

Mitigation Lessons

A Comparison of
Flood & Wind Risk Reduction Programs
for Coastal Communities



Funded by:



Prepared by:

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Firm Description:

The Gulf Coast Community Design Studio (GCCDS) is a professional service and outreach program of Mississippi State University's College of Architecture, Art + Design. GCCDS was established in Biloxi, Mississippi in response to Hurricane Katrina to provide architectural design services, landscape and planning assistance, educational opportunities and research to organizations and communities along the Mississippi Gulf Coast. GCCDS works through close, pragmatic partnerships with local organizations and communities in and beyond the three Mississippi coastal counties, putting professional expertise to work in order to shape vibrant and resilient Gulf Coast communities.

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Executive Summary

This research explores the needs and policy options to support and implement effective and equitable nonstructural programs and processes to mitigate flood and wind hazards for residents on the Gulf Coast. The geographic focus is the Mississippi Gulf Coast. However, programs from other states are included and lessons learned from all of the evaluated programs should be useful to coastal communities in general. Even though flood and wind damage often happen in the same storm event, as far as mitigation is concerned the two types of risk follow separate paths. This split is due to the historic fact that losses from catastrophic flood events exceed the capacity of the private insurance industry so the National Flood Insurance Program is needed to restore communities after a flood.

Both wind and flood risks and responses are rapidly changing. Repeated losses throughout the Southeast and increased insurance costs are leading to changes in both risks. The changes in wind risk management are encouraging and are leading to innovation. The changes in flood risk management are not encouraging and are leading to increased community concerns.



FORTIFIED Home™ inspector checks nailing pattern in roof sheathing. *Image courtesy of Habitat for Humanity of the Mississippi Gulf Coast.*

The encouraging changes in wind risk management are the emergence of mitigation programs to make houses stronger to high winds and more resistant to rain. An important step in the State of Mississippi to address wind mitigation was the Comprehensive Hurricane Damage Mitigation Program (CHDMP) legislation passed in 2007. The CHDMP established an outline for the development of public policy to adopt wind loss mitigation programs in the six coastal counties of Mississippi. CHDMP and efforts in other states set in motion programs that have led to significant reductions in insurance costs for homeowners. During the past decade several programs have paved the way for the development of the Insurance Institute of Building and Home Safety's (IBHS) FORTIFIED Home™ program. This program has become the practical standard for the Southeast U.S. and is on track to be the basis of a national standard. The IBHS FORTIFIED Home™ Program is a three-tiered set of standards identifying construction features, labeled Bronze, Silver and Gold which are cumulative and target typically weak areas in home construction: the roof covering, window and door openings, and structural framing, respectively. A third-party evaluator performs an initial assessment and inspects the home again after the retrofits have been implemented. If implemented correctly, the homeowner will be issued a FORTIFIED certificate, which is used to earn insurance premium reductions. The predictability of the risk reduction outcome of the program is leading to insurance reductions that can be counted upon with enough certainty for mitigation programs to bank on the future cost reduction in order to finance the retrofit improvements. In this way wind

mitigation is approaching a situation in which the payback can support the cost of improvements. It is easy to see that eventually much of the wind mitigation needs will be taken care of without grant assistance, or with the type of consumer-accessed assistance that has enabled energy improvements to become part of the day-to-day market.

Flood risk management is not on the same encouraging path. NFIP rates are predicted to increase for all property owners, more dramatically for some, with ongoing NFIP reform. According to a 2014 US Government Accountability Office report, NFIP has accrued \$24 billion in debt, highlighting increasing concerns about the NFIP burden on taxpayers. The Biggert-Waters Flood Insurance Reform Act of 2012 moves NFIP toward charging full-risk rates. The motivation behind NFIP reform is twofold: to reduce the subsidies that have historically kept NFIP rates below the actual risk rate; and to create an environment that will encourage increased private sector involvement in flood insurance. The 2014 Homeowner Flood Insurance Affordability Act modified some of the Biggert-Waters Act provisions to slow down the increase of most subsidized rates, moving toward full-risk rates at a pace of at least 5% and no more than 18% a year, but some high risk properties will continue to increase at the Biggert-Waters rate of 25% annually.ⁱ

The move to phase out NFIP subsidies began at the same time the extent of flood zones outlined by FEMA's Flood Insurance Rate Maps drastically increased. After Hurricane Katrina the Base Flood Elevations on the Mississippi Gulf Coast increased on average six feet, extending the flood zones into

established neighborhoods of houses that as a result do not meet the Base Flood Elevation requirements. These existing houses are now in a precarious situation. The property owners hear threats of ten-fold increases in insurance premiums for not meeting the FEMA requirements. The long-term solution is to either relocate out of the flood zone or raise the house on a new foundation to meet the Base Flood Elevation. Both efforts are beyond the financial reach of most homeowners and, unlike the wind mitigation work, the payback is a faulty equation of reducing the cost of flood insurance from a future unsubsidized premium that is completely unaffordable, to one that is still more than the homeowner is paying now. Therefore, the flood mitigation needs are overwhelming and need much work to find a

path forward.

The research for this report evaluates seven mitigation programs that have been applied in the past decade throughout the South, looking in more detail at the Coastal Retrofit Mississippi Program and the Comprehensive Hurricane Damage Mitigation Program legislation that led to funding for the retrofit program. The seven programs are considered for their effectiveness and funding sources. The lessons learned from these programs led to four recommendations to guide future mitigation programs.

The recommendations are highlighted below:

1. Use FORTIFIED Home™ as a uniform wind mitigation standard.

Using the FORTIFIED Home™ standard uniformly will both save money in administering programs because it eliminates the need for individual structural evaluations and will save money for homeowners with insurance premium reductions. Furthermore, as illustrated by some of the recent innovative programs, using the FORTIFIED Home™ program more generally will result in predictable insurance savings that can be counted upon to offset mitigation costs.

2. Change the use of federal flood mitigation funds from disaster recovery to disaster preparation.

The U.S. Department of Housing and Urban Development's (HUD) National Disaster Resilience Competition (NDRC) offers an important model for the use of Community Development Block Grants' (CDBG) Disaster Recovery funds to not only address disaster needs but to do flood mitigation with activities such as relocation and elevation. HUD's change of emphasis from disaster recovery to resilience, which led to the creation of the NDRC, is a promising indication that federal leaders are aware of the need for communities to have assistance with flood mitigation efforts. Therefore, the declared formula, "one dollar of mitigation equals four dollars of recovery" needs to guide the planning and use of flood mitigation funds, and communities should be innovative with available CDBG funds to address flood mitigation needs.



A flood-damaged historic structure is elevated during the restoration process. *Image courtesy of Harry Connolly.*

3. Focus both flood and wind mitigation programs on assisting low-income households.

Low-income households are especially vulnerable to disasters because they do not have the resources to recover. Hazard mitigation should be seen as a community equity issue, recognizing that in order to keep a diverse community with access to affordable housing, the high cost of living in a hurricane-prone area needs to be subsidized. Focusing on low-income households is going to be especially important with the predicted large increase of flood insurance costs for houses that do not meet FEMA requirements. Without flood mitigation assistance to help low-income property owners who live in flood zones to either relocate or elevate, these households will not be able to pay for flood insurance, and will not be able to sell their house. In these cases the house will become a liability instead of an asset.

4. Create perpetual mitigation funding programs

Funding plans for mitigation should be aimed at creating perpetual programs that run efficiently because they don't have startup costs. Such programs require some type of revenue stream, learning from some of the emerging innovative funding strategies explained herein. In all of the examples studied, the key to a perpetual mitigation program is to define future value in the improved house and bank on that future value to be able to finance the cost of mitigation.

Background

Hurricanes are the famous hazards of the Gulf Coast; after all, they are given names and become markers in history. From nature's perspective and for the people being battered by the storm, a hurricane is a singular event – destructive winds with flood water coming from storm surge and from rain – all happening at the same time. Trees are being blown over, buildings are being destroyed and people are drowning. However, from the perspective of policy and programs, once the storm passes a hurricane is a dualistic event: the loss, repair and mitigation for wind and the loss, repair and mitigation for flooding follow two separate paths. In fact, nearly as famous as the hurricanes are the legalistic disagreements of insurance companies regarding whether the wind or the flood is responsible for a policy holder's damaged house. Therefore, the distinction between wind and flood damage is an unavoidable framework for a study on hurricane hazard protection.

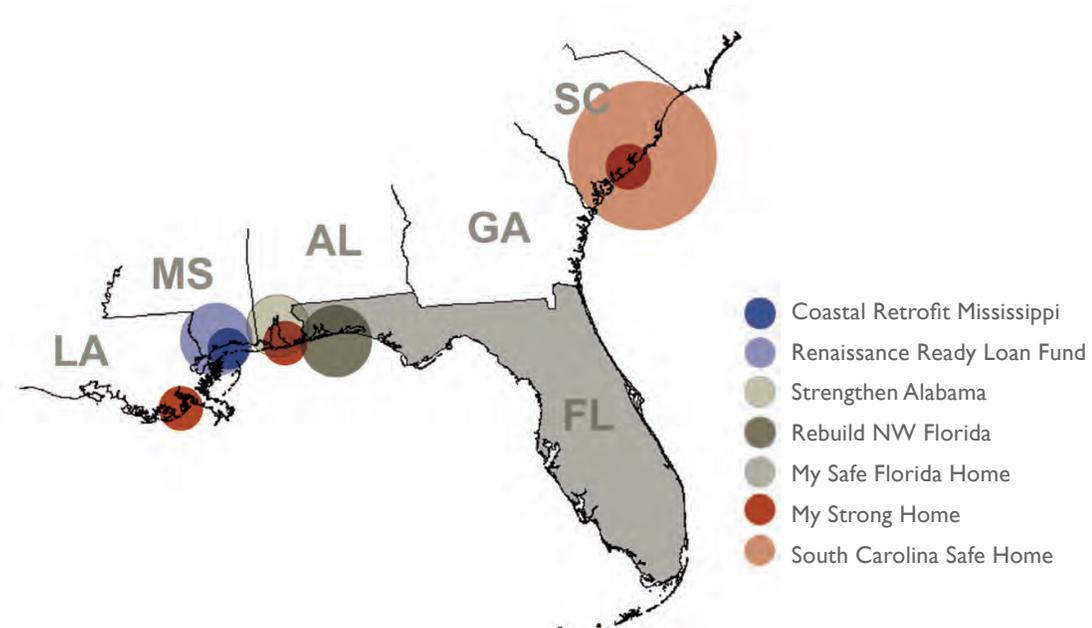
Protective actions are further divided between structural and non-structural approaches. The U.S. Army Corps of Engineers uses the term “non-structural” to distinguish from “structural” protections such as levees and flood walls. The structural protections are distinguished from non-structural protections, which are actions done at the scale of an individual building or property owner. What is more, non-structural approaches are divided further between physical and non-physical:

physical being work done to make buildings stronger and more flood resistant and non-physical being policies, education efforts, building codes, regulations and incentives that aim to bring about changes indirectly.

This report focuses on non-structural, physical protective actions for wind and flood, which are for the most part improvements done to buildings to make them more resilient. However, because structural protection affects non-structural conditions some structural protection is referenced as needed. Likewise, non-physical protective actions educate, require, and encourage people to utilize physical approaches. As such, programs that include non-physical, non-structural activities are also referenced as needed. Regardless of the complexity of the overall picture, the aim of this report is to identify and evaluate programs that assist property owners to make their buildings stronger, more water-tight and less exposed to flood damage.

The purpose of the research is to explore the needs and policy options to support and implement effective and equitable non-structural programs and processes to mitigate flood and wind hazards for residents and communities on the Gulf Coast. The geographic focus is the Mississippi Gulf Coast. However, programs from other states are included and lessons learned from all of the evaluated programs should be useful to coastal communities in general.

Programs and Areas Evaluated in the Southeast United States



Methodology

In early 2015, Oxfam America identified a need to explore storm mitigation programs throughout the Gulf Coast region, focusing on Mississippi. As a state with ongoing Hurricane Katrina repair programs, recently completed hazard mitigation programs and the ten-year anniversary of Hurricane Katrina, Oxfam believed it was an appropriate time to see the progress that had occurred. The Gulf Coast Community Design Studio (GCCDS), an outreach and research center of Mississippi State University comprised of architects, planners and landscape architects was chosen as the grant recipient to complete the research. GCCDS has longstanding relationships with community stakeholders and has become a leader in practice and advocacy of fortified

construction techniques and coastal resiliency on the Mississippi Gulf Coast. This report is designed to complement the research projects conducted by the Center for Progressive Reform and the University of New Orleans, which focus on flood-protection measures. Therefore, this report focuses on case studies of wind and flood mitigation programs as well as findings regarding developments in policy for flood insurance.

Another reason for choosing the Mississippi Gulf Coast as the focus area for the report was to explore the long history the state has had with wind and flood events and their subsequent legislative actions to inflect changes in policy. In 2007, Mississippi legislature passed the Comprehensive Hurricane

Damage Mitigation Program which was intended to establish a framework for mitigation programs to take place within the State and has since garnered a variety of opinions as to its success. This report aims to explore what happened to this legislation- was it successful? What change in policy and programs has it enacted? How can the State move forward with funding hazard mitigation programs?

Research began with literature review of several reports from Mississippi and neighboring states dealing with existing hazard mitigation programs. Those reports included but were not limited to:

- AIR Worldwide Corporation, “Mississippi Insurance Department: Comprehensive Hurricane Damage Mitigation Program: Costs and Benefits Study,” 2010.
- Florida State University, “Home Hardening Incentives Programs,” 2010.
- Center for Planning Excellence, “The View from the Coast,” 2015.
- Louisiana Sea Grant, “The Water is Coming: What To Do?” September 2014. Funded by Oxfam America.

A review of HUD’s Partnership for Sustainable Communities’ report, “Plan for Opportunity: Regional Sustainability Plans for the Mississippi Gulf Coast” provided context of current social and economic conditions in the coastal counties in order to determine the impact of increasing housing costs and insurance rates. Because GCCDS conducted housing assessments immediately following Hurricane Katrina, these reports were used to evaluate progress on neighborhood scales and define

some of the current needs of the population. Some of this information helped inform the present need for affordable mitigation programs that are discussed later in this report. It was important in this study to understand the impacts of increasing insurance premiums and how the Gulf Coast residents are dealing with these issues in order to evaluate current practices in mitigation and make recommendations for future programs.

The literature review helped further define a list of interviews that were needed to investigate active non-structural mitigation programs in the region. GCCDS conducted in-person visits and phone calls to state, regional and national experts in the fields of insurance and hazard mitigation. Community stakeholders such as affordable housing advocates, non-profit professionals, and government officials were interviewed to determine their perspectives on the success and shortcomings of previous mitigation programs and to learn about any current initiatives being discussed today.

This report includes a description of wind and flood mitigation needs and lessons learned from the evaluation of seven relevant homeowner assistance mitigation programs: Rebuild NW Florida, South Carolina Safe Home, My Safe Florida Home, Coastal Retrofit Mississippi, Strengthen Alabama Homes, My Strong Home and Ready Loan Fund. Funding approaches are discussed and recommendations are given for future mitigation programs.

Needs Assessment

Flood Challenges and Risks:

1. Flood occurrence and threat of increased floods. The National Oceanic and Atmospheric Administration (NOAA) has been tracking sea level rise relative to land (SLR_{REL}) throughout the United States for over a century. In their report released June 2014, they state that along with the rising sea level's associated risk of extreme flooding during storm events and the increasing frequency of events, communities are facing another challenge. They report that by 2050 most communities will experience a higher rate

of “nuisance flooding,” which will largely be unassociated with storm events but with high tides, will occur subtly over time, and will be seen thirty days a year. NOAA calls 2050 “the tipping point” to mark when community infrastructure will begin to be stressed and eventually compromised. They urge communities to begin planning now in hopes of protecting these coastal communities’ residents, history and livelihoods.ⁱⁱ

NOAA identifies the Gulf Coast as a region that is particularly vulnerable to sea level rise for several reasons. First, the land around the Mississippi River Delta is sinking,



Aerial image of East Biloxi after Hurricane Katrina, 2005. Image courtesy of Mississippi Renewal Forum.

called land subsidence which multiplies the effect of the SLR_{REL} . The land subsidence is an effect of two factors: one, natural tectonic actions occurring and two, human-induced factors caused by land compaction and the withdrawal of water from underground aquifers. The land subsidence is most drastic in areas of Texas and Louisiana but is apparent in Mississippi as well, causing an estimated 3.24 mm per year of SLR_{REL} in coastal areas, based on a gauge located in Bay Waveland, Mississippi.

