






Mitigation Saves: For Earthquake Mitigation, Federal Grants Provide \$3 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. 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
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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RESULTS OF FEDERAL GRANTS FOR EARTHQUAKE MITIGATION

Considering mitigation costs totaling \$2.2 billion, the average benefit-cost ratio (BCR) of approximately \$3 to \$1 implies that federally funded earthquake hazard mitigation between 1993 and 2016 saves society \$5.7 billion.

For earthquake resistance the mitigation measures examined include strengthening various structural and nonstructural components. Table 1 provides BCRs for each natural hazard the project team examined. Figure 1 shows the benefits specifically attributable to federal earthquake mitigation grants. The national-level BCRs aggregate study findings across natural hazards and across state and local BCRs.

As with the 2005 study, property benefits alone do not equal mitigation cost, but the sum of property and casualties do. By adding other societal benefits—business interruption losses and especially loss of service to society—earthquake mitigation more than pays for itself. That observation reinforces the notion that earthquake risk mitigation broadly benefits society. That is, strengthen one building and the benefits extend far beyond the property line: to the families of the people who work in the building and to the community that the building serves.

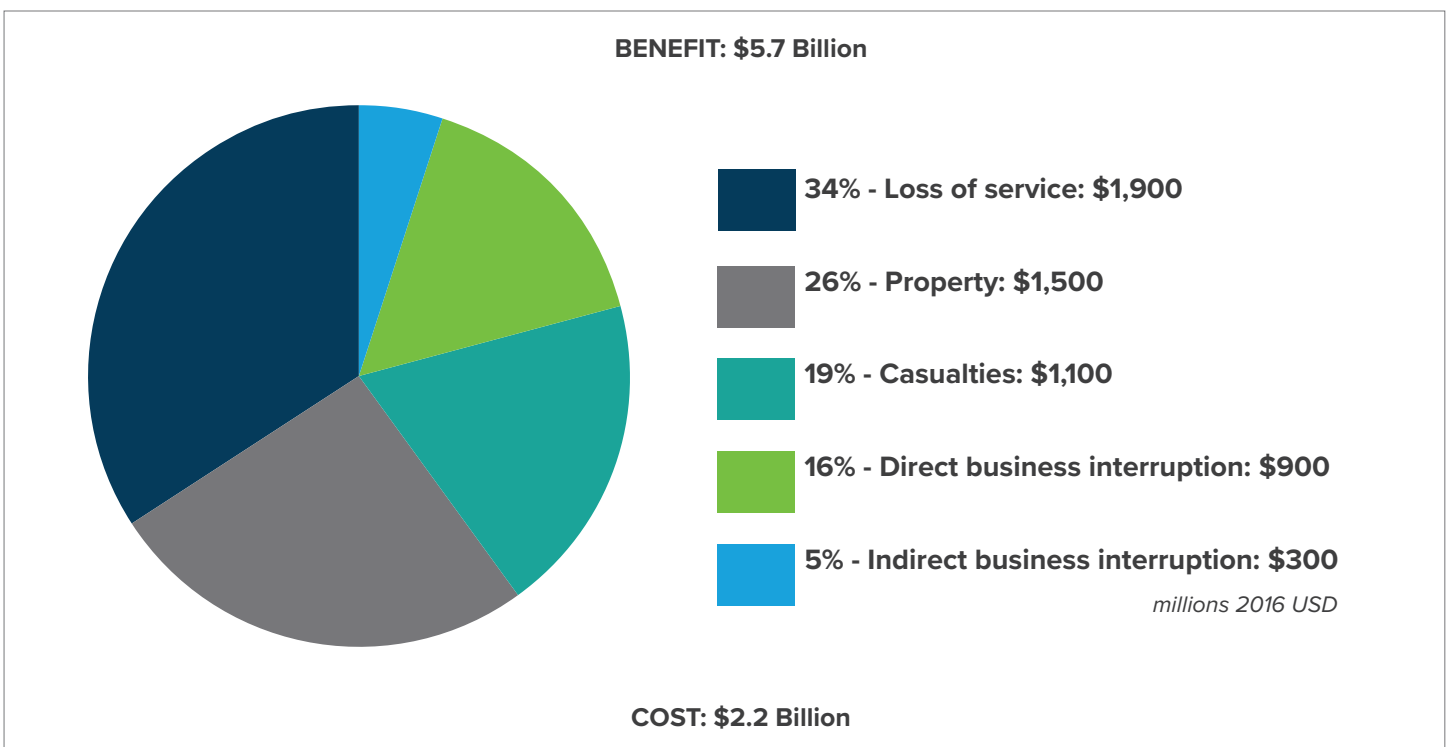


FIGURE 1. Contribution to benefit from federally funded earthquake mitigation grants.