compact was announced at the First Regional Climate Leadership Summit in October 2009 in Fort Lauderdale. Commissioners representing Broward, Miami-Dade, Monroe and Palm Beach Counties announced their intention of sponsoring the draft Regional Compact before their respective County Commissions. By January 2010, each of the four Boards of County Commissioners had adopted the Compact, bringing the core commitments of the Compact into force. The Compact commitments include:

- Development of joint federal and state policy positions on climate related issues, which includes:
    - recognizing the unique vulnerabilities of Southeast Florida to the impacts of climate change,
    - allocating funding based on vulnerability,
    - supporting enhanced levels of participation in regional adaptation projects,
    - supporting energy and climate security and a renewable energy portfolio standard for the State.
- Development of a Southeast Florida Regional Climate Change Action Plan, which includes:
    - conducting a regional greenhouse gas emissions inventory (with a particular focus on emissions from inter-county travel and commerce);
    - developing regional climate impacts planning scenarios incorporating sea-level rise and other potential impacts;
    - developing climate mitigation and adaptation measures for each of the three sectors included in the compact: land use, regional transport, and the built environment.
- Annual participation in regional summits to mark progress.

The primary purpose of the Regional Compact is to enable the four Counties of Southeast Florida to work collectively, efficiently and effectively with each other as well as with state and federal agencies to reduce GHG emissions and to regionally address key vulnerabilities to the impacts of climatic change over the coming decades. In developing the Regional Compact, the Counties recognized the scope of effort was appropriately regional in nature – Compact activities are meant to augment rather than supersede the sustainability and climate initiatives of the four Compact Counties or the many municipal initiatives underway among the 108 municipalities within the Compact region. It should be noted that three of the four Compact Counties have completed county-level emissions inventories to date and that all four are actively implementing previously developed Climate Action Plans or related programs funded in whole or in part by the Energy Efficiency & Conservation Block Grant via the American Recovery & Reinvestment Act of 2009.

Presented here are estimates of greenhouse gas emissions resulting from select activities within Southeast Florida during the five-year baseline period 2005 - 2009. While established GHG inventory protocols were used in compiling this regional inventory, it is by design focused only on the sectors of greatest interest to the Regional Compact and the Regional Climate Action Plan. Omitted here are emissions data from government operations including water infrastructure, waste management among other sectors. While this resulting inventory is incomplete by accepted inventory standards, it serves its primary utility by providing emissions data for the sectors of greatest concern and highest potential for coordinated regional action.

Inventory Methodology

Quantifying Greenhouse Gas Emissions

The first step toward achieving tangible greenhouse gas emission reductions requires identifying baseline levels and sources of emissions in the community. As local governments have continued efforts to reduce emissions, the need for a standardized approach to quantify GHG emissions has proven essential. Standard processes of accounting for emissions have been developed to which this inventory adheres. The Regional Compact's GHG Inventory Team used the International Local Government GHG Emissions Analysis Protocol (IEAP) to inventory emissions across the four counties of Southeast Florida.

Establishing a Base Year

A primary aspect of the GHG emissions inventory process is the need to select a base year with which to compare future emissions over time. The formation of the Regional Compact occurred at a moment of economic dislocation unprecedented in the nation's post-World War II experience. Given that the existing County-level inventories used differing baseline years (2005, 2007 and 2008) and further, that significant state and federal energy policy changes and grants to local governments will alter future emissions trajectories, the Compact Staff Steering Committee directed the Regional GHG Team to obtain five years of emissions data from the period 2005 – 2009 from which to derive an emissions baseline for the Regional Compact. The five-year period includes two years of robust economic activity and three years of recessionary and modest recovery activity (the region was among the first to experience the effects of the 2007-2008 recession) from which an average annual emissions profile can be obtained. After considering the amount and types of data available for each of several recent years, this greenhouse gas emissions inventory utilizes a five-year average of emissions from 2005 - 2009 as the base year.