Another factor which increases vulnerability toward sea level rise in the Mississippi Gulf Coast is due to the increasing level of the Gulf of Mexico. Data that has been collected over several decades shows that the Gulf is rising at the rate of about 3.3-5.8 mm per year. The reasons for this increase are largely unknown at this time but are believed to be related to expanded water from temperature rise and the fact that the Gulf is a mostly-en-

closed body of water.ⁱⁱⁱ

It is clear from these studies and others that sea level rise is a challenge communities will be forced to respond to over the next several decades. Flood events are expected to increase in frequency and sea level rise will make these occurrences more drastic and damaging. Cities and states can begin preparing for this now by identifying areas within their communities that are most vulnerable to flooding and planning long-term strategies for improving or relocating infrastructure, roadways, and buildings. Zoning ordinances should be re-visited and residential neighborhoods or businesses should over time be encouraged to elevate their structures or relocate to higher ground. This will ensure the safety and quality of life of each jurisdiction's citizens, as well as the historical and economic centers of the State of Mississippi.

Floodplain Areas



Source: Federal Emergency Management Agency. (2009). Digital Flood Insurance Rate Map. Hancock County, Harrison County and Jackson County. FEMA Map Service Center. Web.

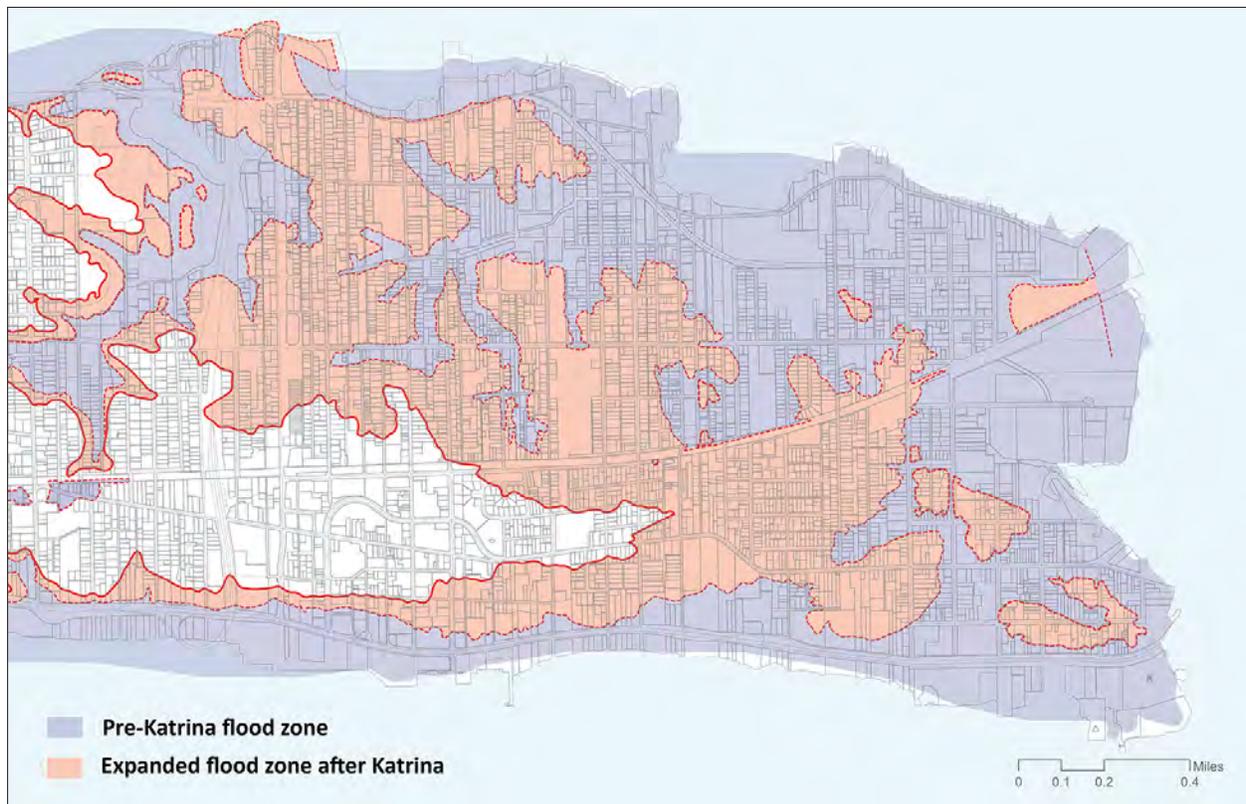
2. Expanded Flood Zones. The federal government formed the National Flood Insurance Program (NFIP) in 1968 to insure homeowners and renters against loss due to flooding, a loss that exceeds the limits of risk that can be covered by private insurance. The NFIP is a pool of nearly 90 private insurance companies, administered by the Federal Emergency Management Agency (FEMA).^{iv} To be eligible for flood insurance, a homeowner, landlord or renter must live in a community that has joined the NFIP. All jurisdictions on the Mississippi Gulf Coast are members of the NFIP.^v

FEMA delineates risk areas into flood zones. Property in high-risk flood zones with mortgages obtained through a federally regulated or insured lender must be insured against flood loss.^{vi} High-risk areas, also known as Special Flood Hazard Areas (SFHAs), are made

up of A and V Zones. A and V Zones are defined as those areas within the floodplain that have a 1% or greater chance of flooding in any given year, or a 26% chance of flooding during a 30-year mortgage.^{vii} Flood insurance is also optionally available for property owned outright or property in moderate or low risk areas. Moderate and low-risk areas include B, C and X Zones. These zones are defined as areas above the 100-year flood limit.^{viii} X Zones are areas outside of the floodplain. Policy premiums vary by zone, with V Zones having the highest cost and X Zones the lowest.

In response to Hurricane Katrina FEMA changed the Flood Insurance Rate Maps (FIRMS). FEMA updates of the flood zones after a disaster is common practice and is explained to the community as a response to storm data that shows increased flood risks.

East Biloxi changes in Special Flood Hazard Areas



Source: GCCDS (2009). Flood Insurance Rate Map in East Biloxi before and after Hurricane Katrina.

Even though the flood map changes are typically explained in scientific terms, it was common to hear people on the Mississippi Gulf Coast that were frustrated with the challenges of rebuilding after Katrina complain that the new flood elevation requirements were intended to discourage people to build back. Whatever the motivation, the revised flood maps significantly increased the area of the floodplain, bringing more residential property

flat this five or six foot change has a substantial impact on the community. In a representative ten square mile section of East Biloxi, before the destruction of Hurricane Katrina there were approximately 1,800 total houses with about 580 houses in the flood zone, or 32% of the houses. With the expanded flood zone approximately 1,690 of the 1,800 houses, if still standing, would have been in the flood zone. This expanded flood zone works out to



One of the many homes in East Biloxi that washed off its foundation as a result of the Hurricane Katrina storm surge, 2005. *Image courtesy of Gulf Coast Community Design Studio.*

into flood zones and increasing the number of residents requiring flood insurance. The revised maps were adopted by all jurisdictions on the Mississippi Gulf Coast in 2009 and had a dramatic impact on property owners.^{ix} For example, after Hurricane Katrina, the Base Flood Elevation in Biloxi was raised from eleven or twelve feet to sixteen or seventeen feet. Because the Mississippi Gulf Coast is relatively

include 93% of the pre-Katrina houses.

Obviously, Hurricane Katrina changed not only the flood zone but also the number of houses left standing. All of the houses in the ten-square-mile sample section of East Biloxi were flooded by Katrina's storm surge, which in East Biloxi was nearly twenty feet above sea level. More than half of the houses were destroyed and many more were eventu-

ally demolished because the property owners deemed that the houses were not worth repairing. Nearly all of the 580 houses in the pre-Katrina flood zone were destroyed by the storm surge and about 25% of the houses outside of the flood zone were destroyed. Most of the new houses that have been built to replace houses that were destroyed are elevated to the new Base Flood Elevation (BFE). A few are not because the City of Biloxi did not adopt the new Flood Insurance Rate Maps until May 2009. All of the houses that were built with the assistance of federal funds were required to be built to the Advisory Base Flood Elevation (ABFE). However, property owners who did not use money from assistance programs such as the Homeowner Assistance Program were not required to elevate to the ABFE and so some new houses that were built back before the city adopted the revised FIRM in 2009 do not meet the current BFE requirements. The houses that were not destroyed or eventually demolished were for the most part rehabilitated from the flood damage, but were not elevated to meet the new Base Flood Elevation. This means that many houses, probably over 800 in the ten-square-mile section, do not meet the Base Flood Elevation requirements.

In other words, approximately two thirds of the total houses in the East Biloxi ten-square-mile sample area do not meet the BFE requirements.

It is important to note that the Homeowner Assistance Programs in Mississippi as well as the parallel HUD-funded rebuilding program in Louisiana, the Road Home pro-

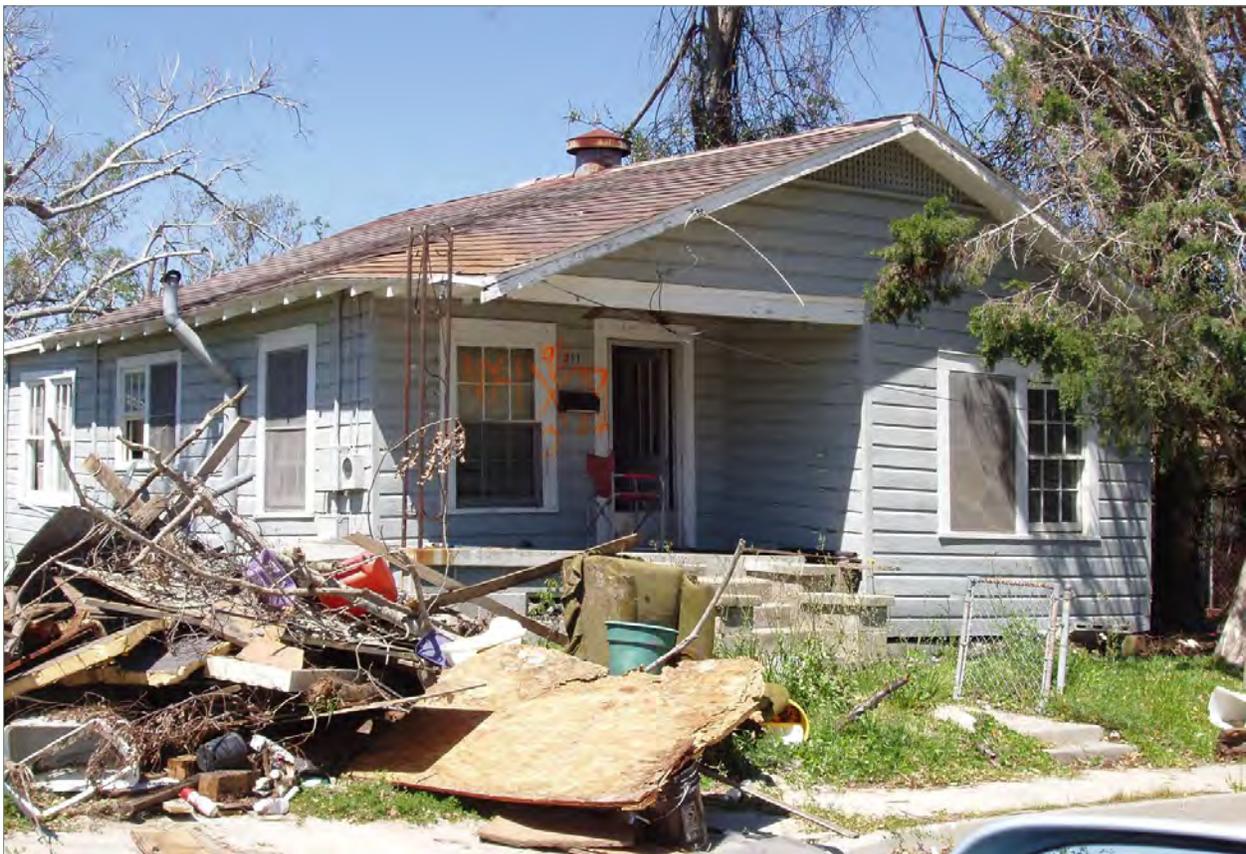
gram, were aimed at recovery and not mitigation. As stated above, new houses that were built with the assistance of federal funds were required to be built to the Base Flood Elevation (or the ABFE before the revised FIRMs were adopted). The requirement was mandated by HUD. However, houses that were rehabilitated were for the most part not elevated. The International Building Code, as is typical for the building codes that preceded it, requires that when the cost to renovate an existing building exceeds 50% of the building's value, the entire building is required to be improved to meet the current building code, which includes the requirement to meet the FEMA flood zone requirement of elevating to at least the BFE. However, the approach that was taken in Mississippi recovery programs was to not renovate a house if it was estimated to exceed 50% of the house's value. Projects that exceeded the 50% threshold were either disqualified or the homeowner was given the option of demolishing the house and getting a new replacement house. Therefore, except for a few unusual cases, the houses that were rehabilitated in the Homeowner Assistance Program, which are now in an expanded flood zone, were not elevated and do not meet the BFE requirements.

Considering that the East Biloxi rebuilding example given above is typical for the rest of the Mississippi Gulf Coast communities that have expanded flood zones, it can be assumed that over half of the houses in flood zones do not meet the BFE requirements. An actual survey of flood zones would be very helpful at this time to accurately quantify the vulnerability of Gulf Coast communities.

3. Increased NFIP Cost and Reform.

When the flood maps changed, homes built to the old standards had to maintain their insurance policies in order to preserve their grandfathered rates.^x However, because many property owners were previously outside the floodplain, they did not have pre-existing policies and had to purchase insurance at the newer, higher rates.^{xi} Many policies for damaged and destroyed structures also had to be rewritten due to non-compliance. Many property owners opt out

NFIP policies have either subsidized or full-risk premiums depending upon whether the building was built before the new Flood Insurance Rate Map was adopted. Structures built after a community's FIRM was published must meet FEMA building standards and the property owners pay full-risk rates. Because buildings built after the adopted FIRM are elevated and meet the FEMA requirements they have a lower risk of flooding and the full-risk rate is deemed to be affordable. Close to 80% of NFIP policy



Destroyed household items are removed from a flooded house post Katrina, 2005. *Image courtesy of Gulf Coast Community Design Studio.*

of flood insurance, given the choice, and are left unprotected against hurricanes and flood events. An estimated 35,000 homes damaged by Katrina were under- or uninsured.^{xii} Less than 25% of structures in high-risk flood areas in Mississippi are covered by flood insurance.^{xiii}

holders pay a full-risk rate.^{xiv} Buildings that do not meet the FEMA requirements have a much higher risk of flooding. The flood insurance rates for these structures are subsidized, as a result of the 1973 federal legislation, the Flood Disaster Protection Act, which made the purchase of flood insurance mandatory

for property owners with mortgages from federally regulated lenders and provided incentives in the form of subsidies to encourage communities to join the program. However, even though they are subsidized, the rates for buildings that do not meet FEMA requirements are, on average, higher than the full-risk premiums. For example, the national average annual subsidized premium with October 2011 rates was \$1,224, while the average annual premium for full-risk properties was \$492.^{xv}

With ongoing NFIP reform, the NFIP rates are predicted to increase for all property owners, and more dramatically for some. According to a 2014 US Government Accountability Office report, NFIP has accrued \$24 billion in debt, highlighting increasing concerns about the NFIP burden on taxpayers. The Biggert-Waters Flood Insurance Reform Act of 2012 moves NFIP toward charging full-risk rates. The motivation behind NFIP reform is twofold: to reduce the subsidies that have historically kept NFIP rates below the actual risk rate; and to create an environment that will encourage increased private sector involvement in flood insurance. The 2014 Homeowner Flood Insurance Affordability Act modified some of the Biggert-Waters Act provisions to slow down the increase of most subsidized rates moving toward full-risk rates to between at least 5% and no more than 18% a year. Some properties, including non-primary residents, Severe Repetitive Loss Properties, and buildings built before the adoption of a FIRM will continue to increase at the Biggert-Waters rate of 25% annually.

