

Resiliency Efforts in Affordable Multifamily Housing

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Introduction

As the climate around us continues to change, so too does the type and amount of risk to our infrastructure, community and safety. Over the past decade alone there have been hundreds of natural disasters and severe weather events that have each exceeded one billion dollars in damage. Combined, these have taken a severe human and economic toll, causing the loss of more than 5,000 lives, an average of 232,000 displaced people per year¹ and over \$800 billion in damage.² The effects of these disasters also present an equity issue, as they are disproportionately borne by low-income communities, communities of color and other vulnerable populations.³

It is also worth examining the extent to which natural disasters uniquely affect renters. Most low-income individuals live in rental housing, and nearly half of all renters in the United States are cost-burdened,⁴ leaving renters in disaster-prone areas at greater risk of incurring property damage, financial hardship, loss of life and other health impacts.

Although natural disasters take many forms, their general increase in frequency and severity, and their resulting human and economic toll, requires a heightened focus on resilient infrastructure. In light of that, steps taken to improve the resiliency of multifamily properties and the communities in which they are located are critical. The need for resiliency in affordable multifamily housing is an economic issue and an equity issue.

Much work has been done in both public and private spheres to enhance resiliency in recent years. Along those lines, the multifamily market is seeing an increased focus on resiliency from investors, many of whom have impact or environmental, social and governance (ESG) mandates, both in the United States and abroad. At present, these resiliency-focused efforts and interests are not fully aligned, limiting their scalability. To address this issue, Freddie Mac is examining whether new system, process, and product innovations in the multifamily debt space can better match capital to need.

To help lay a foundation for this work, in this paper we survey the current market and assess the opportunity to understand how resiliency can be increased at the property level to mitigate against natural disasters. We consider disparate impacts of natural disasters to low-to-moderate income renters and interrelated mitigation efforts at the property level. Our research synthesizes a selection of public and private market approaches to addressing resiliency. We aim to understand a representative sample of efforts and how these efforts could be applied in conjunction with one another to address resiliency most effectively. We find that:

- Increasing resiliency efforts in multifamily housing is important for all property owners, investors and renters, especially for those with low-income and those who are disproportionately impacted.
- There are a wide variety of resiliency programs with narrow goals in mind. These programs are not necessarily designed to work in conjunction with each other.

¹ <https://www.internal-displacement.org/countries/united-states>

² <https://www.climate.gov/news-features/blogs/beyond-data/2010-2019-landmark-decade-us-billion-dollar-weather-and-climate>

³ <https://nca2018.globalchange.gov/chapter/14>

⁴ [https://www.jchs.harvard.edu/blog/more-than-a-third-of-american-households-were-cost-burdened-last-year#:~:text=Among%20renters%2C%20the%20share%20of%202017%20\(10.8%20million%20households\)](https://www.jchs.harvard.edu/blog/more-than-a-third-of-american-households-were-cost-burdened-last-year#:~:text=Among%20renters%2C%20the%20share%20of%202017%20(10.8%20million%20households))

- Only a small number of programs focus on improving resiliency proactively. Most existing public programs are reactive in nature.
- Comprehensive and organized resiliency efforts that combine proactive and reactive measures are relatively new, but can serve as a foundation for future resiliency innovations at the property level.

Why Resiliency is Important

When industry leaders and policy makers consider climate-related improvements at the property level, their focus is often on two aspects: resiliency and efficiency. While resiliency and efficiency are complements of each other, there is a stark difference between the two. Efficiency is gained when achieving the optimal output with minimum waste, while resiliency is the ability to withstand or recover quickly from difficult conditions. Efficiency has numerous long-term benefits, but does not mitigate the consequences of natural disasters. Resiliency is not just a reaction to natural disasters, but a responsible risk-mitigation approach in support of the health and safety of multifamily assets and renters.

Living in a resilient multifamily property provides greater safety and security and can create better health outcomes for tenants and the community as a whole. A property with resilient improvements and design has a greater likelihood of withstanding a natural disaster, allowing more residents to remain safe in their homes and lowering the risk of tenant displacement and the need for temporary housing.

The benefits of implementing resiliency at the property level extends beyond renters; property owners and lenders can also benefit—from a financial and a risk perspective. Properties with resilient features are better protected against natural disasters and weather events, minimizing the cost of rebuilding and the risk of damage. Resilient improvements such as floodproofing, use of more resilient construction materials, backwater valves, and surface stormwater management can create long-term cost savings for owners. Per research from Enterprise Community Partners, Inc., every dollar invested in pre-disaster mitigation for a multifamily property yields an average of \$4 in savings from avoided damages.⁵ Savings can be further maximized through a combination of public and private efforts, such as obtaining insurance premium reductions by adopting stricter building codes. These and other cost reductions help make the implementation of resiliency improvements a sound and economically favorable choice for stakeholders.

Disparate Impacts

Minority households and people making low incomes are disproportionately exposed to climate risk and tend to be disparately impacted by disasters. In the combined floodplain,⁶ Hispanic and Black individuals comprise 36% of the population, compared to 29% nationally. There is also a lower share of White individuals in the combined floodplain—55%—when compared to the national share of the population, which is 62%.⁷ Low-income individuals represent 16% of the combined floodplain population compared to 15% nationally, and 14% of high-poverty census tracts are in the combined floodplain compared to 10% of high-poverty census tracts nationally.

