

City of New Orleans

CARBON FOOTPRINT REPORT

JULY 2009




NEW ORLEANS

Rethink • Renew • Revive

C. Ray Nagin, Mayor

ACKNOWLEDGEMENTS

The Office of Recovery Management wishes to thank everyone who participated in the development of this report. Special thanks to....



Green Light
New Orleans



www.gcrconsulting.com



LOUISIANA
CHAPTER



Report prepared by:

John Moore
Energy and Environmental Policy Analyst
City of New Orleans
jgmoore@cityofno.com

Linda Stone
Policy Associate
Global Green
lstone@globalgreen.org

With assistance from Ryan Foshee, Program Associate for ICLEI-USA South Central, and interns Jessica Akande Oluwabunmi of Tulane University and Simon Warren of Yale University.

Executive Summary	4
Background.....	7
1. ICLEI and the Cities for Climate Protection Campaign	7
2. Science of Global Warming.....	7
3. Projected Impacts of Global Warming on New Orleans and South Louisiana.....	9
Methodology	12
1. Mitigation and Adaptation	12
2. ICLEI’s Five Milestone Process	14
3. Inventory Process	15
4. Quantifying Data.....	15
5. Sources of Data	16
Findings.....	17
1. GHG Emissions from the Community-Wide Inventory	17
Emissions by Type & Scope from Community	19
2. GHG Emissions from the Municipal (Government) Inventory	21
Emissions by Type & Scope from Government.....	23
3. GHG Emissions from Solid Waste Inventory.....	24
4. Comparison of 1998 to 2007 GHG Emissions	25
5. Forecast for Business as Usual Scenario	27
New Orleans’ Climate Action Plan.....	29
1. GreenNOLA.....	29
2. New Orleans Master Plan	30
3. Mayor’s Executive Order to Establish Green Council	31
4. Green Building Ordinance	31
5. Green Job Training	31
6. Sewerage & Water Board Wetlands Assimilation Project	32
7. Louisiana’s Renewable Energy Tax Credit	32
8. Solar America City	33
Community-Wide Emissions Reduction Activities	35
1. The Lower Ninth Ward Center for Sustainable Engagement and Development (CSED)....	35
2. Global Green’s Holy Cross Project.....	36
3. The Make It Right Foundation.....	37
4. Green Light New Orleans	38
5. Enterprise Community Partners	40
6. New Orleans Public Schools.....	41
7. Entergy Residential Solutions Program and Energy Smart	42
8. US Green Building Council, Louisiana Chapter	43
9. The Alliance for Affordable Energy	44
Recommendations.....	45
Works Cited	48

Climate change is one of the most pressing problems of our time. Unless dramatic action is taken globally and locally to reduce greenhouse gas (GHG) emissions and prevent the projected 10°F increase in temperature over the next century, New Orleans will continue to experience the negative impacts of this phenomenon. In addition to increased frequency and intensity of hurricanes, regional impacts may include: higher prices and shortages of basic goods, such as food and energy; increased public expenditures on relief and rebuilding due to extreme weather events; a higher susceptibility to flooding; and a higher rate of infectious diseases and heat-related illnesses and deaths.

New Orleans recognizes its unique position as the most vulnerable city in North America to the effects of global climate change, and aims to position itself as a leader that other municipalities, in the United States and around the world, can follow as they seek to diminish the impact of, and adapt to, global warming in their communities.

Cities for Climate Protection

The City of New Orleans signed onto the International Council for Local Environmental Initiatives (ICLEI)'s Cities for Climate Protection (CCP) Campaign in 1999 with a resolution by then Mayor Marc Morial, which has since been supported and reiterated by Mayor Ray Nagin. The City's leaders have understood how essential it is to develop a framework to tackle climate change challenges. Today, the CCP Campaign is part of standard membership in ICLEI, and all local government members enjoy benefits through their climate mitigation activities including:

- Saving taxpayer dollars through energy efficiency and transportation initiatives
- Building the local economy and creating green jobs (demand for energy efficient services and products, competitive edge)
- Improved air quality and public health (global warming and air pollution go hand in hand)
- Long-term community livability
- Enhanced community engagement
- A legacy of leadership

By way of the Mayor's Resolution, the City agreed to develop and implement a Climate Action Plan (CAP) to reduce energy consumption and associated GHG emissions. In return for the City's efforts, ICLEI provides a wide range of materials and technical support including specialized software for analyzing emissions and annual workshops to meet with other participating municipalities.

Methods

New Orleans' first GHG inventory was completed in 2001, and used 1998 as its baseline year. After Hurricanes Katrina and Rita hit the Gulf Coast in 2005, and the population was drastically diminished, a new baseline emission survey was conducted by the City's Energy Unit, which is located in the Office of Safety and Permits. Mayor Ray Nagin signed on to the development of this carbon emissions report, and committed the city to significant reductions in energy consumption.

This report details the City of New Orleans' activities and findings as a participant in the Cities for Climate Protection (CCP) Campaign and ICLEI member from 1999 to 2009, focusing on the most recent GHG inventory, which 2007 data for its baseline. Included in this document is a quantification of 2007 GHG emissions, comparison to the 1998 data, descriptions of ongoing and proposed reduction measures, and recommendations for going forward.

Under the CCP/ICLEI model, New Orleans’s GHG emissions inventory was conducted by collecting data on all energy consumption and solid waste within the city’s geographic boundaries during 2007, as well as total energy consumption and solid waste generated by the city government for the same base year. With ICLEI’s Clean Air and Climate Protection (CACP) software, these data were used to estimate total community-wide greenhouse gas emissions for the city of New Orleans, and total GHG emissions produced by the city government’s buildings, vehicles, and operations.

Findings

The following table provides data on GHG emissions and other air pollutants that affect air quality in the City. Since the focus of this report is GHGs, there will not be any other discussion on the criteria air pollutants reported below, which were generated using globalized national average percentages. These pollutants, composed of Nitrous Oxide (NOx), sulfuric dioxide (SOx), carbon monoxide (CO), volatile organic compounds (VOC), and a unit of measurement for particles and particle density in the air referred to as particulate matter (PM₁₀), are monitored by the Louisiana Department of Environmental Quality (LDEQ), and at the time these were measured, were not at levels high enough to pose a threat to the health of New Orleans residents.

Ninety-six percent of all GHG emissions in the City of New Orleans come from community-wide sources, and the remaining four percent are generated through the operations of the municipality or city government. Breakdowns of each of these categories are provided below. GHG emissions are measured in equivalent tons of Carbon Dioxide (CO₂e).

Emissions from City of New Orleans for 2007						
Source	Pollutant Type					
	GHG (tons)	NOx (lbs)	Sox (lbs)	CO (lbs)	VOC (lbs)	PM ₁₀ (tons)
Community Emissions	4,467,896	20,326,342	8,253,847	103,523,095	10,667,665	2,550,441
Government Emissions	184,971	704,475	388,856	1,147,460	126,347	121,528
Total Emissions	4,652,867	21,030,817	8,642,703	104,670,555	10,794,012	2,671,969

Table 1: New Orleans Emissions 2007

Community-wide GHG Emissions

Community-wide sources of GHG emissions include residential and commercial buildings, motor vehicles, waste streams, and industry. Forty two percent, or 1,893,132 tons CO₂e were produced by motor vehicles and transportation, 26%, or 1,194,063 tons CO₂e were produced by commerce, 20%, or 914,167 tons CO₂e came from residential buildings, 10% came from industry, with 445,783 tons CO₂e, and 2%, or 94,533 tons CO₂e came from solid waste.

Municipal/City Government GHG Emissions

Sources of GHG emissions from municipal operations include city owned and/or operated buildings, streetlights, transit systems (including city-owned vehicles), and sewerage and water activities. Water and sewage emitted 135,025 tons CO₂e, or 64% of municipal emissions, streetlights emitted 15%, or

31,612 tons CO₂e, government buildings emitted 13%, 27,015 tons CO₂e, and the municipal vehicle fleet was responsible for 8% of all government emissions, with 17,006 tons CO₂e.

Solid Waste GHG Emissions

Emissions from solid waste are calculated for the community category alone, as information for municipal waste was not available. In total, 94,533 tons of CO₂e came from community waste. Of solid waste, 26.2% was paper waste, 16.4% was food waste, 7.6% was plant debris, 13.5% was wood or textiles, and the remaining 36.3% was from other sources.

Current and Planned Programs Affecting GHG Emissions

In order to decrease the levels of GHG emissions, the New Orleans City government and various community and non-profit groups are taking action. The City has begun several initiatives, including a comprehensive, environmentally-focused rebuilding plan called GreenNOLA; a revised Master Plan for the City, which pays special attention to lowering emissions; the creation of a Green Council through the office of the Mayor; a Green Building Ordinance; Green Jobs Training; and a Sewerage and Water Board wetlands assimilation project to increase carbon sequestration. In addition, the City has become a Solar America City, ramping up its commitment to clean, reusable energy sources. Community groups like the Lower Ninth Ward Center for Sustainable Engagement and Development (CSED) advocate for sustainable rebuilding methods and for the neighborhood to become carbon neutral by 2030. Nonprofits like Global Green and Make it Right are engaged in sustainable residential building projects, while others such as Green Light New Orleans and Enterprise Community Partners are making sure that citizens of all income levels have access to ecologically friendly materials, household appliances and tools that help them save energy. Finally, Global Green is working with the Recovery School District to retrofit four New Orleans Public Schools for energy efficiency, and bring two more schools up to the U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED) Silver standard.

Recommendations

New Orleans residents are encouraged to use this report as a guide to reducing GHG emissions in their everyday lives. It will form the basis for the City's Local Climate Action Plan (CAP), which will be an essential document for local government officials, and a tool to leverage assistance from the State and Federal governments in implementing emission reduction policies. Furthermore, the City should take advantage of the stimulus funds available for energy and environment, and take steps to bring in some of the competitive funds available for increasing energy efficiency. New Orleans should continue in its role as an ICLEI City for Climate Protection to collaborate and learn from other participating municipalities as it develops its CAP with a challenging reduction goal for 2030.

1. ICLEI and the Cities for Climate Protection Campaign

“Cities for Climate Protection” (CCP) is a global campaign of ICLEI—Local Governments for Sustainability. Established as International Council for Local Environmental Initiatives, ICLEI is an international membership association of local governments that are dedicated to climate protection and sustainable development. It was formed in 1990 when over 200 municipalities from 43 countries convened at the World Congress of Local Governments for a Sustainable Future at the United Nations in New York.

Local government leaders are uniquely positioned to influence citizen behaviors.

ICLEI USA was launched in 1995 and has grown from a handful of local governments participating in a pilot project to a network of over 560 cities, towns and counties striving to achieve tangible reductions in GHG emissions and create more sustainable communities. More on ICLEI USA can be found at <http://www.icleiusa.org>.

ICLEI works with local governments because it is these entities that control the day-to-day activities that determine the amount of energy used and waste generated as well as the long-term planning for the community – from land use and zoning decisions to control over building codes and licenses, infrastructure investment, municipal service delivery and management of schools, parks and recreation areas. Local government leaders are also uniquely positioned to influence citizen behaviors – their transportation options, energy consumption patterns and general consumer decisions.

ICLEI offers tools, training, and support for its member cities to aid them in adopting policies and implementing quantifiable measures to reduce local greenhouse gas emissions, improve air quality, and enhance urban livability and sustainability.

2. Science of Global Warming

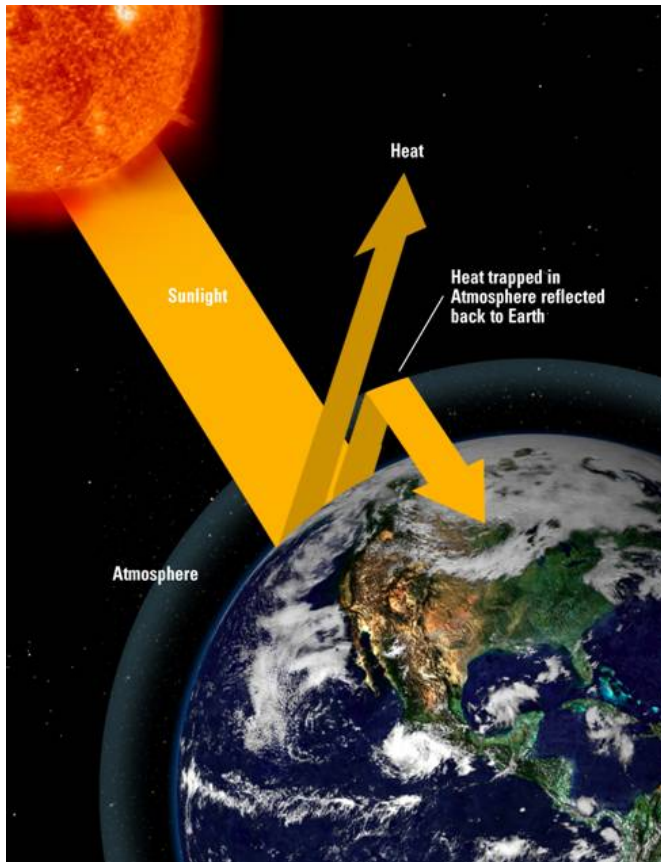
a. Global Warming

Global warming is a term used to describe a gradual increase in the earth’s average ground and atmospheric temperatures. Measurements indicate that the global temperature has increased by about one degree Fahrenheit in the past century. This warming trend appeared during a period when human activities were beginning to increase the carbon dioxide (CO₂) and other greenhouse gases in the atmosphere. Over the last two decades there has been a growing realization that global climate change is a real and substantial issue and that human activities are a significant part of the problem.

b. Enhanced Greenhouse Effect

The earth normally maintains its temperature range by releasing heat into space at the same rate that it absorbs it from the sun. When the system is left alone, the amount of energy given off from the earth equals the amount of energy absorbed. This is the natural greenhouse effect. Human activities, particularly the burning of fossil fuels (coal, oil and natural gas) and land clearing, increase the

concentrations of these gases, upsetting the balance. Excess GHGs form an insulating layer for the Earth, trapping heat and causing an enhanced greenhouse effect.



Graphic courtesy of S. McConnell / Pittsburgh Climate Action Plan.

In addition to the release of CO₂ through the burning of fossil fuels and cutting down of trees, humans are responsible for seven other GHGs:

- Methane (CH₄) is released from landfills, intensive agriculture, livestock, coal mining, and leaky natural-gas lines.
- Industrial products emit chlorofluorocarbons (CFCs).
- Nitrous oxide (N₂O) comes from burning fossil fuels.
- Perfluorocarbons (PFCs) are human-made chemicals designed to replace chlorofluorocarbons (CFCs) in semiconductors and are also a by-product of aluminum smelting.
- Hydrofluorocarbons (HFCs) are human-made chemicals used in refrigeration and insulating foam.
- Sulfur hexafluorides (SF₆) insulate high voltage equipment and assist in cable cooling systems.
- The other two gases are water vapor (H₂O) and ozone (O₃), but unlike the others they cannot be controlled because they are naturally occurring gases in the atmosphere.

