National Institute of BUILDING SCIENCES™
Innovative Solutions for the Built Environment

Mitigation Saves: Everybody Saves: Multiple Stakeholders Benefit from Adopting or Exceeding I-Code Requirements

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

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.

MULTIPLE STAKEHOLDERS BENEFIT FROM ADOPTING OR EXCEEDING I-CODE REQUIREMENTS

Designing new buildings to exceed select 2015 IBC and IRC requirements (where it is cost effective to do so) for flood, hurricane wind and earthquake; designing new buildings in parts of the WUI to meet the 2015 IWUIC to better resist fire; and meeting the 2018 I-Code requirements for flood, hurricane wind and earthquake affect various stakeholder groups differently. The project team considered how each of five stakeholder groups bears the costs and enjoys the benefits of mitigation for the natural hazards under consideration. Stakeholders include:

- Developers: Corporations that invest in and build new buildings, and usually sell the new buildings once they are completed, owning them only for months or a few years.
- Title holders: People or corporations, who own existing buildings, generally buying them from developers or from prior owners.
- Lenders: People or corporations that lend a title holder the money to buy a building. Loans are typically secured by the property, meaning that if the title holder defaults on loan payments, the lender can take ownership.
- Tenants: People or corporations who occupy the building, whether they own it or not. This study uses the term "tenant" loosely, and includes visitors.
- Community: People, corporations, local government, emergency service providers, and everyone else associated with the building or who does business with the tenants.

When one subtracts the costs each group bears from the benefits it enjoys, the difference—called the net benefit—is positive in each category. Figures 2 and 3 reflect long-term averages to broad groups, so it only speaks to the group as a whole, on average, rather than to the experience of each individual member of the group.

