







Mitigation Saves: Private-Sector Hurricane Wind Retrofit Saves \$6 for Each \$1 Invested

EVERY AMERICAN FACES NATURAL HAZARDS, AND THE RISK IS GROWING

U.S. disaster losses from wind, floods, earthquakes, and fires now average \$100 billion per year, and in 2017 exceeded \$300 billion—25% of the \$1.3 trillion building value put in place that year. Fortunately, there are affordable and highly cost-effective strategies that policymakers, building owners, and the building industry can deploy to reduce these impacts. These strategies include adopting and strengthening building codes, upgrading existing buildings, and improving utilities and transportation systems. The benefits and costs associated with these mitigation measures have been identified through the most exhaustive benefit-cost analysis of natural hazard mitigation to date and documented in Natural Hazard Mitigation Saves. The study was funded by three federal agencies and four private-sector sponsors and produced by the National Institute of Building Sciences – the nation’s Congressionally chartered convener of experts from the building professions, industry, labor, consumer interests, and government. For the report and accompanying fact sheets, see www.nibs.org/mitigationsaves. This fact sheet summarizes the study findings and significant savings associated with various mitigation measures.

- Adopting the latest building code requirements is affordable and saves **\$11 per \$1 invested**. Building codes have greatly improved society’s disaster resilience, while adding only about 1% to construction costs relative to 1990 standards. The greatest benefits accrue to communities using the most recent code editions.
- **Above-code design could save \$4 per \$1 cost**. Building codes set minimum requirements to protect life safety. Stricter requirements can cost-effectively boost life safety and speed functional recovery.
- **Private-sector building retrofits could save \$4 per \$1 cost**. The country could efficiently invest over \$500 billion to upgrade residences with 15 measures considered here, saving more than \$2 trillion.
- **Lifeline retrofit saves \$4 per \$1 cost**. Society relies on telecommunications, roads, power, water, and other lifelines. Case studies show that upgrading lifelines to better resist disasters helps our economy and society.
- **Federal grants save \$6 per \$1 cost**. Public-sector investment in mitigation since 1995 by FEMA, EDA, and HUD cost the country \$27 billion but will ultimately save \$160 billion, meaning \$6 saved per \$1 invested.

		ADOPT CODE	ABOVE CODE	BUILDING RETROFIT	LIFELINE RETROFIT	FEDERAL GRANTS	
 National Institute of BUILDING SCIENCES™		Overall Benefit-Cost Ratio	11:1	4:1	4:1	4:1	6:1
		Cost (\$ billion)	\$1_{/year}	\$4_{/year}	\$520	\$0.6	\$27
		Benefit (\$ billion)	\$13_{/year}	\$16_{/year}	\$2200	\$2.5	\$160
 Riverine Flood		6:1	5:1	6:1	8:1	7:1	
 Hurricane Surge		not applicable	7:1	not applicable	not applicable	not applicable	
 Wind		10:1	5:1	6:1	7:1	5:1	
 Earthquake		12:1	4:1	13:1	3:1	3:1	
 Wildland-Urban Interface Fire		not applicable	4:1	2:1	not applicable	3:1	

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TABLE 1. Nationwide average benefit-cost ratio by hazard and mitigation measure. BCRs can vary geographically and can be much higher in some places. Find more details in the report.

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PRIVATE-SECTOR RETROFITS FOR HURRICANE COULD SAVE SOCIETY OVER \$140 BILLION

The International Residential Code and International Building Code provide minimum life-safety requirements for new buildings. The U.S. Department of Housing and Urban Development develops structural design and installation requirements for manufactured housing. Both the I-Codes and HUD requirements have developed over time, but there is room for improvement for 130,000 manufactured homes along the Gulf and Atlantic coasts that are not anchored to the ground, and 3 million single-family dwellings there have relatively weak roofs, windows, doors, and connections.

To make those single-family dwellings more hurricane resistant, one can use the Insurance Institute for Business and Home Safety's (IBHS) FORTIFIED Home Hurricane standards. Applying the IBHS standards where they would be most cost effective would cost \$24 billion, but save society \$141 billion in the long run -- a benefit-cost ratio of 6:1. Adding an engineered tie-down system (ETS) to the unanchored manufactured homes would cost \$200 million and save \$800 million, or \$4 saved per \$1 spent. Together, the two measures would save society approximately \$142 billion at a cost of \$24 billion, a 6:1 benefit-cost ratio. Figure 1 shows the sources of these benefits, totaling the two hurricane retrofit options considered here, and rounding slightly to reduce the appearance of excessive accuracy. The benefit-cost ratios are greatest for homes near the coast. Figure 2 shows that BCRs can exceed 8:1 for either retrofit measure.