For the purposes of this report, all of the anthropomorphic GHG emissions will be combined and expressed as CO₂ equivalent or CO₂e.

c. Climate Change

Climate is the long-term average of a region's weather events. Climate change is a change in these long-term weather patterns. Increased levels of GHGs in the atmosphere are causing climatic changes that vary across the planet, from place to place and season to season. The Intergovernmental Panel on Climate Change (IPCC), a panel of 2,000 scientists convened by the United Nations' Environment Programme and the World Meteorological Organization, determined that even if steps are taken now to reduce human emissions of GHGs, the globe could warm at a rate faster than it has in the past 10,000 years. If no actions are taken to reduce emissions and business as usual circumstances are maintained, computer models of the earth's climate predict that global average temperatures will rise by 1.6-6.3

degrees Fahrenheit over the next 100 years. This is particularly dramatic when one considers that the global temperature has only risen 4.5 degrees Celsius since the Ice Age. Plants and animals have had eighteen thousand years to adapt to this change, and the rapid changes are already stressing the natural resources on which all human beings depend.

If no actions are taken to reduce emissions... global average temperatures will rise by 1.6-6.3 degrees Fahrenheit over the next 100 years

d. The United States' Response

Although the United States has lagged behind other developed nations in reducing GHG emissions, some key pieces of legislation have been passed in this country. In 1990, the Clean Air Act was updated, paving the way for a cleaner environment and better air quality. The updated Act proposed emissions trading and added provisions for addressing acid rain, ozone depletion, and toxic air pollution. In 1992, international leaders met at the Earth Summit in Rio de Janeiro sponsored by the United Nations, where they signed the world's first Earth Charter. That same year, the United State's first Energy Policy Act was issued by the U.S. Environmental Protection Agency (EPA). This Act created the framework for more competition in energy generation, and a more progressive energy future for America.¹ The law mandated that the Federal Energy Regulatory Commission (FERC) open transmission lines to wholesale providers of energy. This in turn, opened the market for energy producers of various sources including renewable energy producers and gas turbines.

3. Projected Impacts of Global Warming on New Orleans and South Louisiana

Despite Congress' actions, the Earth's average temperature has continued to increase. Current annual U.S. GHG emissions are 12% higher than they were in 1992, and worldwide greenhouse gas emissions increased 14% over that period. Atmospheric concentration of CO₂ has increased by 6 ppm between 1997 and 2002.² In 2007, the IPCC released its latest assessment report, which forecasts an increase in the type of changes that are already seen: more severe weather events, higher temperatures, shortages of water in arid regions and excess water in tropical regions. Two changes predicted in the IPCC report that will most certainly affect South Louisiana are: rising average sea level and increased temperature of the Earth's waters.

The EPA clearly states that coastal zones like South Louisiana are more vulnerable to climate change because of sea level rise.³ Sea level rise is caused by the melting of glaciers due to higher temperatures. Its effects include wetland inundation, increased flooding, beach erosion, and higher salinity in fresh water bodies. Most of New Orleans is already below sea level, so the entire city could be submerged with a 7-15 inch rise in sea level, which is what is predicted by the end of the century in the most optimistic scenarios.⁴ Not only could New Orleans be submerged due to sea level rise, but until then will experience increased hurricane intensity due to the warming of the ocean.

¹ www.eia.doe.gov.

² <http://www.netl.doe.gov/about/index.html>.

³ "Coastal Zones and Sea Level Rise." <http://www.epa.gov/climatechange/effects/coastal/index.html>

⁴ Bindoff, N.L., et al. http://ipcc-wg1.ucar.edu/wg1/Report/AR4WG1_Print_Ch05.pdf

In addition, New Orleans' proximity to water puts residents at a higher risk for diseases such as malaria, dengue fever, yellow fever, and other 'vector-borne' diseases as global warming occurs. Increased water temperatures also cause algae blooms that aid the spread of 'water-borne' diseases such as cholera.⁵ Algae blooms can also reduce productivity of fisheries by killing off fish and other seafood. Finally, Louisiana's economy will suffer from the combined effects of increased disasters and flooding, and

The entire city could be submerged with a 7-15 inch rise, which is what is predicted by the end of the century in the most optimistic scenarios. Not only could New Orleans be submerged due to sea level rise, but until then may experience increased hurricane intensity due to the warming of the ocean.

reduced products and productivity. Louisiana is a the leading producer of fish in the United States, and an increase in disasters and flooding, as seen with hurricanes Katrina and Rita, can cause tremendous damage to Louisiana fishery production.⁶ Furthermore, much of Louisiana's advantages as a seafood hub come from the turbid waters of the Mississippi near the Gulf of Mexico. Increases in sea levels could destroy that advantage. Eighty four percent of fish consumed in the US is imported, and it is crucial for the nation to continue to produce some of its own seafood, and it is important for the State of Louisiana, the "Sportsman's Paradise" to protect the ecosystems that support such beneficial wildlife and aquaculture⁷. On another note, the Port of New Orleans is a major source of income for the State, employing 160,498 people, bringing in \$8 billion in earnings, spending \$17 billion, and paying \$800 million in statewide taxes. The port is the nation's leading rubber and coffee importer, and is a leader in steel imports, has the world's longest wharf, and is one of the biggest Foreign Trade Zones.⁸ If the city were to be submerged, this would be a huge blow to the nation's economy.

According to the IPCC's latest report,⁹ resulting disruptions from climate change can be divided into four broad areas. These are listed below with the impacts that are likely in this geographic area:

Agriculture, Forestry and Ecosystems

- Decreased yields in warmer environments due to heat stress
- Increased danger of wildfire
- Increased insect outbreaks
- Damage to crops and uprooting of trees (from intense tropical cyclone activity)
- Salinisation of irrigation water, estuaries and fresh water systems

Water Resources

- Increased water demand due to heat
- Water quality problems, e.g. algae blooms
- Adverse effects on quality of surface and groundwater (from frequent heavy rains)
- Contamination of water supply
- Power outages causing disruption of public water supply
- Decreased freshwater availability due to saltwater intrusion

⁵ "Health." <http://www.epa.gov/climatechange/effects/health.html>

⁶ "Fisheries and Seafood" <http://www.laseagrant.org/hurricane/archive/fisheries.htm>

⁷ "Seafood Consumption Declines Slightly in 2007" http://www.noanews.noaa.gov/stories2008/20080717_seafood.html

⁸ "Port Facts" http://www.portno.com/pno_pages/about_overview.htm

⁹ IPCC. http://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr_spm.pdf

Human Health

- Reduced human mortality from decreased cold exposure
- Increased risk of heat-related mortality, especially for the elderly, chronically sick, very young and socially isolated
- Increased risk of deaths, injuries and infectious, respiratory and skin diseases (from frequent heavy precipitation)
- Increased risk of deaths, injuries, water- and food-borne diseases, and post traumatic stress disorders (from intense tropical cyclone activity)
- Increased risk of deaths and injuries by drowning in floods, and migration-related health effects

Industry, Settlement and Society

- Reduced energy demand for heating and increased energy demand for cooling
- Declining air quality in cities (Coastal communities and habitats will be increasingly stressed by climate change impacts interacting with development and pollution)
- Reduction in quality of life for people in warm areas without appropriate housing—impacts of heat in general will be hardest on elderly, very young and poor
- Disruption of settlements, commerce, transport and societies due to flooding
- Pressure on urban and rural infrastructures
- Loss of property
- Disruption by flood and high winds
- Withdrawal of risk coverage in vulnerable areas by private insurers
- Potential for population migrations
- Costs of coastal protection versus costs of land-use relocation—potential for movement of populations and infrastructure
- New Orleans and the surrounding region have already suffered a number of these impacts, particularly in the wake of the 2005 and 2008 hurricane seasons, and the City is anxious to do what it can to minimize future climate effects.

1. Mitigation and Adaptation

The Center for Clean Air Policy (CCAP) defines climate mitigation as taking actions to reduce GHG emissions and to enhance efforts aimed at reducing the dangerous impacts of global warming. This is distinct from climate adaptation, which involves communities taking action to build resiliency to the effects of climate change.¹⁰ The potential to adjust in order to minimize negative impact and maximize any benefits from changes in climate is a system's adaptive capacity.

The Pew Climate Center, in its report entitled "Climate 101: Adaptation," notes that adaptation decreases a system's vulnerability, or increases its resilience to impacts.¹¹ This report also provides a useful glossary of terms, defining "system" as "A population or ecosystem; or a grouping of natural resources, species, infrastructure or other assets," and "resilience" as "The ability of a system to withstand negative impacts without losing its basic functions."

The Pew Center also recommends that each municipality come up with a plan for adaptation that identifies main areas of vulnerability, involves every stakeholder, and prioritizes based on the extent of projected impacts. Cities across the country, like New Orleans, have taken steps towards creating area-specific adaptations to climate changes, such as desalination, fighting against erosion and flooding, and dealing with droughts. Cities like New York have released extensive adaptation programs like PlaNYC that call for major changes to protect infrastructure and high risk communities, in addition to major reductions in carbon emissions.¹²

In particular, New Orleans has started looking at programs to help it protect it from hurricane and flooding damage. A plan that has been adopted recently both by the state and the Army Corps of Engineers is the "Multiple Lines of Defense" Strategy, first created by the Lake Pontchartrain Basin Foundation (LPBF) and the Coalition to Restore Coastal Louisiana (CRCL), which could work to decrease the level of damage caused by future storms. This plan, similar to that of Ivor van Heerden, former director of the Louisiana State University Hurricane Center, calls for the creation and restoration of more wetlands surrounding the Louisiana Coast, utilizing natural barriers like wetlands, ridges, and barrier islands, in addition to man-made protection, such as levees and elevated highways.

Studies conducted on Hurricane Betsy, Katrina, and Rita have found that locations protected by more land and wetlands faced reduced levels of storm surge, regardless of wind speed, direction, or hurricane transfer speed. In order to deal with that, the strategy heavily advocates the restoration of coastal wetlands, however, using proactive measures. Before the approval of the "Multiple Lines of Defense" program was approved, flood protection and coastal restoration programs were kept separate, however, now the two are managed together to make the program more sustainable and effective. Specifically, the plan takes advantage of wetlands and marsh habitat as a drain for storm surges, and simultaneously recommends creating "back levees" to protect communities from the surrounding wetlands. In all, the steps are meant to be a comprehensive plan for dealing with one of New Orleans most pressing adaptation needs.¹³

¹⁰ "Mitigation." <http://www.ccap.org/index.php?component=issues&id=4>

¹¹ "Climate Change 101: Adaptation" p.3. <http://www.pewclimate.org/docUploads/Climate101-Adaptation-Jan09.pdf>

¹² Ibid, p.7-8

¹³ "Overview of Multiple Lines of Defense Strategy to Sustain Coastal Louisiana" http://www.mlods.org/images/web_MLODS_overview.pdf

The more proactive steps (mitigation) taken, the fewer the consequences requiring adaptation. However, recent history shows that significant climactic risks exist that must be acknowledged and dealt with in low lying coastal lands. Climate mitigation and adaptation should not be seen as alternatives to each other, but rather a combined set of actions in an overall strategy to reduce greenhouse gas emissions.¹⁴

Scientists have confirmed that even with current climate change mitigation policies and related sustainable development practices in place, global GHG emissions will continue to grow over the next few decades.¹⁵ Already, many systems worldwide are being forced to adapt to changes in temperature, weather patterns, sea level and fresh water availability.

CCAP has formed an Urban Leaders Adaptation Initiative¹⁶ in which government leaders from ten large counties and cities will examine projected climate impacts in 2050 and identify what steps are necessary now to reduce GHG emissions and build community resiliency. Under the Initiative, representatives from Chicago; King County (Washington); City of Los Angeles; Miami-Dade County (Florida); City of Milwaukee; Nassau County (New York); New York City; Phoenix; San Francisco; and Toronto will work together to:

The more proactive steps (mitigation) taken, the fewer the consequences requiring adaptation

1. Formulate recommendations that help advance the development of national adaptation policy and/or programs that support local resiliency efforts; and
2. Disseminate findings on partners' actions and successes to inform and motivate other local communities in the U.S. and worldwide.

The Heinz Center for Science, Economics and the Environment is another resource for communities on both mitigation and adaptation, offering guidelines for local governments. The Heinz Center has published a report on adaptation¹⁷ as well as a guidebook for coastal communities entitled, "Resilient Coasts: A Blueprint for Action." In "A Survey of Climate Change: Adaptation Planning," referenced above, the authors outline adaptation concerns, planning and efforts underway in several major metropolitan areas including:

- o Boston, Massachusetts built the Deer Island Wastewater Treatment Plant at a higher elevation and higher cost than originally planned to accommodate for anticipated sea-level rise.
- o Chicago, Illinois is planning for a projected water level decrease in Lake Michigan and the effects of higher temperatures on aviation fuel economy.
- o Homer, Alaska is examining impacts from ocean acidification and warming.
- o Miami-Dade County, Florida is looking at strategies to deal with a loss of tourism.
- o New York City, New York has partnered with Columbia University and community groups to design a process for engaging waterfront neighborhoods in conversations about climate change adaptation.

¹⁴ <http://www.global-greenhouse-warming.com/climate-mitigation-and-adaptation.html>

¹⁵ Ibid, IPCC, p.7

¹⁶ "Urban Leaders Adaptation Initiative." <http://www.ccap.org/index.php?component=programs&id=6>

¹⁷ "A Survey of Climate Change Adaptation Planning."

http://www.heinzctr.org/publications/PDF/Adaptation_Report_October_10_2007.pdf

- King County, Washington is funding climate studies to further refine knowledge of impacts and enhance adaptation.¹⁸

This report focuses on mitigation, but New Orleans is also looking at adaptation strategies that will be further explored as the City moves through ICLEI's five milestone process and develops its Local Climate Action Plan. ICLEI's Climate Resilient Communities™ Program assists local governments in enhancing community resiliency to the impacts and costs associated with projected climate change. The program builds upon the Five Milestone Methodology, described below, that ICLEI established for climate change mitigation. Participating communities assess vulnerabilities, establish targets and goals, and plan and take action to enhance their resiliency to a changing climate.

2. ICLEI's Five Milestone Process

ICLEI's five-milestone process provides a simple, standardized means of: calculating GHG emissions; establishing reduction targets; reducing emissions; and monitoring, measuring and reporting performance. ICLEI's software tool, Clean Air Climate Protection (CACP) helps cities comply with the methodology. The five milestones are:

1. **Conduct a baseline emissions inventory and forecast.**
The city first calculates greenhouse gas emissions for a base year (e.g., 2000) and for a forecast year (e.g., 2015). The calculations capture emissions levels from all municipal operations (e.g., city owned and/or operated buildings, streetlights, transit systems, wastewater treatment facilities) and from all community-related activities (e.g., residential and commercial buildings, motor vehicles, waste streams, industry). This inventory and forecast provide a benchmark for planning and monitoring progress.
2. **Adopt an emissions reduction target for the forecast year.**
The city passes a resolution establishing an emission reduction target for the city. The target is essential. It both fosters political will and creates a framework that guides the planning and implementation of measures.
3. **Develop a Local Climate Action Plan.**
The local government then develops a Local Climate Action Plan, ideally with robust public input from all stakeholders. The plan details the policies and measures that the local government will take to reduce greenhouse gas emissions and achieve its emissions reduction target. Most plans include a timeline, a description of financing mechanisms, and an assignment of responsibility to departments and staff. In addition to direct greenhouse gas reduction measures, most plans also incorporate public awareness and education efforts.
4. **Implement policies and measures.**
The city implements the policies and measures contained in their Local Climate Action Plan. Typical policies and measures include energy efficiency improvements to municipal buildings and water treatment facilities, streetlight retrofits, public transit improvements, installation of renewable power applications, and methane recovery from waste management.

