MAKING THE BUSINESS CASE

We all have seen the kind of destruction to physical property and infrastructure that can result from natural hazards. Some of us may have even experienced the devastation firsthand. In the U.S., we are especially vulnerable because our expansive geography encompasses a diversity of terrain and creates exposure to various natural hazards including wildfires, tornadoes, hurricanes, earthquakes, and flooding. Many places are experiencing more frequent and more powerful events with significant financial losses.

To a certain degree, there are limits to what we can do to avoid the hazards given the unpredictability and often random nature of these events, but there are ways to minimize potential damages and losses. One is to implement building codes that strengthen the ability of buildings to withstand the natural hazards that are likely to affect the places where we live. There are myriad ways to develop building codes that reflect local natural hazard risk profiles. Building codes address resilience within the building itself so it can to withstand increased impacts from climate change. Insurance, credit rating downgrades, and property devaluation are all reactive, focusing on emergency response and recovery. Upgrading building codes focuses on opportunities to prepare for those impacts — including both acute shocks and long-term stressors. What follows is a primer on what building codes are, why making them more resilient is important, and information that builds the business case for upgrading local codes to protect against losses.

A Children's Tale

Many of us remember the children's story of the three little pigs. One built their house out of straw, and it was immediately wiped out by the wolf. It was built fast, easily, and cheaply. One built their house out of sticks, and while it withstood the wolf at the door for a while, it eventually was destroyed. The little pig who built his house to a higher standard and used more resilient building materials — bricks — withstood the wolf at the door. That house took more time and effort to build, but it kept him safe in the long run. Imagine if all three little pigs had built to the higher standard. What is the moral of the story?

Children's stories aside, many communities face real devastating natural hazards, and adopting building codes that require building and rebuilding to higher standards that reflect the risks present in those particular communities is worth exploring.

What are building codes?

Let's begin with the basics. Building codes are standards used to establish minimal life safety requirements for the construction of new buildings and major rebuilds. Our country's building codes reflect our diversity of geography and local governance. While most states have statewide codes, some do not have any and leave decisions on building codes to local jurisdictions, and some have a mix of statewide and local building codes. Most codes are based on international or national building code standards. Many standards could be upgraded to address the more severe natural hazards that many communities face, and it is for this reason that it is important to understand how building codes can be amended to create a more resilient building stock overtime. The savings of life and physical losses due to extreme weather events could be significant if codes are made more resilient. The key is to understand the costs and benefits of those decisions.

As professionals involved in decision-making related to building code adoption, it is important to understand where your state falls in the spectrum, and what the process is for adoption or amendment of these codes. It is estimated that 65 percent of cities, counties, and towns across the U.S. have not adopted the International Code Council's (ICC) 2018 or 2021 building codes, which are considered modern building standards.[1] This leaves buildings and residents vulnerable not only to climate risks, but standard, everyday risks associated with poor construction quality and oversight. Adopting or upgrading codes can add administrative burden to the local governing entity, but before staking a position on whether or not to improve codes, it is critical to understand the economic impacts of the decisions around building codes in both the short- and long term.

Why are resilient building codes important?

Designing to a more resilient standard means that the physical damage and/or interruption of services to a particular building will be less severe in the midst of extreme events. Focusing on resilience requires that the design incorporates more than just emergency life and safety measures. The asset should be designed to be able to better withstand the impact of potential severe weather events and remain operational during the event as well as continuous occupancy during or directly after an event. The main function of a home is to ensure a healthy and safe place to live. A truly resilient home is one that provides for that environment during and directly after a major event.

What are the differences between building codes and zoning?

Building codes focus on the performance of the building itself, often with little reference to the immediate or surrounding land uses. Zoning ordinances reference the underlying parcel of land and allowable uses, as well as the physical and operational aspects of the building — including total footprint and height, access and accessibility considerations, as well as density and type of occupancy. While building codes are controlled at the state level, land use and zoning practices are typically controlled at the local level.

Dollars and cents: understanding the cost implications

Year over year, the losses related to natural hazards are increasing. Since 1980, the average number of billion-dollar losses related to natural hazards was six per year. That number rose dramatically between 2016 and 2018, with the average of billion-dollar loss events jumping to 15.[2]

Quantifying the return on investment of implementing resiliency measures in construction can be challenging. Fortunately, there are increasingly more studies presenting the cost benefits of these decisions. Many are showing that there is a positive return on investment for every hazard and building type — including both new and existing building stock. One, by the National Institute of Building Sciences, found that just adopting the 2018 International Residential Code (IRC) and 2018 International Building Code (IBC) yielded savings including:

- "For flood resistance, incorporating at least one foot of freeboard into the elevation requirements to comply with the 2018 I-Codes saved $6 for every $1 invested.
- For resistance to hurricane winds, complying with roofing and a variety of openings and connection detailing requirements in the 2018 I-Codes saved $10 for every $1 invested.

1 FEMA, **Building Codes Save: A Nationwide Study**, 2020.

2 Ibid.

- For resistance to earthquakes, building new buildings stronger and stiffer relative to comply with the 2018 I-Codes saved $12 for every $1 invested."[3]

Compelling evidence shows that adopting more resilient codes at the local level can make a dent in the number of billion-dollar loss events. The FEMA study estimates that the reduction in property losses due to the use of modern building codes could total $132 billion from 2000 to 2040. Adopting better codes does not have to be expensive either. Among other findings, the study concluded that the incremental cost of constructing resilient buildings is less than two percent over standard construction. The savings to a community of not only avoiding property damage, but also of ensuring business and operational continuity together add up to a compelling reason that communities in harm's way should explore adopting more resilient codes.

