National Building Code Assessment Report

Building Code Effectiveness Grading Schedule

2019 Edition

ISO
A Verisk Business

About ISO and the Building Code Effectiveness Grading Schedule (BCEGS®)

ISO is a leading source of data and analytics about property risk. ISO actively works with fire departments, building departments, and municipalities regarding our Building Code Effectiveness Grading Schedule (BCEGS®) and Public Protection Classification (PPC®) programs.

Through the BCEGS program, ISO assesses the building codes in effect in individual communities and how those communities enforce their building codes. The assessments place special emphasis on mitigation of losses from natural hazards and fire. With the participation and cooperation of thousands of towns and cities across the United States, we're working together toward our ultimate goal: safer communities.

ISO is a Verisk (Nasdaq:VRSK) business.

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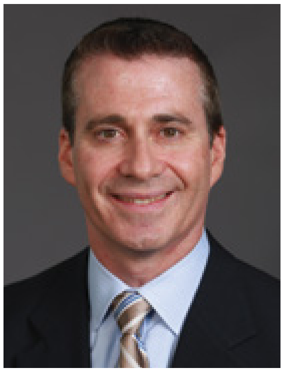


By Neil Spector, President, ISO Underwriting

The modern world faces many challenges, and one of the most important is the risk from natural disasters. We've all seen the devastating toll from hurricanes, flooding, wildfires, earthquakes, and other events, with billions of dollars in losses to businesses, communities, insurers, and property owners. Still, the most heartrending aspect has always been the terrible impact these natural disasters have on people, with thousands killed and millions more hurt and rendered homeless.

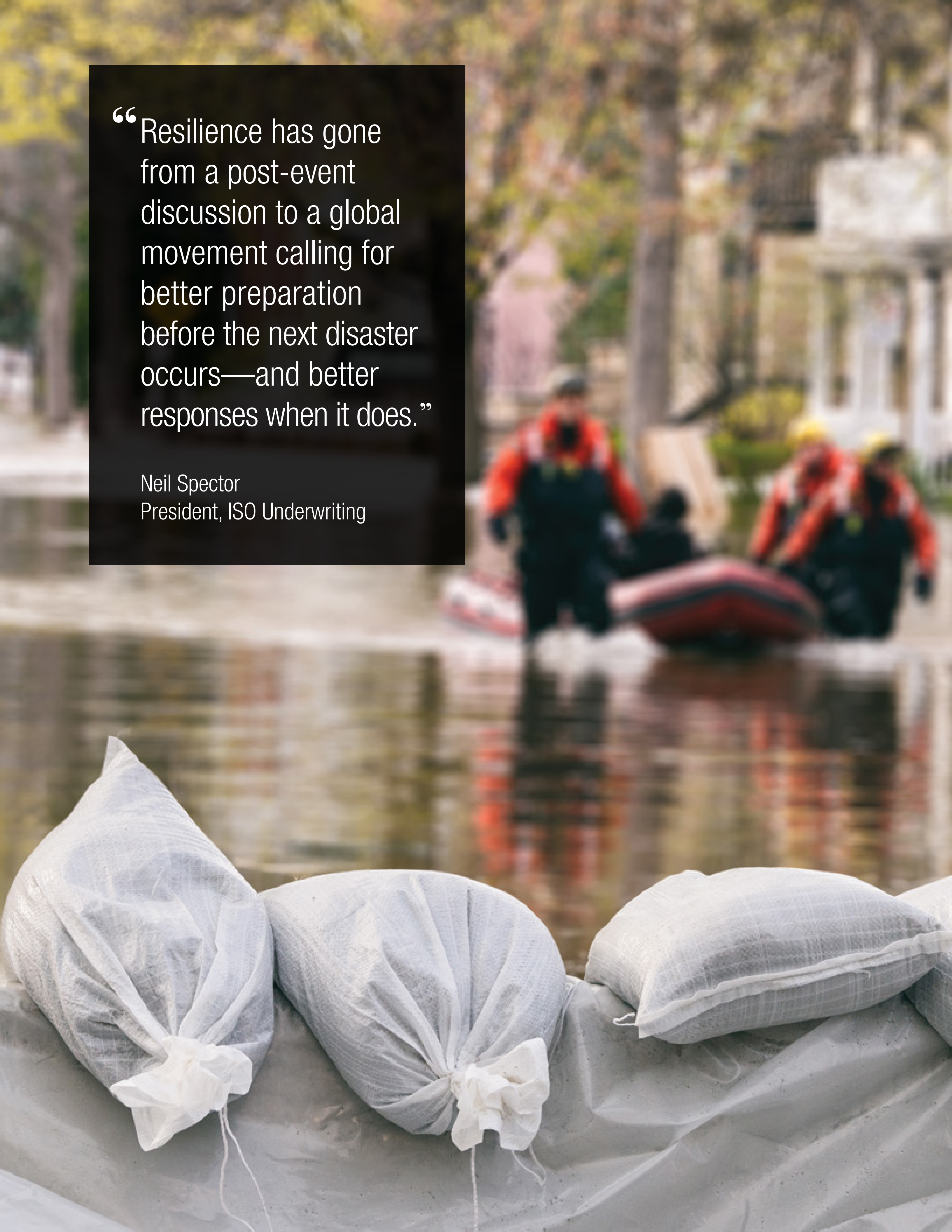
Predicting the effects of natural disasters is a task often exacerbated by human activity. People insist on living in disaster-prone areas. The nation's population has grown dramatically over the years along the windstorm-exposed Gulf and Atlantic Coasts, seismic-threatened Pacific Coast, Hurricane Alley, and wildland-urban interfaces. Emerging risks associated with fracking activity, alternative construction materials, and green building practices present a new set of concerns.

Resilience has gone from a post-event discussion to a global movement calling for better preparation before the next disaster occurs—and better responses when it does. These aren't easy challenges to overcome given the potential economic and political ramifications. But analysis of our Building Code Effectiveness Grading Schedule (BCEGS®) program and other industry data shows that effective building codes have a strong positive effect on disaster preparation and resilience.

Risk assessment and risk-transfer decision making are dependent on how well we can identify and proactively mitigate hazards. How do we support best practices to prepare residential and commercial structures for the next major catastrophe? How do we encourage communities to develop resilient regulations to maintain private infrastructure and safeguard community longevity? How do we help insurers build portfolios of risk opportunity while limiting the uncertainty around expected loss? The adoption and effective enforcement of modern building codes can pave the way.

The ISO industry data analysis is clear: Communities with well-enforced, up-to-date codes generally demonstrate better loss experience, both monetarily and in terms of human suffering. Reducing catastrophe-related damage and ultimately lowering insurance premiums provide strong incentives for communities to adopt and rigorously enforce effective building codes. Even so, code adoption and enforcement practices vary widely from community to community, even within the same state.

ISO's *National Building Code Assessment Report* provides a detailed analysis of the state of commercial and residential property building code adoption and enforcement for communities participating in ISO's BCEGS program. This is essential information for insurers, building officials, government entities, fire and emergency services departments, resilience organizations, municipalities, and others with a stake in reducing the devastating costs and human toll of natural disasters. ■



> “Resilience has gone from a post-event discussion to a global movement calling for better preparation before the next disaster occurs—and better responses when it does.”
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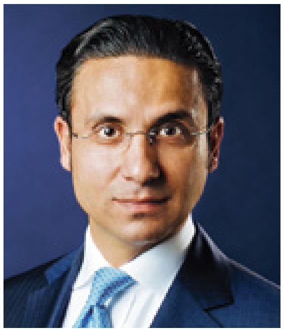
> Neil Spector
> President, ISO Underwriting

Resilience and Preparation: Learning the Lessons from a Month of Natural Disasters



By Maroun Mourad, President, ISO Commercial Lines

In late summer of 2017, Mother Earth made her supremacy known when a stream of natural disasters hit North America. Hurricanes Harvey, Irma, and Maria, wildfires in the western United States, a powerful earthquake off the coast of Mexico, and other hurricanes, quakes, and fires that followed made for a disastrous month for millions of people—and many losses for insurers to cover.

The long road to recovery after natural disasters and weather events poses challenges for the insurance industry and leads to an important question: How can insurers help provide speedy coverage responses to those in need, shorten recovery time, and help communities improve resilience?

Summary of a Disastrous Month

The results of the disasters mentioned above point to an alarming trend. While the frequency of natural catastrophes hasn't necessarily increased significantly, their duration, intensity, and severity have. Some key facts that support this conclusion:

- Hurricane Harvey broke numerous rainfall records, dropping more than 50 inches in some communities.
- During the wildfires in the western United States, according to the National Interagency Fire Center, almost 2 million acres—an area nearly the size of Rhode Island and Delaware combined—were aflame on just one day, September 14.
- Hurricane Irma maintained 185 mph winds for 37 hours, something no storm on record has done before. Irma was a Category 5 hurricane for 51 hours, the third-longest Cat 5 ever in the Atlantic (according to reports from the National Weather Service at the time and data from AIR Worldwide).
- In Mexico, two major earthquakes occurred within ten days of each other. The 8.1 quake in Chiapas was the highest-magnitude earthquake in Mexico in more than 100 years, according to AIR Worldwide data. Worse, from a damage and loss-of-life perspective, was the 7.1 quake in Puebla because of its proximity to Mexico City.

> “AIR Worldwide estimated that private property flood damage from Harvey totaled $65 billion to $75 billion, with more than $10 billion covered by the private insurance industry.”

The losses from these disasters ranged in the billions of dollars. AIR Worldwide estimated that private property flood damage from Harvey totaled $65 billion to $75 billion, with more than $10 billion covered by the private insurance industry. Some of that loss could ultimately be absorbed by the National Flood Insurance Program (NFIP), but that still leaves tens of billions of dollars of uninsured losses. AIR loss estimates for wind and storm surge add about $3 billion to Harvey's loss total, moving it into the PCS® top 20 historical catastrophes. When you add AIR's estimate of Irma's industry insured losses for the United States and the Caribbean, which range from $32 billion to $50 billion, the potential total is $128 billion in losses—and that doesn't include the earthquakes and wildfires.

So, what can be done to mitigate such losses?

Resilience, Resilience, Resilience

The discussion among experts is wide-ranging, but it boils down to one essential theme: resilience. Preparation is the key to mitigating losses from a natural disaster, and that calls for partnerships between insurers, communities, government entities, and property owners.

Insurers are on the front lines of the resilience movement. Losses directly affect insurers' bottom line; and the more done to promote preparation, effective building codes, smart construction, and positive community support, the better insurers can protect their customers and maintain profitability. Insurers do spend a lot of time and money to mitigate risk, but the public might not see those efforts.

Some experts who work extensively in disaster relief believe one answer to help mitigate losses significantly is simple: Move people out of flood (and other disaster-prone) zones. That's not always easy or even possible. Local and state governments often choose to encourage rebuilding rather than relocating, as we saw after Superstorm Sandy in New Jersey. Often, such decisions are made for political and short-term economic reasons, not for long-term disaster preparation goals.

Local politics can get in the way of sound disaster-mitigation goals. Choices are sometimes made because people like living in disaster-prone areas, which can be aesthetically pleasing and offer recreational opportunities. Local governments, perhaps bending to the "will of the people" and businesses, often support such desires with rebuilding programs.

Better Building Codes

Effective building codes and the construction of more resilient buildings have proven to provide better outcomes when rigorously enforced by communities. ISO's Building Code Effectiveness Grading Schedule (BCEGS®) is a national program that rates communities on a scale of 1 (exemplary commitment to code enforcement) to 10. Communities with better BCEGS scores have shown to fare better during a natural disaster or catastrophe, cutting down on insured losses while providing better protection to properties, residents, and businesses. If it's not expedient to move people out of disaster-prone areas, as discussed above, then the construction standards of the buildings in which they live and work should be improved to help better protect them from future events.

Both the insurance industry and government can encourage adopting and enforcing better building codes. Premium rates can be designed to appropriately reflect lower loss experience for buildings built with strong codes.

Building Code Education

Education is a great need for both governments and residents. Many state regulators would likely benefit from a better understanding of how governmental building policies can affect the response to catastrophe events and how enforcement of such policies can affect insurance pricing. Government officials can benefit from a better understanding of how rates are determined, including through risk analysis, the use of past claims experience, and analytics that inform the predictive nature of underwriting and rating. Officials could then work more efficiently with insurers. Officials should also know how insurers' risk mitigation efforts can work in advance of events to help lower premium costs and encourage better structure performance during an event to decrease losses.

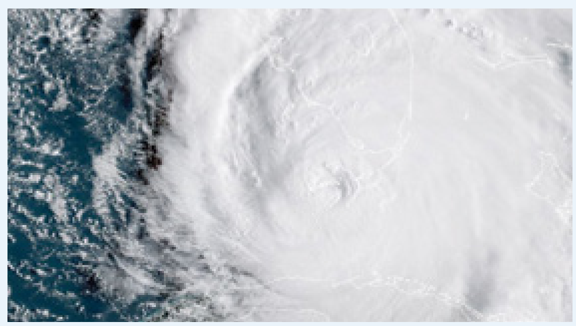
Residents and business owners face similar challenges when it comes to insurance coverage for disasters. AIR research shows that, for example, residents in California are ill-informed on earthquake coverage. Many believe standard homeowners policies provide adequate protection. Others believe that they don't need earthquake coverage because the government will adequately compensate them for damages in the event of an occurrence. Both beliefs are usually proven wrong and can put properties at serious risk. The same applies to people who live in flood zones. They need to understand the risks, know about the costs involved, and make educated decisions based on that knowledge.

Conclusion

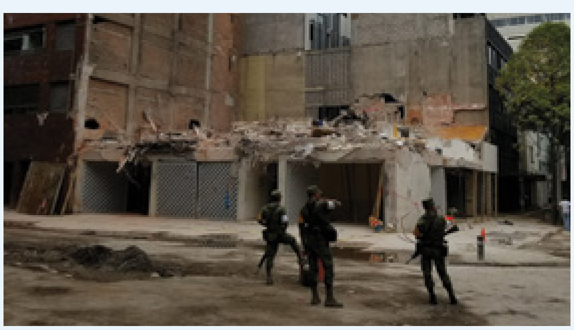
Mitigating the effects of natural disasters is an ongoing task for insurers, governments, and residents. With evidence pointing to increases in severity and the tendency for people to live in potential disaster areas, insurers must do all they can to push resilience efforts at the local, state, and federal levels. Insurers need to use data and analytics tools to rate and underwrite policies that not only protect customers but also help ensure profitability and solvency.

This report addresses the current state of building codes in the United States and is a good source for continuing the discussion toward better preparation for natural disaster mitigation. ■

AIR estimates that most of the $10 billion in insured flood losses from Hurricane Harvey will come from flooded autos.



Hurricane Irma's cloud field was 300,000 square miles, which would more than cover the state of Texas.



The 8.1-magnitude earthquake in Chiapas was the highest-magnitude earthquake in Mexico in more than 100 years.

By late summer of 2017, more than 8.5 million acres burned in the western United States, which is tracking to be the most acres ever burned.

"While the frequency of natural catastrophes hasn't necessarily increased significantly, their duration, intensity, and severity have."

Maroun Mourad
President, ISO Commercial Lines

The Importance of Effective, Well-Enforced Building Codes: History and Development

Adapted from materials from the International Code Council (ICC) and the Insurance Information Institute (I.I.I.)

In the last 30 years, the importance of constructing structures according to modern, enforced building codes has been shown to be an effective way to prepare structures better for natural or man-made catastrophes. Consider the evidence:

- In 1984, Hurricane Alicia hit Texas, causing $675 million in insured damage, of which nearly 70 percent was attributed to poor building code enforcement.
- Also in 1984, Hurricane Diana hit North Carolina, where codes were effectively enforced. Researchers found that only 3 percent of homes suffered major structural damage.
- A similar assessment of losses in South Carolina after Hurricane Hugo prompted a study of coastal municipal building code departments in southern states. Researchers found that building officials and inspectors in about half of the communities surveyed were not enforcing the building code wind-resistance standards on their books.
- In 1992 when Hurricane Andrew struck South Florida (which has one of the strongest building codes in the country), experts estimated that between 25 to 40 percent of Hurricane Andrew losses were avoidable. That's because, according to a Dade County, Florida, grand jury report, much of the damage was due to lax code enforcement.

The chart below from the Insurance Information Institute (I.I.I.) shows the top ten costliest catastrophes in the United States.

Top Ten Costliest Catastrophes, United States[1]

($ millions)

			Estimated insured property losses	
Rank	**Date**	**Peril**	**Dollars when occurred**	**In 2016 dollars[2]**
1	Aug. 2005	Hurricane Katrina	$41,100	$49,793
2	Sep. 2001	Fire, explosion: World Trade Center, Pentagon terrorist attacks	18,779	24,987
3	Aug. 1992	Hurricane Andrew	15,500	24,478
4	Oct. 2012	Hurricane Sandy	18,750	19,860
5	Jan. 1994	Northridge (California) earthquake	12,500	14,036
6	Sep. 2008	Hurricane Ike	12,500	14,036
7	Oct. 2005	Hurricane Wilma	10,300	12,479
8	Aug. 2004	Hurricane Charley	7,475	9,348
9	Sep. 2004	Hurricane Ivan	7,110	8,891
10	Apr. 2011	Flooding, hail, and wind, including the tornadoes that struck Tuscaloosa (Alabama) and other locations	7,300	7,875

1.Property losses only. Excludes flood damage covered by the federally administered National Flood Insurance Program.
2.Adjusted for inflation through 2016 by ISO using the GDP implicit price deflator.
*The chart does not include 2017 or 2018 catastrophe events, but that information is available from PCS.
Source: The Property Claim Services® (PCS®) unit of ISO, a Verisk Analytics business

> “Researchers found that building officials and inspectors in about half of the communities surveyed were not enforcing the building code wind-resistance standards on their books.”

Because of this data, the insurance industry acknowledged the need for a building code compliance rating system. ISO worked closely with the Insurance Institute for Property Loss Reduction (now the Insurance Institute for Business & Home Safety, or IBHS), International Conference of Building Officials (ICBO), Southern Building Code Congress International (SBCCI), Building Officials and Code Administrators International (BOCA), and more than 1,500 building code officials to create the Building Code Effectiveness Grading Schedule (BCEGS®) program.

Creating Building Codes

Of course, before rating building codes or their enforcement, the codes need to be created in the first place. People expect the buildings in which they live and work to be safe and resilient. The concept of building safety is widely accepted, but unfortunately, its value is often overlooked until a disaster strikes.

The International Code Council (ICC) and its 64,000 members are dedicated to making building safety an international priority. ICC is committed to helping the building industry by providing the compliance information needed to build resilient structures effectively. Current building codes reflect the latest understanding of hazard exposure and building performance and help prevent loss of life, property damage, and unnecessary post-disaster expenses.

Regularly updated building codes are essential to prepare communities for inevitable disasters and help them rebound faster following an event. The international codes (I-Codes) developed by ICC provide the foundation on which resilient structures and communities are built. ICC's consensus codes and standards help ensure the health, safety, and welfare of building occupants by mitigating risk from a variety of natural and man-made hazards.

Code Development

ICC facilitates an open, transparent, inclusive, and consensus-based code development process to explore, study, debate, and incorporate the latest in resilient construction. The process's success relies on the expertise of every sector of society, including government, private industry, academia, and the public.

From government agencies to building owners, designers, and manufacturers, all are welcome to apply to serve on one of the code development committees, submit code change proposals via cdpACCESS, and pass along public comments for consideration. The final vote on code changes rests with governmental voting representatives who have no vested financial interest in the outcome. An updated edition of the I-Codes is published every three years.

Code Adoption and Enforcement

Code adoption and enforcement are key components of building safety. The ICC Government Relations Department collaborates with ICC chapters, members, and federal and state governments to support the adoption and use of the I-Codes as the foundation for building and safety regulations, products, and services of the ICC and its family of companies.

The model codes serve as a critical launching point, and jurisdictions that adopt the latest I-Codes are more prepared to withstand natural and man-made disasters. After adoption, local jurisdictions can refine, develop, and employ additional systems and emerging sciences to build on and reinforce the foundation provided by the regulatory framework of the codes.

Although the specific needs of each community vary depending on region and resources, across the country, code officials remain the unsung heroes. Code officials play a leading role in making sure that all commercial, residential, public assembly, and other buildings within a governmental jurisdiction are constructed in accordance with the provisions of the governing building codes. It's the code officials' responsibility to protect the public health, safety, and welfare in relationship to the built environment through effective code enforcement.

> "The cornerstone of the code development process is openness and transparency. All interested parties are welcome to participate."
>
> Michael Pfeiffer, P.E.
> Senior Vice President
> of ICC Technical Services

Source: EPNAC.com

The Importance of Building Code Ratings

BCEGS is modeled after ISO's fire rating program, the Public Protection Classification (PPC®). The BCEGS grading system provides an assessment of the building codes in effect within various communities as well as the enforcement of the codes. It helps jurisdictions critically analyze the administration of building codes, plan reviews, and field inspections and identify areas for improvement. BCEGS considers such things as the size of the building code enforcement budget relative to the amount of building activity, the professional qualifications of building inspectors, and past code enforcement levels, with special emphasis on mitigating losses due to natural disasters. Communities are regraded for building code enforcement every four to five years.

The chart below from I.I.I. provides a snapshot of insured losses due to natural catastrophes over a ten-year period.

Estimated Insured Property Losses, U.S. Catasrophes, 2007—2016[1]

Year	Number of catastrophes	Number of claims (millions)	Dollars when occurred ($ billions)	In 2016 dollars[2] ($ billions)
2007	23	12	$6.7	$7.7
2008	36	4.1	27.0	30.4
2009	27	2.2	10.5	11.8
2010	33	2.4	14.3	15.8
2011	30	4.9	33.6	36.3
2012	26	4.0	35.0	37.0
2013	28	1.8	12.9	13.4
2014	31	2.1	15.5	15.8
2015	39	2.0	15.2	15.4
2016	42	3.0	21.7	21.7

1.Included catastrophes causing insured property losses of at least $25 million in 1997 dollars and affecting a significant number of policyholders and insurers. Excluded losses covered by the federally administered National Flood Insurance Program.
2.Adjusted for inflation through 2016 by ISO using the GDP implicit price deflator.
Source: The Property Claim Services® (PCS®) unit of ISO, a Verisk Analytics business

The ongoing and periodic reassessment of building codes is critical because natural disasters are unpredictable and vary across the country. Regions like the West Coast that are prone to wildfires and earthquakes experienced firsthand the positive impact of regularly updated building codes and consistent enforcement. In California, due to statewide enforcement of residential and commercial building codes, the state earned a BCEGS score of 82 out of 100. This shows how a community investment in modern building codes and stringent enforcement can help make the community and state more resilient.

In addition, communities and property owners benefit from stronger codes and code enforcement when it comes to property insurance. Insurers understand that such communities tend to demonstrate better loss experience during a catastrophe or disaster event, and they price policies accordingly, often with lower premiums. The prospect of reducing catastrophe-related damage and ultimately lowering insurance premiums provides another strong incentive for communities to enforce their building codes rigorously.

Increased Demand for Code Enforcement Personnel

As predictions grow for future natural disasters, so does the demand for well-trained and engaged building safety professionals. Over the next 15 years, the building industry will experience a loss of 80 percent of its existing skilled workforce, which presents a great opportunity for students, military veterans, and other job seekers looking for a rewarding career. ICC is committed to helping make the transition to the next generation and has made great strides in recruiting new talent.

ICC's Safety 2.0 initiative includes technical training programs for high school and college students, a career program for military families, and a membership council for emerging leaders. More than 12,000 individuals have already participated and benefited from these programs. A new generation of building safety professionals will help emphasize the immense value of code adoption at the state and local levels.

ISO supports and sponsors ICC's Safety 2.0 High School Training Program (see photo below).

ICC, other resilience organizations, communities, governments, the building and insurance industries, and ISO's BCEGS program can work together to help ensure a stronger built community—and hopefully reduce losses of both property and lives due to natural disasters and catastrophes. ■

Tim Mason, Technology Education teacher, and Michelle Knight, representing Prince William County Career and Technical Education, stand with students holding their ICC Technical Training Program Certificate of Commitment.

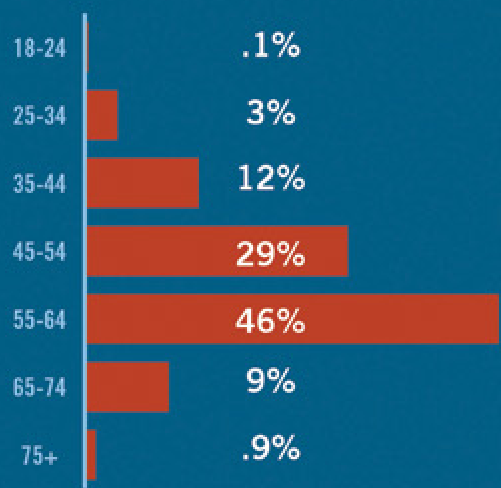
SAFETY 2.0 – Building Careers for Today's Generation

The International Code Council welcomes a new generation of members and leaders to the building safety profession.

CODE OFFICIALS: A SNAPSHOT

MEDIAN SALARY

AGES



COMMON TASKS

1. Plan reviewer
2. Building inspector
3. Department manager
4. Residential inspector
5. Mechanical inspector
6. General inspector
7. Plumbing inspector
8. Energy inspector
9. Fire inspector
10. Rental inspector

THE OPPORTUNITY

Over the next 15 years, the building industry will experience a loss of 80 percent of the existing skilled workforce. This is a tremendous opportunity for young adults entering the job market!

S2.0 PROGRAMS

- Training
- Mentoring
- Technology Innovation
- Certification
- Career Advancement

Over 12,000 individuals have participated in our Safety 2.0 programs.

Our High School Technical Training Program

- **37** high schools
- **5** colleges
- **1,085** Certificates of Achievement

HOW YOU CAN HELP

- Spread the **WORD**
- Visit **SCHOOLS and COLLEGES**
- Connect **ONLINE**

www.iccsafe.org/safety2

17-14675

ICC CODE DEVELOPMENT PROCESS

BY THE NUMBERS

2015-2017 CYCLE

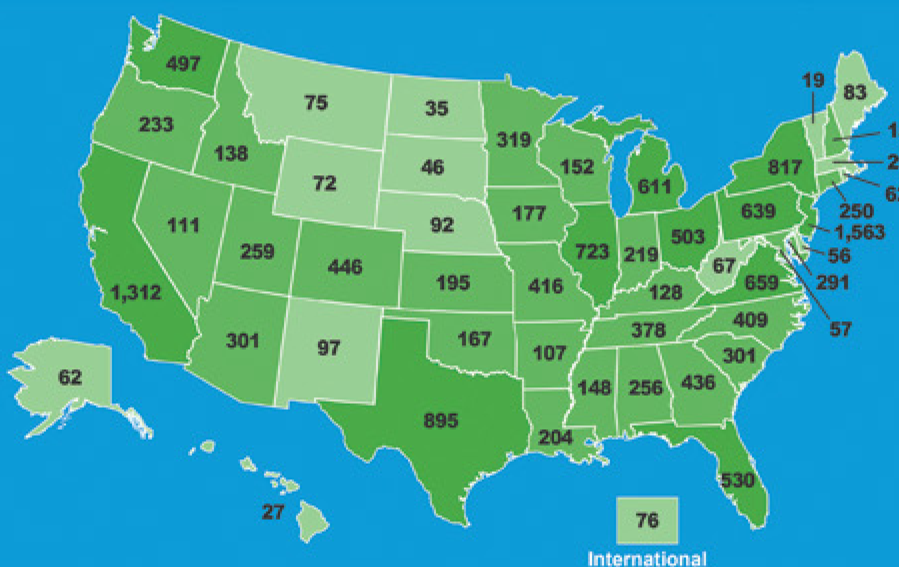
3,318	1,552	207,176
CODE CHANGES	VOTERS	VOTES CAST

VOTING REPRESENTATIVES

Number of **government agency** members: **9,509**

Number of **private sector** members: **54,920**

Total number of governmental member voting representation: 16,156*



*Numbers as of March 2018

The International Code Council is a member-focused association dedicated to developing model codes and standards used in the design, build, and compliance process to construct safe, sustainable, affordable, and resilient structures.

Building Codes and Catastrophe Models

By AIR Worldwide

In 1987, AIR Worldwide began the catastrophe modeling industry by modeling risks from natural and man-made disasters. AIR models have undergone continual refinement, and we still create models for new perils and diverse regions of the globe. Catastrophe modeling has become standard practice in the insurance industry and increasingly in other segments, such as the financial industry, government, and non-governmental organizations (NGOs).

Natural disasters serve as a litmus test for building code effectiveness and often are catalysts for code overhauls. Following studies of the devastating effects of Hurricane Andrew (1992) and the Northridge earthquake (1994), the country made significant advances in building technology, materials, and construction practices. Also, the International Code Council (ICC) emerged to develop a single set of comprehensive and coordinated model building codes that have been implemented across most hurricane- and earthquake-prone states.

Building Code Evolution and Enforcement

Understanding the evolution of building codes across regions is important because the differences in state adoption and enforcement practices have a strong influence on the resilience of the built environment. Although it's advantageous for state and local building code departments to adopt and enforce the latest building codes as soon as possible, there's generally a time lag due to factors such as the financial, training, and personnel resources available. The length and stringency of the required state procedures for official code adoption contribute to the delay.

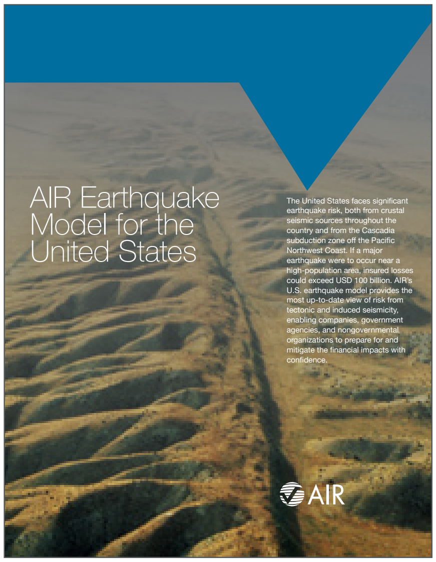
Adoption may occur within a year of code publication where state building code agencies mandate deadlines. In states without a mandated date for adoption, local jurisdictions (counties, cities, towns, or other incorporated or unincorporated areas with local ordinances) may take several years after code publication to adopt codes. In extreme cases, states may not require building code adoption at all, such as in several jurisdictions in Mississippi.

Code enforcement practices vary substantially across and within states. When it comes to wind and hurricane risk, code enforcement is generally more stringent in coastal counties because they have a higher risk. A building code department's financial resources for expenses—such as for official and inspector salaries and training—also play a role.

"AIR's catastrophe models strive to build-in a detailed view of building code evolution, adoption, and enforcement practices at the local level in an effort to capture their impact on the risk faced by the built environment."

Dr. Jayanta Guin
Executive VP and Chief Research Officer
AIR Worldwide

How Catastrophe Models Are Used



Catastrophe models help anticipate the likelihood and severity of potential hurricanes and other natural catastrophes before they occur; they also gauge the effectiveness of building codes with respect to the exposed hurricane risk. The models integrate a hazard component comprising simulated natural catastrophes with an engineering component that incorporates detailed views of building vulnerability. That produces a probability distribution of insured losses after insurance policy conditions are applied by the financial component of the model. The detailed views of building vulnerability include information about building codes and their enforcement at the local level across all states in AIR's catastrophe models. This insight came after AIR engineers undertook comprehensive, peer-reviewed studies to understand the evolution of building codes and building construction practices throughout the United States, helping to quantify the risk from natural hazards.

Insurers and reinsurers employ catastrophe models to estimate the loss potential to books of business; the models give them tools they need to manage that risk. Model output is one source of information that companies use to develop and implement a wide range of activities, including calculating appropriate insurance rates and underwriting guidelines, analyzing the effects of different policy conditions (such as the terms of the policy, limits, deductibles, included/excluded perils/sub-perils, etc.), making sound decisions on purchasing reinsurance, and optimizing portfolios.

The models allow "what if" analyses that measure the effect of various mitigation strategies, such as adding storm shutters in hurricane-prone areas or retrofitting with cross-bracing where earthquake risk is high. Insurers can use the models to estimate potential property damage, losses, injuries, fatalities, and claims.

It's important to note that catastrophe models don't determine insurance rates. The estimates of potential losses they produce are only one input in the process. Other components include risk from noncatastrophe events, operational expenses, targeted profit margins, and external factors. Increasingly, organizations outside insurance use catastrophe models to assess catastrophe risk, including government agencies, mortgage lenders, financial services companies, risk pools, corporations, and owners of high-value real estate. ■

“We cannot control the various disasters that come our way. However, our mitigation efforts, which include strong building code enforcement, make all the difference when we are hit by a tragic natural disaster. We witnessed a series of wildfires in 2017, and our code enforcement efforts made it possible for us to bounce back faster in the wake of those disasters.”

Jay Elbettar, P.E., CBO, LEED AP, CASp
Immediate Past President of ICC
Building Official of Mission Viejo, California

AIR Loss Cost Maps

AIR Worldwide natural catastrophe models estimate the effects of catastrophes to help insurers, communities, building code officials, and government entities prepare for and mitigate losses. A loss cost map shows modeled losses per unit of exposure and is one way to visualize potential losses.

AIR compiles information for many events, and we illustrate the following ones on the pages ahead:

Earthquake Hazard: In this report, modeled loss costs associated with earthquakes are illustrated on the following loss cost map:

- Earthquake Shake: The earthquake shake hazard is concentrated along the West Coast states, the New Madrid area in the center of the United States, the Intermountain West, and in Charleston, South Carolina. More recently, Oklahoma has become a concern due to water injection–induced seismicity, which is subject to a high degree of uncertainty.

Inland Flood Hazard: Flood risk is ubiquitous. Most states and counties across the country have a significant risk of flooding. Midwest and southern states along the Mississippi River and its tributaries, Texas and Florida in the South, and California in the West have relatively higher risk than in other areas. The Inland Flood Loss Cost Map illustrates modeled loss cost associated with this hazard.

Severe Thunderstorm Hazard: In this report, modeled loss costs associated with severe thunderstorms are illustrated in the Severe Thunderstorm Loss Cost Map and also on the following loss cost maps:

- Hail: Hail is most prevalent in the Great Plains, from Northern Texas through North Dakota, and is especially a concern in the foothills of the Rocky Mountains, where mountain effects encourage severe thunderstorm initiation. Significant risk also exists in the Midwest and Southeast, where summertime thunderstorms are a near-daily occurrence and Gulf moisture provides the energy and instability for significant weather.
- Tornado: Most people have heard of Tornado Alley, the corridor running from the Texas Panhandle up through Kansas, Nebraska, and Oklahoma. Historical experience shows this area to be particularly prone to large tornadoes. The Southeast sees its fair share as well. An area sometimes referred to as "Dixie Alley" has seen increased tornado activity, including most recently the EF-5 Tuscaloosa tornado in 2011 that was part of a larger catastrophic outbreak costing more than $7 billion.