¹⁸ King County is an adaptation planning leader having formed its own interdepartmental climate change adaptation team, incorporating climate impacts in all municipal planning processes, and authoring "Preparing for Climate Change: A Guidebook for Local, Regional, and State Governments" in association with ICLEI (<http://www.pewclimate.org/docUploads/Climate101-Adaptation-Jan09.pdf>, p.8).

5. **Monitor and verify results.**

Monitoring and verifying progress on the implementation of measures to reduce or avoid greenhouse gas emissions is an ongoing process. Monitoring begins once measures are implemented and continues for the life of the measures, providing important feedback that can be used to improve the measures over time. ICLEI's software provides a uniform methodology for cities to report on measures.

The City of New Orleans used the CACP software provided by ICLEI and the National Association of Clean Air Agencies to calculate its GHG emissions for 2007. The CACP software was developed by Torrie Smith Associates Inc. and is made available to local governments working with ICLEI.

3. Inventory Process

The baseline year for this GHG emissions survey was 2007, the most recent year for which complete data were available. Data for that year were collected by John Moore, of the Office of Infrastructure and Environmental Planning, between August 2008 and March 2009. The compiled data were first separated by community and municipal categories. GHG emissions from the community category include any and all CO₂e emissions from the City of New Orleans that were not generated by city government. Municipal emissions are those specifically created by city government's operations.

Once separated into community and municipal categories, the GHG emissions were then categorized by source. In the community category, sources include residential, commercial, industrial buildings, transportation, and waste. From the government category, sources of emissions are buildings, city owned vehicle fleet, street lights, and sewerage and water. ICLEI also suggests incorporating sanitation into the municipal category; however, figures for government waste were not available.

Finally, it is noted what "Scope" the emissions are from.

Scope 1 emissions are generated within the City of New Orleans. They come from sources such as vehicles and power generators that are located in the City.

Scope 2 emissions are generated outside city limits due to demand within the City of New Orleans. Most of this is electrical power demand from buildings, since the majority of time they are sourcing power from plants located outside the City's boundaries.

Scope 3 emissions are all indirect emissions not covered in Scope 2, such as those resulting from the production of purchased materials or associated with company travel. Scope 3 emissions are seldom quantified in studies such as these because they can be very difficult to quantify.

4. Quantifying Data

The GHG emission data obtained for this study was calculated based on activity data and emission factors entered into the CACP software. Activity data are the relevant measurement of energy use or other GHG generating processes. For instance, when collecting data on the vehicle fleets they are separated by fuel type and car models. Likewise, when collecting research on building types the information is delineated by metered annual energy consumption. Emission factors are calculated ratios that relate the GHG emissions to a measure of activity at an emission source. These emission factors are based on default percentage growth rates that are included in CACP software. The percentages are based on national averages for percentage of growth from every emission source. Emission factors are

used to convert activity data to associated GHG emissions, and are expressed in terms of emissions created per energy used.

5. Sources of Data

Data were provided by a range of city departments and a private sector planning company. Contacts for each sector are as follows:

Type of Data Collected	Entity Providing Data (City Dept. or Bus.)	Contact & Title	Phone Number
Vehicle Mileage	Chief Administrative Office (CAO)	Jay Palestina	504-915-9834
Buildings and Street Lights	CAO	Cynthia Sylvain Lear	504-658-8653
Technological Information	Management Information Services	Cheryl McKey	504-658-7603
City Utility Bill Information	Capital Projects	David Becnel	504-658-8663
	Finance	Kim Delarge	504-658-1850
	Finance	Derrick Muse	504-658-3621
	Property Management	Pam Smith	504-658-3600
	Property Management	Edwin Mazoue	504-658-1520
Vehicle Miles Traveled	Public Works	Vickie Saulny	504-658-8002
Waste	Sanitation	Veronica White	504-658-3800
	MWH (Firm)	Susan N. Nolan	504-581-6900
Sewerage & Water Data	N.O. S & W Board	Gordon Austin	504-658-4074
1998 ICLEI Data	Environmental Affairs	Wynecta Fisher	504-658-4070
City Carbon Emission Data	GCR Consulting	Greg Rigamer	504-304-2500
Utility Data	Entergy New Orleans	Jeff Williams	504-220-6524

Total GHG emissions in New Orleans for 2007 were 4,657,791 tons CO₂e. Community-wide GHG emissions accounted for 95% of this amount, while municipal, or governmental operations, accounted for the remaining 5%. Electricity usage accounted for 47% of emissions, with 2,215,622 tons CO₂e; gasoline accounted for 33%, or 1,576,103 tons CO₂e; natural gas accounted for 11%, or 532,024 tons CO₂e; diesel accounted for 7%, or 334,035 tons CO₂e; and methane from waste accounted for 2%, or 94,533 tons CO₂e. Light Fuel Oil accounted for 16 tons CO₂e, or 0.000003%, an amount so small that it doesn't appear on the graph below.

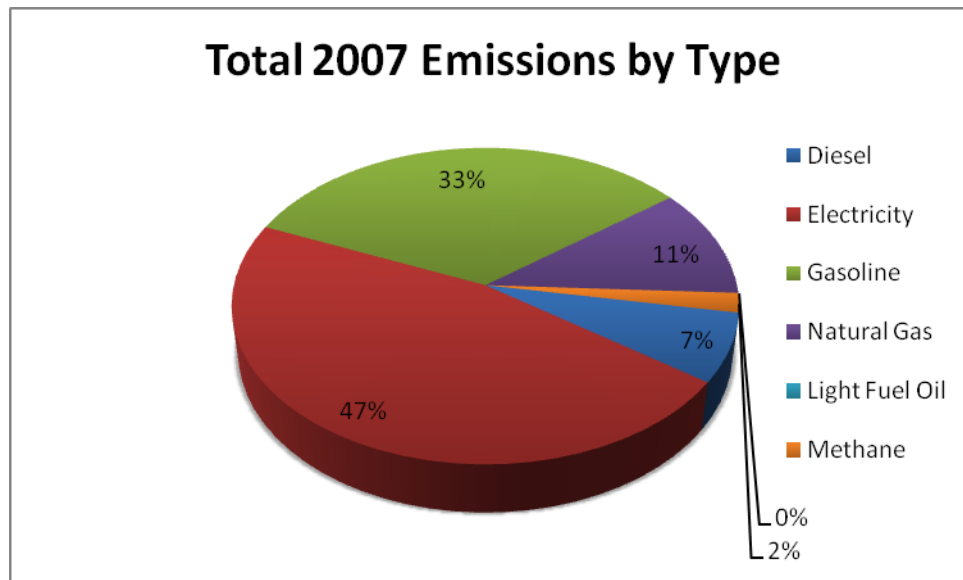


Figure 1: New Orleans Total GHG Emissions by Type

1. GHG Emissions from the Community-Wide Inventory

There are five sectors from which community-wide CO₂e emissions are derived: Residential, Commercial, Industrial, Transportation and Waste. According to the figure below, the sector that contributed most to GHG emissions is the transportation sector, followed by the commercial and residential sectors, while the industrial sector was much smaller than those two sectors, and the waste sector was even smaller than the industrial sector (*See Figure 2*).

Community GHG Emissions for 2007

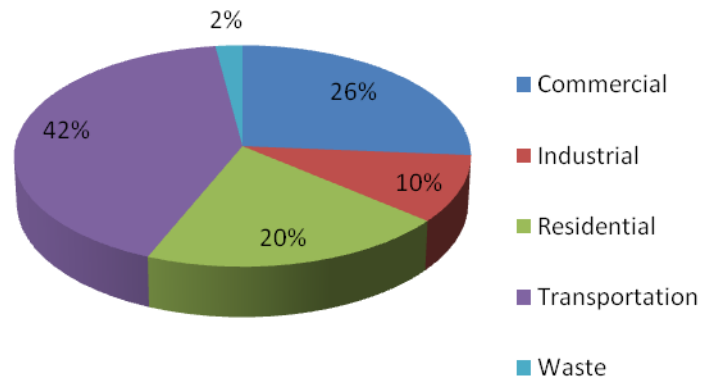


Figure 2: Community Greenhouse Gas Emissions by Percentage

Commercial

Twenty seven percent of the CO₂ emissions come from the commercial sector of the community greenhouse gas emissions which is equivalent to **1,194,063 tons CO₂e**. In this sector, 88% of this CO₂ emission was sourced from electricity while the other 12% came from the natural gas section.

Industrial

The industrial sector, comprised of light commercial activity within city limits, produced 10% of community GHG emissions, or **445,783 tons CO₂e**. Seventy-six percent of these emissions came from electricity while the other 24% came from natural gas.

Residential

The residential sector contributed 20%, or **914,167 CO₂e**, to the community GHG emissions. 79% of these emissions came from electricity while the remaining 21% came from natural gas emissions in this sector.

Transportation

The transportation sector was the largest contribution to community-wide GHG emissions at 42%, or **1,893,132 tons of CO₂e**. The great majority (82.5%) of these emissions were from gasoline while the remaining 17.5% came from diesel.

Waste

The waste sector was the smallest contribution to community-wide GHG emissions at 2%, or **94,533 tons of CO₂e**. The great majority of these emissions were in the form of methane, as solid waste decomposed, releasing the gas.

All together, New Orleans community factors were responsible for emitting **4,467,896 tons CO₂e** in 2007 and as can be seen in [Figure 3](#) below, most of the community greenhouse gas emissions came from electricity sources (47%) followed by gasoline sources (34%). Methane contributed the least to community greenhouse gas emissions (2%) while natural gas contributed 10% and diesel contributed 7% of the greenhouse gas emissions to the community category.

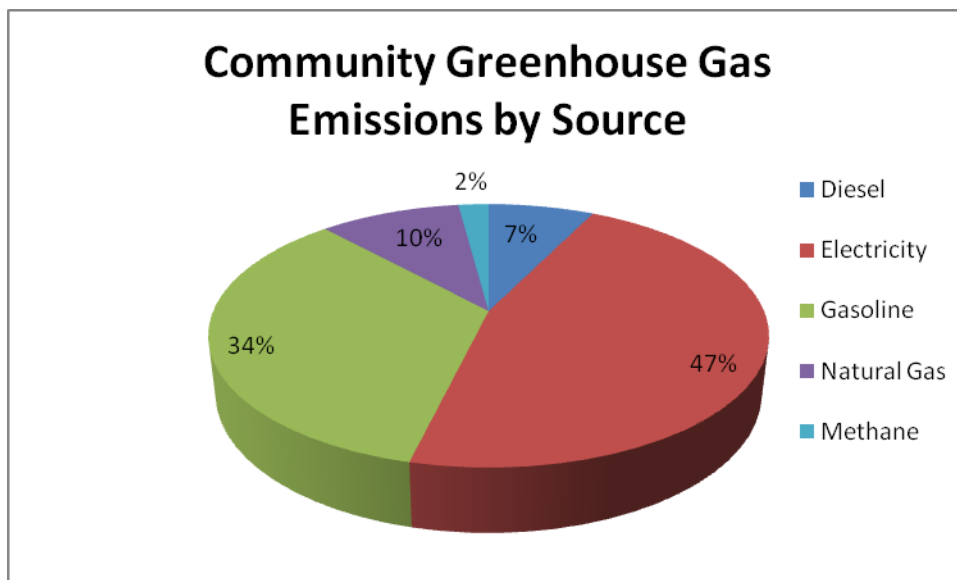


Figure 3: Community CO₂ Emissions by Source

Emissions by Type & Scope from Community

Community emissions were almost evenly divided between Scope 1 and 2 emissions, with Scope 1 representing 54% of emissions and Scope 2 covering 46%. From this, **2,429,975 tons CO₂e** were associated with Scope 1 emissions, coming from residential buildings, commercial sector, industry, transportation, and waste. From Scope 2 emissions, there were **2,111,701 tons CO₂e**. These were derived from the commercial, industrial, and residential sectors. The commercial sector emitted mostly Scope 2 emissions, 1,048,122 tons CO₂e, with some of its emissions (145,940 tons CO₂e) falling in Scope 1. Although it produced no Scope 2 emissions, transportation was responsible for the most emissions total, with 1,893,132 tons CO₂e, while the residential sector had 188,269 tons CO₂e in Scope 1, and 725,897 tons CO₂e in Scope 2, and industry emitted 108,101 tons CO₂e in Scope 1, and 337,682 tons CO₂e in Scope 2. Like transportation, waste produced no Scope 2 emissions, and emitted 94,533 tons CO₂e in Scope 1.

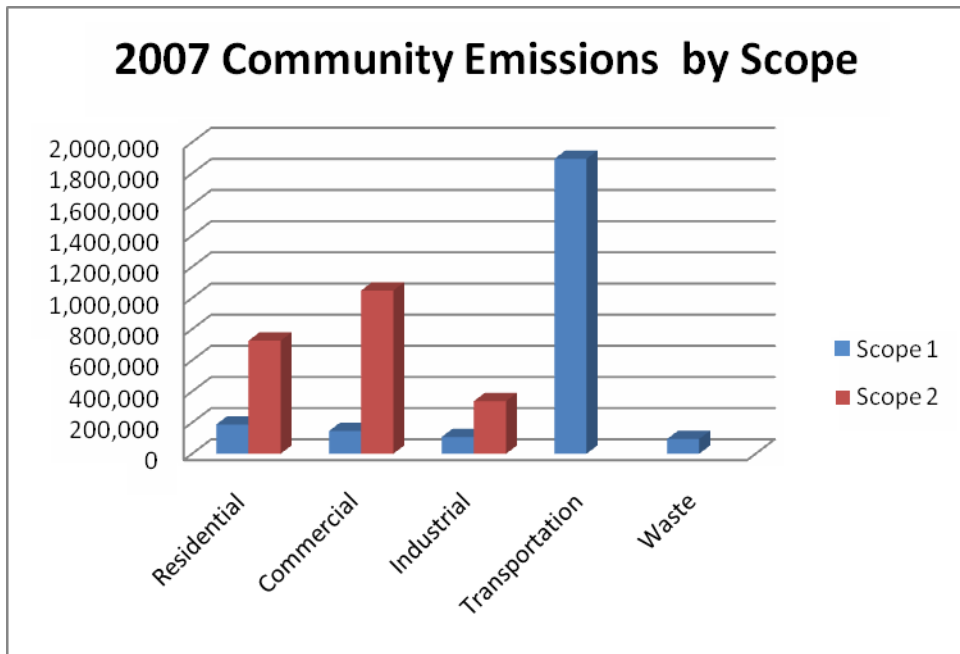


Figure 4: Community Emissions by Scope

Of Scope 1 Emissions, transportation-related emissions from gasoline dominated with 64%, or 1,562,140 tons CO₂e, and diesel, once again only from transportation, made up 14%, an emission of 330,992 tons CO₂e. Natural Gas emissions, which came from residential, commercial and industrial sectors, represented 18%, or 532,013 tons. Methane, produced by the waste sector, represented 4%, or 94,533 tons CO₂e.