The 2012 Biggert-Waters Act aims to eventually eliminate subsidized rates for

National Disaster Resilience Competition

- In June 2015, HUD announced the winners eligible to continue into the second phase of application for the National Disaster Resilience Competition. Mississippi was one of the forty states and large cities invited to continue with the selection process and remains eligible for a portion of the \$1 billion available.
- HUD took an innovative approach during the application process by inviting Rockefeller Foundation to partner with them to foster discussions with community stakeholders and provide technical assistance. This part of the process emerged after the Rebuild by Design program which was highly regarded as successfully identifying innovative solutions to disaster-related community issues which are becoming more commonplace. During this competition communities were introduced to and encouraged to explore ecologically-creative strategies in order to deal with repetitive flooding and other natural disasters.
- Competitions such as these demonstrate the shifting preference from heavy engineering solutions toward more ecologically robust strategies. Also noticeable is the desire to shift from reactively spending money on repair programs immediately following a disaster and instead funding proactive solutions that communities can employ today to prepare for future natural disasters.

buildings that do not comply with FEMA regulations or that have other negative policyholder situations such as properties that had received payments for flood-related damage that exceed the property's fair market value or policyholders that have deliberately chosen to let the policy lapse or refuse to accept an offer of mitigation assistance (including relocation) following a major disaster.^{xvi} In addition, the Biggert-Waters Act includes provisions that impact new policies and property transactions. For example, properties that did not have NFIP insurance when the act was enacted and properties purchased after that date will not receive subsidies. That is to say, subsidized properties that are sold will lose their subsidies.

Concerns regarding the impact of NFIP reform on communities is leading to reactive policy hoping to slow down and limit the reduction of subsidies and proactive policy aimed to eliminate all subsidized premiums and instead provide a direct means-based subsidy to low-income policy holders. Proponents for means-based assistance suggest that subsidies should be explicit and provided directly to the policyholder instead of hidden in a discounted premium rate, partly because such hidden subsidies conceal a property's actual flood risk and encourage development in high-risk areas. In addition to favoring transparency, another argument for non-subsidized premiums and direct assistance to low-income property owners is that an insurance market with premiums that reflect actual risk is thought to be an environment in which private sector insurance companies can better understand risk and will be more able to do business in flood insurance.^{xvii}

4. Unmet Need From Past and Current Programs.

As stated above the Homeowner Assistance Programs (HAP) in Mississippi and the Road Home program in Louisiana were aimed at recovery and not mitigation. Nevertheless, both programs included grant assistance in addition to the basic compensation grant to elevate houses. In the Road Home program, owners who opted to rebuild their homes and who were located in a flood zone were eligible for an additional \$30,000 grant for site built homes and \$20,000 grant for mobile homes. Likewise, in Mississippi's Home Owner Assistance Program grants up to \$30,000 were available to homeowners to defray the cost of elevating homes to FEMA's flood requirements. Elevation grants could be used to raise homes on the same footprint or to replace an existing house with an elevated one. The elevation grants could be combined with other HAP grants but could only cover the increased cost of elevating the structure.^{xviii}

A survey of homeowners for the Housing Recovery for the Gulf Coast report determined that 42.5% of the homeowners surveyed received a CDBG homeowner grant. Less than 10% of all owners of property with major or severe storm damage completed elevation work on their properties.^{xix} Not all of the properties included in the survey were in a flood zone and the survey did not determine the number of properties that would need to elevate based on BFE requirements. Nevertheless, the survey correlated owners who elevated with those who received a CDBG grant and determined that of the homeowners that elevated, around two-thirds were CDBG grant recipients.^{xx} This correlation is most likely due to the requirements explained above

that new home construction in both Mississippi and Louisiana that received CDBG grants was required to be built to the FEMA requirements. There is no data available to determine the number of homeowners that used CDBG grant funding to elevate a renovated house. A windshield survey of the Housing Recovery for the Gulf Coast report concludes that the majority of rebuilt properties were not elevated.^{xxi} This finding agrees with the experience of the report authors who were involved with the Homeowner Assistance program in Mississippi and confirm that very few houses that were renovated were brought to the BFE requirements by elevating the house and building a new foundation. The few projects to elevate existing houses in Biloxi observed by the authors have been completed by property owners in the past several years after the Homeowner Assistance Program funding was no longer available, so appear to be done without grant assistance.

A comprehensive study of houses that are in flood zones on the Gulf Coast that do not meet FEMA requirements would be useful to quantify unmet non-structural flood mitigation needs. As stated above, based in the sample surveyed in Biloxi about two thirds of the houses in flood zones do not meet FEMA requirements. With the nearly certain prospects of significant increases in flood insurance premiums for houses that do not meet FEMA requirements such unmet needs will become more critical. FEMA and CDBG grants to provide assistance to property owners to elevate or relocate are typically limited to disaster recovery funds. There is certainly a need for programs to assist property owners that live in flood zones to be able to mitigate against

floods ahead of disasters.

Currently, the Mississippi Development Authority is working on the second phase of an application for HUD's National Disaster Resilience Competition (NDRC). This program was created by HUD using one billion dollars of Disaster Recovery CDBG funds for states and large cities throughout the US that had a federally declared disaster between 2011 and 2014. On the Mississippi Gulf Coast the qualifying disaster was Hurricane Isaac. The unmet needs of Hurricane Isaac that were identified in the Phase I application of the NDRC were the results of vulnerable households that live in flood zones in houses that do not meet the FEMA requirements. Local housing agencies in two Gulf Coast communities, Moss Point and Hancock County, provided information about the damage from Hurricane Isaac and explained how homeowners with houses that do not meet the FEMA requirements were unable to repair their homes because they could not afford to meet the building permit requirements. As stated above the building code requires buildings to be improved to the current code standards if the projected cost of a renovation exceeds 50% of the building's value. In the case of flooded houses in flood zones if the damage is extensive and the house does not meet the BFE requirements, the homeowner cannot get a building permit unless the house is elevated. This large unmet need will continue to be a challenge for Gulf Coast Communities, especially for low-income households. The State's second phase NDRC application includes work in Jackson County to address vulnerable households in flood zones with a combination of relocation and elevation for houses

and storm water improvements for areas with chronic flooding problems.

Wind Challenges and Risks:

1. Background. Twenty six percent (around 30 million) of US households live in high wind zones with an expected wind speed of 110 mph or greater.^{xxii} In the International Building Code wind speeds of 110 mph or greater are defined as high winds and require special structural considerations. The mapped wind speeds used in the International Building Code are based on a three-second gust instead of a sustained wind speed that is more familiar to the general public watching the weather report. The equivalent wind speed in a weather report that equals the three second gust of 110 mph is 94 mph. In the familiar Saffir-Simpson Hurricane Wind Scale used by the National Weather Services, 94 mph wind is on the upper end of a Category 1 Storm. Along the Gulf Coast the extent of the high wind zone varies but it generally extends to about 100 miles inland. Therefore, all Gulf Coast communities are in high wind zones and all buildings have special structural requirements for wind loads.

2. Change in Wind Zone Policy. Determining wind risk is much less complicated than determining flood risk. Wind velocity zones are mapped by the American Society of Civil Engineers and provide the design wind velocity, which is used to calculate the design forces for the structure. Wind hazard zones are much larger than flood zones and, unlike flood zones that are based on topography, in practice the dividing line between one wind

zone and another is not as precise as flood zones. For example, the wind velocities used in HUD's programs are simply designated by county. What is more, an engineer can simply choose to use higher wind velocities in the design calculations and thus design a stronger building. In this way wind mitigation is much more in the control of the engineer than is flood mitigation.

After Katrina, Mississippi Gulf Coast cities and counties adopted the International Building Code (IBC). Before that time most of Gulf Coast cities used the Standard Building Code (SBC). The IBC was created by the International Code Council in 2000 to replace the Standard Building Code and other regional building codes across the country and is now used throughout the United States. The IBC is updated every three years and municipalities along the Mississippi Gulf Coast adopted the 2006 version after Katrina and have each adopted more recent versions since. The method of calculating the design wind load is different for the SBC and the IBC, so the wind velocity maps for the IBC has higher numbers than the maps for the SBC. For example, the 3 second wind gust speed of 120 mph used in the International Building Code is equivalent to fastest mile wind speed of 104 mph used in the Standard Building Code. Therefore, it is understandable that many people saw the new maps and concluded that, like the FEMA flood maps, the wind zones had been increased. In reality, even though there is more detail in the IBC wind force calculations and some parts of the structure are designed with a higher load than others, the resulting wind loads of the IBC are on average not significantly higher

than the previously used loads from the SBC. Adding to the confusion for the general public, in 2010 the American Society of Civil Engineers introduced a new design approach known as “ultimate strength design,” which uses increased wind speeds in the calculation but results in nearly equal design pressures as the older design approach. In response to this new engineering method the associated wind zone maps increase wind speeds by around 29%.

the building site is more or less protected. The exposure categories range from: a) large city with tall buildings; b) urban and suburban area with numerous closely spaced single family dwellings; to c) open terrain and shorelines in hurricane-prone regions. With the destruction of so many buildings in parts of the Gulf Coast due to Katrina’s storm surge, many building sites are now calculated with a higher exposure category, thus increasing the design wind force on some sites by 40%.



Volunteers building a house in East Biloxi post Katrina, 2005. Image courtesy of Gulf Coast Community Design Studio.

Even though the various engineering methods to calculate wind did not change the determination of wind risk, one aspect of the wind force calculations that did change in some places was the exposure classification. The exposure coefficient is used to modify the calculated wind force by noting whether

3. Change in Wind Insurance Costs.

Premiums for wind insurance have increased dramatically following Hurricane Katrina, and for several years the high cost and scarcity of options was a major deterrent to the redevelopment of the Gulf Coast. The Mississippi Gulf Coast Post-Katrina insurance story is

lengthy and not the subject of this report. At this point, because of much work by many state and local leaders to improve Mississippi's insurance market conditions, along with the global economic conditions of recent years that have benefited the reinsurance industry, homeowner insurance with wind coverage is available, competition between

had been providing last-resort homeowner policies since 1970. The MWUA replaced its predecessor when the State legally allowed for separation of peril specific wind policies from homeowner policies, in an effort to reduce homeowner insurance rates. For property owners unable to obtain wind coverage in the private market, the MWUA is the only



A house designed by the Gulf Coast Community Design Studio to meet new Base Flood Elevations, post Katrina. Image © Alan Karchmer.

insurance companies is improving and the cost of premiums has stabilized.

The Mississippi Windstorm Underwriting Association (MWUA) is a state-sanctioned consortium of private insurers that was created in 1987 to provide windstorm and hail insurance to property owners in the six coastal counties, as an insurer of last resort. An earlier iteration of the agency

way to insure against wind loss. The MWUA, commonly known as the wind pool, is funded through customer premiums and assessments on insurers relative to their market share in Mississippi.^{xxiii} State Farm has the largest market share in the state, with 25%, followed by the Southern Farm Bureau and Allstate.^{xxiv}

In the first few years after Katrina the wind pool was partially subsidized by

the State of Mississippi with federal CDBG funds. However, the state legislature did not reinsure the program at the amount needed to make up for losses from Hurricane Katrina. As a result, premiums on residential and commercial wind pool insurance were increased by 90% and 268% respectively in 2006.^{xxv} Rates were restructured with percent deductibles in 2008. Despite increases, the wind pool is still the most used insurance option for homeowners. About 60% of property owners in the coverage area have opted for MWUA wind insurance policies.^{xxvi} Wind pool premiums have a complicated effect on private wind insurance companies. The Mississippi Insurance Department is working to bring about a shift from the wind pool to private insurance companies and to encourage more competition in the state's private insurance market. However, because private companies set their premiums to be less than the wind pool, if wind pool premiums are reduced too much private companies cannot make lower rates work and will drop out of the market.

An important step in the State of Mississippi to address wind mitigation was the Comprehensive Hurricane Damage Mitigation Program (CHDMP) legislation passed in 2007. The CHDMP established an outline for the development of public policy to adopt wind loss mitigation programs in the six coastal counties of Mississippi. The legislation required the Mississippi Insurance Department (MID) to implement and administer CHDMP and even though the legislation did not include state funding the mitigation efforts in the state that followed in many ways were possible because of the CHDMP.

Community Rating System

One way local governments can help lower insurance premiums in their communities is by participating in the Community Rating System (CRS) program. The CRS encourages cities' floodplain management to employ community actions to reduce risk to the community and educate residents about how to prepare for natural disasters. Communities receive a class "grading" of 1-10 with 1 being the best. For example, Biloxi, Mississippi has earned a CRS rating of 5 and residents in Special Flood Hazard Areas receive a 25% discount on their flood insurance. The four categories through which communities can earn points are:

1. Public information- educating citizens on flood risks and how to mitigate them.
2. Mapping and regulations- increasing protections for new development.
3. Flood damage reduction- reducing flood risks in areas already developed.
4. Flood preparedness- implementing warnings and dam safety programs

Even though the cost of wind insurance continues to be a burden on homeowners, there are two positive outcomes of the work done by many to improve the wind insurance market in Mississippi. First, coastal communities have made significant advances by adopting and using the International Build-

ing Code so the construction on the coast since Katrina is at a high standard. In fact, a local insurance broker explained that at this point, other parts of the state that still do not use any building code have a negative impact on the Gulf Coast insurance market. In other words, as far as insurance risk reduction, the Gulf Coast is ahead of the rest of the state. The other positive outcome is a competitive insurance market, which has encouraged insurance companies to provide discounts to homeowners for actions that reduce wind damage risks. The various wind damage risk reduction programs, including the FORTIFIED Home™ program, are explained below. One interviewed insurance agent explained that now the challenge is that there are so many options that it has become confusing for the consumer. Part of this confusion is in the way insurance companies each have their own premium discount incentives, so a homeowner might think he or she can reduce his or her insurance premium by making use of a mitigation program only to find out that their insurance company has already reduced the premium with their own list of risk reduction factors.

The insurance industry has been an active part of creating ways to reduce risk and contrary to the attitude of many consumers, the insurance industry has the same risk reduction goals as the consumer. The most apparent aspect of the insurance industry's active participation in risk reduction is the creation and growth of the Insurance Institute for Building and Home Safety (IBHS). IBHS is an independent research and education organization that is funded by the insurance industry whose purpose is to

Building Code Effectiveness Grading Schedule (BCEGS)

- Studies have shown the extreme reduction of risk of buildings that utilize more up-to-date building codes, and the BCEGS grading system is the means to understanding a community's commitment to resilient construction. Verisk Insurance Solutions, a leader in insurance underwriting and risk management performs an evaluation of municipalities' building code adoption and their method of enforcing the building code on site. Each community receives a Building Code Classification from 1 to 10 with 1 being exemplary.
- The BCEGS classification is one component of determining a community's CRS rating.

determine the most effective strategies for fortifying homes, businesses, and communities against future natural disasters. By conducting simulated wind and storm events in their state-of-the-art research facility, IBHS is able to test full-scale houses to see the effects a given storm will have on the structure. In 2010, IBHS created the FORTIFIED Home™ program, a three-tiered set of standards identifying construction features that will protect an existing home from an identified disaster. The tiers, labeled Bronze, Silver and Gold, are cumulative and target typically weak areas in home construction: the roof covering, window and door openings, and structural framing, respectively. A third-party evaluator

performs an initial assessment and inspects the home again after the retrofits have been implemented. If implemented correctly, the homeowner will be issued a FORTIFIED certificate.

