The Business Case for Building Codes

Keith Porter, Leslie Chapman-Henderson, Ryan Colker, Steve McCabe, and Lakisha Woods

PDHs available: 1.0

#ASCE20
The case for better codes: society saves if codes minimize lifecycle cost, not initial cost.

Colker, ICC

Making the case to the public: No Code. No Confidence.

Chapman-Henderson

The case for codes: the foundation of community resilience

McCabe, NIST

The business case for building codes: NEHRP Report to Congress on Functional Recovery

Porter, CU

The case for consensus: how NIBS can convene the building sciences to build incentives.

Woods, NIBS
The Case for Codes: The Foundation of Community Resilience

Ryan M. Colker
Executive Director, Alliance for National & Community Resilience
Vice President, Innovation, International Code Council
• Codes and Standards
• Personnel Training and Certification
• Product Evaluation
• Accreditation Services
• Codification & Administration Services
• Engineering Support
• Community Resilience Benchmarks
• Third-Party Evaluation Services
## National Institute of Building Sciences™

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[www.nibs.org/mitigationsaves](http://www.nibs.org/mitigationsaves)
What Mitigation Makes Sense Where? Application of the I-Codes

Hurricane Wind

Wildfire

Seismic

www.nibs.org/mitigationsaves
• The implementation of Florida’s statewide codes reduced windstorm property damage 72%.¹

• A FEMA analysis from 2014 estimated approximately $500 million in annualized loss avoided in eight southeastern states due to the adoption of modern building codes based on the I-Codes.²

• The 2019 Mitigation Assessment Team report following Hurricane Harvey found that National Flood Insurance Program (NFIP) regulations reduced average claim payments by almost half and following modern code requirements reduced the average claim payments by an additional 90%.³

• Researchers found effective and well-enforced building codes in Missouri⁴ reduced hail damage to homes by 10 to 20 percent on average.⁵

• Stronger building codes in Moore, OK had no impact on price or sales when compared to neighbors with lower codes.⁶
Resilience in the built environment starts with strong, regularly adopted, and properly administered building codes. However, to attain whole community resilience, communities must look at the resiliency of all interconnected systems and function of the community as well.
The scope of the IBC is clearly focused on assuring that a community’s building stock supports the resilience of the community. Reducing the impacts on people and property in the fact of multiple shocks and stresses allows communities to survive and ultimately thrive.
The entire Nation must work as a team to increase pre-disaster mitigation in communities. FEMA will continue to work directly with SLTT and non-governmental partners to advocate for the adoption and enforcement of modern building and property codes. Disaster resilience starts with building codes, because they enhance public safety and property protection. Furthermore, FEMA will encourage robust code enforcement, providing education and training when needed to help convey the value of standardized, up-to-date building codes.

**DESIRED STATE:**
APPROPRIATE BUILDING CODES ARE ADOPTED AND LOCAL GOVERNMENTS ARE ABLE TO ENSURE CODE COMPLIANCE
Community Resilience

Alliance for National & Community Resilience™

www.resilientalliance.org | @ANCResilience

Galveston Texas, Post-Ike
Manhattan, Post-Sandy
Paradise, Post-Camp Fire
1. Adoption of Building Codes
2. Administration and Enforcement of Building Codes
3. Licensure & Continuing Education or Testing of Contractors
4. Mitigation of Highly Vulnerable Buildings
5. Mitigation and Design of Critical Facilities
6. Resilient Design
7. Disaster Response/Continuity of Operations Plans (COOPs)
8. Standards for Emergency Shelters
9. Financial Resources for Post-Disaster Recovery
Ryan M. Colker, J.D.
Vice President, Innovation
Executive Director, Alliance for National & Community Resilience
International Code Council
500 New Jersey Ave., NW
6th Floor
Washington, DC 20001
202-370-1800x6257
rcolker@iccSAFE.org • ANCR@resilientalliance.org
iccSAFE.org • resilientalliance.org
@rmcolker • @ANCResilience
Making the case to the public: No Code. No Confidence.

Presentation for ASCE 2020 Virtual Convention

Leslie Chapman-Henderson

Wednesday, October 28, 2020
Advancing Codes Through Outreach

- Conduct behavior-focused study to support development of public awareness/outreach strategy, campaign, messaging, and asset creation
  - Benchmark current attitudes and behaviors
  - Identify communication barriers; identify levels of understanding of building codes; identify motivators to drive appreciation for building codes
- Create data-driven code adoption status transparency mechanism (Building Code Digital Lookup Tool)
- Implement Phase I - National Awareness Program
- Design and Implement Phase II
No Code. No Confidence. – Inspect2Protect.org

Why Americans Aren’t Concerned About Building Codes (even though they should be)

Understanding the research-inspired “No Code. No Confidence.” outreach campaign to increase public awareness and decrease the policy gap between vulnerable and resilient communities

Co-Authors: Leslie Chapman-Henderson President and CEO
Audrey K. Rieszner, J.D. Senior Policy Analyst

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2 out of 3 places prone to severe weather don’t have the building codes they need.