Hurricane Hazard: In this report modeled loss costs associated with hurricanes are illustrated on the following loss cost maps:

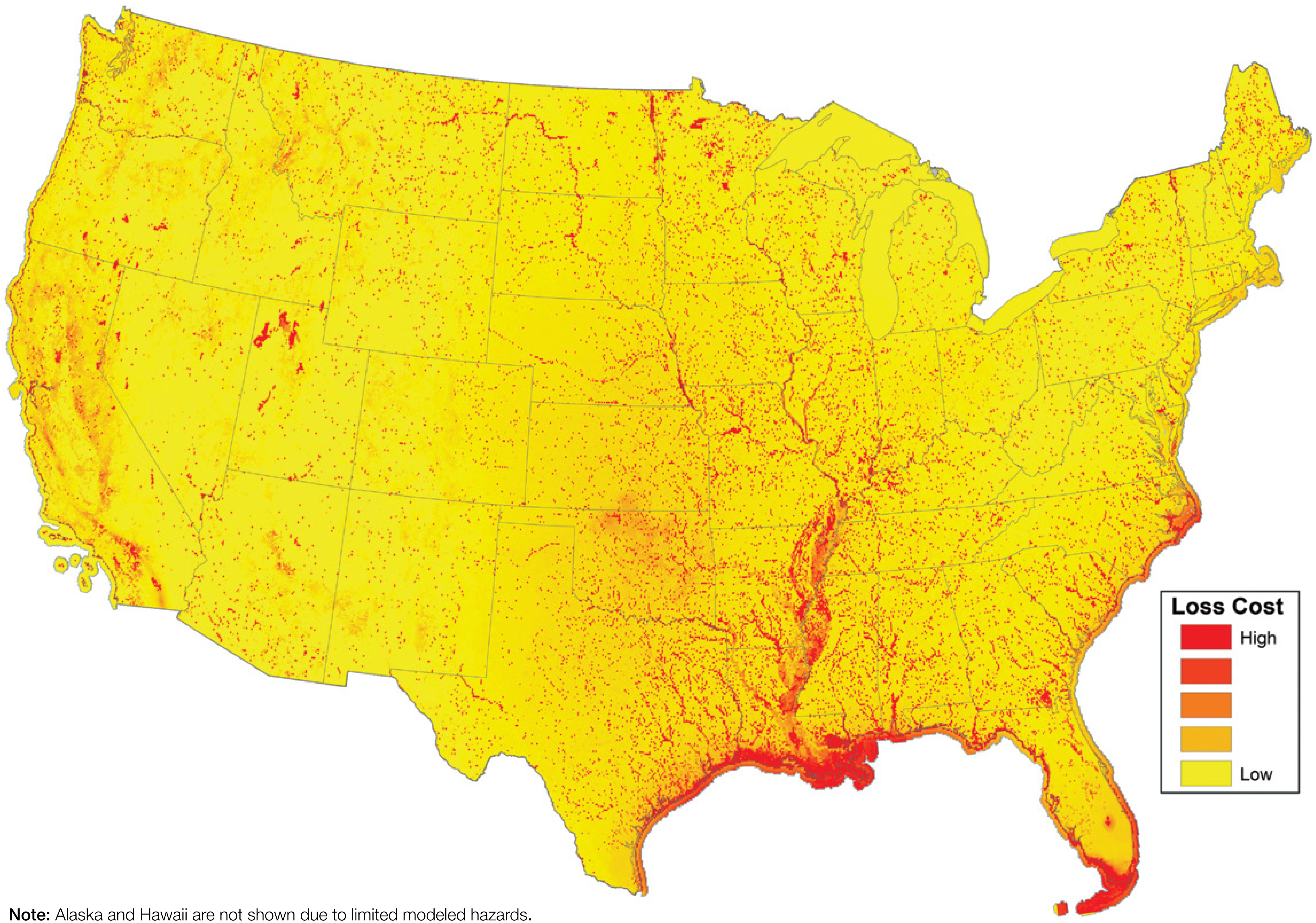
- Hurricane Wind: High loss cost areas along the coastal areas of the Gulf of Mexico and the southeast United States are consistent with locations that historically have the highest expected annual hurricane landfall frequency. Generally, the most hurricane-prone areas are the western and northern Gulf of Mexico, southeast Florida, and coastal North Carolina. Due to geography and typical hurricane tracks, there are areas with lower risk interspersed along the coast, such as the northeast Gulf of Mexico, northeast Florida, coastal Georgia, and the Mid-Atlantic. For these same reasons, coastal New England has a slightly higher risk than the Mid-Atlantic. Since hurricanes generally weaken after landfall as they move inland, the loss cost rapidly decreases with distance from the coastline.
- Hurricane Storm Surge: Storm surge from hurricanes is confined mainly to the coastline, coastal bays and estuaries, and tidal rivers under threat from a landfalling hurricane. Some hurricane-prone, low-lying areas, such as southern Louisiana and southwest Florida, are particularly vulnerable to storm surge, but the threat also extends along the entire eastern United States and Gulf coasts (with only a minimal threat north of coastal Massachusetts).

Wildfire Hazard: While risk of wildfire is present across the nation, higher risk of wildfire is concentrated in the western United States, where hot and dry conditions combined with an availability of fuel allow fires to ignite and spread. California has the highest risk of wildfires; however, recent fires in the Pacific Northwest, Colorado, and Arizona remind us that significant risk occurs across the western states. The Wildfire Loss Cost Map illustrates modeled loss cost associated with this hazard.*

Winter Storm Hazard: Winter storm events can affect the entire country; however, depending on the region, a different sub-peril may be the driving cause of loss. Increased risk on the West Coast comes mainly in the form of Pacific windstorms. In the Plains and Northeast, snow can play a more important role. Southern exposure is at risk to freeze loss, where the typically warmer temperature discourages policyowners from preparing for extreme cold. The following Winter Storm Loss Cost Map illustrates modeled loss costs associated with this hazard.

*Note: The Wildfire Loss Cost Map shown in this report is limited to an area of the western U.S.

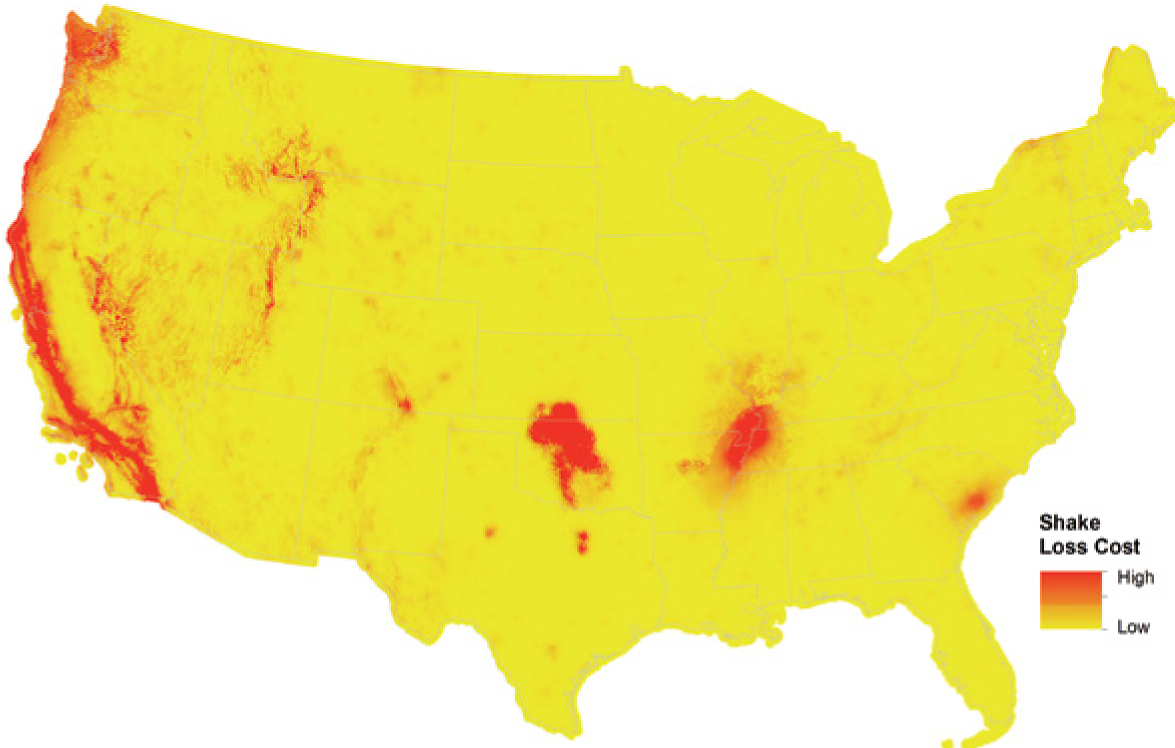
AIR Loss Cost Maps

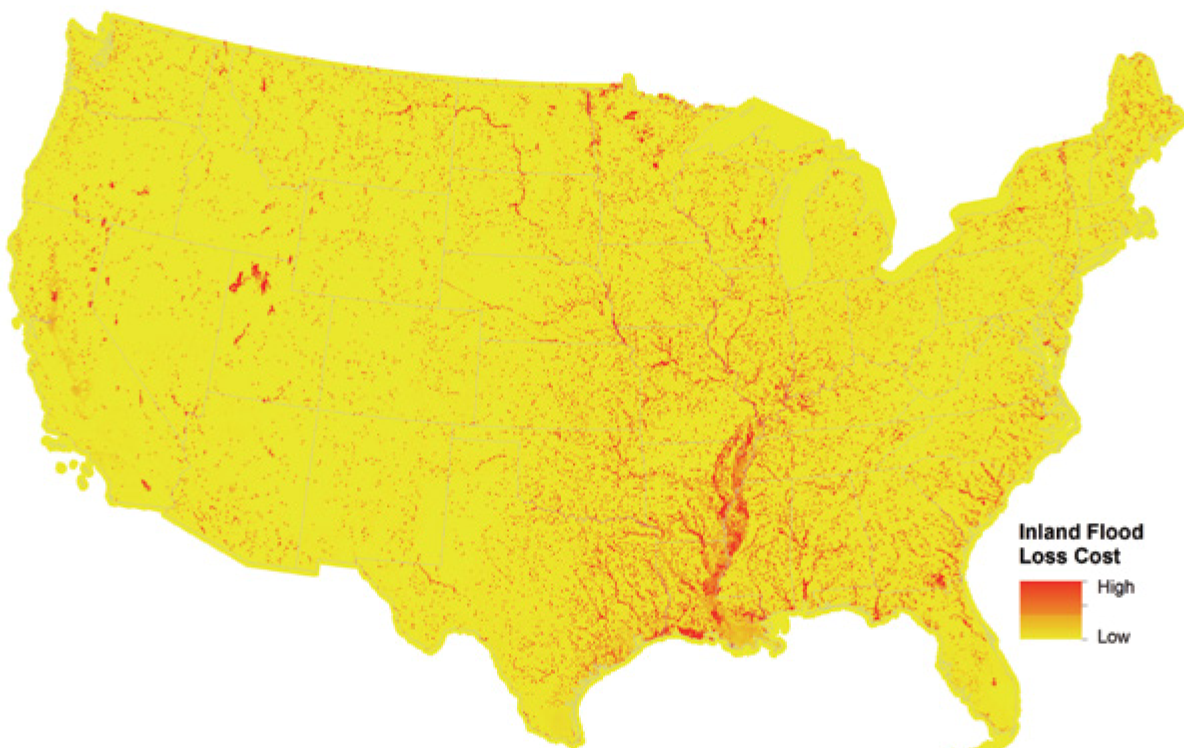


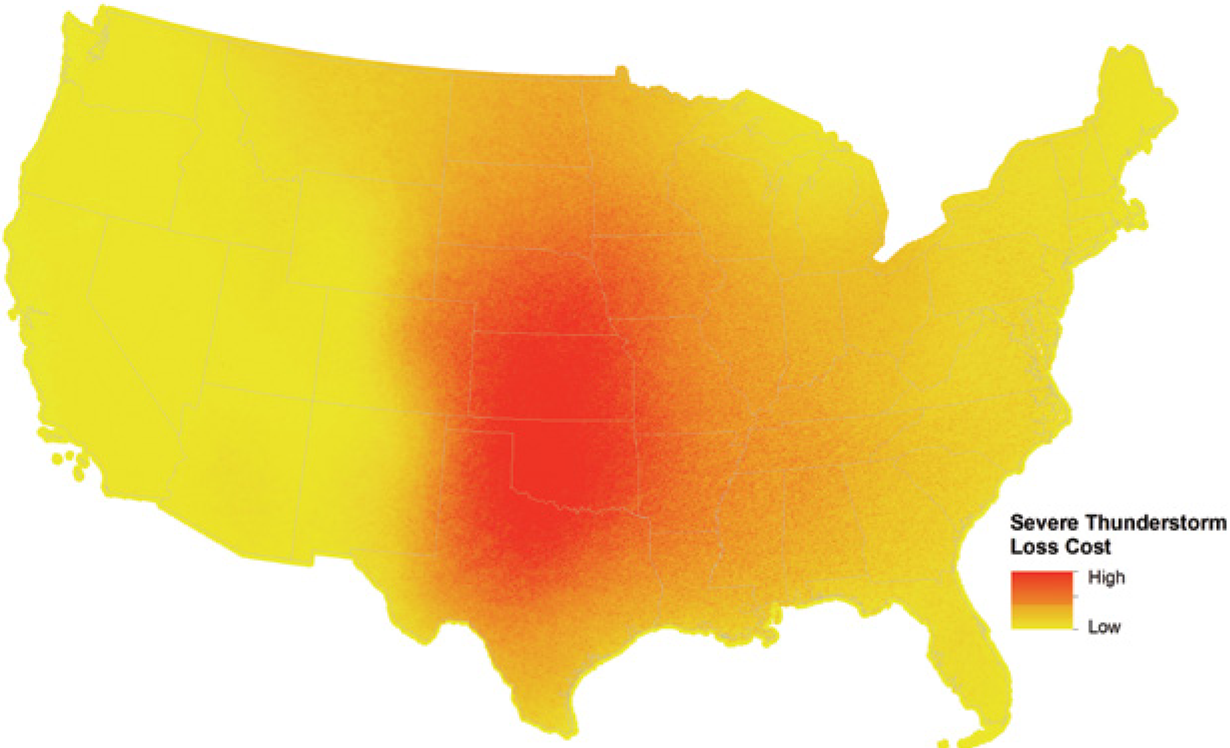
Note: Alaska and Hawaii are not shown due to limited modeled hazards.

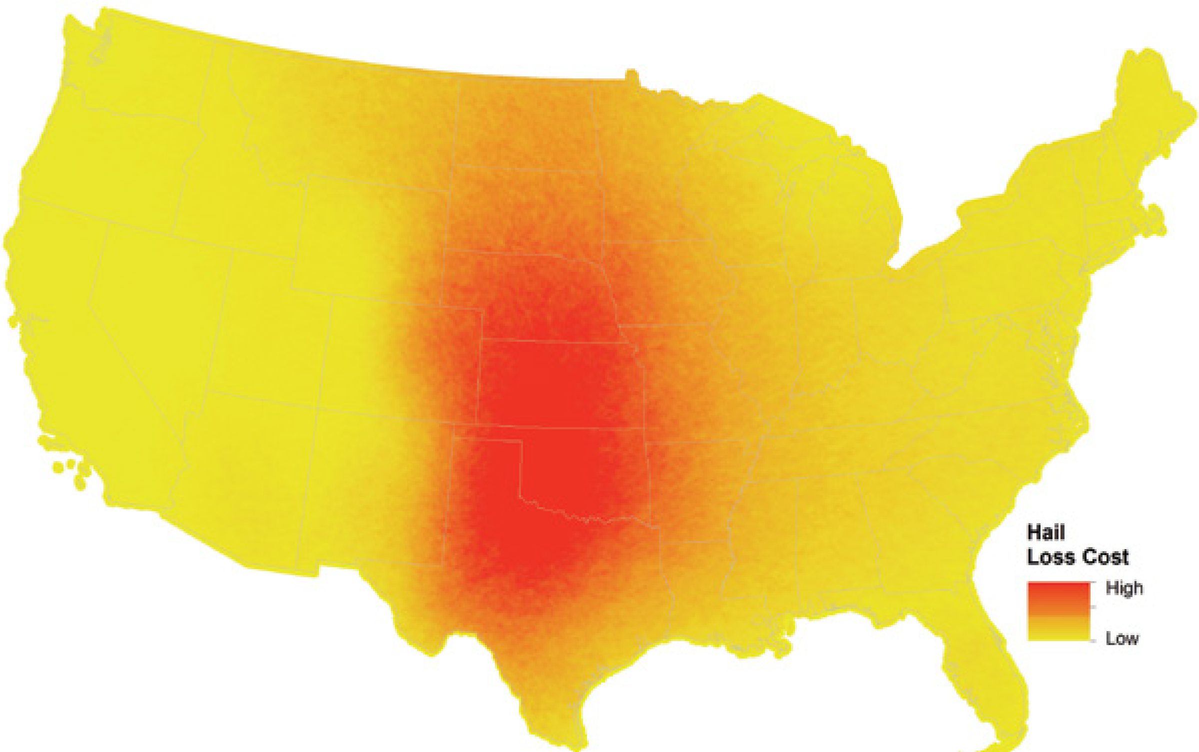
The All-Perils Heat Map shows combined national results from the following loss cost maps:

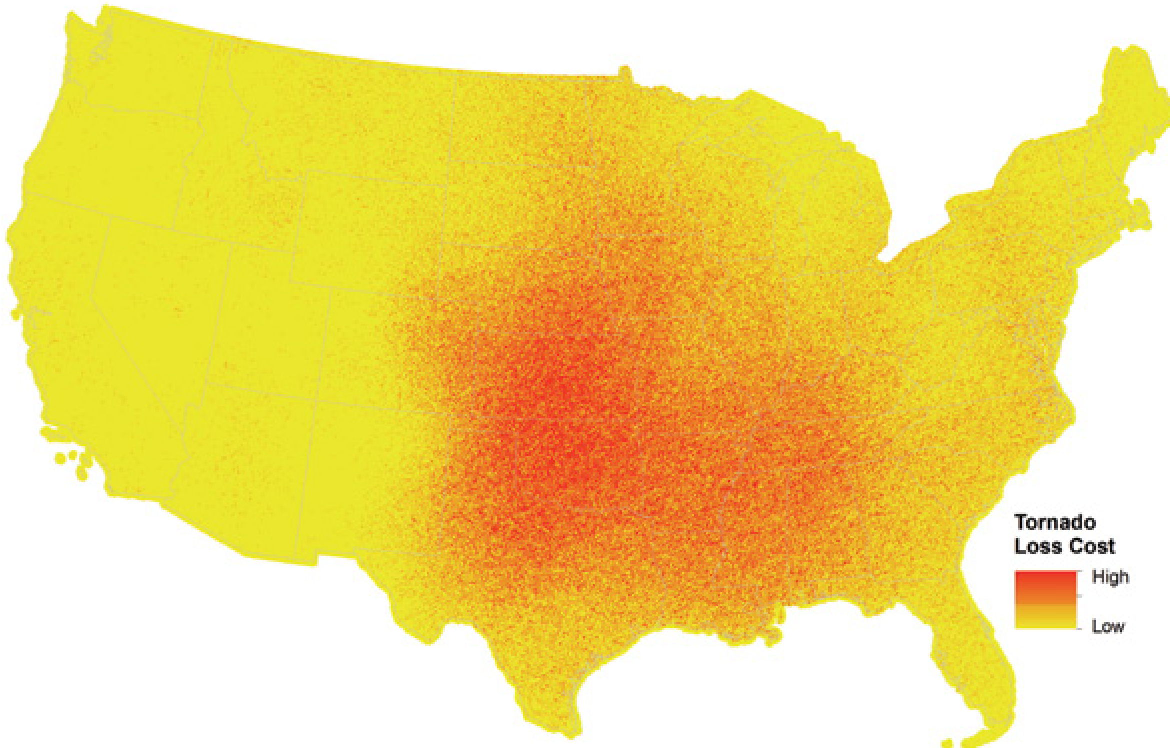
- Earthquake Shake
- Inland Flood
- Severe Thunderstorm
- Hail
- Tornado
- Hurricane Wind
- Hurricane Storm Surge
- Wildfire
- Winter Storm
- Landslide
- Tsunami

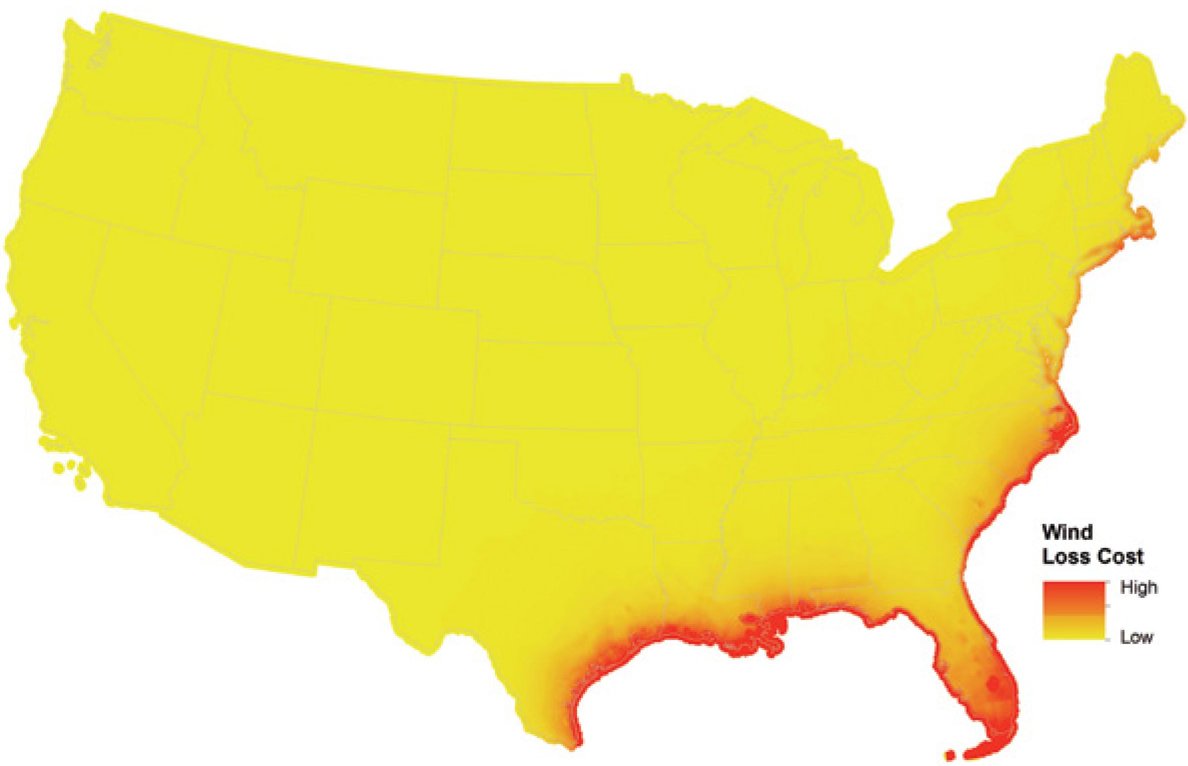

Shake
Loss Cost
High
Low

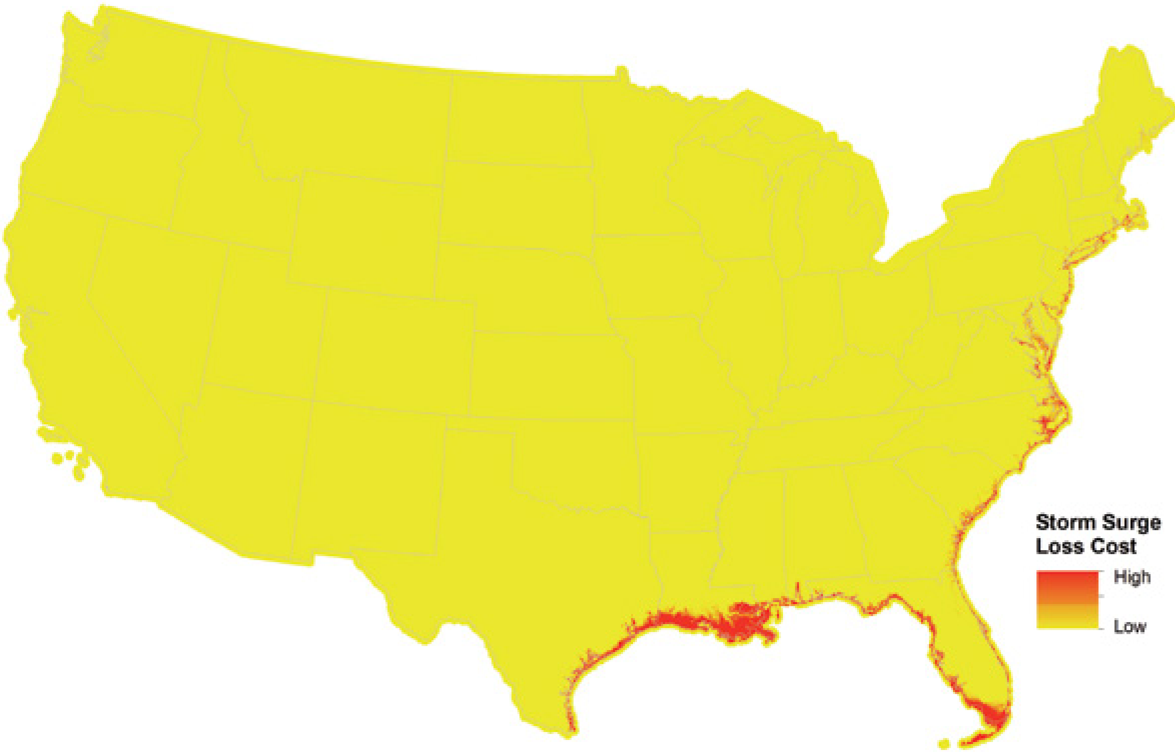

Inland Flood
Loss Cost
High
Low

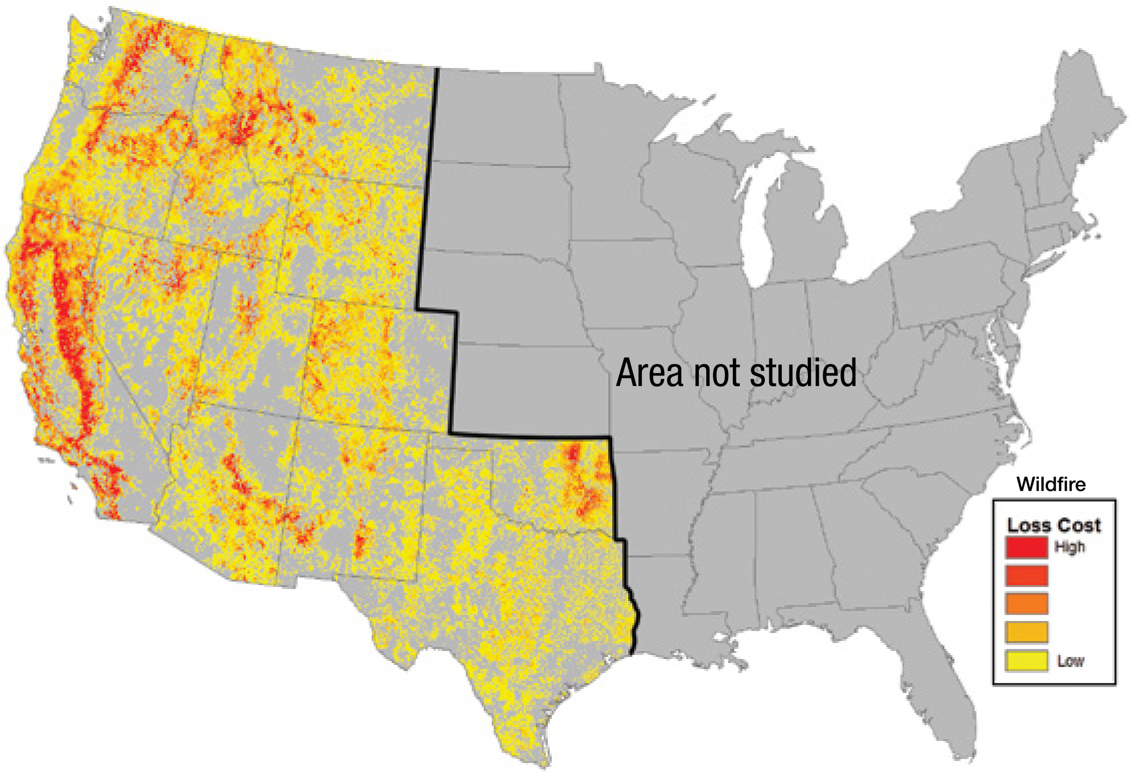

Severe Thunderstorm
Loss Cost
High
Low

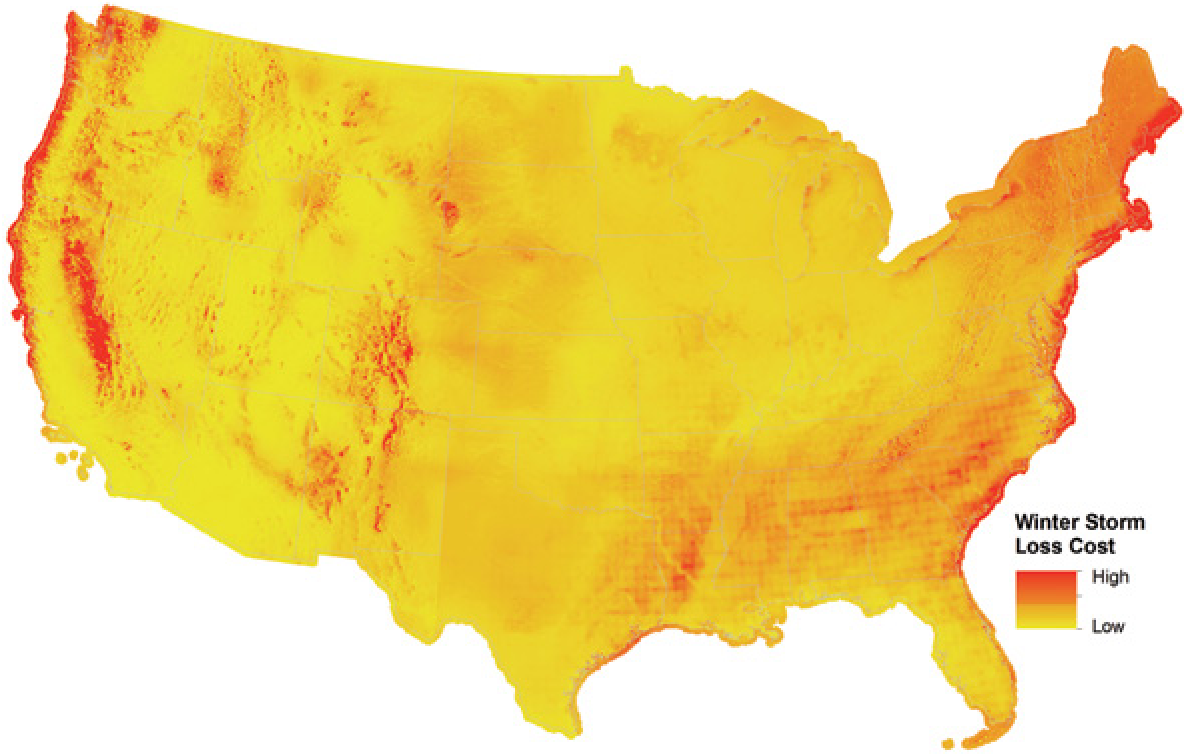

Hail
Loss Cost
High
Low

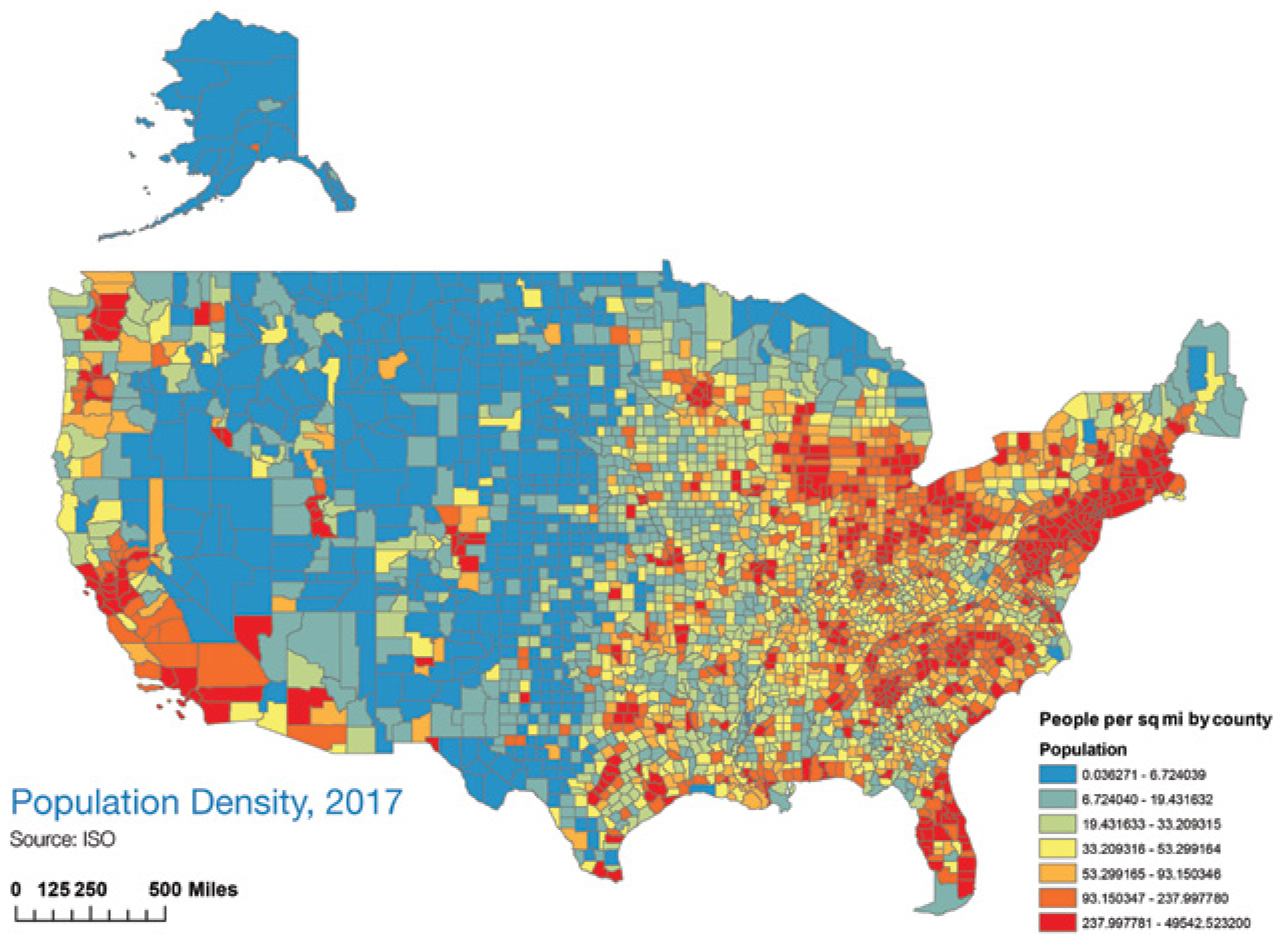

Tornado
Loss Cost
High
Low


Wind
Loss Cost
High
Low


Storm Surge
Loss Cost
High
Low


Area not studied
Wildfire
Loss Cost
High
Low


Winter Storm
Loss Cost
High
Low


Population Density, 2017
Source: ISO
0 125 250 500 Miles
People per sq mi by county
Population
0.036271 - 6.724039
6.724040 - 19.431632
19.431633 - 33.209315
33.209316 - 53.299164
53.299165 - 93.150346
93.150347 - 237.997780
237.997781 - 49542.523200

“AIR Worldwide natural catastrophe models estimate the effects of catastrophes to help insurers, communities, building code officials, and government entities prepare for and mitigate losses.”

Effective, Well-Enforced Building Codes Help Communities

Based on research and articles by the Wharton School of the University of Pennsylvania

Communities with well-enforced, up-to-date building codes typically demonstrate better loss experience when faced with a natural or man-made catastrophe. A team of researchers led by the Wharton Risk Management and Decision Processes Center set out to substantiate this concept by assessing to what extent stronger, well-enforced building codes reduce wind-related property losses.

> "For every dollar spent on compliance, property damages were reduced between \$2 and \$8."

The team's research focused on Florida and used both ISO industry loss data and ISO's Building Code Effectiveness Grading Schedule (BCEGS®) rating data. Through a series of published studies in leading economic, risk management and insurance, and engineering academic journals, the research:

- Quantified a 72 percent reduction in windstorm property damages stemming from the implementation of the statewide Florida Building Code (FBC)
- Quantified the effectiveness of the FBC against not only the effects of high wind speeds but also against extended duration of strong winds and large wind directional change
- Demonstrated the reduction of additional Florida windstorm losses through the intensity of building code implementation at the local level using BCEGS rating data
- Determined the economic efficiency of the stronger code by comparing the reduced property damages (the benefits of the stronger code) with the costs of compliance—for every dollar spent on compliance, property damages were reduced between \$2 and \$8
- Demonstrated enhanced economic effectiveness of stronger codes under expected increases in hurricane wind speeds due to climate change

The breadth and depth of the research, combined with the use of realized wind hazard and wind loss data, exhibited the value of having stronger building codes in place and enforced in communities. Understanding effective loss mitigation is critical in this era of ever-increasing catastrophic risk, driven by increasing population and wealth and compounded by changes to our climate. The research:

- Explores the extent to which the findings apply to other U.S. states and across other hazardous weather phenomena
- Identifies the components of the wind codes that lead to the largest loss reductions
- Characterizes building code attributes and adaptations that are effective against multiple simultaneous hazards
- Identifies the role of human behavioral factors affecting code compliance

Having more broadly characterized effective building codes, future research will explore intersections with building code policy and insurance affordability.

Case Study 1 — Economic Effectiveness of Implementing a Statewide Building Code: The Case of Florida

By Kevin Simmons, Jeffrey Czajkowski, and James Done
***Land Economics*, Volume 94:2 (May 2018)**

Strong and well-enforced building codes increase the costs of property construction but also have the potential of reducing future property damage from hurricanes in vulnerable areas. Twenty-five years ago, Hurricane Andrew, at that time the costliest disaster in U.S. history, devastated South Florida. Andrew revealed that construction practices and code enforcement in Florida for the 20 years prior had deteriorated, leading to increased damage when the hurricane struck. In response, the state of Florida created the Florida Building Code (FBC), fully enacted in 2001, as the strongest statewide building code in the United States. Still, amid concerns about the increased costs of construction, efforts are underway to weaken the stringency of the FBC. However, the extensive damage wrought by Hurricane Harvey in Texas renewed conversations in Texas about the need for stronger building codes, because currently that state has some of the most lenient standards in the country.