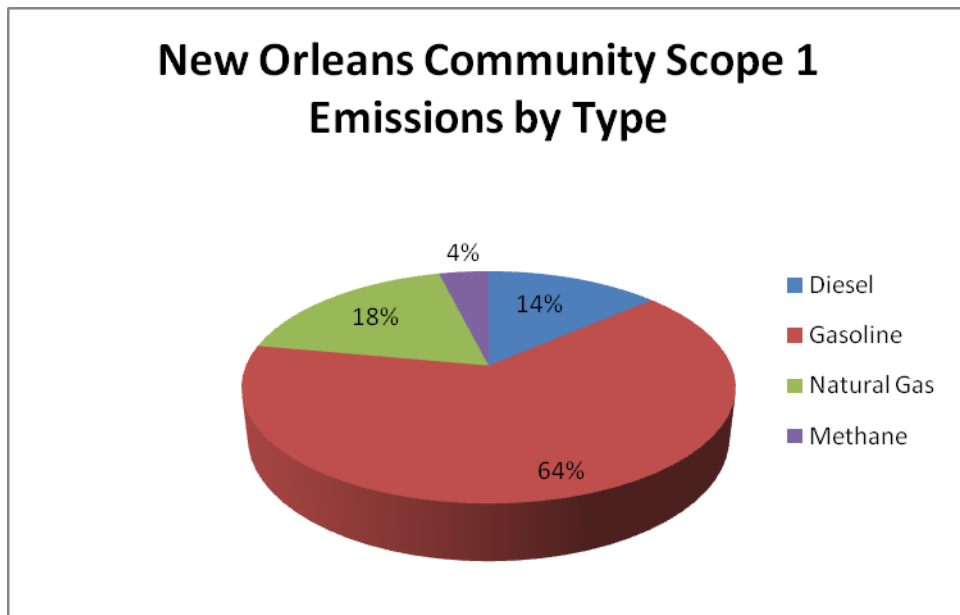


Figure 5: Community Scope 1 Emissions by Type

2. GHG Emissions from the Municipal (Government) Inventory

Municipal or city government GHG emissions are counted in four major areas: streetlights, city owned vehicles, water/sewage, and city-owned buildings. The highest emissions in City Government were from water and sewage which emitted 135,025 tons CO₂e. This was followed by streetlights with 31,612 tons CO₂e. The other two sectors which are buildings and vehicle fleet emitted 27,004 and 17,006 tons CO₂e, respectively. According to these numbers, government vehicle fleet emitted the least amount of CO₂ in 2007 (*See Figure 9*). Overall, GHG emissions from the government category were 210,647 tons CO₂e in 2007. NO_x emissions value for the year 2007 from the government category was 637,820 pounds while VOC emissions value was 44,868 pounds.

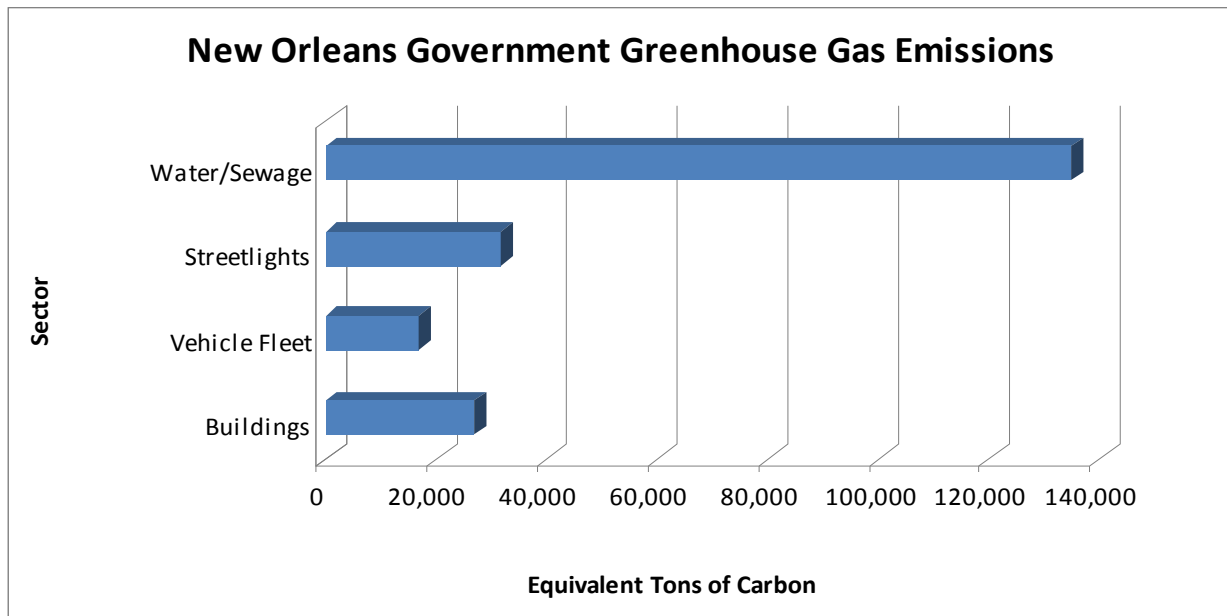


Figure 6: New Orleans Government Greenhouse Gas Emissions by sector

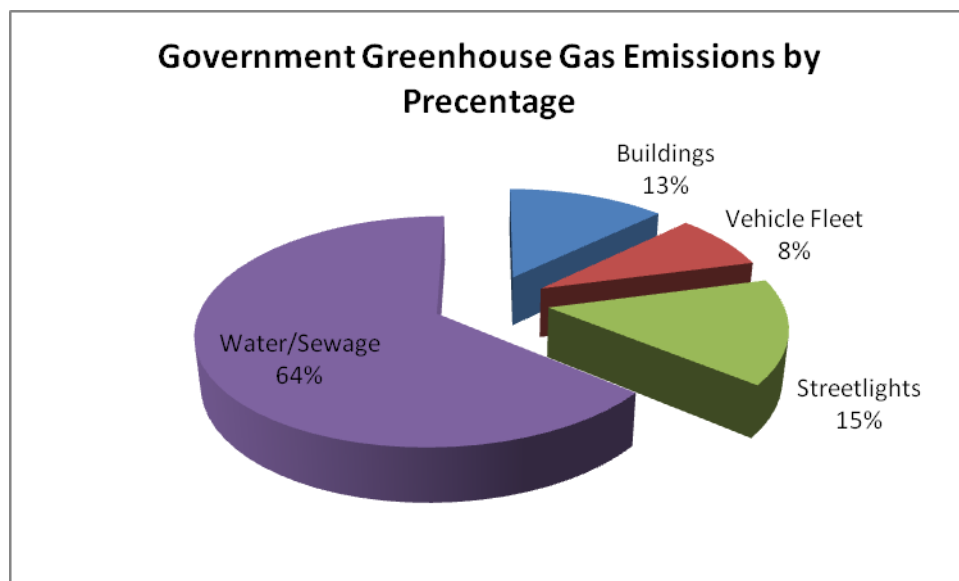


Figure 7: New Orleans Government Emissions by Percentage

Water/Sewage

As stated earlier, this sector emitted **135,025 tons CO₂e** in 2007 and was the source for the majority of the municipal greenhouse gas emissions. The emissions in the sewerage sector came from three different sources of fuel. These are Electricity (which contributed 46,617 tons CO₂e), Light fuel oil (which contributed 16 tons CO₂e) and Natural gas (which contributed 88,391 tons CO₂e). The water/sewage sector is responsible for more than half of New Orleans government GHG emissions as can be seen in *Figure 2* above. This sector accounted for 401,978 pounds of NO_x emissions and 20,689 pounds of VOC emissions.

Streetlights

This sector emitted **31,612 tons CO₂e**. In the year 2007, 55,441,063.1 kWh/ccf was used by the street lights in the city, which cost \$2,719,355. According to the data, streetlights were used mostly in January and December, while the lowest months of streetlight usage were between April and July. The source of the CO₂ that was emitted by the streetlights came directly from electricity. This sector contributed 102,302 pounds of NO_x and 4,652 pounds of VOC to the government sector emissions.

Vehicle Fleet

From city owned vehicles in the city of New Orleans, **17,006 tons CO₂e** were emitted. In 2007, 1,555,799 gallons of gasoline and 271,638 gallons of diesel were used by government vehicle fleet. When these figures are translated into CO₂ emissions numbers, gasoline emitted 13,963 tons CO₂e while diesel emitted 3,043 tons CO₂e (*See Figure 8*). It is evident in this case that fuel types affect how much CO₂ is emitted in the use of vehicles. This sector contributed 46,668 pounds of NO_x, most of which came from diesel (38,550 pounds). VOC emissions were 15,541 pounds for this sector.

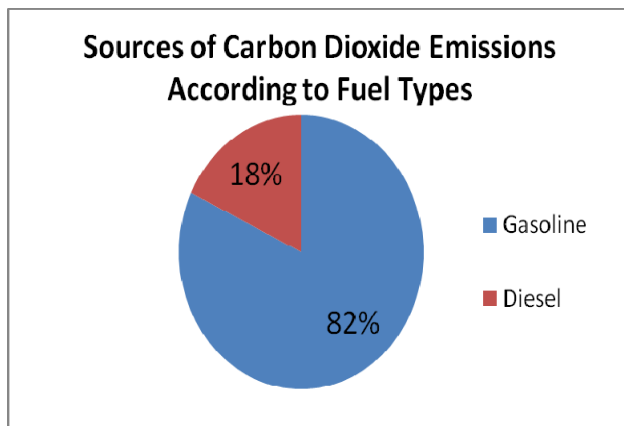


Figure 8: Fuel Types used by municipal fleet

Buildings

The building sector is the second largest source of CO₂ emissions from the government sectors. Buildings emitted about **27,004 tons CO₂e** in 2007, which was generated by both electricity and natural gas. \$5,009,431 was spent on 45,059,624 KWH of electricity used by buildings contributing 25,692 tons CO₂e. Natural gas being used by buildings amounted to 219,282 CCF in 2007 and this contributed 1,312 tons CO₂e to CO₂ emissions. This sector contributed 86,873 pounds of NO_x to the government category as well as 3,986 pounds of VOCs.

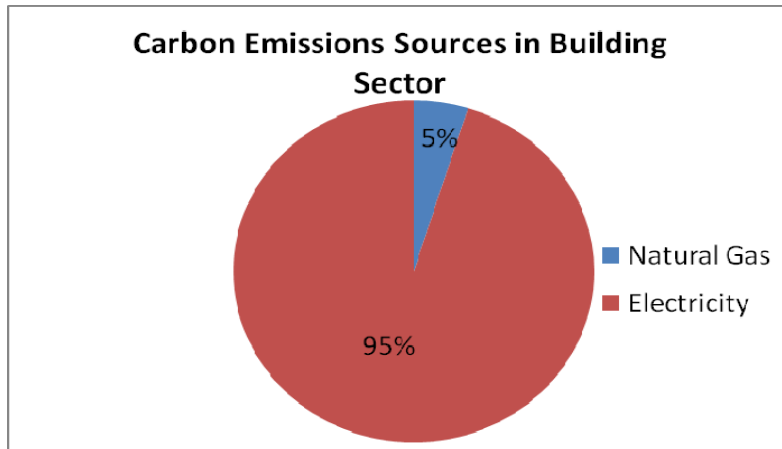


Figure 9: CO₂ Emissions in Government Buildings

Emissions by Type & Scope from Government

Government emissions were divided almost exactly evenly between Scope 1 and 2 emissions, with Scope 1 representing 51% of emissions and Scope 2 covering 49%. From this, **106,736 tons CO₂e** is associated with Scope 1 emissions, derived from buildings, vehicles, and sewerage and water. From Scope 2 emissions, there were **103,921 tons CO₂e**, derived from buildings, streetlights, and sewerage and water. Buildings tended to emit mostly Scope 2 emissions, 25,692 tons CO₂e, with 1,323 tons of these emissions falling in Scope 1. Streetlights emitted only in Scope 2, 31,612 tons CO₂e, and the vehicle fleet emitted only in Scope 1, 17,006 tons CO₂e, but Sewerage and Water emitted the most in either Scope, with 88,407 tons CO₂e in Scope 1, and 46,617 tons CO₂e in Scope 2.

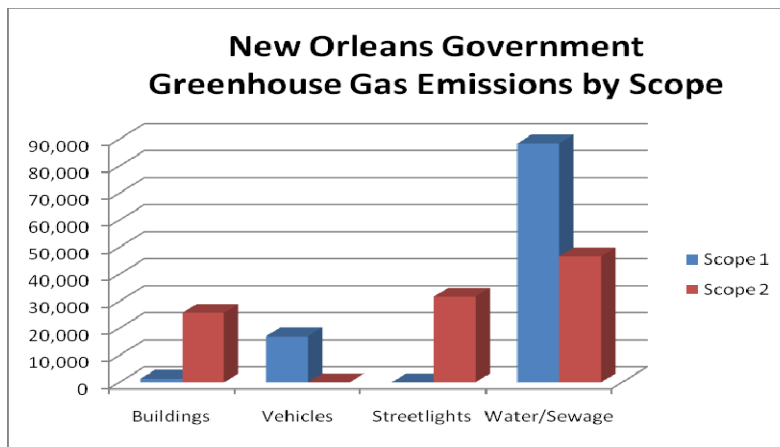


Figure 10a: New Orleans Government GHG Emissions by Scope

84%, or 89,714 tons CO₂e, of Scope 1 emissions came from natural gas; 13%, or 13,963 tons CO₂e, were from gasoline; 3%, or 3,043 tons CO₂e, were from diesel, and the rest, 16 tons CO₂e or 0.000003%, came from light fuel oil. These Scope 1 emissions were from Sewerage and Water Board activities, as well as government owned/operated buildings, and the vehicle fleet.

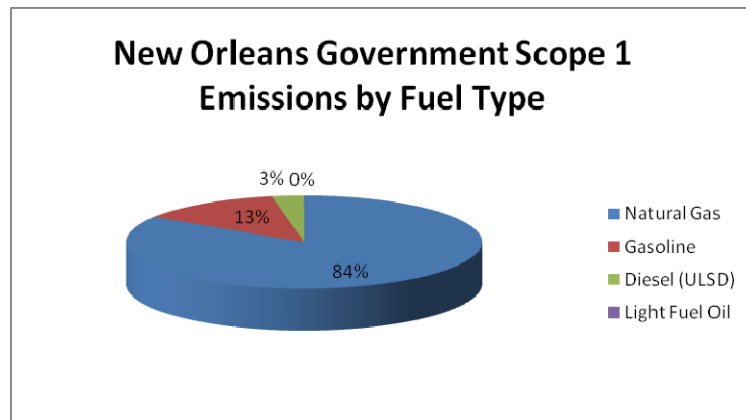


Figure 10b: Government Scope 1 Emissions by Fuel Type

3. GHG Emissions from Solid Waste Inventory

The City's emissions from waste were calculated using the IPCC's First Order Decay (FOD) model, which operates on the assumption that the amount of carbon released is directly proportional to the current amount of waste in the landfill, and that carbon from waste will not necessarily be emitted in the year the waste is produced or deposited. As such, the community carbon emissions from waste in 2007 are taken to be 94,533 tons CO₂e. Values for waste in the government category were unattainable, and so waste has to be kept separate as an emissions source. All emissions of GHGs from the waste sector are factored into Scope 1 emissions, including waste produced inside the city and then deposited outside. These emissions are from the decomposition of solid waste and the emissions relate to the collection and transport of the waste. Although the specific amounts of waste were not known by type, the total amount of solid waste produced in the community was 206,664 tons. Using the FOD model's default characterization of U.S. urban waste, the number was broken down and the emissions total calculated. Of the waste produced in both government and community, 26.2% was paper waste, 16.4% was food

waste, 7.6% was plant debris, 13.5% was wood or textiles, and the remaining 36.3% was from other sources.

