Supporting Communities: The Energy/Resilience Nexus

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The Family of Building & Community Solutions

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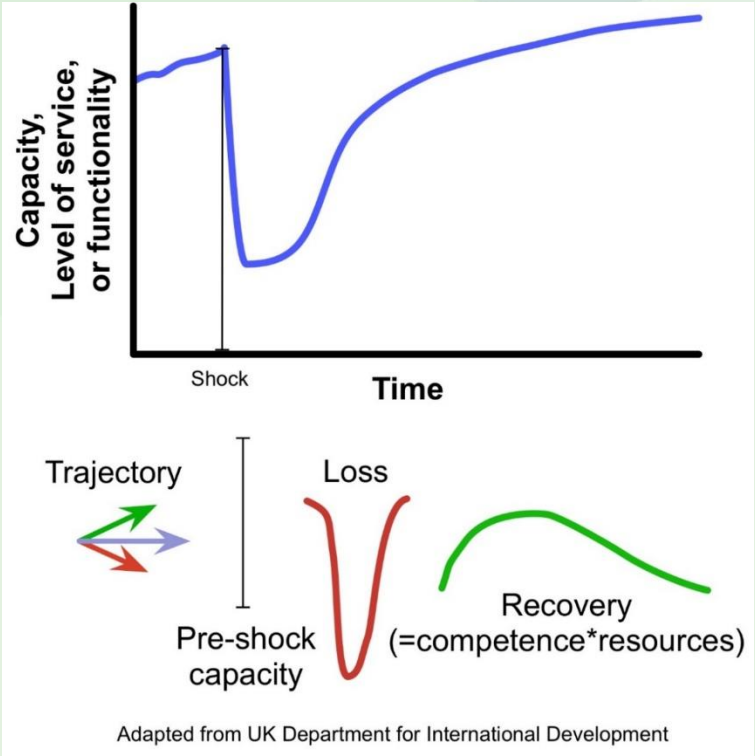
- Codes and Standards
- Personnel Training and Certification
- Product Evaluation
- Accreditation Services
- Codification & Administration Services
- Engineering Support
- Community Resilience Benchmarks
- Third-Party Evaluation Services

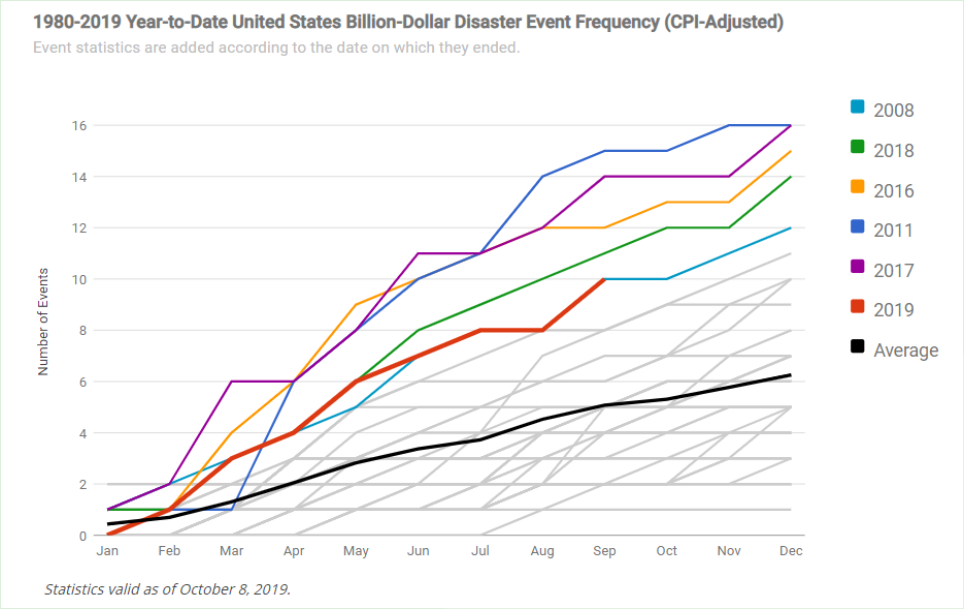
What is Resilience?