Because increased cost of construction is a fundamental argument against more stringent codes, the question is, How does the reduction in hurricane damage due to compliance with stringent codes compare with increases in construction costs? To answer that question, we conducted a study of the difference in damage to homes built before and after enactment of the FBC in 2001. We used data from windstorms that struck Florida in the ten years after the new building codes were put in place.

Between 2001 to 2010, Florida experienced seven land-falling hurricanes, and four reached Category 3 or higher on the Saffir-Simpson scale of hurricane strength. First, we quantified the reduction of residential property wind damage due to the implementation of the FBC using realized insurance policy, claim, and paid insured loss data across Florida from 2001 to 2010 provided to us by ISO. We found that homes built to the FBC suffered 53 percent less damage than homes built before, and homes built to the FBC were less likely to file a claim. The full reduction in damage of new versus older homes was 72 percent.

But how does that benefit compare to the cost of complying with the code? From our claim-based empirical loss estimations, we further assessed the economic effectiveness of the FBC through a cost-benefit analysis. The cost-benefit ratios ranged from a low of 2.67 to a high of 7.93. That means for every dollar of increased construction cost, the damage reduction cost is \$2 to \$8—easily supporting the conclusion that the FBC is good economic public policy.

Case Study 2 — Demonstrating the Intensive Benefit to the Local Implementation of a Statewide Building Code

Jeffrey Czajkowski, Kevin Simmons, and James Done
***Risk Management and Insurance Review*, 20: No. 3, 363-390, 2017 (winner of the 2018 RMIR Best Article Award by the American Risk and Insurance Association)**

Risk reduction from the implementation of building codes is due not only to the extent of the code as it applies to new construction but also to the intensity of local adoption and enforcement. It's an open question as to how well a code is maintained and enforced at the local level, even for a relatively strong adopted statewide code such as the FBC. We test the importance of the intensity of building code implementation at the local level for reducing Florida windstorm losses by using Building Code Effectiveness Grading Schedule (BCEGS®) rating data from ISO. BCEGS ratings provide a joint assessment of local building code effectiveness in terms of the strength of the adopted codes in addition to how well those adopted codes are enforced. We find that both components provide value in reducing windstorm losses in Florida, with the statewide code being the dominant factor reducing losses on the order of 72 percent.

Although not as substantial in terms of its loss reduction magnitude, intensively implementing building codes at the local level by ensuring codes are properly administered and enforced at this scale provides additional loss reduction value on the order of 15 to 25 percent. Understanding the relative value of these two implementation components is important to better inform building code policy and enforcement efforts given continually updated codes.

> "Windstorm losses are reduced by as much as 72 percent due to implementation of the Florida codes, consistent with other previous findings."

Case Study 3 — Relationship between Residential Losses and Hurricane Winds: Role of the Florida Building Code

James Done, Kevin Simmons, and Jeffrey Czajkowski
***ASCE-ASME Journal of Risk and Uncertainty in Engineering Systems, Part A, Civil Engineering,* 4(1): 04018001 (March 2018)**

The effectiveness of the Florida Building Code (FBC) against the effects of wind speed, duration of strong winds, and wind directional change is quantified. For seven historical hurricanes that impacted Florida during 2004 and 2005, wind speed, duration, and directional change are significantly correlated with insured wind loss. Losses increase log-linearly with wind speed and have a step-function relationship with directional change. Duration effects are important only for minor hurricanes. Losses are most sensitive to major hurricane wind speeds, followed closely by minor hurricane wind speeds, and are less sensitive to duration and directional change. A multiple-regression analysis finds homes built after implementing a statewide FBC in the early 2000s experience significantly lower losses than homes built in the previous decade, in agreement with previous literature. The FBC appears to be effective in reducing losses against wind speed, wind duration, and wind directional change effects. Understanding the importance of different wind parameters in driving loss, combined with assessments of how building codes perform against those parameters, may inform effective building code development. ■

Author Credentials

Dr. Jeffrey Czajkowski is managing director for the Wharton Risk Management and Decision Processes Center.

Dr. Kevin Simmons is a professor of economics and the chair of the Economics & Business Administration Department at Austin College.

Dr. James Done is a project scientist and Willis Research Fellow in the Capacity Center for Climate and Weather Extremes at the National Center for Atmospheric Research.

FEMA and Building Codes

By the Federal Emergency Management Agency (FEMA)

The Federal Emergency Management Agency (FEMA), a division of the U.S. Department of Homeland Security, was created by an executive order from President Jimmy Carter in 1979 to merge separate disaster-related responsibilities into one agency. FEMA's mission is to help people before, during, and after disasters, and that includes building codes and their importance to safer, more resilient properties.

FEMA Building Code History

FEMA's goal is to reduce the risk of losses due to natural hazards, including flood, earthquake, and wind. It's been generally shown through FEMA research and analysis that buildings built to the latest model building codes are better able to resist natural hazards, thereby promoting building resilience. These codes are the most effective way to ensure adequate construction at the local level. FEMA policy is to work with model codes to ensure they address natural hazards to meet national minimum standards.

FEMA is very active in the development of building codes and code enforcement and has an ongoing influence on how codes are updated. In fact, FEMA was one of the first federal agencies to work within the model code development process with all three legacy code organizations: Building Officials and Code Administrators International (BOCA), International Conference of Building Officials (ICBO), and Southern Building Code Congress International (SBCCI). In 1994, the three organizations founded the International Code Council (ICC), a nonprofit organization that develops and maintains international building codes, or I-Codes. As the ICC develops codes through a collaborative process, working with partners, FEMA participates and helps provide technical insight and recommendations for future versions of the codes.

Flood: FEMA reviewed building codes of the 1980s and concluded that although all had some flood provisions, none were fully consistent with the National Flood Insurance Program (NFIP). FEMA worked with the three legacy organizations to have NFIP criteria adopted into their codes and continued to advance the inclusion of NFIP-compliant standards in model building codes with ICC. That helped maximize NFIP participation and encourage consistently high standards for hazard resistance. Beginning with the 2009 I-Codes edition, the flood provisions have met or exceeded the minimum requirements of the NFIP, meaning that participating communities can look to the I-Codes with respect to their floodplain management practices for buildings and structures.

> "FEMA's goal is to reduce the risk of losses due to natural hazards, including flood, earthquake, and wind."

Earthquake: FEMA has been heavily involved with the National Earthquake Hazards Reduction Program (NEHRP), with the goal of reducing fatalities, injuries, and property losses caused by earthquakes. The NEHRP provisions are a knowledge-based resource document intended to translate research results into engineering design practice. Since its creation in 1979, the NEHRP has provided a framework to reduce the risk from earthquakes. Most of the seismic information contained in the American Society of Civil Engineers' *Minimum Design Loads and Associated Criteria for Buildings and Other Structures* (ASCE 7), a consensus design standard referenced by the building codes, comes directly from the *NEHRP Recommended Seismic Provisions for New Buildings and Other Structures*. The updated versions of NEHRP's publication often serve as the primary seismic design input for the building codes.

FEMA's Role

In addition to working with the ICC and NEHRP, the FEMA Building Science Branch regularly partners with developers, building professionals, scientific organizations, the American Society of Civil Engineers (ASCE), and standards committees to lead or participate in the development and implementation of multihazard-resistant building codes and standards. FEMA frequently shares lessons learned from previous disasters and lends insight to code-related studies. The technical standards developed by organizations such as ASCE and the American Institute of Architects (AIA) are referenced by the building codes. These collaborations have successfully incorporated best practices and disaster-resilient policies into nationwide model building codes and engineering standards that communities can adopt to help reduce risks from natural hazards. FEMA conducts outreach to local communities and supports local adoption efforts with training and technical assistance.

FEMA performs many other functions too, including:

- Proposing changes to maintain consistency with the NFIP and to incorporate best practices identified in post-disaster investigations
- Defending against changes that weaken flood provisions and make them inconsistent with the NFIP
- Contributing to requests for interpretations by the ICC
- Supporting training of state and local officials

FEMA and BCEGS®

The FEMA Building Science Branch uses ISO's Building Code Effectiveness Grading Schedule (BCEGS®) data to track the rate of code adoption and report performance to FEMA. A performance goal for Building Science is to increase the percent of communities in hazard-prone areas (flood, wind, and earthquake) that adopt disaster-resistant building codes. Building Science produces national-level reports that include hazard maps listing each reporting BCEGS jurisdiction by county and state, grouped by FEMA region. The hazard maps and reports show the degree of resistance to building code adoption by jurisdictions at high risk.

FEMA uses national-level reports to promote the adoption of the latest building codes within FEMA regions because:

- Today's codes were designed to help structures be disaster-resistant.
- Effective codes equal better-built buildings and better performance.
- Building codes can support uniformity, efficiencies, and predictable performance.
- Strong disaster-resistant building codes are a cornerstone of effective mitigation.

National-level reports track the rate of adoption of disaster-resistant provisions in state-of-the-art building codes across the nation and the resulting improvement in the disaster resistance of building construction in those natural hazard areas.

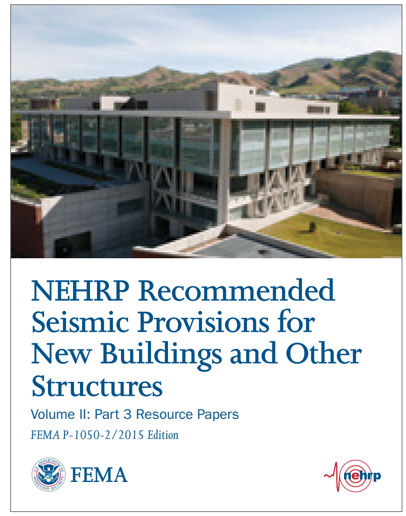
FEMA Building Code Resources

The following documents can be found at www.fema.gov/building-code-resources. They provide guidance on the hazard-resistant provisions in the building codes for property owners, engineers, design professionals, building code officials, and the general public. The resources are divided by natural hazard and address earthquake, flood, and wind (including information on hurricane and tornado shelters).

Source: FEMA.gov

Earthquake

- *Earthquake-Resistant Design Concepts* (FEMA P-749)
- *NEHRP Recommended Seismic Provisions for New Buildings and Other Structures, 2015 Edition* (FEMA P-1050)
- *Homebuilders' Guide to Earthquake-Resistant Design and Construction* (FEMA 232)
- *Techniques for the Seismic Rehabilitation of Existing Buildings* (FEMA 547)
- *Reducing the Risks of Non-structural Earthquake Damage—A Practical Guide* (FEMA E-74)



Flood

- *Flood Resistant Provisions of the International Codes®* (2018 Edition, 2015 Edition, 2012 Edition, 2009 Edition)
- *Highlights of ASCE 24 Flood Resistant Design and Construction*
- *Reducing Flood Losses Through the International Codes: Coordinating Building Codes and Floodplain Management Regulations*
- *Quick Reference Guide: Comparison of Select NFIP & Building Code Requirements for Special Flood Hazard Areas*
- *2008 Supplement to the 2006 Evaluation of the NFIP's Building Standards*

Wind

- *Highlights of ICC 500-2014, ICC/NSSA Standard for the Design and Construction of Storm Shelters*
- *Foundation and Anchoring Criteria for Safe Rooms Fact Sheet*

Multihazard

- *Understanding Substantial Damage in the International Building Code, International Existing Building Code, or International Residential Code*
- *Understanding Substantial Structural Damage in the International Existing Building Code*

Today, building codes address structural integrity, fire resistance, safe exits, lighting, ventilation, and construction materials. They generally specify minimum requirements to safeguard the health, safety, and general welfare of building occupants. The development and widespread adoption of building codes have the beneficial effect of creating a uniform regulatory environment for design professionals and contractors. Most important, building codes can support families' and communities' protection efforts in the event of a natural disaster.* ■

*Written and all information provided by the Federal Emergency Management Agency (FEMA), edited for length, and approved by FEMA.

FLASH® and BCEGS®: Informing Consumer Perceptions in the Fight for Safer Building Codes

Article provided by FLASH

FLASH and Its Mission

Founded in 1998, the award-winning Federal Alliance for Safe Homes (FLASH®) is the United States' leading nonprofit education organization dedicated to strengthening homes and safeguarding families from natural and man-made disasters. ISO is a vital part of the FLASH partnership, which includes more than 100 public, private, and nonprofit companies and organizations that support a common vision: making America a more disaster-resilient nation. FLASH partners collaborate with the following strategic objectives in mind:

- **Create market demand for disaster safety and mitigation.**
  FLASH initiatives create a culture of disaster resilience where consumers understand and want safer, better-built homes. Innovative public outreach supports this objective by showcasing the social and economic benefits of mitigation through creative awareness projects. One example is the landmark *StormStruck: A Tale of Two Homes* "edu-tainment" experience in Epcot® at the Walt Disney World® Resort. Attracting more than 5.8 million visitors from 2008 to 2016, *StormStruck* generated a proven consumer attitude shift and documented behavior change in favor of mitigation.
- **Inform, educate, and engage the professional community.**
  FLASH delivers mitigation knowledge through briefings, conferences, and education programs for builders, business owners, code officials, design professionals, elected and appointed leaders, emergency managers, engineers, insurers, journalists, meteorologists, nonprofits, realtors, thought leaders, and more. In 2015, FLASH created comprehensive toolkits and workshops as part of the Ready Business Program for FEMA on earthquakes, inland flooding, hurricanes, power outages, and severe wind and tornadoes. The program content outlines disaster resilience essentials, including current model building codes that are adopted, enforced, and maintained.
- **Provide mitigation leadership.**
  FLASH is an independent, trusted, and proven expert on mitigation. It develops and articulates best practices and is a preeminent advocate and convener to bring diverse interests and entities together in support of safe, strong, resilient buildings. FLASH commentary papers make the case for building codes as the foundation for resilience.

"ISO is a vital part of the FLASH partnership, which includes more than 100 public, private, and nonprofit companies and organizations that support a common vision: making America a more disaster-resilient nation."

Leslie Chapman-Henderson
President and Chief Executive Officer
Federal Alliance for Safe Homes (FLASH)

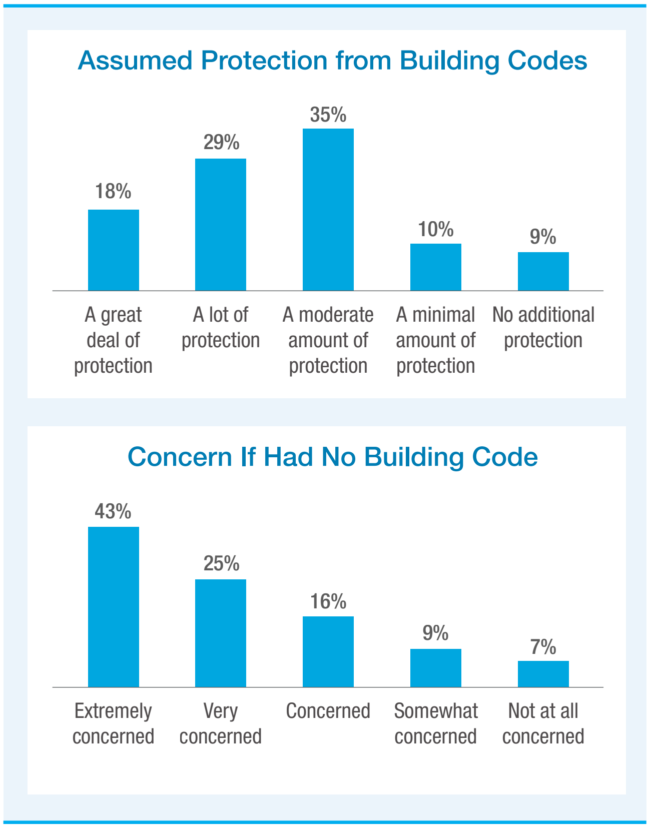
The Challenge of Consumer Awareness

The costly and devastating 2017 disaster season made it clear that building codes are a top priority for the disaster safety and resilience movement. However, as George Santayana said, "Those who do not remember the past are condemned to repeat it." Even though building-failure investigations have proven that codes are the most important line of defense against natural disasters, some communities overlook this proven tool as a method to recover after a disaster event.

The breakdown not only occurs before disasters strike but often during disaster recovery as well. That sets up a cycle known as "build-destroy-rebuild." We build without codes or with outdated codes, natural disasters destroy our buildings, and then we rebuild them the same way—perpetuating the cycle. FLASH has worked for years to overcome this problem.

Although FLASH and the disaster safety movement have enjoyed clear successes, is there a more systematic way to accomplish our goals? Is the breakdown simply a communication problem? Do leaders and homeowners not know how important codes are to survive a disaster? FLASH researched this last question through a national survey during the first quarter of 2018.

What FLASH found is that due to programs like ISO's Building Code Effectiveness Grading Schedule (BCEGS®), experts may understand building codes, but our findings indicate that homeowners may not. In the FLASH survey, most homeowners were "very" or "extremely" concerned about the effects of natural disasters, but many didn't understand the link between building codes and resilience. Most assumed, incorrectly, that adequate building codes were in place for their buildings and enforced in their communities.



Perhaps most important, when asked how they would feel if they learned they didn't have any codes, 68 percent reported they would be "extremely concerned" or "very concerned."

Building codes, standards, and floodplain regulation policies are complex and removed from everyday life. Typical consumers aren't involved in key decisions. Even elected officials may be separated from the details as they balance limited resource allocation with many competing priorities and rely on the technical expertise of others. However, the key finding of the FLASH survey is that consumers don't focus on building codes, because they believe they already have what they need. They're confident their leaders made good decisions and put the best protections in place.

FLASH and BCEGS: Working Together

BCEGS provides the system to evaluate each community's building code effectiveness and enforcement. As the FLASH findings proved, there's a gap between public understanding of building performance in disasters and the presence of well-enforced modern building codes. BCEGS is our nation's most credible tool to bridge this communication gap and promote understanding of the importance of not just adoption but also enforcement and overall quality of the systems in place to advance and administer codes. FLASH incorporates BCEGS data to benchmark a community's state of resilience and increase transparency for the public and government leaders. Experience shows that BCEGS has increased understanding and acceptance of building codes in dozens of states over the past 20 years, especially California, Florida, Georgia, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, and Texas.

Texas is a good example: its building code landscape is one of the most difficult to understand because of the state's size, diversity of perils, and inconsistency in how building codes are adopted and enforced. In 2012, FLASH convened the Texas State Collaborative (TSC), a private/public alliance, to address the most pressing issues affecting the Texas built environment. The TSC focused on weather and geologic hazards or perils and building codes and building practices.

When the TSC was established, the central question was, Are the residential codes in Texas adequate or lacking in basic minimum safety requirements for residential construction? Opinions varied widely. BCEGS helped create education products to equip Texas leaders and jurisdictions with tools to better understand the weather perils and building practices in place.

> "The BCEGS rating is very important to me because it helps identify what we need to do to make sure San Antonio is safe. One of the first things I looked at was our ISO rating."
>
> Roderick J. Sanchez
> Assistant City Manager
> The City of San Antonio

Other FLASH Initiatives

Beyond state and local efforts, FLASH works to advance building codes nationally. In 2016, FLASH brought FEMA, NOAA, and The Weather Channel together to create *#HurricaneStrong*—part of the National Hurricane Resilience Initiative to save lives and homes through collaboration with leading organizations in the disaster safety and resilience movement. *#HurricaneStrong* offers empowering hurricane safety and mitigation information to families and practitioners alike through business summits, digital channels, home improvement store workshops, kids' programming, media outreach, presidential proclamations, school lesson plans, special events, and social media campaigns.

The NOAA Hurricane Awareness Tour serves as the preeminent outreach vehicle for *#HurricaneStrong.* Before hurricane season each year, the tour brings hurricane hunter aircraft, meteorologists, scientists, and leaders to coastal communities to raise awareness and promote resilience. The education program includes an emphasis on strong homes and building codes, and people are engaged. From March 2016 to August 2018, more than 15,000 contributors generated approximately 54,000 tweets using the hashtag *#HurricaneStrong* alongside critical disaster resilience messages. The tweets have generated more than 541 million timeline deliveries with an audience reach of 82 million.

In 2018, FLASH expanded *#HurricaneStrong* and created a community designation with BCEGS as the main qualifier. Communities must meet or exceed stringent criteria, including excellent BCEGS and Community Rating System (CRS) scores. Three communities have earned the designation so far: Leon and Miami-Dade Counties in Florida and Chatham County, Georgia. Many more have expressed the desire to participate.

"What gets measured, gets done." And thanks to BCEGS, we have a credible building code measurement system to use as the cornerstone of the *#HurricaneStrong* community designation. The new designation initiative is bringing focus back to building codes as the critical first step on the path to community resilience. Clearly, we must do more to improve the adoption and enforcement of modern building codes, but FLASH is confident that trends are moving in the right direction. Through continued alliances, enhanced consumer transparency, and the commitment of partners like ISO, local and state leaders will increasingly recognize and leverage building codes to drive disaster resilience—and we'll have safer families and stronger communities when disasters strike. ■

Chatham County, Georgia, *#HurricaneStrong* Designation (September 21, 2018)

The Importance of Effective, Well-Enforced Building Codes for Insurers

A Panel Discussion with Kevin Kuntz, Vice President, Risk Engineering, ISO Underwriting, and Kyle Pelecky, Director, Commercial Property, ISO Underwriting,

Moderator: You both worked for many years with insurers and have extensive experience with ISO's Building Code Effectiveness Grading Schedule (BCEGS®) program. The effectiveness of building codes and their enforcement can play a large role in determining how to rate and underwrite insurance policies in a community. Can you discuss the importance of building codes from an underwriting and risk engineering perspective?

Kevin Kuntz: BCEGS research and analysis have shown that structures built to modern, effective building codes perform better during a natural or man-made catastrophe or weather event. It's a general insurance industry tenet that policy rates can and should reflect that fact through better pricing. However, just having effective building codes doesn't guarantee a community will have buildings built to those codes. You can have the best building codes, but the second part of the equation is how well those codes are enforced.

Kyle Pelecky: Insurers need data on both building codes and their enforcement. Codes are not enough. Communities must have those codes enforced, and that requires having sufficient people with appropriate skills and training to make sure the codes are followed. Insurers need to know what properties have both strong codes and strong code enforcement.

The BCEGS program, as evidenced by the information in this *National Building Code Assessment Report*, offers detailed information on the level of code enforcement in communities. BCEGS can be a valuable tool in the risk selection process for an underwriter. First, at a high level, the program can help provide insight with respect to the construction quality of a risk. That's particularly valuable in areas prone to natural catastrophes and hazards such as hurricanes, earthquakes, flood, and fire.

Second, BCEGS also provides data on how well a community enforces its building codes. This is the critical second half of the equation insurers need to know before pricing or rating a risk.

Moderator: Since BCEGS can give insurers insight for better risk selection, can you elaborate on what the growing concerns are from a risk engineering and underwriting perspective?

Kevin: Just as water damage exposures from storms and hurricanes have become a more significant issue to the property insurance industry, mechanical and plumbing codes should become more of a focus for insurers.

Since Superstorm Sandy, building codes have improved, and studies can speak directly to better performance in areas where codes were enforced. Analysis of loss costs in Florida and Texas after Hurricanes Irma and Harvey in 2017 showed that Florida, with generally stronger and better enforced codes, performed better than Texas.

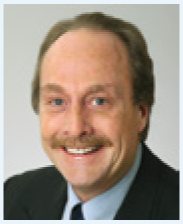
Kyle: Underwriters are interested in getting more granular data in the report to help with risk selection. In support of this, we're working on determining what underlying BCEGS data can provide valuable insight on a "by peril" basis to help insurers make better decisions. ISO is looking for customers that want to partner with us to identify what attributes can provide the most value.

Moderator: With insurers wanting more data, I would think that having innovative technology will play a huge part during the underwriting process. How do you think technology is transforming the insurance industry?

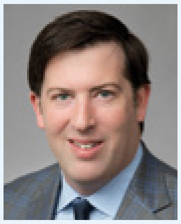
Kevin: With new technology in construction materials and methods, fire risks are changing and could be more severe, especially if not managed properly. Although prevention programs are reducing the number of structure fires overall, insurers are seeing the severity of those fires becoming more severe—with the potential for increased losses—due to modern construction methods and materials.

Kyle: Underwriters are getting a lot of data from new technologies such as prefill, straight-through processing, artificial intelligence, and machine learning. These tools can help underwriters make faster decisions because the tools eliminate time spent on research and provide more accurate information, which goes beyond BCEGS and applies to the scores and the granular information BCEGS provides.

ISO and its parent company, Verisk, provide insurers tools and services designed to help them handle changes, developments, and new technologies in the insurance industry, including those that affect building codes and their enforcement. These tools are designed to help insurers provide better customer service and increase profitability. ■



Kevin Kuntz is vice president and chief engineer for commercial lines at ISO. He serves as the lead technical resource on a variety of underwriting, risk control, and specific risk engineering subjects and oversees the risk engineering and safety groups. Kevin has more than 38 years of experience in the insurance industry.



Kyle Pelecky joined Verisk in 2017 as director of commercial property. Before joining Verisk, Kyle led commercial underwriting teams at Nationwide and Travelers. Kyle has a strong underwriting background with expertise in commercial property.

Aiding the Resilience Revolution: ISO's BCEGS® Program and How It Works

Starting in the late 1980s, a number of property insurers noticed an increase in the number and severity of insured catastrophe events. (See "The Importance of Effective, Well-Enforced Building Codes: History and Development" on page 8.) Even though insurers have no control over the weather, they needed to explore ways to mitigate the severity of property losses, a point hammered home in August 1992 as Hurricane Andrew caused insured losses of more than $15.5 billion in South Florida. It was the costliest catastrophe in the United States to that point, as recognized by AIR Worldwide, a Verisk business. A number of studies following the storm indicated that poorly enforced building codes had significantly increased the number and severity of claims and structural losses.

Acting on the findings of the post-Andrew studies, there emerged a heightened interest by many in the insurance industry for a way to analyze and understand risks associated with building code enforcement. Based on years of experience with its Public Protection Classification (PPC®) program—which generally evaluates the fire suppression capabilities of fire departments across the country and develops a grading that many property insurers use in the pricing of insurance coverages—ISO worked to create an approach to preventing and mitigating property loss. The result was the creation by ISO of the Building Code Effectiveness Grading Schedule (BCEGS®) program, an effort that included research by ISO and considered input from the industry, state and local governments, model code organizations, and building code officials. BCEGS was an early example of the resilience movement.

The BCEGS program evaluates building code enforcement efforts at the jurisdiction level in three areas: code administration, plan review, and field inspection. We collect and analyze more than 1,200 data elements to calculate scores for one- and two-family residential properties and for commercial or industrial properties. Scores range from a minimum of 0 to a maximum of 100. ISO translates the scores to a scaled class rating of 1 (exemplary commitment to building code enforcement) to 10 (as shown in the chart on page 46). Communities are reevaluated generally every four to five years nationally (every three years in Florida) or as substantial changes are made to department operations.

> "The BCEGS program evaluates building code enforcement efforts at the jurisdiction level in three areas: code administration, plan review, and field inspection."

BCEGS focuses on evaluating the effectiveness of code enforcement efforts related to exposures that may result in property losses, such as wind, earthquake, and fire risks. Many experts maintain that buildings constructed and maintained according to model building codes suffer fewer losses from such perils. Additionally, municipalities that adopt and rigorously enforce modern building codes often find that losses from other risks, including man-made perils, are lower than in municipalities without such enforcement.

By focusing on classifications at the community level, BCEGS can provide differentiation at the highest geographic resolution possible for commercial and residential construction. Through decades of analysis, ISO can recognize and account for variations in the resources and support made available to code enforcement and the use of those resources, all tied to the year of construction of a risk.

ISO has also developed and filed BCEGS advisory rating credits to apply to loss costs for personal and commercial property coverages in each community. ISO files manual rules to be used with the credits. Insurance underwriters can use BCEGS ratings in reports and to help effectively price policies. Most underwriters understand that a better BCEGS rating generally means structures perform better during events—and that can be reflected in lower premium rates.

During the more than 20 years that BCEGS has been in place, the concept of resilient communities has gained much greater awareness and momentum with key stakeholders, community leaders, and consumers. Programs at the national level down to the smallest communities participating in BCEGS are embracing resilience and seeking solutions to enhance social and financial stability into the future.

BCEGS Schedule: Areas of Focus

A large number of factors are considered in every BCEGS classification. The table below lists key areas of focus but is not all-inclusive:

Administration of Building Codes	Plan Review	Field Inspection
Adopted Building Code	Plan Review Staffing	Inspection Staffing
Adopted Sub-Codes	Experience of Plan Review Personnel	Experience of Inspection Personnel
State and Local Code Amendments	Detail of Plan Review	Management of Inspection Activity
Method of Code Adoption	Management of Plan Review Activity	Inspection Checklists
Natural Hazards Impacting the Jurisdiction	Natural Hazards Impacting the Jurisdiction	Special Inspections
Staff Training and Education	Staff Training and Education	Inspections for Natural Hazard Mitigation
Certification of Staff	Certification of Staff	Final Inspections
Qualification of the Building Official	Qualification of the Building Official	Certificates of Occupancy
Utilization of Design Professionals	Utilization of Design Professionals	
Zoning and Land-Use Provisions		
Contractor Licensing Programs		
Public Awareness Programs		
Appeals Process		
Administrative Policies and Procedures		
Quality Assurance Programs		

Determining a BCEGS Classification

Communities are evaluated based on the categories shown in the chart on page 45 on state or local building code policies and practices in 27 different areas of focus. The values are calculated based on the terms of ISO's BCEGS schedule to determine a score on a 0-to-100-point scale for both commercial buildings and one- and two-family residential dwellings. Each community's score is then converted to a 1-to-10 classification, one classification for commercial lines and one classification for personal lines of coverage (as shown in the table to the right). Participating insurers can use the classifications when applying filed BCEGS credits in relation to policies issued on related properties.

Classification	Score Point Range
1	93.00 – 100.00
2	85.00 – 92.99
3	77.00 – 84.99
4	65.00 – 76.99
5	56.00 – 64.99
6	48.00 – 55.99
7	39.00 – 47.99
8	25.00 – 38.99
9	10.00 – 24.99
10	0.00 – 9.99

BCEGS at the Community Level

- BCEGS classifications can help identify communities that are more resilient to natural hazards and everyday perils. Resilient communities more readily attract businesses and residents.
- Policyholders in communities with effective building code programs are positioned to benefit from better-informed insurance choices and available premium discounts because ISO participating insurers can apply credits and receive information relating to building code enforcement vigor from ISO.
- BCEGS data and benchmarking reports offer community officials detailed information about their local code enforcement program, including regional, state, and national trends that can be used to help in their efforts to effectively manage the delivery of building safety services.
- A more favorable BCEGS classification makes a community better able to qualify for Hazard Mitigation Grants from FEMA.
- BCEGS classifications are currently part of the criteria for receiving discounted flood insurance premiums from the National Flood Insurance Program (NFIP) through the Community Rating System (CRS) program.

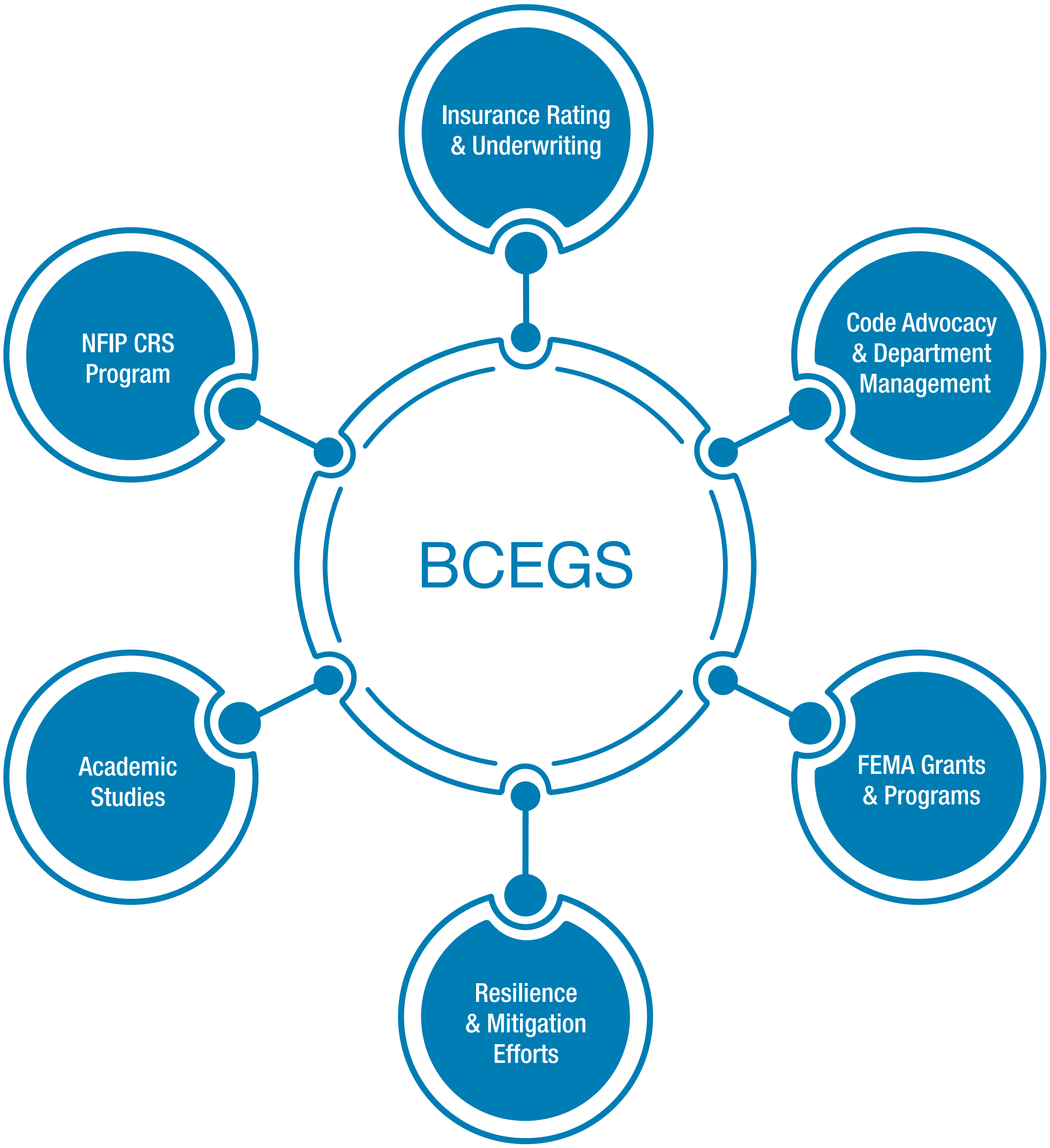
BCEGS and Insurers

- BCEGS provides scalable insight into code enforcement differentiation by geography, size, and population from community to community.
- The program supports the concept that communities with effective codes and related enforcement provide less risk.
- BCEGS issues location-based classifications that help insurers analyze and manage risk from catastrophic and nonmodeled perils across their portfolio.
- Participating insurers can use the BCEGS classification or the underlying data as an underwriting tool to gain a competitive edge in markets with favorable classifications.

BCEGS in Insurance Underwriting and Pricing

BCEGS grades are filed credits in 45 states and imbedded in many ISO analytics and reports. As a result, property insurers have access to BCEGS when they obtain a loss cost, underwrite a policy, or establish a rate.

We provide participating communities some specific information related to their community and license the data to insurers. Due to the proprietary nature of BCEGS data, specific community-level details are not released publicly. ■



BCEGS Class 1 Jurisdiction: Exemplary Performance					
Commercial				**Residential**	
Jurisdiction	**State**	**Jurisdiction**	**State**	**Jurisdiction**	**State**
Charlotte Mecklenburg County	NC	St. Louis County	MO	Beverly Hills	CA
Beverly Hills	CA	Centre Region Code Administration	PA	Newport Beach	CA
Newport Beach	CA	Palo Alto	CA	Milpitas	CA
Milpitas	CA	Orange County	CA	Palo Alto	CA
Clark County	NV	San Antonio	TX		
Roanoke	VA	Fairfax County	VA		

State-Mandated/Nonmandated Code Enforcement

For the purpose of this chart, a state is considered to have a mandate if all communities are required to enforce a building code.