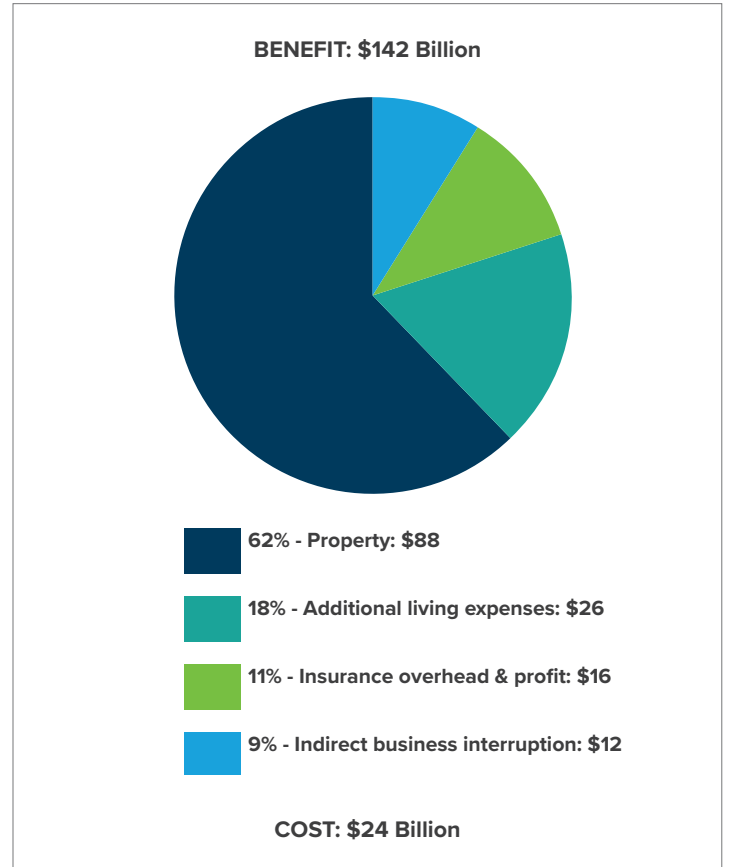


FIGURE 1. Total costs and benefits of private-sector retrofit options considered here.

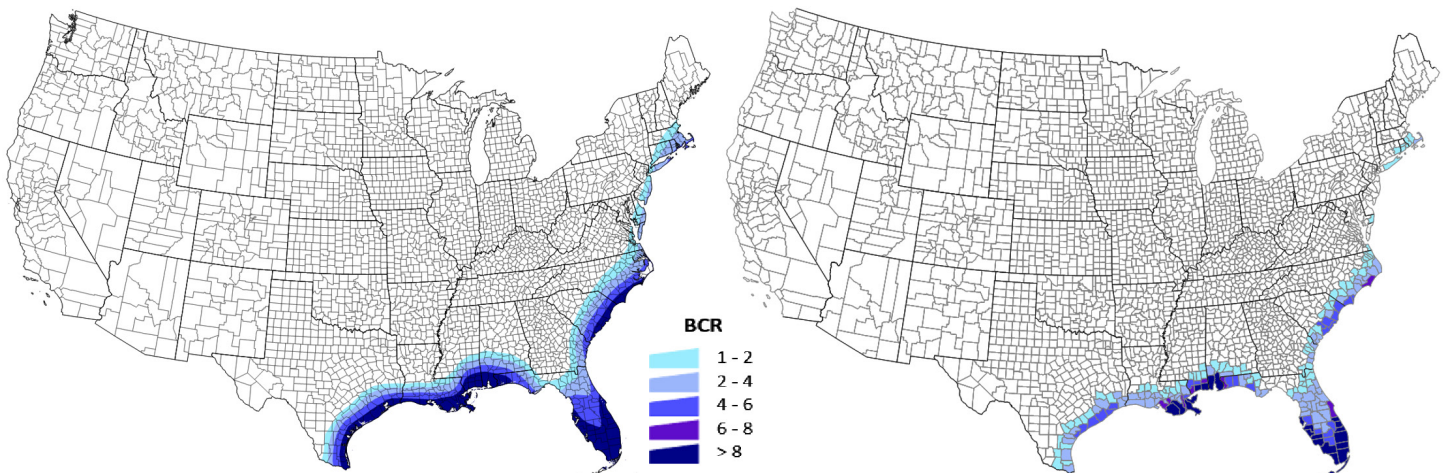


FIGURE 2. Benefit-cost ratios of hurricane retrofit measures: (left) IBHS FORTIFIED Home Hurricane retrofit; (right) adding an engineered tie-down system to an unanchored manufactured home.