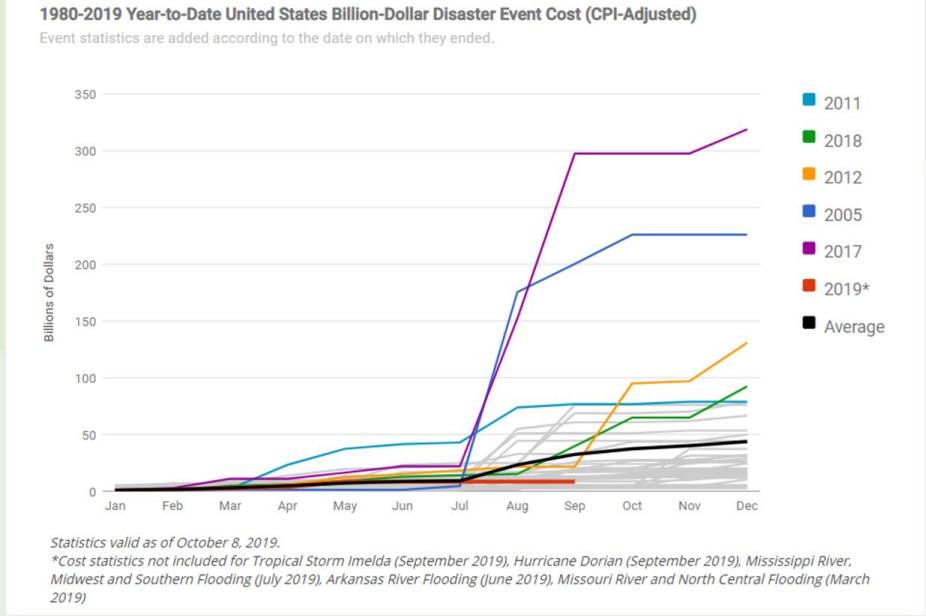
According to the National Academy of Sciences:

Resilience is the ability to prepare and plan for, absorb, recover from, and more successfully adapt to adverse events.



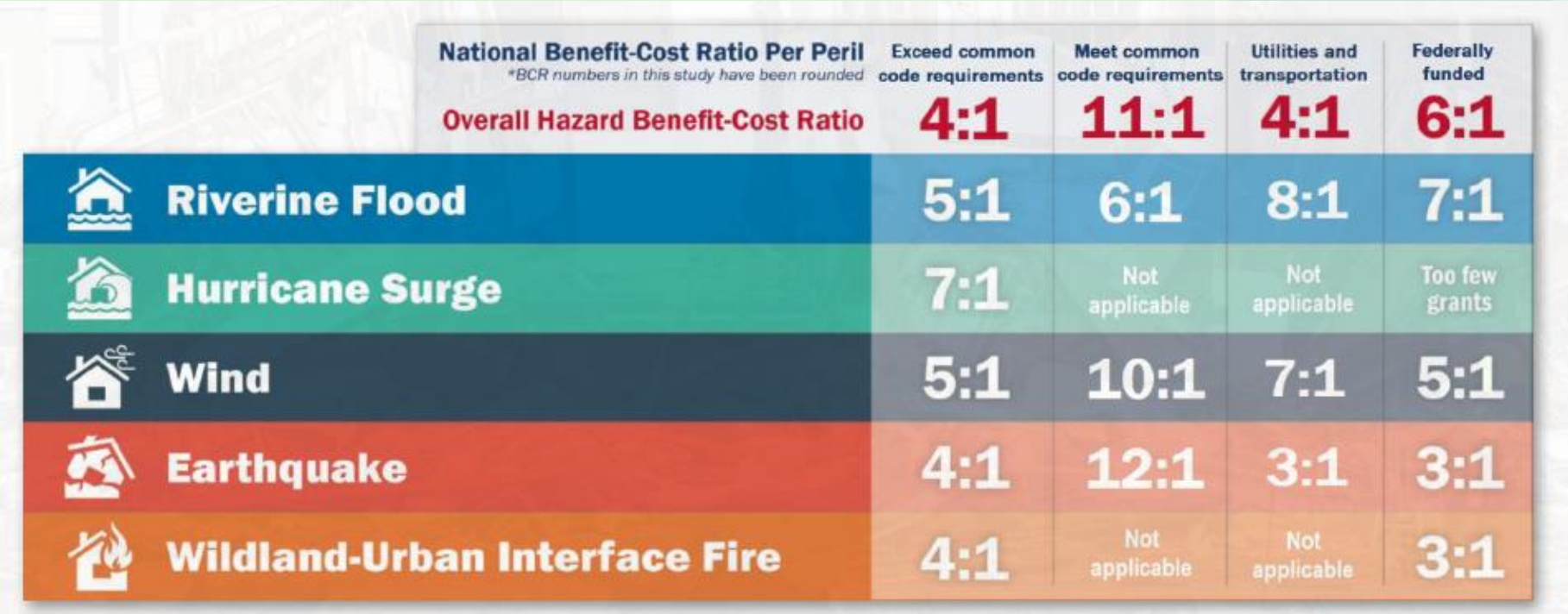
Why Resilience?