State	Mandated – Edition Prescribed or Limited		Optional – Edition Prescribed or Limited		Mandated – Edition Not Prescribed or Limited		Optional – Edition Not Prescribed or Limited		Page
	Commercial	Residential	Commercial	Residential	Commercial	Residential	Commercial	Residential	
Alabama							X	X	52
Alaska			X					X	53
Arizona					X	X			54
Arkansas			X	X					55
California	X	X							56
Colorado							X	X	57
Connecticut[1]	X	X							58
Delaware							X	X	59
Florida	X	X							60
Georgia			X	X					61
Illinois							X	X	62
Indiana			X	X					63
Iowa[3]	X	X							64
Kansas							X	X	65
Kentucky[1]	X			X					66
Maine[4]	X	X							67
Maryland	X	X							68
Massachusetts[2]	X	X							69
Michigan			X	X					70
Minnesota[5]	X	X							71
Missouri							X	X	72
Montana	X			X					73
Nebraska			X	X					74
Nevada	X	X							75
New Hampshire			X	X					76
New Jersey	X	X							77
New Mexico	X	X							78
New York	X	X							79
North Carolina[1]	X	X							80
North Dakota			X	X					81
Ohio	X	X							82
Oklahoma			X	X					83

State	Mandated – Edition Prescribed or Limited		Optional – Edition Prescribed or Limited		Mandated – Edition Not Prescribed or Limited		Optional – Edition Not Prescribed or Limited		Page
	Commercial	Residential	Commercial	Residential	Commercial	Residential	Commercial	Residential	
Oregon	X	X							84
Pennsylvania	X	X							85
Rhode Island[1]	X	X							86
South Carolina	X	X							87
South Dakota			X					X	88
Tennessee			X	X					89
Texas							X	X	90
Utah	X	X							91
Vermont	X							X	92
Virginia	X	X							93
West Virginia			X	X					94
Wisconsin	X	X							95
Wyoming	X							X	96

State-Mandated/Nonmandated Code Enforcement Chart Definitions and Footnotes

The State Mandated/Nonmandated Code Enforcement Chart was prepared by the ISO BCEGS program team as a quick reference based on their review of how states handled code adoption.

Definitions

- Mandated: Statewide requirement regarding the adoption and enforcement of commercial and/or residential building codes.
- Prescribed: State mandate in which the edition of the building code to be adopted is determined at the state level. Enforcement may be variable or optional at the local level.
- Limited: State mandate that allows some discretion at the local level but places limitations as to which building code edition may be adopted.

Footnotes

1. Commercial and residential codes weakened
2. Residential code weakened
3. Required for jurisdictions with a population greater than 15,000
4. Required for jurisdictions with a population greater than or equal to 4,000
5. Required for jurisdictions with a population greater than 2,500

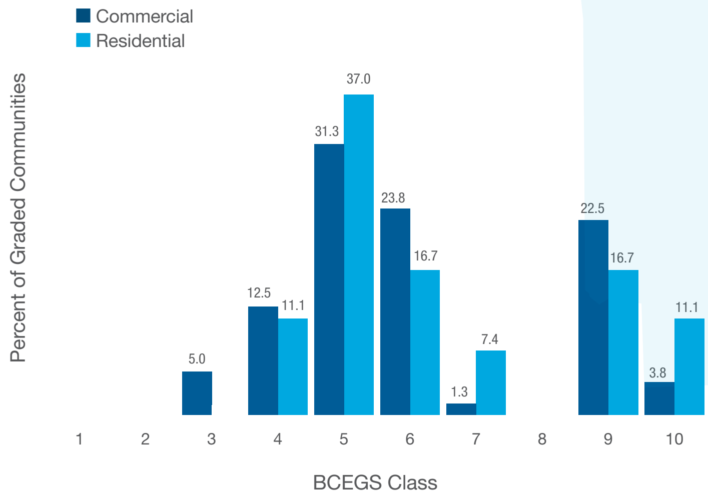
Please note: The information in the State Mandated/Nonmandated Code Enforcement Chart is based solely on ISO staff review of select state code adoption data. The chart does not purport to convey legal opinions or advice and is for informational purposes only.

State Page User Guide

Data does not include the following bureau states: Hawaii, Idaho, Louisiana, Mississippi, Washington

Arkansas

1 BCEGS Community Class Distribution



2 BCEGS State Averages

	Score	Class
Commercial	48	**6**
Residential	44	**7**

The BCEGS 1–10 classification is based on a 1-to-100-point score. For complete details on the scoring process, see pages 44–47, "Aiding the Resilience Revolution: ISO's BCEGS® Program and How It Works."

3 By the Numbers*

19,696 (national average: 31,618)	Average population served by building code enforcement departments in the state
$11.39 (national average: $22.62)	Average department expenditure per capita of population served
$0.24 (national average: $0.44)	Average department employee training expenditure per capita of population served
2.73% (national average: 2.48%)	Average training expenditure as a percentage of overall department expenditure

*Community data from BCEGS database

4 Top Three Modeled Natural Hazards**

Most Likely | Most Costly in a Typical Year | Most Extreme

**Source: AIR Worldwide modeled loss cost data

5 Building Code Adoption History (as of 10/1/18)

ICC Code Release	Commercial Date Adopted	Residential Date Adopted
2009	Not adopted	Not adopted
2012	1/1/14	1/1/14
2015	Not adopted	Not adopted
2018	Not adopted	Not adopted

55

1 BCEGS® Community Class Distribution
Participating BCEGS community breakout by class for commercial and residential grade as of 10/1/2018

2 BCEGS State Averages
State average BCEGS score and class for commercial and residential code enforcement

3 By the Numbers
Key building code department facts compared with national averages

4 Top Three Modeled Natural Hazards
Top identified hazards in the state separated into the following categories:

- Most Likely: These events occur most often in a typical year.
- Most Costly in a Typical Year: These events produce the most damage, on average, in a typical year.
- Most Extreme: Large events of this type occur less frequently but can produce significant damage.

5 Building Code Adoption History
Ten-year state commercial and residential building code adoption history

Note: Average state classifications and scores are calculated using the latest available BCEGS results from graded communities in each state. As ISO evaluates communities on a 4-to-5 year recurring cycle, data used in the averages may not be from the same period in time. Averages are not weighted, and no community data is counted more than once in the calculation of a state's average.

Modeled Natural Hazards Key

Hurricane
Modeled sub-perils include tropical cyclone–generated wind and storm surge.

Winter Storm
Modeled sub-perils include windstorms, snow, and freezing temperatures.

Earthquake
Modeled sub-perils include ground-shaking, liquefaction, landslide, tsunami, fire following, and sprinkler leakage.

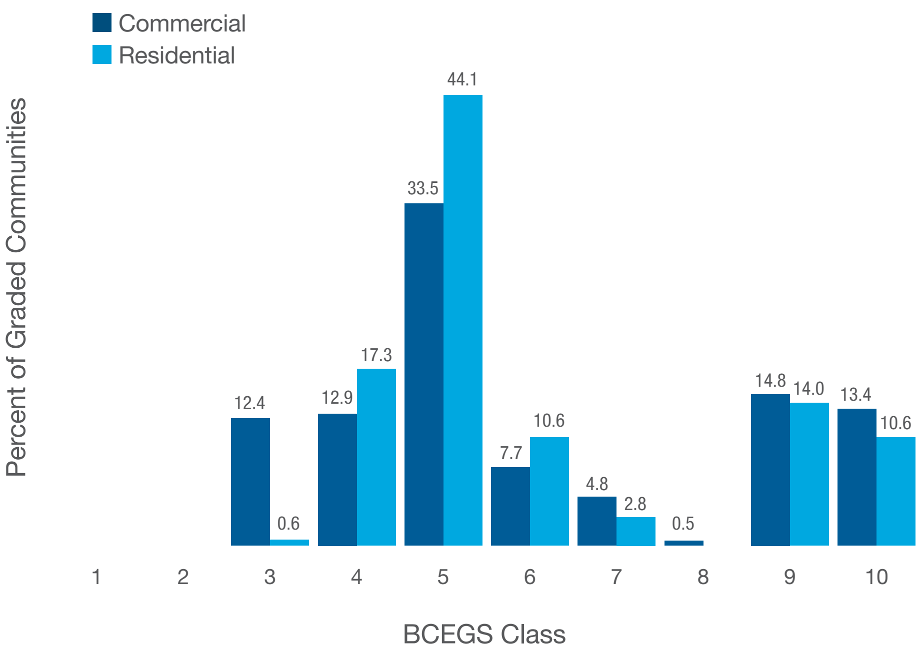
Severe Thunderstorm
Modeled sub-perils include tornadoes, hailstorms, and straight-line winds.

Inland Flood
Modeled sub-perils include on-floodplain (riverine) and off-floodplain flooding.

Wildfire
Modeled perils include wildfire.

Alabama

BCEGS Community Class Distribution



BCEGS State Averages

	Score	Class
Commercial	48	**6**
Residential	49	**6**

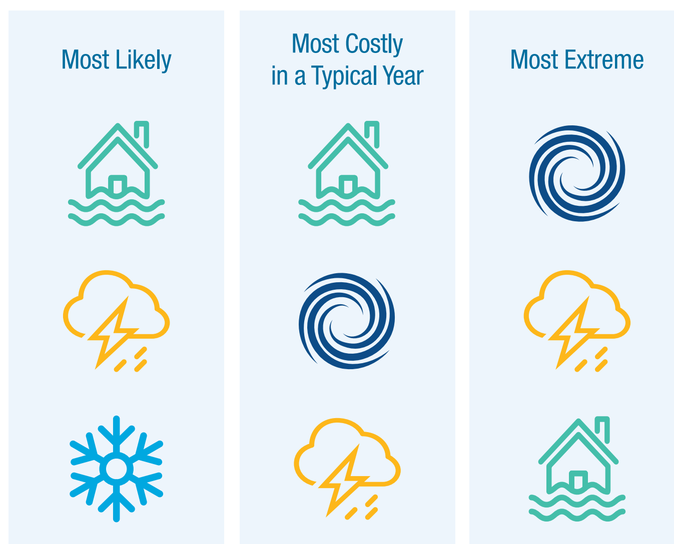
The BCEGS 1–10 classification is based on a 1-to-100-point score. For complete details on the scoring process, see pages 44–47, "Aiding the Resilience Revolution: ISO's BCEGS® Program and How It Works."

By the Numbers*

34,355 (national average: 31,618)	Average population served by building code enforcement departments in the state
$15.18 (national average: $22.62)	Average department expenditure per capita of population served
$0.16 (national average: $0.44)	Average department employee training expenditure per capita of population served
1.43% (national average: 2.48%)	Average training expenditure as a percentage of overall department expenditure

*Community data from BCEGS database

Top Three Modeled Natural Hazards**



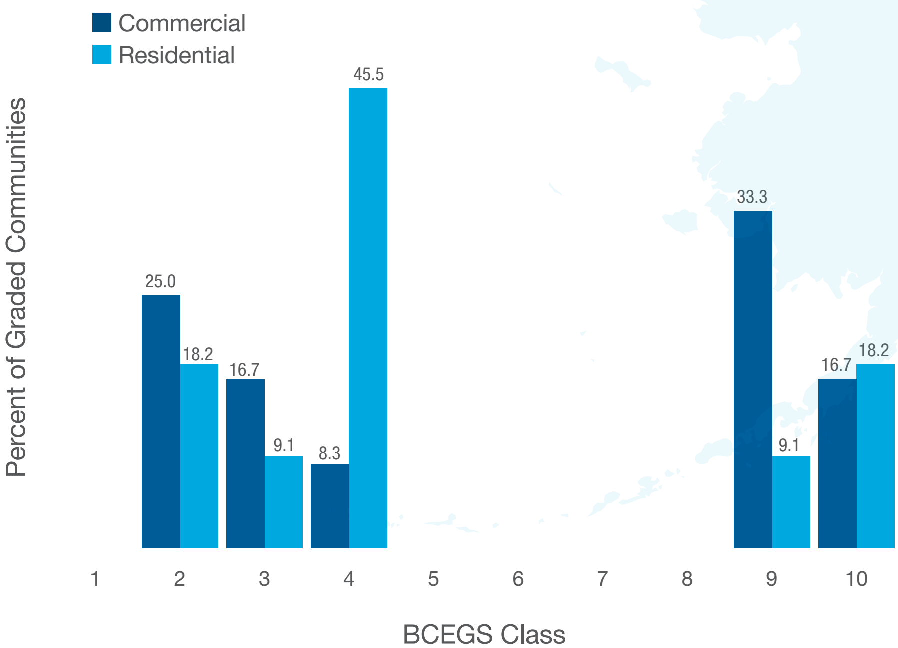
**Source: AIR Worldwide modeled loss cost data

Building Code Adoption History (as of 10/1/18)

Building codes are adopted and enforced at the local jurisdiction level.

Alaska

BCEGS Community Class Distribution



BCEGS State Averages

	Score	Class
Commercial	49	**6**
Residential	58	**5**

The BCEGS 1–10 classification is based on a 1-to-100-point score. For complete details on the scoring process, see pages 44–47, "Aiding the Resilience Revolution: ISO's BCEGS® Program and How It Works."

By the Numbers*

29,635 (national average: 31,618)	Average population served by building code enforcement departments in the state
$30.77 (national average: $22.62)	Average department expenditure per capita of population served
$1.60 (national average: $0.44)	Average department employee training expenditure per capita of population served
4.31% (national average: 2.48%)	Average training expenditure as a percentage of overall department expenditure

*Community data from BCEGS database

Top Three Modeled Natural Hazards**

Most Likely	Most Costly in a Typical Year	Most Extreme

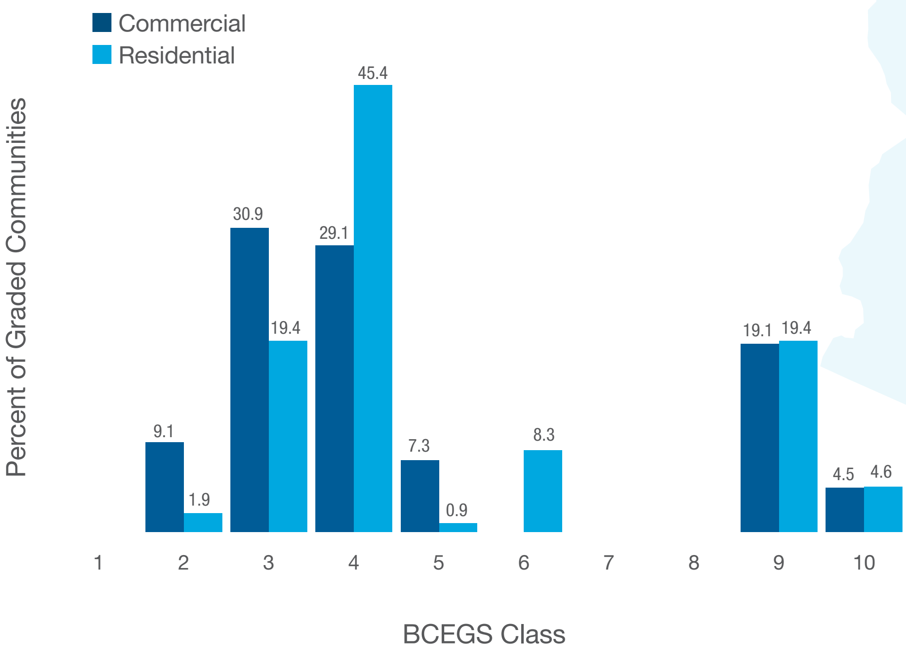
**Source: AIR Worldwide modeled loss cost data (Modeling limited to seismic)

Building Code Adoption History (as of 10/1/18)

ICC Code Release	Commercial Date Adopted	Residential Date Adopted
2009	11/16/12	Not adopted
2012	5/9/17	Not adopted
2015	Not adopted	Not adopted
2018	Not adopted	Not adopted

Arizona

BCEGS Community Class Distribution



BCEGS State Averages

	Score	Class
Commercial	62	**5**
Residential	58	**5**

The BCEGS 1–10 classification is based on a 1-to-100-point score. For complete details on the scoring process, see pages 44–47, "Aiding the Resilience Revolution: ISO's BCEGS® Program and How It Works."

By the Numbers*

98,303 (national average: 31,618)	Average population served by building code enforcement departments in the state
$21.10 (national average: $22.62)	Average department expenditure per capita of population served
$0.21 (national average: $0.44)	Average department employee training expenditure per capita of population served
1.21% (national average: 2.48%)	Average training expenditure as a percentage of overall department expenditure

*Community data from BCEGS database

Top Three Modeled Natural Hazards**

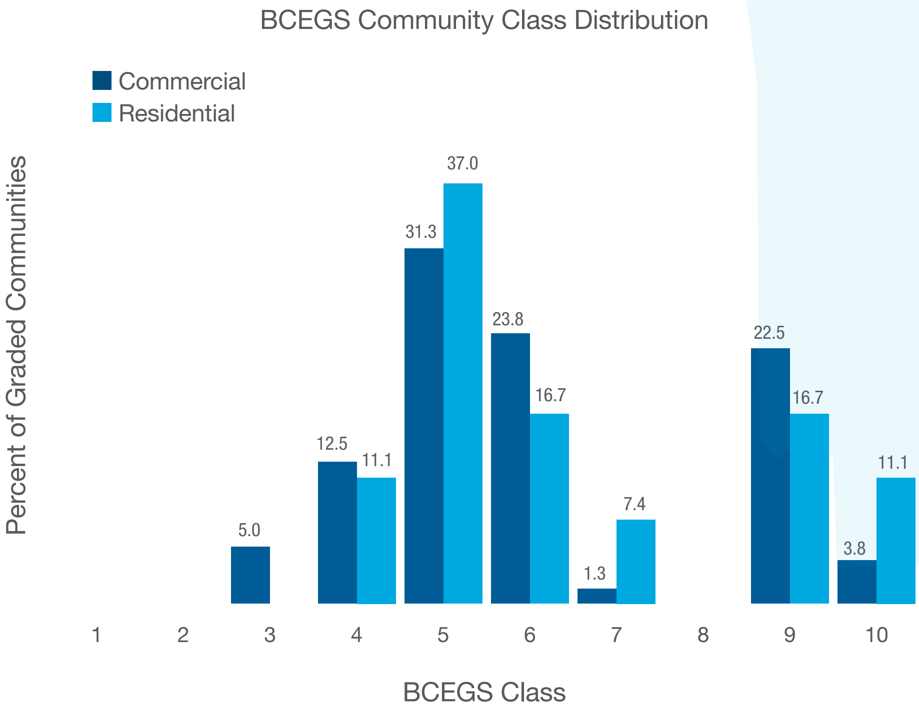
Most Likely	Most Costly in a Typical Year	Most Extreme

**Source: AIR Worldwide modeled loss cost data

Building Code Adoption History (as of 10/1/18)

Building codes are adopted and enforced at the local jurisdiction level.

Arkansas



BCEGS State Averages

	Score	Class
Commercial	48	**6**
Residential	44	**7**

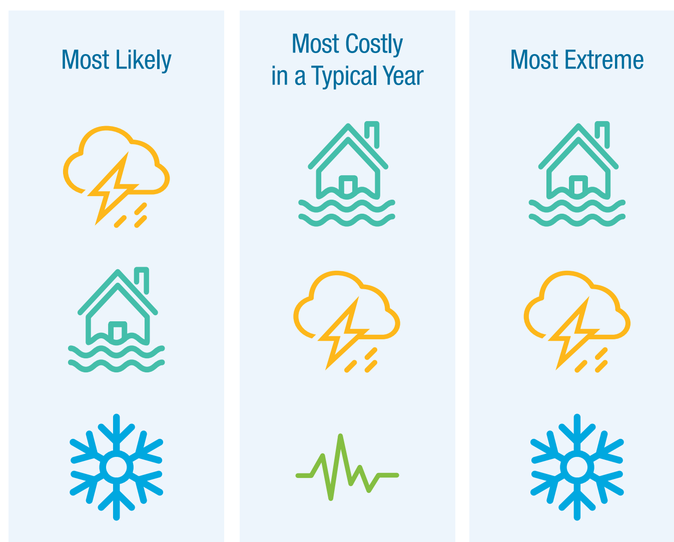
The BCEGS 1–10 classification is based on a 1-to-100-point score. For complete details on the scoring process, see pages 44–47, "Aiding the Resilience Revolution: ISO's BCEGS® Program and How It Works."

By the Numbers*

19,696 (national average: 31,618)	Average population served by building code enforcement departments in the state
$11.39 (national average: $22.62)	Average department expenditure per capita of population served
$0.24 (national average: $0.44)	Average department employee training expenditure per capita of population served
2.73% (national average: 2.48%)	Average training expenditure as a percentage of overall department expenditure

*Community data from BCEGS database

Top Three Modeled Natural Hazards**

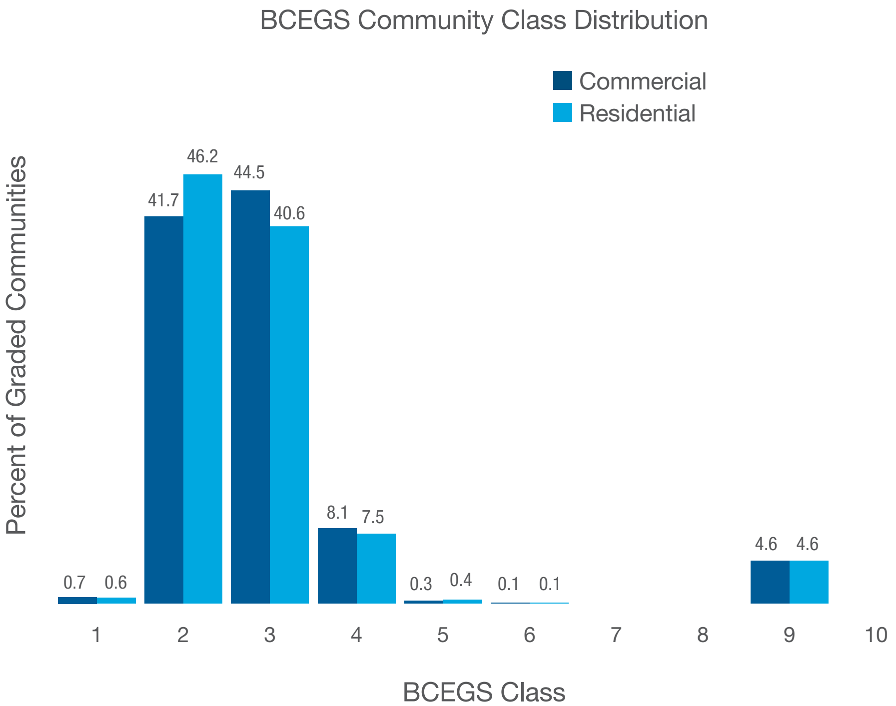


**Source: AIR Worldwide modeled loss cost data

Building Code Adoption History (as of 10/1/18)

ICC Code Release	Commercial Date Adopted	Residential Date Adopted
2009	Not adopted	Not adopted
2012	1/1/14	1/1/14
2015	Not adopted	Not adopted
2018	Not adopted	Not adopted

California



BCEGS State Averages

	Score	Class
Commercial	80	**3**
Residential	81	**3**

The BCEGS 1–10 classification is based on a 1-to-100-point score. For complete details on the scoring process, see pages 44–47, "Aiding the Resilience Revolution: ISO's BCEGS® Program and How It Works."

By the Numbers*

119,673 (national average: 31,618)	Average population served by building code enforcement departments in the state
$45.90 (national average: $22.62)	Average department expenditure per capita of population served
$0.22 (national average: $0.44)	Average department employee training expenditure per capita of population served
0.95% (national average: 2.48%)	Average training expenditure as a percentage of overall department expenditure

*Community data from BCEGS database

Top Three Modeled Natural Hazards**

Most Likely | Most Costly in a Typical Year | Most Extreme

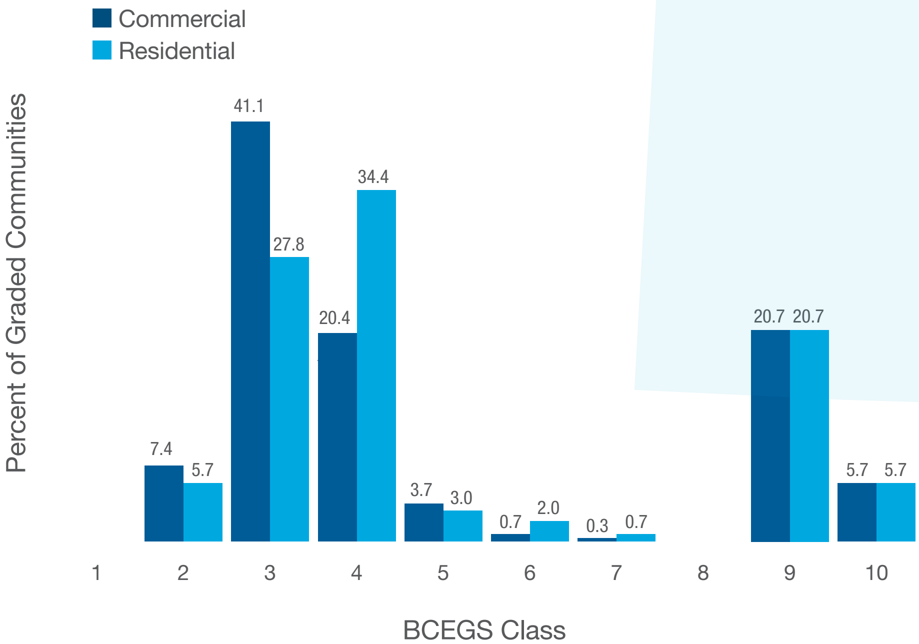
**Source: AIR Worldwide modeled loss cost data

Building Code Adoption History (as of 10/1/18)

ICC Code Release	Commercial Date Adopted	Residential Date Adopted
2009	1/1/11	1/1/11
2012	1/1/14	1/1/14
2015	1/1/17	1/1/17
2018	Not adopted	Not adopted

Colorado

BCEGS Community Class Distribution



BCEGS State Averages

	Score	Class
Commercial	62	**5**
Residential	59	**5**

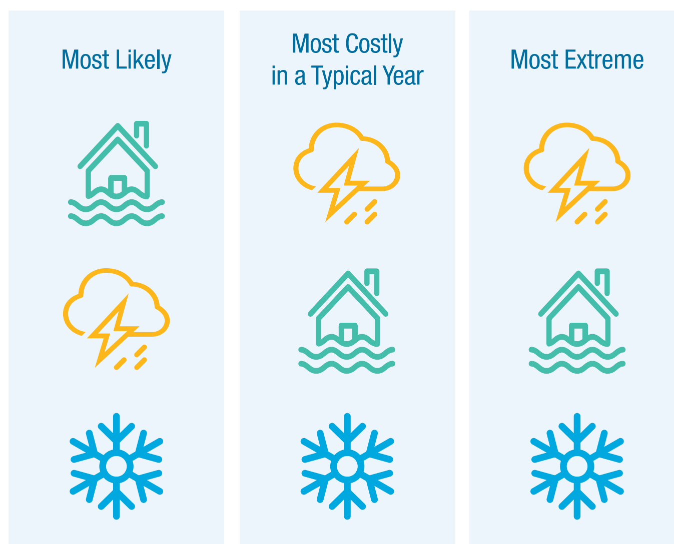
The BCEGS 1–10 classification is based on a 1-to-100-point score. For complete details on the scoring process, see pages 44–47, "Aiding the Resilience Revolution: ISO's BCEGS® Program and How It Works."

By the Numbers*

45,690 (national average: 31,618)	Average population served by building code enforcement departments in the state
$38.10 (national average: $22.62)	Average department expenditure per capita of population served
$0.64 (national average: $0.44)	Average department employee training expenditure per capita of population served
1.41% (national average: 2.48%)	Average training expenditure as a percentage of overall department expenditure

*Community data from BCEGS database

Top Three Modeled Natural Hazards**



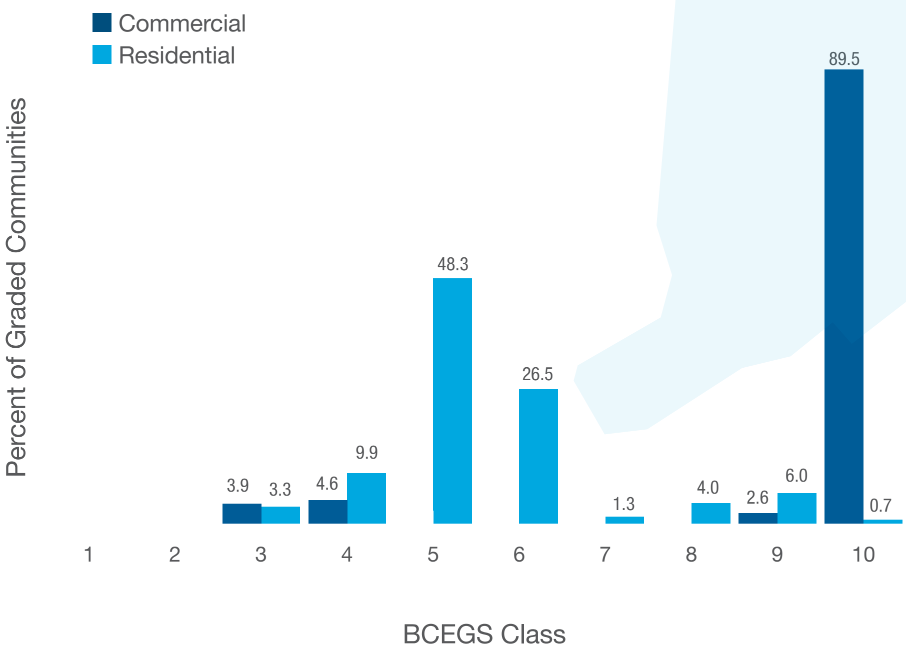
**Source: AIR Worldwide modeled loss cost data

Building Code Adoption History (as of 10/1/18)

Building codes are adopted and enforced at the local jurisdiction level.

Connecticut

BCEGS Community Class Distribution



BCEGS State Averages

	Score	Class
Commercial	12	**9**
Residential	55	**6**

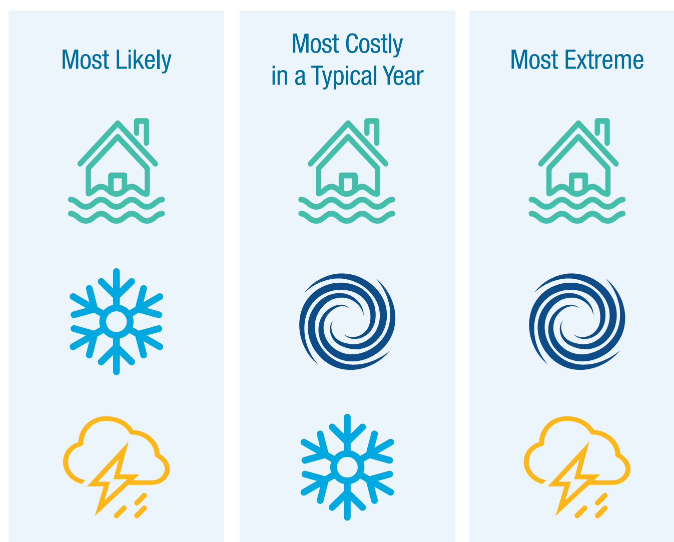
The BCEGS 1–10 classification is based on a 1-to-100-point score. For complete details on the scoring process, see pages 44–47, “Aiding the Resilience Revolution: ISO’s BCEGS® Program and How It Works.”

By the Numbers*

20,994 (national average: 31,618)	Average population served by building code enforcement departments in the state
$11.60 (national average: $22.62)	Average department expenditure per capita of population served
$0.17 (national average: $0.44)	Average department employee training expenditure per capita of population served
1.42% (national average: 2.48%)	Average training expenditure as a percentage of overall department expenditure

*Community data from BCEGS database

Top Three Modeled Natural Hazards**



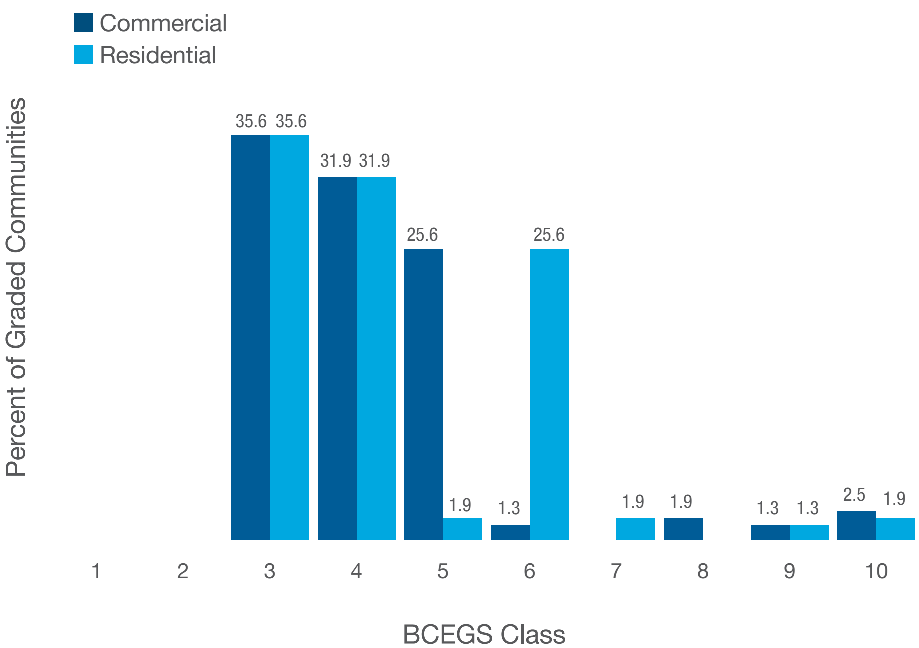
**Source: AIR Worldwide modeled loss cost data

Building Code Adoption History (as of 10/1/18)

ICC Code Release	Commercial Date Adopted	Residential Date Adopted
2009	Not adopted	Not adopted
2012	10/1/16	Not adopted
2015	10/1/18	10/1/18
2018	Not adopted	Not adopted

Delaware

BCEGS Community Class Distribution



BCEGS State Averages

	Score	Class
Commercial	70	**4**
Residential	66	**4**

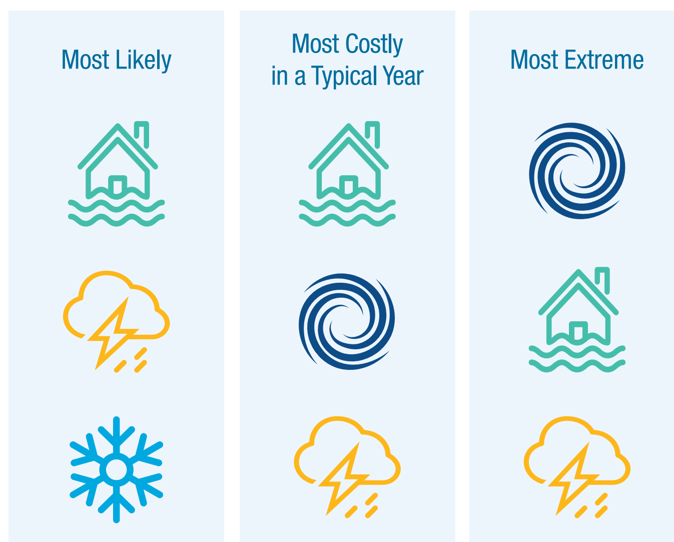
The BCEGS 1–10 classification is based on a 1-to-100-point score. For complete details on the scoring process, see pages 44–47, "Aiding the Resilience Revolution: ISO's BCEGS® Program and How It Works."

By the Numbers*

48,938 (national average: 31,618)	Average population served by building code enforcement departments in the state
$55.56 (national average: $22.62)	Average department expenditure per capita of population served
$0.56 (national average: $0.44)	Average department employee training expenditure per capita of population served
0.96% (national average: 2.48%)	Average training expenditure as a percentage of overall department expenditure

*Community data from BCEGS database

Top Three Modeled Natural Hazards**



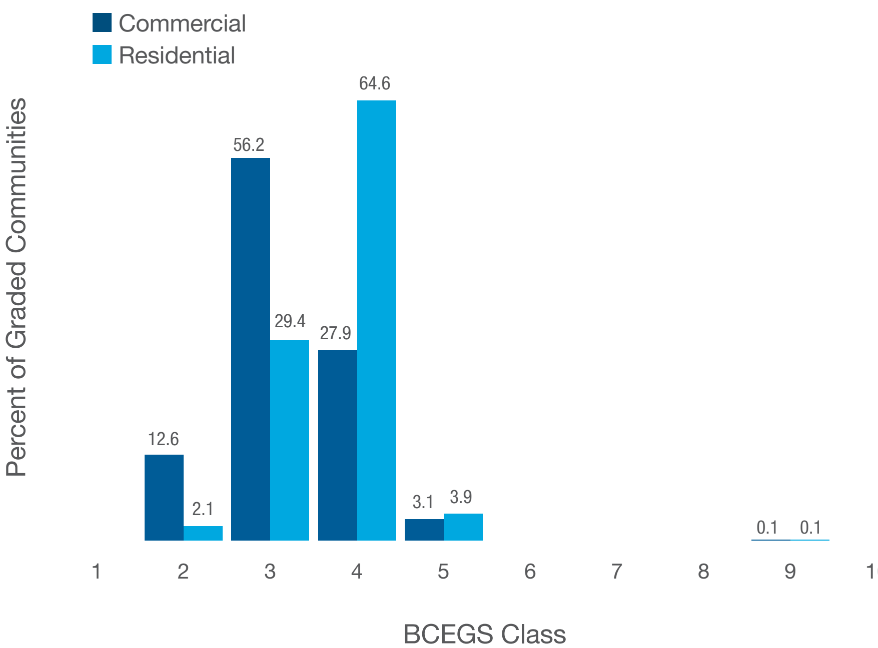
**Source: AIR Worldwide modeled loss cost data

Building Code Adoption History (as of 10/1/18)

Building codes are adopted and enforced at the local jurisdiction level.