State legislators continue to pursue initiatives to improve Mississippi's insurance business climate. In July 2015 the state passed the Clarity Bill, following examples of other southern states in an effort to gather data surrounding insurance premiums and claims. The Act requires insurance carriers in Mississippi to submit information every three years to the Mississippi Insurance Department (MID), giving numbers for total earned premiums, total losses, reinsurance and homes served. MID intends to compile this data and make it available on their website to enable consumers to compare carriers. This act again emphasizes the expectation that transparency in the insurance industry surrounding premiums and loss will help determine an accurate value for the risk associated with properties.

Flood and Wind Mitigation Needs:

Even though flood and wind risks are divided as far as insurance companies and mitigation programs are concerned, the two risk factors combine for the homeowner and make up a substantial part of overall housing costs on the Gulf Coast. This combined insurance cost is especially a burden for low-income households. Mississippi homeowners have the fourth-highest homeowner insurance premiums in the nation, spending an average of \$1,185 on homeowners insurance each year.^{xxvii} Premiums on the Mississippi Gulf Coast exceed the state average, due to the addi-

tional cost of peril-specific policies for wind and flood loss. The high cost of insurance is frequently cited as a primary barrier to housing development in Mississippi's three coastal counties.^{xxviii} Households paying more than 30% of household income for housing are considered "cost burdened" and have a housing affordability problem. The Department of Housing and Urban Development (HUD) defines affordable housing as housing for which occupants pay no more than 30% of household income, including direct payments on rent and mortgage, utilities, taxes, and insurance.^{xxix}

The financial burden of the cost of insurance is especially difficult for low-income households and the expected increases in flood insurance will certainly have an impact. One result of the Homeowner Assistance Program is many low-income households received both financial and volunteer assistance with getting their flooded house rehabilitated. These households now have a house that is better in many ways than it was before Katrina and for the most part they do not have a mortgage. A condition of the HUD grants used to assist these homeowners is the requirement for them to have flood insurance. However, as explained above, rehabilitation of flooded houses generally did not include the added work to elevate the existing house to the new Base Flood Elevation so most of the homeowners that received assistance to repair a flooded house now live in a house that does not meet the current FEMA requirements. With the planned NFIP reforms these low-income homeowners who live in houses that do not meet FEMA requirements will be hard hit with the eventual elimination of NFIP subsidies. What is more, the plan to eliminate

subsidies for houses that are resold will mean that many low-income homeowners will not be able to sell their house and thus lose their primary source of family wealth. Because they are now living in a house without a mortgage they have a very affordable housing situation, which they will not be able to replicate if they become a renter.

The specific demographics of households that now live in flood zones on the Mississippi Gulf Coast is not known. As explained in the conclusion of this report additional research to overlay the flood zones onto available household demographic data along with a survey of these households would be very helpful to better understand flood mitigation needs. Nevertheless, the general situation for low-income households offers a view of the challenges of the increased cost of living in a flood zone. Data from the 2010 American Community Survey (ACS) for the two coastal Metropolitan Statistical Areas (MSA) provide a general understanding of housing affordability on the coast and by extension the challenges of low-income households living in a flood zone.

Median household income in the Gulfport-Biloxi MSA was \$41,875 in 2010.^{xxx} In the same year, median household income was slightly higher in the Pascagoula MSA at

\$44,878.^{xxxii} The distribution of income is determined in relation to Area Median Income (AMI) such that moderate incomes are between 80% and 120% of AMI, low incomes are between 50% and 80% of AMI, very low incomes are between 30% and 50% of AMI, and extremely low incomes are those below 30% AMI. Households earning more than 120% of AMI are considered high income.

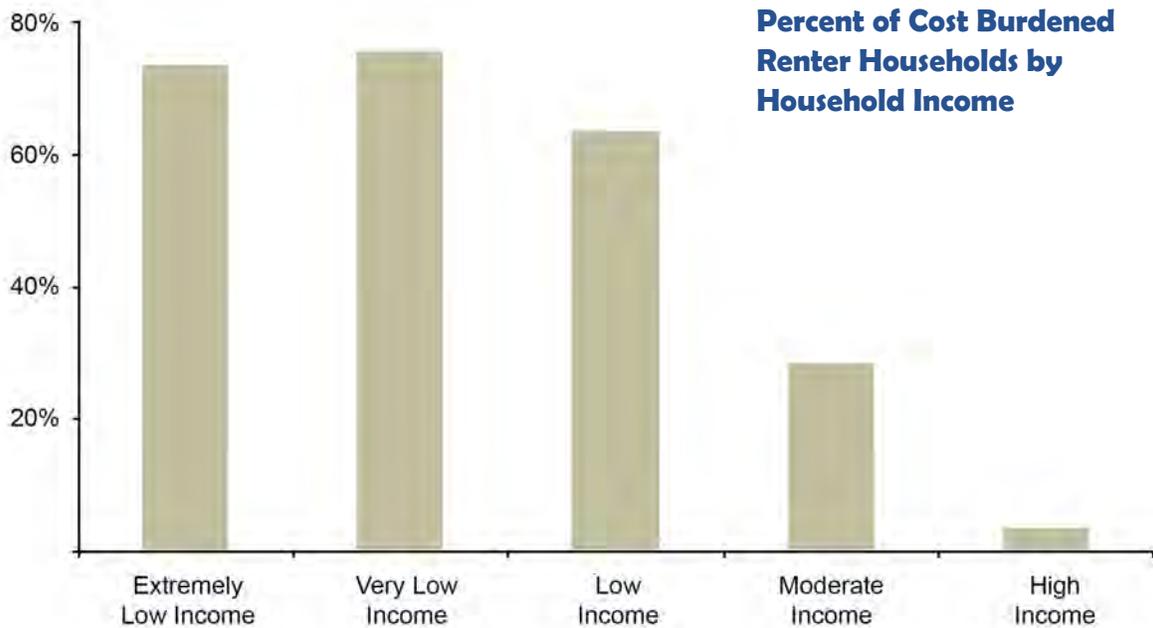
There are approximately 155,208 households in the Gulfport-Biloxi-Pascagoula MSA.^{xxxiii} As of 2010, 141,061 of those households lived in the three coastal counties.^{xxxiii} The distribution of incomes on the Mississippi Gulf Coast is significant in that a majority of households in the MSA earn less than Area Median Income.^{xxxiv}

As shown in the chart below, 17% of households are moderate income, 20% of households are low income, 6% of households are very low income, and 14% of households are extremely low income. This means that over 21,000 households in the MSA earn less than \$13,000 per year. For these households, adhering to the 30% affordability rule would mean spending only \$360 per month on rent and utilities – a challenge in an area where the fair market rent is more than \$550 for a one-bedroom apartment.^{xxxv}

Distribution of Household Income

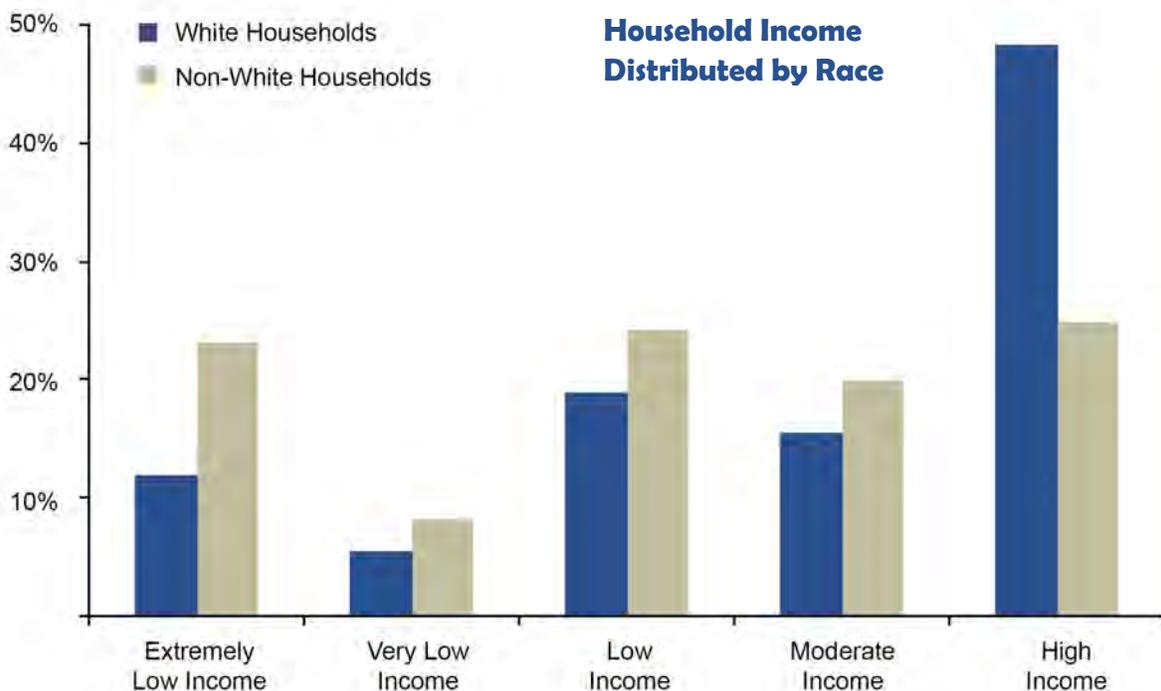
	Extremely Low Income	Very Low Income	Low Income	Moderate Income	High Income
Gulfport-Biloxi MSA	14.7%	5.4%	20.9%	16.8%	42.2%
Pascagoula MSA	13.7%	6.8%	18.5%	25.5%	35.4%
Gulfport-Biloxi-Pascagoula MSA	14.3%	6.0%	20.0%	16.5%	43.2%

Source: American Community Survey (2010). ACS 1-Year Estimates. Gulfport-Biloxi-Pascagoula MSA. Tenure By Housing Costs As A Percentage Of Household Income In The Past 12 Months.



Source: American Community Survey (2010). ACS 1-Year Estimates. Gulfport-Biloxi-Pascagoula MSA. Household Income By Gross Rent As A Percentage Of Household Income In The Past 12 Months.

Looking at the distribution of household income between races highlights even wider income disparities. As shown in the chart below, nearly half of all white households are high income households. In contrast, less than a quarter of non-white households are high income households. There are twice as many non-white extremely low-income households than white. Because of the direct relationship between income and housing affordability, this means non-white households are more likely to lack ready access to affordable housing than white households.



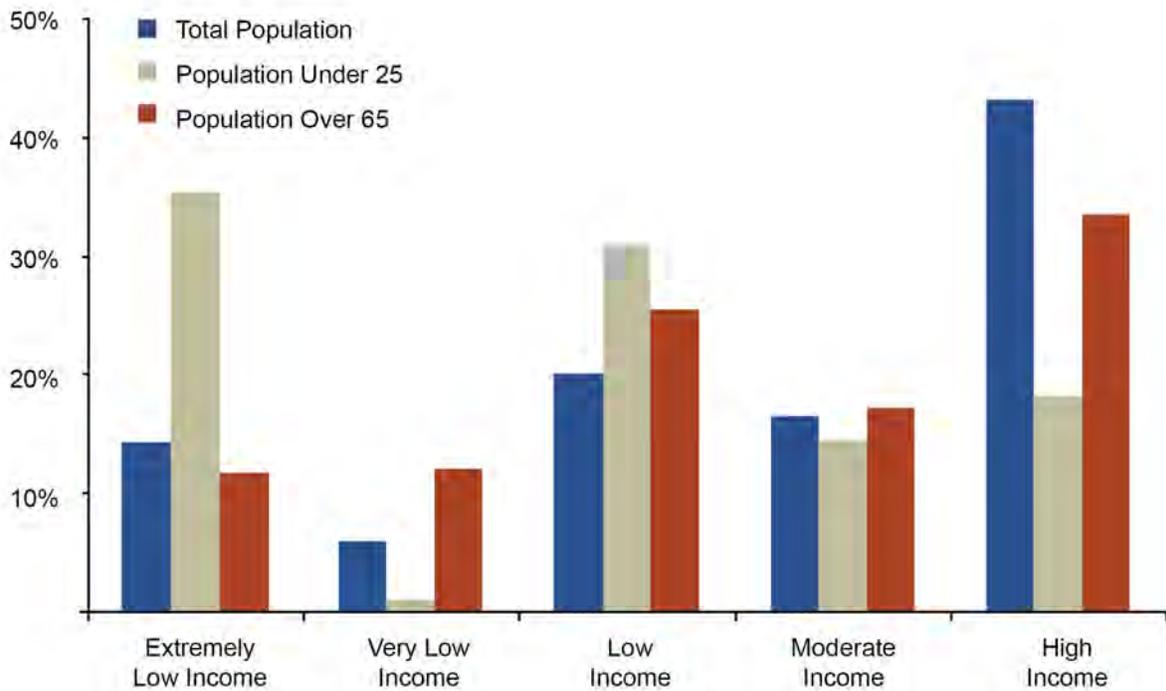
Source: 2010 ACS 1-Year Estimates. Gulfport-Biloxi-Pascagoula MSA.

The income distribution by householder age highlights a different disparity. Young households – those headed by someone age 25 or younger – are far more likely to be extremely low income than any other age group. Senior households – those headed by someone age 65 or older – are far more likely to be very low income. Both seniors and youth are more likely to be low income and less likely to be high income than all other households.

This distribution indicates that young households, which may be headed by a student or an entry-level worker, have lower incomes overall and are more likely to experience difficulty accessing affordable housing. Those youth who head extremely low income households will face special difficulty because of a lack of credit and minimum age restrictions on public housing and housing vouchers.

The distribution also indicates that about half of seniors, who may be retired and/or living on social security, earn less than 80% of area median income. Over 3,000 seniors in the region live below the poverty line.^{xxxvi} This population may face additional difficulties accessing affordable housing because of the need to accommodate for aging and disability. According to the 2010 ACS 1-Year Estimates, more than half of seniors in the region who live below the poverty line are disabled.^{xxxvii}

Household Income Distributed by Age

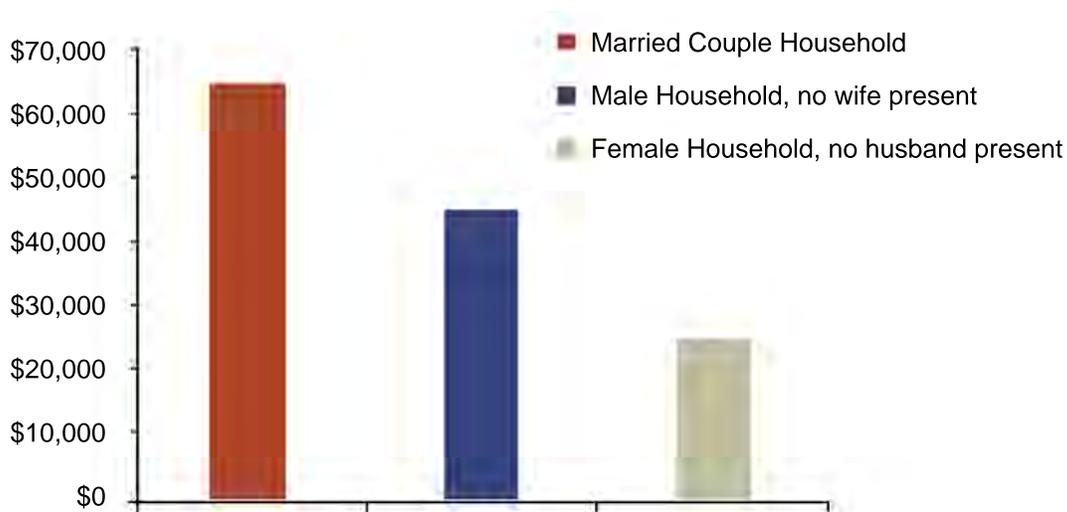


Source: 2010 ACS 1-Year Estimates. Gulfport-Biloxi-Pascagoula MSA.

Looking at the distribution by gender highlights an additional income disparity. As shown in the chart below, a married couple family household has an income advantage over a male family household with no wife present. Even greater disparity is evident in female family households with no husband present.

In family households, a male householder (no wife present) earns a 61% of a married couple household. A female householder (no husband present) earns only 39% of a married couple household. Comparing male-only and female-only households, the median female household income is just 61% of the median male household income. The direct relationship between household make-up and income suggests a female household with no husband present will face significant challenges in housing affordability.