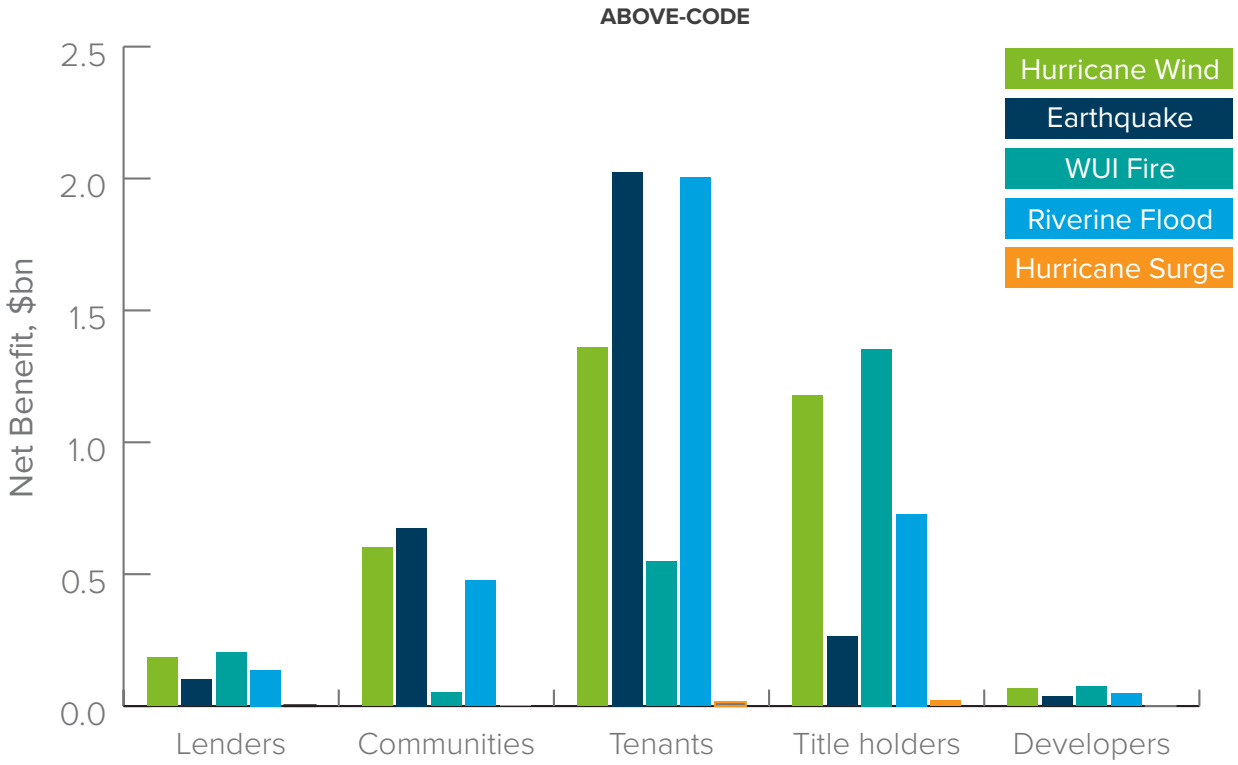

FIGURE 2. Stakeholder net benefits resulting from one year of constructing all new buildings to exceed select 2015 IBC and IRC requirements or to comply with 2015 IWUIC.

Mitigation Saves:
Multiple Stakeholders Benefit from Adopting or Exceeding I-Code Requirements

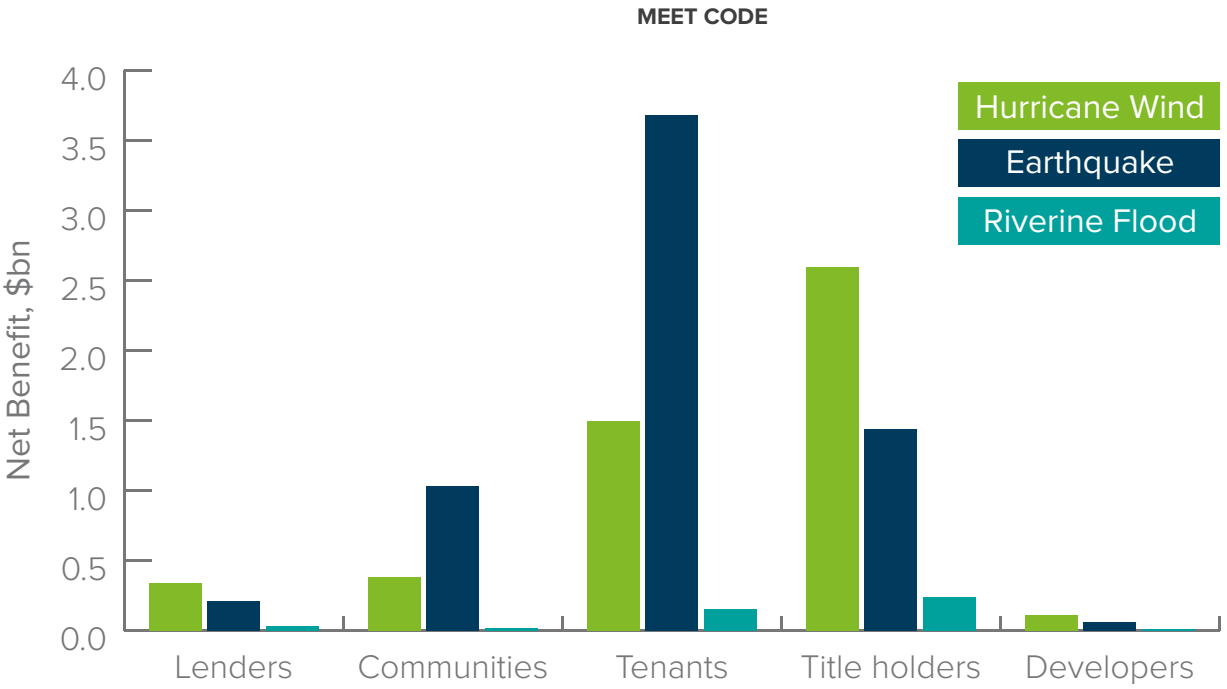

FIGURE 3. Stakeholder net benefits per year of new construction resulting from meeting the 2018 IRC and IBC.