Florida

BCEGS Community Class Distribution



BCEGS State Averages

	Score	Class
Commercial	79	**3**
Residential	73	**4**

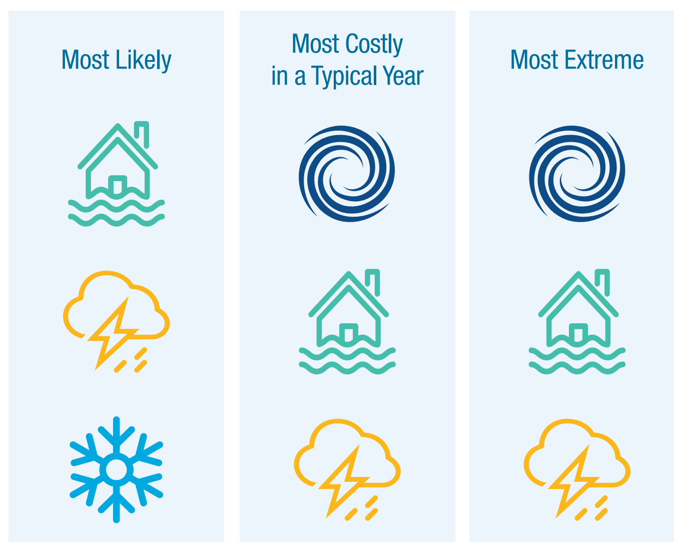
The BCEGS 1–10 classification is based on a 1-to-100-point score. For complete details on the scoring process, see pages 44–47, “Aiding the Resilience Revolution: ISO’s BCEGS® Program and How It Works.”

By the Numbers*

64,322 (national average: 31,618)	Average population served by building code enforcement departments in the state
$52.63 (national average: $22.62)	Average department expenditure per capita of population served
$0.62 (national average: $0.44)	Average department employee training expenditure per capita of population served
1.42% (national average: 2.48%)	Average training expenditure as a percentage of overall department expenditure

*Community data from BCEGS database

Top Three Modeled Natural Hazards**



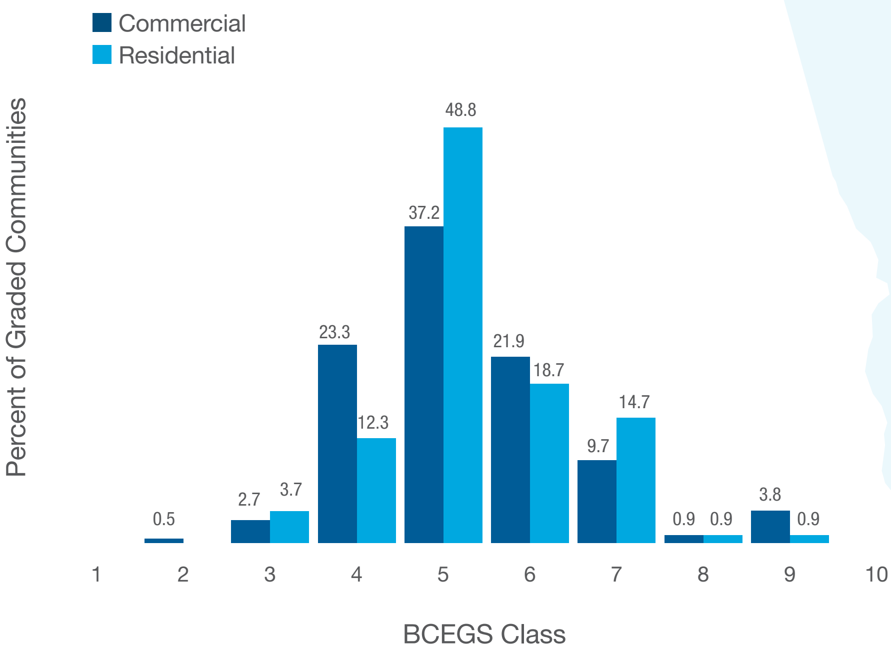
**Source: AIR Worldwide modeled loss cost data

Building Code Adoption History (as of 10/1/18)

ICC Code Release	Commercial Date Adopted	Residential Date Adopted
2009	3/15/12	3/15/12
2012	6/30/15	6/30/15
2015	12/31/17	12/31/17
2018	Not adopted	Not adopted

Georgia

BCEGS Community Class Distribution



BCEGS State Averages

	Score	Class
Commercial	61	**5**
Residential	58	**5**

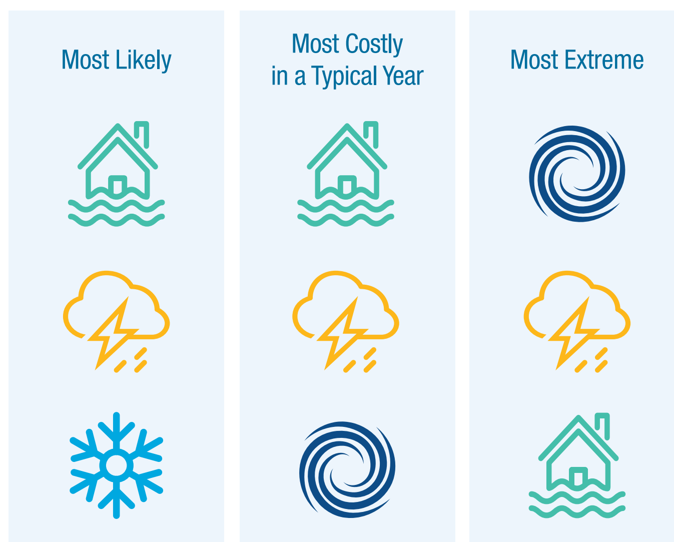
The BCEGS 1–10 classification is based on a 1-to-100-point score. For complete details on the scoring process, see pages 44–47, "Aiding the Resilience Revolution: ISO's BCEGS® Program and How It Works."

By the Numbers*

36,205 (national average: 31,618)	Average population served by building code enforcement departments in the state
$18.29 (national average: $22.62)	Average department expenditure per capita of population served
$0.25 (national average: $0.44)	Average department employee training expenditure per capita of population served
1.45% (national average: 2.48%)	Average training expenditure as a percentage of overall department expenditure

*Community data from BCEGS database

Top Three Modeled Natural Hazards**



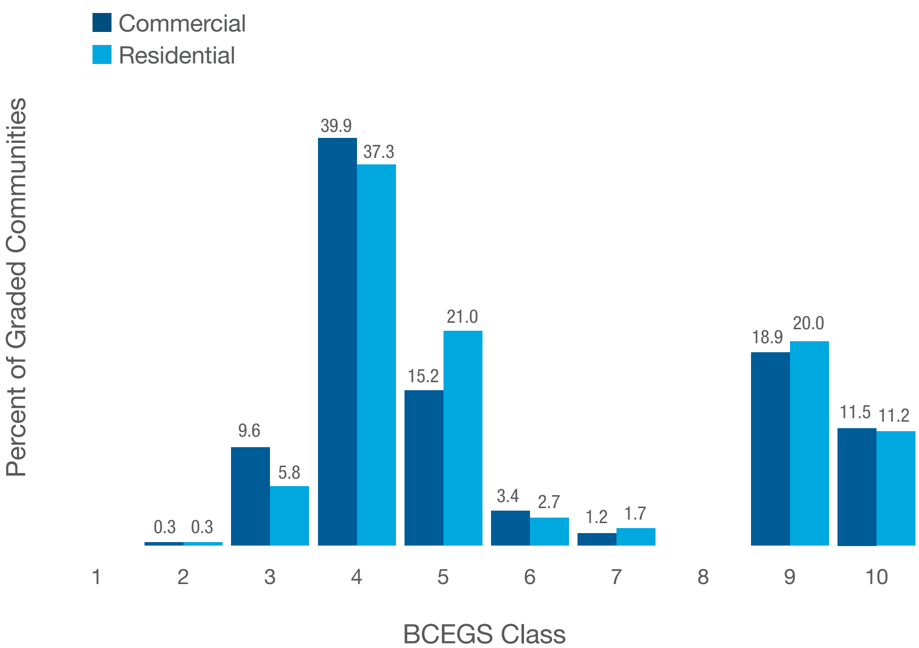
**Source: AIR Worldwide modeled loss cost data

Building Code Adoption History (as of 10/1/18)

ICC Code Release	Commercial Date Adopted	Residential Date Adopted
2009	Not adopted	Not adopted
2012	1/1/15	1/1/15
2015	Not adopted	Not adopted
2018	Not adopted	Not adopted

Illinois

BCEGS Community Class Distribution



BCEGS State Averages

	Score	Class
Commercial	51	**6**
Residential	49	**6**

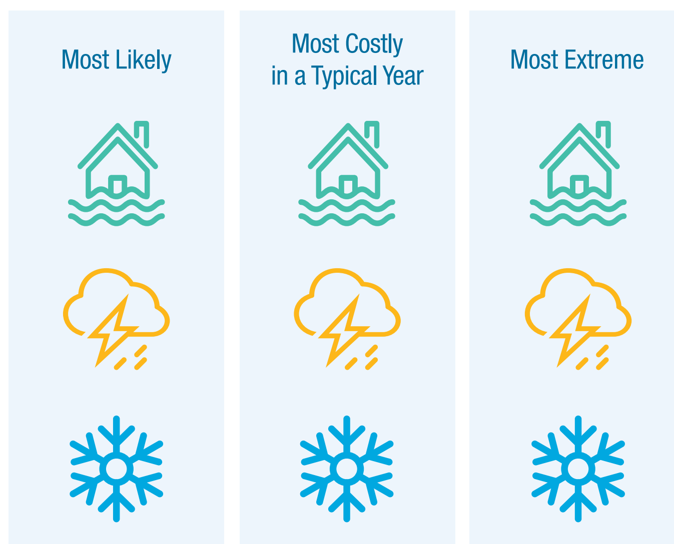
The BCEGS 1–10 classification is based on a 1-to-100-point score. For complete details on the scoring process, see pages 44–47, "Aiding the Resilience Revolution: ISO's BCEGS® Program and How It Works."

By the Numbers*

26,651 (national average: 31,618)	Average population served by building code enforcement departments in the state
$23.29 (national average: $22.62)	Average department expenditure per capita of population served
$0.16 (national average: $0.44)	Average department employee training expenditure per capita of population served
0.90% (national average: 2.48%)	Average training expenditure as a percentage of overall department expenditure

*Community data from BCEGS database

Top Three Modeled Natural Hazards**



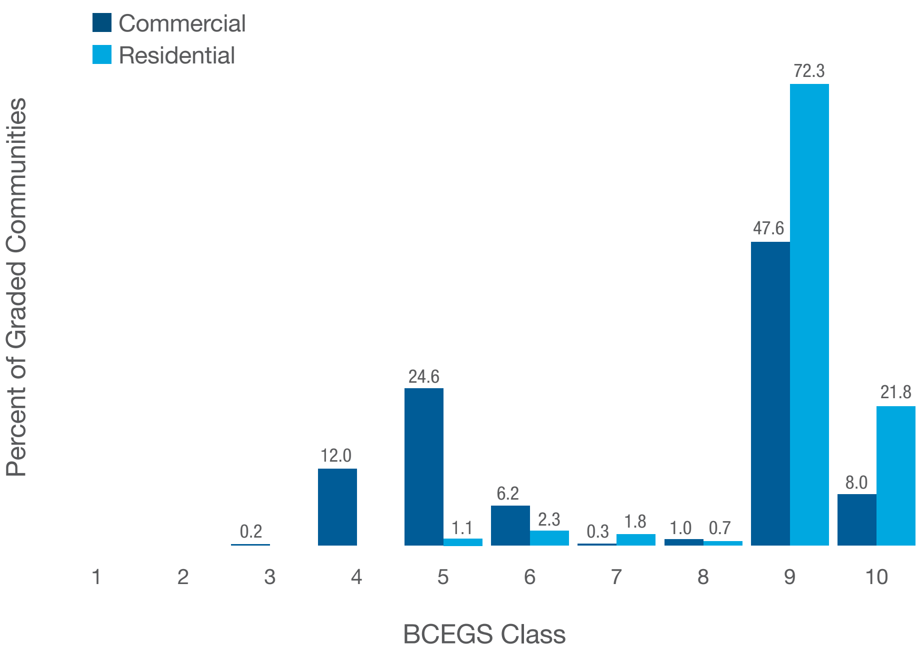
**Source: AIR Worldwide modeled loss cost data

Building Code Adoption History (as of 10/1/18)

Building codes are adopted and enforced at the local jurisdiction level.

Indiana

BCEGS Community Class Distribution



BCEGS State Averages

	Score	Class
Commercial	33	**8**
Residential	14	**9**

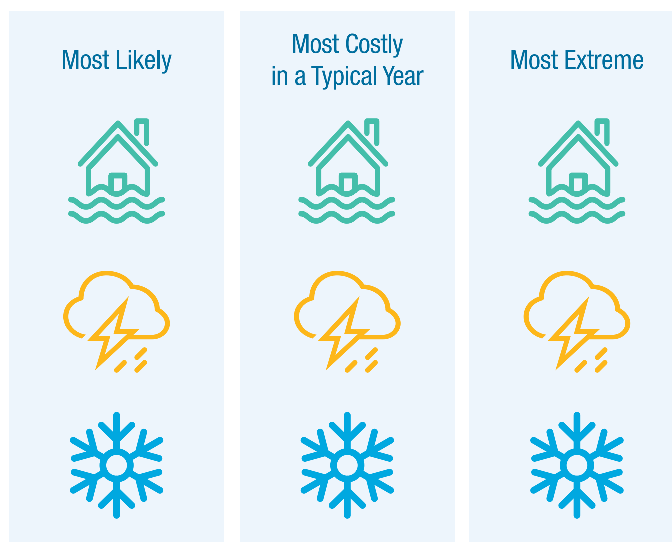
The BCEGS 1–10 classification is based on a 1-to-100-point score. For complete details on the scoring process, see pages 44–47, "Aiding the Resilience Revolution: ISO's BCEGS® Program and How It Works."

By the Numbers*

44,631 (national average: 31,618)	Average population served by building code enforcement departments in the state
$11.57 (national average: $22.62)	Average department expenditure per capita of population served
$0.15 (national average: $0.44)	Average department employee training expenditure per capita of population served
1.51% (national average: 2.48%)	Average training expenditure as a percentage of overall department expenditure

*Community data from BCEGS database

Top Three Modeled Natural Hazards**

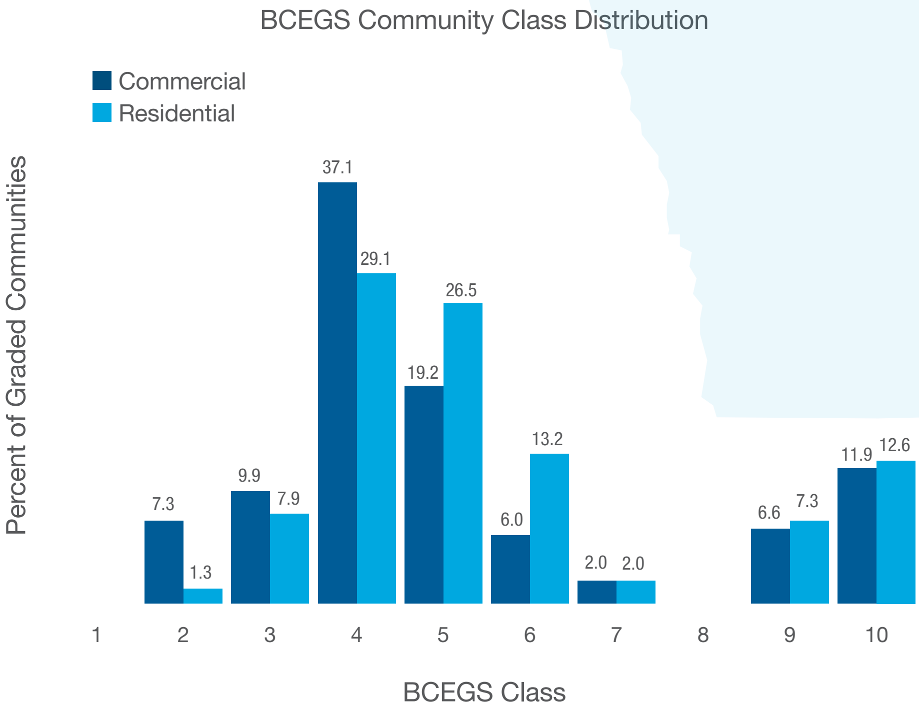


**Source: AIR Worldwide modeled loss cost data

Building Code Adoption History (as of 10/1/18)

ICC Code Release	Commercial Date Adopted	Residential Date Adopted
2009	Not adopted	Not adopted
2012	12/1/14	Not adopted
2015	Not adopted	Not adopted
2018	Not adopted	Not adopted

Iowa



BCEGS State Averages

	Score	Class
Commercial	57	**5**
Residential	54	**6**

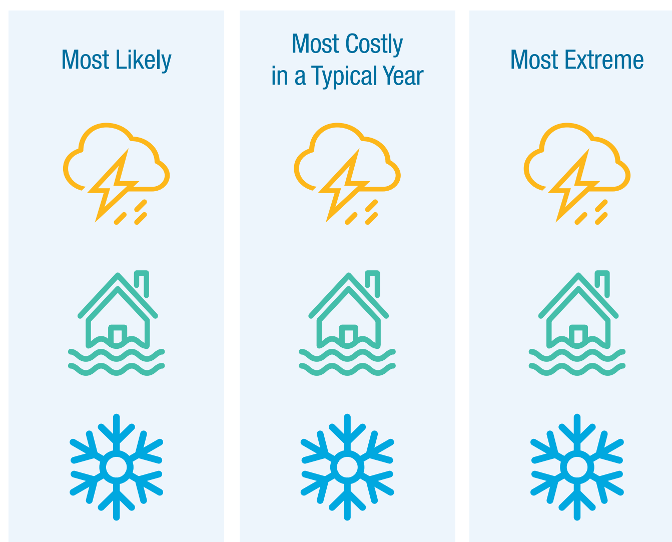
The BCEGS 1–10 classification is based on a 1-to-100-point score. For complete details on the scoring process, see pages 44–47, “Aiding the Resilience Revolution: ISO’s BCEGS® Program and How It Works.”

By the Numbers*

16,750 (national average: 31,618)	Average population served by building code enforcement departments in the state
$15.29 (national average: $22.62)	Average department expenditure per capita of population served
$0.24 (national average: $0.44)	Average department employee training expenditure per capita of population served
1.90% (national average: 2.48%)	Average training expenditure as a percentage of overall department expenditure

*Community data from BCEGS database

Top Three Modeled Natural Hazards**

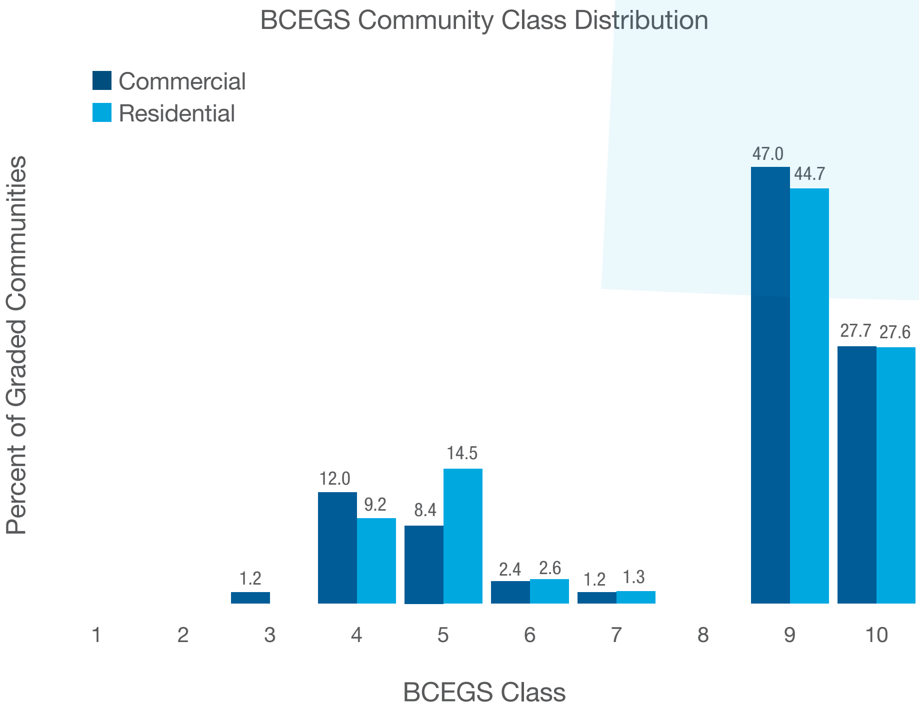


**Source: AIR Worldwide modeled loss cost data

Building Code Adoption History (as of 10/1/18)

ICC Code Release	Commercial Date Adopted	Residential Date Adopted
2009	1/2/10	1/2/10
2012	Not adopted	Not adopted
2015	5/18/16	5/18/16
2018	Not adopted	Not adopted

Kansas



BCEGS State Averages

	Score	Class
Commercial	26	**8**
Residential	25	**8**

The BCEGS 1–10 classification is based on a 1-to-100-point score. For complete details on the scoring process, see pages 44–47, "Aiding the Resilience Revolution: ISO's BCEGS® Program and How It Works."

By the Numbers*

16,825 (national average: 31,618)	Average population served by building code enforcement departments in the state
$19.87 (national average: $22.62)	Average department expenditure per capita of population served
$0.34 (national average: $0.44)	Average department employee training expenditure per capita of population served
4.07% (national average: 2.48%)	Average training expenditure as a percentage of overall department expenditure

*Community data from BCEGS database

Top Three Modeled Natural Hazards**

Most Likely	Most Costly in a Typical Year	Most Extreme

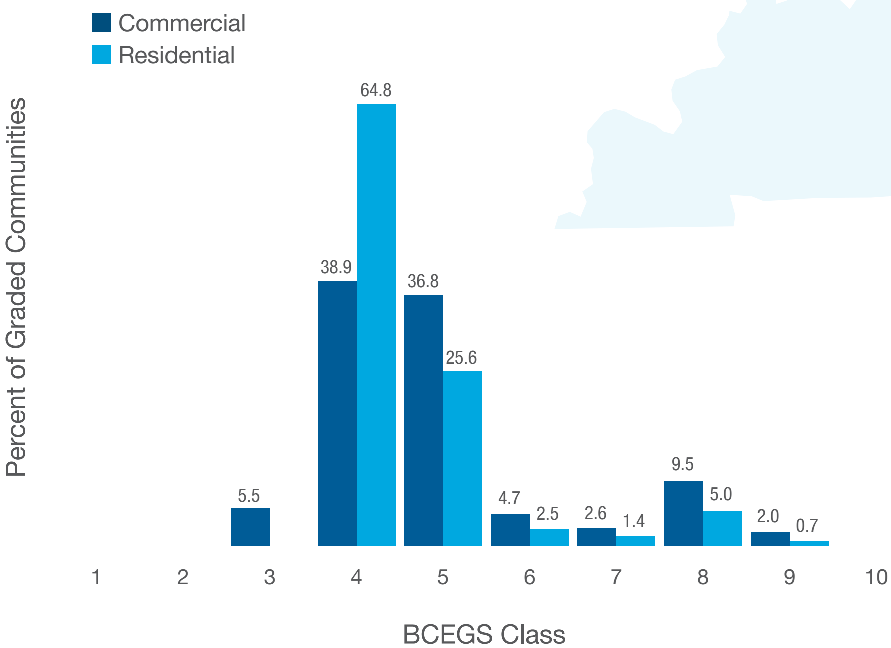
**Source: AIR Worldwide modeled loss cost data

Building Code Adoption History (as of 10/1/18)

Building codes are adopted and enforced at the local jurisdiction level.

Kentucky

BCEGS Community Class Distribution



BCEGS State Averages

	Score	Class
Commercial	62	**5**
Residential	66	**4**

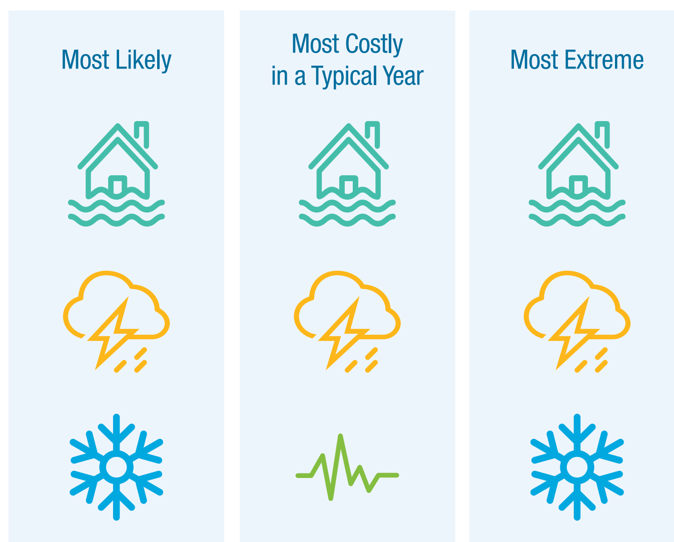
The BCEGS 1–10 classification is based on a 1-to-100-point score. For complete details on the scoring process, see pages 44–47, “Aiding the Resilience Revolution: ISO’s BCEGS® Program and How It Works.”

By the Numbers*

32,289 (national average: 31,618)	Average population served by building code enforcement departments in the state
$6.77 (national average: $22.62)	Average department expenditure per capita of population served
$0.10 (national average: $0.44)	Average department employee training expenditure per capita of population served
1.13% (national average: 2.48%)	Average training expenditure as a percentage of overall department expenditure

*Community data from BCEGS database

Top Three Modeled Natural Hazards**



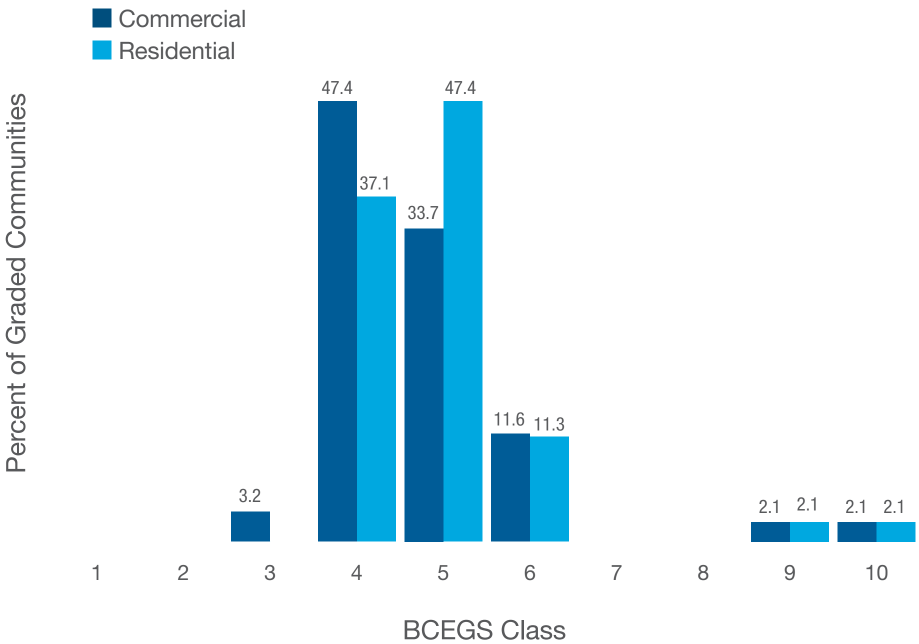
**Source: AIR Worldwide modeled loss cost data

Building Code Adoption History (as of 10/1/18)

ICC Code Release	Commercial Date Adopted	Residential Date Adopted
2009	Not adopted	Not adopted
2012	1/1/14	1/1/14
2015	8/22/18	8/22/18
2018	Not adopted	Not adopted

Maine

BCEGS Community Class Distribution



BCEGS State Averages

	Score	Class
Commercial	63	**5**
Residential	60	**5**

The BCEGS 1–10 classification is based on a 1-to-100-point score. For complete details on the scoring process, see pages 44–47, "Aiding the Resilience Revolution: ISO's BCEGS® Program and How It Works."

By the Numbers*

9,017 (national average: 31,618)	Average population served by building code enforcement departments in the state
$23.40 (national average: $22.62)	Average department expenditure per capita of population served
$0.30 (national average: $0.44)	Average department employee training expenditure per capita of population served
1.64% (national average: 2.48%)	Average training expenditure as a percentage of overall department expenditure

*Community data from BCEGS database

Top Three Modeled Natural Hazards**

Most Likely | Most Costly in a Typical Year | Most Extreme

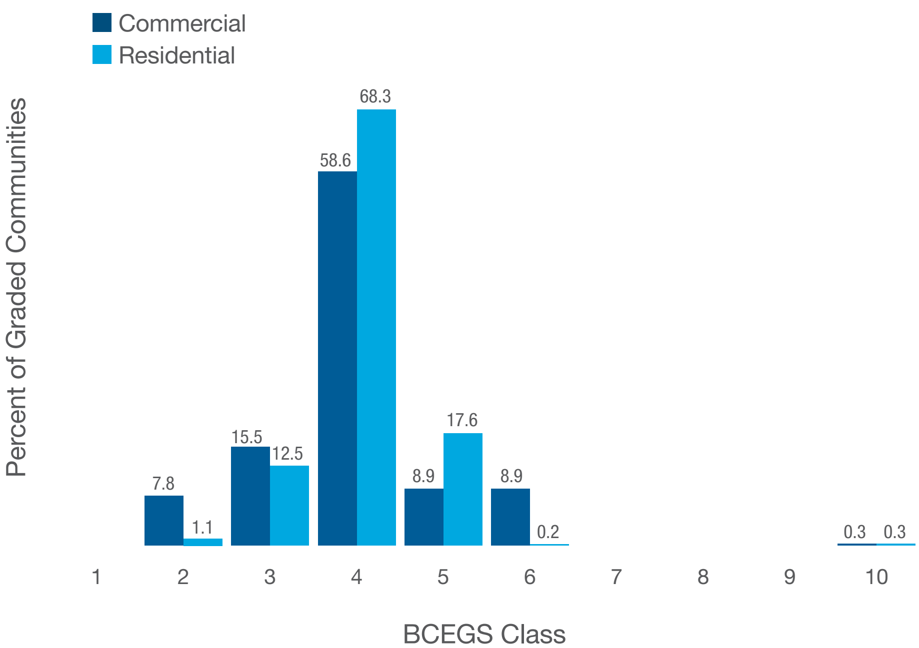
**Source: AIR Worldwide modeled loss cost data

Building Code Adoption History (as of 10/1/18)

ICC Code Release	Commercial Date Adopted	Residential Date Adopted
2009	7/1/10	7/1/10
2012	Not adopted	Not adopted
2015	1/23/18	1/23/18
2018	Not adopted	Not adopted

Maryland

BCEGS Community Class Distribution



BCEGS State Averages

	Score	Class
Commercial	71	**4**
Residential	70	**4**

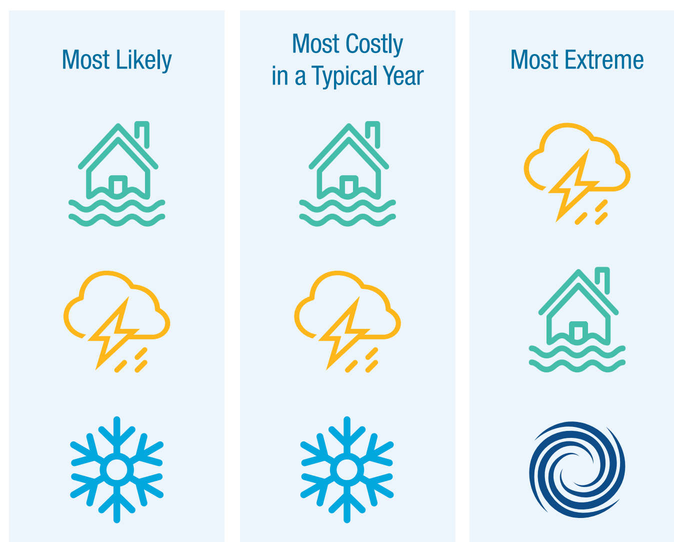
The BCEGS 1–10 classification is based on a 1-to-100-point score. For complete details on the scoring process, see pages 44–47, "Aiding the Resilience Revolution: ISO's BCEGS® Program and How It Works."

By the Numbers*

176,450 (national average: 31,618)	Average population served by building code enforcement departments in the state
$17.18 (national average: $22.62)	Average department expenditure per capita of population served
$0.11 (national average: $0.44)	Average department employee training expenditure per capita of population served
0.96% (national average: 2.48%)	Average training expenditure as a percentage of overall department expenditure

*Community data from BCEGS database

Top Three Modeled Natural Hazards**



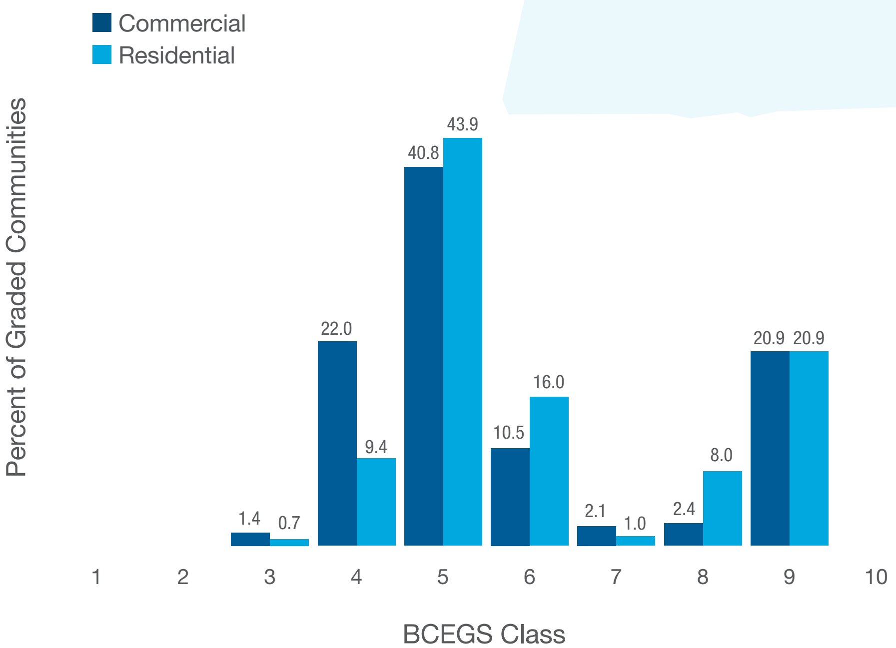
**Source: AIR Worldwide modeled loss cost data

Building Code Adoption History (as of 10/1/18)

ICC Code Release	Commercial Date Adopted	Residential Date Adopted
2009	4/14/10	4/14/10
2012	3/10/13	3/10/13
2015	1/1/15	1/1/15
2018	Not adopted	Not adopted

Massachusetts

BCEGS Community Class Distribution



BCEGS State Averages

	Score	Class
Commercial	52	**6**
Residential	49	**6**

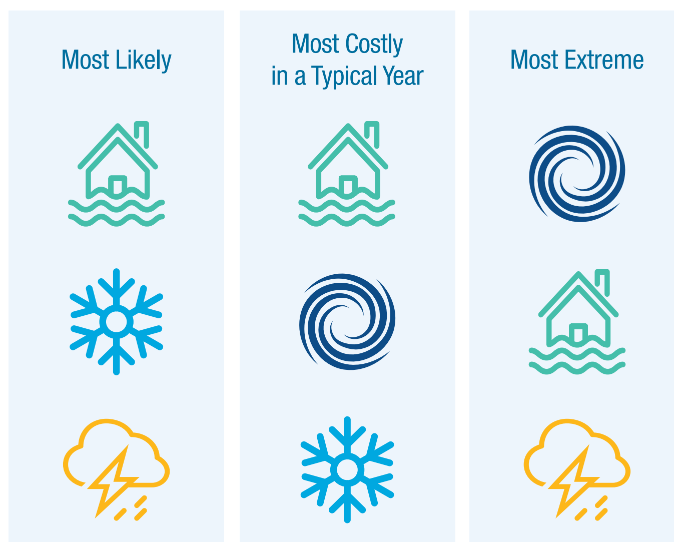
The BCEGS 1–10 classification is based on a 1-to-100-point score. For complete details on the scoring process, see pages 44–47, "Aiding the Resilience Revolution: ISO's BCEGS® Program and How It Works."

