

# Sustainability Guidelines for Gulf Coast Reconstruction

Creating a Disaster-Resilient and Sustainable American Gulf Coast



U.S. Green Building Council **Gulf Coast Reconstruction Charrette**

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### Special Thanks To

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Alabama  
South Florida  
Louisiana (forming chapter)

### Sustainability Guidelines for Gulf Coast Reconstruction

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Cover Photo: This house in Pas Christian, Mississippi, was built of reinforced concrete and elevated on piers to minimize damage from storms. Under construction when Hurricane Katrina hit, it was the only house in the neighborhood left standing.



Production of the U.S. Green Building Council Gulf Coast Reconstruction reports is being made possible by funding from Entergy Corporation. Entergy is an integrated energy company engaged primarily in electric power production and retail distribution operations. The company delivers electricity to 2.7 million customers in Arkansas, Louisiana, Mississippi and Texas.

November 9-11, 2005

# Creating a Disaster-Resilient and Sustainable American Gulf Coast

## Charrette Overview

The Sustainability Guidelines for Gulf Coast Reconstruction were developed by participants of a series of four charrettes held November 9-11, 2005, at the U.S. Green Building Council's annual Greenbuild conference in Atlanta, Georgia. In total, approximately 160 people participated in the charrettes, approximately one-fifth of whom were invited guests from the Gulf Coast region. The rest, from throughout North America, included experts in urban planning, water management, engineering, and architecture, along with some of the leading voices in sustainable design. These guidelines represent the outcome of the two charrettes that focused most directly on policy and planning issues.

## Opportunity

The recent and tragic destruction of major areas of the Gulf Coast from Hurricanes Katrina and Rita now presents this region with a unique and historic opportunity. That opportunity is to rebuild these communities in a way that brings forward their rich and unique histories, while redefining what a 21st century city, town, or rural settlement can be. This process allows these communities to address problems that existed prior to the 2005 storms—to create communities that are stronger economically, physically, and culturally for all of their citizens.

The following guidelines were developed to help redirect planning and rebuilding efforts, with the intent of enhancing environmental, social, and economic outcomes. This holistic, or “triple-bottom-line,” approach promotes environmental, economic, and equitable solutions in addressing the rebuilding efforts—creating stronger, more self-sufficient, and protected communities that embody the principle of sustainability.

The rebuilding effort on which our nation is about to embark holds the potential to generate a world-class, living example of what is possible when we work together intelligently and strategically.



# Sustainability Guidelines for Gulf Coast Reconstruction

## *1 • Respect the rights of all citizens by implementing an inclusive planning process*

Ensure that displaced Gulf Coast citizens have the opportunity to return to healthy, livable, safe, and secure cities, towns, and neighborhoods of their choice. Build a community-centered planning process that uses local talent and ensures that the voices of all residents are heard.

## *2 • Restore and expand the natural protections of the Gulf Coast*

Restore and sustain coastal and floodplain ecosystems and urban forests that support and protect the environment, economy, and communities of the Gulf Coast and that contribute greatly to the economy and well-being of the nation. Expand or build flood protection infrastructures that serve multiple uses. Value, restore, and expand the urban forests, wetlands, and other natural systems of the Gulf Coast that protect coastal communities from storms.

## *3 • Embrace smart redevelopment*

Maintain and strengthen the unique traditions of the communities along the Gulf Coast. Encourage mixed uses and diverse housing options; foster communities of varied incomes, mixed ages, and racial diversity. Celebrate the unique diversity of each region's culture, architecture, and commerce. Look to schools for jumpstarting neighborhood redevelopment and for rebuilding strong communities, and redevelop in ways that reduce automobile dependence.

## *4 • Honor the past; build for the future*

In the rebuilding of the damaged areas of the Gulf Coast, honor the history of each community while creating 21st century buildings that are durable, affordable, inexpensive to operate, and healthy to live in. Through codes and other measures, ensure that all new buildings are built to high standards of energy, structural, environmental, and human health performance.

## *5 • Provide for passive survivability*

Build or rebuild homes, schools, and other public buildings to serve as livable refuges in the event of crisis or breakdown of energy, water, and sewer systems.

## *6 • Foster locally owned, sustainable businesses*

Support existing and new local businesses built on a platform of sustainability that will contribute to stronger and more diverse local and regional economies.

## *7 • Focus on the long term*

Undertake all measures related to rebuilding and ecological restoration, even short-term efforts, with explicit attention to the long-term solutions.

## 1. *Respect the rights of all citizens by implementing an inclusive planning process*

*Ensure that displaced Gulf Coast citizens have the opportunity to return to healthy, livable, safe, and secure cities, towns, and neighborhoods of their choice. Build a community-centered planning process that uses local talent and ensures that the voices of all residents are heard.*

### Background and Context

The Gulf Coast faces a planning challenge that is perhaps greater than any other in the history of the United States. It is becoming increasingly clear that to protect Gulf Coast communities and their residents, some areas should not be rebuilt. It is critically important, therefore, that all of its current and displaced citizens—and the diversity of cultures, heritage, and income levels they represent—be a central part of the new Gulf Coast. Open and participatory planning is a key tenet of these Sustainability Guidelines for Gulf Coast Reconstruction.

Finding other places to build safe and high-quality homes, apartments, and neighborhoods, therefore, needs to be a top priority. Coordinated planning activities are critical to redeveloping in a way that benefits people at all socioeconomic levels. Policymakers from these communities, as well as the affected states and the nation, need to find ways to fund the relocation of these communities.