⁵ <http://www.cplusga.com/wp-content/uploads/2016/06/enterprise-manual.pdf>

⁶ The combined floodplain includes the 100-year floodplain and the 500-year floodplain.

⁷ https://furmancenter.org/files/Floodplain_PopulationBrief_12DEC2017.pdf

Though there appears to be a lesser degree of variation in national data on the effects on those of different income levels or ethnicity/race due to natural disasters, in states where natural disasters have been more frequent and severe, a larger disparity exists. For example, 27% of Arkansas residents living in the combined floodplain are Black, where the Black population of Arkansas is only 15%. In Alabama, 22% of the population in the combined floodplain are low-income, compared to 19% of the population across the state.⁸ Analysis on the \$31 billion paid in flood damage claims by the National Flood Insurance Program over the last decade found that nearly 20% of the claims were paid to zip codes where at least one quarter of the residents are Black. These zip codes only represent 13% of the U.S. population nationally.⁹

Natural disaster risk exacerbates existing social and racial inequalities in health.¹⁰ In 2018, as part of the Fourth National Climate Assessment, the United States federal government conducted an analysis of health impacts experienced as a result of natural disasters.¹¹ The research in this assessment indicated that extreme weather events and temperatures can exacerbate existing health problems, lead to heart disease, produce stress and debilitate mental health. Lack of potable water after a hurricane, for example, can impact the food security of a low-income, vulnerable population already living in a food desert and cause lasting negative effects.¹²

Disparities in the health of low-income and minority households is a topic that researchers across multiple industries have been analyzing for decades. Researchers in economics, urban planning, sociology and psychology leveraged nearly thirty studies as part of the Resilience in Survivors of Katrina (RISK) project, which examined the impacts on and recovery of predominately low-income, Black parents in the fifteen years following Hurricane Katrina.¹³ Through this study, researchers found that social inequities left vulnerable and marginalized communities increasingly susceptible to natural disasters and the aftermath effects.

The RISK study also indicated that factors beyond geographic location, such as access to information and disaster planning inequities, can contribute to adverse effects on low-income and minority individuals. Many populations become increasingly vulnerable to natural disasters and climate risks due to inadequate access to information. The transmission of information from governmental and non-governmental organizations to low-income communities is often inconsistent,¹⁴ with minority populations, children, and non-English speakers experiencing disproportionate impacts. Low-income communities have also been more severely affected by natural disasters due to a lack of inclusive disaster planning—they are often left out of disaster planning and not accounted for when considering the potential displacement risk.¹⁵ Individuals with disabilities are often left out of the disaster planning process as well, particularly low-

⁸ https://furmancenter.org/files/Floodplain_PopulationBrief_12DEC2017.pdf

⁹ <https://www.scientificamerican.com/article/flooding-disproportionately-harms-black-neighborhoods>

¹⁰ <https://www.healthaffairs.org/doi/10.1377/hlthaff.2020.01161>

¹¹ The Global Change Research Act of 1990 mandates that the U.S. Global Change Research Program deliver a report to Congress and the President less than every four years on various aspects of climate analysis. A team of more than 300 federal and non-federal experts helped produce the 2018 assessment and it was reviewed by the 13 federal agencies in the U.S. Global Change Research Program. <https://nca2018.globalchange.gov/chapter/front-matter-about>

¹² <https://nca2018.globalchange.gov/chapter/14>

¹³ <https://www.healthaffairs.org/doi/10.1377/hlthaff.2020.01161>

¹⁴ <https://www.phi.org/wp-content/uploads/migration/uploads/application/files/h7fjou01i38v3tu427p9s9kcmhs3oxsi7tsg1fov3yesd5hxu.pdf>

¹⁵ https://nlihc.org/sites/default/files/Fixing-Americas-Broken-Disaster-Housing-Recovery-System_P1.pdf

income renters with disabilities in apartment communities. In the event of an emergency or natural disaster, individuals with disabilities will often lack proper transportation and access to resources available in shelters and throughout the community.¹⁶

Lower-income individuals are more vulnerable to direct threats to their safety and well-being in the face of a natural disaster, as those who have the funds can evacuate and secure temporary housing more easily.¹⁷ In many cases, tenants cannot pay for the costs of transportation or hotels, leaving them with no choice but to stay home, where they face risk of injuries or even death. Studies show that risks and impacts are lower for individuals with higher incomes and for those with access to cars, as these individuals had more resources allowing them to dictate when, where and how they evacuated.¹⁸ In order for equity to be achieved in the wake of a natural disaster, better evacuation options are needed for those who lack financial means and personal transportation.

Like health, the housing stability of low-income and minority households can be severely affected in the face of a natural disaster. Though emergency response services typically set up temporary housing for those with demolished or unsafe housing after a natural disaster, it can take several days or weeks, and often there is still a lack of supply to meet the demand after public and private aid.¹⁹ This can lead to overcrowding in shelters and leave hundreds to thousands of renters at risk of facing housing instability after an extreme weather event.