By the Numbers*

20,687 (national average: 31,618)	Average population served by building code enforcement departments in the state
$17.55 (national average: $22.62)	Average department expenditure per capita of population served
$0.19 (national average: $0.44)	Average department employee training expenditure per capita of population served
1.26% (national average: 2.48%)	Average training expenditure as a percentage of overall department expenditure

*Community data from BCEGS database

Top Three Modeled Natural Hazards**

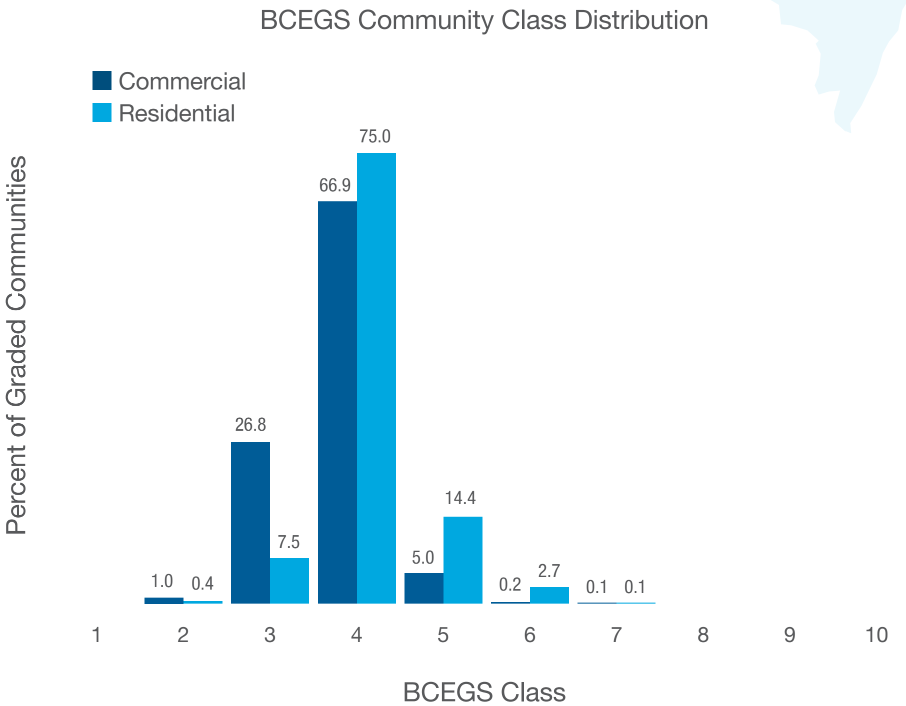


**Source: AIR Worldwide modeled loss cost data

Building Code Adoption History (as of 10/1/18)

ICC Code Release	Commercial Date Adopted	Residential Date Adopted
2009	1/15/11	1/15/11
2012	Not adopted	Not adopted
2015	1/1/18	1/1/18
2018	Not adopted	Not adopted

Michigan



BCEGS State Averages

	Score	Class
Commercial	73	**4**
Residential	69	**4**

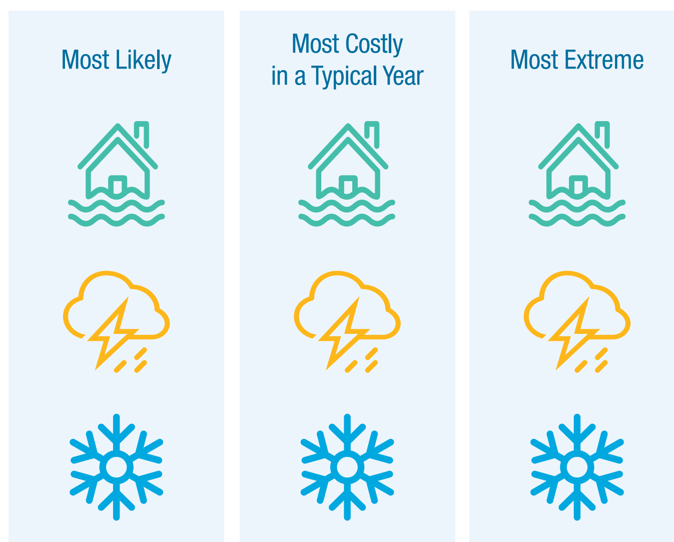
The BCEGS 1–10 classification is based on a 1-to-100-point score. For complete details on the scoring process, see pages 44–47, "Aiding the Resilience Revolution: ISO's BCEGS® Program and How It Works."

By the Numbers*

15,168 (national average: 31,618)	Average population served by building code enforcement departments in the state
$13.13 (national average: $22.62)	Average department expenditure per capita of population served
$0.23 (national average: $0.44)	Average department employee training expenditure per capita of population served
2.39% (national average: 2.48%)	Average training expenditure as a percentage of overall department expenditure

*Community data from BCEGS database

Top Three Modeled Natural Hazards**



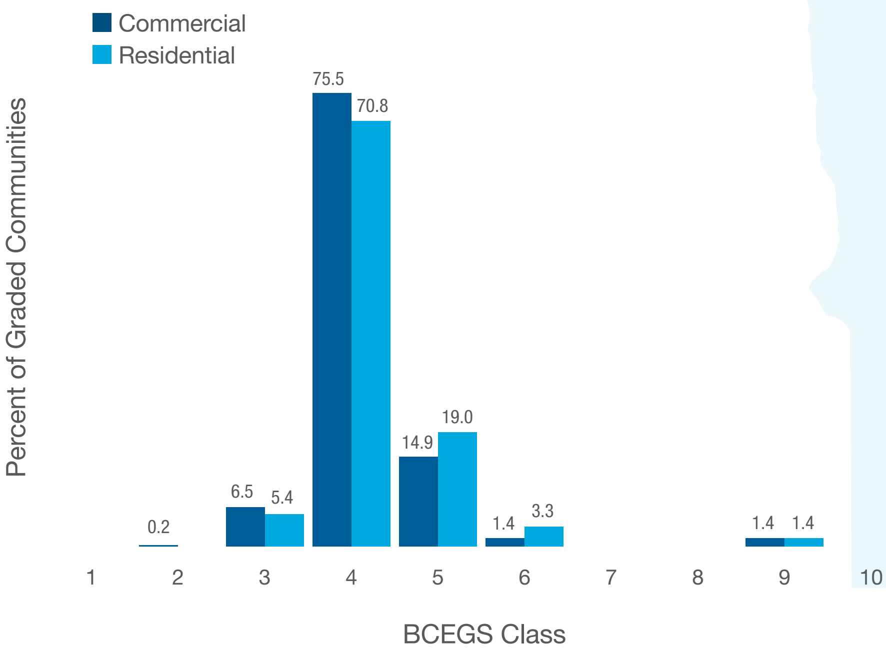
**Source: AIR Worldwide modeled loss cost data

Building Code Adoption History (as of 10/1/18)

ICC Code Release	Commercial Date Adopted	Residential Date Adopted
2009	3/9/11	3/9/11
2012	10/9/14	Not adopted
2015	4/20/17	2/8/16
2018	Not adopted	Not adopted

Minnesota

BCEGS Community Class Distribution



BCEGS State Averages

	Score	Class
Commercial	68	**4**
Residential	67	**4**

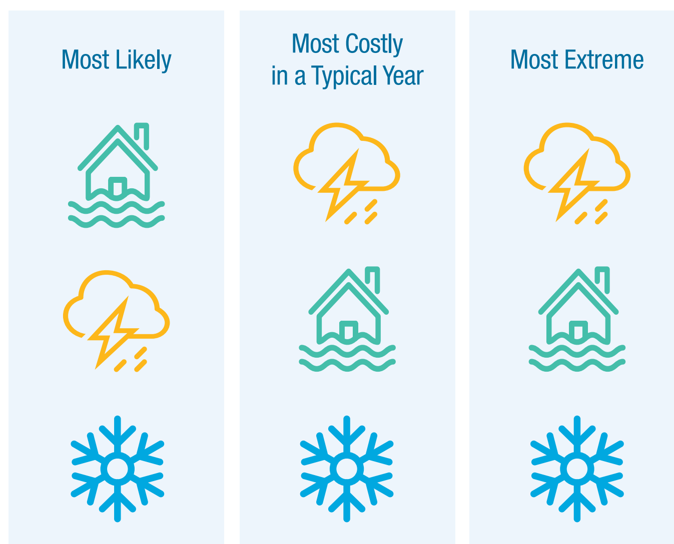
The BCEGS 1–10 classification is based on a 1-to-100-point score. For complete details on the scoring process, see pages 44–47, "Aiding the Resilience Revolution: ISO's BCEGS® Program and How It Works."

By the Numbers*

14,066 (national average: 31,618)	Average population served by building code enforcement departments in the state
$18.73 (national average: $22.62)	Average department expenditure per capita of population served
$0.26 (national average: $0.44)	Average department employee training expenditure per capita of population served
2.10% (national average: 2.48%)	Average training expenditure as a percentage of overall department expenditure

*Community data from BCEGS database

Top Three Modeled Natural Hazards**

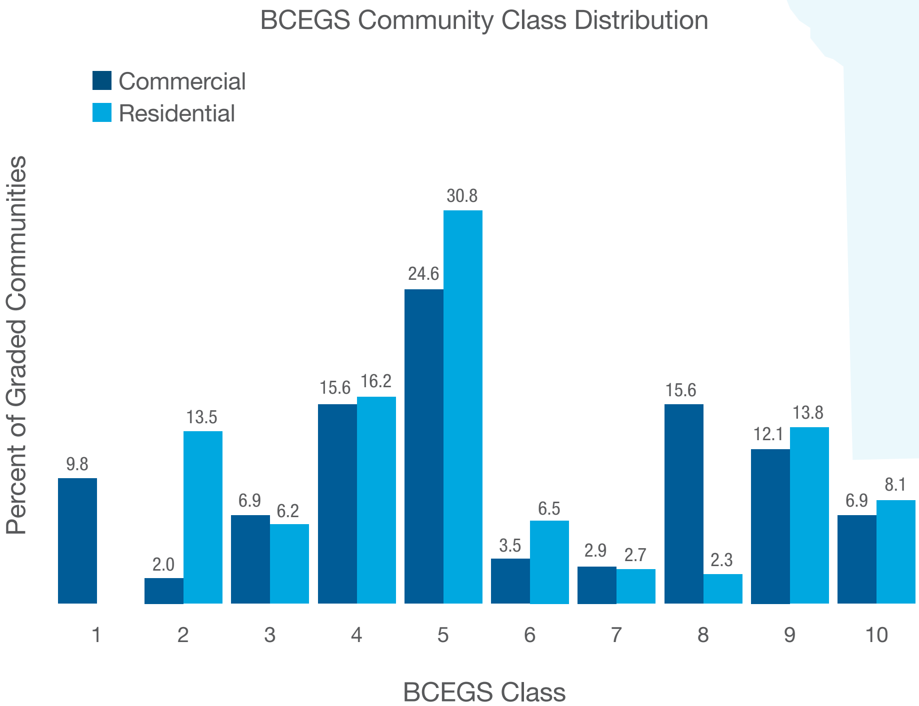


**Source: AIR Worldwide modeled loss cost data

Building Code Adoption History (as of 10/1/18)

ICC Code Release	Commercial Date Adopted	Residential Date Adopted
2009	Not adopted	Not adopted
2012	6/2/15	1/24/15
2015	4/20/17	2/8/16
2018	Not adopted	Not adopted

Missouri



BCEGS State Averages

	Score	Class
Commercial	51	**6**
Residential	50	**6**

The BCEGS 1–10 classification is based on a 1-to-100-point score. For complete details on the scoring process, see pages 44–47, “Aiding the Resilience Revolution: ISO’s BCEGS® Program and How It Works.”

By the Numbers*

33,375 (national average: 31,618)	Average population served by building code enforcement departments in the state
$24.27 (national average: $22.62)	Average department expenditure per capita of population served
$0.28 (national average: $0.44)	Average department employee training expenditure per capita of population served
1.84% (national average: 2.48%)	Average training expenditure as a percentage of overall department expenditure

*Community data from BCEGS database

Top Three Modeled Natural Hazards**

Most Likely	Most Costly in a Typical Year	Most Extreme

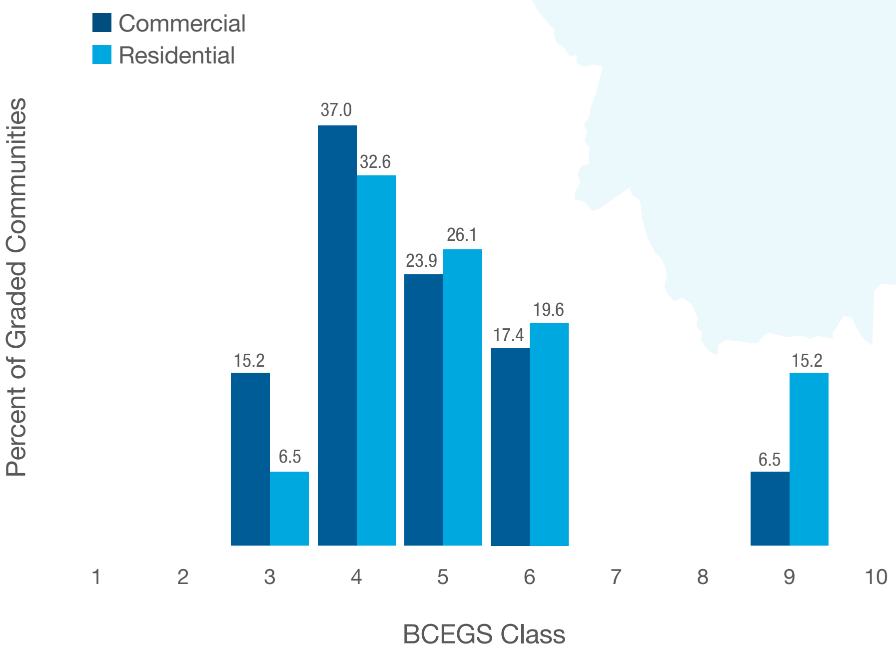
**Source: AIR Worldwide modeled loss cost data

Building Code Adoption History (as of 10/1/18)

Building codes are adopted and enforced at the local jurisdiction level.

Montana

BCEGS Community Class Distribution



BCEGS State Averages

	Score	Class
Commercial	63	**5**
Residential	57	**5**

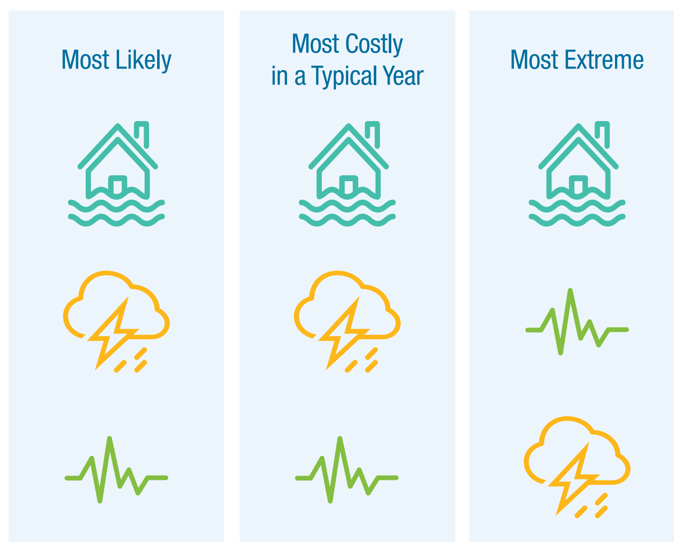
The BCEGS 1–10 classification is based on a 1-to-100-point score. For complete details on the scoring process, see pages 44–47, “Aiding the Resilience Revolution: ISO’s BCEGS® Program and How It Works.”

By the Numbers*

13,147 (national average: 31,618)	Average population served by building code enforcement departments in the state
$14.14 (national average: $22.62)	Average department expenditure per capita of population served
$0.27 (national average: $0.44)	Average department employee training expenditure per capita of population served
2.70% (national average: 2.48%)	Average training expenditure as a percentage of overall department expenditure

*Community data from BCEGS database

Top Three Modeled Natural Hazards**

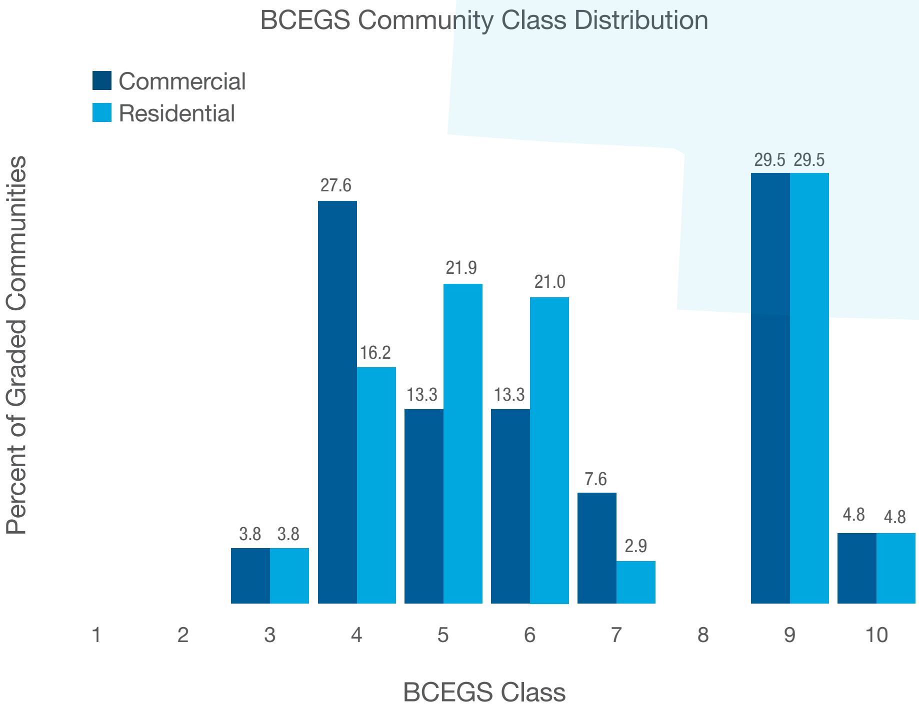


**Source: AIR Worldwide modeled loss cost data

Building Code Adoption History (as of 10/1/18)

ICC Code Release	Commercial Date Adopted	Residential Date Adopted
2009	7/1/10	7/1/10
2012	11/6/14	11/6/14
2015	Not adopted	Not adopted
2018	Not adopted	Not adopted

Nebraska



BCEGS State Averages

	Score	Class
Commercial	46	**7**
Residential	44	**7**

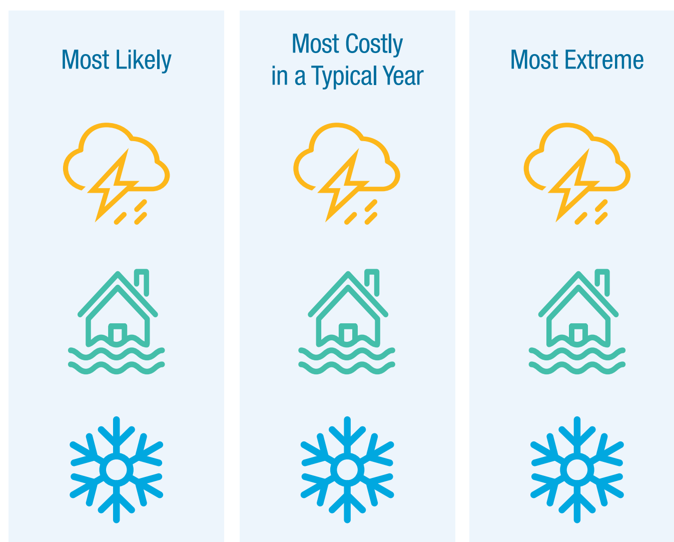
The BCEGS 1–10 classification is based on a 1-to-100-point score. For complete details on the scoring process, see pages 44–47, "Aiding the Resilience Revolution: ISO's BCEGS® Program and How It Works."

By the Numbers*

30,467 (national average: 31,618)	Average population served by building code enforcement departments in the state
$16.49 (national average: $22.62)	Average department expenditure per capita of population served
$0.20 (national average: $0.44)	Average department employee training expenditure per capita of population served
1.40% (national average: 2.48%)	Average training expenditure as a percentage of overall department expenditure

*Community data from BCEGS database

Top Three Modeled Natural Hazards**

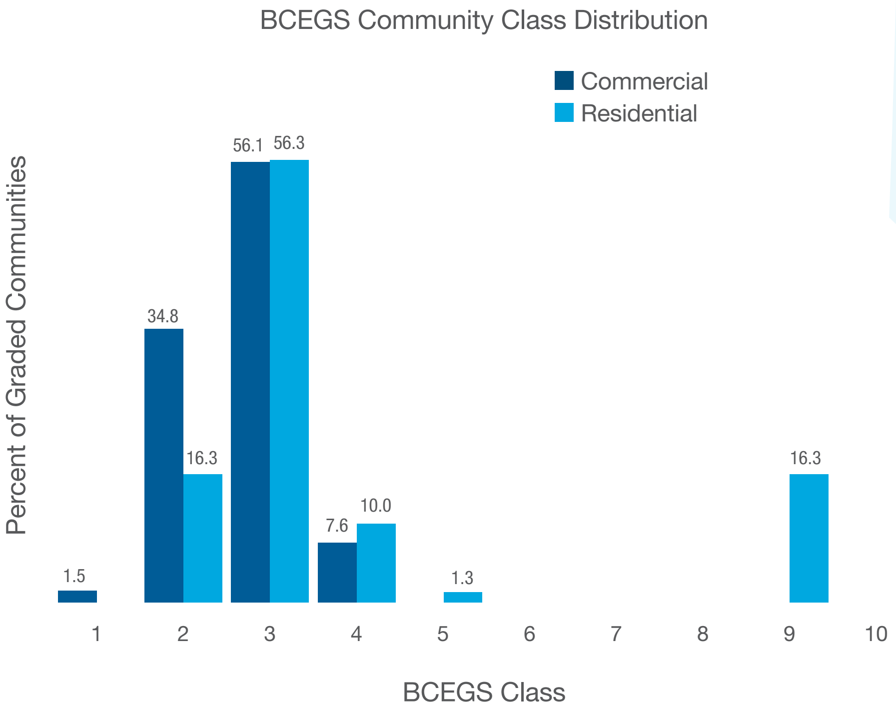


**Source: AIR Worldwide modeled loss cost data

Building Code Adoption History (as of 10/1/18)

ICC Code Release	Commercial Date Adopted	Residential Date Adopted
2009	1/1/12	4/14/11
2012	1/1/15	1/1/15
2015	Not adopted	Not adopted
2018	Not adopted	Not adopted

Nevada



BCEGS State Averages

	Score	Class
Commercial	83	**3**
Residential	70	**4**

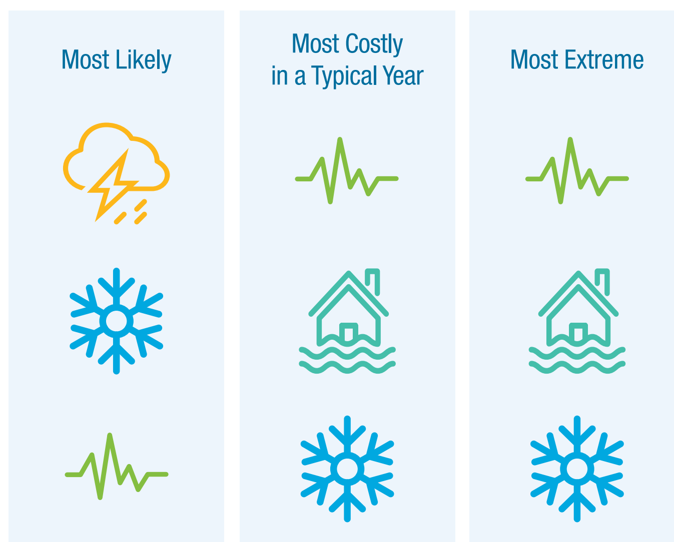
The BCEGS 1–10 classification is based on a 1-to-100-point score. For complete details on the scoring process, see pages 44–47, "Aiding the Resilience Revolution: ISO's BCEGS® Program and How It Works."

By the Numbers*

95,392 (national average: 31,618)	Average population served by building code enforcement departments in the state
$19.26 (national average: $22.62)	Average department expenditure per capita of population served
$0.19 (national average: $0.44)	Average department employee training expenditure per capita of population served
1.37% (national average: 2.48%)	Average training expenditure as a percentage of overall department expenditure

*Community data from BCEGS database

Top Three Modeled Natural Hazards**



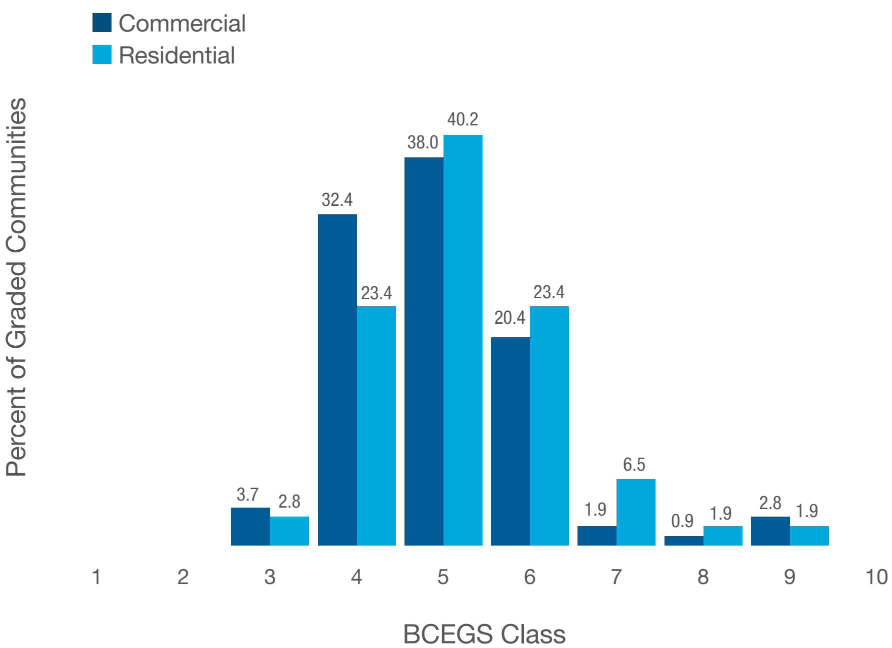
**Source: AIR Worldwide modeled loss cost data

Building Code Adoption History (as of 10/1/18)

ICC Code Release	Commercial Date Adopted	Residential Date Adopted
2009	Not adopted	Not adopted
2012	9/1/13	9/1/13
2015	Not adopted	Not adopted
2018	Not adopted	Not adopted

New Hampshire

BCEGS Community Class Distribution



BCEGS State Averages

	Score	Class
Commercial	60	**5**
Residential	59	**5**

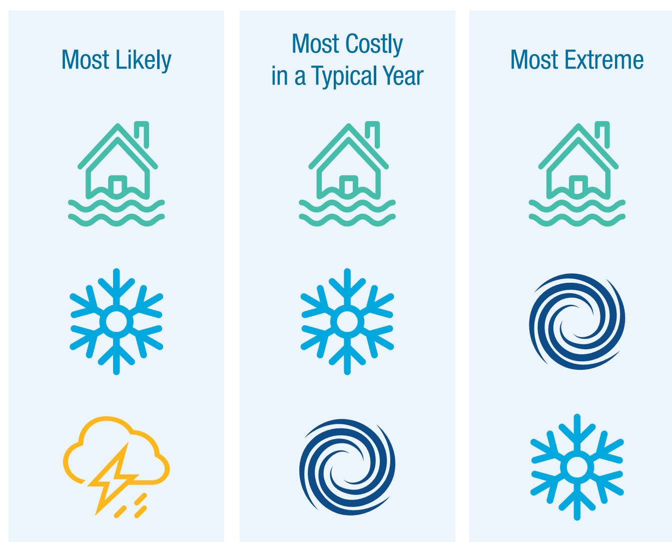
The BCEGS 1–10 classification is based on a 1-to-100-point score. For complete details on the scoring process, see pages 44–47, "Aiding the Resilience Revolution: ISO's BCEGS® Program and How It Works."

By the Numbers*

10,696 (national average: 31,618)	Average population served by building code enforcement departments in the state
$12.80 (national average: $22.62)	Average department expenditure per capita of population served
$0.20 (national average: $0.44)	Average department employee training expenditure per capita of population served
2.23% (national average: 2.48%)	Average training expenditure as a percentage of overall department expenditure

*Community data from BCEGS database

Top Three Modeled Natural Hazards**

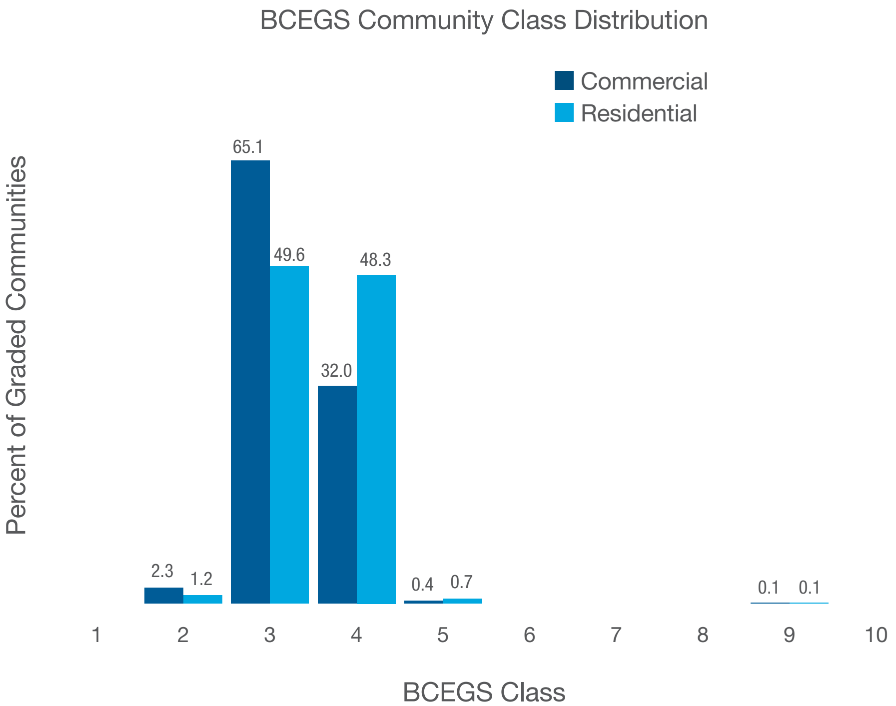


**Source: AIR Worldwide modeled loss cost data

Building Code Adoption History (as of 10/1/18)

ICC Code Release	Commercial Date Adopted	Residential Date Adopted
2009	4/1/10	4/1/10
2012	Not adopted	Not adopted
2015	Not adopted	Not adopted
2018	Not adopted	Not adopted

New Jersey



BCEGS State Averages

	Score	Class
Commercial	78	**3**
Residential	76	**4**

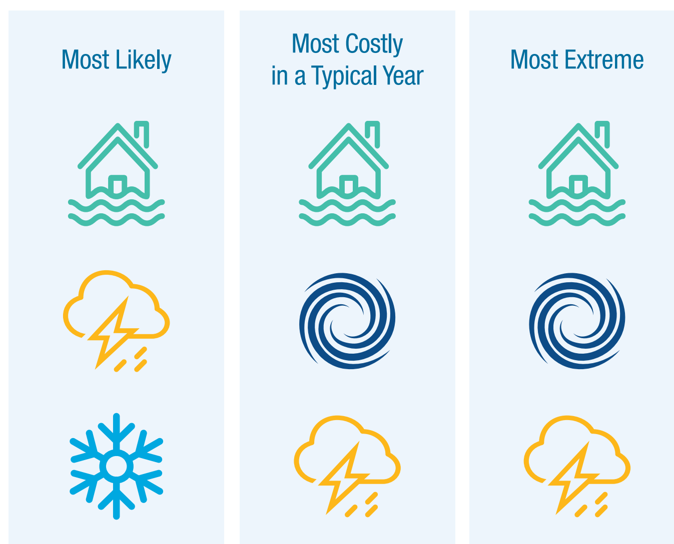
The BCEGS 1–10 classification is based on a 1-to-100-point score. For complete details on the scoring process, see pages 44–47, "Aiding the Resilience Revolution: ISO's BCEGS® Program and How It Works."

By the Numbers*

16,996 (national average: 31,618)	Average population served by building code enforcement departments in the state
$24.86 (national average: $22.62)	Average department expenditure per capita of population served
$2.18 (national average: $0.44)	Average department employee training expenditure per capita of population served
8.90% (national average: 2.48%)	Average training expenditure as a percentage of overall department expenditure

*Community data from BCEGS database

Top Three Modeled Natural Hazards**

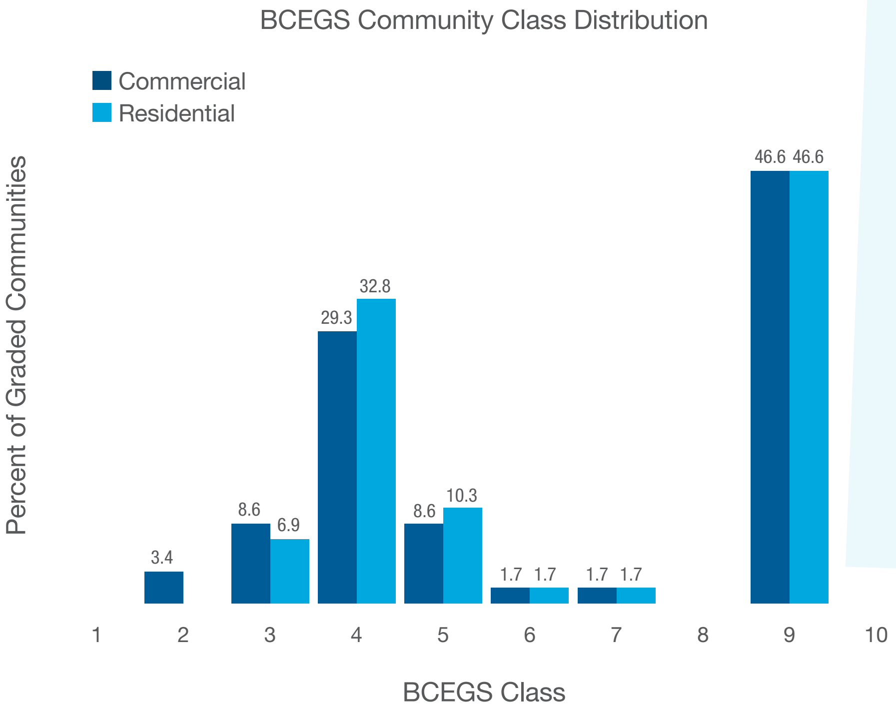


**Source: AIR Worldwide modeled loss cost data

Building Code Adoption History (as of 10/1/18)

ICC Code Release	Commercial Date Adopted	Residential Date Adopted
2009	3/7/11	3/7/11
2012	Not adopted	Not adopted
2015	9/21/15	9/21/15
2018	Not adopted	Not adopted

New Mexico



BCEGS State Averages

	Score	Class
Commercial	47	**7**
Residential	44	**7**

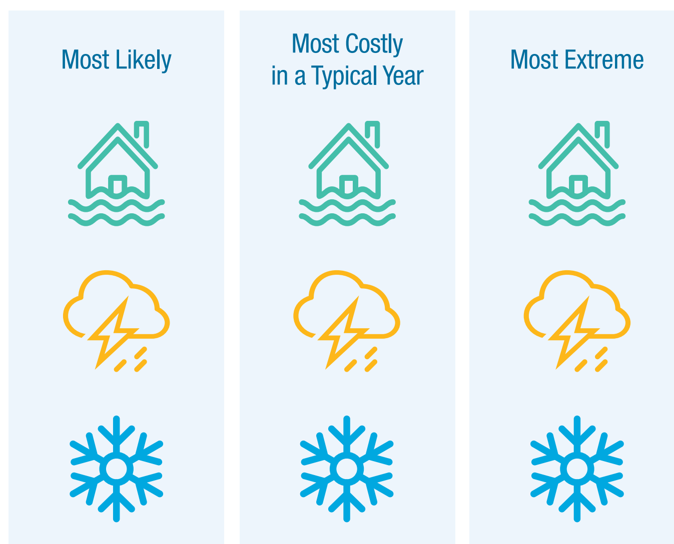
The BCEGS 1–10 classification is based on a 1-to-100-point score. For complete details on the scoring process, see pages 44–47, "Aiding the Resilience Revolution: ISO's BCEGS® Program and How It Works."