https://www.ncdc.noaa.gov/billions/

Cost Effective Mitigation Solutions



National Benefit-Cost Ratio Per Peril *BCR numbers in this study have been rounded	Exceed common code requirements	Meet common code requirements	Utilities and transportation	Federally funded
Overall Hazard Benefit-Cost Ratio	4:1	11:1	4:1	6:1
Riverine Flood	5:1	6:1	8:1	7:1
Hurricane Surge	7:1	Not applicable	Not applicable	Too few grants
Wind	5:1	10:1	7:1	5:1
Earthquake	4:1	12:1	3:1	3:1
Wildland-Urban Interface Fire	4:1	Not applicable	Not applicable	3:1

www.nibs.org/mitigationsaves

Multihazard Mitigation Council (2018). Natural Hazard *Mitigation Saves: 2018 Interim Report.* Principal Investigator Porter, K.; co-Principal Investigators Scawthorn, C.; Huyck, C.; Investigators: Eguchi, R., Hu, Z.; Reeder, A; Schneider, P., Director, MMC. National Institute of Building Sciences, Washington, D.C. www.nibs.org

The Importance of Community-Level Resilience

Galveston Texas, Post-Ike

Manhattan, Post-Sandy

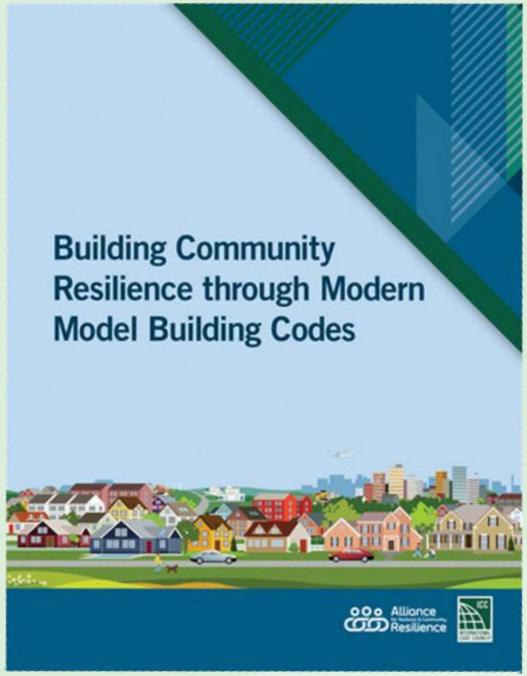
Paradise, Post-Camp Fire

Community Functions

Alliance for National & Community Resilience

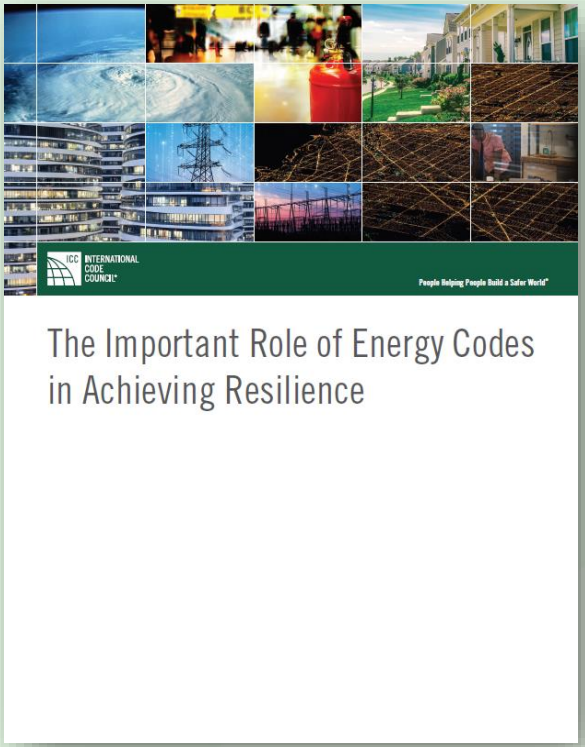
www.resilientalliance.org | @ANCResilience

Building Codes & Resilience



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.

