

Chapter 3. Evaluating Existing Homes explains how to assess homes to determine their vulnerabilities and what type of mitigation measures would be most appropriate and feasible.

Chapter 4. Technical Design and Construction Methods provides details and specific measures for each of the three Mitigation Package categories: Basic, Intermediate, and Advanced.

Chapter 5. Implementing Mitigation Projects describes how to move a project forward, important issues and challenges that should be considered, and details about potential sources of assistance.

Appendix A. FORTIFIED for Existing Homes™ (FEH) summarizes the Institute for Business and Home Safety (IBHS) program. This program is also a “package-based” wind retrofit program for existing residential buildings that seeks to improve the performance of buildings during high-wind events.

Appendix B. Evaluation Guidance provides guidance on conducting an evaluation of a home that is being considered for a wind retrofit project; this appendix supplements the information in Chapter 3.

Appendix C. Using the Hurricane Wind Module for Determining Cost Effectiveness of Retrofit Projects contains information that can be used with the FEMA BCA Tool (Version 4.5.5) to model the post-mitigation effectiveness of the projects detailed in Chapter 4. A BCA must be performed as part of a FEMA mitigation grant application.

Appendix D. Resources, References, and Links provides details on where additional resources can be located, including information about FEMA funding programs and building science publications. It also includes a list of documents, publications, and other sources used to help develop this Guide.

Appendix E. Acronyms and Abbreviations

CHAPTER 1

Introduction

Every year, homes along the coast are subject to high winds that cause extensive damage and threaten the safety and security of coastal residents. Much of this wind-related damage can be reduced or prevented by improving the performance of the buildings through retrofits that strengthen the building's envelope (the shell of the house, including the doors, roof covering, windows, and walls), the adequacy of the home's load path (the connections of each part of the structure, from roof to foundation), and their ability to transfer loads without failing.

The purpose of this Guide is to provide guidance on how to improve the wind resistance of existing residential buildings in Mississippi and across the Gulf Coast. Although this Guide was developed to support initiatives in the Gulf Coast region, the content of this document should serve as guidance on retrofitting existing buildings for improved performance during high-wind events in all coastal regions; it is applicable to one- and two-family dwellings, but not to manufactured housing. Although this guidance is primarily intended to be applied in the hurricane-prone region of the United States, it may also be applied to other regions. The Federal Emergency Management Agency (FEMA) has published many other guidance documents on coastal construction as well. In areas where this Guide does not address particular material types, building layouts, and other customizable factors of homes, the *Coastal Construction Manual* (FEMA 55, fourth edition to be published in 2011) should be used as a reference, as discussed in later chapters of this Guide.

There are multiple intended audiences for this Guide. Homeowners should be involved in the process of the wind retrofit project; they must understand the benefits and costs of each potential decision. Using this Guide, homeowners should work with their contractor, an evaluator, and a design professional (if necessary) to determine which package of wind retrofit activities is most appropriate for their home.

This Guide summarizes the technical information needed for selecting and implementing cost-effective wind retrofit projects for residential buildings. Implementing the Mitigation Packages in this Guide on existing vulnerable homes within the hurricane-prone regions of the United States will result in their improved performance in high-wind events.

This Guide presents mitigation measures in **packages**. A package is a required set of retrofit measures that must be implemented for a home to provide a consistent level of protection. This Guide identifies three successive protection packages: Basic, Intermediate, and Advanced.

EVALUATOR

When implementing a wind retrofit project, homeowners or the local government will need to work with an evaluator, who will evaluate the existing condition of the home. The evaluation will help determine how a home can be retrofitted for the Mitigation Packages outlined in this Guide.

Evaluators must possess sufficient knowledge of the design and construction of residential buildings to perform these evaluations, but they need not be a registered engineer or architect. However, the evaluator should have knowledge of and familiarity with the wind retrofit Mitigation Packages and their intent as described in this Guide.

State and local governments and entities who have mitigation programs in hurricane-prone regions will also benefit from this Guide by using the information to pursue, develop, and deliver technical assistance to the public on successful wind retrofit mitigation projects for residential buildings.

1.1 Need for Technical Guidance

Hurricane Katrina damaged or destroyed 234,230 single-family homes (including manufactured homes) in Mississippi alone (FEMA, 2006a). Louisiana and Mississippi did not have strong residential building codes in their hurricane-prone regions prior to Hurricane Katrina. The impact of Hurricane Katrina has illustrated the importance of adopting and enforcing an effective building code. However, thousands of existing homes remain vulnerable to the effects of coastal high-wind events and are not designed to the same level of wind resistance required by today's codes and standards.

In response to Hurricane Katrina, the Mississippi Emergency Management Agency's (MEMA's) Mitigation Section, in coordination with the Mississippi Department of Finance and Administration (DFA), has applied for a Hazard Mitigation Grant Program (HMGP) grant under presidentially declared disaster number DR-1604 (Hurricane Katrina in Mississippi) to fund wind retrofit projects for homeowners in Mississippi. This program will fund up to 75 percent of eligible costs of retrofits such as adding roof deck attachments, roof-to-wall connections, and opening protection.

Local and national FEMA staff have concluded that additional technical guidance is needed to facilitate the development of retrofit projects for residential buildings including: engineering-based prescriptive construction solutions, implementation guidance, and wind-damage function data to support user-identified damage curves for performing the related benefit-cost analysis (BCA).

1.2 Wind Retrofit Project Type

The purpose of a residential wind retrofit project is to reduce the vulnerability of and damage to homes from wind and wind-driven rain intrusion during a high-wind event such as a hurricane. According to recent FEMA Mitigation Assessment Team (MAT) findings, there are three areas of the home that are typically vulnerable to failure due to high winds:

- Roof and wall coverings
- Openings (e.g., windows, doors)
- Load path connections

Although nothing can guarantee total and absolute property and life protection from high winds, many types of wind retrofit projects can be effective and cost-beneficial in reducing damage from high-wind events.

The retrofits in this Guide are intended to be applied throughout the hurricane-prone region, though they may be applied to any home to reduce the risk to wind-related damage. While the solutions described in this Guide were designed primarily for wood-frame residences, and though construction techniques can vary considerably throughout the United States and territories, the intent of the retrofits in this Guide may be applied to all homes.

Despite the significant damage experienced by all types of buildings during high-wind events, grant applications for wind retrofit projects have focused more on non-residential or commercial buildings and less on residential buildings. FEMA has developed this Guide to encourage wind mitigation of existing residential buildings.

Through its Hazard Mitigation Assistance (HMA) grant programs, FEMA administers two grant programs that fund wind retrofit projects: the HMGP and the Pre-Disaster Mitigation (PDM) grant program. Hazard mitigation is defined as any sustained action taken to reduce or eliminate long-term risk to people and property from natural hazards and their effects. The HMA process cycles through five stages starting with mitigation planning and ending with successful execution of a project (Figure 1-1). Chapter 5 provides more information on the HMA process and the roles and responsibilities of different stakeholders at each stage of the process.



FIGURE 1-1:
HMA grant process

1.3 Using This Guide

This Guide consists of five chapters and four appendices. Following is a brief description of each of these components. It is recommended that users review this Guide in its entirety before pursuing the development of a wind retrofit mitigation project.

Chapter 1. Introduction provides an overview of the Guide, summarizing its purpose and contents.

Chapter 2. Identifying the Risks and Desired Level of Protection describes wind hazards, how to identify wind risks for a particular site or area, and how the wind hazard is addressed through building codes and best practices.