### Benefits

A clear, open, and accountable policy of inclusion in planning will help Gulf Coast residents be part of the solution, and make them more likely to return to the region. Removing the specter of uncertainty surrounding the rights of residents to return allows attention that would otherwise be focused on this issue to instead be devoted to addressing the long-term challenges that face these municipalities and their residents.

The most successful macro-scale planning efforts in recent decades have resulted from broad participation of residents. In North Charleston, South Carolina, for example, a major planning and development effort currently underway, known as Noisette, has garnered a remarkable participation of close to 40% of adults in planning meetings, focus groups, or hearings on their master plan—this in a city whose residents, most of whom fall at the lower end of the economic spectrum, had long felt disenfranchised from all planning. The



Photo: Alex Wilson

*Four Gulf Coast Reconstruction Charrettes in November, 2005 brought together more than 160 people from the New Orleans region and throughout North America to address rebuilding in the wake of Hurricane Katrina.*

Noisette Master Plan, built from the ground up through neighborhood- and community-scale discussions, demonstrates the remarkable accomplishments that can arise from an inclusive planning process.

### Policy Recommendations and Actions

- 1. Outreach Program and Public Health** – In heavily damaged areas, convey to all residents that it is the municipality's and the state's policy to make it possible for all residents to return to the area. Implement a communications outreach program that will reach all citizens—those who have returned and those who remain displaced—to maintain a sense of community and open access to information.
- 2. Environmental Health** – Strengthen and enforce the laws and rules that protect the environment and public health. The U.S. Environmental Protection Agency (EPA) must enforce accountability and monitor the levels of pollutants for as many years as necessary. Residents and leaders should expect long-term monitoring of the health of individuals exposed to floodwater and the resulting molds. Learning from experiences in New York City following 9/11, EPA should also provide ready access to protective

measures for those rebuilding their homes and businesses, as many residents will not return if they must also face health risks. Develop a master plan that restores environmental quality and supports ecosystem health. The government at all levels must prioritize public health over speed of rebuilding and should seek innovative ideas from a wide variety of disciplines.

**3. Involve Residents in Future Planning** – Rebuilding provides an opportunity for community members to apply innovative ideas about design and infrastructure as they recreate their homes, businesses, and neighborhoods. Involve all local and displaced residents in the planning that will guide the rebuilding. Allow residents to have input into how public dollars are spent. Work at all levels and scales—neighborhoods, church communities, school districts, nonprofit community development organizations, social-justice groups, Chambers of Commerce and other business organizations, city-wide organizations and agencies, and within the political leadership—to ensure participatory and inclusive planning. Mobilize “ambassadors” to regularly go out and meet with displaced residents.

**4. Involve Outside Expertise** – Address all environmental impacts of the building process, as this scale of construction has the potential to cause significant secondary environmental impacts. Continue to seek the help of outside expertise from organizations including the Urban Land Institute (ULI), American Institute of Architects (AIA), American Planning Association (APA), American Society of Civil Engineers (ASCE), American Public Works Association (APWA), Congress for the New Urbanism (CNU), and U.S. Green Building Council (USGBC) to assist local talent in meeting the highly challenging planning needs and to ensure the best thinking possible. Just as Europe benefited from the Marshall Plan following World War II—a plan envisioned and largely implemented by the U.S.—so too can the Gulf Coast’s reconstruction benefit from creative thinking originating outside of the immediate region.

**5. Plan for New Neighborhoods** – Direct planning efforts to explicitly address the fact that not all residents will be able return to their original neighborhoods. Assess the environmental conditions and limitations of building sites—during this assessment, learn from the experiences with past storms and identify which site-related factors contributed most directly to failure. Develop location-specific guidelines for determining where to rebuild based on studies of the environmental conditions, cultural needs, economic

costs of relocating, neighborhood needs, and strategies of repopulation. Redevelopment should be planned to maintain density in areas that can safely support development, while shifting development away from regions at the highest risk of hurricane and flood damage. For those areas deemed unsuitable for rebuilding, identify other living options for the former residents. There are often areas within cities and towns that can support additional housing and even new neighborhoods.

- **Mixed-Use Centers** – Create higher-density centers in communities by combining retail and commercial space with apartments and other housing for people of all ages, including the elderly. This is a key tenet of New Urbanism or neo-traditional development. Buildings with retail space on the first floor and apartments above bring more people into an area while reinforcing a sense of community.

- **Levee zones** – Many of the levees in New Orleans and other areas of the Gulf Coast have to be rebuilt, modified, or reinforced. In some cases, the banks of these levees can and should be greatly widened to reinforce them while creating higher ground for critical-needs facilities and high-density housing. If developed in a comprehensive way, the system of levees in New Orleans or along a river could also become linear parks linking communities and providing valuable green space. Look for creative opportunities to share the costs of creating a better levee system by focusing on recreational opportunities—for example, the National Park System could fund a new park.

- **River zones** – Numerous areas of high ground along the Mississippi River corridor are underused and suitable for redevelopment into new neighborhoods. The same applies to other major rivers that drain into the Gulf of Mexico.

- **Downtown core** – Create high-density housing areas adjacent to existing business and residential areas at the edges of the downtown cores of cities and towns, including former hospital zones and vacant parcels.