Energy Codes & Resilience



Second in a series

"Using energy codes to provide enhanced passive survivability provides significant co-benefits. Community and individual resilience is enhanced while building owners and tenants reap energy efficiency related rewards everyday in the form of lower energy bills and greater cost certainty."

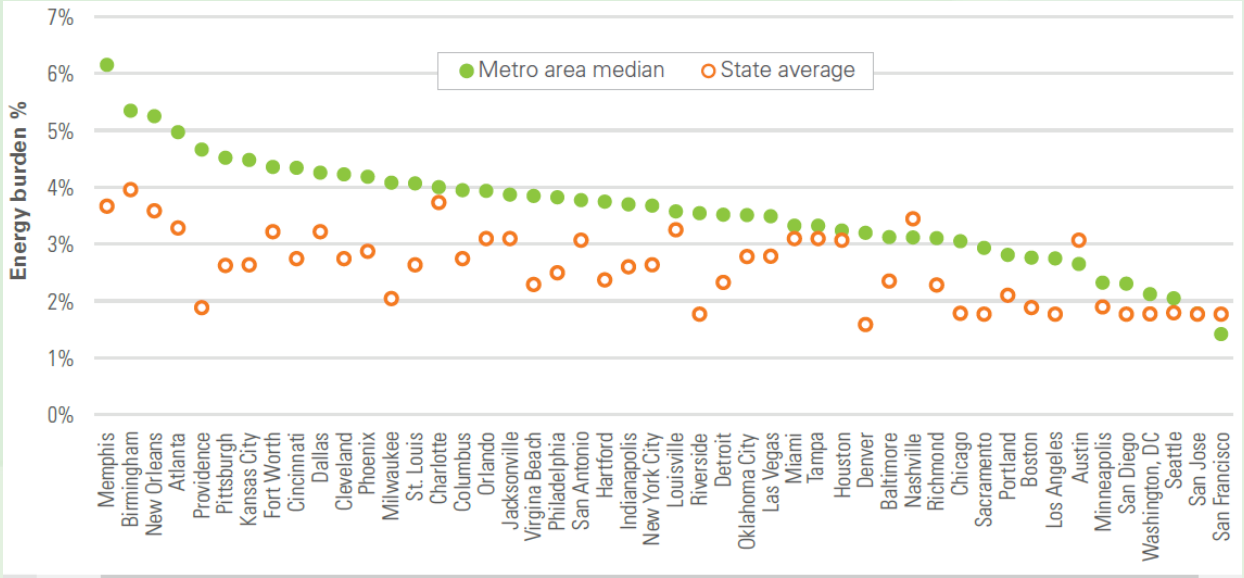
https://www.iccsafe.org/wp-content/uploads/19-18078_GR_ANCR_IECC_Resilience_White_Paper_BRO_Final_midres.pdf

Energy Code Contributions to Resilience

Energy & Low Income Households

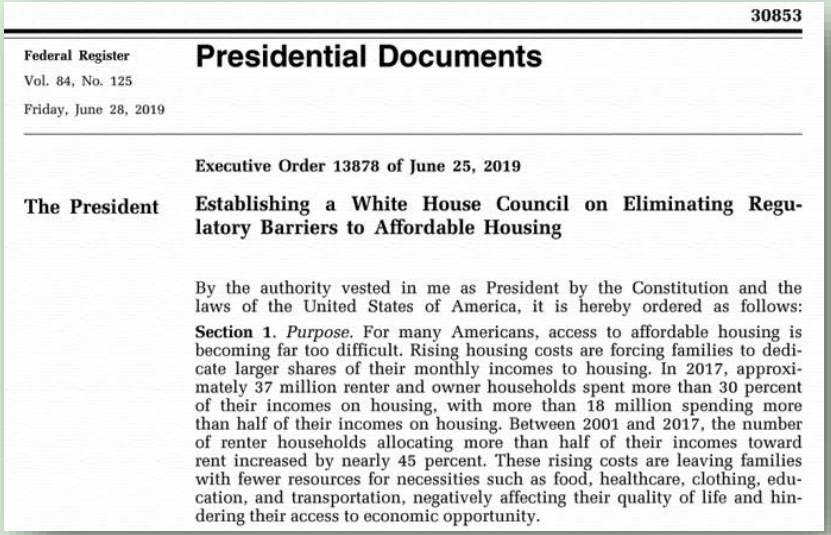
- Low income households face an energy burden twice that of average households (in some places up to 25%)
- Energy efficiency provides a limit to exposure level of homeowners or businesses due to volatility in energy prices
- Reduced generation needs leads to reduced air pollutants, reducing health impacts