Establishing Boundaries

Setting an organizational boundary for greenhouse gas emissions accounting and reporting is an important step in the inventory process. The Southeast Florida Regional Climate Compact community inventory assesses emissions resulting from activities taking place within the geopolitical boundaries of Broward, Miami-Dade, Monroe and Palm Beach Counties and includes the municipalities therein. The IEAP defines geopolitical boundary as that "consisting of the physical area or region over which the local government has jurisdictional authority." Activities that occur within this boundary can be, for the most part, controlled or influenced by each county's policies and educational programs. Although the Compact Counties may have limited influence over the level of emissions from some activities, it is important that every effort be made to compile a complete analysis of all activities that result in greenhouse gas emissions.

Emission Types

ICLEI's International Local Government Emissions Protocol (IEAP) assesses emissions from the six internationally recognized greenhouse gases regulated under the Kyoto Protocol as listed in Table 1. Given the scope of the Regional Climate Action Plan as established by the Regional Compact, primary attention was given to CO_2, methane and nitrous oxide. Greenhouse gas emissions are commonly aggregated and reported in terms of equivalent carbon dioxide units, or CO_2e. This standard is based on the Global Warming Potential (GWP) of each gas, which is a measure of the amount of warming a greenhouse gas may cause, measured against the amount of warming caused by carbon dioxide. Converting all emissions to equivalent carbon dioxide units allows for the consideration of different greenhouse gases in comparable terms. For example, methane is twenty-one times more powerful than carbon dioxide on a per weight basis in its capacity to trap heat, so one metric ton of methane emissions is equal to 21 metric tons of carbon dioxide equivalents. See Table 1 for the GWPs of the commonly occurring greenhouse gases.

Table 1: Greenhouse Gases

Greenhouse Gas	Chemical Formula	Global Warming Potential
Carbon Dioxide	**CO_2**	**1**
Methane	**CH_4**	**21**
Nitrous Oxide	**N_2O**	**310**
Hydrofluorocarbons	**Various**	**43-11,700**
Perfluorocarbons	**Various**	**6,500-9,000**
Sulfur Hexafluoride	**SF_6**	**23,900**

Quantification Methods

Greenhouse gas emissions can be quantified in two ways:

- Measurement-based methodologies refer to the direct measurement of greenhouse gas emissions (from a monitoring system) emitted from a flue of a power plant, wastewater treatment plant, landfill, or industrial facility.
- Calculation-based methodologies calculate emissions using activity data and emission factors. To calculate emissions accordingly, the basic equation is used: $Activity\ Data \times Emission\ Factor = Emissions$

Activity data refer to the relevant measurement of energy use or other greenhouse gas-generating processes such as fuel consumption by fuel type, metered annual electricity consumption, and annual vehicle miles traveled. This Regional Emissions Inventory used calculation-based methodologies to determine the emissions presented in this report.

Known emission factors are used to convert energy usage or other activity data into associated quantities of emissions. Emissions factors are usually expressed in terms of emissions per unit of activity data (e.g. lbs CO_2/kWh of electricity). Table 2 demonstrates an example of common emission calculations that use this formula.

Table 2: Basic Greenhouse Gas Emissions Calculations

Activity Data	Emissions Factor	Emissions
Electricity Consumption (kWh)	**CO_2 emitted/kWh**	**CO_2 emitted**
Natural Gas Consumption (therms)	**CO_2 emitted/therm**	**CO_2 emitted**
Gasoline/Diesel Consumption (gallons)	**CO_2 emitted /gallon**	**CO_2 emitted**
Vehicle Miles Traveled	**CH_4, N_2O emitted/mile**	**CH_4, N_20 emitted**

The ICLEI Clean Air and Climate Protection 2009 (CACP 2009) software defines regional variations in emission factors from electricity production using the regions of the country as defined by the North American Electric Reliability Council (NERC) and corresponds to grid-connected electricity-producing regions. The Southeast Florida region is located within NERC region 08 – Southeastern Electric Reliability Council/ Florida.

Clean Air and Climate Protection 2009 (CACP 2009) Software

To facilitate community efforts to reduce greenhouse gas emissions, ICLEI developed the CACP 2009 software package in partnership with the National Association of Clean Air Agencies (NACAA) and the U.S. Environmental Protection Agency (EPA). CACP 2009 is designed for compatibility with the LGOP and determines emissions by combining activity data (energy consumption, waste generation, etc.) with verified emission factors.

