EERI Policy White Paper
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Promoting the Adoption and Enforcement of Effective Building Codes with Earthquake Provisions in the United States

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EERI Policy Position

EERI supports federal, state, and local adoption, enforcement, and funding of modern, effective building codes with provisions for earthquake design for new and existing buildings in the United States. While the focus of this paper is on United States conditions and recommendations, EERI supports action worldwide.

Background

Risk is directly proportional to hazard, exposure and vulnerability. For earthquakes, the hazard is not a variable that can be reduced. But vulnerability is controlled by the adoption and enforcement of building codes. Even so, the adoption of modern, effective seismic building codes has been uneven across the country and within individual states. Internationally, the use of codes varies even more widely. This paper considers only code adoption in the United States.

A minimum standard for building design is provided by the building codes. Without such standards the variability of engineering, construction quality, and enforcement is seldom acceptable. In order to see the disparity in construction with and without engineered designs and the use of modern building codes, we only need look at the devastation of the 2010 Haiti earthquake where there were virtually no enforced building codes as compared to the 2010 Chile earthquake with modern codes nationwide. Beyond safety and property loss, building codes also reliably limit earthquake damage and facilitate response and recovery.

Strong statewide building codes are the most effective yet often overlooked aspect of the risk reduction equation because they allow the state to implement uniform code amendments. The consideration of population and its exposure to earthquake hazards is important for real risk assessment. Risk is inherently increased in larger population centers, independent of the characterization of the hazard itself, because more people are exposed to the hazard. Therefore, amendments and ordinances to the baseline, statewide building code can be adopted by jurisdictions with consideration to specific local risk conditions to help bolster the built environment. Adoption and enforcement of up to date building codes meaningfully mitigate against earthquake risks. Even where a building code has been adopted, the risk posed by new buildings remains significant if the code is outdated or has no seismic provisions.

Modern, effective building codes also regulate the risks posed by existing buildings. Code requirements for existing buildings should also be included in the code adoption. The International Existing Building Code (IEBC) is now referenced as part of the International Building Code (IBC), beginning with the 2015 editions.

All states have the legal authority to regulate construction and engineering design, but not all states exercise this authority. A statewide code should assure a minimum standard of seismic resistance for new construction throughout the state. Local amendments beyond the basic code requirements can be important to achieve the desired level of safety.

According to the Federal Emergency Management Agency (FEMA), more than two-thirds of disaster-prone communities have outdated codes that do not employ the latest disaster-resistant codes[1] (National Mitigation Investment Strategy, 2019). Many jurisdictions are still applying outdated codes or do not enforce a building code at all. At the time this paper was written, ten states with statewide code requirements are using building codes that are considered outdated[2]. Of the eight states in the New Madrid Seismic Zone (NMSZ), five states do not have a code

[1] Based on adoption of the 2015 International Building Code and International Residential Code as the minimum disaster-resistant codes, FEMA Building Science Branch April, 2019.

[2] For federal and state programs that evaluate state and local code option, ICC considers the two most recent editions as the

that is a standard for all buildings, do not adopt the latest building code, or both. Even where statewide building codes are mandatory, local jurisdictions still have to introduce ordinances to adopt and enforce the code. This has failed to happen in many localities, leaving jurisdictions unnecessarily vulnerable. Generally, NMSZ states are lagging behind the nation in the adoption of building codes with earthquake provisions.

The passage of the Disaster Recovery Reform Act (DRRA) (S. 3041, 2018) and the Supplemental Appropriations for Disaster Relief Act provide new resources and incentives for communities to modernize and enforce codes (ICC, Oct. 2018). Under the DRRA, communities adopting and enforcing modern codes are more competitive applicants for funding. The legislation would also aid communities that—for lack of resources—have not updated their codes or are not enforcing the codes to use pre-disaster mitigation grants for modern code adoption and enforcement. In addition, the Department of Housing and Urban Development has allowed its Community Development Block Grant programs to be used for updating and enforcing local building codes as well as for training.

A recent report by the National Institute of Building Sciences (N.I.B.S., 2018) advocates for multi-hazard mitigation and reports a 4:1 to 11:1 benefit-cost ratio. For the earthquake hazard, the report demonstrates that the benefit of building to the seismic provisions of the 2018 International Codes (I-codes) as compared to 1990s era codes is $12 for every $1 spent. Studies have shown that adding adequate seismic provisions to a building code generally adds less than 2% to the overall cost of typical building construction and that the adoption of statewide codes can help reduce the costs further (Griffin, 2016).

Needed Actions

Adopt Codes: Up to date building code adoption and enforcement is the most effective means of achieving reliable seismic performance of new buildings and improving seismic performance for existing buildings. EERI advocates state building codes be adopted, enacted and administered through one of the following forms of regulation (FEMA, 1998):

1. A state agency responsible for building regulations develops, adopts, and enacts regulations for mandatory local implementation and enforcement, including any amendments necessary to provide for more stringent regulations based on local conditions, standardized on a statewide basis.
2. State building regulations are adopted as a minimum standard. Local jurisdictions are required to adopt and enact equal or more restrictive regulations. Code implementation and enforcement are still mandatory for the local jurisdictions.

A strong link has been shown between building code adoption and enforcement and the mitigation of catastrophic losses. The prospect of lessening damage and ultimately lowering insurance costs is another incentive for communities to enforce building codes. Preventing and mitigating property losses enables communities to rebound quickly. Reducing property losses by application and enforcement of building codes results in lowered insured losses and insurance rates, thereby increasing community and built environment resilience.

latest edition. At the time of this position statement, these would be the 2018 and 2015 editions.

Recommended Policy Actions for the Adoption and Enforcement Building Codes with Earthquake Provisions in the United States

Provide support for code adoption at following levels:		
Federal Policy	**State Policy**	**Local Policy**
- Continue to provide incentives such as Pre-Disaster Mitigation Grants (PDMs) for the establishment of a statewide building code by each State. - Support the National Mitigation Strategy statement that "up-to-date building codes and standard criteria should be required in federal and state grants and programs." - Ensure continued development and regular improved revisions to the I-Codes to provide quality baseline standards for the use of jurisdictions.	- Fund the administration of a state building code regulatory agency with adequate staff and resources. - Apply for PDM and other available grants to adopt and enforce the latest building codes. - Support local participation of jurisdictions as sub-applicants to PDM grants. - Evaluate statewide earthquake hazard risk with input from the State Geologist and the State Seismic Commission (where applicable). - Involve building code and engineering organizations in identifying the need for and the content of state amendments, such as for minimum seismic design categories.	- Enforce the building code and ensure that the necessary plan reviews and inspections are being conducted by qualified personnel. Seek DRRA funding. - Participate as sub-applicants to competitive PDM applications that would adopt and enforce the latest building codes. - Support and conduct training and recruitment to ensure the availability and quality of code enforcement personnel. - Enact amendments to adapt the building code seismic provisions to local conditions as appropriate. - For local code provisions, involve building code and engineering organizations in helping the community identify the need for and the content of local amendments, such as for minimum seismic design categories.

References and Sources for More Information

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