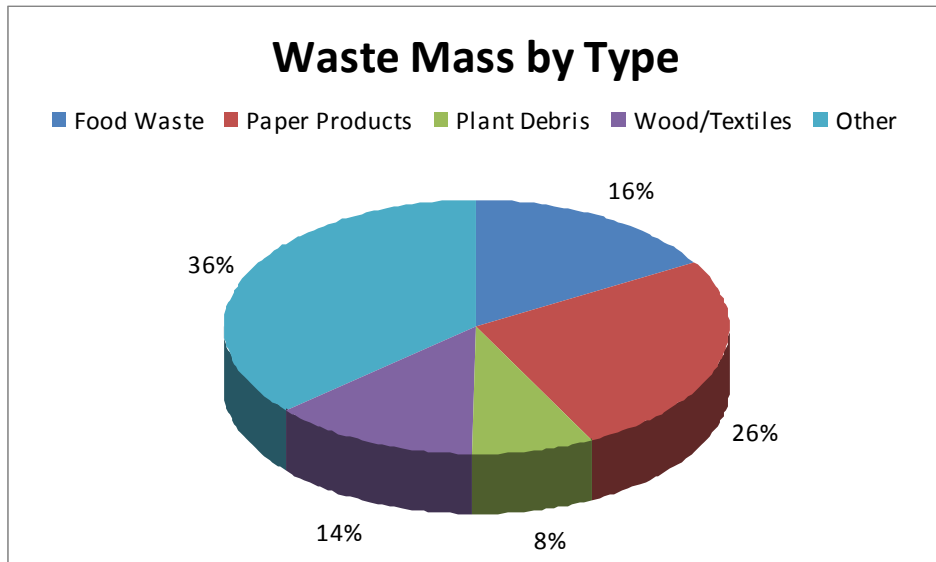


Figure 11: Waste Mass by Type of Waste

Some sequestration is provided by the presence of landfills, as some of the carbon present in solid waste will never be broken down, and so those landfills are considered to be carbon sinks. While paper products were responsible for 65,535 tons CO₂e, and food waste accounted for 38,287 tons CO₂e, plant debris, including grass, leaves, and yard waste, was responsible for sequestering 2,535 tons CO₂e, and textiles and wood sequestered 6,754 tons CO₂e.

One major issue with the emissions from the Solid Waste sector is that they often are in the form of methane, or CH₄, a greenhouse gas that is 21 times more powerful than CO₂ in causing global warming. Since the City of New Orleans does not have a methane capture system installed on any of its landfills, decomposing waste releases more equivalent tonnage of CO₂ than it would if that gas were collected or even burned as a flare.

4. Comparison of 1998 to 2007 GHG Emissions

Between 1998 and 2007, New Orleans experienced the largest decline in population that any major U.S. City has experienced from a single event. Hurricane Katrina decimated the City and its population, impacting 80% of the built environment and chasing 90% of the population out of the City, some never to return. The numbers in the following tables reflect the huge reduction in energy use, transportation and city services.

Comparison of 1998 and 2007 Community Data			
Sector	1998 (CO₂e)	2007 (CO₂e)	Change
Residential	2,199,929 tons	914,167 tons	-58.4%
Commercial	1,911,965 tons	1,194,063 tons	-37.5%
Industrial	588,995 tons	445,783 tons	-24.3%
Transportation	3,296,432 tons	1,893,132 tons	-42.6%
Waste	117,325 tons	94,533 tons	-19.4%
Total	8,114,646 tons	4,541,677 tons	-44.0%

Table 2a: Comparison of 1998 and 2007 Community GHG emissions data

There was an overall decrease of 44.0% in carbon emissions (excluding those produced by solid waste) between 1998 and 2007. The smallest decrease of 19.4% occurred in the waste sector. The largest decrease occurred in the residential sector in which there was more than 1.2 million tons difference between 1998 and 2007. The 1998 community emissions data are almost double the 2007 data, showing a dramatic reduction of GHG emissions in all sectors.

A graphic representation of the changes in sectors is shown below in *Figure 7* giving a better comparison of how the different sectors have changed from pre to post-Katrina.

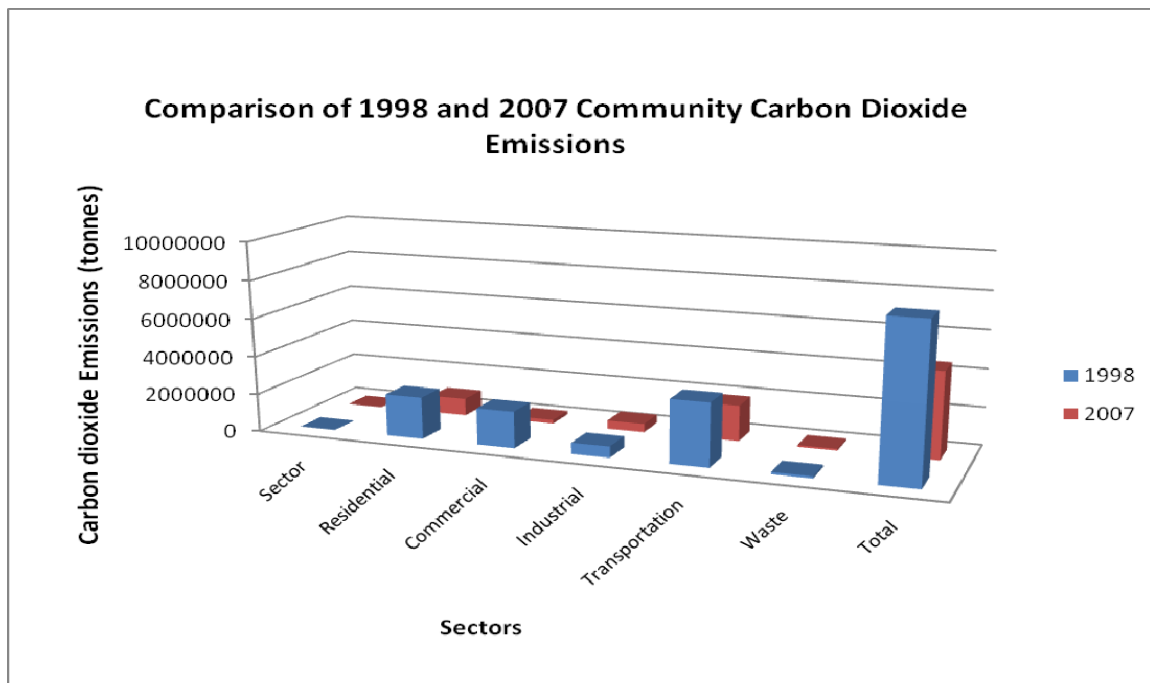


Figure 12: Comparison of differences among Years and Sectors

Comparison of 1998 and 2007 Municipal Data			
Sector	1998 (CO₂e)	2007 (CO₂e)	Change
Buildings	90,088 tons	27,004 tons	-70.0%
Vehicle Fleet	25,484 tons	17,006 tons	-33.3%
Streetlights	43,070 tons	31,612 tons	-26.6%
Water/Sewage	139,438 tons	135,025 tons	-3.2%
Total	298,080 tons	210,647 tons	-29.3%

Table 2b: Comparison of 1998 and 2007 Municipal GHG emissions data

Overall, there was a 29.3% decrease in GHG emissions in all sectors of government operations. The greatest change was in buildings, which had a reduction of 63,084 tons CO₂e, a 70.0% decrease! The likely reason for this dramatic change is the closure of several city buildings due to Hurricane Katrina, plus ongoing energy efficiency upgrades. GHG emissions from the vehicle fleet decreased by 8,478 tons, or 33.3%. GHG emissions from streetlights were reduced by 11,458 tons CO₂e, a 26.6% change. The least amount of change occurred in the Water/Sewage sector with a reduction of only 4,413 tons CO₂e or 3.2%. The reason the change for Water/Sewage is so small compared to the other sectors is that the 2007 calculation incorporated community-wide data while the 1998 calculation did not.

5. Forecast for Business as Usual Scenario

The reports below were generated using the CACP software provided by ICLEI. The software was used to forecast what the City's GHG emissions would be in 2030 under what is referred to as "business as usual" circumstances. If no action were taken to reduce GHG emissions from the date the data were collected, the City of New Orleans would produce 6,451,399 tons CO₂e in the year 2030, a 36.5% increase from 2007. Sea level rise and wetland loss are variables that are not included in this projection. These factors have the potential to affect the projections created through the software, as they can lead to significant changes in citizen's behavior, government activities, and overall carbon emissions.

Pending no action, the City of New Orleans would produce 6,451,399 equivalent tons of carbon in the year 2030, a 36.5% increase.

a. Community Inventory

In the year 2030, under "business as usual" circumstances, emissions for the Community category, would reach 6,064,981 tons CO₂e, a net increase of 35.8%. The transportation sector would grow to 2,666,244 tons CO₂e, followed by the commercial and residential sectors, which would rise to 1,681,691 and 1,287,492 tons, respectively. Industrial GHG emissions would rise to 627,831 tons CO₂e, and solid waste, to 29,255 tons CO₂e. The projected increase is due in large part to normal population increases, with the city's population growing an estimated average of 1.43% per year. Immediately after Hurricane Katrina, the City of New Orleans saw an 8.2% growth rate in its population size. This increase was due to returning residents following the hurricane, but the city is expected to maintain a future growth rate of 2.9%. GHG emissions would increase at the same rate as they were in 2007, 1.5% per year. The ratios of various sectors emissions would stay the same.

b. Municipal (Government) Inventory

If GHG emissions continued to rise at their 2007 growth level, municipal levels in 2030 would reach a total of 260,509 tons CO₂e, an increase of 40.8% from 2007 levels. Sewerage and Water Board activities would rise to 190,166 tons CO₂e. Streetlights would emit 44,522 tons CO₂e, followed by the vehicle fleet, at 23,951 tons CO₂e, and buildings would produce 1,848 tons CO₂e.

New Orleans' Climate Action Plan

After Katrina, the City of New Orleans has renewed its commitment to reduce its GHG emissions. The 2007 GHG inventory report and subsequent Climate Action Plan, under Mayor C. Ray Nagin's leadership, will take the City in a new direction of sustainability, establishing New Orleans as a leader in climate change mitigation. Mayor Nagin, like his predecessor, has signed onto ICLEI's Climate Action Blueprint, committing New Orleans to an aggressive citywide campaign to reduce carbon emissions. Mayor Nagin's administration and the current City Council have already spearheaded a number of initiatives, described below.

1. GreenOLA

GreenOLA is the City of New Orleans' plan for smart and sustainable rebuilding. It is comprehensive and well thought out, incorporating relevant concepts from successful programs around the country.

Sustainable redevelopment for New Orleans will require establishing population resettlement patterns based on a thorough understanding of flood risk... (and) incorporating improved building codes

GreenOLA addresses the need to rebuild both the city's physical infrastructure and its administrative infrastructure, and to do both in a way that is smarter, greener, and better than before.

Sustainable redevelopment for New Orleans will require establishing population resettlement patterns based on a thorough understanding of flood risk; implementing hazard mitigation into comprehensive citywide planning processes; incorporating improved building codes with more stringent include energy efficiency standards; diversifying energy sources; reducing the waste stream; and protecting and restoring both urban and natural environments.

GreenOLA is a product of the Office of Recovery and Development Administration (ORDA) and is the City's roadmap for sustainable rebuilding. It prescribes a plan of action guided by these three steps:

1. Revive previously existing environmental programs and policies.
2. Improve city government so that it can more effectively implement initiatives related to energy and the environment. These improvements include creation of:
 - A Chief Energy Officer and Chief Environmental Officer within ORDA.
 - A Consortium of Gulf Coast Mayors, sponsored by the USCM, to address regional issues related to energy, economics, and the environment.
 - A "green team" to recommend sustainable green building practices for current FEMA recovery projects as they are being implemented.
3. Establish short, medium, and long-term citywide sustainability goals.

In sum, GreenOLA is a comprehensive plan to rebuild the City's physical and administrative infrastructure, incorporating the best aspects of green rebuilding and smart growth. The three steps described above support work in six essential areas:

- green building, energy efficiency
- alternative energy
- waste reduction, reuse, and recycling
- transportation and clean fuels
- environmental outreach and justice
- flood risk reduction.

By focusing on these six areas, and by following best-practice models for each, the City hopes to attain all its sustainability goals.

2. New Orleans Master Plan

The New Orleans City Charter requires that the City Planning Commission (CPC) prepare a long-term Master Plan. Before Katrina, the CPC had been working on a Master Plan for several years and had approved some sections of the plan. These older sections are being reviewed and updated, and new sections prepared. Topics include housing and human services, infrastructure and facilities, environmental quality, and economic development. The Master Plan is intended to integrate and balance the many interests and perspectives of neighborhoods and organizations, while defining a “roadmap” for the city’s future.

Environmental issues, including reduction of CO₂, are referenced throughout the draft Master Plan which is online at <http://www.nolamasterplan.org/>. The Master Plan elements related to environmental sustainability, such as walkability, green space, wetlands restoration and protection, storm water management, reducing urban heat island, green technology and jobs, and green building, can be found in chapters 5, 6, 8, 9, 10, 12, 13, 14, and 15 of the document.

“New Orleans 2030: A Vision for the 21st Century” outlines a future in which the city has built a greener reality, with a major focus on transportation, including a rapid transit system, extended greenways and bike pathways, and improved sidewalks and streets that make the city safer and more accessible for pedestrians and cyclists. The Master Plan also calls for extensive improvement of parks, community wellness centers, to enhance public health and safety and to help to lower community emissions. Efficiency and resiliency is a repeated theme, with particular emphasis on water purification and sewage management, as well as sanitation and the restoration of recycling.

The Master Plan seeks to put every resident within walking distance of fresh produce outlets and parks and to increase the urban forest to a 50% canopy. Currently, parks and urban forests store 1,291,700 tons of carbon yearly, and sequester 10,000 tons. Carbon sequestration is the process in which plants actively remove carbon from the atmosphere, while carbon storage is the amount of that carbon that is permanently prevented from going back into the atmosphere, as it is stored as the genetic makeup of the plants. Today’s tree cover is 30,019 acres of canopy, or 24%. If the canopy cover were to increase to 40%, 2,134,300 tons would be stored, and 16,600 tons would be sequestered, as well as mitigating 431,250,928 cubic feet of

“New Orleans 2030: A Vision for the 21st Century” outlines a future in which the city has built towards a greener reality

stormwater, and removing 4,716,169 pounds of air pollution a year.¹⁹

The importance of managing the City's water resources is underscored—an overhaul of the stormwater drainage system and an increase in wetlands and coastal restoration is written into the plan. An economy based on green jobs and sustainable technologies is suggested through local universities' researching energy-efficient technologies, encouragement of green building practices, and expansion of urban agriculture. Above all, the plan seeks to turn the city into a world leader in renewable energy use, sustainable practices, and preservation.