Financial impacts from a disaster can be substantial as well. Those making low incomes are often slowest to recover after natural disasters and are also more likely to be renters. Although there are non-disaster aid programs such as Medicare and unemployment insurance, there are limits to the support programs like these can provide. A World Bank and Global Facility for Disaster Reduction and Recovery report suggests that even when disaster aid and non-disaster aid programs are combined, the funds provided are typically insufficient to offset the loss of financial assets for low-income individuals, which can further a cycle of poverty.²⁰

Addressing Resiliency Through Public and Private Approaches

Policy makers and private market stakeholders can take actionable steps by way of mandating, encouraging and incorporating resilient property level improvements to reduce the disparities felt by these individuals as a result of extreme weather events. By doing so, property owners, lenders and low-income renters would face less risk of financial and physical hardship when recovering from these events.

To protect vulnerable populations, resiliency efforts should not be considered in isolation as there is no one-sized-fits-all solution; adaptable solutions incorporating a variety of resiliency efforts are needed. Stakeholders in both the public and private sector have been working to increase the resiliency of affordable properties and tenants who live in them, though there is still a disconnect on which efforts can be combined to achieve the greatest impact.

When analyzing resiliency in the context of affordable multifamily housing, we look at both public and private efforts and examine how these efforts can work in conjunction with one

¹⁶ <https://www.tandfonline.com/doi/full/10.1080/00963402.2018.1436808>

¹⁷ <https://www.aspeninstitute.org/blog-posts/the-devastating-effects-of-climate-change-on-us-housing-security>

¹⁸ <https://www.healthaffairs.org/doi/10.1377/hlthaff.2020.01161>

¹⁹ <https://reliefweb.int/report/world/phases-disaster-recovery-emergency-response-long-term>

²⁰ https://www.samhsa.gov/sites/default/files/dtac/srb-low-ses_2.pdf

another to protect the most vulnerable populations. We outline those efforts below; when well-coordinated as a part of a comprehensive plan, they can reduce the human and economic toll of natural disasters. They include addressing both general resiliency needs as well as the disparate exposure to, and impact from, climate events described above.

Public Policy and Private Market Approaches

Public Efforts

1. Governmental and Grant Programs
 - a. Federal Emergency Management Agency's (FEMA) Building Resilient Infrastructure and Communities (BRIC) Program
 - b. National Flood Insurance Program
 - c. Department of Housing and Urban Development's (HUD) Green and Resilient Retrofit Program
 - d. HUD's Community Development Block Grant—Mitigation (CDBG-MIT) Program
2. Building Codes
3. Low-Income Housing Tax Credit Incentives

Private Market Efforts

1. Insurance Premium Reductions
2. Financial-Based Incentives
3. Specialized Financing for Resiliency Measures

Public Policy Approaches

First, we look at several public policy solutions aimed at addressing resiliency for low-to-moderate income renters and property owners serving these programs. These solutions can result from modifications to and the creation of federal programs, grant programs, building codes and tax-credit-based incentives. The examples listed below are intended to be representative of the panoply of existing programs, but are by no means exhaustive.

Governmental and Grant Programs

FEMA's Building Resilient Infrastructure and Communities (BRIC) Program

FEMA's Building Resilient Infrastructure and Communities (BRIC) program was created as a result of the Disaster Recovery Reform Act (DRRA) of 2018²¹ and is considered the most comprehensive FEMA reform since the passage of legislation in response to Hurricanes Katrina and Sandy.²² Legislative and programmatic changes concerning disaster preparedness, response and recovery were made as a result of both hurricanes and the DRRA authorized the creation of the National Public Infrastructure Pre-Disaster Mitigation Fund (NPIPDM). The NPIPDM fund includes a pre-disaster mitigation program funded by setting aside six percent of federal post-disaster grant funding for this purpose.²³ The President is allowed to grant this set

²¹ The Disaster Recovery Reform Act of 2018 (DRRA): A Summary of Selected Statutory Provisions

²² Sandy Recovery Improvement Act of 2013 (SRIA, Division B of P.L. 113-2) and the Post-Katrina Emergency Management Reform Act of 2006 (PKEMRA, P.L. 109-295)

²³ Set aside funding for the NPIPDM can be equivalent to six percent of the aggregate amount of grants under the Stafford Act, which include sections such as essential assistance, debris removal and repair, and federal assistance to individuals and households. https://www.fema.gov/sites/default/files/2020-03/stafford-act_2019.pdf

aside from the Disaster Relief Fund with respect to each major disaster, establish limitations on recipients of pre-disaster hazard mitigation funding and expand the criteria for awarding mitigation funds.

This program is particularly noteworthy because it is one of the few federal programs with a sole focus on pre-disaster mitigation, as opposed to funding authorized for natural disaster recovery. With pre-disaster mitigation, resilient improvements can be made at the property level prior to a natural disaster occurring again, allowing renters to live in a building that would be safer should a disaster occur.