Median energy burden for metro area and state averages



http://www.aceee.org/sites/default/files/publications/researchreports/u1602.pdf

Affordable Housing = Resilient Housing



30853

Federal Register
Vol. 84, No. 125
Friday, June 28, 2019

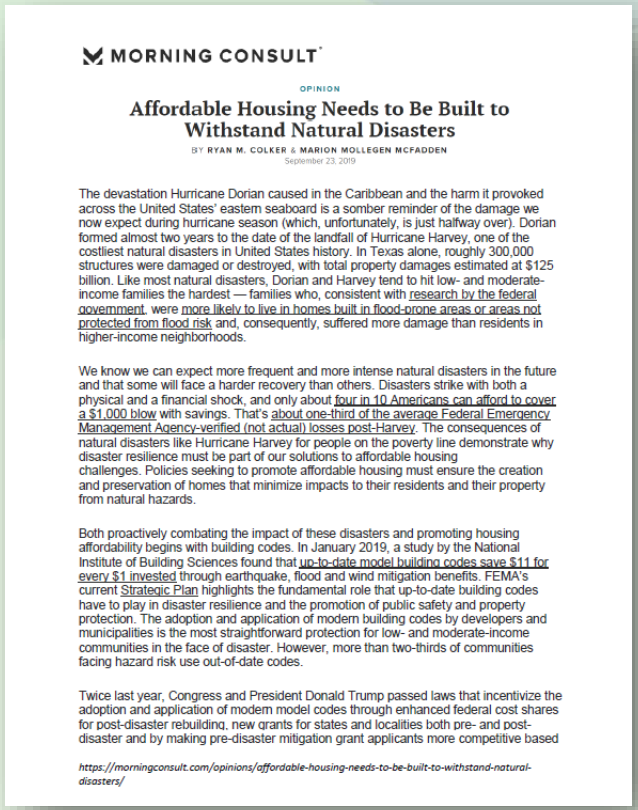
Presidential Documents

Executive Order 13878 of June 25, 2019

The President — **Establishing a White House Council on Eliminating Regulatory Barriers to Affordable Housing**

By the authority vested in me as President by the Constitution and the laws of the United States of America, it is hereby ordered as follows:

Section 1. *Purpose.* For many Americans, access to affordable housing is becoming far too difficult. Rising housing costs are forcing families to dedicate larger shares of their monthly incomes to housing. In 2017, approximately 37 million renter and owner households spent more than 30 percent of their incomes on housing, with more than 18 million spending more than half of their incomes on housing. Between 2001 and 2017, the number of renter households allocating more than half of their incomes toward rent increased by nearly 45 percent. These rising costs are leaving families with fewer resources for necessities such as food, healthcare, clothing, education, and transportation, negatively affecting their quality of life and hindering their access to economic opportunity.



MORNING CONSULT

OPINION

Affordable Housing Needs to Be Built to Withstand Natural Disasters

BY RYAN M. COLKER & MARION MOLLEGEN MCFADDEN
September 23, 2019

The devastation Hurricane Dorian caused in the Caribbean and the harm it provoked across the United States' eastern seaboard is a somber reminder of the damage we now expect during hurricane season (which, unfortunately, is just halfway over). Dorian formed almost two years to the date of the landfall of Hurricane Harvey, one of the costliest natural disasters in United States history. In Texas alone, roughly 300,000 structures were damaged or destroyed, with total property damages estimated at $125 billion. Like most natural disasters, Dorian and Harvey tend to hit low- and moderate-income families the hardest — families who, consistent with research by the federal government, were more likely to live in homes built in flood-prone areas or areas not protected from flood risk and, consequently, suffered more damage than residents in higher-income neighborhoods.