3. Mayor's Executive Order to Establish Green Council

In 2007, the Office of the Mayor created the Green Council. This council is tasked with changing the mindsets and habits of citizens, bringing conservation-based principles into the daily activities of every department in the City, and promoting and encouraging sustainable practices within city government. The Council, coordinated by the Office of Environmental Affairs, consists of members from Sanitation, Public Works, Parks & Parkways, Mosquito & Termite Control, Recovery Management, and Purchasing, as well as other outside members appointed by the Mayor.

4. Green Building Ordinance

On October 4, 2007, the New Orleans City Council unanimously passed Ordinance 26728, mandating the establishment of a city-wide green building program. The Ordinance calls for the creation of voluntary New Orleans-specific green-building standards, a unified energy policy, and instructs the City to encourage LEED-compliant construction, the use of Energy Star appliances, park development following Green Communities Criteria, and the shift to renewable and alternative energy sources.

5. Green Job Training

The City's workforce development agency has funded and supported the Conservation Corps Network's Green Jobs Initiative, which trains New Orleans youth through green building related projects and programs. These programs include training energy auditors, solar installer training, placing at-risk youth in green non-profit organizations, and helping local builders earn their LEED certification.²⁰ Groups like the Conservation Corps of Greater New Orleans, teach green building skills to local young people, as a way of reconnecting them to the job market. Projects usually are focused on rebuilding, disaster recovery, and occasionally on agriculture.²¹

¹⁹ "Urban Ecosystem Analysis New Orleans, Louisiana Metropolitan Area."

http://www.americanforests.org/downloads/rea/AF_NewOrleans.pdf

²⁰ Moore, John. Note: LEED stands for Leadership in Energy and Environmental Design and is the green building rating program of the U.S. Green Building Council.

²¹ Conservation Corps of Greater New Orleans.

6. Sewerage & Water Board Wetlands Assimilation Project

Over the past century, Louisiana has lost a tremendous amount of wetland protection due to oil and gas development and the construction of levees and navigation channels. These wetlands have long provided a buffer zone of protection from hurricanes, originally covering over 3.3 million acres—in other words, forty percent of all contiguous US wetlands are in Louisiana— but due to dredging, draining, and development, the region currently faces eighty percent wetlands loss, and are projected to lose one million acres by 2050.²²

In order to begin restoring the wetlands, and responding to a great deal of public demand, the Army Corps of Engineers has begun closing the Mississippi Gulf River Gulf Outlet (MRGO), a channel often cited as a major cause of wetlands destruction and which caused major flooding from Hurricane Katrina. Similarly, the Sewerage and Water Board of New Orleans and St. Bernard Parish Government have recently proposed a new infrastructure design to divert municipal effluent to wetlands rather than to through the Mississippi River. Currently, effluent from the two parishes goes to the Northern Gulf of Mexico and nourishes algal blooms, which then die, and as the blooms decompose, they consume most of the oxygen in the area. This then creates a massive oxygen-depleted region in the Gulf, known as a “dead zone.” When diverted, however, the nutrient-rich effluent would help restore 10,000 acres of wetlands throughout Bayou Bienvenue; the area affected by MRGO, and would help to protect the sewage treatment plants, which were severely damaged by Katrina and Rita.²³

Studies have found that in addition to storm surge protection, wetlands provide excellent carbon sequestration. The Sewerage and Water Board commissioned a study lead by Sarah K. Mack, MSPH, PhD, with the LA Carbon Team to determine exactly how much carbon is sequestered by the wetlands, as well as how much N₂O and CH₄ are produced by the wetlands. N₂O and CH₄ are greenhouse gases that are emitted by wetlands, and can offset the amount of carbon sequestered. As a result, the study must find the optimal acreage of wetlands in order to provide the most greenhouse gas abatement.²⁴

7. Louisiana’s Renewable Energy Tax Credit

In 2007, the Louisiana State Legislature passed Act 371, known as the “solar tax credit bill”, which gives residents a fifty percent tax reimbursement for each system installed—up to \$25,000—which makes it the largest in the country. When coupled with the Federal Tax credit for installation of solar power in homes, this is a strong incentive to install renewable energy systems. Act 371 provides for a credit on each system, so residents may install as many systems as needed to totally offset their emissions. (Due to Louisiana State net-metering rules, residents may continually produce energy indefinitely— however, the energy produced is sold back to the utility company as a “store credit”, and so it is not a feasible option for systems to produce excess energy to sell). This act, as well as the Federal stimulus package will substantially increase the use of solar power in New Orleans, away from carbon-emitting energy sources, and can greatly lower the city’s emissions.²⁵

²² Meffert, Doug.

²³ Mack, S., et al. “Plans for Discharging Treated Municipal Effluent from the East Bank Wastewater Treatment Plant and St Bernard Parish Consolidated Munster Plant to Coastal Wetlands for Water Quality Improvement and Coastal Wetland Restoration”

²⁴ Mack, Sarah. “Wetland Central Unit Carbon Proposal.” Tierra Resources/ LA Carbon Team.

²⁵ “Louisiana has the best solar rebate program in THE NATION.”

The 2009 legislative session saw several other important bills pass. These include Louisiana State Senate Bills 91, 92, and 224, all introduced by Senator Nick Gautreaux, as well as House Bills 858 and 733, introduced by Representatives Erich Ponti and Walt Leger III, respectively. Senate Bill 91 creates a tax credit of up to 25% of the costs for anyone, corporate or individual, who owns a qualified energy resource—including wind, solar, and other sources—up to \$3,750,000. The tax credit can be transferred or traded, and can be used up to five years after it is first issued. Senate Bill 92 is similar, but reenacts an old bill that gives tax credit for wind and solar energy installation, and specifies that the credit cannot be used twice. Senate Bill 224 creates “sustainable energy financing districts” within the state, which can provide local homeowners and commercial taxpayers with tax-exempt bonds to improve energy efficiency or install renewable energy devices. The goal of the bill is to encourage and permit the growth of energy efficiency, and allows local governments to give out loans beyond their budgetary capacity. House Bill 858 allows third party installers and owners to receive the 50 % state tax credit on solar installations, which will lead to the creation of more green jobs and help the growing solar power market. Finally, House Bill 733 gives tax credits to employers for creating jobs in the green industry, involved in fields such as energy efficiency, energy audits, renewable energy, and building deconstruction.²⁶

8. Solar America City

In 2007, New Orleans applied and was selected to become one of 25 Solar America Cities (SAC), by the U.S. Department of Energy (DOE). The program provides funding and technical assistance to the cities to accelerate the adoption of solar energy technologies. SAC has engaged over 180 organizations, including municipal, county, and state agencies; solar companies; universities; utilities; and non-profit organizations to work together to help power their cities with solar energy. New Orleans’ SAC program is managed by the Office of Recovery Management along with its partners Global Green, the Alliance for Affordable Energy, FutureProof, and the Louisiana CleanTech Network. Some of the activities and progress made as a result of the SAC award are described below.

The City of New Orleans held its first Solar Summit on June 4, 2008 to begin the process of removing barriers to the use of solar power. Stakeholders came together to define obstacles and find solutions to ease the process of installation and interconnection of photovoltaic systems. Workforce development and solar outreach were other issues discussed at the summit. Participants and key stakeholders included: the New Orleans Office of Safety and Permits, the Office of Recovery and Development Administration (ORDA), the Historic District Landmark Commission (HDLC), Entergy New Orleans, Delgado Community College, and the community of solar installers.

To expedite the solar permitting process, the City has worked closely with experts from DOE’s Solar America Board of Codes and Standards (Solar ABC’s) to provide guidelines for evaluating photovoltaic (PV) systems. In addition, DOE also provided training for code officials via one of its partners, the Florida Solar Energy Center, to help them better understand how PV systems work and how to inspect them for safety. The SAC team has worked closely with the local utility, Entergy New Orleans, to help expedite the process of interconnecting PV systems to the grid. SAC partners developed a technical paper explaining

²⁶“VICTORY! - Energy efficiency, renewable energy, solar tax credit and green jobs bills pass.”

<http://all4energy.org/news/victory-energy-efficiency-renewable-energy-solar-tax-credit-and-green-jobs-bills-pass>

how to safely interconnect PV systems in area networks like that found in New Orleans' Central Business District.

The Florida Solar Energy Center, in an effort to build local capacity through workforce training, gave a three-day workshop for residents on how to properly install grid-connected PV systems. The workshop was done in conjunction with Louisiana Clean Tech, which now offers training classes in New Orleans and around the State of Louisiana.

Community-Wide Emissions Reduction Activities

In addition to city government initiatives, a number of local nonprofits have undertaken projects that are contributing to the reduction of GHGs. The most prominent of these are described below.

1. The Lower Ninth Ward Center for Sustainable Engagement and Development (CSED)

The CSED was created in January 2007 as a project of the Holy Cross Neighborhood Association (HCNA). Its mission is to encourage restorative rebuilding, sustain natural systems, support community leadership, and stimulate civic engagement through an informed, protected, engaged, repopulated Lower Ninth Ward. Through these initiatives, residents hope to create a cohesive, prosperous, sustainable community that is climate-neutral by 2020 and carbon-neutral by 2030. They define these achievements as follows:

- **Climate-neutrality:** *Offsetting carbon-producing activities with those that reduce or capture carbon, neutralizing the net amount of carbon released from a particular activity.*
- **Carbon-neutrality:** *Achieving net zero carbon emissions by balancing carbon released with an equivalent amount sequestered or offset. Reaching this balance can be aided by using renewable energy in place of energy created from the burning of fossil fuels.*

To achieve these goals, the Lower 9th Ward CSED initiated and collaborates on a number of projects and is working a comprehensive campaign for sustainable rebuilding. Work to date includes: Recruiting 300 residents to participate in initiatives to energy-efficiency rate and retrofit, historic preservation and restoration, direct outreach to 675 residents, install 10 solar panels in Lower Nine, the introduction of Sustainable Zoning Initiative, the Commercial and Industrial Building Reuse Initiative, and considerable work with the community to implement affordable housing, repopulation, and sustainable economic growth.

Working Partners for CSED's carbon neutral initiative include:

- Alliance for Affordable Energy
- Global Green
- Community Development International
- Make it Right
- Louisiana Bucket Brigade
- Preservation Resource Center
- National Trust for Historic Preservation
- Preservation Trades Network
- Louisiana Department of Natural Resources
- Alliance for Healthy Homes
- Greenlight New Orleans
- Lower Ninth Ward Village
- Sharp Solar International
- University of Southern Illinois
- Sierra Club
- Natural Resources Defense Council
- Churches
- Common Ground Relief
- Lower9.org

CSED's practice of collaboration and community-building is an excellent method for achieving its goals and can be seen as a microcosm and model for the City of New Orleans. Two of the nonprofits who work with HCNA and CSED have their own model projects in the Lower Ninth Ward. These are Global Green and Make it Right.

2. Global Green's Holy Cross Project

Global Green USA responded to Hurricane Katrina by developing a plan in the week after the storm to share the organization's expertise with the devastated New Orleans community. Global Green committed to hire displaced residents, green homes and schools, adopt a neighborhood in New Orleans, and create a green building industry hub. In a very short time, Global Green was able to raise the funds to open a New Orleans office and hire two staff—both displaced residents. In 2006, Global Green worked with Brad Pitt to develop and implement a Sustainable Building Design Competition to challenge the world to create a model green building housing development for New Orleans. The winning design was chosen by a design jury chaired by Brad Pitt, a green building technical jury and Holy Cross residents. The winning design team was featured on the Today Show with Pitt and Global Green president Matt Petersen; the first LEED Platinum green home was completed in spring of 2008.

The entire Holy Cross Project consists of 5 single-family homes, an 18-unit apartment building, and a community center/sustainable design and climate action center. The first house, which is serving as a visitors center until the entire development is project is complete, has received its LEED Platinum certification from the U.S. Green Building Council. This home is net zero electricity and carbon neutral. By using solar panels, high performance building design, HVAC systems, energy and resource monitoring systems, and energy efficient appliances, the buildings in the Holy Cross Project will use at least 75% less energy than typical buildings.



Staff at Global Green calculated that it was estimated that if 50,000 of the homes destroyed by Hurricane Katrina were rebuilt according to the green standards set by Global Green USA's design competition, residents of New Orleans would save \$38 million to \$56 million in energy bills every year and eliminate over 1/2 million total tons of CO₂ – the equivalent of taking 100,000 cars off the road.



The Holy Cross Project is a holistic effort to provide overall sustainability for the nation. In addition to the construction element, Global Green Global Green hopes to “seed” the beginnings of a truly sustainable neighborhood by providing housing, a high quality location for a couple of essential small businesses, making infrastructure repairs around the site, and collaborating with stakeholders to return the public bus loop that existed in the Lower 9th Ward prior to the storm. The organization is also exploring the use of river turbines in the adjacent Mississippi River, which could be a powerful source of alternative energy in the near future.

Finally, the Sustainable Design and Climate Action Center is the centerpiece of the Holy Cross Project and Global Green's ongoing presence in New Orleans. The building will house a credit union and corner grocery, provide offices and a green building resource center for Global Green and the Holy Cross Neighborhood Association, serve as a center of operations for first responders after major hurricane

events, and, through conferences and symposia, bring international experts together to seek solutions to climate change.

In sum, the Holy Cross Project will advance the green rebuilding of the Gulf Coast, making sustainable development the new gold standard in the region. It will also help export knowledge for other cities – especially those in endangered coastal areas or otherwise threatened directly by global warming – to create a unified front on the adaptation to and mitigation of the dangers of climate change. Global Green views the Lower 9th Ward as a national and worldwide focal point for climate change action. By returning this neighborhood to vibrancy and dedicating long-term attention to its restoration as a climate-proof community, the Lower 9th Ward can serve as the leader in citizen and government action to protect coastal communities from the worst impacts of climate change.

3. The Make It Right Foundation

Hurricane Katrina flooded 80 percent of the City of New Orleans and killed 1,577 people in Louisiana. Hardest hit was the Lower 9th Ward where more than 4,000 homes were destroyed by the storm and the surge of water caused by the breach of the Industrial Canal levee. When the water receded after weeks of stagnation, block after block of one of the city’s poorest neighborhoods lay filled with debris, mangled homes and mud-filled cars. Two years later, when actor Brad Pitt toured the city, the once-vibrant neighborhood was still silent and razed and the community frustrated by a lack of progress. After meeting with community groups and families, Pitt pledged to work with top architects to rebuild the Lower 9th Ward back better than it was before Katrina, and to build 150 green, affordable high-quality design homes in the neighborhood closest to the levee breach. Make It Right (MIR) was born.