**6. Publicly Owned Conservation Zones** – Protect flood-prone areas that will remain undeveloped or where damaged buildings will be removed as either parks or conservation districts. They should be used for the benefit of all of the people—first and foremost to protect populated areas from future storms and, secondarily, to serve as natural greenway areas, linked with trails and bicycle paths to form connected corridors for people and wildlife.

## 2. Restore and expand the natural protections of the Gulf Coast

*Restore and sustain coastal and floodplain ecosystems and urban forests that support and protect the environment, economy, and communities of the Gulf Coast and that contribute greatly to the economy and well-being of the nation. Expand or build flood protection infrastructures that serve multiple uses. Value, restore, and expand the urban forests, wetlands, and other natural systems of the Gulf Coast that protect coastal communities from storms.*

### Background and Context

The Gulf Coast houses North America's largest expanse of coastal wetlands. Human actions have dramatically altered the natural hydrology of the region and significantly eroded the wetlands and protective islands, marshes, swamps, and floodplain forests that have long protected the land along the Gulf of Mexico. Because rivers were channelized and levees prevent annual flooding of the Mississippi River and certain other Gulf Coast river systems, sediment is no longer deposited to a significant extent in the deltas along the Gulf Coast; instead, high-velocity river flows erode the remaining land base, carrying sediment farther into the Gulf of Mexico.

Marshes and wetlands act as wave buffers, storage tanks, water purifiers, oxygen pumps, food pantries to wildlife, and fish nurseries. According to the strategic plan *Coast 2050: Toward a Sustainable Coastal Louisiana* (Louisiana Coastal Wetlands Conservation and Restoration Task Force and the Wetlands Conservation and Restoration Authority, 1998), since 1930, more than 1,500 square miles of vegetation-rich wetlands have been lost along the Louisiana coast; these losses are continuing at an average rate of a football field every 30 minutes—25-30 square miles per year. This lowland marsh and swamp is being replaced by open water, which offers no protection from hurricane winds or storm surges. Compounding the problem, the land not eroded is subsiding as the organic silt soils decompose and compress. These actions make New Orleans and other coastal communities increasingly vulnerable to hurricane damage.

The severity of storms in the Atlantic Ocean and Gulf of Mexico has increased in the past decade, which many scientists believe to be a result of global warming; global warming has increased water temperatures in the South Atlantic and Gulf Coast, allowing tropical storm systems to build up more energy. This adds urgency to the need to repair the natural systems that provide the primary line of protection to coastal communities.



*There was a dramatic increase in the frequency and severity of tropical storms in the decade 1995-2004, compared with the previous ten-year period. Ocean surface temperatures in the most recent period were 1-2° F warmer, driving this increase in storm activity.*

Rendering: Ethan Gibney, National Oceanic and Atmospheric Administration



Along with putting people at risk, the loss of wetlands also threatens coastal fisheries. These ecosystems contribute nearly 30%, by weight, of all commercial fishery harvests in the lower 48 states. These wetlands also provide wintering habitat for some 70% of migratory waterfowl on the Central and Mississippi Flyways.

Although the Mississippi River is largest, 33 major rivers drain into the Gulf of Mexico. Healthy floodplains protect the wetlands and downriver communities. When heavy runoff forces a river out of its banks, the river slows down and thus loses its power to carry its cargo of silt. As they spread these blankets of silt, rivers cleanse themselves and provide rich nutrients for plant life, but they also protect the bays, estuaries, and wetlands downstream. Without healthy, functioning floodplains, rivers tear into the estuaries and overwhelm the saltwater-adapted life there.

## Benefits

Protecting and restoring the coastal floodplain and woodland ecosystems will better protect the Gulf Coast region from future storm damage and coastal erosion. Restoring some natural flows along the major rivers of the Gulf Coast and allowing floodplains to function would allow sediment deposition in the wetlands and, in turn, allow these wetlands and the vegetation they support to protect Gulf Coast communities from storm surges and other impacts of hurricanes. In rough terms, every mile of wetland buffer absorbs one foot of storm surge.

The replanting of indigenous vegetation and urban forests in the Gulf Coast region will help to deflect winds during hurricanes; while some trees will be lost, trees provide a critically important protective buffer. Healthier wetland ecosystems along the Coast are crucial in sustaining the fisheries upon which the entire region has so long depended.

Strengthening or rebuilding the constructed flood-control infrastructure is critical in providing all residents and business owners the confidence they need to return to their communities and invest in their futures there. The reconstruction of levees and other flood-control infrastructure can achieve multiple benefits—for example, the construction of buildings on more protected, higher ground can provide space for recreational amenities such as perimeter parks, and the restoration of coastal wetlands and forests that can shield communities from storm events while providing recreational and economic opportunities.

## Policy Recommendations and Actions

**1. Rebuild or Strengthen Levee Systems** – Consolidate the authorities controlling levees, water levels, and coastal restoration into a single organization to manage the regional hydrologic systems comprehensively. In particularly susceptible cities, such as New Orleans, upgrade existing levee systems to withstand a Category 5 storm with redundant systems throughout; incorporate internal levees to isolate flooding in case of a breach in the primary levees. Use redesigned, reinforced, and buttressed levee systems and embankments as segments of a system of linear parks with biking, walking, and jogging trails. These parks can also be a component of a coordinated evacuation strategy; such an emergency evacuation system could potentially be funded by the Department of Homeland Security. Use suitable demolition waste (such as crushed concrete, aggregate, and bricks) to raise ground levels in especially low-lying regions of cities and along expanded levee banks.