By the Numbers*

72,516 (national average: 31,618)	Average population served by building code enforcement departments in the state
$18.25 (national average: $22.62)	Average department expenditure per capita of population served
$0.25 (national average: $0.44)	Average department employee training expenditure per capita of population served
1.44% (national average: 2.48%)	Average training expenditure as a percentage of overall department expenditure

*Community data from BCEGS database

Top Three Modeled Natural Hazards**

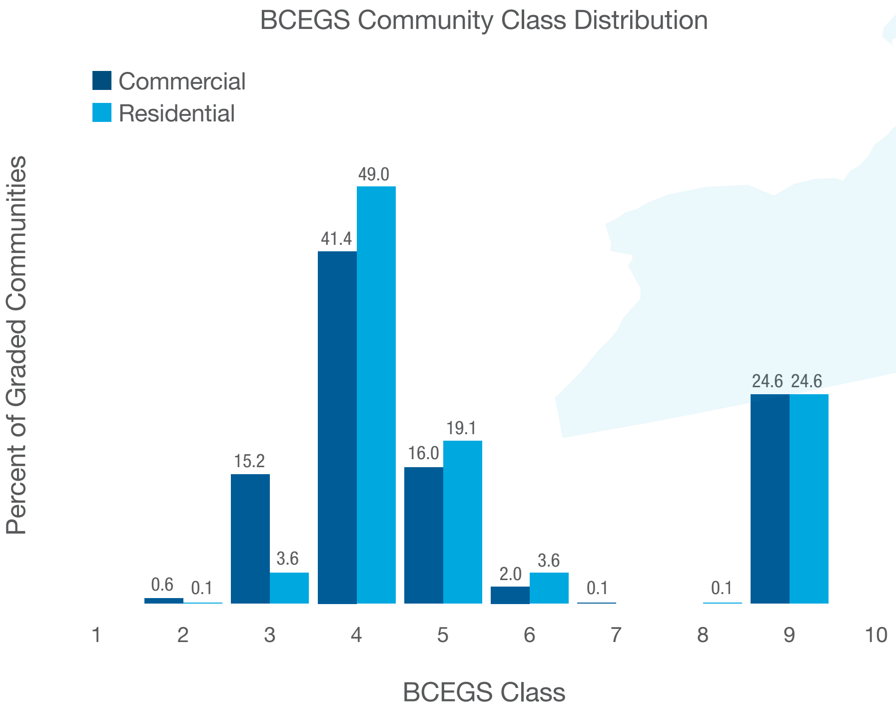


**Source: AIR Worldwide modeled loss cost data

Building Code Adoption History (as of 10/1/18)

ICC Code Release	Commercial Date Adopted	Residential Date Adopted
2009	1/28/11	1/28/11
2012	Not adopted	Not adopted
2015	11/15/16	11/15/16
2018	Not adopted	Not adopted

New York



BCEGS State Averages

	Score	Class
Commercial	58	**5**
Residential	55	**6**

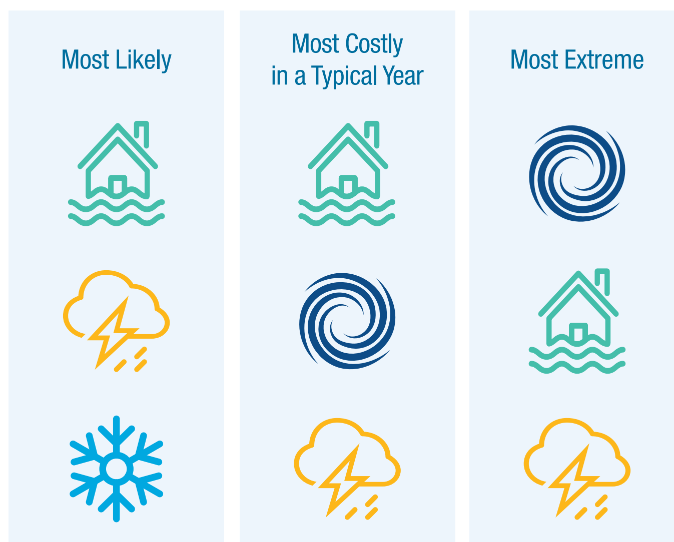
The BCEGS 1–10 classification is based on a 1-to-100-point score. For complete details on the scoring process, see pages 44–47, "Aiding the Resilience Revolution: ISO's BCEGS® Program and How It Works."

By the Numbers*

11,484 (national average: 31,618)	Average population served by building code enforcement departments in the state
$15.49 (national average: $22.62)	Average department expenditure per capita of population served
$0.37 (national average: $0.44)	Average department employee training expenditure per capita of population served
5.41% (national average: 2.48%)	Average training expenditure as a percentage of overall department expenditure

*Community data from BCEGS database

Top Three Modeled Natural Hazards**



**Source: AIR Worldwide modeled loss cost data

Building Code Adoption History (as of 10/1/18)

ICC Code Release	Commercial Date Adopted	Residential Date Adopted
2009	Not adopted	Not adopted
2012	Not adopted	Not adopted
2015	10/3/16	10/3/16
2018	Not adopted	Not adopted

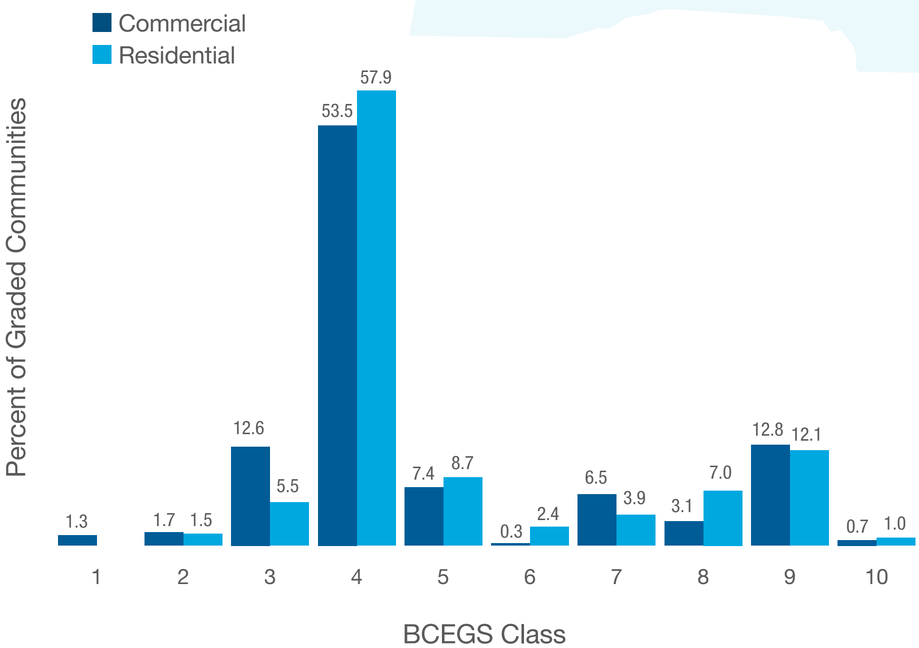
North Carolina

BCEGS State Averages

	Score	Class
Commercial	62	**5**
Residential	59	**5**

The BCEGS 1–10 classification is based on a 1-to-100-point score. For complete details on the scoring process, see pages 44–47, "Aiding the Resilience Revolution: ISO's BCEGS® Program and How It Works."

BCEGS Community Class Distribution

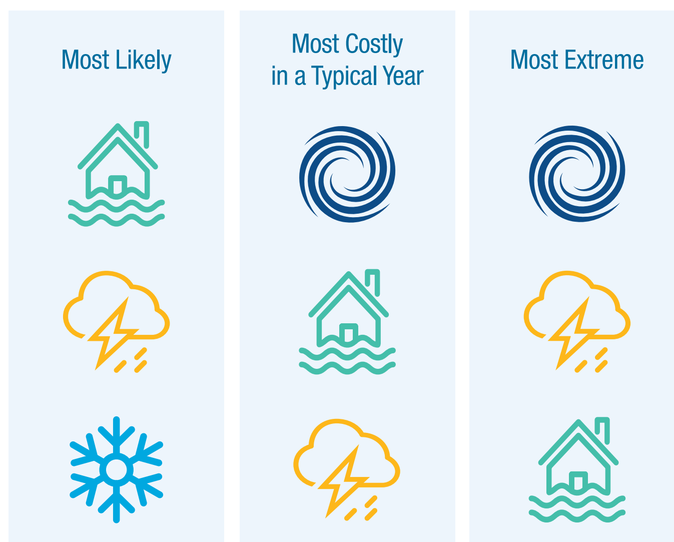


By the Numbers*

45,461 (national average: 31,618)	Average population served by building code enforcement departments in the state
$32.96 (national average: $22.62)	Average department expenditure per capita of population served
$0.53 (national average: $0.44)	Average department employee training expenditure per capita of population served
1.58% (national average: 2.48%)	Average training expenditure as a percentage of overall department expenditure

*Community data from BCEGS database

Top Three Modeled Natural Hazards**



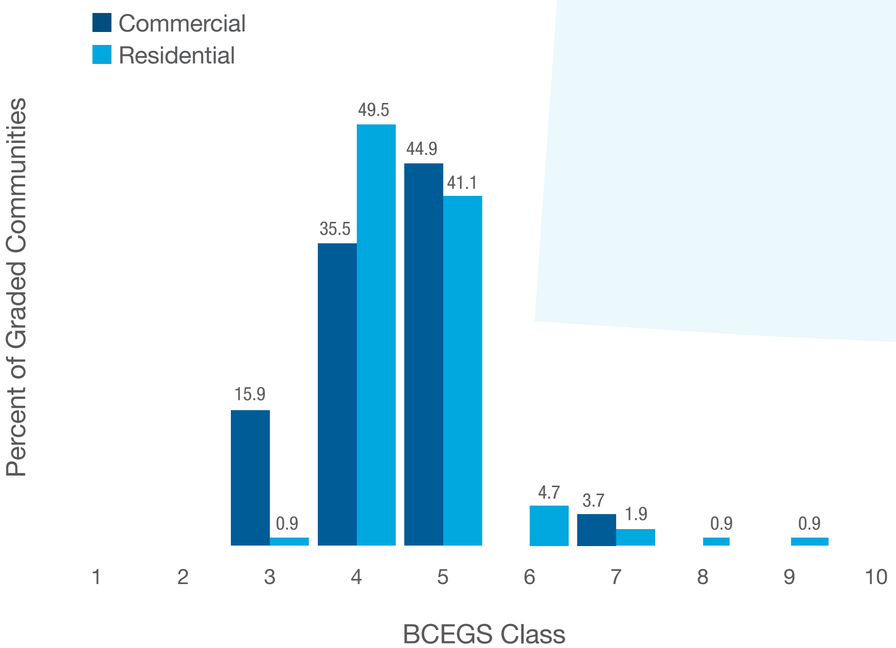
**Source: AIR Worldwide modeled loss cost data

Building Code Adoption History (as of 10/1/18)

ICC Code Release	Commercial Date Adopted	Residential Date Adopted
2009	9/1/11	9/1/11
2012	Not adopted	Not adopted
2015	1/1/2019	1/1/2019
2018	Not adopted	Not adopted

North Dakota

BCEGS Community Class Distribution



BCEGS State Averages

	Score	Class
Commercial	66	**4**
Residential	62	**5**

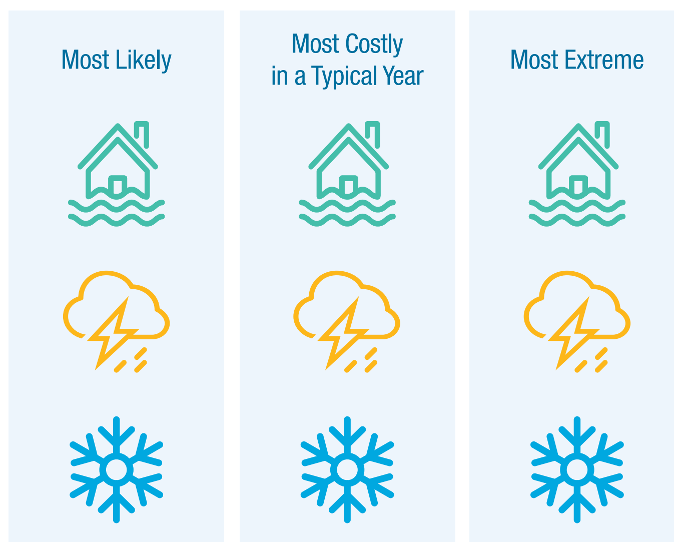
The BCEGS 1–10 classification is based on a 1-to-100-point score. For complete details on the scoring process, see pages 44–47, "Aiding the Resilience Revolution: ISO's BCEGS® Program and How It Works."

By the Numbers*

14,571 (national average: 31,618)	Average population served by building code enforcement departments in the state
$17.41 (national average: $22.62)	Average department expenditure per capita of population served
$0.36 (national average: $0.44)	Average department employee training expenditure per capita of population served
2.62% (national average: 2.48%)	Average training expenditure as a percentage of overall department expenditure

*Community data from BCEGS database

Top Three Modeled Natural Hazards**



**Source: AIR Worldwide modeled loss cost data

Building Code Adoption History (as of 10/1/18)

ICC Code Release	Commercial Date Adopted	Residential Date Adopted
2009	1/1/11	1/1/11
2012	1/1/14	1/1/14
2015	1/1/17	1/1/17
2018	Not adopted	Not adopted

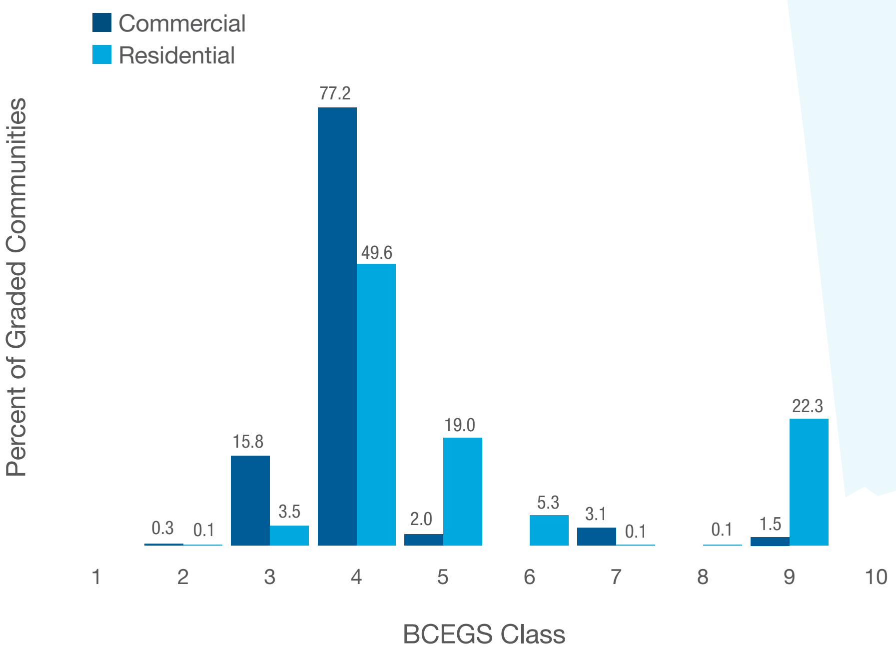
Ohio

BCEGS State Averages

	Score	Class
Commercial	70	**4**
Residential	55	**6**

The BCEGS 1–10 classification is based on a 1-to-100-point score. For complete details on the scoring process, see pages 44–47, "Aiding the Resilience Revolution: ISO's BCEGS® Program and How It Works."

BCEGS Community Class Distribution

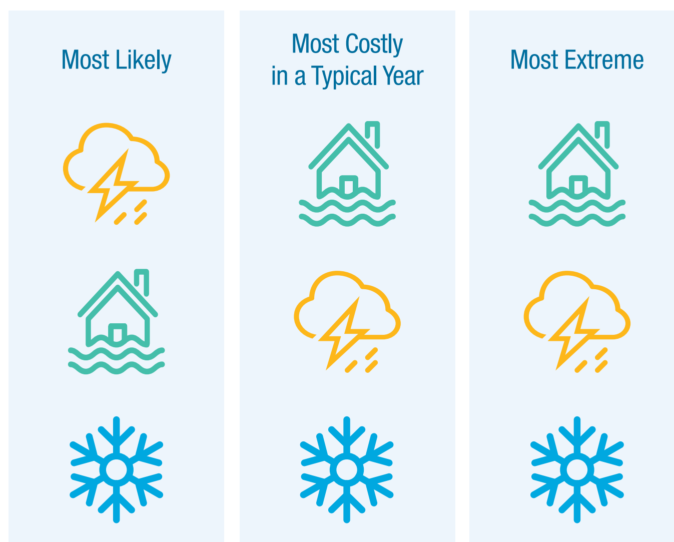


By the Numbers*

61,173 (national average: 31,618)	Average population served by building code enforcement departments in the state
$29.88 (national average: $22.62)	Average department expenditure per capita of population served
$0.58 (national average: $0.44)	Average department employee training expenditure per capita of population served
2.19% (national average: 2.48%)	Average training expenditure as a percentage of overall department expenditure

*Community data from BCEGS database

Top Three Modeled Natural Hazards**



**Source: AIR Worldwide modeled loss cost data

Building Code Adoption History (as of 10/1/18)

ICC Code Release	Commercial Date Adopted	Residential Date Adopted
2009	11/1/11	1/1/13
2012	Not adopted	Not adopted
2015	11/1/17	Not adopted
2018	Not adopted	Not adopted

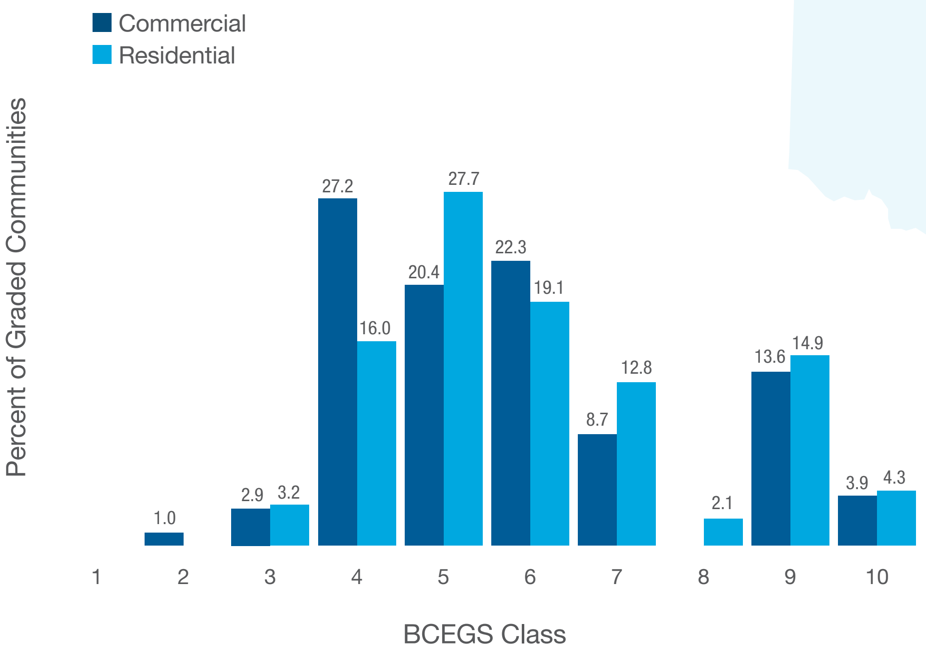
Oklahoma

BCEGS State Averages

	Score	Class
Commercial	52	6
Residential	48	6

The BCEGS 1–10 classification is based on a 1-to-100-point score. For complete details on the scoring process, see pages 44–47, "Aiding the Resilience Revolution: ISO's BCEGS® Program and How It Works."

BCEGS Community Class Distribution

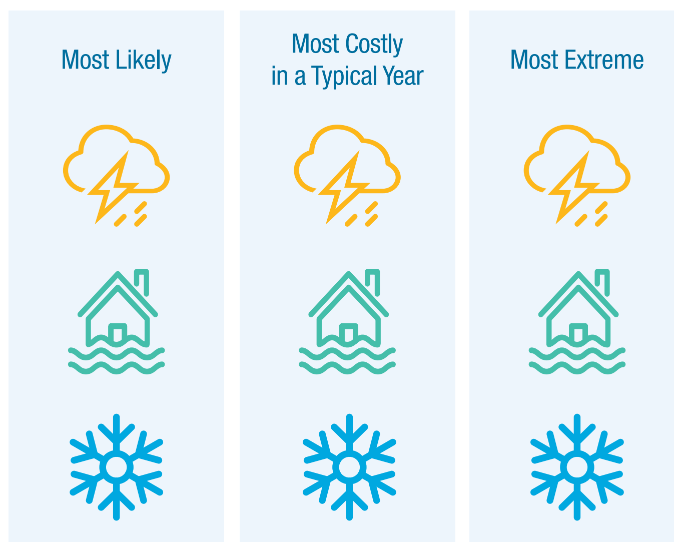


By the Numbers*

24,369 (national average: 31,618)	Average population served by building code enforcement departments in the state
$29.88 (national average: $22.62)	Average department expenditure per capita of population served
$0.25 (national average: $0.44)	Average department employee training expenditure per capita of population served
1.79% (national average: 2.48%)	Average training expenditure as a percentage of overall department expenditure

*Community data from BCEGS database

Top Three Modeled Natural Hazards**



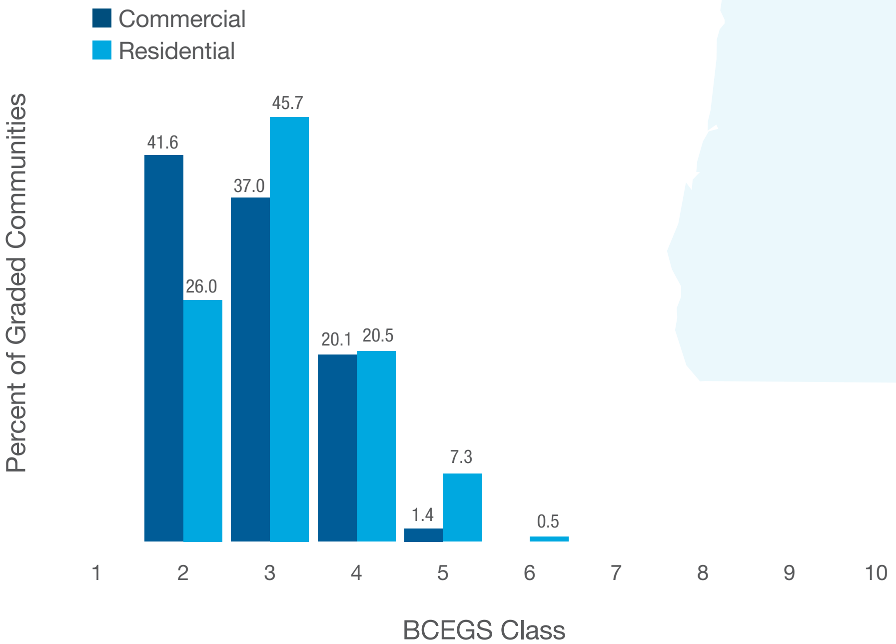
**Source: AIR Worldwide modeled loss cost data

Building Code Adoption History (as of 10/1/18)

ICC Code Release	Commercial Date Adopted	Residential Date Adopted
2009	11/2/12	11/2/12
2012	Not adopted	Not adopted
2015	10/30/15	11/1/16
2018	Not adopted	Not adopted

Oregon

BCEGS Community Class Distribution



BCEGS State Averages

	Score	Class
Commercial	81	**3**
Residential	78	**3**

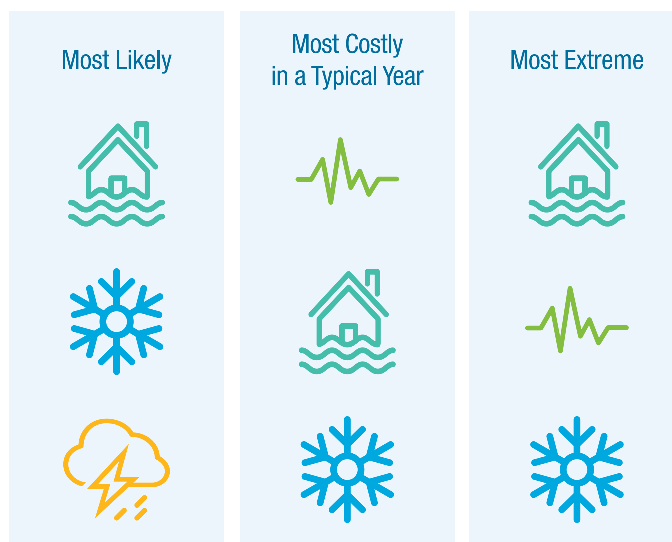
The BCEGS 1–10 classification is based on a 1-to-100-point score. For complete details on the scoring process, see pages 44–47, "Aiding the Resilience Revolution: ISO's BCEGS® Program and How It Works."

By the Numbers*

59,981 (national average: 31,618)	Average population served by building code enforcement departments in the state
$30.01 (national average: $22.62)	Average department expenditure per capita of population served
$0.28 (national average: $0.44)	Average department employee training expenditure per capita of population served
1.79% (national average: 2.48%)	Average training expenditure as a percentage of overall department expenditure

*Community data from BCEGS database

Top Three Modeled Natural Hazards**



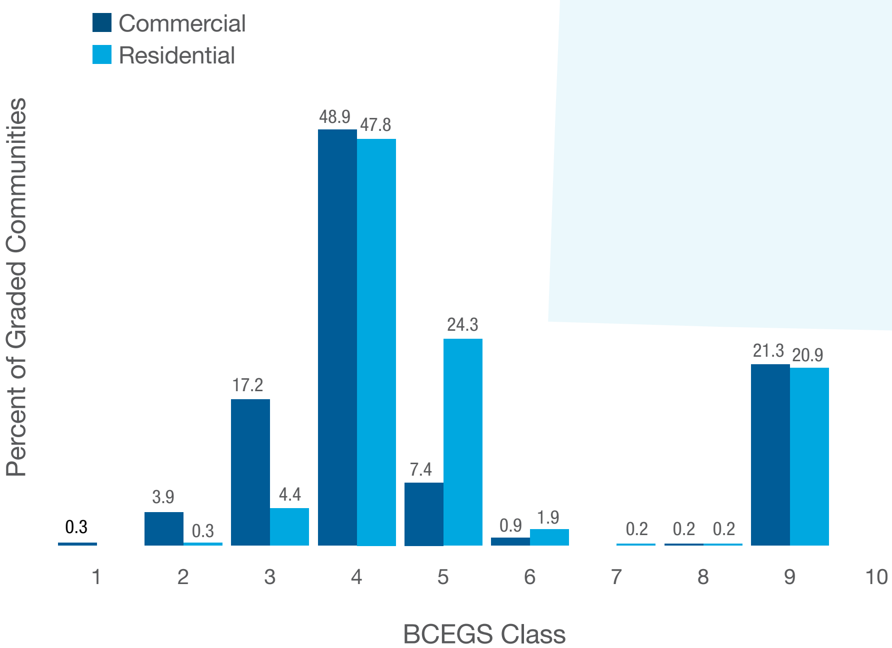
**Source: AIR Worldwide modeled loss cost data

Building Code Adoption History (as of 10/1/18)

ICC Code Release	Commercial Date Adopted	Residential Date Adopted
2009	7/1/10	7/1/10
2012	7/1/14	Not adopted
2015	Not adopted	10/1/17
2018	Not adopted	Not adopted

Pennsylvania

BCEGS Community Class Distribution



BCEGS State Averages

	Score	Class
Commercial	62	**5**
Residential	56	**5**

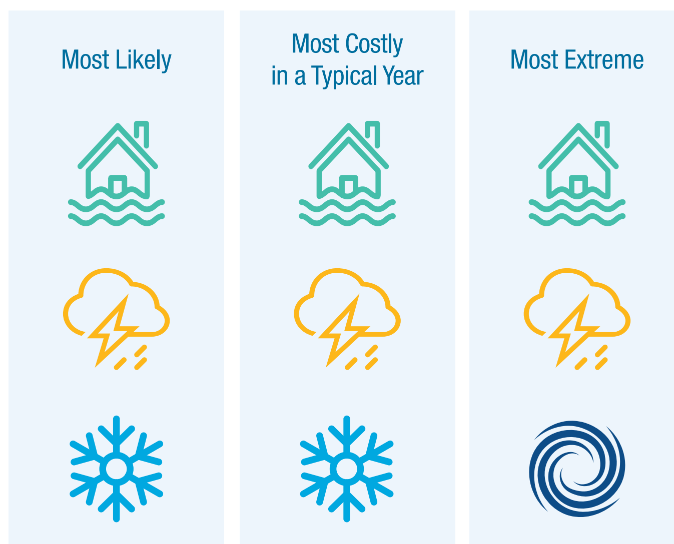
The BCEGS 1–10 classification is based on a 1-to-100-point score. For complete details on the scoring process, see pages 44–47, "Aiding the Resilience Revolution: ISO's BCEGS® Program and How It Works."

By the Numbers*

18,552 (national average: 31,618)	Average population served by building code enforcement departments in the state
$58.43 (national average: $22.62)	Average department expenditure per capita of population served
$0.70 (national average: $0.44)	Average department employee training expenditure per capita of population served
2.46% (national average: 2.48%)	Average training expenditure as a percentage of overall department expenditure

*Community data from BCEGS database

Top Three Modeled Natural Hazards**



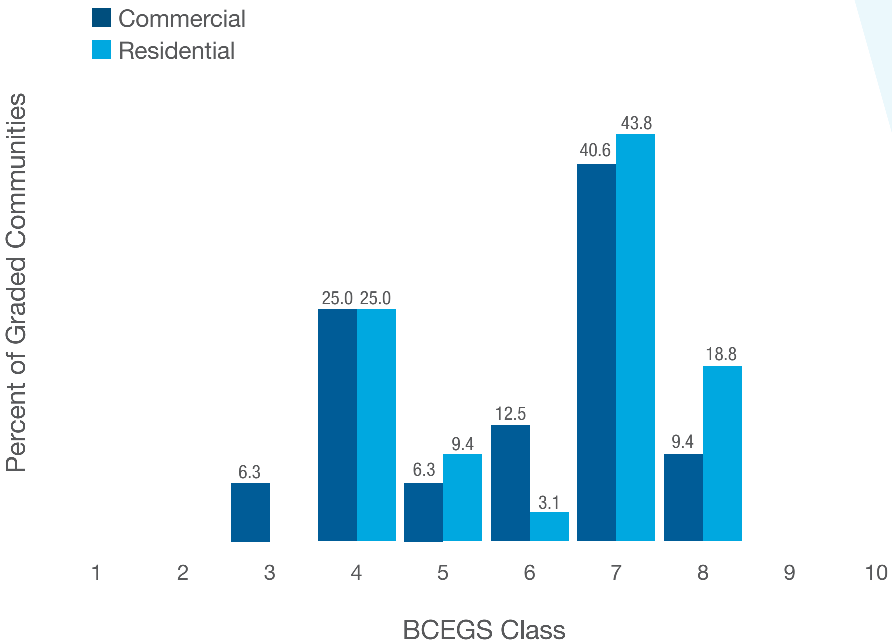
**Source: AIR Worldwide modeled loss cost data

Building Code Adoption History (as of 10/1/18)

ICC Code Release	Commercial Date Adopted	Residential Date Adopted
2009	12/31/09	12/31/09
2012	Not adopted	Not adopted
2015	10/1/18	10/1/18
2018	Not adopted	Not adopted

Rhode Island

BCEGS Community Class Distribution



BCEGS State Averages

	Score	Class
Commercial	54	**6**
Residential	50	**6**

The BCEGS 1–10 classification is based on a 1-to-100-point score. For complete details on the scoring process, see pages 44–47, “Aiding the Resilience Revolution: ISO’s BCEGS® Program and How It Works.”

By the Numbers*

29,549 (national average: 31,618)	Average population served by building code enforcement departments in the state
$18.34 (national average: $22.62)	Average department expenditure per capita of population served
$1.23 (national average: $0.44)	Average department employee training expenditure per capita of population served
6.86% (national average: 2.48%)	Average training expenditure as a percentage of overall department expenditure

*Community data from BCEGS database

Top Three Modeled Natural Hazards**

Most Likely | Most Costly in a Typical Year | Most Extreme

**Source: AIR Worldwide modeled loss cost data

Building Code Adoption History (as of 10/1/18)

ICC Code Release	Commercial Date Adopted	Residential Date Adopted
2009	7/1/10	7/1/10
2012	7/1/13	7/1/13
2015	Not adopted	Not adopted
2018	Not adopted	Not adopted

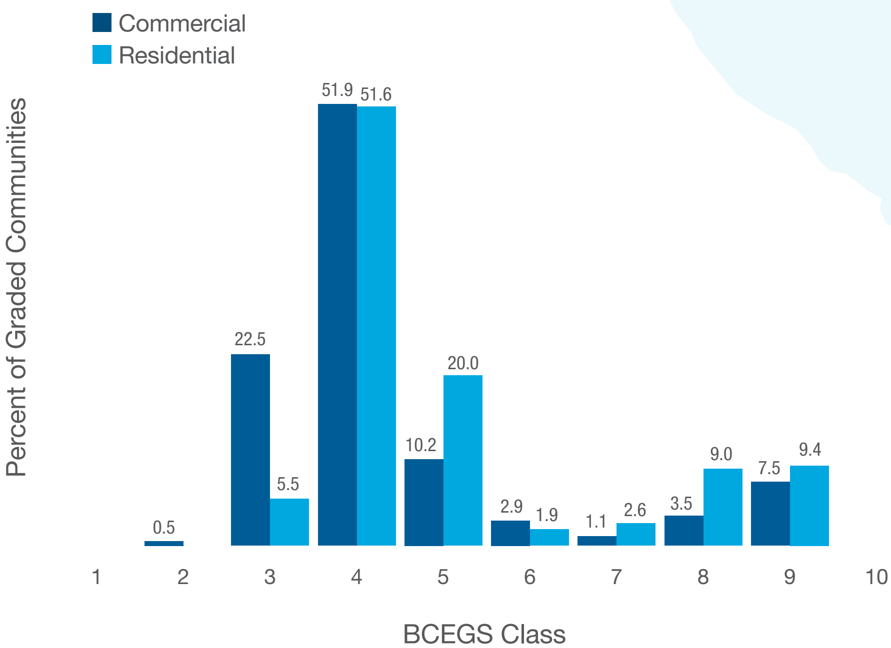
South Carolina

BCEGS State Averages

	Score	Class
Commercial	66	**4**
Residential	59	**5**

The BCEGS 1–10 classification is based on a 1-to-100-point score. For complete details on the scoring process, see pages 44–47, “Aiding the Resilience Revolution: ISO’s BCEGS® Program and How It Works.”

BCEGS Community Class Distribution



By the Numbers*

44,848 (national average: 31,618)	Average population served by building code enforcement departments in the state
$22.84 (national average: $22.62)	Average department expenditure per capita of population served
$0.47 (national average: $0.44)	Average department employee training expenditure per capita of population served
2.22% (national average: 2.48%)	Average training expenditure as a percentage of overall department expenditure

*Community data from BCEGS database

Top Three Modeled Natural Hazards**

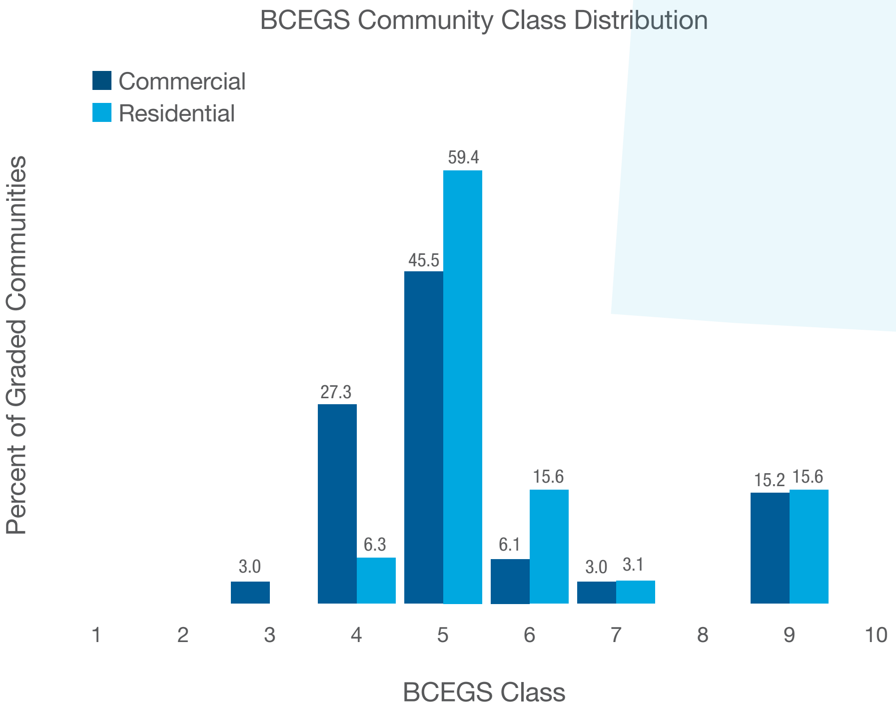
Most Likely	Most Costly in a Typical Year	Most Extreme

**Source: AIR Worldwide modeled loss cost data

Building Code Adoption History (as of 10/1/18)

ICC Code Release	Commercial Date Adopted	Residential Date Adopted
2009	Not adopted	Not adopted
2012	7/1/13	7/1/13
2015	7/1/16	7/1/16
2018	Not adopted	Not adopted

South Dakota



BCEGS State Averages

	Score	Class
Commercial	55	**6**
Residential	51	**6**

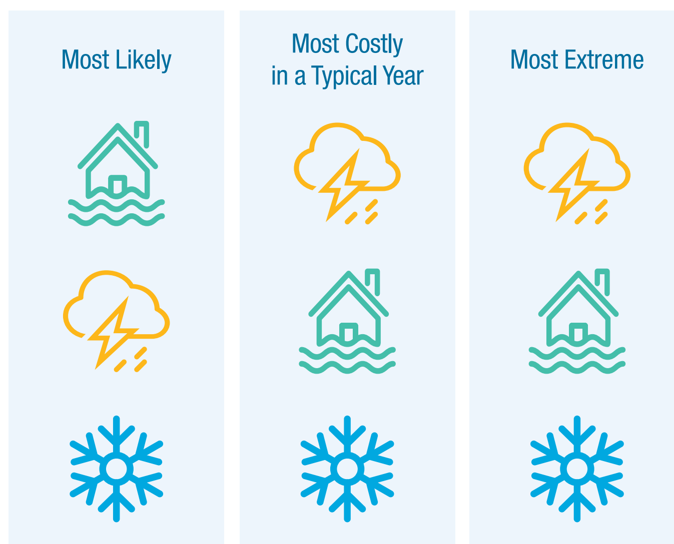
The BCEGS 1–10 classification is based on a 1-to-100-point score. For complete details on the scoring process, see pages 44–47, “Aiding the Resilience Revolution: ISO’s BCEGS® Program and How It Works.”