The BRIC program within DRRA allows FEMA to support states, Washington D.C., U.S. territories and tribal governments that have had major disaster declarations in the past seven years so they may undertake innovative infrastructure projects that will reduce the risks they face from disasters. BRIC program funds may be used for mitigation projects, management costs and capability and capacity building activities. Priorities under BRIC for fiscal year 2020 included incentivizing projects that mitigate risk to one or more lifelines, incentivizing projects that incorporated nature-based solutions and adopting or enforcing the latest editions of building codes. Funding for the BRIC program will vary year-over-year, though FEMA estimates that \$300-\$500 million dollars will be granted and designated for pre-disaster mitigation per year.²⁴ BRIC also allows communities to obtain nonfinancial, direct technical assistance in order to build capacity and develop applications, which can be necessary when trying to replicate resilient improvements adopted by other communities.

Funding available under BRIC is distributed through three categories: 1) states and territories allocation, 2) tribal set-asides and 3) national competition for mitigation projects. Projects must be cost-effective, reduce or eliminate risk and damage from future natural hazards, align with the applicable hazard mitigation plan, meet all environmental and historic preservation requirements and meet the latest edition of a consensus-based codes, specifications and standards.²⁵ The third category, national competition for mitigation projects, allows applicants to submit unlimited mitigation project applications, each valued up to \$50 million. This is a significant increase in funding available for individual mitigation projects and there is an estimated \$446.4 million in funding available through the national competition, meaning multiple states, localities and individual jurisdictions have the opportunity to secure funding for resilient improvements. Projects submitted to the national competition are judged on both technical and qualitative criteria,²⁶ such as resiliency effectiveness, population impacted, partnerships and mandatory building code adoption. Building code adherences are weighted the heaviest within technical criteria, which aligns with FEMA's emphasis on disaster resiliency through building codes.

National Flood Insurance Program (NFIP)

One of the most known and publicized government programs is FEMA's National Flood Insurance Program (NFIP). The NFIP requires all property owners in participating communities with a federally backed mortgage to purchase flood insurance if the property is in a high-risk

²⁴ Major disaster declarations due to COVID-19 resulted in an anomalous amount of set aside funding—over \$1 billion dollars—though as of February 28, 2021, FEMA has not decided if it will use all of the set aside funds or retain some for future use.

²⁵ <https://www.fema.gov/grants/mitigation/building-resilient-infrastructure-communities/before-apply>

²⁶ <https://www.fema.gov/sites/default/files/documents/fema-BRIC-FY21-Tech-Qual-Criteria9082021.pdf>

flood area determined by the 100-year flood plain²⁷ and aims to reduce the impact of flooding on any property with a federally backed mortgage. NFIP insurance offers an insurance alternative to private insurance for disaster assistance and helps cover high costs of repairing flood damage to buildings and the loss of personal property.²⁸ This federally created program exists to provide affordable and reliable flood insurance for at-risk properties, insures multifamily properties of all types and sizes and extends across every state in the country. Additionally, NFIP has established requirements for properties planned to be constructed in known Special Flood Hazard Areas to meet certain requirements for construction, such as elevating buildings in floodways.

FEMA manages the hazard identification and mapping, floodplain management and flood insurance components of the NFIP. Multifamily and commercial/mixed-use properties account for approximately 11% of policies supported by the NFIP, however, more than 10 million renter households live in zip codes prone to natural disasters that are not all considered Special Flood Hazard Areas and renters living outside of federal policy areas may lack potential benefits.²⁹ Renters are less likely to be displaced if they are living in a property where the owner has flood insurance and property repairs can be funded and completed more quickly if a flood does occur. Regardless, affordable rental properties would benefit if they are located in a special flood hazard area, though this is a voluntary increase in expenses for property owners with properties outside of special flood hazard areas.

HUD's Green and Resilient Retrofit Program

HUD's green and resilient retrofit program was created as a result of the Fourth National Climate Assessment (2018) and is designed to improve the affordable housing stock by providing funding to multifamily property owners for rehabilitating properties and making them more resilient to extreme weather events. This program seeks to both reduce the likelihood of damage as a result of a natural disaster and increase savings through reducing energy and water consumption.³⁰

Retrofitting properties will aid in preserving aging property infrastructure and mitigating rising utility costs. The proposed 2022 budget for HUD's Green and Resilient Retrofit program supports the development of utility-consumption benchmarking and the establishment of utility baseline data for properties assisted by public subsidy programs like Section 8, Section 202 and Section 811. This program provides funding for climate resilience measures that benefit low-income and marginalized communities. For example, a property could become more resilient by relocating the HVAC systems to ensure they are not affected by flooding.

HUD's Community Development Block Grants—Disaster Recovery (CDBG-DR) Program and Mitigation (CDBG-MIT) Program

HUD offers special Community Development Block Grants (CDBGs) funding through the Disaster Recovery Program (CDBG-DR) and the Mitigation Program (CDBG-MIT). These programs are designed to help cities and communities across the country recover from Presidentially declared disasters, such as major floods, hurricanes, tornadoes and earthquakes.

²⁷ <https://www.nmhc.org/advocacy/issue-fact-sheet/national-flood-insurance-program-fact-sheet>

²⁸ <https://www.benefits.gov/benefit/435>

²⁹ <https://www.jchs.harvard.edu/blog/10-surprising-facts-from-americas-rental-housing-2020#:~:text=More%20than%2010%20million%20renter,to%20the%20American%20Housing%20Survey>

³⁰ https://www.hud.gov/sites/dfiles/CFO/documents/25_FY22CJ-GreenandResilientRetrofit.pdf

Currently, HUD's two largest CDBGs are the Disaster Recovery Program and the Mitigation Program. Congress can appropriate funding through the disaster recovery block grant to provide housing, infrastructure and economic assistance to areas impacted by natural disasters.

