






# Mitigation Saves: For Wind Mitigation, Federal Grants Provide \$5 Benefit 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](http://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.

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

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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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### RESULTS OF FEDERAL GRANTS FOR FIRE MITIGATION

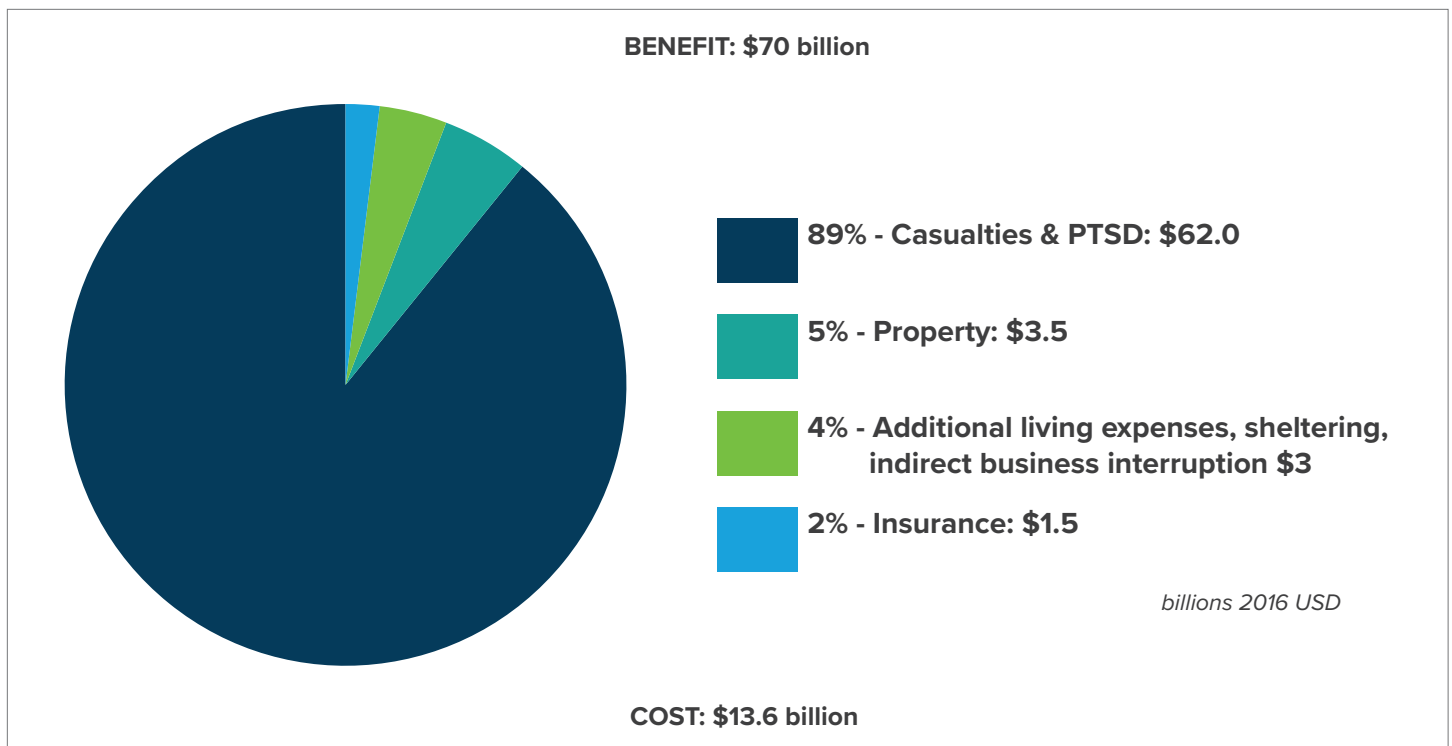
Federal grants to mitigate wind damage are highly cost-effective. In 23 years, public entities have spent \$13.6 billion to mitigate future wind losses; these efforts will ultimately save the United States an estimated \$70 billion in avoided property losses, additional living expenses, business impacts, and deaths, injuries, and post-traumatic stress disorder (PTSD). Their total benefit-cost ratio (BCR) is approximately 5:1.

For wind resistance the mitigation measures examined include the addition of shutters, safe rooms, and other common measures. Table 1 provides BCRs for each natural hazard the project team examined. Figure 1 shows the benefits specifically attributable to federal flood mitigation grants. The national-level BCRs aggregate study findings across natural hazards and across state and local BCRs.

The estimated BCR depends largely on the level of hazard,

alternative use of the facility, and accessibility. In-home safe rooms generally appear to be cost-effective, exhibiting an average BCR of 4.25. Large facilities with dual purposes, such as school gymnasias and cafeterias, exhibit an average BCR of 8.0. In these cases, the cost of mitigation is simply the additional cost of hardening the facility.

Accessibility and use also strongly affect cost-effectiveness. For example, a shelter located at a hospital will likely protect life at any time of day throughout the year. Shutters appear to be highly cost-effective, particularly those that protect valuable equipment at utilities or industrial facilities. Shutters for ordinary public buildings without high-value contents produce a lower but still impressive BCR (about 3.5).



**FIGURE 1.** Contribution to benefit from federally funded wind grants.