The CACP software has been and continues to be used by over 600 U.S. local governments to reduce their greenhouse gas emissions. However, it is worth noting that, although the software provides governments with a sophisticated and useful tool, calculating emissions from energy use with precision is difficult. Calculating GHG emissions depends upon numerous assumptions, and it is limited by the quantity and quality of available data. With this in mind, it is useful to think of any specific number generated by the CACP 2009 software as an approximation of reality, rather than an exact value.

Evaluating Greenhouse Gas Emissions

Greenhouse Gas Emissions by Scope

For both community and government operations, emissions sources are categorized relative to the geopolitical boundary of the community or the operational boundaries of the government. Emissions sources are categorized as direct or indirect emissions – Scope 1, Scope 2, or Scope 3. The prevention of double counting for major categories such as electricity use and waste disposal is one of the most important reasons for using the scopes framework for reporting greenhouse gas emissions at the local level.

The Scopes framework identifies three emissions scopes for community emissions:

- **Scope 1:** All direct emissions from sources located within the geopolitical boundary of the local government.

- **Scope 2:** Indirect emissions associated with the consumption of purchased or acquired electricity, steam, heating, and cooling. Scope 2 emissions occur as a result of activities that take place within the geopolitical boundary of the local government, but that rely upon emissions-producing processes located outside of the government's jurisdiction.
- **Scope 3:** All other indirect or embodied emissions not covered in Scope 2 that occur as a result of activity within the geopolitical boundary.

Scope 1 and Scope 2 sources are the most essential components of a community greenhouse gas analysis as these sources are typically the most significant in scale, and are most easily affected by local policy making. This Regional Inventory utilizes only Scope 1 and Scope 2 data.

Greenhouse Gas Emissions by Sector

In addition to categorizing GHG emissions by scope, this inventory examines emissions by sector. Many local governments find a sector-based analysis more relevant to policy making and project management, as it assists in formulating sector-specific GHG reduction measures and climate action plan components. This inventory evaluates community emissions by the sectors noted in bold text in Table 3. Government Sector emissions were not analyzed as part of the Regional Inventory initiative as they were deemed to be below the scope of a regional initiative.

Table 3: Community and Government Sectors

Community	Government
Residential	Buildings
Commercial/ Industrial	Streetlights
Transportation	Vehicle Fleet
Regional Sources	Employee Commute
	Water / Sewage
	Waste

Inventory Results

Greenhouse Gas Emissions by Sector and County

Regional emissions, across all scopes, were approximately 64.9 million metric tons of CO_2e in 2009, down from 69.7 $MMTCO_2e$ in 2005. As is evident in Figure 1 and Table 4 below, all sectors included in the Regional Inventory peaked in total emissions in 2006 and declined in the following three years, consistent with the performance of the national economy during this period.