The CDBG Mitigation (CDBG-MIT) Program provides funding to areas impacted by recent disasters for high-impact activities that increase resilience through future disaster risk mitigation. The program defines mitigation as activities that "increase resilience to disasters and reduce or eliminate the long-term risk of loss of life, injury, damage to and loss of property, and suffering and hardship by lessening the impact of future disasters."³¹ The mitigation efforts of the CDBG-MIT Program align with other federal programs that address hazard mitigation,³² with the goal of creating a more cohesive effort at the federal, state and local levels. The CDBG-MIT Program aims to maximize the impact of funds by encouraging private and public partnerships and coordination with other federal agencies.

The Fair Housing Equal Opportunities Office reviews HUD's CDBG Disaster Recovery and Mitigation programs to ensure that program funds are being distributed in accordance with fair housing and civil rights obligations. Grantees of these two block grants are required to assess how these funds promote resilient affordable housing and assist vulnerable communities.³³ The CDBG Disaster Recovery action plans are also required to meet additional obligations to help individuals with disabilities and limited English proficiency. These obligations must be met through training, education or technical assistance. The resiliency benefits within the Disaster Recovery Program go beyond the property level, as efforts address disparate impacts felt by lower-income and minority renters when recovering from a natural disaster. Educational assistance can help affected renters recover faster if faced with a natural disaster in the future, creating a more resilient community and meeting the goal of the program.

Resilient Building Codes

Building codes are used to set a minimum requirement for safety, quality, construction and operation and can be used to regulate new or existing construction. No national building codes exist today and building codes are not regulated by the federal government.³⁴ Model building codes vary depending on the location of a property and the specific natural disaster from which it is at risk of damage. For example, building codes can include building or rehabilitating properties to be above base flood elevation, requiring stormproof siding and windows and requiring new construction in earthquake-prone areas to be stronger. Most states and localities rely on organizations that develop standards to create building codes, but they are dependent on state and local level authorities adopting and enforcing them. Localities are autonomous in deciding which building codes they require of multifamily properties and whether they want to adopt codes that were developed with furthering resiliency in mind.

Several organizations and rating systems have created building codes that exceed minimum state and local requirements and further resiliency at the property level. The most widely adopted building code is called the International Building Code, developed by the International

³¹ <https://www.hudexchange.info/programs/cdbg-mit/overview>

³² Examples include FEMA's Hazard Mitigation Grant Program and FEMA's BRIC program.

³³

https://www.hud.gov/program_offices/fair_housing_equal_opp/fheo_requirementsfor_community_development_block_grant_

³⁴ <https://crsreports.congress.gov/product/pdf/R/R46776/3>

Code Council (ICC). The International Building Code provides minimum building requirements to protect the health and safety of individuals. All fifty states and Washington, D.C. have adopted I-codes at the state or jurisdictional level.³⁵ The standards within the International Building Code are updated every three years, designed to protect the safety of individuals and reduce property damage. Adopting elective building codes can increase the resiliency of a residential building, protect the health and safety of low-to-moderate income renters and produce significant cost savings. However, only about half of at-risk jurisdictions currently have hazard-resistant building codes. This is particularly noteworthy because residential buildings account for 80% of disaster damages. A 2020 study by FEMA on building code savings found that, out of the 18.1 million post-2000 buildings modeled, over half showed avoided losses as a result of adopting International Building Codes, totaling \$1.6 billion in avoided losses.³⁶

The ICC recently adopted a new approach to increase the resiliency of residential buildings through International Codes by aiming to enhance community resilience.³⁷ The ICC is now working in conjunction with the American Institute of Architects to determine what risks communities should consider when developing their own definition of resilience. The American Institute of Architects has identified shocks that impact communities—such as tornadoes and wildfires—and also accounts for factors such as housing affordability, aging infrastructure and the growing wealth gap when considered community resiliency.³⁸ International Codes are now being developed with housing affordability in mind in order to ensure that resiliency and safety can be achieved for low-to-moderate income renters—without overburdening property owners with high costs.

³⁵ https://global.ihs.com/icc_international_codes.cfm

³⁶ https://www.fema.gov/sites/default/files/2020-11/fema_building-codes-save_study.pdf

³⁷ https://www.iccsafe.org/wp-content/uploads/19-17804_IBC_Resilience_WhitePaper_FINAL_HIRES.pdf

³⁸ https://www.iccsafe.org/wp-content/uploads/19-17804_IBC_Resilience_WhitePaper_FINAL_HIRES.pdf