By the Numbers*

15,409 (national average: 31,618)	Average population served by building code enforcement departments in the state
$14.38 (national average: $22.62)	Average department expenditure per capita of population served
$0.29 (national average: $0.44)	Average department employee training expenditure per capita of population served
2.41% (national average: 2.48%)	Average training expenditure as a percentage of overall department expenditure

*Community data from BCEGS database

Top Three Modeled Natural Hazards**



**Source: AIR Worldwide modeled loss cost data

Building Code Adoption History (as of 10/1/18)

ICC Code Release	Commercial Date Adopted	Residential Date Adopted
2009	7/1/10	Not adopted
2012	7/1/12	Not adopted
2015	7/1/15	Not adopted
2018	Not adopted	Not adopted

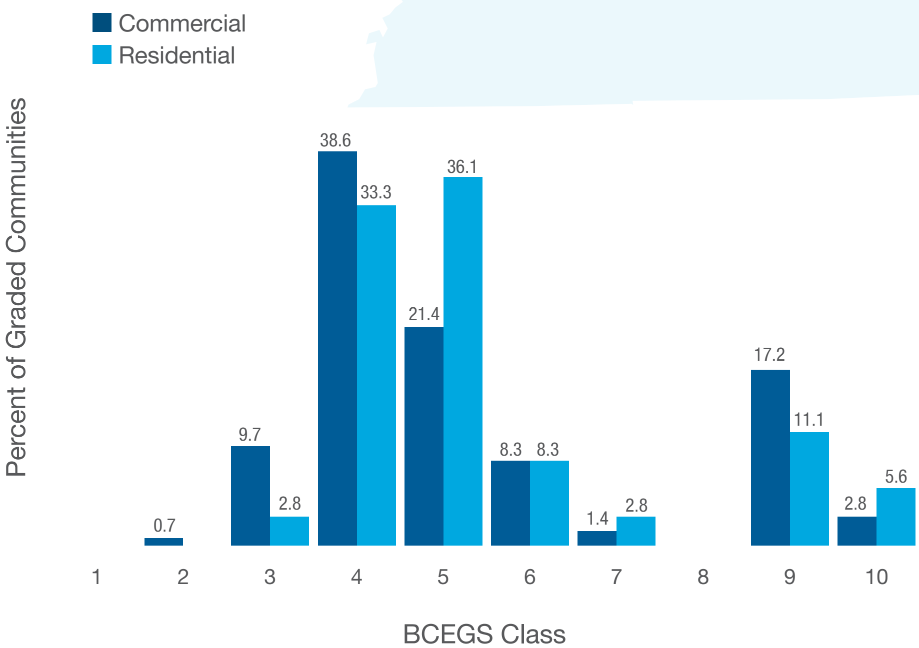
Tennessee

BCEGS State Averages

	Score	Class
Commercial	56	**5**
Residential	55	**6**

The BCEGS 1–10 classification is based on a 1-to-100-point score. For complete details on the scoring process, see pages 44–47, "Aiding the Resilience Revolution: ISO's BCEGS® Program and How It Works."

BCEGS Community Class Distribution

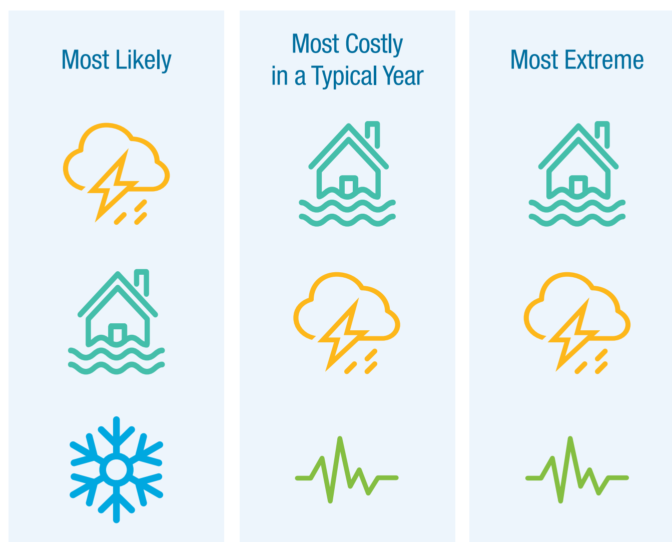


By the Numbers*

34,798 (national average: 31,618)	Average population served by building code enforcement departments in the state
$17.08 (national average: $22.62)	Average department expenditure per capita of population served
$0.24 (national average: $0.44)	Average department employee training expenditure per capita of population served
2.14% (national average: 2.48%)	Average training expenditure as a percentage of overall department expenditure

*Community data from BCEGS database

Top Three Modeled Natural Hazards**



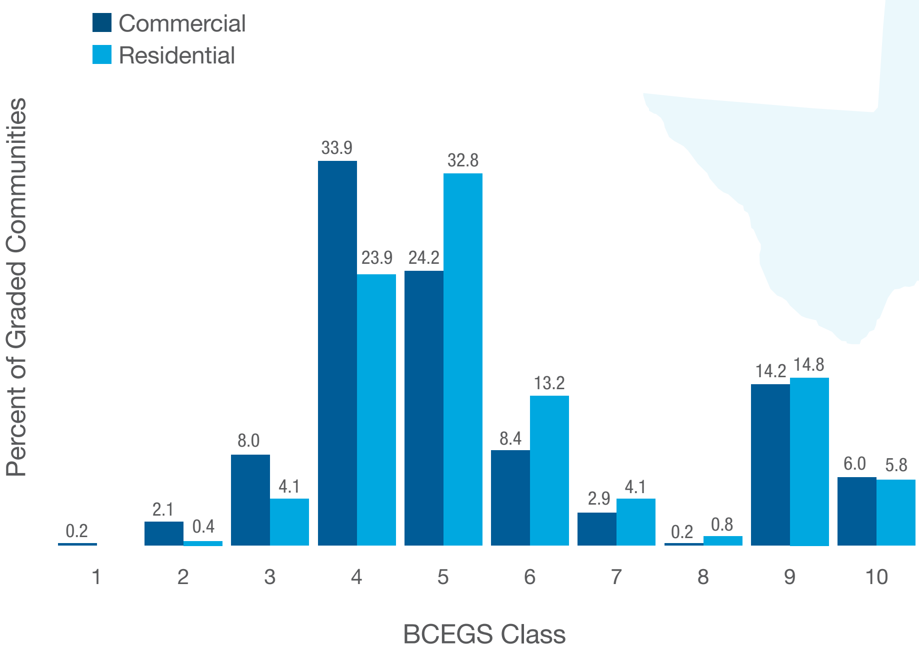
**Source: AIR Worldwide modeled loss cost data

Building Code Adoption History (as of 10/1/18)

ICC Code Release	Commercial Date Adopted	Residential Date Adopted
2009	Not adopted	10/1/10
2012	8/4/16	Not adopted
2015	Not adopted	Not adopted
2018	Not adopted	Not adopted

Texas

BCEGS Community Class Distribution



BCEGS State Averages

	Score	Class
Commercial	55	**6**
Residential	51	**6**

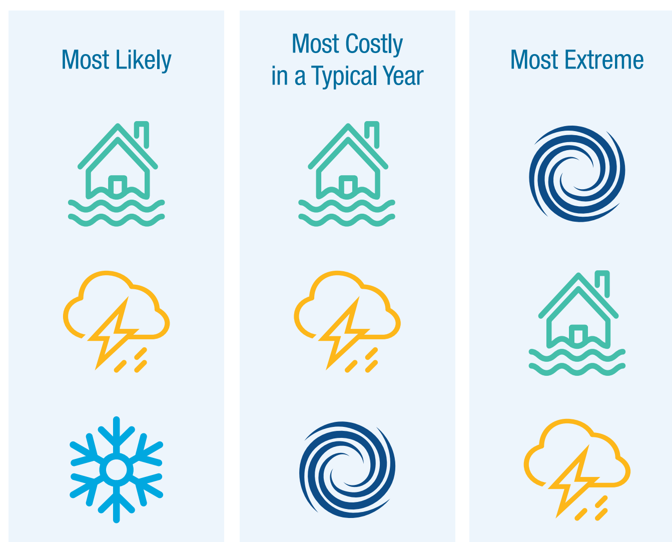
The BCEGS 1–10 classification is based on a 1-to-100-point score. For complete details on the scoring process, see pages 44–47, "Aiding the Resilience Revolution: ISO's BCEGS® Program and How It Works."

By the Numbers*

67,595 (national average: 31,618)	Average population served by building code enforcement departments in the state
$27.05 (national average: $22.62)	Average department expenditure per capita of population served
$0.38 (national average: $0.44)	Average department employee training expenditure per capita of population served
2.03% (national average: 2.48%)	Average training expenditure as a percentage of overall department expenditure

*Community data from BCEGS database

Top Three Modeled Natural Hazards**



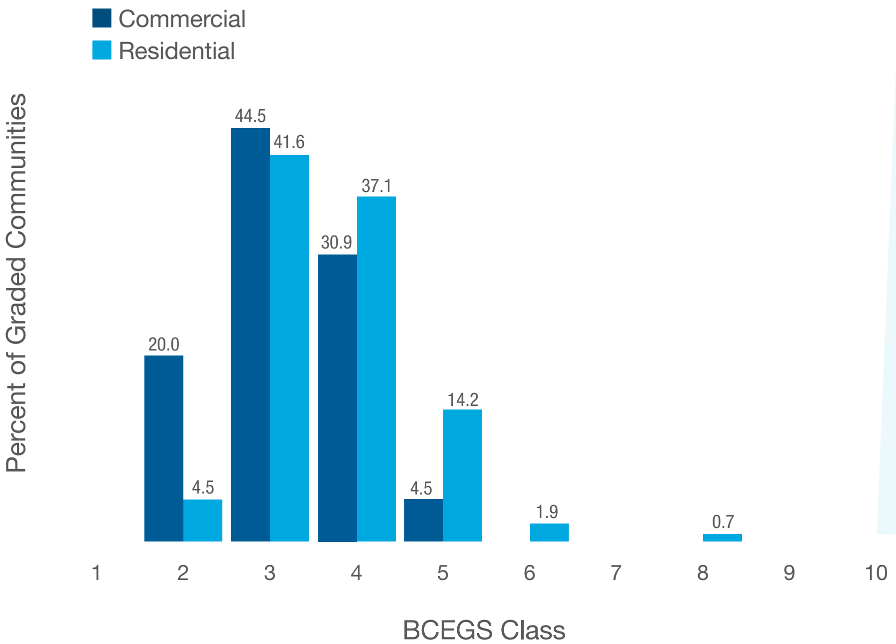
**Source: AIR Worldwide modeled loss cost data

Building Code Adoption History (as of 10/1/18)

Building codes are adopted and enforced at the local jurisdiction level.

Utah

BCEGS Community Class Distribution



BCEGS State Averages

	Score	Class
Commercial	78	**3**
Residential	74	**4**

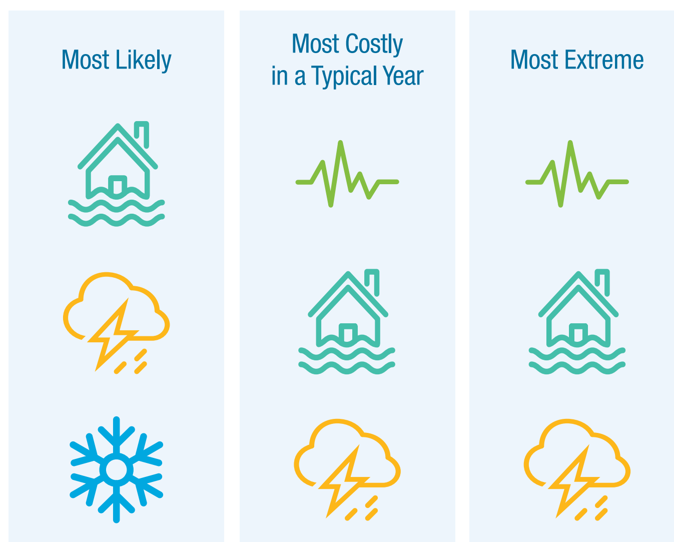
The BCEGS 1–10 classification is based on a 1-to-100-point score. For complete details on the scoring process, see pages 44–47, "Aiding the Resilience Revolution: ISO's BCEGS® Program and How It Works."

By the Numbers*

23,799 (national average: 31,618)	Average population served by building code enforcement departments in the state
$35.20 (national average: $22.62)	Average department expenditure per capita of population served
$0.50 (national average: $0.44)	Average department employee training expenditure per capita of population served
1.83% (national average: 2.48%)	Average training expenditure as a percentage of overall department expenditure

*Community data from BCEGS database

Top Three Modeled Natural Hazards**

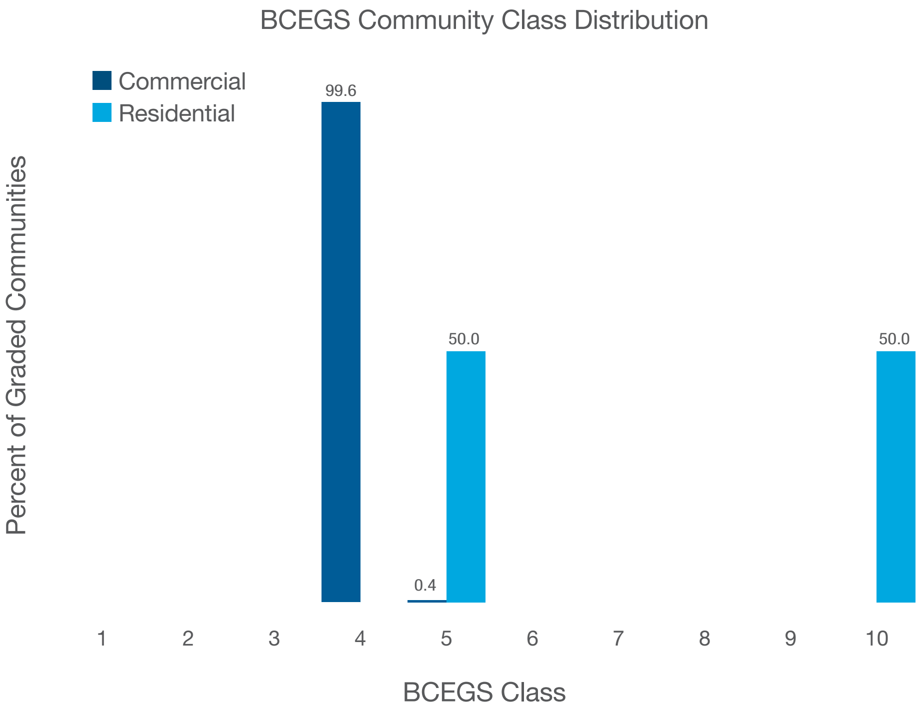


**Source: AIR Worldwide modeled loss cost data

Building Code Adoption History (as of 10/1/18)

ICC Code Release	Commercial Date Adopted	Residential Date Adopted
2009	7/1/10	7/1/10
2012	7/1/13	7/1/13
2015	7/1/16	7/1/16
2018	Not adopted	Not adopted

Vermont



BCEGS State Averages

	Score	Class
Commercial	67	**4**
Residential	34	**8**

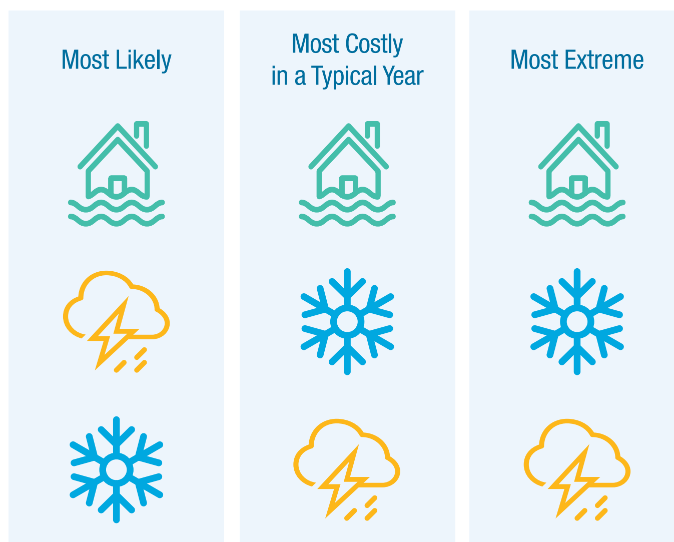
The BCEGS 1–10 classification is based on a 1-to-100-point score. For complete details on the scoring process, see pages 44–47, “Aiding the Resilience Revolution: ISO’s BCEGS® Program and How It Works.”

By the Numbers*

19,670 (national average: 31,618)	Average population served by building code enforcement departments in the state
$8.69 (national average: $22.62)	Average department expenditure per capita of population served
$0.19 (national average: $0.44)	Average department employee training expenditure per capita of population served
2.22% (national average: 2.48%)	Average training expenditure as a percentage of overall department expenditure

*Community data from BCEGS database

Top Three Modeled Natural Hazards**



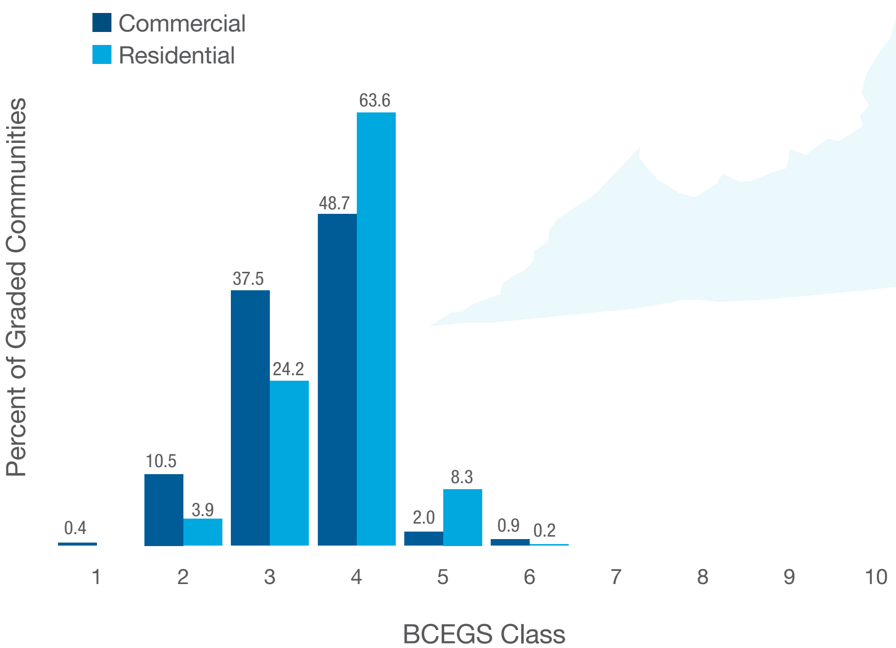
**Source: AIR Worldwide modeled loss cost data

Building Code Adoption History (as of 10/1/18)

ICC Code Release	Commercial Date Adopted	Residential Date Adopted
2009	Not adopted	Not adopted
2012	6/21/14	Not adopted
2015	10/10/16	Not adopted
2018	Not adopted	Not adopted

Virginia

BCEGS Community Class Distribution



BCEGS State Averages

	Score	Class
Commercial	77	**3**
Residential	72	**4**

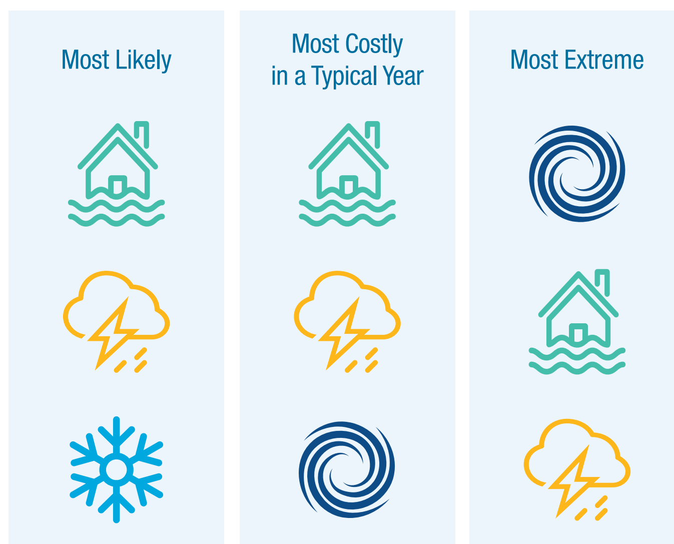
The BCEGS 1–10 classification is based on a 1-to-100-point score. For complete details on the scoring process, see pages 44–47, "Aiding the Resilience Revolution: ISO's BCEGS® Program and How It Works."

By the Numbers*

53,379 (national average: 31,618)	Average population served by building code enforcement departments in the state
$49.43 (national average: $22.62)	Average department expenditure per capita of population served
$0.38 (national average: $0.44)	Average department employee training expenditure per capita of population served
2.54% (national average: 2.48%)	Average training expenditure as a percentage of overall department expenditure

*Community data from BCEGS database

Top Three Modeled Natural Hazards**



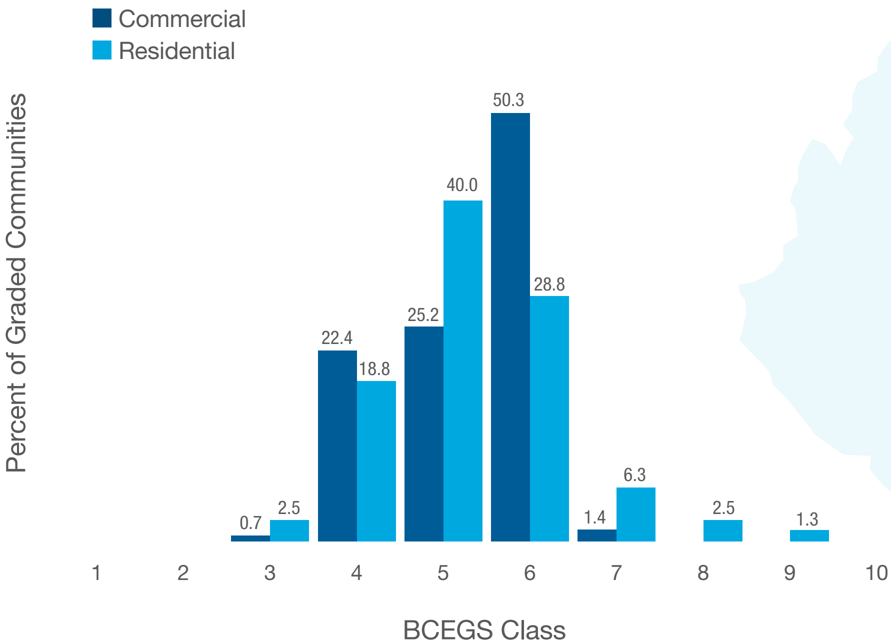
**Source: AIR Worldwide modeled loss cost data

Building Code Adoption History (as of 10/1/18)

ICC Code Release	Commercial Date Adopted	Residential Date Adopted
2009	3/1/11	3/1/11
2012	7/14/14	7/14/14
2015	9/4/18	9/4/18
2018	Not adopted	Not adopted

West Virginia

BCEGS Community Class Distribution



BCEGS State Averages

	Score	Class
Commercial	59	**5**
Residential	57	**5**

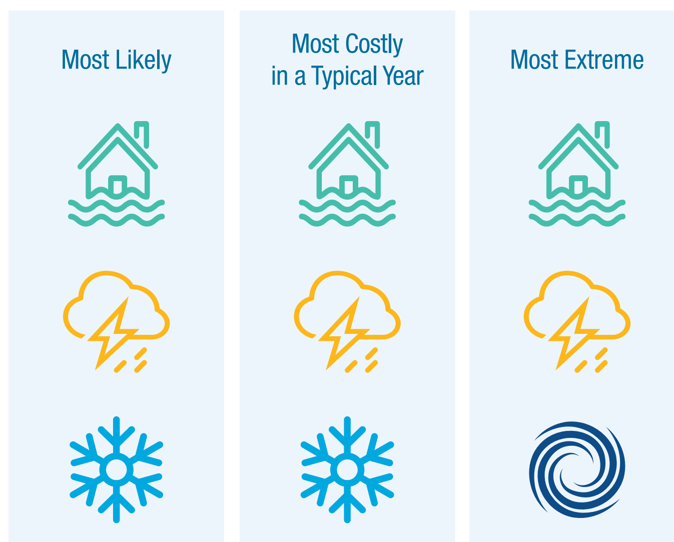
The BCEGS 1–10 classification is based on a 1-to-100-point score. For complete details on the scoring process, see pages 44–47, "Aiding the Resilience Revolution: ISO's BCEGS® Program and How It Works."

By the Numbers*

16,607 (national average: 31,618)	Average population served by building code enforcement departments in the state
$21.91 (national average: $22.62)	Average department expenditure per capita of population served
$0.38 (national average: $0.44)	Average department employee training expenditure per capita of population served
2.59% (national average: 2.48%)	Average training expenditure as a percentage of overall department expenditure

*Community data from BCEGS database

Top Three Modeled Natural Hazards**

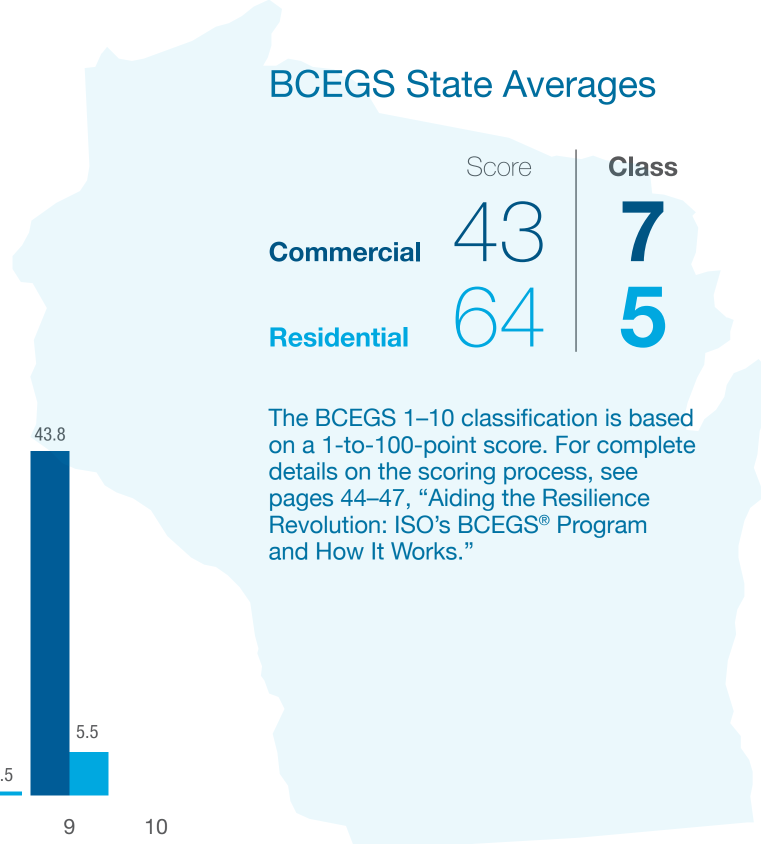


**Source: AIR Worldwide modeled loss cost data

Building Code Adoption History (as of 10/1/18)

ICC Code Release	Commercial Date Adopted	Residential Date Adopted
2009	7/1/10	7/1/10
2012	9/1/13	Not adopted
2015	8/1/16	8/1/16
2018	Not adopted	Not adopted

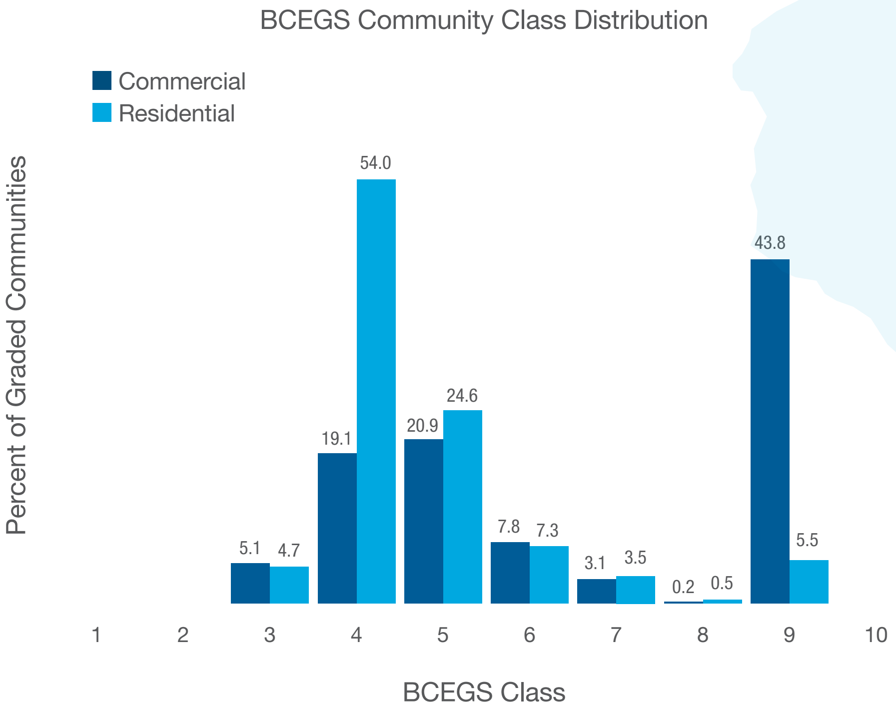
Wisconsin



BCEGS State Averages

	Score	Class
Commercial	43	**7**
Residential	64	**5**

The BCEGS 1–10 classification is based on a 1-to-100-point score. For complete details on the scoring process, see pages 44–47, "Aiding the Resilience Revolution: ISO's BCEGS® Program and How It Works."

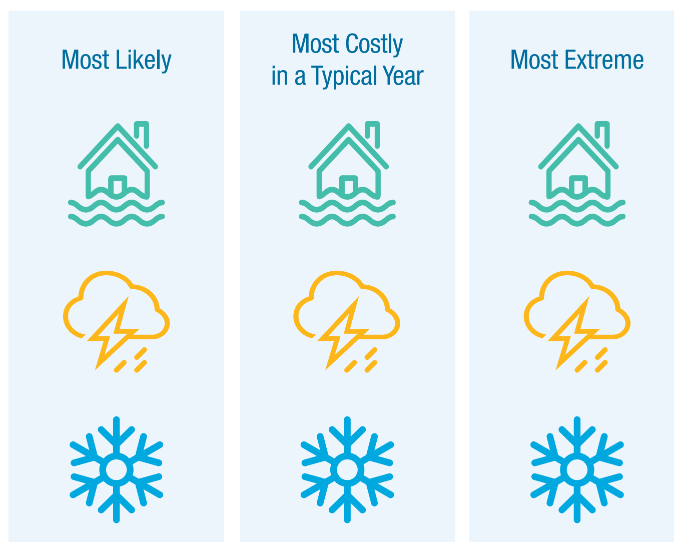


By the Numbers*

9,390 (national average: 31,618)	Average population served by building code enforcement departments in the state
$11.64 (national average: $22.62)	Average department expenditure per capita of population served
$0.24 (national average: $0.44)	Average department employee training expenditure per capita of population served
3.90% (national average: 2.48%)	Average training expenditure as a percentage of overall department expenditure

*Community data from BCEGS database

Top Three Modeled Natural Hazards**



**Source: AIR Worldwide modeled loss cost data

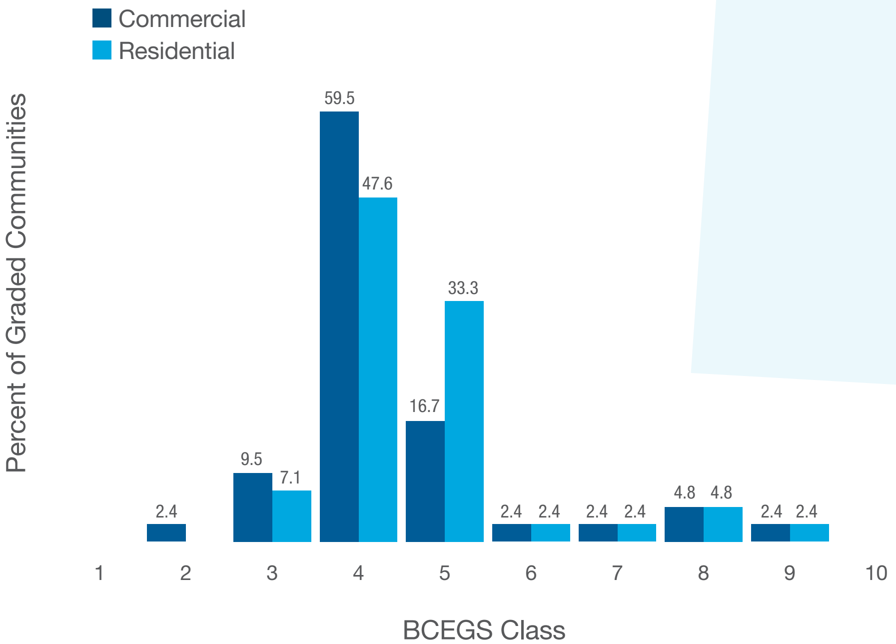
Building Code Adoption History (as of 10/1/18)

ICC Code Release	Commercial Date Adopted	Residential Date Adopted
2009	1/1/11	Not adopted
2012	Not adopted	Not adopted
2015	5/1/18	Not adopted
2018	Not adopted	Not adopted

*State publishes and adopts its own residential building code

Wyoming

BCEGS Community Class Distribution



BCEGS State Averages

	Score	Class
Commercial	67	**4**
Residential	64	**5**

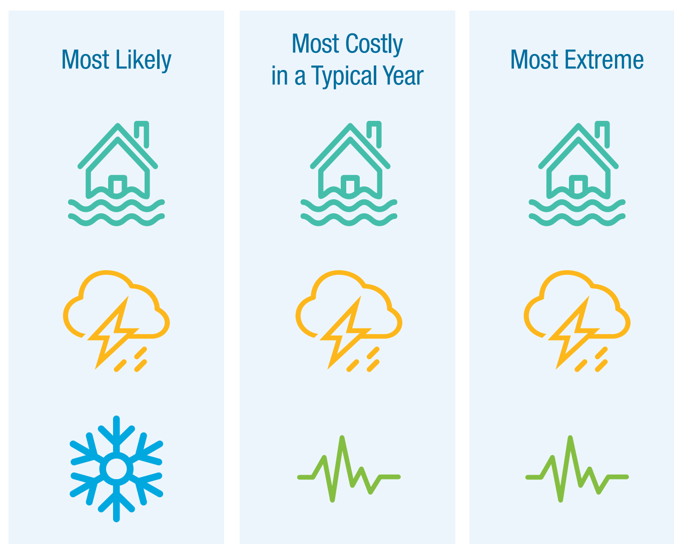
The BCEGS 1–10 classification is based on a 1-to-100-point score. For complete details on the scoring process, see pages 44–47, "Aiding the Resilience Revolution: ISO's BCEGS® Program and How It Works."

By the Numbers*

14,312 (national average: 31,618)	Average population served by building code enforcement departments in the state
$24.42 (national average: $22.62)	Average department expenditure per capita of population served
$0.38 (national average: $0.44)	Average department employee training expenditure per capita of population served
1.60% (national average: 2.48%)	Average training expenditure as a percentage of overall department expenditure

*Community data from BCEGS database

Top Three Modeled Natural Hazards**



**Source: AIR Worldwide modeled loss cost data

Building Code Adoption History (as of 10/1/18)

ICC Code Release	Commercial Date Adopted	Residential Date Adopted
2009	Not adopted	Not adopted
2012	2/21/12	Not adopted
2015	1/1/16	Not adopted
2018	5/23/18	5/23/18

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- Insurance Information Institute (I.I.I.)
- International Code Council (ICC)
- Wharton School of the University of Pennsylvania
- AIR Worldwide
- ISO Building Code Effectiveness Grading Schedule Team

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