Figure 3: Regional Emissions by Sector 2005 - 2009

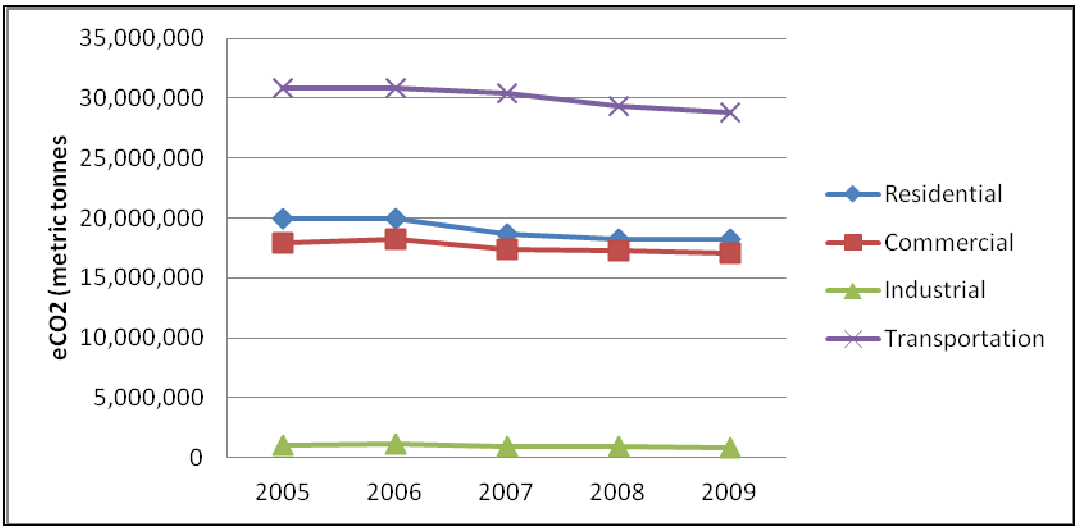
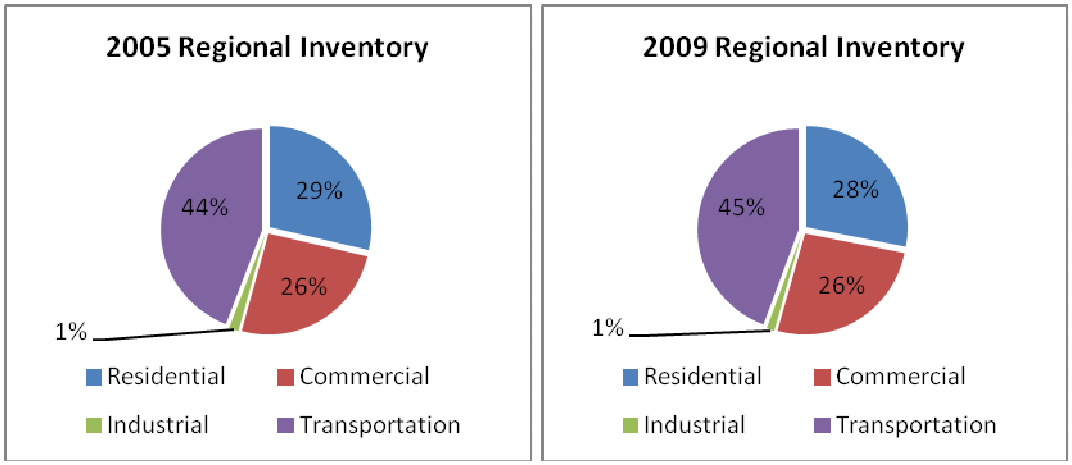


Table 4: Regional Emissions by Sector (metric tons CO_2e)

Sector	2005	2006	2007	2008	2009
Residential	19,963,638	19,989,441	18,685,833	18,186,886	18,237,990
Commercial	17,884,8920	18,212,352	17,356,620	17,314,930	17,083,809
Industrial	1,075,979	1,103,572	961,883	888,111	811,016
Transportation	30,793,879	30,853,046	30,373,200	29,300,926	28,784,969
Totals	69,718,390	70,158,412	67,377,537	65,690,854	64,917,785

The declines in regional emissions observed following the 2006 peak appear to be fairly uniform across sectors when presented in graphic form as in Figure 2 below:

Figure 4: Emissions by Sector - 2005 vs. 2009



But a tabular presentation of the percent change in sector emissions indicates that the largest declining sector by far is the Industrial Sector with a nearly 25% decline in 2009 emissions from 2005. The Residential Sector shows nearly a 9% decline over this time.

Table 5: Percentage Change in Emissions by Sector, 2005 to 2009

Sector	2005	2006	2007	2008	2009
Residential	-	**0.13%**	**-6.40%**	**-8.90%**	**-8.64%**
Commercial	-	**1.83%**	**-2.95%**	**-3.19%**	**-4.48%**
Industrial	-	**2.56%**	**-10.60%**	**-17.46%**	**-24.63%**
Transportation	-	**0.19%**	**-1.37%**	**-4.85%**	**-6.52%**
Totals	-	**0.63%**	**-3.36%**	**-5.78%**	**-6.89%**

Emissions from the Transportation Sector accounted for 44% percent of total regional emissions in 2005 and 45% in 2009. Electricity and natural gas consumption within the Residential Sector contributed 29% of the Region's overall emissions in 2005 and 28% in 2009. The relative proportional contributions of the respective sectors observed in the Regional Inventory comport well with previous inventories prepared by individual counties in Southeast Florida and for the State of Florida as a whole. As is the case in each of these instances, the Transportation Sector is proportionally higher in Southeast Florida than is the case for the United States as a whole. See below for further detail on each sector.