Household Income Distributed by Gender



Source: 2014 ACS 1-Year Estimates. Gulfport-Biloxi-Pascagoula MSA.

The information for the Gulfport-Biloxi-Pascagoula MSA provides a view of the challenge for all low income households. The burden of costly wind and flood insurance is added to the general challenge of the Gulf Coast Region. Premiums on residential wind insurance have increased 90% since Hurricane Katrina.^{xxxviii} Flood insurance premiums have increased by at least 33% in the same time frame, and will likely increase again with the proposed Flood Insurance Reform and Mod-

ernization Act.^{xxxix} Combined, the costs of homeowners, wind, and flood insurance have become unaffordable for many property owners in the three coastal counties. The relationship between flood and wind insurance burden is affected by several variables. As stated above, currently homeowners in a flood zone that do not meet FEMA requirements pay approximately three times more than houses that meet the requirements.

Furthermore, with anticipated NFIP reform the annual cost for flood insurance for houses that do not meet FEMA requirements may exceed \$10,000, which for some Mississippi neighborhoods will be more than the house mortgage and will put most households into a cost burdened situation of paying more than 30% of their income on housing cost.

What's more, other than very expensive houses along the beach, houses in flood zones that do not meet FEMA requirements will become much harder to sell, since the new owner will most likely lose the NFIP subsidy; thus the market will likely cause these houses to lose property value. Therefore, even though the prospect for wind insurance is getting better, increasing flood insurance cost will increase the overall cost burden for thousands of Gulf Coast households.

As described in the various programs below, wind mitigation is feasible with a relatively low construction cost. However, depending upon the type of foundation and the BFE height, the cost to elevate an existing house to meet FEMA requirements is reported to average \$74 a square foot, which for many houses on the Mississippi Gulf Coast can exceed the value of the house.^{x1} For example, at 2015 house prices, the market value of a modest house that is in one of the Back Bay flood zones such as East Biloxi is probably less than \$50,000. If the house is on a conventional pier foundation, elevating the house is feasible

but will likely cost around \$40,000. Obviously, there is no way to recover such a cost in the sale of the house. When flood insurance premiums for a nonconforming house reach \$10,000 and the difference between a house that meets FEMA requirement and one that doesn't might be \$9,000, the payback for elevating a house appears to be less than five years. However, such calculations are deceiving because the homeowner probably can't afford the high insurance cost in the first place and the reduced insurance of \$1000 a year is probably close to what they are paying now with a subsidized premium.

Buy-out programs have similar feasibility problems. If the buy-out is for the fair market value the homeowner of that same \$50,000 house will not get enough money to buy an equivalent house.

This is why when voluntary buy-out programs have been available to communities in flood zones in the past, many people chose to stay in their house because they are in a sense trapped in the only housing situation they can afford.

The real need is housing relocation programs that assist homeowners based on income to move out of the flood zone and into an existing or new house so that the homeowner ends up with a comparatively affordable housing cost. In the process of completing the application for Mississippi's response to HUD's National Disaster Resilience Competition,

the described above input was received from stakeholders and residents from several flood zone communities along the Mississippi Gulf Coast. These community informants repeatedly responded that the mitigation program that is most beneficial is not a buy-out but is a relocation program that maintains housing affordability. The budgeted cost of the relocation program for Mississippi's NDRC application is \$120,000 for each household.

Designing a flood mitigation program is not within the scope of this research and without a workable program to reference it is difficult to estimate unit costs. Furthermore, there is no data about the number and make up of houses in any Gulf Coast city flood zone. A very useful research effort would be a complete inventory of the houses in flood zones along the Mississippi Gulf Coast, includ-

ing information on which houses do not meet the BFE requirements. With such information and with general household income data it would be possible to determine the complete cost to either elevate or relocate every house and thus fully address the mitigation need. The number, however, would be enormous. For example, in the ten-square-mile East Biloxi sample described above with about 800 houses that do not meet the BFE requirements, there would be a mix of elevated and relocated houses needed. With an estimated \$40,000 for each elevation and \$120,000 for each relocation and depending on the number of houses that elevate compared to the number of houses that relocate, the cost of mitigation in just this 10-square-mile sample area would be around \$50,000,000.

Best Practices & Lessons Learned

Hazard mitigation should take place before, during and after a natural disaster; at all scales from the region down to the individual; and include non-structural, non-physical strategies such as planning, policy-making and education. While a holistic approach is most effective, this report focuses on lessons learned from non-structural, physical mitigation programs that include actions done at the scale of an individual building or property owner to make buildings stronger and more flood resistant.

The Gulf Coast has long been home to natural disasters, most centered on flood and wind hazards resulting from hurricanes and tropical storms. As such, many of the leading examples of flood and wind hazard mitigation programs can be found in the Gulf Coast region. Over the last decade, a range of nation-

ally renowned hazard mitigation programs, mostly focused on wind mitigation, have been employed in Florida, South Carolina, Alabama and Mississippi. Most have been successful in many regards, though none perfect. Programs reviewed in this research were selected because they focus on making homes stronger and more storm resistant in order to reduce the impact of future storms and to reduce the cost of insurance. Best practices and lessons learned from a handful of these programs are discussed below and should be considered as new programs are developed or existing programs are modified. These flood and wind mitigation programs have been evaluated and are shown in comparison to each other in the table on the following page, and a case study for each of the programs is provided in Appendix B of this document.

Wind Mitigation Program Comparison Chart

	Roof Deck Attachment	Reinforce Roof-to-Wall Connection	Gable End Bracing	Opening Protection	Exterior Doors/Garage Doors	Roof Covering	Sealed Roof Deck	Structural Repair	Tie-Downs	Outlookers	Roof Vents	Program Manager	Program Period	Funding	Certificate Offered	Financial Incentive to Homeowner
Rebuild Northwest Florida	•	•	•	•	•							Rebuild NW Florida	2004-2015	HMGP funds (75%) Homeowner funding (25%)	none	Insurance Discounts (for individual measures)
South Carolina Safe Home	•	•	•	•	•	•	•	•	•	•	•	South Carolina Dept. of Insurance	2007-2015	State Grants up to \$5,000 & Homeowner Funds	South Carolina Safe Home certificate	Tax Credit Incentive up to \$1500
My Safe Florida Home			•	•	•							Florida Dept. of Financial Services	2007-2009	State Grants of \$5,000 & Homeowner Funds	none	Insurance Discounts (for individual measures)
Coastal Retrofit Mississippi	•	•	•	•	•	•	•	•	•	•	•	Mississippi Emergency Mgmt. Agency	2011-2014	HMGP funds (90%) Homeowner funding (10%)	FORTIFIED Bronze or Silver	Mandatory Insurance Discounts in MS
Strengthen Alabama Homes	program currently in development											Alabama Dept. of Insurance	Jan. 2016 Start	Increase in DOI fees, Fed. Home Loan Bank & AL Windpool	FORTIFIED Bronze	Mandatory Insurance Discounts in AL
My Strong Home	•	•	•	•	•	•	•	•	•	•	•	My Strong Home	2014-2015	Premium Financing Company	FORTIFIED Bronze	Insurance Discounts built into financing mechanism
Ready Loan Fund	•	•	•	•	•	•	•	•	•	•	•	Renaissance Corp.	2012-2015	Low interest homeowner loan	FORTIFIED Bronze or Silver	Mandatory Insurance Discounts in MS

A comparison of the mitigation features offered by the 7 programs evaluated in this report, as well as programmatic structure and funding sources.

The following lessons learned were identified from evaluating the effectiveness of wind and flood mitigation programs. Most lessons were learned from positive outcomes. A few others were learned from programs whose success was negatively affected by a policy that could have been otherwise prevented. The importance of the lessons learned was confirmed both from program results and from feedback from individuals involved in the various programs:

- **Standards Based**
- **Adaptability**
- **Multiple and protected funding streams**
- **Mandated insurance reductions**
- **Targeted populations and accessibility**
- **Data Collection**
- **Time Line for Completion and Realizing Benefits**
- **Built-in training**
- **Public education and awareness**



Volunteers review plans for a new house in East Biloxi post Katrina, 2005. *Image courtesy of Gulf Coast Community Design Studio.*

IBHS FORTIFIED Home™ Program

- The Insurance Institute for Business and Home Safety (IBHS) is an independent research and communication organization that is funded by the insurance industry whose purpose is to determine the most effective strategies for fortifying homes, businesses, and communities against future natural disasters. By conducting simulated wind and storm events in their state-of-the-art research facility, IBHS is able to test full-scale houses to see the effects a given storm will have on the structure.
- In 2010, IBHS created the FORTIFIED Home™ program, a three-tiered set of standards identifying construction features that will protect an existing home from an identified disaster. The tiers, labelled Bronze, Silver and Gold, are cumulative and target typically weak areas in home construction: the roof covering, window and door openings, and structural framing, respectively.
- A third-party evaluator performs an initial assessment and inspects the home again after the retrofits have been implemented. If implemented correctly, the homeowner will be issued a FORTIFIED certificate. The certificate must be renewed every five years, requiring another inspection to ensure there is sufficient roof life remaining and that no major renovations have occurred that might diminish the performance of the home.

Standards Based:

While non-structural flood mitigation is for the most part limited to elevation, flood-proofing and relocation, wind hazard mitigation is more varied. All wind mitigation efforts aim at making buildings stronger and more storm resistant. However, because there are a number of ways to accomplish such an objective, wind mitigation programs can vary in the particular improvements they offer the builder or building owner. During the past decade programs in various southern states



programs have in fact two related purposes: first to improve the building's performance and second to reduce the risk with enough certainty to be able to reduce the cost of insurance. In other words, a building can be engineered and built to a high level of strength and storm resistance, but if that increased performance cannot be quantified and if the resulting decreased risk cannot be compared with other lower-performing buildings, an insurance company and their re-insurers have a difficult time equating the building's improvements to reduced insurance cost. A lesson



Hurricane strapping. Images courtesy of Habitat for Humanity of the Mississippi Gulf Coast.

have been developed and, in the absence of a national standard, program-specific technical approaches have been created to increase a building's wind and water resistance. In the course of these programs it became clear to many people that more successful wind hazard mitigation programs offer packages that include strategic combinations of retrofits that are tested, proven and tied to widely recognized performance standards. The importance of performance standards for wind mitigation stems from the reality that wind mitigation

learned in the past decade of wind mitigation programs is that insurance reduction is the most immediate benefit of wind mitigation and is an effective incentive for property owners to participate in any given mitigation program. Furthermore, a related lesson learned is that the most effective way to achieve insurance reductions is to utilize building standards accepted by the insurance industry. A study prepared for the Mississippi Windstorm and Underwriting Association in 2013 noted that "carriers, builders, state and local officials,

and homeowners are much more likely to have confidence in a retrofit program if the rating and mitigation component system are based on well-tested and high-performing standards.”^{xli}

The most widely recognized building standard aimed at making houses more wind and storm resistant is the Insurance Institute for Business and Home Safety’s (IBHS) FORTIFIED Home™ program. The program is a three-tiered certification of bronze, silver and gold levels of retrofits for new and existing homes that make use of best practices in engi-



Volunteers raise a wall panel. *Image courtesy of Gulf Coast Community Design Studio.*

neering and building standards from over two decades of research and analysis.^{xlii} The benefit of using FORTIFIED Home™ standards is clearly illustrated by the fact that Coastal Retrofit Mississippi incorporated FORTIFIED Home™ components after the program had been implemented for a year. Once these insurance reducing standards were included in the retrofit program the applications increased significantly. Alabama’s PIER Program legislation and the Strengthen Alabama Homes

Coastal Retrofit Mississippi

Purpose: To help homeowners in Mississippi’s three coastal counties strengthen their homes by retrofitting to withstand hurricane force winds in compliance with International Building Code standards.

Project Manager: Mississippi Emergency Management Agency (MEMA).

Retrofits:

- Package A – Roof Retrofits
- Package B – Opening Retrofits
- Package C – Roof & Opening Retrofits
- Optional Package – IBHS FORTIFIED Bronze - Outlookers, vents, Etc.

South Carolina Safe Home

Purpose: To help individual homeowners perform mitigation upgrades to their properties. The program helps to increase community resilience through home retrofits and homeowner education.

Project Manager: South Carolina Department of Insurance

Retrofits:

- Bracing gable ends
- Exterior doors
- Opening protection
- Reinforcement of roof-to-wall connections
- Roof covering
- Roof deck attachment
- Secondary water barrier
- Problems associated with structural components

Program that are discussed below are also tied to FORTIFIED standards.

The Department of Homeland Security (DHS) has been looking to integrate the FORTIFIED Home™ standards into a national program that is being called “Resilience STAR,” following the Department of Energy’s well-known Energy STAR program, which has been



Volunteers review plans on site. *Image courtesy of Gulf Coast Community Design Studio.*

very successful at creating a market for energy conservation products and programs. The goal of Resilience STAR is to create more resilient communities by increasing the number of homes built or retrofitted to include design features that are both affordable and strong. The first Resilience STAR Pilot Project was launched in 2013 and focused on single-family homes in hurricane-prone coastal communities located along the Gulf Coast in Alabama and Mississippi. Participating homes received their official designation in the fall of 2014.^{xliii} A second pilot project is currently being discussed.

Some jurisdictions are going a step further to incorporate stronger building

standards into their building codes. Orange Beach, Alabama, for example, adopted the coastal supplements for the 2012 International Building Code that are based on FORTIFIED for Safer Living standards. The supplement requires roof systems, impact glass and shutters that make homes stronger and can help prevent water damage to homes. As part of

My Safe Florida Home

Purpose: To create a culture of mitigation in Florida and to help Floridians learn how to harden their homes to better protect themselves and their families from wind-storm damage.

Project Manager: Florida Department of Financial Services

Retrofits:

- Specific wind-resistance home improvements as recommended in an inspection report including:
- Opening protections (e.g., hurricane shutters);
- Exterior doors, including garage doors;
- Gable-end wall bracing.

this, rebates are also given for certifications in LEED, Energy STAR and FORTIFIED for Safer Living construction.^{xliv} Not only does including FORTIFIED standards in the building code result in all new construction being stronger constructions, when damage is caused from a natural disaster it requires insurance carriers to cover costs associated with rebuilding to these higher standards.

My Strong Home – one of the mitigation programs described below - employed

Risk Management Solutions and Milliman actuarial consultants to conduct modeling to determine the reduced risk of homes receiving home hardening with FORTIFIED standards. While the reports generated were proprietary, Margot Brandenburg, CEO of My Strong Home did share that the FORTIFIED Bronze improvements were seen as a significantly more cost effective upgrade than the Silver certification. The roof improvements required for Bronze certification substantially reduce the risk to the home during wind events. The major component required to meet Silver level certification is opening protection and while these types of improvements reduce risk, they are expensive and generally do not produce significant reductions in premiums.

Adaptability:

No program, irrespective of how much planning and research goes into its development, will function completely as intended. It is therefore important that a program allows for a degree of flexibility and has a process for adaptive management. Coastal Retrofit Mississippi is an example where changes made mid-program dramatically increased the reach and success of the program.

The Coastal Retrofit Mississippi program was approved for Hazard Mitigation Grant Program (HMGP) funding in the spring of 2011. The initial program conformed to HMGP guidance and stipulated that 25% of the cost of the retrofits be provided by a non-federal source, which in the case of Coastal Retrofit Mississippi matching funds were paid by the homeowner. The 25% homeowner match proved to be a significant barrier to participation in the program as many homeowners

My Strong Home

Purpose: To combine insurance, specialty finance, and mitigation construction to manage climate risk.

Program Manager: My Strong Home as premium financing company and SageSure insurance managers. Construction work completed by local contractors.

Retrofits:

- Roof deck attachment
- Reinforcing roof-to-wall connections
- Gable end bracing
- New roof material with sealed roof (spray foam under the roof deck for homes with existing new roofs)
- Opening protection and new garage doors (optional upgrade)

could not afford the match and/or initial \$250 inspection fee. In the fall of 2012, FEMA approved a change in the program that reduced the match to 10%. Residents who had already participated in the program at the 25% cost-share were to be reimbursed.^{xlv}

Additionally, FEMA approved the inclusion of additional retrofits such as gable outlookers and ridge and off-ridge vents, which allowed the Mississippi Emergency Management Agency to offer a package which parallels the Institute for Business and Home Safety's FORTIFIED Home™ Bronze level. This was an appealing package to many participants and allowed for a higher degree of confidence from insurance agencies when approving cost reductions based on the retrofits.