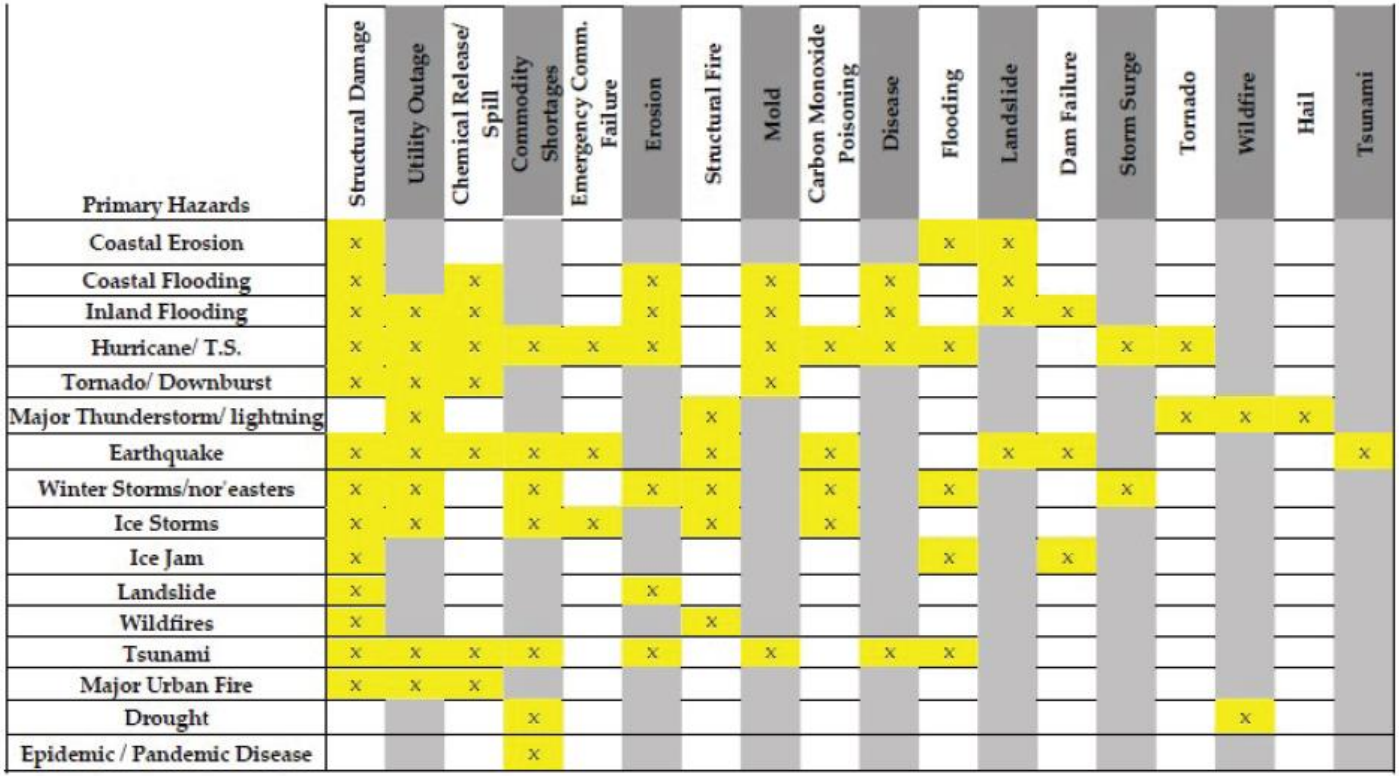
We know we can expect more frequent and more intense natural disasters in the future and that some will face a harder recovery than others. Disasters strike with both a physical and a financial shock, and only about four in 10 Americans can afford to cover a $1,000 blow with savings. That's about one-third of the average Federal Emergency Management Agency-verified (not actual) losses post-Harvey. The consequences of natural disasters like Hurricane Harvey for people on the poverty line demonstrate why disaster resilience must be part of our solutions to affordable housing challenges. Policies seeking to promote affordable housing must ensure the creation and preservation of homes that minimize impacts to their residents and their property from natural hazards.