Photo: US Army Corps of Engineers

*New Orleans levees failed in 17 locations during Hurricane Katrina.*

- 2. Coast 2050 Plan** – Update and revise accordingly the *Coast 2050* plan in light of 2005 Katrina and Rita hurricane damage. Fully fund and expedite its implementation. Promote the restoration of natural river flows and floodplains along parts of the Mississippi and other river systems to begin rebuilding sediments that support vegetation and protect inland areas. Very simply, use the valuable services of river systems to rebuild the protective wetland land base along the Gulf Coast.
- 3. River Sediment** – Pump and trap river sediments to restore eroded islands and wetlands. Sediment can also be pumped across levees to raise land elevation in parts of cities. Use dredged sediment appropriately: fine sediment can be used for wetlands and

bottomland forest and silty sand for islands and fill areas. Use small, woody debris as “brush mattresses” to accelerate vegetative establishment. Promptly plant filled areas with native vegetation. Use crib walls made from hurricane waste to naturally trap sediments and rebuild islands and wetlands. Use large, woody debris to trap sediment; this is a natural process with a high likelihood of success.

4. **Soil** – Prioritize soil building, as it is a critical to ecosystem health. Conserve and create topsoil, and incorporate live soil (including organisms critical to soil function) to support regeneration of natural systems. Proper waste management techniques can also contribute to the rebuilding of the soil supply; burning and hauling off of vegetative debris should be avoided, as it can be used for soil building. Use soil-building, native plants for landscaping, and test soils to understand what needs to be added. Soil contamination can render whole regions as brownfields; treat them accordingly, and remove all toxins.



Photo: John Fleck/FEMA

*Vegetative debris was widely burned in the aftermath of Hurricanes Katrina and Rita, increasing air pollution.*

5. **Reforest to Provide Storm Protection** – Plant wind-resistant, native trees to provide bands of protection from future storms. Use composted botanical waste and wood chips from Hurricanes Katrina and Rita, if uncontaminated, to mulch trees and provide an organic soil matrix. Fill areas on islands to protect them from waves and surges. Previously developed but heavily damaged areas that are vulnerable to future flooding should be designated for woodlands, wildlife habitat, and regenerative natural functions such as soil building.

6. **Eliminate artificial channels** – Channels create open water in areas that used to be wetlands, thus eliminating natural protections. When channels are open to large bodies of water, storm surges can be funneled into populated areas, risking loss of lives and property. Eliminate these artificial channels where not absolutely necessary and restore these areas as wetlands and floodplain woodlands.

7. **Water Resistant Construction** – Locate higher-density housing and critical-needs buildings, such as hospitals, schools, and emergency response services, farther inland or on higher, more protected ground along the redesigned waterway systems. Require new construction in low-lying areas to be built to withstand expected future flooding through careful material selection, elevated floor levels, and careful placement of utilities. Design structures to resist water intrusion and mold growth. Ensure that zoning bylaws and building codes permit creative storm-management techniques under all site conditions: rural, suburban, urban, and undeveloped.

8. **Reduce Stormwater Loading** – Reduce urban and suburban stormwater loads through the design of new buildings and infrastructure. Reducing stormwater loading reduces the rate at which runoff reaches pumps, lessening flooding and allowing use of smaller pumps operating at substantially lower cost. Open, green areas that accept stormwater and have controlled discharge structures act as temporary storage and further reduce flooding risk. Redesign pumping stations so that they can function and be operated safely during even the most severe storm events. Specific recommendations:

- Require porous pavement wherever feasible to reduce stormwater loading. Even where water tables are high, porous pavement is helpful in reducing flooding that results from small and moderate storms.
- Require green roofs for most large structures, both to reduce stormwater loading and to reduce the urban heat island effect, thereby cooling the city as a whole, reducing energy consumption for cooling, and improving air quality.
- Require rainwater harvesting systems, including onsite cisterns, both to lessen the stormwater loading and to provide water for other uses, including landscape irrigation, toilet flushing, cooling and heating systems, maintenance, and passive survivability (see page 15).

### 3. Embrace smart redevelopment

*Maintain and strengthen the unique traditions of the communities along the Gulf Coast. Encourage mixed uses and diverse housing options; foster communities of varied incomes, mixed ages, and racial diversity. Celebrate the unique diversity of each region's culture, architecture, and commerce. Look to schools for jumpstarting neighborhood redevelopment and for rebuilding strong communities, and redevelop in ways that reduce automobile dependence.*

#### Background and Context

The Gulf Coast is a melting pot of cultures, each offering its own unique characteristics. The amalgam of cultures found in places like New Orleans occurs through dense urban development, with compact, tightly knit, walkable neighborhoods serving to bring people together. Large single-family homes mixed with densely occupied apartment blocks, store-front retail and offices with residences above, and active nightlife are emblematic of these communities.

The city of New Orleans, for example, has long served as one of America's best and most emulated examples of high-density, mixed-use, walkable, and diverse neighborhoods. A strong and active movement, often referred to as New Urbanism or neo-traditional development, creates spaces with the sort of human scale and feel found in New Orleans. We now have the rare opportunity to influence the evolution of cities, towns, and neighborhoods along the Gulf Coast region and, in doing so, to help create this sense of community.

