



For Earthquake Mitigation, Federal Grants Provide \$3 Benefit for Each \$1 Invested

Introduction

Natural hazards present significant risks to many communities across the United States. Fortunately, there are measures governments, building owners, developers, tenants and others can take to reduce the impacts of such events. These measures—commonly called mitigation—can result in significant savings in terms of safety, prevent property loss and disruption of day-to-day life.

The National Institute of Building Sciences Multihazard Mitigation Council (MMC) undertook a study in 2017 to update and expand upon the findings of its *2005 Mitigation Saves* study on the value of mitigation. In the *2017 Interim Report* (now incorporated into the *2018 Interim Report*), the project team analyzed two areas of mitigation programs:

- **Federal grants:** The impacts of 23 years of federal grants made by the Federal Emergency Management Agency (FEMA), Economic Development Administration (EDA) and the Department of Housing and Urban Development (HUD), resulting in a national benefit of \$6 for every \$1 invested.
- **Beyond code requirements:** Designing new structures to exceed select provisions of the *2015 International Building Code* (IBC) and *International Residential Code* (IRC) and the adoption of the *2015 International Wildland-Urban Interface Code* (IWUIC). This resulted in a national benefit of \$4 for every \$1 invested.

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.

National Benefit-Cost Ratio Per Peril <small>*BCR numbers in this study have been rounded</small>		Federally Funded	Beyond Code Requirements
Overall Hazard Benefit-Cost Ratio		6:1	4:1
 Riverine Flood		7:1	5:1
 Hurricane Surge		Too few grants	7:1
 Wind		5:1	5:1
 Earthquake		3:1	4:1
 Wildland-Urban Interface Fire		3:1	4:1

Table 1. Benefit-Cost Ratio by Hazard and Mitigation Measure.

Benefit: \$5.7 billion

- 34% – Loss of service: \$1,900
 - 26% – Property: \$1,500
 - 19% – Casualties: \$1,100
 - 16% – Direct business interruption: \$900
 - 5% – Indirect business interruption: \$300
- millions 2016 USD

Cost: \$2.2 billion

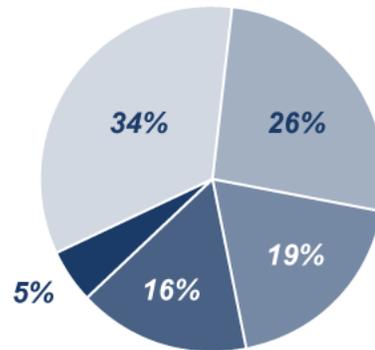


Figure 1. Contribution to benefit from federally funded earthquake mitigation grants.