Both proactively combating the impact of these disasters and promoting housing affordability begins with building codes. In January 2019, a study by the National Institute of Building Sciences found that up-to-date model building codes save $11 for every $1 invested through earthquake, flood and wind mitigation benefits. FEMA's current Strategic Plan highlights the fundamental role that up-to-date building codes have to play in disaster resilience and the promotion of public safety and property protection. The adoption and application of modern building codes by developers and municipalities is the most straightforward protection for low- and moderate-income communities in the face of disaster. However, more than two-thirds of communities facing hazard risk use out-of-date codes.

Twice last year, Congress and President Donald Trump passed laws that incentivize the adoption and application of modern model codes through enhanced federal cost shares for post-disaster rebuilding, new grants for states and localities both pre- and post-disaster and by making pre-disaster mitigation grant applicants more competitive based

https://morningconsult.com/opinions/affordable-housing-needs-to-be-built-to-withstand-natural-disasters/

Secondary Hazard Effects



Primary Hazards	Structural Damage	Utility Outage	Chemical Release/ Spill	Commodity Shortages	Emergency Comm. Failure	Erosion	Structural Fire	Mold	Carbon Monoxide Poisoning	Disease	Flooding	Landslide	Dam Failure	Storm Surge	Tornado	Wildfire	Hail	Tsunami
Coastal Erosion	x										x	x						
Coastal Flooding	x		x			x		x		x		x						
Inland Flooding	x	x	x			x		x		x		x	x					
Hurricane/ T.S.	x	x	x	x	x	x		x	x	x	x			x	x			
Tornado/ Downburst	x	x	x					x										
Major Thunderstorm/ lightning		x					x								x	x	x	
Earthquake	x	x	x	x	x		x		x			x	x					x
Winter Storms/nor'easters	x	x		x		x	x		x		x			x				
Ice Storms	x	x		x	x		x		x									
Ice Jam	x										x		x					
Landslide	x					x												
Wildfires	x						x											
Tsunami	x	x	x	x		x		x		x	x							
Major Urban Fire	x	x	x															
Drought				x												x		
Epidemic / Pandemic Disease				x														

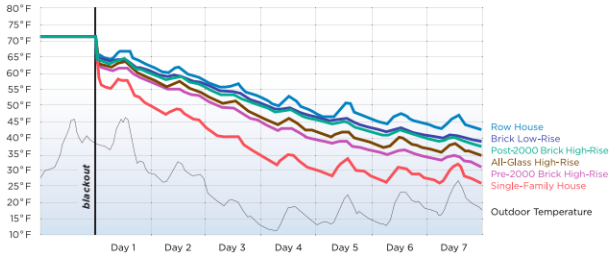
Figure 3. Secondary Hazard Effects Matrix (Linnean 2013)

Source: MA Hazard Mitigation Plan (2010) p. 117 Table 14

Passive Survivability, Extreme Heat/Cold

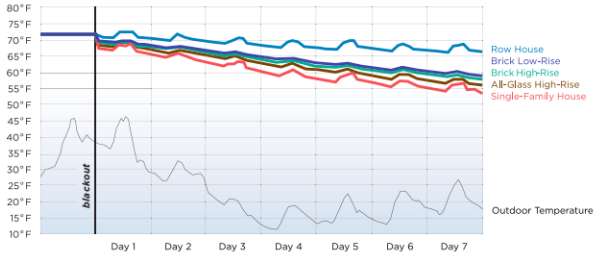
Indoor Temperatures During a Winter Blackout

Typical Building



A typical detached single-family house would fall below freezing on the fourth day. After a week, all the other buildings would be almost as cold, between 32°F and 43°F indoors.

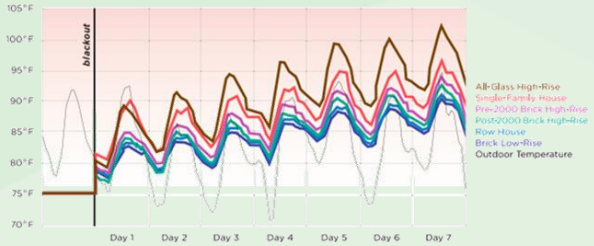
High-Performing Building



At the end of the week, there would be an 18°F to 27°F difference between a typical existing building and a high-performing building of the same type. All the high-performing buildings would maintain temperatures above 54°F.