While the adaptability of the Coastal Retrofit Mississippi program allowed for

changes that improved program participation, the South Carolina Safe Home Program is currently running into challenges because it is not adaptable. The South Carolina Safe Home Program has enabling legislation with detailed language that describes specific technical approaches. Such specificity is proving to make adaptability a challenge. South Carolina created the Safe Home program as part of the State's Omnibus Coastal Property Insurance Act of 2007. The program has been very successful, awarding more than \$17 million in grants to 3,700 homeowners across all 11 coastal counties.^{xlvi} South Carolina Safe Home was created prior to the development of the FORTIFIED Home™ standards. Instead the program was developed using the standards of the Federal Alliance for Safe Homes, Inc. (FLASH). Program managers would now like to modify the program to align with FORTIFIED standards, but are finding that the enabling legislation is overly detailed to a point that it is making the transition difficult if not impossible, without changing the legislation.

Even though adaptability has proven to

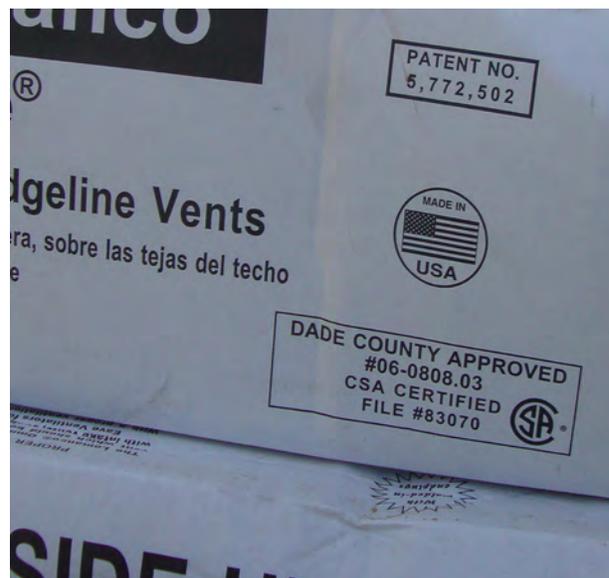


Federal funding allows for post disaster construction in East Biloxi. Image courtesy of Gulf Coast Community Design Studio.

be beneficial for retrofit programs, it is important to note that change during the implementation of a program can lead to consumer confusion. It was the perception of some connected to Coastal Retrofit Mississippi that once MEMA changed the homeowner match requirement from 25% to 10% prospective applicants were delaying participating in the program because they were “holding off” for further reductions in discounts and, in general, were overwhelmed by the changes in administration, eligibility and program options.

Multiple and Protected Funding Streams:

Following the general theory that resilient systems have redundancy, the most sustainable mitigation programs are funded through multiple revenue streams and include some level of protection. The My Safe Florida Home program is an example of what can happen if funding is not varied or protected. The My Safe Florida Home program was created as a result of the Florida Comprehensive Hurricane Damage Mitigation Program in 2007 and



A label showing roof vent specifications. Image courtesy of Habitat for Humanity of the Mississippi Gulf Coast.

was funded through legislative appropriations. The program was successful in terms of the number of free home inspections conducted (399,164 as of March 1, 2009) and grants awarded (40,385 as of March 1, 2009). Following a change of administration, however, and in light of budget constraints, funds for grants were discontinued in 2009.^{xlvii} This serves as an example of the importance of creating a protected funding stream for home mitigation programs in order to be sustainable and withstand changes in the political climate.

One approach communities are using to overcome the funding obstacle is improving integration with other local plans and programs, such as capital improvement plans and storm water management programs, to help achieve mitigation through other community objectives. Improved public education and awareness of hazard vulnerabilities and mitigation options also may help to garner more funding for mitigation through tax dollars and private sources. The best time to implement this approach is often in the window of opportunity after a disaster.^{xlviii}



A label showing door specifications. Image courtesy of Habitat for Humanity of the Mississippi Gulf Coast.

Mandated Insurance Reductions:

In March of 2012, Mississippi legislature passed House Bill 1410 which mandated that insurance carriers give insurance credits to homes that have received certification through the FORTIFIED program. Discounts were to be in place by July 2013. Similar bills have also been passed in Georgia, Alabama and North Carolina. House Bill 1410 does not set exact amounts or percentages for discounts, as some other states have done. Instead, it requires companies to file price breaks with the state Insurance Department that actuaries can justify. In theory, this was to avoid problems that Florida had, where the state legislature mandated discounts, only to have insurers say they were so deep that companies couldn't collect enough money to justify writing policies. Some stakeholders believe this general mandate is working because insurance carriers feel threatened by the possibility of specific mandated discounts so are offering comparable discounts on their own initiative. Others feel there is too much variability in discounts offered making it harder for the consumer.

In 2015, Gulf Coast Renaissance Corporation conducted a phone call survey to many of the insurance carriers along the Gulf Coast to learn about the various discounts offered for FORTIFIED certifications and found widely varying acceptance of the standard. A few carriers offered discounts as high as 20-25% while one or two carriers claimed to have never heard of FORTIFIED. This survey shows that more education is needed among insurance carriers to familiarize them with the IBHS standards, as well as education among community members as to how important it

is to “shop around” for the best rate for their home insurance.

Currently, the State of Florida mandates insurance discounts based on an independent inspection of the home by a licensed contractor, architect or engineer and will be eligible for insurance credits based on individual fortification features evident in the home. According to one person interviewed, this system is flawed because a home may be eligible for discounts for features such as opening protection or gable end bracing while there is a gaping hole in the roof. The features are not looked at on a cumulative basis, lacking a more holistic approach to mitigating risk. Moreover, the individual feature discounts are not an accurate representation of loss reduction for the insurance carrier.

Whether or not mandated insurance discounts exist in a state, one important point to note is that a FORTIFIED certificate is commonly able to



Engineered storm shutter panels provide no benefit when left unused due to installation challenges. *Image courtesy of Gulf Coast Community Design Studio.*

grant a home “preferred coverage”.

In other words, for a home located in a higher risk area covered typically only by the state’s wind pool, a private insurer will often-times extend coverage to that home if it has received a FORTIFIED certificate. With a certificate, private carriers feel confident enough to deem the property as having the same amount of risk as another home in a different, lower risk location. Homeowners that were once limited to one insurance provider are finally able to shop around to private carriers for a better rate. In this way, there is hope that the market can shift more to private carriers and become less dependent on the wind pool.^{xlix}

Targeted Participation and Accessibility:

Eligibility criteria for most programs commonly includes being located in a certain high risk area. The first phase of Coastal Retrofit Mississippi, for example, focused on the zone with the highest wind risk which are homes south of the CSX Railroad tracks



Lightweight roll-down storm guards are readily manageable for elderly users. *Image courtesy of Gulf Coast Community Design Studio.*

in Hancock, Harrison and Jackson Counties. Likewise, eligible grant recipients in the My Safe Florida Home program had to reside in a designated wind-borne debris region. Such criteria are important in targeting some of the more hazard-vulnerable populations, but do little to get resources to some of those most in need including lower-income residents and the elderly who tend to live in more hazard-prone areas in older homes with fewer resources. Few hazard mitigation programs, for example, include income guidelines related to area median income or take a tiered approach to matching grant funding. Including such guidelines, in addition to geographic stipulations would help better address the needs of the more vulnerable populations.

In 2015 the Gulf Coast Renaissance Corporation expanded their existing energy retrofit loan program to include FORTIFIED Home™, Bronze level, which is roof improvements. The loan fund is called Ready Loan and is targeted to households below the area median income. The purpose of the low interest loan program is to assist low income

homeowners to retrofit their roof in order to qualify for reductions in their wind insurance.

In addition, retrofit options need to not only address hazard mitigation, but need to be usable for the entire targeted population. For example, the removable sheet metal hurricane shutters offered by Coastal Retrofit Mississippi are left to the homeowner to install prior to a storm. Holes were drilled around the windows to match the metal sheets and the sheets were labeled to align with given windows, but recipients noted how cumbersome they were to store and almost impossible to install for an elderly or disabled homeowner. The pull-down storm protection for doors, on the other hand, is much easier to operate and is usable for most homeowners.

Data Collection:

None of the mitigation programs evaluated include a budget allocated to collect data or a system for data collection. Data would be a valuable by-product of any mitigation program and could lead to more effective mitigation programs and more cooperation with the



Post disaster construction in East Biloxi. *Image courtesy of Gulf Coast Community Design Studio.*



Hurricane strapping installation. *Image courtesy of Habitat for Humanity of the Mississippi Gulf Coast.*

insurance industry. Reinsurance companies, for example, benefit from understanding the physical characteristics of the portfolio of insurance policies for which they hold. Ordinarily, very little data is collected about the structure of a house such as gable versus hip roofs, shingle versus metal roofing material, or number and types of windows. The IBHS standard is one avenue for collecting physical data about the housing stock, which helps inform reinsurance companies about the risk associated with the policy, and ultimately bring down reinsurance costs. Demographic and geographic data on program participation can also help improve a given program by alerting program managers if and when a change or changes are needed in the program to be able to better reach a targeted population.

Time Line for Completion and Realizing Benefits:

Robust programs involve processes that are planned and supported from start to finish. Such programs include everything from the initial application and eligibility determination to inspections, construction, ending in re-inspection and certification. These processes inevitably take a considerable amount of time. Major delays and long periods of no communication, however, can be frustrating for participants. A program with a lengthy time line is difficult for applicants and can lead to people dropping out of the program, which not only is ineffective for those homeowners, it also leads to poor public opinion and has a negative impact on the program. Strategies including setting time frames for approvals, simplifying application processes, phasing more complex projects and pre-determining benefits

Rebuild NW Florida

Purpose: Established originally to aid recovery after Hurricane Ivan. Began as a grassroots program to strengthen communities.

Program Manager: Rebuild Northwest Florida, a 501(c)(3) organization.

Retrofits:

- Roof deck attachment
- Reinforcing roof-to-wall connections
- Gable end bracing
- Opening protection
- Exterior doors (including garage doors)

can help streamline processes, reduce time lines and improve participant satisfaction. This is particularly important in recovery efforts immediately following a disaster.

Long time frames for realizing program benefits or benefits that are not clearly understood by participants can also result in low participation rates or under-mitigation.¹



Volunteers help East Biloxi rebuild. *Image courtesy of Gulf Coast Community Design Studio.*

Addressing this dilemma can come in several forms. For example, many of the programs looked at in this report were designed to help participants realize financial incentives within the first year or two with insurance reductions. In programs where pay-off will take considerably longer, more time needs to be invested in communicating with participants and potential participants the importance of benefits to come and how and when they will be realized.

In both the case of process delays and delays in benefit realization, case managers can play an active role as mediators between program managers and participants and should be factored in to any program design. An example of this can be seen with Gulf Coast Renaissance Corporation's Ready Loan Fund. Insurance discounts as a benefit of retrofitting can be difficult to navigate. Program managers at Gulf Coast Renaissance Corporation are in communication with the client's insurance company about applicable discounts and also shop around for preferred coverage options on behalf of the client.

Built-in Training:

In order for a program to run smoothly and to maximize the benefits of retrofits made through hazard mitigation programs, all parties involved need to have a common level of understanding. Contractors, inspectors, appraisers and insurance agents all need to be educated on the elements of retrofitting for hazard mitigation and their respective roles in both existing programs and regional preparedness in general. This common level of understanding does not necessarily occur through market forces alone. For example, homes



Volunteers help East Biloxi rebuild. Image courtesy of Gulf Coast Community Design Studio.

that have been implemented with fortification features would ideally see an increased value in the marketplace to represent their increased safety benefits which does not occur at this time. To address this, both real estate agents and appraisers would need to know the types of construction features to look for in homes and be able to assign a monetary value to these upgrades. To address this, adequate funding should be set aside for professional, multi-disciplinary training.

The My Strong Homes program conducted a thirty-home pilot program and retrofitted houses to the Bronze and Silver FORTIFIED standard. As reported by My Strong Homes, the pilot homes were located in Louisiana, Alabama and South Carolina and were insured by a number of different insurance carriers throughout the three states, receiving discounts ranging from 0-40% on their premiums after work was completed. This confirms the varying knowledge and acceptance of home fortification to reduce insurance risk among insurance carriers.

Public Education and Awareness:

In order for the real estate market to establish monetary value for mitigation features, a public campaign demonstrating the benefits of owning and living in a home that has been retrofitted would increase demand for these types of properties. Simple additions during construction such as sealing the roof deck typically cost \$500-1000 for the entire house, depending on its size but can drastically reduce the amount of damage done to a house and allow the homeowners to safely return to their homes more quickly following a storm

event. Homeowners should be educated about these features before a disaster occurs so they will be familiar with them and know to specify them while they are having work completed on their home. A 1992 report concerning earthquake mitigation determined that many homeowners do not understand the cost-benefits of mitigating because the benefits are either unknown or too long-term to be easily understood.^{li} Homeowners need to be educated on the associated costs of receiving retrofits and the associated insurance discounts, as well as reminded of the intangible benefits such as life safety and decreased

Evaluation of Comprehensive Hurricane Damage Mitigation Programs

Because the State of Mississippi is the primary focus of this report, a closer look at the evolution of mitigation programs and the Coastal Retrofit Mississippi program specifically is needed. Following Hurricane Katrina in 2005 and once the initial, more reactive repair programs were underway it became very apparent to the state's constituents that additional proactively focused mitigation programs were needed. The Comprehensive Hurricane Damage Mitigation Program (CHDMP) legislation passed in 2007, establishing an outline for the development of public policy to adopt wind loss mitigation programs in the six coastal counties of Mississippi. The legislation required the Mississippi Insurance Department (MID) to implement and administer CHDMP but gave no mandate to the State to fund the

program. It was stated in Air Worldwide's "Cost Benefit Analysis of CHDMP" that MID would offer free wind mitigation inspections to homeowners and provide a report detailing improvements they can make to their house to fortify it against future wind events as well as estimates of insurance discounts if these features are implemented. MID does not advertise these inspection services, and it is unknown whether the services are in fact still available. Furthermore, the CHDMP did not offer any funding for grants to further encourage homeowners to participate. One item to manifest from the CHDMP was the Cost and Benefit Study prepared by AIR Worldwide Corporation in 2010 which was mandated by the legislation and is discussed in more detail below.