The contributions of each Compact County to regional emissions over the 2005 – 2009 display a similar pattern with a peak in 2006 and declining emissions in the subsequent years, as is evident in Figure 3 and Table 5 below.

Figure 5: Emissions by County - 2005 vs. 2009

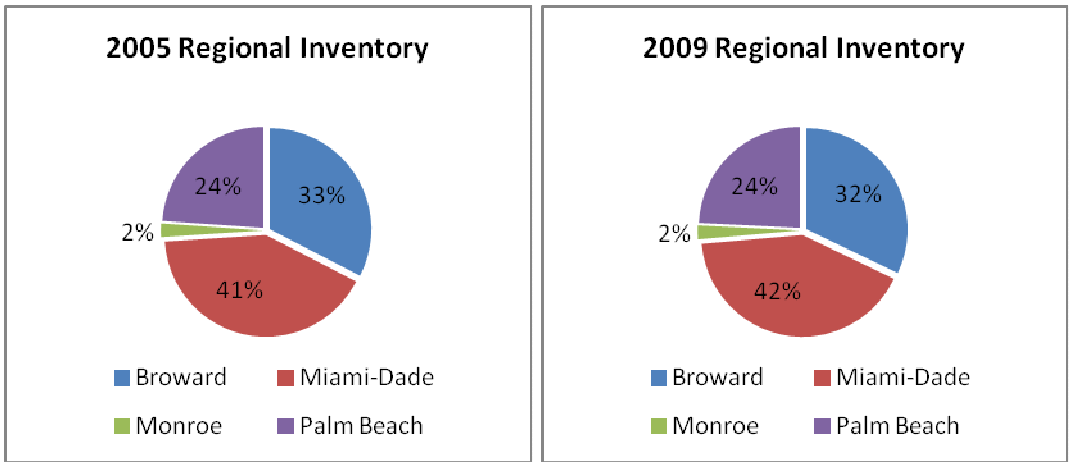


Table 6: Regional Emissions by County (metric tons CO_2e)

Sector	2005	2006	2007	2008	2009
Broward	22,655,421	22,657,880	21,921,832	21,216,712	20,810,719
Miami-Dade	28,715,847	29,058,677	27,832,307	27,057,988	26,859,326
Monroe	1,504,047	1,532,500	1,465,634	1,408,288	1,417,206
Palm Beach	16,588,536	16,658,369	15,920,070	15,785,752	15,675,174
Regional Sources	254,537	250,984	237,691	222,113	155,359
Totals	69,718,390	70,158,412	67,377,537	65,690,854	64,917,785

The Region as a whole saw a 6.9% reduction in emissions of the five-year period with Broward County showing the largest percentage reduction in emissions at 8.1% as noted in Table 6 below:

Table 7: Percentage Change in Emissions by County, 2005 to 2009

Sector	2005	2006	2007	2008	2009
Broward	-	0.01%	-3.24%	-6.35%	-8.14%
Miami-Dade	-	1.19%	-3.08%	-5.77%	-6.47%
Monroe	-	1.89%	-2.55%	-6.37%	-5.77%
Palm Beach	-	0.42%	-4.03%	-4.84%	-5.51%
Totals	-	0.63%	-3.36%	-5.78%	-6.89%

It is important to reiterate here that this Regional GHG Emissions Inventory focused on emissions from the built environment and transportation sectors and aren't immediately comparable to County level GHG emissions inventories prepared by individual Compact Counties. The latter will have included emission sources from water and waste management while accounting for emissions from local government operations separately from community emissions.

Residential, Commercial and Industrial Sectors

The primary source of energy – and emissions – for the residential, commercial and industrial sectors within Southeast Florida is electricity. Natural gas emissions are three orders of magnitude below that of electricity. Combined, these sectors accounted for 55% of regional emissions in 2009. Data for electricity consumption within the Compact Counties were obtained from Florida Power & Light, the Lake Worth Municipal Utility, the Homestead Municipal Utility, the Florida Keys Electric Cooperative and Keys Energy Services. Data for natural gas consumption were obtained from TECO Peoples Gas and Florida City Gas. Data on residential equipment usage, such as lawnmowers or on-site electricity generation, is not included in this inventory.