The drive to make energy-efficient, solar-powered, disaster-resistant homes more affordable for



working families has led to a series of innovations by MIR contractors, engineers, landscape architects and architects that could transform the green building industry. Traditionally, building green has added to the upfront costs of a home. However, MIR’s work has yielded breakthroughs that have reduced construction costs. For example, MIR has created new applications for familiar materials, revamped traditional construction processes, implemented new technologies and products, and worked with manufacturers to improve

their products, generating new markets and lowering costs.

Technologies and practices that are really making a difference in the MIR homes include:

- Storm water management: Each house has allowed the MIR team to achieve zero run-off sites, integrating various techniques on its lots such as pervious concrete, rain gardens and native landscaping.
- Advanced framing: By switching from conventional 16-inch on-center spacing to 24-inch on-center, aligning the structural members of the house, and using metal fasteners in place of

excess lumber at corners, headers, and intersecting walls, MIR has been able to reduce material and labor costs by 30%, save energy, and make the house stronger.

- Construction type testing: MIR has implemented structural insulated panels (SIPs), a strong and efficient material, modular construction, site-built stick construction with advanced framing techniques, and the Saebi Alternative Building System (SABS), which uses concrete-coated foam to create a strong, light-weight, and versatile foundation.
- Foundation building: MIR uses “friction piles” interlocked with concrete grade beams that support eight-foot tall columns. All concrete used has high recycled content. The MIR foundation uses about 1/3 the concrete of a standard foundation.
- Streets: MIR is working with the City of New Orleans to develop a pilot storm water management study that will monitor and analyze a series of demonstration projects in an effort to decrease run off and localized flooding.
- Landscape: MIR’s landscape architects are working with the Center for Sustainable Engagement & Development and the Louisiana Disaster Recovery Foundation to design and implement thirty demonstration projects showcasing stormwater management, urban micro farms, wetland restoration, and rain gardens to reduce flooding impacts.
- Green jobs and skills training: MIR has created a demand for trades, such as pervious concrete and solar panel installation, which has resulted in new “green collar” jobs for local builders and caused new local businesses to form. MIR also conducts on-the-job training for contractors in green building techniques such as advanced framing and SIP panel construction.

Today, eight LEED Platinum-certified MIR homes stand where there was once six feet of water. Twenty-four homes are under construction and 50 families are in homeowner counseling. By December 2009, more than 80 Lower 9th Ward families will be MIR homeowners in what the US Green Building Council says is the “largest, greenest development of single family homes in America.”

4. Green Light New Orleans

Green Light New Orleans is a nonprofit based in New Orleans that actively works to reduce carbon emissions and the burden of rising energy bills both in the City and surrounding parishes. This is accomplished through a free program that helps low and moderate income households make the switch from incandescent light bulbs to energy efficient compact fluorescent lights (CFLs), one house at a time. Volunteers go into homes and install the bulbs, as well as educate participants on the energy savings and environmental advantages of using CFL bulbs. Statistics from this program are highlighted below.

As of June 2009, Green Light New Orleans:

- Is the largest installation program in the U.S
- Installed 176,828 CFLs
- Installed CFLs in 6647 homes
- Prevents 36,000 tons of CO₂ from entering the atmosphere over the next nine years
- Saves 69 Gigawatt Hours (GWh)²⁷ of energy
- Saves \$8,000,000 in energy costs
- Currently installs 10,000 CFLs per month, with a capacity to install 15,000 each month

²⁷ A GWh is a unit of electrical energy equal to one billion watt hours, one thousand megawatt hours, 3.6 terajoules, or 3.41 billion British thermal units (Btu).

Green Light New Orleans is the first business in the city to successfully commercialize its carbon credits, partnering with the Dublin-based company EcoSecurities. A report generated by Green Light New Orleans's carbon consultant, Policy Solutions report projects the amount of carbon emission reductions that would take place if 400,000 bulbs were installed per year,²⁸ covering 60% of the City. The CFLs are expected to last over 9 years, so they are providing carbon reductions over their lifetime.

CO2 Reductions from bulbs installed in 2008									
	Wattage of Incandescents		60	40	75	100			
	Wattage of CFLs		14	9	20	23			
		LFR	NESy (kWh)	NESy (kWh)	NESy (kWh)	NESy (kWh)	Total (GWh)	(kt ²⁹ CO2)	
2008	Year 1	0.055	4,386,413	578,416	1,148,627	716,757	7	4	
2009	Year 2	0.110	4,132,347	544,914	1,082,097	675,242	6	3	
2010	Year 3	0.164	3,878,280	511,411	1,015,567	633,727	6	3	
2011	Year 4	0.219	3,624,214	477,909	949,037	592,211	6	3	
2012	Year 5	0.274	3,370,148	444,406	882,507	550,696	5	3	
2013	Year 6	0.329	3,116,082	410,904	815,978	509,180	5	2	
2014	Year 7	0.383	2,862,015	377,401	749,448	467,665	4	2	
2015	Year 8	0.438	2,607,949	343,898	682,918	426,149	4	2	22
2016	Year 9	0.493	2,353,883	310,396	616,388	384,634	4	2	
2017	Year 10	0.500	2,320,239	305,959	607,578	379,136	4	2	
	TOTAL		32,651,570	4,305,615	8,550,145	5,335,398	51	26	kt CO2
								201	kg per bulb
	Assumptions								
	Hours of operation	Oi	3.00	hours					
	Bulbs installed in Year 0	QPJ,i	17,078.00	# 40 Watt					
			85,422.00	# 60 Watt					
			19,115.00	# 75 Watt					
			8,520.00	# 100 Watt	130,135	total bulbs 2008			
		Pi, BL	60.00	watt					
		Pi, PJ	13.00	watt					
			12.00	watt					
	Rated life	Li	10,000.00	hours					
	Annual operating hours	Xi	1,095.00	hours/year					
		Ri	50.00	%					
	TDy		0.10						
	NTG		0.95						

²⁸ The 400,000 bulbs per year would begin in 2010. One hundred thirty thousand CFLs were installed in 2008 and 200,000 will be installed by the end of 2009.

²⁹ "kt" is kilo tons or 1,000 tons.

	Emissions factor (DNA)		0.52							
	Expected lifetime		9.13242009							
	Total Reductions through 2015	227	kt CO ₂							
	(bulbs installed 2008-2013)	1,930,135	total bulbs installed							
	Total Reductions through 2022	388								

Table 3: Green Light New Orleans Energy Reductions

The above table shows energy/emissions avoided by replacing four different wattages of incandescent bulbs with appropriate CFLs. Since these bulbs last for an average of 9.1 years, savings have been calculated over the lifetime of the bulbs. Savings (avoided emissions) through 2015 for the bulbs installed in 2008 is 22 kilo tons (kt) CO₂ or 22,000 tons. The cumulative avoided emissions of all CFL bulbs installed through 2015 are 227 kt CO₂.

5. Enterprise Community Partners

Enterprise Community Partners is a national nonprofit with 25 years experience in community development and affordable housing. Its mission is to create opportunities for low- and moderate-income people through fit, affordable housing and diverse, thriving communities. Several years ago the organization introduced its Green Communities Initiative, the first national green building program for affordable housing, proving its assertion that “green” and “affordable” are one and the same.

Green Communities promotes the use of environmentally sustainable materials, reduction of negative environmental impacts and increased energy efficiency as well as emphasizing designs and materials that safeguard the health of residents and locations that provide easy access to services and public transportation. Now the program is offering carbon offsets to organizations, individuals and events that support its efforts to bring green housing to low-income people. Here’s how it works:

- Enterprise raises charitable contributions to support the development and rehabilitation of green affordable homes that generate lower carbon emissions.
- The contributions are used to purchase measure and verify carbon offsets from affordable housing sponsors.
- Enterprise provides documentation to contributors that their support has helped create green affordable homes and reduce global warming.

Additional information on Green Communities Offset Fund is available on their website at www.greencommunitiesonline.org/green/offset/.

Enterprise’s Gulf Coast office has committed to the development of 10,000 healthy, affordable homes in the most heavily storm-damaged region. Three local partners, Jericho Road Episcopal Housing Initiative,

New Orleans Neighborhood Development Collaborative (NONDC), and Providence Community Housing, have been awarded Green Communities grants to integrate the criteria into their affordable housing developments. Features of the new homes include: green seal certified carpet; Energy Star rated appliances and light fixtures; low-e, double glazed vinyl windows; passive solar site design; highly efficient HVAC throughout; low or no-VOC paints, sealants and adhesives; and close proximity to public transportation.

6. New Orleans Public Schools

Global Green USA, a national nonprofit with an office in New Orleans, has been working with New Orleans public schools for the past two years with a grant from the Bush Clinton Katrina Fund (BCKF). Global Green’s schools work incorporates technical assistance, outreach, and policy development. For one component of the grant, selected schools in Orleans Parish received energy efficiency upgrades which resulted in significant reduction in energy consumption, bills and ghg emissions. In 2008, partly because of the success of these energy upgrades, a new Master Plan was adopted for Orleans Parish public schools, which includes green guidelines for all new schools and major upgrades.

Global Green has discussed pursuing carbon credits for the offsets provided by energy efficient schools, and developed the following table for discussions with the Recovery School District. The following chart showing energy savings from retrofits on three public schools at a cost of \$75,000 each gives a good indication of the savings and carbon offsets available.

Conservation Measures	A.P. Tureaud	International School	Dr. Martin Luther King
Solar Shades	Y	Y	N
Relamping of Fluorescents	Y	Y	Y
Replace Incandescent Lights with Compact Fluorescents	Y	N	Y
Caulk/Weatherstrip	Y	N	N
Adjust thermostat settings for occupancy load & season	Y	N	Y
Install Occupancy Sensors	Y	Y	Y
Install Daylighting Sensors	N	N	Y
Install Rainwater Cistern	Y	Y	N
Install Hot Water Heater Insulating Blanket	N	Y	Y
Estimated kWh Electricity Saved	211,000	168,000	190,000

Estimated MMBtu Natural Gas	471	420	450
Est. Gallons of Potable Water Saved	N/A	90,000	N/A
Estimated lbs CO2 Reductions (lbs)	220,000	177,000	180,000
Estimated Dollars Saved on Energy	\$26,000	\$22,000	\$25,000
Estimated Dollars Saved on Water	N/A	\$234,000	N/A
Payback Period	2.5 years	3.5 years	2.5 years

Carbon credits may be an important source of funding for high performance schools once mandatory state and/or national cap and trade programs are established. Currently, voluntary markets for carbon credits in the U.S. are selling credits at about \$3 a ton. Initiation of a federal carbon market, which is strongly being pursued by the Obama administration, would likely raise the price to about \$30 per ton. In preparation for this event, Global Green has begun to develop a carbon model for energy efficiency in schools. The organization’s initial calculations (Table 4) predict that annual revenues from carbon credits could decrease the pay-back period for green construction by one year.

Schools to be blt or renov under Master Plan	Cost of green const (3% of total)	Est. annual energy savings	Tons CO ₂ reduced per year	Est carbon credit (CC) revenue @ \$30/ ton	Payback w/ energy savings	Payback w/energy sav + CC revenue	Decrease in payback time
85	\$32,651,154	\$3,779,662	15,553	\$466,599	8.64 yrs	7.69 yrs	11%

Table 4: New Orleans Public School Savings

7. Entergy Residential Solutions Program and Energy Smart

New Orleans’ utility company, Entergy New Orleans has also started a \$2 million energy efficiency pilot program available to all residential customers, called the “Residential Solutions Program.” The program provides customers with a list of certified insulation or heating, ventilating and air conditioning contractors on the Entergy New Orleans website. Customers can then choose certified contractors and receive cash incentive rebates for improvements like attic insulation, sealing of air ducts, reducing air leakage, and upgrading heating and air-conditioning systems. In addition, the program provides training for the partnering contractors in advanced energy-saving methods.

Energy Smart was developed by an Energy Policy Task Force consisting of interested citizens and stakeholders, who met voluntarily on a regular basis for close to two years following Hurricane Katrina. The resulting program was passed unanimously by the City Council and is funded by a millage on Entergy customers' bills totaling \$3.1 million annually. Entergy will determine the final design of the program and will hire a third party administrator to run it. Energy Smart will provide weatherization, CFL light bulbs, and air conditioning tune-ups to residential customers, with a special component for low income residents, and will provide commercial and industrial customers with rebates and incentives for various installations. The program is slated to weatherize 7,500 homes and install solar power in another 1,500 in its first three years. In low-income homes, it will provide “weatherization ready funds”

in accordance with the Weatherization Assistance Program (WAP), and will provide new Energy Star air-conditioning units in homes with inefficient units, as determined by WAP. Entergy will provide incentives for small commercial customers to upgrade lighting, HVAC, appliances, and food service equipment, and will incentivize large commercial, industrial, and governmental customers to upgrade lighting, HVAC, motors, and process energy efficiency.

8. US Green Building Council, Louisiana Chapter

The U.S. Green Building Council (USGBC) is a national non-profit 501c3 that convenes leaders from across the building industry to promote and support the construction of buildings that are cost-efficient, energy-saving, and healthy for occupants. The Louisiana Chapter of USGBC, an all-volunteer organization, works towards these ends with education and advocacy across the state, including New Orleans. After Hurricane Katrina, USGBC convened a Gulf Coast Reconstruction charrette with over 160 participants at its annual Greenbuild conference on November 9-11, 2005 in Atlanta, Georgia. The individuals at the charrette, one-fifth of whom were guests from New Orleans or its vicinity, drafted a document called "The New Orleans Principles," detailing ten principles vital to rebuilding New Orleans in a sensitive, sustainable, and thoughtful manner. These include:

1. Respect the rights of all citizens of New Orleans.
2. Restore natural protections of the greater New Orleans region.
3. Implement an inclusive planning process.
4. Value diversity in New Orleans.
5. Protect the city of New Orleans.
6. Embrace smart redevelopment.
7. Honor the past; build for the future.
8. Provide for passive survivability.
9. Foster locally owned, sustainable businesses.
10. Focus on the long term.

The Louisiana Chapter of USGBC is continuing the work of implementing these principles throughout the city. The group is participating in the installation of large solar photovoltaic arrays on four schools in New Orleans. Through a corporate grant, the schools will each receive approximately 25 KW of solar PV panels, which will provide approximately 5% of the schools' energy needs. USGBC-LA assisted in planning and is acting as fiscal sponsor for the grant. Additionally, the chapter has been working closely with a staff member from the National Office of USGBC, who has been located in New Orleans and working with the Recovery School District since September 2008. This staff member is assisting the RSD with their new schools and major renovations, all of which have the goal of reducing energy usage by 30% and achieving LEED Silver certification.

The local Chapter has provided workshops and presentations on green building to various groups throughout the city, including the International Facility Managers Association (IFMA), Louisiana State Office of Facility Planning and Control, National Association of Independent Schools, and private firms in

the building industry. They also provide consultation on the LEED Certification process; in New Orleans, USGBC-LA assisted in the certification of the New Orleans Family Center.

9. The Alliance for Affordable Energy

The Alliance for Affordable Energy has worked for fair, affordable, environmentally friendly, community based energy policy for Louisiana and the nation since 1985. The Alliance has been leading voice on Global Warming caused by greenhouse gases since 1995 and was the driving force behind the production of Louisiana's first report concerning our state's unique risk from Global Warming, *Danger and Opportunity* in 1999.