#### Benefits

The planning and redevelopment that will occur in the aftermath of Hurricanes Katrina and Rita can serve both to preserve the past tradition of compact, connected communities and to strengthen that model of land use moving forward. The cultural diversity out of which our nation grew is crucial to the future of the Gulf Coast region. Retaining compact, pedestrian-friendly neighborhoods will serve to bring people back together. By addressing past underlying problems, cities along the Gulf Coast can retain and reinvigorate their unique cultures and return to being some of the foremost destinations of tourists from around the world.

In the process of recovering from hurricane damage, planning and redevelopment can address problems of poverty, drug use, poor schools, and separation of people by economic status that have plagued cities, such as New Orleans, for decades. Low-income schools and neighborhoods must no longer be built without



Photo: Greg Henshall/FEMA

*Dr. Claudette Reichel, AG Professor at LSU and Project Chair for "LaHouse," described the building techniques and materials used to construct this innovative residential structure. LaHouse is built in four sections, each one showcasing solutions to help homes survive environmental threats common to the Gulf Coast.*

green space, near polluting industries, in flood zones, or on landfills. In particular, an effective, integrated planning initiative can restore schools as the hubs of neighborhoods and communities; schools can become the beacons of communities, jumpstarting progressive redevelopment and luring residents back to their cities, towns, and neighborhoods. Through various green building strategies, these schools and neighborhoods will not only recover from hurricane damage, but will end up healthier and in far more livable condition than before the hurricane damage.

#### Policy Recommendations and Actions

- 1. Bring Cultural Leaders Home to Participate in Planning and Redevelopment** – Bring cultural leaders back as soon as possible through targeted funding, temporary housing, temporary workspaces, and attractive employment opportunities. Engage leaders of all social organizations in this effort. Providing these options will inspire others to return to cities, towns, and rural settlements throughout the region.

**2. Schools as Community Social Anchors** – Jumpstart neighborhood redevelopment by rebuilding schools as key community institutions. Reestablish schools as *community centers for learning*, providing people of all ages and walks of life with access to art, music, education, and community-service programs. Redesign and rebuild schools to be high-performance buildings with passive survivability features that will enable them to be safely occupied in the event of extended power outages (see page 15).



Photo: Robert Kaufmann/FEMA

*The gutted halls of Cameron Elementary School, in Cameron, Louisiana, show the devastation the parish experienced from Hurricane Rita.*

**3. Continue Mixed-Use Tradition** – Preserve and build on the New Orleans *Main Street* tradition of mixed-use, walkable neighborhoods, where people live near basic services (including working, shopping, eating, entertainment). Plan for mixed uses and diverse housing options. Encourage inclusive planning with all new developments. Healthy and diverse cities, towns, and neighborhoods depend on creating vibrant, safe, mixed-use communities with a wide range of housing options available to all residents. The tragedy of Hurricanes Katrina and Rita offers a one-time opportunity to address these needs in a comprehensive, coordinated manner that will serve the Gulf Coast region for generations.

**4. Save Historic Structures** – Salvage as many historic structures as possible, moving them as necessary to protect them from future flooding or redevelopment pressures, or to serve as anchors in new neighborhood development. Make it a priority to preserve large and historic trees.

**5. Provide for Higher-Density Housing** – Identify areas suitable for higher-density housing. These should be areas on high ground—or where the elevation can be raised—that are more protected from future flooding and wind damage. Where possible, utilize formerly underdeveloped land or vacant properties. Encourage high-ground growth (up-zoning) with greater density throughout cities.

**6. Transit System as Development Incentive** – Rising energy costs make it imperative to expand transit options. Plan neighborhoods around a wide variety of appealing, useful, and convenient public transit systems. Use the construction of new transit lines as inducements for development in the areas served by those lines. Investigate the possibility of designing systems that also serve in an evacuation capacity, possibly with funding from the Department of Homeland Security.



Photo: HOK

*New Orleans and other densely populated Gulf Coast cities could benefit from expanded streetcar systems.*

**7. Promote Alternative Modes of Transportation** – Incorporate bicycle and pedestrian paths in and between neighborhoods. Walkable cities and towns that provides ease of bicycle and foot traffic are magnets for movement within those areas and enhance both physical activity and commerce. Provide students with safe walking access to school.

## 4. Honor the past; build for the future

*In the rebuilding of the damaged areas of the Gulf Coast, honor the history of each community, while creating 21st century buildings that are durable, affordable, inexpensive to operate, and healthy to live in. Through codes and other measures, ensure that all new buildings are built to high standards of energy, structural, environmental, and human-health performance.*

### Background and Context

In Louisiana, the Federal Emergency Management Agency (FEMA) reported on February 13, 2006, that more than 770,000 families had been displaced by Hurricanes Katrina and Rita. In Mississippi, more than 515,000 residents had registered for FEMA assistance as of February 10, 2006. Hundreds of thousands of other buildings that escaped major structural damage may cause ongoing problems for their occupants due to mold or other problems. Nearly all of the buildings that were destroyed relied on fossil fuels and contributed to global climate change, which—many experts believe—in turn contributed to the severity of this year's hurricane season.

With the rebuilding that will occur throughout the Gulf Coast, there is opportunity to reconsider how we design and construct those buildings. While there is, of course, urgency to begin reconstruction as quickly as possible, this is a one-time opportunity to reexamine standard practice and create cities that, even within a historical context, model advanced, energy-efficient, environmentally responsible, and durable new structures able to withstand future storms.