Benefit-cost ratio to adopting building codes by natural disaster

National Institute of BUILDING SCIENCES™		ADOPT CODE	ABOVE CODE	BUILDING RETROFIT	LIFELINE RETROFIT	FEDERAL GRANTS
		Overall Benefit-Cost Ratio	11:1	4:1	4:1	4:1
		Cost (\$ billion)	\$1/year	\$4/year	\$520	\$0.6
		Benefit (\$ billion)	\$13/year	\$16/year	\$2200	\$2.5
 Riverine Flood		6:1	5:1	6:1	8:1	7:1
 Hurricane Surge		not applicable	7:1	not applicable	not applicable	not applicable
 Wind		10:1	5:1	6:1	7:1	5:1
 Earthquake		12:1	4:1	13:1	3:1	3:1
 Wildland-Urban Interface Fire		not applicable	4:1	2:1	not applicable	3:1

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In some instances where building codes cannot help increase the stability of a building in the face of a natural disaster, unique rating systems can be used as a supplement. Unlike building codes that mitigate against riverine floods and hurricane surges, there are few building codes that focus on earthquake resiliency. Earthquakes can damage or demolish affordable multifamily properties and the financial costs associated with an earthquake can often be significant, but there are some International Codes that do include seismic provisions aimed at increasing the stability of a building in the event of an earthquake. Additionally, third-party firms have developed rating systems designed for property owners to use in order to increase the stability of a property if an earthquake were to occur. The Resiliency-based Earthquake Design Initiative (REDi™) Rating System designed by ARUP provides property owners and engineers with a framework to implement design and planning materials, enabling owners to provide livable conditions quickly after an earthquake occurred and resume business operations.³⁹ The U.S. Resiliency Council Building Rating system similarly assesses earthquake resiliency by awarding points for strategies that further resiliency in the forms of safety, minimized damage and recovery.⁴⁰

For state or local laws that include a resilient building code, multifamily property owners must make the decision to comply or risk getting fined. Once resiliency improvements are made at the property level, a property owner could benefit in the form of an insurance premium reduction.

Additionally, certain insurance companies will offer a premium reduction for multifamily property owners who integrate beyond-code improvements such as LEED and green-certified retrofit buildings. Incentives for voluntary adoption of above-code resilient improvement exist within federal programs as well. For example, the Community Rating System⁴¹—part of the NFIP—discounts flood insurance premiums for communities that adopt additional building codes beyond the minimum requirements of the NFIP.

³⁹ <https://www.arup.com/perspectives/publications/research/section/redi-rating-system>

⁴⁰ <http://www.usrc.org/usrc-rating-system>

⁴¹ https://www.fema.gov/sites/default/files/2020-11/fema_building-codes-save_study.pdf

Low-Income Housing Tax Credit Incentives for Resiliency

The Low-Income Housing Tax Credit (LIHTC) is the most common form of public subsidy for affordable multifamily housing. The federal government issues tax credits to states and the credits are then allocated to developers of eligible housing projects by the state's Housing Finance Agency (HFA), based on priorities in the state's unique Qualified Allocation Plan (QAP). In the past several years, an increasing number of states have prioritized resiliency requirements to make affordable housing safe for renters and a strong investment for multifamily financers.

States can elect to include provisions in their QAPs for natural disaster mitigation, preparedness or recovery, including provisions promoting structurally resilient design or prohibiting projects in floodways and using LHTC for the rehabilitation and replacement of units affected by a natural disaster. The Massachusetts Institute of Technology conducted a study analyzing forty-nine state QAPs to determine how many included provisions for resiliency and natural disaster preparedness. In total, twenty-four states and territories included provisions for mitigation, preparedness or recovery within the QAPs, with three only including recovery provisions.⁴²

By adhering to resiliency requirements in a state's QAP using LIHTC, property owners receive a more affordable financing structure and are able to increase the stability and longevity of a property. LIHTC promotes the preservation of affordable housing and equity investors that finance resilient affordable properties reap additional financial benefits.

Benefits of tax-credit-based incentives can have a continuous effect in the multifamily housing industry. LIHTC investments are one of the most stable types of investment in the multifamily housing industry and their soundness has already spurred investor demand, creating a competitive market for tax credits. The soundness of a resilient-friendly LIHTC investment can also lead to reduced insurance premiums for LIHTC properties. Government-sponsored enterprises, federal housing agencies and life company lenders routinely provide financing for LIHTC properties. This alignment of public policy and private market efforts can increase resiliency at the property level, potentially leading to more stable homes for renters in properties at risk of natural disaster as well as providing tax reductions to investors.⁴³

Private Market Approaches

Private market approaches can also be used to increase resiliency in affordable multifamily housing. Similar to the public policy initiatives, this list is not exhaustive, rather it is a sample of some of the more common private market efforts to promote financing of resilient multifamily properties.

We elaborate on these private market solutions below and offer more examples of how these approaches can be combined with public policy efforts to maximize the efficiency of a resilient property, creating a safer environment for low-income renters.