The reductions in observed emissions over the five-year period can be at least partly attributed to the prevailing economic climate. While many green and/or energy efficiency initiatives have been launched by cities and counties in the Southeast Florida Region during this five-year period, other data suggest that the pronounced recessionary economy is likely the primary reason for the observed emission reductions. Table 8 presents the change in local population observed during the five-year period:

Table 8: Estimated Population on July 1 – U.S. Census Bureau

Sector	2005	2006	2007	2008	2009
Broward	1,766,620	1,762,334	1,746,968	1,753,262	1,766,476
Miami-Dade	2,413,583	2,438,702	2,453,567	2,478,745	2,500,625
Monroe	76,135	74,104	73,420	73,298	73,165
Palm Beach	1,262,956	1,265,707	1,264,648	1,269,745	1,279,950
Totals	5,519,294	5,540,847	5,538,603	5,575,050	5,620,216
Florida	17,783,868	18,088,505	18,277,888	18,423,878	18,537,969

Table 9: Population Change Relative to July 1, 2005 – U.S. Census Bureau

Sector	2005	2006	2007	2008	2009
Broward	-	-0.24%	-1.11%	-0.76%	-0.01%
Miami-Dade	-	1.04%	1.66%	2.70%	3.61%
Monroe	-	-2.67%	-3.57%	-3.73%	-3.90%
Palm Beach	-	0.22%	0.13%	0.54%	1.35%
Totals	-	0.39%	0.35%	1.01%	1.83%
Florida	-	1.71%	2.78%	3.60%	4.24%

The relatively low growth rate (as compared to historical averages) and small losses of population in Broward and Monroe Counties are likely attributable to out-migration for workers previously employed in the region's construction and real estate development sectors. Further evidence is offered by data submitted by Florida Power & Light (FP&L) to the Federal Energy Regulatory Commission in annual Form 1 Filings, which shows a decline in residential sales.

Table 10: FP&L Electric Sales – Residential Sector, 2005 – 2009; FERC Form 1

Residential Sector	2005	2006	2007	2008	2009
MWh Sold	54,348,188	54,570,485	55,138,456	53,226,815	53,949,528
%Change from 2005	-	0.41%	1.45%	-2.06%	-0.73%
Avg Customers	3,828,375	3,906,270	3,981,453	3,992,262	3,984,496
KWh Sales/Customer	14,196	13,970	13,849	13,333	13,540
MWh = Megawatt hours of electricity sold/consumed; KWh = Kilowatt hours of electricity sold/consumed					

The Commercial Sector demonstrates greater resilience over this period, even showing an increase in average commercial customers throughout the depth of the recession. These data cover the entire FP&L service territory that extend well north and west of the Southeast Florida Regional Climate Compact boundaries, but provide useful context for understanding recent trends.

Table 11: FP&L Electric Sales – Commercial Sector, 2005 – 2009; FERC Form 1

Commercial Sector	2005	2006	2007	2008	2009
MWh Sold	43,467,783	44,487,284	45,920,842	45,561,429	45,024,713
%Change from 2005	-	2.35%	5.64%	4.82%	3.58%
Avg Customers	469,976	478,869	493,131	500,751	501,058
KWh Sales/Customer	92,489	92,901	93,121	90,986	89,859

As Southeast Florida recovers from the Great Recession, the key challenge is to continue with investments in energy efficiency and renewable energy in order to facilitate commerce without dramatically increasing emissions. The outlook for emissions in the Residential, Commercial and Industrial Sectors of Southeast Florida is positive: FP&L has installed 110MW of solar generation capacity and is currently repowering generation units to achieve greater efficiencies in power generation. These developments will further reduce the emissions factors for the electric power serving the Southeast Florida region. Further, local governments across the four Compact Counties are making significant investments in energy efficiency and renewable energy made possible through the ARRA. Each of these developments will contribute to the region's future emissions performance.

Transportation Sector

As previously discussed, Southeast Florida's Transportation Sector accounted for nearly 28.8 MMTCO2e or 45% of the region's 2009 GHG emissions. The Transportation Sector analysis includes emissions from all vehicle use within the four Compact County boundaries (whether on local roads or State highways passing through the Compact Counties' jurisdiction), Transportation emissions from the movement of goods through regional ports were not included in the Transportation Sector analysis.