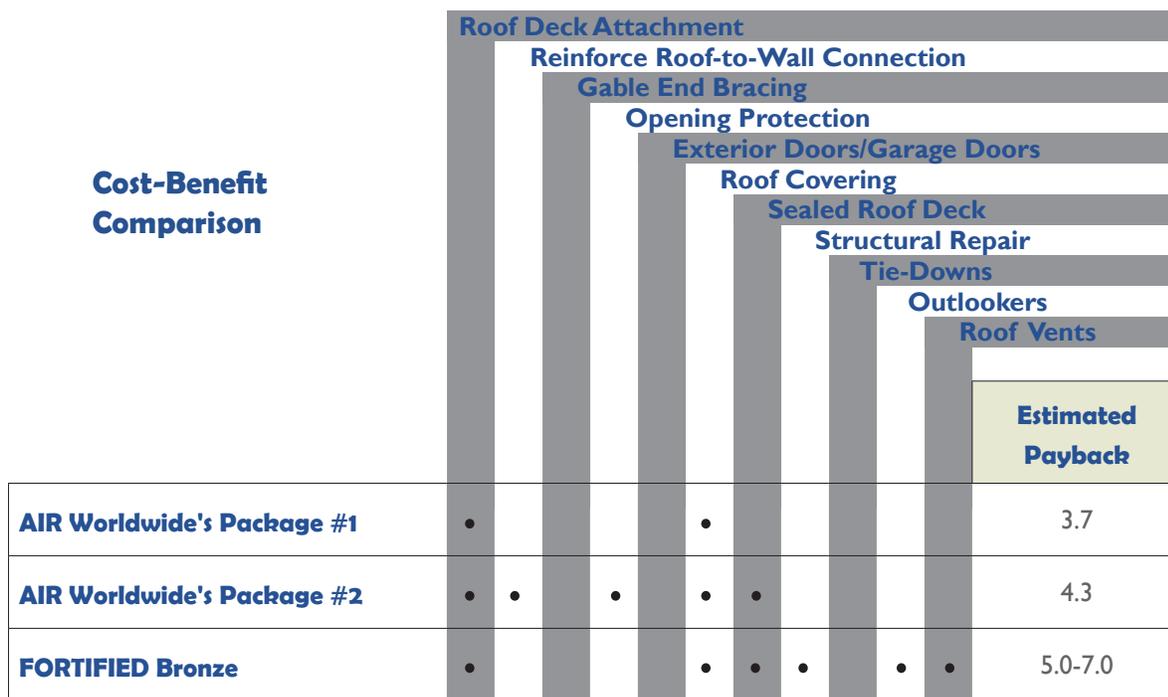
From the list of people interviewed for this report, very few recognized the name of the CHDMP or were able to describe what progress it has enacted, leading us to believe that it is not commonly referred to or very active today. Two interviewees were able to describe the progress the program offered at the state level in that it provided a framework for the State to leverage additional HMGP funds which eventually led to the development of the Coastal Retrofit Mississippi Program discussed earlier. In this way, it can be concluded that the CHDMP legislation was largely ineffective in regards to educating the public about or funding home hardening projects, but it did begin the discussion about hazard mitigation in the State of Mississippi and eventually paved the way for a state-funded mitigation program.

Evaluation of AIR Worldwide’s Cost Benefit Analysis of CHDMP:

One item to materialize from the CHDMP was the Cost and Benefit Study prepared by AIR Worldwide Corporation in 2010 which was mandated by the legislation and funded by MID. This report took a very scientific approach to explore questions relating to the use of hazard mitigation features in the building stock in South Mississippi and suggested challenges that would need to be overcome in order for the insurance industry to be better equipped and ready to give insurance credits for homes with mitigation features. This report looked specifically at wind insurance and excluded flood insurance. By developing the Individual Risk Model (IRM), engineers were able to identify building features in typical South Mississippi homes and subject them to computer simulations of

storm events in order to see what damage would be created. The “packages” of retrofits created on the test houses, along with their specifications were very similar to those of the IBHS FORTIFIED Home™ standard including wind-rated shingles, roof deck attachment, wall-to-roof strapping, sealed roof deck, and engineered storm shutters. While the study determines payback periods for each package of improvement, their analysis is clouded somewhat because their modeling assumes the associated cost for each package is specific only to the additional mitigation features (for example, the cost of shingles in the roof replacement was not taken into account because it was needing replacement anyway). Package #1 included replacement of wind-rated shingles and attachment of roof deck and was found to have a payback period of 3.7 years with no grant assistance. Package #2 included Package #1 as well as wall-to-roof strapping, a sealed roof deck and engineered shutters and had a resulting payback period of 4.3 years without assistance.^{lii}

While these results seem very favorable, one must keep in mind that this analysis was conducted five years ago and the cost of building materials and wind insurance premiums has increased since then, so it is difficult to say how accurate the payback periods remain. However, the mitigation program My Strong Home, discussed at length later in this report, also went through an extensive vetting and cost-benefit analysis using actuarial consultants. Those studies estimate payback periods for a home retrofitted with FORTIFIED Bronze features to be between five and seven years and include the cost of roof shingles, so it seems their numbers are somewhat in keep-



A comparison of the two packages looked at in AIR Worldwide's Cost-Benefit Study as compared to the FORTIFIED Home™ Bronze Standard.

ing with those of AIR Worldwide's. These two studies together are encouraging and help to demonstrate two important points. First, the CHDMP analysis serves as a good reminder that roof work will need to be performed on homes periodically due to general wear, and this is the most opportune and cost-effective time to implement these fortification features. If the mitigation work is completed alongside a routine re-roofing, the costs are lower and the payback period is shorter. The second thing to note from these two sets of payback numbers is that a four to seven year payback period is a manageable time period for homeowners to understand and realize the cost savings, and even more manageable if a grant program or financing mechanism accompanies the investment.

Another topic discussed heavily in AIR Worldwide's report is the challenge to implementing a cohesive system shared among insurance carriers to determine the financial savings of mitigation features. It was sug-

gested that the regulatory requirements that were in place to determine fair insurance premiums would be cumbersome to change. Furthermore, the writers of AIR Worldwide's report detailed the difficulties of data management involved in this process; information-technology of the industry would need to be re-worked in order to determine the actuarial risk associated with each house and specific to its physical construction features. Fortunately, the developments that have been implemented in recent years regarding the IBHS FORTIFIED Home™ Standard may be possible solutions to these dilemmas. Because the standard has been accepted in many states in the Gulf Coast region including Mississippi, a framework for recognized benefits in wind mitigation is already in place. The data collection and management suggested as possible challenges may not need to be an issue if a universal standard is accepted and applicable insurance credits can be applied.

Funding Opportunities

While the need for wind and flood mitigation programs is immense and ever-growing, there are several avenues through which funding for hazard mitigation can be accessed. The first and largest source is through federal programs such as FEMA's Hazard Mitigation Grant Program (HMGP). HMGP funds are released after a Presidential disaster is declared and are aimed at projects which reduce long-term risk to communities. Funds are awarded through the state or local government and homeowners, businesses and non-profit organizations may apply through their local or state office. Also, HUD annually awards Community Development Block Grants (CDBG) that are flexible in nature and may be used for affordable housing needs or other community development projects. Seventy percent or more of CDBG funds must be directed to low to moderate-income persons and could be a potential source of funds for neighborhood-wide redevelopment, home elevation or infrastructure projects.

Local funding for mitigation planning and projects remains one of the greatest challenges for improving local capabilities. Local plans indicate that most local governments use federal funds for mitigation and have met match requirements through in-kind services or their general operating fund. A dedicated tax revenue source for mitigation is difficult

to implement as tax increases are unpopular with the public. A tax designated to targeted, tangible benefits, such as funding an emergency manager position and/ or an advance warning system, may be more acceptable to the public. ^{liii}

The second funding source explored in this report is funds secured by the State government. States such as Alabama and South Carolina have taken it upon themselves to raise fees or allocate funds from different sources and they are set aside for mitigation programs. South Carolina implemented taxes on wind insurance premiums to fund 50% of home fortification improvements with the remaining 50% paid for by the homeowner. The State of Alabama has done an exemplary job of developing an annual stream of funds by marginally raising licensing fees for insurance agents and companies and has since leveraged these funds and found matching funds to run their Strengthen Alabama Homes program. Alternatively, a state could use these initial funds to set up a tax-lien-structured local financing program (discussed in the next section) through which homeowners can pay over several years for home hardening services.

The third funding source looked at is private money through foundations or non-profit organizations which is generally used to create a case study or to explore a new innovative idea through pilot programs. The My

Strong Home program discussed shortly is an example of this, originally developed through private funding and now being piloted as a viable business model.

Tax Lien Structured Financing Programs:

Municipalities occasionally use a system called non-ad valorem assessments to make elective infrastructure improvements such as sidewalks or lighting in neighborhoods. Instead of the municipality paying for the improvements, and because the improvements are in essence adding to the property value of the adjacent homes, the associated cost of the improvements is assessed to the homeowners through their annual property tax. Similarly, some states have fashioned programs for energy efficiency and fortification improvements to be paid for in the same manner. The state of Florida's Property Assessed Clean Energy (PACE) Program was expanded in 2010 from an energy efficiency program to also include wind mitigation improvements. PACE allows wind mitigation improvements to be made on homes and paid through bonds while the construction cost is assessed through the home's non-ad valorem property taxes over several years. Ideally, the additional property taxes can be paid through savings in the homeowner's wind insurance premiums. This program costs the homeowner little or no money upfront, creating opportunity for low-income families.

One critical aspect to understand about the PACE program is that a lien is placed on the property and not carried as debt by the homeowner, causing the assessment to be transferred along with the property in the case of a sale. Because PACE works through

a senior tax lien, lenders including Fannie Mae and Freddie Mac were concerned about purchasing loans with PACE attached to them, in case of default. In 2010, the Federal Housing Finance Agency (FHFA) issued notifications to their lenders reminding them that properties carrying senior loans would need to pay off their lien before refinancing or selling their property. This sent quite a shock through the finance sector seeing as two-thirds of the national mortgaging institutions are controlled by the FHFA. Many tax-lien type programs were halted because of this mandate. That same year, two bills were introduced in Congress that would allow for property to utilize PACE without repayment before sale or refinancing, but neither bill passed. Legislation has been underway since then in many different states and municipalities to contest these regulations.^{liv}

In 2015, Alabama created a program similar to PACE and named it the Property Insurance and Energy Reduction Act (PIER) which includes provisions for energy efficiency, high wind and flood mitigation. The PIER program establishes FORTIFIED as the standard for wind retrofits since insurance carriers are already familiar with the program and have established insurance credits. Improvements for flood mitigation are defined as "the raising of a structure above the base flood elevation to eliminate flood damage; installation of a flood diversion apparatus; electrical, mechanical, plumbing, or other systems improvements that reduce flood damage; and improvements to mitigate or eliminate the potential for microbial growth, or reduce flood insurance premiums; any other improvement that reduces repetitive loss that is recognized by the National Flood Insurance Program, Commu-

nity Rating System, or the Federal Emergency Management Agency (FEMA).”^{1v} The PIER program has no results available to date and is still considered to be in its pilot stage, as it is initially only available to commercial properties.

Delegates from the State of Mississippi have expressed interest in introducing a tax-lien-structured local financing program similar to PACE that would include provisions for wind mitigation improvements. A bill was in development in 2014 but was never introduced into legislation; instead, delegates chose to pursue the establishment of a state-wide building code which was considered a higher priority. A state-wide building code was passed in Mississippi in 2014.

My Strong Home:

The Rockefeller Foundation and Prudential Financial funded a pilot program called My Strong Home, which takes a unique approach to offering home hardening services. My Strong Home, a premium financing company, has partnered with insurance carrier SageSure, to offer home mitigation improvements with little to no upfront cost to the homeowner, depending on the financing option chosen. Homeowners will be able to receive Bronze or Silver FORTIFIED Home™ upgrades depending on which option they choose, and the improvements are completed by local contractors. After construction has been completed, the homeowner pays an adjusted premium plus a portion of the construction cost over a period of five to seven years until the roof improvements are paid off. At the end of the period, the homeowner will then realize a reduced insurance premium. During the pilot program, homeowners have been insured by

a number of different carriers and are reporting premium savings ranging from 0-40%. My Strong Home expects to fully deploy their product in 2016 partnering with SageSure Insurance and while the premium discounts are unknown at this time, actuarial models are showing a loss reduction of 50% so the expectation is for the discount to be quite favorable. Initially, their model will only be available in the states that were piloted (Louisiana, Alabama and South Carolina) but My Strong Home sees Mississippi as a viable market and expects to expand there as soon as their insurance partner is licensed to do work in Mississippi.

The homeowner’s savings in their insurance premiums is approximately the cost of the fortification improvements so homeowners make payments similar to their original insurance premium. Through this type of funding mechanism, My Strong Home is able to repay itself for the investment and it becomes self-sustaining, allowing revenue from one year to be applied to replicate additional home improvements the following year. It did rely on start-up funds for the pilot program which, if expanded, could be fulfilled by investors, HMGP funds or private foundations.

This program model is also a viable option for low income households as there is little to no upfront payment. In fact, smaller, simple-construction homes have been targeted for the pilot program because they are less expensive to retrofit (as opposed to homes with skylights and complicated rooflines) and their risk reduction is the same as that of a larger home, making them more cost-effective to complete and a more attractive investment. Because My Strong Home is a mission-driven corporation, they would like to eventually find

supplemental grant funding to address deferred maintenance issues while doing roof retrofits on homes with low-income occupants.

An important thing to note is that when using a model similar to My Strong Home, insurance carriers are unable to sign a multi-year repayment agreement with a homeowner; they are required to issue premiums yearly. In this case, a premium financing company or a non-profit organization would need to act as a third arm to the agreement.

Recommendations

The following four recommendations for future mitigation programs are made based on the needs described above and lessons learned from the programs studied:

1. Use FORTIFIED Home™ as a uniform wind mitigation standard.

Implementation Targets:

State and non-profit mitigation program creators and managers as well as housing developers, financiers and homebuilders.

Explanation:

Clearly, the Institute for Business and Home Safety has become the established leader in standards for practical mitigation for wind and wind-driven rain. Using the FORTIFIED Home™ standard uniformly will both save money in administering programs because it eliminates the need for individual structural evaluation and will save money for homeowners with insurance premium reductions. As shown above, programs that have been able to adapt to use the FORTIFIED Home™ standards have been most successful. In addition to reducing administrative cost, some of the recent innovative programs illustrate that using the FORTIFIED Home™ program more generally will result in predictable insurance savings which can be counted upon to offset mitigation costs. Such guaranteed return should eventually result in a financially self-sustaining wind mitigation market for both retrofit and new construction. As contractors and devel-

opers become acquainted with FORTIFIED Home™ they will market the insurance advantages. At that time wind related improvements will have enough certainty of payback that mitigation will no longer need grant assistance. Once wind mitigation is part of the market, assistance programs will become targeted primarily at low-income households that are not able to finance such improvements. What is more, in the same way that ENERGY Star has resulted in higher performance along with affordability in energy efficient appliances and HVAC systems, a RESILIENCE Star program using the FORTIFIED Home™ standard has the promise of creating more competition in resilient building products such as hurricane rated windows and doors, which should make such products more available and affordable.

2. Change the use of Federal flood mitigation funds from disaster recovery to disaster preparation.

Implementation Targets:

Federal agencies such as HUD and DHS as well as state agencies and local cities that seek and use CDBG funding.

Explanation:

HUD's National Disaster Resilience Competition (NDRC) offers an important model for the use of CDBG Disaster Recovery funds to not only address disaster needs but to do flood mitigation with activities such as relocation and elevation. HUD's change of emphasis from disaster recovery to resilience that led to the creation of the NDRC is a promising indication that federal leaders are aware of the need for communities to have assistance with flood mitigation efforts. However, NDRC is a one-time program that was made possible because of one billion dollars of CDBG Disaster Recovery funds available from the budget allocation following Super Storm Sandy. Therefore, even though NDRC is a sign that HUD is focused on resilience, there is no ongoing HUD program for further flood mitigation. An eventual outcome of NFIP Reform as suggested by the 2012 Biggert-Waters Act is to create a business environment favorable

for insurance companies to get into the flood insurance business. Even though there is no guarantee, a possible benefit of a private flood insurance market is a sort of IBHS FORTIFIED Home™ program for flood risk. However, until such an industry change, communities will continue to rely upon federal grant funding for flood mitigation. This is obviously a problem because flood mitigation needs far exceed possible federal mitigation funds. Therefore, the declared formula of "one dollar of mitigation equals four dollars of recovery" needs to guide the planning and use of flood mitigation funds, and communities should be innovative with available CDBG funds to address flood mitigation needs. Hopefully, as federal funds are used successfully for pre-disaster mitigation, private supporters, following the lead of the Rockefeller Foundation will participate in flood mitigation funding.

3. Focus both flood and wind mitigation programs on assisting low-income households.

Implementation Targets:

Federal agencies such as HUD, state agencies and local cities that seek and use CDBG funding and especially philanthropic organizations that are looking for ways to further an equity mission statement.