⁴²

<https://dusp.mit.edu/sites/dusp.mit.edu/files/attachments/publications/Mehta%20Brennan%20Steil%202020%20Affordable%20Housing%20Disasters%20and%20Social%20Equity.pdf>

⁴³ <https://www.buildingresilient.com/wp-content/uploads/2016/03/NIBS-MMC-Resilience-Incentives-Oct-2015.pdf>

Catastrophic Risk Modeling and Insurance

Sophisticated, catastrophic risk modeling is widely used by institutional investors and insurance companies to assess current and long-term risks of natural disasters and the impact on their businesses. In 1992, the damage done by Hurricane Andrew to commercial and residential properties acted as a wake-up call to insurance companies and real estate investors. When it happened, Hurricane Andrew was the most expensive natural disaster in U.S. history and shortly thereafter transformed the catastrophe models (“cat models”) used to help predict and cope with infrequent, high-severity natural disasters.⁴⁴ Prior to Hurricane Andrew—which caused \$26.5 billion in damage and left over 250,000 homeless⁴⁵—cat models used traditional actuarial science based on historical data and could not properly calculate risk exposure for natural disasters and extreme weather events.⁴⁶ Today, cat models are significantly more forward-looking and incorporate advanced technology and meteorological data. The majority of cat models today can combine natural disaster risk—such as hurricane and flood risk—with probable economic losses, enabling better predictions about the potential impacts of the risk a given catastrophe presents to a company’s business continuity and financial loss.

Some cat models used by insurance companies also incorporate climate change. Models that incorporate climate change help companies and investors assess the near- and long-term impacts of climate change to aid in sound investment decisions. For example, as of June 2021, catastrophe modeler Risk Management Solutions, Inc. (RMS) launched climate change models for North Atlantic hurricanes that incorporate forward-looking predictions to capture potential events across different climate change scenarios.⁴⁷ Modelers such as RMS are incorporating a climate change framework in order to understand the challenges associated with physical risk and the broad potential impacts over time, which will in turn help to minimize future property damage and protect tenants against climate-related challenges.

Favorable insurance coverage terms and premium reductions are one of the largest incentives to incorporate resiliency measures at the property level. A resilient property reduces the risk of severe claims paid by insurers; as a result, insurance underwriters can factor property resiliency measures such as stormwater management or building envelope improvements into their underwriting models and offer broader coverage at lower premiums. Insurance companies across the country have partnered with climate scientists to integrate climate-related risk modeling techniques into their own business and underwriting models that help better project possible losses and mitigate their own financial risks. Insurance companies have heightened incentive to do this, as natural disaster risk directly affects their underwriting of insurance policies and their claims-paying ability, as well as their profitability. Minimizing risk of economic loss is central to the profitability of insurance companies, and implementation of resilient design and improvements into multifamily structures reduces the risk of losses for all stakeholders. As natural disasters have increased in frequency and severity over the past several years, insurance companies are increasing their promotion of resilient improvements at the property level.

⁴⁴ <http://uli.org/wp-content/uploads/ULI-Documents/Resilience-Strategies-for-Communities-at-Risk.pdf>

⁴⁵ <https://www.nps.gov/articles/hurricane-andrew-1992.htm>

⁴⁶ <https://www.eesi.org/papers/view/fact-sheet-strengthening-financial-resilience-to-climate-change>

⁴⁷ <https://www.businessinsurance.com/article/00010101/NEWS06/912340593/RMS-to-incorporate-climate-change-into-major-cat-models>

Specialized Financing for Resiliency Measures

Increasing resiliency at the property level can also provide a financial incentive for property owners and lenders. Private market financial institutions have the opportunity to redesign and scale the market by integrating performance-based retrofit financing into their normal loan offerings and programs. Although many major banks and lenders are beginning to offer financial incentives for increasing resiliency at the property level, C-PACE financing and Community Development Financial Institutions (CDFIs) have been early adopters of resiliency retrofit financing.

C-PACE for Resiliency Retrofits

Commercial property-assessed clean energy, commonly referred to as C-PACE, is a newer financing structure available for property owners looking to incorporate resilient and energy efficiency improvements. C-PACE was first introduced in 2007 in California and is a financing structure that allows property owners to borrow capital for energy efficiency or resilient improvement projects via a voluntary assessment on their property tax bill. This type of financing can be fundamental to increasing and later preserving the long term sustainability of a multifamily property and is typically subsidized by government programs or private investment. C-PACE assessments remain with the property even if it is sold, which facilitates long-term investment in resilient design and building performance.⁴⁸

Participants in C-PACE financing can retrofit a property to increase its resiliency to natural disasters. Retrofits are the addition of new technology or features to an older system. An example is seismic retrofits, which is the process of strengthening older buildings to make them more resistant to earthquakes. This can be done using external post-tensioning, base isolators, or supplementary dampers, which are now commonly used on buildings located in earthquake-prone areas.

There is no national standard for C-PACE programs, as implementation is dependent on states that have enabling legislature and active participating programs. Thirty-eight states and Washington, D.C. have passed laws that enable C-PACE; however, only twenty-six states and D.C. currently have active operational C-PACE programs.⁴⁹ Programs vary by locality and states can offer different levels of incentives to owners who implement resiliency at the property level. For example, lenders in Florida have been very active in incentivizing C-PACE to finance hurricane resiliency improvements, as a C-PACE property receives an insurance premium reduction. At present, only about 7% of C-PACE investment is used for resiliency improvements,⁵⁰ but lenders and program administrators in the multifamily industry that we have had conversations with expect C-PACE investment to continue to evolve and be used for resilience.