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

Source: **National Institute of Building Sciences**

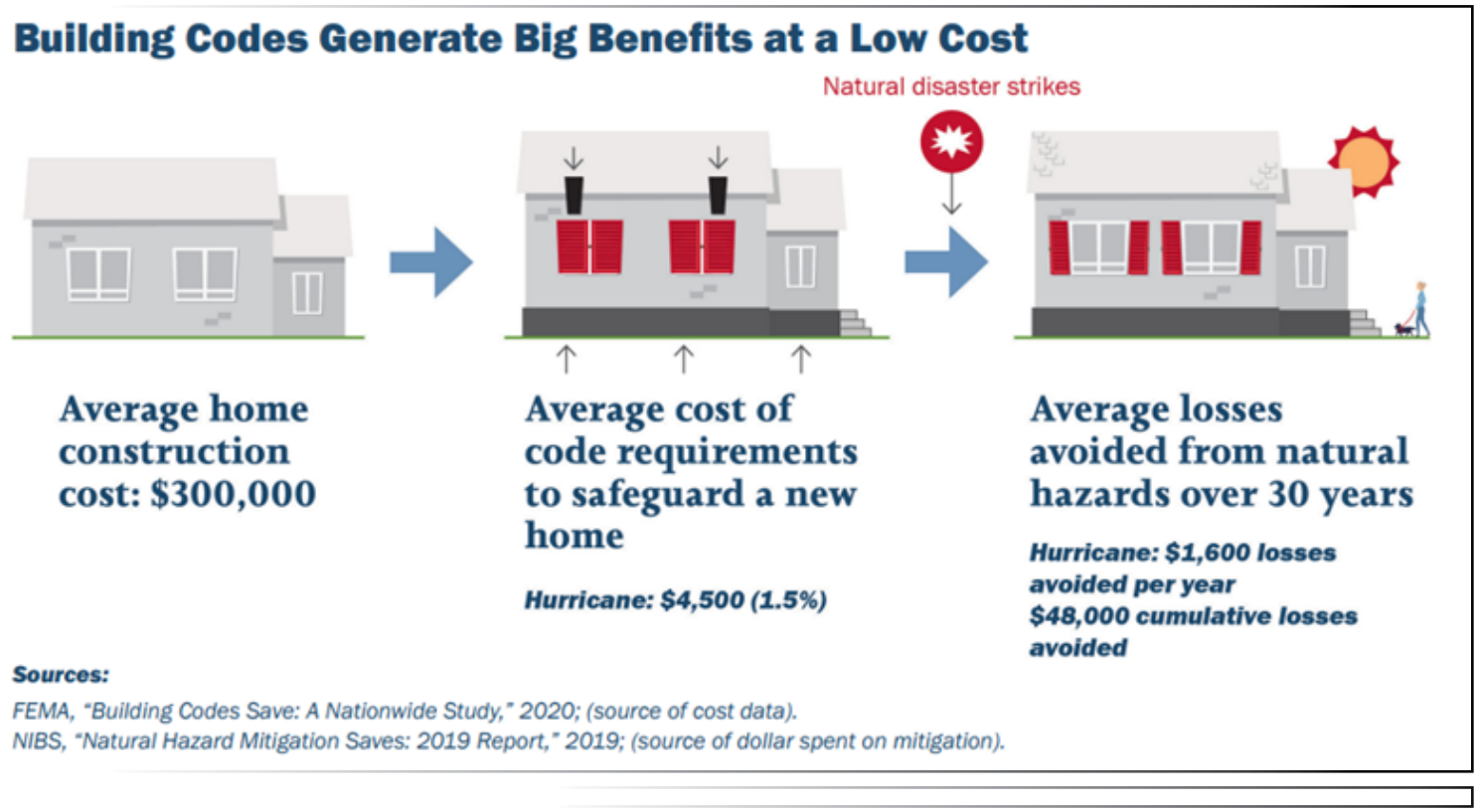
National findings of modeled I-Code savings

	NUMBER OF POST-2000 STRUCTURES	MONEY SAVED (ANNUAL AVERAGE)
Flood	786,000	$484 million
Hurricane wind	2.4 million	$60 million
Earthquake	9.2 million	$1.1 billion

Source: **Building Codes Save: A Nationwide Study of Loss Prevention**, FEMA

3 Ibid.

Non-resilient housing stock can create significant financial stresses for individuals as well as larger economic impacts at the municipal and regional levels. The fiscal health of a municipality is directly dependent on the health of its residents and businesses. Safe, reliable buildings are an essential determinant of the overall health of the community. The potential for mortgage defaults, loss of and/or an increase in the cost of insurance, credit rating downgrades, climate migration and decreasing disaster relief funding have all been implicated as potential ways in which climate change could fuel a devaluation in property values and economic health at local levels.



Next steps and continued learning

Evidence increasingly shows that more severe natural hazards are taking a toll on communities across the country. Mitigating for the damages caused by these hazards can save billions over time and avoid critical losses for communities including climate migration, potential credit rating downgrades, and declining local tax base at the community level. At the individual homeowner level, building to more resilient standards can help avoid mortgage defaults and loss of insurance coverage. In addition, we cannot assume that every major disaster in the future will receive disaster recovery funds from the federal government.

While not the only answer, upgrading to more resilient building codes is one tool local officials can use to protect assets in their community and help them bounce back faster to normal economic and civic activity after a natural disaster.

For a deeper dive on all these topics, including detail on the impacts of natural disasters on mortgage defaults and insurance, please refer to the Building the Business Case section of the **Resilient Building Codes Toolkit**.