### Benefits

The widespread destruction of buildings that occurred during the 2005 hurricane season presents an opportunity for us to do better in the reconstruction—creating buildings that are less expensive to heat and cool, healthier to live and work in, durable despite occasional (limited) flooding, survivable in times of extended power outages or fuel supply interruptions, and far better for the environment. Out of these



Photo: John Fleck/FEMA

*Mississippi resident Scott Sunberg in Pas Christian is building a steel reinforced concrete house to minimize damage from hurricanes. Still under construction, his was the only house left standing in the neighborhood after Hurricane Katrina.*

tragedies comes an opportunity unlike any we have seen in the United States in recent decades, to effect dramatic, fundamental improvement in a large percentage of the nation's coastline. If we plan the forthcoming reconstruction carefully, we will be able to look back at Katrina and Rita as watershed events that ushered in an age of dramatically better buildings that will benefit not only the people of the Gulf Coast, but the nation as a whole, for generations to come. In signing on to the U.S. Mayors' Climate Protection Agreement and in aggressively addressing energy efficiency and alternative energy sources, the entire region could become a model in its response to global climate change, giving it yet another distinction and attraction for visitors.



*Designing and building hurricane- and flood-resistant houses calls for a multi-pronged approach. Measures such as those shown here not only make homes more survivable during storms but also better, healthier places to live. Homes with low-energy needs will also significantly reduce regional energy needs and related pollution.*

## Policy Recommendations and Actions

1. **Strict New Building Codes** – Rising energy costs and environmental impacts make it imperative to prioritize energy efficiency and renewable energy systems. Adopt strict new building codes that mandate high levels of energy efficiency, structural stability, flood resistance, water efficiency, responsible stormwater management, and passive survivability (see page 15).
2. **LEED** – Adopt the LEED® Rating System for all new construction and major reconstruction. Set a minimum of LEED Silver for all public buildings and buildings that receive taxpayer assistance. Create a regional version of LEED to address the special considerations of building along the Gulf Coast.
3. **Incentives** – Encourage the development of new building prototypes that respond to historical precedents while providing innovative and cost-effective modern structures through expedited approvals, waived fees, and tax incentives to offset process costs. Provide the greatest incentives for construction of carbon-neutral or zero-energy buildings.
4. **Partner** – There remains an urgent need for hundreds of thousands of healthy, affordable, homes, from temporary or expandable to permanent. Seek outside partners and funding to meet the housing needs of

Gulf Coast residents. Work with federal, state, and local agencies and nonprofit organizations, such as Habitat for Humanity International, the Enterprise Foundation, and the Trust for Public Land, to meet these extraordinary needs.

5. **Resource Center** – Establish a resource center for community education, job training, access to green building product information, and financial incentive resources. Provide training for anyone contributing to the rebuilding.

### LEED Rating System

LEED (Leadership in Energy and Environmental Design) is used to rate the overall environmental performance of buildings, measuring such factors as energy efficiency, water efficiency, relationship to the site and community, and how healthy the building is for its occupants. LEED is widely used by governments at all level, universities, developers, corporations, and other building owners who want to improve the performance of their buildings.

## 5. Provide for passive survivability

*Build or rebuild homes, schools, and other public buildings to serve as livable refuges in the event of crisis or breakdown of energy, water, and sewer systems.*

### Background and Context

Hurricanes Katrina and Rita will not be the last to hit coastal America. The national weather service is forecasting another turbulent hurricane season already in 2006. Terrorism, resource shortages, and other circumstances could also cause power outages and fuel supply interruptions. In the weeks following the 2005 hurricanes, many newer homes, otherwise little damaged, had to be abandoned because they depended on electricity to function. This characteristic was also blamed for many deaths, particularly among the elderly. Many older, traditional homes, however, functioned without power as they did for many years before electricity. These older homes were designed to minimize solar gain through the use of deep porches and overhangs, and they functioned adequately with daylight as the primary source of illumination. They were designed with high ceilings, cross ventilation, and raised first floors as cooling systems. Many of these homes originally had their own cisterns for rainwater catchment.

Along the Gulf Coast—and everywhere—it makes increasing sense to design buildings so that they can maintain livable conditions in the event of extended power outages or fuel supply interruptions. This design criteria for buildings is referred to here as *passive survivability*.

### Benefits

Many experts believe that natural disasters, terrorism, energy supply shortages, and other circumstances will become increasingly common during the 21st century. If that is the case, we can significantly reduce human discomfort and suffering by designing homes, schools, and other public buildings so that they can serve as livable refuges in the event of crisis or the interruption of electricity, heating fuel, water, or sewer systems. Beyond disaster preparedness, these simple strategies make sense because they reduce operating costs and often create more attractive places to live.



Photo: Mark Wolfe/FEMA

*A member of the Indiana Task Force 1 Urban Search and Rescue team marks a damaged house in Biloxi, Mississippi, after searching for victims of Hurricane Katrina.*

If implemented wisely, in an integrated fashion, these strategies should not significantly increase construction costs—some may actually *reduce* construction costs. They also encourage vernacular architecture, which provides unique character to Gulf Coast buildings.