State and local governments are interested in attracting private capital to take advantage of the financing opportunities associated with implementing resilient improvements at the property level. The Connecticut Green Bank, for example, has financed more than 30 commercial projects with over \$21 million in financing using C-PACE. Through technical assistance and financing solutions, the Connecticut Green Bank allows multifamily property owners to invest in

⁴⁸ <https://betterbuildingssolutioncenter.energy.gov/financing-navigator/option/cpace>

⁴⁹ <https://www.pacenation.org/pace-programs>

⁵⁰ <https://www.pacenation.org/pace-market-data>

building envelope efficiency. Through insulation, exterior shades and reflective roofs, envelope efficiency increases the resiliency of a property through its ability to withstand extreme weather events.⁵¹ Much of the capital used to fund these projects was obtained through private investment, proving the efficacy of combining public policy and private market efforts.

Financing through CDFIs

Because CDFIs interact with communities at the ground level, they are well suited to pilot different climate and resilience investment models and they are more likely to take risks other financial institutions might be reluctant to take.⁵² CDFIs and Green Banks act as catalysts that help mobilize greater local and global private market investment to support public policy initiatives such as increasing resiliency at the property level.

Several CDFIs have developed innovative products or programs that incorporate resiliency, energy efficiency and water efficiency at the property level and are offering attractive financial incentives for investors. Opportunity Finance Network has developed a framework for merging resiliency and financial impact and has created the Resilient Community Development Finance (ResCDF) initiative, which looks to weave ESG factors into establishing resilient communities. The goal of this initiative is to ensure CDFI stakeholders are equipped with the capital, infrastructure and tools to be resilient to economic and natural disasters.⁵³ ResCDF created a resilient assessment tool for CDFIs to use when assessing the level of resiliency for a new loan in underwriting or an existing loan in portfolio and risk management to determine how to further property and community level resiliency through financing. CDFIs like Coastal Enterprises, Inc. (CEI), NDN Fund/Collective, Black Business Investment Fund, Enterprise Partnerships and Genesis Fund are all currently part of the ResCDF initiative and are working together alongside Bank of America and the Rockefeller Foundation to increase property and community resiliency.⁵⁴

Emerging Standards in Resiliency Measurement and Impact Investing

Per analysis from the National Institute of Building Sciences, implementing resiliency at the property increases its market value and reduces the risk to lenders and other stakeholders involved in the mortgage business. Recently, companies started to issue sustainability or resilience bonds specifically designed to support affordable housing projects with resilient improvements.

Resilience bonds raise capital specifically for climate resilient investment and are a subset of green bonds. These investments are either asset or system focused and intended to either maintain or enhance the resilience of an asset against a natural disaster or climate change, or provide climate resilience benefits to the broader system.⁵⁵ In 2019, the European Bank for Reconstruction and Development raised \$700 million and launched the first-ever resilience bond. The proceeds from the bond provide current and future financing for climate resilience

⁵¹ <https://blog.aee.net/this-is-advanced-energy-efficient-building-envelope-systems>

⁵² <https://centerforcommunityinvestment.org/sites/default/files/Seeding%20Climate%20Resilience%20deVuono-powell.pdf>

⁵³ <https://www.summitllc.us/blog/ofn-2020-recap-3-cdfi-sustainability-and-resilience>

⁵⁴ https://resilientcitiesnetwork.org/downloadable_resources/UR/SP/2021/10/ResCDF-Overview-CFL-10-June-2021.pdf

⁵⁵ <https://www.climatebonds.net/climate-resilience-principles>

projects across the globe, with projects furthering climate resilient infrastructure, climate-resilient business and commercial operations, or climate-resilient agriculture and ecological systems.⁵⁶

Standards for resiliency measurement continue to evolve. A rating agency such as Standard and Poor's, Fitch Ratings, or Moody's can be used to rate a bond on its probability of default. Assuming all other factors are equal, the more resilient the properties in a portfolio are, the less likely they may be to default in certain scenarios and the higher the potential rating. This in turn can contribute to a better deal execution. However, rating agencies do not yet have a clear way of incorporating resiliency into their models and they are continuing to evolve. Many investors rely on second opinion firms and frameworks to rate the resiliency of a bond or portfolio. Others rely on engineering companies and some property owners report resiliency metrics themselves. There is a greater need for a centralized or standardized view on resiliency, as a streamlined rating system will enable investors to make more sound decisions.

Conclusion

The focus on resiliency in multifamily housing is growing and there is a need to innovate in the future, maximizing both public and private roles. Greater attention needs to be paid to the challenges low-income and minority communities face, why they are disproportionately impacted and what can be done to increase resiliency. Maximizing the resiliency of multifamily properties effectively is not something that can be done unilaterally; it requires collaboration, incentivization of private market stakeholders and agreement among public policy advocates and private market investors.

By examining how public policy and private market efforts mitigate against natural disaster damage, we are able to see how resiliency challenges can be addressed in a variety of ways and how resiliency can improve affordable rental housing. We also see how an intersection of public and private efforts is needed in order for the market to address the lack of resiliency in affordable multifamily housing most effectively. Resiliency efforts and incentives are not only essential to improving the property level resilience of an affordable multifamily housing asset, but are also essential to the health, safety and livelihood of renters across the country.

⁵⁶ [World's first dedicated climate resilience bond, for US\\$ 700m, is issued by EBRD](#)