See if your local building codes protect you. InspectToProtect.org
No real reason to worry: We're protected already.

8 out of 10 Americans assume they are at least moderately protected.

Assumed Protection from Building Codes

- A great deal of protection: 18%
- A lot of protection: 29%
- A moderate amount of protection: 35%
- A minimal amount of protection: 10%
- No additional protection: 9%
What truly frightens Americans: No code at all

**No code?** Two-thirds of Americans would be very or extremely concerned.
Top Takeaways

1. The public is generally disinterested in building codes and they don't understand exactly what they are (can't distinguish between codes, historic preservation, zoning, etc.)

2. The public is not interested because they are highly (wrongly), yet highly confident that “someone else” is “handling” it, and ensuring homes are built safely. The “someone else” is their local officials and builder community.

3. However, once they learn that they may not have a code, or that the codes they have are inadequate, or not enforced, their engagement and interest skyrockets.

4. Transparency emerges as the ideal method to disrupt the existing assumptions and introduce a case for building codes as a priority.

5. “Confidence” tested out as the most powerful way to frame the dialogue with the public. They want certainty and learn that codes (while still a minimum) can introduce safety (and more certainty).
Program Components

- **Inspect2Protect.org**
  - Building Code Digital Lookup Tool
  - Red, Yellow, Green, Black Analysis

- **No Code. No Confidence. Information and Promotional Toolkit**
  - PSA’s featuring Weather Channel meteorologists and more in various file sizes for broadcast, digital, social media, slide presentations, etc.
  - Animated short feature – “Tale of Two Towns”
  - Shareable graphics, slide decks, web badges
Phase II Enhancements

▪ Refreshed Homepage
  □ Option to search w/zip code only
  □ Preserves address search option
  □ Streamlined click journey to results

▪ Dataset Additions
  □ IBC as well as IRC
  □ Historic codes where available (mostly statewide adoptions)

▪ New Information Features
  □ Retrofit recs based on code version
  □ Proximity to flood risk, fault lines
  □ Declared disasters near user
Engagement Opportunities

• Request free access to the campaign - www.Inspect2Protect.org
• Share the study findings and campaign in your community through outreach
• Provide the toolkit to your partners and the PSA’s to local media
• Ask partners to post the web badge and link to I2P.org site
• Email info@flash.org for help or more ideas
Leslie Chapman-Henderson
Leslie@FLASH.org
Twitter: @LCHenderson &
@FederalAlliance
Facebook.com/FederalAlliance
YouTube.com/stronghomes
The Case for Better Codes

Keith Porter, P.E., Ph.D., M.ASCE, F.SEI
University of Colorado Boulder and SPA Risk LLC
U.S. cat losses grow 6% annually, now $100B/yr

US builds $1.3T/year

$100B = 8% of 1 year's construction

2017 loss $300B = 25% of 1 year's construction
Why? The resilience investment gap

California adds $50B±/yr new buildings

Includes $2B (4%) for lateral strength

Quake losses: $3.7B/yr (7%)

Suggests an investment gap
Two “big problems” in resilience

Risk from existing buildings

Ensuring we are not in the same situation in 50 years
Retrofit can avoid $2T+ future loss for $500B

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Retrofit can avoid $2T+ future loss for $500B

Flood: elevate, buyout, wet floodproof, raise MEP

Fire: gutters, vents, siding, deck, fuel maintenance

Quake: soft-story retrofit, ETS, secure your space

Hurricane: IBHS FORTIFIED; ETS
Optimal design to minimize total cost of ownership (TCO)

[Graph showing total cost of ownership and avoided future loss with greater first cost on the x-axis.]
Optimal design for earthquake

Up to 3x stronger and stiffer

saves up to 8x the added cost
Codes to minimize TCO rather than first cost add $4B, save $16B, per year of construction

- Higher foundation
- Defensible, fire-resistive
- Stronger & stiffer
- Connections, shutters

$4B = +0.3\%\text{ of } 1.3T\text{ construction} \\
$16B = -16\%\text{ of cat losses}
Minimizing TCO benefits everyone \textit{in the long run}
Owners and developers bear the cost, others get co-benefits.
Incentivization can share costs more fairly, equilibrate benefit-cost ratios.
Conclusion