### Policy Recommendations and Actions

1. **Storm Resilience** – Buildings in the storm-prone Gulf Coast region should be designed and built to maximize storm resilience. While some damage will be inevitable with a 25-foot storm surge, damage can be minimized and repairs streamlined through careful attention to building design, construction detailing, and materials selection.
2. **Passive Survivability** – Make it the policy of municipalities in the Gulf Coast region that all homes, schools, churches, and civic buildings that could be used as emergency shelters be designed and built to provide life-support shelter in times of crisis—a criteria referred to here as *passive survivability*. These buildings should be designed

to maintain survivable thermal conditions without air conditioning or supplemental heat through the use of cooling-load-avoidance strategies, natural ventilation, highly efficient building envelopes, and passive solar design. Schools and other public buildings should incorporate natural daylighting so that they can be used without power during the daytime. Co-locate healthcare facilities with schools as part of the community anchor and to strengthen survivability.

3. **Water Systems** – Provide incentives to homeowners and other building owners for installing emergency water systems, including rooftop rainwater harvesting systems. Configure rainwater harvesting systems to provide landscape irrigation during normal times (reducing potable water consumption and reducing stormwater runoff), but with an option so that during power outages or in the event of water supply interruptions, stored water can be used for drinking (with filtration), toilet flushing, bathing, and other uses in the building.
4. **Back up Power for Municipal Sewage** – Provide back-up generator power at sewage treatment plants and pumping stations so that minimal sewage-line operation can be maintained during extended power outages. Seal sewer systems so that rain and floodwater cannot enter the system through vents or sewer-access points. This will ensure that, even if floodwater overwhelms the system, untreated wastewater will not be released from the treatment plant.
5. **Distributed Infrastructure** – Reconfigure key infrastructure (including power supply, water supply, and communications) to provide these critical services on a distributed basis and ensure emergency response capability during times of crisis. Include renewable energy strategies in achieving this requirement. Develop a reliable and survivable cell phone system and citywide high-speed wireless access to the Internet.
6. **Solar Electric Systems** – Seek federal funding through the Solar Roofs Program to provide rooftop photovoltaic (PV) systems on new homes and other buildings throughout the Gulf Coast. Configure these grid-connected systems so that they can provide emergency power within the building when the electricity grid is down (this will necessitate some battery backup as well as equipment to safely disconnect the PV system from

the grid during blackouts). In normal times, these systems will reduce the owner's need to purchase electrical power, reduce peak demand, and lower regional pollution levels.

7. **Solar Water Heating** – Provide incentives for homeowners, schools, and businesses to install solar water-heating systems on buildings.
8. **Protect Infrastructure** – Make it the policy of municipalities throughout the region to install new electric, communications, and gas lines below ground and protected from stormwater and floodwater.
9. **Areas of Refuge** – Ensure that each neighborhood or community has a designated building (typically a school, but alternately a public library, church, or other civic building) that can serve the community during times of emergency or extended power outage. Construct or rebuild schools as neighborhood centers and potential refuges. Fund an outreach program to educate residents about this emergency shelter system.
10. **Highway System** – Upgrade the existing highway system to withstand future Category 5 storms, both to provide safe egress from flood-prone coastal areas and to save the expense of having to rebuild them after a future storm.

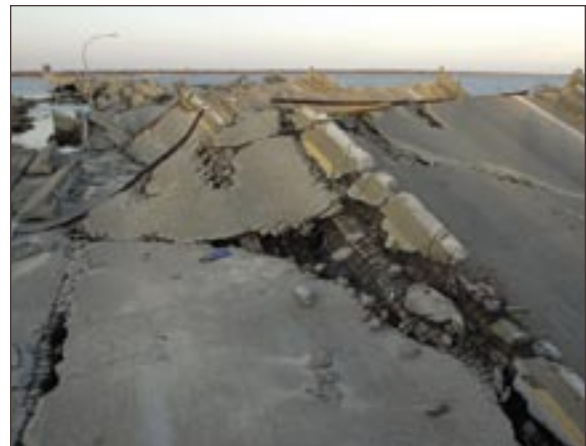


Photo: Mark Wolfe/FEMA

*The U.S. Highway 90 bridge east of Biloxi, Mississippi was totally destroyed by Hurricane Katrina.*

11. **Emergency Access** – At schools and hospitals and in recreation areas, include spaces that, during an emergency, can be used as assembly areas, helicopter landing spaces, and distribution points.



## 6. Foster locally owned, sustainable businesses

*Support existing and new local businesses built on a platform of sustainability that will contribute to stronger and more diverse local and regional economies.*

### Background and Context

Recovery of the Gulf Coast involves more than strengthening its levees, rebuilding homes, repairing and opening schools and hospitals, restoring power and water throughout the region, and restoring wetlands. For communities to become whole again, businesses must also be strong. With many Gulf Coast businesses currently closed and many business owners unsure if they will reopen, Gulf Coast municipalities are at great risk of losing economic vitality and the business tax base that funds local services. There is great need to convince business owners to reopen their shuttered businesses and to attract new businesses to the region. This process provides an opportunity to establish a platform of sustainability for the economy of the Gulf Coast region. Reconstruction work stemming from Hurricanes Katrina and Rita can jumpstart the creation of such an economy if local businesses carry out much of this work.

### Benefits

The highest rates of job growth in the United States today are not from large national and multinational companies, but rather from small and emerging companies. Meanwhile, manufacturers that have failed to respond to changing needs, such as General Motors, are being forced to downsize, while fleet-of-foot companies like Toyota are experiencing burgeoning growth. Companies that look to the future for opportunities are better positioned for growth than companies that base plans only on the past—that steer using the rearview mirror. As the Gulf Coast seeks to advance a healthy business economy, supporting and attracting forward-looking, environmentally responsible, and socially responsible businesses will likely yield a high return. Promoting a strong economy of such companies—with locally owned businesses that pay living wages—benefits everyone in the region.