The vast majority of transportation-related greenhouse gas emissions were generated from vehicle miles traveled (VMT) on state highways and on local roads within the Compact Counties. Data for the Transportation Sector were obtained from the Florida Department of Transportation and portray average VMT on a state fiscal year basis. Railroads

generated a small percentage of transportation-related greenhouse gas emissions, but are treated in the "Regional Sources" section that follows. Emissions from air travel were not included in the Transportation Sector analysis.

Regional Emissions

In developing the Regional Emissions Inventory for Southeast Florida, we chose to treat two classes of emissions as "regional emissions" including street lighting and railroad emissions. For the former, separate data for street lighting was not available from Monroe County (those data are included in Residential and Commercial data). Rather than attempt to apportion these data into specific county-level energy usage within the other three counties, we chose to assign emissions associated with street lighting to the Regional Emissions category. Total emissions associated with street lighting make a relatively small component of regional emissions, amounting to 155,359 metric tonnes of CO_2e in 2009, or about one quarter of one percent of total regional emissions that year.

Railroads, including Amtrak, CSXT, FEC and Tri-Rail, operate in Palm Beach, Broward and Miami-Dade Counties. We were able to obtain sufficient data from the respective railroads to estimate emissions for the period 2005 – 2008. Data for 2009 were not available. Total contributions to regional emissions from these four railroad operations average 75,000 metric tonnes CO_2e on an annual basis, or about one eighth of one percent of total regional emissions. We report total regional emissions for 2009 with these railroad data omitted as its impact is barely material to total regional emissions for 2009.

Toward a Regional Emissions Baseline

For purposes for establishing an emissions baseline for the Southeast Florida Regional Climate Compact, the following table provides an average by sector from the years 2005 through 2009. We propose to use this 5 year average as the baseline against which to assess future performance in reducing emissions.

Table 12: Regional Emissions by Sector (metric tons CO_2e)

Sector	2005	2006	2007	2008	2009	Five Year Average
Residential	19,963,638.00	19,989,441.20	18,685,833.10	18,186,886.70	18,237,990.20	**19,012,757.84**
Commercial	17,884,892.70	18,212,352.50	17,356,620.50	17,314,930.10	17,083,809.80	**17,570,521.12**
Industrial	1,075,979.90	1,103,572.30	961,883.70	888,111.50	811,016.60	**968,112.80**
Transportation	30,793,879.80	30,853,046.30	30,373,200.10	29,300,926.30	28,784,969.10	**30,021,204.32**
Totals	69,718,390.20	70,158,412.30	67,377,537.40	65,690,854.60	64,917,785.60	**67,572,596.02**

Appendices

Appendix A - Regional Greenhouse Gas Emissions 2005 - 2009

Scope 1 + Scope 2

	2005	2006	2007	2008	2009
Residential					
eCO2 (metric tonnes)	19,963,638.00	19,989,441.20	18,685,833.10	18,186,886.70	18,237,990.20
Energy (MMBtu)	114,373,669.10	114,409,906.90	115,589,454.20	112,593,056.60	113,067,849.20
Commercial					
eCO2 (metric tonnes)	17,884,892.70	18,212,352.50	17,356,620.50	17,314,930.10	17,083,809.80
Energy (MMBtu)	107,459,145.50	108,622,460.40	111,501,033.80	111,116,419.80	110,127,241.40
Industrial					
eCO2 (metric tonnes)	1,075,979.90	1,103,572.30	961,883.70	888,111.50	811,016.60
Energy (MMBtu)	6,209,619.90	6,369,767.40	5,999,684.60	5,541,354.90	5,065,185.10
Transportation					
eCO2 (metric tonnes)	30,793,879.80	30,853,046.30	30,373,200.10	29,300,926.30	28,784,969.10
Energy (MMBtu)	426,009,136.20	427,857,481.20	421,139,872.70	406,211,643.20	399,023,166.50
Total					
eCO2 (metric tonnes)	69,718,390.20	70,158,412.30	67,377,537.40	65,690,854.60	64,917,785.60
Energy (MMBtu)	654,051,570.70	657,259,615.80	654,230,045.30	635,462,474.50	627,283,442.20

Data generated using ICLEI's Clean Air and Climate Protection 2009 Software.