Codes that minimize lifecycle cost, not initial cost, can keep us safe and help to reverse unsustainable growth in our disaster liability.
Keith Porter
Principal, SPA Risk LLC
Research Professor, Univ Colo Boulder
kporter@sparisk.com
626-233-9758
LinkedIn: keith-porter-86327

This deck: www.sparisk.com/pubs/Porter-2020-ASCE-1.pdf
The Business Case for Building Codes

NEHRP Report to Congress on Functional Recovery

Dr. Steven McCabe, P.E., NEHRP Director
NIST Engineering Laboratory
Recent NEHRP Reauthorization

• NIST is the lead agency of the National Earthquake Hazards Reduction Program (NEHRP).
  o Four Agencies: USGS, NSF, FEMA & NIST
  o First enacted in 1977 following the San Fernando Earthquake of 1971.
  o Responsible for developing new knowledge (hazard maps, new engineering methods and technologies) and building code provisions to improve the nation's resilience to earthquake.

• The 2018 NEHRP Reauthorization (Public Law 115-307) included a requirement that NIST and FEMA develop a report to Congress concerning our recommendations for implementing a Functional Recovery performance objective for buildings and lifelines.

• Why? $100B avg annual loss natural hazards; 50% of U.S. population have earthquake risk.
Reoccupancy Performance Level

“Reoccupancy is a post-earthquake performance state in which a building is maintained, or restored, to allow safe re-entry for the purposes of providing shelter or protecting building contents.”

Reoccupancy Performance Objective:

“A reoccupancy objective is reoccupancy achieved within an acceptable time following a specified earthquake, where the acceptable time might differ for various building uses and occupancies.”
• Functional Recovery Performance Level:
  “Functional recovery is a post-earthquake performance state in which a building and lifeline infrastructure system is maintained, or restored, to safely and adequately support the basic intended functions associated with the pre-earthquake use or occupancy of a building, or the pre-earthquake service level of a lifeline infrastructure system.”

• Functional Recovery Performance Objective:
  “A functional recovery objective is functional recovery achieved within an acceptable time following a specified earthquake, where the acceptable time might differ for various building uses and occupancies, or lifeline infrastructure services.”
Recommendation #1: Framework

- Develop a Framework for Post-Earthquake Reoccupancy and Functional Recovery Objectives.
  A framework is needed to provide national consensus on policies and technical criteria to define the design requirements needed for a building or lifeline infrastructure system to be deemed occupiable or functionally recoverable within a specified timeframe after an earthquake.

Recommendation #2: New Design

- Design New Buildings to Meet Recovery-Based Objectives.
  Because current building codes do not specifically address recovery-based objectives and resulting designs yield inconsistent performance results, new buildings should be designed for specific recovery-based objectives that will support reoccupancy and functional recovery times following a major earthquake.
Recommendation #3: Retrofit Existing

• Design New Buildings to Meet Recovery-Based Objectives.
  To address known vulnerabilities in the existing building inventory, existing buildings should be retrofitted to meet recovery-based objectives that will support reliable reoccupancy and acceptable functional recovery times following a major earthquake.

• By mandate or voluntary with incentives?
Recommendation #4: Lifelines

• Design, Upgrade, and Maintain Lifeline Infrastructure Systems to Meet Recovery-Based Objectives.
  o To improve the performance of lifeline infrastructure systems, a recovery-based approach for the design of new systems and the upgrade and maintenance of existing systems is needed.
  o Because the operation of a lifeline infrastructure system depends on components designed and built over time, the recovery-based design, upgrade, and maintenance of a system are combined and considered under a single recommendation.

• Task 4.3: Develop National Seismic Design Standards to Meet Recovery-Based Objectives for Lifeline Infrastructure Systems
• Task 4.4: Create Regional Lifelines Councils
Recommendation #5: Planning

• Develop and Implement Pre-Disaster Recovery Planning Focused on Recovery-Based Objectives.
  Pre-disaster recovery planning by government, building owners, and lifeline infrastructure systems is needed.

• Task 5.1: Develop and Implement Pre-Disaster Recovery Plans
• Task 5.2: Create and Promote Seismic Continuity Programs
• Task 5.3: Expand and Improve Criteria, Guidelines, and Procedures for Post-Earthquake Assessments and Evaluations
• Task 5.4: Plan Staffing to Expedite Post-Earthquake Recovery
• Task 5.5: Implement Building Occupancy Resumption Programs
• Task 5.6: Alternative Standards for Temporary Habitability
Recommendation #6: Education

• Provide Education and Outreach to Enhance Awareness and Understanding of Earthquake Risk and Recovery-Based Objectives. Education and outreach are needed to enhance awareness and understanding of earthquake risk and recovery-based objectives, and to enable communities to make rational decisions about how the built environment should be designed and constructed.