Photo: John Fleck/FEMA

*An excavator moves waste material at a construction and demolition debris landfill in D'Iberville, Mississippi. FEMA estimates that Hurricane Katrina generated 50 million tons of debris (compared with the 1.2 million tons of waste generated by the World Trade Center collapse on 9/11).*

### Policy Recommendations and Actions

1. **Reconstruction-Centered Businesses** – Create new, locally owned businesses that produce or provide materials, systems, or services to aid in reconstruction. The Gulf Coast could house a new *Center of Excellence* in reconstruction systems, technologies, and businesses as a new source of economic strength.
2. **Waste as Resource** – Treat waste as a resource by using hurricane waste and demolition debris to advance economic development through locally owned businesses employing local labor. Whenever possible, *deconstruct* buildings that have to be taken down rather than simply demolishing them. Salvage, decontaminate, and store usable building materials for later use in reconstruction.

3. **Sustainability Industries** – Establish the Gulf Coast region as a world leader in a *New Economy* based on sustainable manufacturing and service industries. Attract clean industry that does not generate harmful emissions. Establish strict performance standards for emissions from industry that mandates no downstream impacts. Create new exportable skills and services based on environmental resilience, renewable energy, and responsible water-use technologies. For example, photovoltaic solar roofing business could be the 21st century equivalent of the New Orleans-based Higgins Industries of World War II fame, manufacturer of Higgins boats. Just as New Orleans helped win that war with its local boat industry, so too could it help win the war for more reliable and sustainable energy sources.

4. **Center of Disaster Response and Mitigation** – Seek federal funding to establish a *Center of Excellence for Disaster Response and Mitigation* somewhere in the Gulf Coast region. This Center could develop and export technologies and best practices for responding to natural disasters and other emergency situations. It could refine *passive survivability* building practices and code language. Local businesses and consulting firms built around this Center could generate economic growth for the region.



Photo: Mark Wolfe/FEMA

A construction crew from Mobile, Alabama, installs a tarp on a roof in Biloxi, Mississippi.

5. **Agriculture** – Within the conservation districts created to protect coastal land, designate agricultural areas to provide jobs and support the local food-service industry. Develop farmers' markets in conjunction with community centers.

6. **Ecotourism** – Expand the tourism industry to include ecotourism, showcasing restored wetlands and conservation areas. Link tourism needs with local needs such as mixed-use commercial spaces and community gardens. Such sustainability features as passive survivability, energy efficiency, and effective water management can bring people to the region for learning.

7. **Economic Growth** – Expand small business and microcredit loan programs to help create or expand local business and create jobs.



Photo: Daniel Hellmuth, hellmuth + bicknese architects

Fabricating photovoltaic panels, as is being done here in a Chicago factory, provides one example of how new enterprises based on sustainability could bolster the Gulf Coast's economic prosperity.

## 7. Focus on the long term

*Undertake all measures related to rebuilding and ecological restoration, even short-term efforts, with explicit attention to the long-term solutions.*

### Background and Context

There is a tendency in responding to any emergency to focus only on the immediate needs and problems, without addressing the long-term picture. The Marshall Plan put forth by the United States at the close of World War II dramatically strengthened Western Europe's economy, in part because it considered the long term. Key funding was provided to catalyze economic growth in 16 countries, and these economies blossomed. Simply throwing money at the Gulf Coast destruction will not fix the problems—while it may solve some immediate problems relating to hurricane damage, it will not fix the deeper, more systemic problems that have plagued American cities for decades. Planning related to the recovery will be most successful if long-term impacts and benefits are considered in every decision.

### Benefits

With the tragedy of Hurricanes Katrina and Rita and the planning and rebuilding that will emerge during the recovery, there is a once-in-a-generation opportunity to fix many of the problems that have long plagued the region. This holds true for restoring wetlands and protecting cities from storm surges and it holds true for promoting social justice. If approached wisely, the ensuing rebuilding of the Gulf Coast can bring about dramatic improvement for the cities, the residents, and the environment, long into the future.

### Policy Recommendations and Actions

**1. Visionary Master Plan** – Use the opportunity to remaster a city and regional plan that corrects past mistakes. Make decisions that will serve well for the next several hundred years. Identify near-term and long-term strategies and goals based on the long-term prosperity of the Gulf Coast. Set goals to serve immediate needs while establishing a permanent process and framework for moving



Photo: Mark Wolfe/FEMA

*Gulfport, Mississippi was extensively damaged by Hurricane Katrina. Minimizing damage from future storms and flooding in the Gulf Coast will necessitate effective long-range planning.*

toward sustainability. Look for opportunities to correct past mistakes.

- 2. Temporary Basic Services** – Provide temporary solutions for basic services (including water, sewage treatment, electricity, and security) that will allow system-wide improvements to be made in the context of integrated needs assessment and planning.
- 3. Temporary Structures**—Implement phased solutions, such as temporary housing and classrooms, in a manner that allows longer-term solutions to be fully planned and implemented.
- 4. Establish Priorities**—Make it a priority to implement long-term, environmentally responsible, and economically responsive improvements. Coordinate with city and county economic and civic plans, and draw from national, regional, state, and local resources as needed. Seek economic diversification away from petrochemical industry.

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