Explanation:

Low-income households are especially vulnerable to disasters because they do not have the resources to recover. Hazard mitigation should be seen as a community equity issue, recognizing that in order to keep a diverse community with access to affordable housing, the high cost of living in a hurricane-prone area needs to be subsidized. Advances in cooperation with the insurance industry around wind risk is already pointing to the feasibility of a market-driven wind mitigation environment. What is more, innovative financing strategies such as PACE are beginning to show ways to work within the tax and insurance system to make wind mitigation affordable to a homeowner who has financial stability and adequate property value. Therefore, it is important to use the scarce government and philan-

thropic funds to assist low-income households that do not have financial stability and very often live in a house with low property value. Focusing on low-income households is going to be especially important with the predicted large increase of flood insurance cost for houses that do not meet FEMA requirements. Without flood mitigation assistance to help low-income property owners who live in flood zones to either relocate or elevate, these households will not be able to pay for flood insurance, will not be able to sell their house, and their house will become a liability instead of an asset. Focusing hazard mitigation programs on low-income households will help offset the already growing disparity between the housing burden of low-income and middle-income households.

4. Create perpetual mitigation funding programs.

Implementation Targets:

Federal agencies such as HUD and DHS, state agencies and local cities that seek and use CDBG funding and insurance industry leaders such as IBHS.

Explanation:

Much of the cost of the mitigation programs evaluated in this research was in getting the program started. Each new program requires activities such as designing, promoting and operationalizing the program. Some of the people interviewed who have been working within one of the programs acknowledged the high cost of getting the program off the ground and lessons learned from things that were more costly than expected. Therefore, it is unfortunate with the amount of effort and cost it takes to get a hazard mitigation program started, that most programs only last until the initial funding runs out, which in the cases studied is typically less than five years. Funding plans for mitigation should be aimed at creating perpetual programs that will run efficiently because they do not have startup costs. As shown in the lessons learned section of this report, funding programs are more likely to be sustained with multiple and protected funding streams. Such programs require some type of revenue stream, learning from some of the emerging innovative funding strategies explained above. Alabama and South Carolina have done exemplary jobs of set-

ting up state funds dedicated to running wind mitigation programs, raising money annually either through increased taxes on insurance or licensing fees within their States.

While programs such as these have been paving the way in hazard mitigation and demonstrating the cost effectiveness of wind mitigation versus recovery, it can be surmised that these types of state-assisted programs will have a changing role in the next several years. Because insurance reductions are becoming more understood following wind mitigation retrofits and are proving to be favorable in comparison to the cost of the work, a private market is quickly developing that will offer retrofits for little or no upfront cost to the homeowner. As the private market begins to fulfill the need for affordable wind mitigation retrofits, federal, state and local governments should shift their focus to serve the remaining unmet need. Government funded programs can be left to largely focus their efforts on flood mitigation efforts for low-income households and larger infrastructure improvements needed to fortify their communities against increasing risk.

In all cases, the key to a perpetual mitigation program is to define future value in the improved house and bank on that future value to be able to finance the cost of mitigation. The recommendation to use FORTIFIED Home™ standards to be able to count on insurance savings is an important ingredient in designing a perpetual mitigation program. Creating perpetual funding for flood mitigation is more challenging than wind mitigation because the cost of elevating or relocating a home is much higher than the cost to achieve a FORTIFIED Home™ wind standard. How-

ever, if the subsidies are removed as expected with NFIP reform, in particular for a home that is being sold, there might come a time when the difference in the value of a house that meets FEMA requirements compared to one that does not is large enough to justify a mitigation loan program that is paid off at the time of sale. There is certainly both need and opportunity for innovative leaders to imagine perpetual funding mechanisms and to do the necessary legislative and policy work to make such programs possible.

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Conclusions

The mitigation programs evaluated illustrate that both flood and wind risks and responses to risk have changed significantly during the past decade. Repeated losses throughout the Southeast and increased insurance costs are leading to changes in both risks. The changes in wind risk management are encouraging and are leading to innovation. The changes in flood risk management however are not as encouraging and are leading to increased community concerns.

The encouraging changes in wind risk management are the development of standardized mitigation programs to make houses stronger to high winds and more resistant to rain. These programs are resulting in significant reductions in insurance costs for homeowners. During the past decade several programs paved the way for the development of the Insurance Institute of Building and Home Safety's (IBHS) FORTIFIED Home™ program. This program has become the practical standard for the Southeast US and is on track to be the basis of a national standard. The predictability of FORTIFIED Home™ risk reduction outcome is resulting in insurance reductions that can be counted upon with enough certainty for mitigation programs to bank on the future cost reduction in order to finance retrofit improvements. Emerging wind mitigation programs are using the guarantee of insurance premium reduction to work out innovative methods to

fund fortified improvements. In this way wind mitigation is approaching a situation in which the payback can support the cost of improvements. It is easy to see that eventually much of the wind mitigation needs will be taken care of without grant assistance, or with the type of consumer accessed assistance that has enabled energy improvements to become part of the day-to-day market.

Flood risk management is not on the same encouraging path. NFIP rates are predicted to increase for all property owners, more dramatically for some, with ongoing NFIP reform. The Biggert-Waters Flood Insurance Reform Act moves NFIP towards charging full-risk rates. The move to phase out NFIP subsidies is happening at the same time the extent of flood zones outlined by FEMA's Flood Insurance Risk Maps have increased, putting the many houses in flood zones that do not meet FEMA requirements in a precarious situation. The actual number of households that are in such a vulnerable situation is not fully understood for any Gulf Coast city. Additional research is needed to ascertain the number of houses now in flood zones, determine the percentage that don't meet FEMA requirements, and survey these households to be able to better understand their economic and social vulnerability. Such research would help local, state and federal governments quantify flood mitigation needs in order to create assistance

programs to help people elevate their house or relocate out of flood zones.

In conclusion, continued focus and innovation are needed to advance wind mitigation efforts, with the target of market-driven wind mitigation for home owners with sufficient property value and perpetual funding assistance programs for home owners with low property value. Flood mitigation efforts require larger scale planning, starting with a more complete understanding of the number and situation of households that live in houses that do not meet current FEMA requirements. In general the mitigation options are limited to relocation and elevation, both of which are going to cost more than the resulting flood insurance savings. However, if households do not have help to get out of the situation of not meeting FEMA requirements, the cost of flood insurance for them and certainly for the person they hope to sell their house to will increase to become unaffordable and the property will eventually lose its resale value. Innovation with flood mitigation is needed at

the state and federal level to more effectively use HUD and FEMA funds more for prevention than for disaster recovery. At the local level innovation is needed with land-use planning to create more housing opportunities in existing communities out of flood zones and to create ways to value property with removed houses in flood zones so that relocation within communities becomes a primary outcome of floodplain land-use policy and planning. Encouraging examples of ideas at the scale of land-use planning are being seen in HUD's recent funding programs such as the National Disaster Resilience Competition. The best hope is for some of these emerging plans and ideas to be realized in order to demonstrate how flood mitigation programs can serve the needs of individual homeowners within the framework of larger community mitigation plans.

Interview Participants

Interviewee	Position	Organization	Date
Darius Grimes	CEO/President	Disaster-Smart Consulting, Inc.	10/7/2015
Angelyn Treutel Zeringue	President	South Group Insurance Services	10/8/2015
Tracie Sempier	Coastal Storms Outreach Coordinator	Mississippi-Alabama Sea Grant Consortium	10/9/2015
Wendy McDonald	Executive Director	Habitat for Humanity Bay-Waveland Area	10/12/2015
Chris Monforton	Chief Executive Officer	Habitat for Humanity of the MS Gulf Coast	10/12/2015
Alex Cary	Manager, FORTIFIED Coastal Programs	Insurance Institute for Business and Homes Safety	10/14/2015
Scott DeLano	Representative – District 117	Mississippi House of Representatives	10/14/2015
Camille Schafer	Program Director	Gulf Coast Renaissance Corporation	10/19/2015
Lars Powell	Director	Alabama Center for Insurance Information and Research	10/20/2015
Margot Brandenburg	Chief Executive Officer	My Strong Home	10/23/2015

CS 1 Rebuild Northwest Florida

Purpose: Established originally to aid recovery after Hurricane Ivan. Began as a grassroots program to strengthen communities.

Dates: Established in 2004. Ongoing.

Funding Mechanism: HMGP FEMA funds provides 75% of improvement costs with the homeowner contributing 25%. Rental properties can qualify with 50% owner funding.

Program Manager: Rebuild Northwest Florida, a 501(c)(3) organization.

Eligibility:

- No home value limitations.
- Homes must be built pre-2002.
- Located in Escambia or Santa Rose County
- Home must be owner-occupied with homeowner exemption filed
- Cannot be a mobile/ manufactured home, apartment, duplex, or town home.

Retrofits:

- Roof deck attachment
- Reinforcing roof-to-wall connections
- Gable end bracing
- Opening protection
- Exterior doors (including garage doors)

Results to Date: Has completed more than 10,000 home mitigation projects with over \$89 million.

For Further Information: <http://www.rebuildnwf.org/>



CS 2 South Carolina Safe Home

Purpose: To help individual homeowners perform mitigation upgrades to their properties. The program helps to increase community resilience through home retrofits and homeowner education.

Dates: Established in 2007 by the Omnibus Coastal Property Insurance Act. Ongoing.

Funding Mechanism: Grant funds, raised via premium taxes on wind insurance, total around \$2.2 million per year. The maximum amount of grant funds disbursed by the state will be half of the actual total cost of the completed improvement project, up to a maximum of \$5,000. Low-income homeowners may be eligible for non-matching grant funds if they meet certain requirements.

Program Manager: South Carolina Department of Insurance (DOI)

Eligibility:

- The owner-occupied, single-family residence must be site-built, manufactured, or modular. Manufactured (mobile) homes are only eligible to receive tie-downs.
- The residence must have a current valid property tax assessment record and is adequately insured. The assessed value of the building alone cannot exceed \$300,000.

Retrofits:

- Bracing gable ends
- Exterior doors
- Opening protection
- Reinforcement of roof-to-wall connections
- Roof covering
- Roof deck attachment
- Secondary water barrier
- Problems associated with weakened trusses, studs, and other structural components
- Repair or replacement of manufactured home piers, anchors, and tie-down straps

Results to Date: Awarded more than \$17 million in grants to 3,700 owner-occupiers across all 11 coastal counties. Homeowner education is another significant part of the program.

For Further Information: <http://www.doi.sc.gov/605/SC-Safe-Home>



CS 3 My Safe Florida Home

Purpose: To create a culture of mitigation in Florida and to help Floridians learn how to harden their homes to better protect themselves and their families from windstorm damage.

Dates: Established in 2007 by Florida Legislature. Ended in 2009.

Funding Mechanism: Legislative appropriations. Due to budget constraints, funding for the matching grants was discontinued in 2009.

Program Manager: Florida Department of Financial Services

Eligibility:

- Inspections: Available statewide to single-family, site-built, owner-occupied residential properties.
- Grants: matching grants of up to \$5,000 available to homeowners who meet the following qualifications:
 - Be a home for which the building permit application for initial construction was made before March 1, 2002 (i.e., built under the old building codes);
 - Have undergone a hurricane mitigation inspection after May 1, 2007;
 - Be a homestead property (i.e., the homeowner's personal residence, not a rental property);
 - Be a dwelling with an insured value of \$300,000 or less;
 - And be located in a designated wind-borne debris region.

Retrofits:

- Specific wind-resistance home improvements as recommended in an inspection report including:
 - Opening protections (e.g., hurricane shutters);
 - Exterior doors, including garage doors;
 - And gable-end wall bracing.
 - Did not include any roof retrofits.

Results to Date: As of March 1, 2009, the program had processed 443,339 inspection applications and completed 399,164 free home inspections in 67 counties at a cost of \$60 million. In addition, 40,385 grants were awarded totaling \$148 million for hurricane mitigation.



CS 4 Coastal Retrofit Mississippi

Purpose: To help homeowners strengthen their homes against wind damage. Improve homes to withstand hurricane force winds of 130 mph or higher, in compliance with currently adopted International Building Code standards.

Dates: Funding awarded May 2011. Will continue until funds run out.

Funding Mechanism: \$27 million grant funded project through FEMA Hazard Mitigation Grant Program (HMGP). Funds to pay up to 90% of the cost of the standard retrofit package(s) with homeowner contribution.

Program Manager: Mississippi Emergency Management Agency (MEMA) and Applied Research Associates. Retrofits completed by local contractors.

Eligibility:

- Residing in Hancock, Harrison or Jackson Counties in MS
- Owner-occupied single family structures.
- Owners have a current homestead exemption.
- Homes meet or exceed FEMA's required Benefit Cost Analysis (BCA) ratio.
- Site built and mounted on a secure foundation.
- The first phase of this project focused on the zone with the highest wind risk which will include homes south of the CSX Transportation (railroad) tracks.

Retrofits:

- Package A – Roof Retrofits
- Package B – Opening Retrofits
- Package C – Roof & Opening Retrofits
- Optional Package – IBHS FORTIFIED Bronze - Out-lookers, vents, Etc.

Results to Date: MEMA has not released results.

For Further Information: <http://www.msema.org/be-prepared/coastal-retrofit/>



CS 5 Strengthen Alabama Homes

Purpose: To aid Alabama homeowners improve their homes with updated building modifications that minimizes property loss due to hurricane or other catastrophic windstorm events.

Dates: Established in 2011 by the Strengthen Alabama Homes Act

Funding Mechanism: Established the Strengthen Alabama Homes Fund within the State Treasury subject to annual legislative appropriations, receipt of federal grants or funds, or receipt of other sources of grants or funds. In April 2015, House Bill 92 allotted a portion of increased fees that the Department of Insurance already collects on insurance agents and insurance companies that operate in the state of Alabama. Currently working on matching funds from Federal Home Loan Bank and the Alabama Wind Pool.

Program Manager: Alabama Department of Insurance

Eligibility: TBD/Dependent upon funding

Retrofits: TBD

Results to Date: Application period beginning early 2016.

For Further Information: <http://www.aldoi.gov/SAH/Documents/SB389-eng.pdf>

CS 6

My Strong Home

Purpose: To combine insurance, specialty finance, and mitigation construction to manage climate risk.

Dates: Established in 2014. Currently in pilot phase.

Funding Mechanism: Startup and pilot program paid for by grant funding through Rockefeller Foundation and Prudential Financial. Long-term goal of becoming a self-sustaining benefit corporation with a social mission.

Program Manager: My Strong Home as premium financing company and SageSure insurance managers. Construction work completed by local contractors.

Eligibility:

- Pilot program primarily serves smaller, simple construction homes but long-term program will have very few limitations for house construction.
- Single or two-family dwelling.
- Home must be owner-occupied. Working on model for rental homes.
- Cannot be a mobile/ manufactured home.

Retrofits:

- Roof deck attachment
- Reinforcing roof-to-wall connections
- Gable end bracing
- New roof material with sealed roof (spray foam under the roof deck for homes with existing new roofs)
- Opening protection and new garage doors are optional upgrade.

Results to Date: Have completed 30 home pilot program in SC, LA and AL at a total cost of improvements at \$240,000. They are looking toward a full launch in those states in 2016.

For Further Information: <http://www.mystronghome.net/>

CS 7 Renaissance Ready Loan Fund

Purpose: To provide a lending program for low to moderate income homeowners in the six coastal counties of Mississippi to have energy efficiency, fortification and ADA compliance retrofits. Loan program was envisioned as a continuation of the state-funded Coastal Retrofit Program. Renaissance Corporation works with each client to provide case management and helps shop for insurance coverage after fortification improvements are made.

Dates: Established as the Green Loan Fund in 2012 and rebranded in 2015 as the Ready Loan Fund to include home hardening services.

Funding Mechanism: Homeowner loans with payback period and interest rate based on debt-to-income ratio and ability to pay.

Program Manager: Renaissance Corporation and Gulf Coast Community Design Studio. Construction labor completed by local contractor or non-profit.

Eligibility:

- Applicants must be at or below 120% of the Area Median Income
- Home must be owner-occupied and primary residence
- Home must meet minimum eligibility requirements and must be considered safe to work in.

Retrofits:

- New roof covering
- Re-nail deck attachment
- Seal roof deck
- Upgrading roof vents and flashing as needed
- Energy efficiency and ADA-compliance improvements offered as well

Results to Date: Only a handful of retrofits have been completed and have consisted mainly of energy efficiency upgrades. Renaissance believes more outreach and education is needed for low-income population to learn about the program and understand the long-term benefits of home hardening.

For Further Information: <http://msgcrc.com/borrow/readyloanfund/>



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