• Task 6.1: Educate Building and Lifeline Infrastructure System Stakeholders about Risk and Recovery-Based Objectives

• Task 6.2: Educate Design and Construction Industry Professionals about Risk and Recovery-Based Objectives
Recommendation #7: Financial

- Facilitate Access to Financial Resources Needed to Achieve Recovery-Based Objectives.
  A shift to a focus on recovery-based objectives will cost money. Those who will bear these costs must have access to the financial resources needed to make such a shift. Existing mechanisms to facilitate access to needed financial resources should be augmented with newly developed and implemented mechanisms.

- Task 7.1: Develop and Deploy Pre-Disaster Financial Mechanisms to Achieve Recovery-Based Objectives
- Task 7.2: Develop and Deploy Post-Disaster Financial Mechanisms to Achieve Recovery-Based Objectives
**Current Situation:**

- New construction and changes to existing buildings are regulated by the building codes.
- Building codes provide life safety except better for critical facilities and high risk buildings.
- Lifelines follow industry standards.
- Little coordination.

**Functional Recovery:**

- Uses existing code process to regulate FR for individual buildings.
- Improve lifeline systems to provide FR.
- Coordinate both in the process.

**Community Resilience Goals:**

- Plans call for goals for building clusters.
- The role of building codes in enforcing goals is unknown.
- Goals for lifeline systems to provide resilient service.
- Enforcement of these goals are at the community level is a major challenge.
Thank you
The Case for Consensus: how NIBS can convene the building sciences to build incentives

Lakisha Ann Woods, CAE, President & CEO
Finding Solutions: NIBS is America's Congressionally chartered non-profit, non-governmental organization bringing together representatives of government, the professions, industry, labor and consumer interests to focus on the identification and resolution of problems and potential problems that hamper the construction of safe, affordable structures for housing, commerce and industry throughout the United States.
What we do?

NIBS conducts independent studies

Develops consensus guidelines/pre-standard

Authoritative source through our councils and committees

Building Seismic Safety Council (BSSC)
Multi-Hazard Mitigation Council (MMC)
Building Information Management (BIM) Council
Whole Building Design Guide (WBDG)
Building Enclosure Technology & Environment Council (BETEC)
Off-Site Construction Council (OSCC)
Facility Management Operations Council (FMOC)
Think as home owners

- Is my home safe?
- Can I make it safer?
- How much safer?
- Am I covered by insurance?
- How much it costs to get covered?
- How much it costs to upgrade/rebuild?
- Finance options?
- What assistance I may get from federal and state?
- Is it a good investment? Higher resale value? Piece of mind?

Business case for a community

- Mitigation measures? Building codes?
- How to pay? Public assistance programs? Private investment?
- Any successful cases in other communities?
- How to communicate with residents and businesses?
NIBS initiative to convene the dialogues among building science and finance, insurance, and real estate industries

Multi-Hazard Mitigation Council (MMC) and its Committee on Finance, Insurance, and Real Estate (CFIRE)

Best Engineering Practices
- Codes, guidelines, functional recovery

NIBS as a Convener
- Financial products recognizing stronger collateral and lower default risk, ...
- Insurance programs reflecting lower claim frequency & severity, higher take-up rate, ...
- Real Estate practice with higher resale & rent value, faster leasing, ...
- Federal and Local Public Programs with lower response & recovery cost, more stable tax base, ...

Application in Local Communities
NIBS initiative to convene the dialogues among building science and finance, insurance, and real estate industries

Multi-Hazard Mitigation Council (MMC) and its Committee on Finance, Insurance, and Real Estate (CFIRE)

- National platform for collaboration across building science, finance, insurance, and real estate industries
- Develop consensus guidelines and tools
- Serve as a national resource center for local communities
- Support consumer engagement and education
Power of Leverage

Mitigation Cost

Owner Finance Insurance Public sector

Engineering tools
Continue the conversation online:
Twitter & Facebook: @bldgsciences
Or on LinkedIn
Lakisha Ann Woods, CAE @LAnnWoods1
lwoods@nibs.org
THANK YOU FOR ATTENDING

ASCE 2020!

Reminder:
WE LOOK FORWARD TO SEEING YOU NEXT YEAR AT

ASCE 2021 IN Chicago, Illinois!