Education and organizing around the impacts of greenhouse gas emission are explicitly a part of Alliance activity that is integrated into other program areas. It is a powerful motivator for reform and helps to set the parameters of policy. Since hurricane expert Dr. Kerry Emanuel has determined that the power that enabled the Hurricane Katrina to burst the levees came from additional energy attributable to Global Warming, the elimination of greenhouse gas emissions has become an even more urgent issue for Louisiana and the Gulf Coast.

The core of the Alliance's work has been in the arena of utility regulation, where decisions are made about what methods will be used to generate electricity. The Alliance has consistently promoted energy efficiency as a centrally important strategy for reducing greenhouse gas emissions by reducing demand for electricity. Alliance staff has consistently advocated for clean methods of generation including wind and solar technologies and has authored the initial draft of the Renewable Portfolio Standard that is now before the Louisiana Public Service Commission. The recent success of a state-wide coalition in preventing the conversion of the Little Gypsy generating plant to burn coal and petroleum coke is typical of the approach of the Alliance. Energy efficiency measures and programs such as EnergySmart in New Orleans continue to benefit greatly from the experience and vigorous advocacy of the Alliance.

Sustainable rebuilding has become a major emphasis of the Alliance since the levee failures and subsequent damage to 80% of New Orleans. Alliance staff have initiated major public education efforts. One example of this was the initiation of the *New Orleans Build Smart Learning Center*, first as a major feature of the New Orleans Home and Garden Show, and now as an independent center for community education at the Alliance's offices. The Alliance also hosts and manages the LA Green Corps, a training program that prepares at-risk youth for entry level employment performing weatherization, an activity that promises to reduce the electricity requirements of structures in New Orleans, thus reducing greenhouse gas emissions.

Recommendations

The IPCC has calculated the planet has only 10 years to be well on its way toward *global* GHG emissions reductions to avoid catastrophic climate change. Yet there are hundreds of coal-fired power plants currently on the drawing boards in the U.S. Seventy-six percent of the energy produced by these plants will go to operate buildings. Buildings are the major source of demand for energy and materials that produce by-product GHG's. Slowing the growth rate of GHG emissions and then reversing it over the next ten years is the key to keeping global warming under one degree centigrade (°C) above today's level. It requires immediate action and a concerted global effort.³⁰ This report takes a step in the right direction by quantifying New Orleans' carbon emissions.

Part of the local Climate Action Plan (CAP), which will be developed based on this baseline inventory, should include a section on taking advantage of the Obama Administration's commitment to invest heavily in a more sustainable and environmentally friendly economy. There is now an unprecedented opportunity for investment in environmentally sustainable projects through the American Recovery and Reinvestment Act (ARRA).

On DOE's website (<http://www.energy.gov>), U.S. Energy Secretary Steven Chu details President Obama's \$26.4 billion Fiscal Year 2010 budget request for the Department, highlighting the administration's promise to secure reliable, clean, safe and secure energy, create new jobs and fight climate change.³¹

There is now an unprecedented opportunity for investment in environmentally sustainable projects through the American Recovery and Reinvestment Act.

The City of New Orleans should seek funding from the DOE's budget to implement progressive energy efficiency and renewable energy projects. The State of Louisiana will receive a significant amount of funding from the DOE, some of which will be used to upgrade the City's infrastructure. The City of New Orleans will have a significant portion of its federal and state funding allocated towards weatherization programs, which will produce many more energy efficient homes, reducing peak loads on the utility.

The City of New Orleans should remain involved with ICLEI, and participate in its developing programs. Currently, ICLEI is designing a program called the STAR Community Index in collaboration with the United States Green Building Council (USGBC), and the Center for American Progress. STAR is a standard that gives local governments the opportunity to measure their success according to a graded system similar to the LEED rating system developed by the USGBC.³² Once rated, cities would find new ways of improving their sustainability ratings. The program also allows local governments to set specific priorities and focus on maximizing investments. Because partners in the program will find best practice models for improve ratings, and share those practices amongst themselves, program development and administrative costs for the City of New Orleans will go down, and the city can have full access to highly successful programs. Development of sustainable programs can happen in a more straightforward manner, accounting for restraints in the local governments' jurisdiction. The rating system is set to be released in January of 2010. By taking early action, the City of New Orleans can become one of the pilot cities for this project and set itself on course to be a model for how to realize the goals of the STAR

³⁰ "The Challenge." http://www.architecture2030.org/2030_challenge/index.html

³¹ "Secretary Chu: President's Energy Budget Creates Jobs, Restores America's Scientific Leadership and Puts Nation on the Path to Energy Independence." <http://www.energy.gov/news2009/7387.htm>

³² "STAR Community Index." <http://www.icleiusa.org/star>

Community Index. The program will assist the City in incorporating policies and programs using performance based metrics that are incorporated in the software.

Another model that the City of New Orleans is encouraged to follow is the Architecture 2030 Plan. This plan, developed by architect Edward Mazria, is being touted as one of the nation's leading plans for reduction in carbon emissions. The tenets of this plan are widely promoted as having solutions for how to simultaneously address the problems of climate change and economic shortfalls. The pretence of this plan is that buildings are responsible for the majority of energy consumption, which leads to green house gas emissions. The architecture 2030 plan puts forth the challenge that all new buildings reduce their energy consumption by 50%, all existing buildings undergo yearly retrofits to reduce their energy consumption to 50% reduction of energy use, and that municipalities set goals to incrementally decrease their use of fossil fuels such that the energy consumption of all buildings is neutralized by 2030.³³ The plan lays out a model for how everyone from homeowners to business owners and municipalities can reduce the energy consumption of their facilities by incorporating energy efficient design techniques.

Associated with the Architecture 2030 plan is an economic model designed around ARRA called the 14x Stimulus Plan, which should be considered by the City. This portion of the Architecture 2030 plan was developed in partnership with ICLEI, RESNET and Veterans for Green Jobs. Based on the same principles as the national plan, the 14x Stimulus plan recommends using state and local stimulus money to create a local mortgage buy-down program that offers reduced mortgage interest rates contingent upon renovating or building to meet specific energy reduction targets.

Existing homes would have their interest rates lowered if the home is renovated to a minimum Home Energy Rating (HERS) rating, and if the homeowner makes a minimum investment in efficiency upgrades and/or renewable energy systems. New homes would receive lower interest rates the better their rating. The current U.S. average for a 30-year, fixed mortgage interest rate is 5%; the mortgage buy-down program would reduce this percentage by tying an increase in energy efficiency in the home to the reduction in the mortgage rate. The minimum investment is double the cost of the buy-down and depends on the amount of the mortgage. The pairing of energy efficiency with inflating property costs solves two problems at one time, and also stimulates the economy by creating a demand for more construction jobs in the area of energy efficiency. The plan will encourage the purchase of new energy efficient homes and multiply the stimulus dollars that are being injected into the economy 14 fold, hence the name the 14x Stimulus plan.³⁴

On a federal level, the National Home Energy Savings Revolving Fund (H.R. 1573) is a bill currently in the House Committee first introduced by Representative Chris Van Hollen (D-MD). If passed, the bill would create a fund of \$10 billion, created by two deposits of \$5 billion over 2010 and 2011, which would then be allocated to local governments to make interest-free loans of up to \$10,000 to homeowners for energy audits and energy saving improvements. Similar programs are being enacted at local and state levels all over the country, like Louisiana's Senate Bill 224. Under the Energy Efficiency and Conservation Block Grant Program, municipalities in California, Colorado, New Mexico, and Virginia have set up Municipal Energy Financing programs, which operate the same way as the proposed House bill, as loans that are paid back as property taxes.³⁵ The key aspect of this type of plan is that it has almost zero liability for local governments. In addition, the Department of Energy emphasizes the need to create an

³³ <http://www.architecture2030.org/>

³⁴ "Multiply Your Stimulus Dollars: 14X Stimulus." http://www.architecture2030.org/14x_stimulus/14x_stimulus.html

³⁵ Hemmeline, Charlie, et al.

economy of scale, which is more manageable and can be effectively handled by local, county, and state governments.³⁶ Other cities like Baltimore have used programs using Energy Performance Contracting to fund improvements, with the theory being that savings from energy improvements wind up paying for themselves. Proponents of this model highlight that it is very useful for municipalities with little funding for energy efficiency programs.³⁷ These programs could all be incredibly useful for the City of New Orleans in terms of increasing energy efficiency and decreasing carbon emissions, and the City should take advantage of SB224 as soon as possible.

The City's adoption of the ICLEI program has put it in a position to take action on these recommendations and position the City to be a leader in this industry. The work that is already being done in the City also puts it in a strong position to take advantage of the projects and programs that are being developed on a national level. Between 1998 and 2007, Louisiana's green jobs economy has grown more than six times as fast as jobs in general.³⁸ Businesses and other governmental office of the City of New Orleans are encouraged to use this research as they seek to rebuild a more sustainable New Orleans.

New Orleans is the United States' most vulnerable city to the effects of climate change. While there are many factors beyond the City's control, there are steps that can be taken to make New Orleans greener, smarter and safer, and perhaps aid in its longevity, despite the inevitably massive loss of land Louisiana will suffer.³⁹ By joining the ICLEI program, using the CCAP software, and by issuing this report, the City has begun the process to start mitigating its carbon emissions. With programs like GreenNOLA, an environmentally focused Master Plan, the Green Building Ordinance, Green Jobs Training, a new Green Council, the Solar America City program, the Louisiana State Renewable Energy Tax Credit, and by working with organizations like CSED, Global Green, Make It Right, New Orleans Public Schools, Greenlight New Orleans, Entergy New Orleans, and Enterprise Community Partnership, the City is moving in the right direction. It can definitely do more—focusing on the energy usage of the Sewerage and Water Board, as well as providing transportation alternatives for the community. Whatever action the City takes needs to happen immediately; while levees are being rebuilt and wetlands restored, New Orleans must insure its operations are not causing further heating of the atmosphere.

³⁶ DeVries, Cisco

³⁷ Hahs, Dale L.

³⁸ "Clean-energy jobs."

³⁹ Schleifstein, Mark. "LSU researchers: coastal restoration projects doomed to fail."

"A Survey of Climate Change Adaptation Planning." The John Heinz Center for Science, Economics and the Environment.

http://www.heinzctr.org/publications/PDF/Adaptation_Report_October_10_2007.pdf

Architecture 2030. <http://www.architecture2030.org/>

Bindoff, N.L., et al. "2007: Observations: Oceanic Climate Change and Sea Level." *Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA. http://ipcc-wg1.ucar.edu/wg1/Report/AR4WG1_Print_Ch05.pdf

"Clean-energy jobs." Times Picayune 13 June 2009.

"Climate Change 101: Adaptation." Pew Center on Climate Change. pp.3, 7-8

<http://www.pewclimate.org/docUploads/Climate101-Adaptation-Jan09.pdf>

"Climate Mitigation and Adaptation." Global Warming.

<http://www.global-greenhouse-warming.com/climate-mitigation-and-adaptation.html>

"Coastal Zones and Sea Level Rise." EPA Climate Change.

<http://www.epa.gov/climatechange/effects/coastal/index.html>

Conservation Corps of Greater New Orleans. "Green Skills." Power Point presentation 17 June, 2009.

DeVries, Cisco. US Department of Energy Webinar. 15 June 2009.

"Fisheries and Seafood." Louisiana Hurricane Resources. 3 October, 2005.

<http://www.laseagrant.org/hurricane/archive/fisheries.htm>

Hahs, Dale L. "Innovative Energy Efficiency Finance Approaches - Energy Saving Performance Contracting." US Department of Energy Webinar. 15 June, 2009.

"Health." EPA Climate Change. <http://www.epa.gov/climatechange/effects/health.html>

Hemmeline, Charlie, Claire Broido Johnson, John Rhow, Chris Moriarty, Cisco DeVries, Dale Hahs, and Ted Atwood. "Innovative Energy Efficiency Financing Approaches." US Department of Energy Webinar. 15 June 2009.

IPCC. "Climate Change 2007: Synthesis Report, Summary for Policy Makers." pp. 7, 8, 13, (November, 2007) http://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr_spm.pdf

Lake Pontchartrain Basin Foundation & Coalition to Restore Coastal Louisiana. "Overview of Multiple Lines of Defense Strategy to Sustain Coastal Louisiana" PowerPoint Presentation. 2006.

http://www.mlods.org/images/web_MLODS_overview.pdf

"Louisiana has the best solar rebate program in THE NATION." Louisiana Green Scene, June 2009.

Mack, S., et al. "Plans for Discharging Treated Municipal Effluent from the East Bank Wastewater Treatment Plant and St Bernard Parish Consolidated Munster Plant to Coastal Wetlands for Water Quality Improvement and Coastal Wetland Restoration"

Mack, Sarah. "Wetland Central Unit Carbon Proposal." Tierra Resources/ LA Carbon Team.

Meffert, Doug. "A Scientist's Look at the 'Changing Landscape'." Out of the Woods, Spring 2009.

"Mitigation." Center for Clean Air Policy. <http://www.ccap.org/index.php?component=issues&id=4>

Moore, John. "Green Collar Jobs of the Future: Pathways out of Poverty." Power Point Presentation.

"Multiply Your Stimulus Dollars: 14X Stimulus." Architecture 2030.
http://www.architecture2030.org/14x_stimulus/14x_stimulus.html

National Energy Technology Laboratory, U.S. Department of Energy .
<http://www.netl.doe.gov/about/index.html> .

"Port Facts." Port of New Orleans—Louisiana, USA.
http://www.portno.com/pno_pages/about_overview.htm

Schleifstein, Mark. "LSU researchers: coastal restoration projects doomed to fail." The Times Picayune. 29 June 2009.
http://www.nola.com/news/index.ssf/2009/06/timespicayune_projects_on_coa.html

"Seafood Consumption Declines Slightly in 2007." National Oceanic and Atmospheric Administration. 17 July, 2008. http://www.noaanews.noaa.gov/stories2008/20080717_seafood.html

"Secretary Chu: President's Energy Budget Creates Jobs, Restores America's Scientific Leadership and Puts Nation on the Path to Energy Independence." US Department of Energy. May 7, 2009.
<http://www.energy.gov/news2009/7387.htm>

"STAR Community Index." ICLEI USA. <http://www.icleiusa.org/star>

The Energy Information Administration. The Energy Information Administration. www.eia.doe.gov.

"The Challenge." Architecture 2030. http://www.architecture2030.org/2030_challenge/index.html

"Urban Leaders Adaptation Initiative." Center for Clean Air Policy.
<http://www.ccap.org/index.php?component=programs&id=6>

"Urban Ecosystem Analysis New Orleans, Louisiana Metropolitan Area." American Forests. August, 2002.
http://www.americanforests.org/downloads/rea/AF_NewOrleans.pdf

"VICTORY! - Energy efficiency, renewable energy, solar tax credit and green jobs bills pass." Alliance for Affordable Energy. 22 June 2009. <http://all4energy.org/news/victory-energy-efficiency-renewable-energy-solar-tax-credit-and-green-jobs-bills-pass>