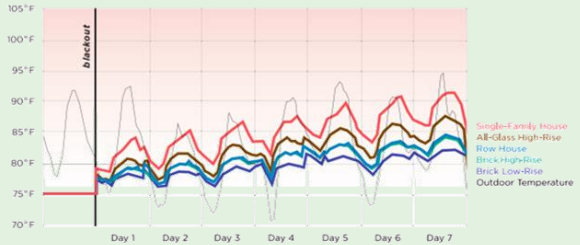
Indoor Temperatures During a Summer Blackout

Typical Building



The typical all-glass high-rise apartment and single-family house heat to almost 90°F on the first day. The all-glass apartment climbs above 95°F on the fourth day and peaks over 100°F. The brick buildings, including the row house, low-rise and high-rise apartments, stay cooler throughout the week but still end above 85°F.

High-Performing Building

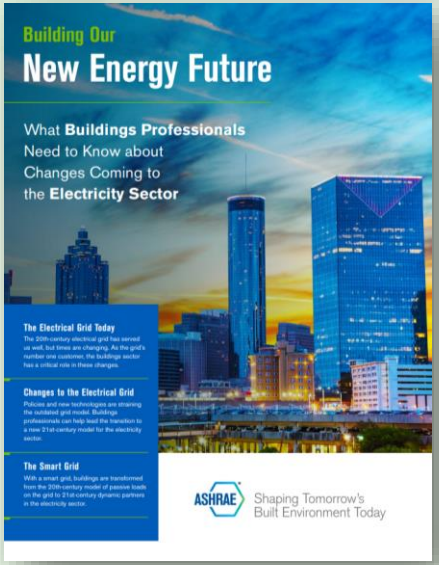


High-performing brick buildings, including the row house and brick low- and high-rise apartments, would stay below 80°F for the first half of the week, and never go above 85°F. The high-performing glass building reaches 88°F and the single-family house still rises above 90°F.

https://www.urbangreencouncil.org/babyitscoldinside

Resilience and energy

- Extending supply in power outages
- Reduced burden on shelters
- Distributed generation bolstering the grid
- Islandability and microgrids



https://www.ashrae.org/File%20Library/About/Leadership/new_energy_future_web_061518.pdf

Returns on Resilience

6 New Street

Boston, Massachusetts

Project data

PROJECT TYPE
Residential, mixed use

DEVELOPMENT TEAM
Gerding Edlen, ADD Inc., Stantec, Copley Wolff Design Group, Suffolk Construction

PROJECT SIZE
267,150 square feet on 4.4 acres

PROJECT COST
$132 million

RESILIENCE FEATURES
Elevated grade and systems out of floodplain, cogeneration of heat and power, entrances limited on waterfront, ground-floor space protected by curb wall and planters, saltwater-hardy native landscape

RESILIENCE INVESTMENTS
Minimal additional

RESILIENCE RETURNS
$9 million-plus in avoided losses, lower insurance premiums, $150,000 annual energy savings, 2 to 18 percent rental premiums

DESIGN AND CONSTRUCTION for the 267,150-square-foot, mixed-use 6 New Street redevelopment on 4.4 acres on East Boston's waterfront, "is about rebounding after a storm surge event," says Patrick Wilde, a partner with Portland, Oregon-based investment manager and developer Gerding Edlen. "How do we ensure that everything goes back to normal three days later?" In this emerging neighborhood of Boston, 6 New Street, under construction with 259 apartments, 5,000 square feet of ground-floor commercial space, and new public waterfront access, is being praised for bringing needed housing, economic vitality, and open space. The project also is being looked to as an example for the long term: resilient against storm surge, sea-level rise, and flooding in a site vulnerable to climate change.

The 4.4-acre site incorporates resilient design and construction to reduce the costs of repairing damages from storms or sea-level rise.
ADD Inc., now part of Stantec

The Residences at La Cantera

San Antonio, Texas

IN SAN ANTONIO, TEXAS, resilience means being able to prepare for, recover from, and adapt to drought. So when USAA Real Estate Company, San Antonio, and the Cambridge Development Group, Dallas, were planning a resort-style destination town center at La Cantera, a master-planned community on land owned by USAA, they committed to developing a project that conserved and recycled water. "Drought in San Antonio is a way of life, and addressing that within the building design made total sense to us," says Hailey Ghalib, managing director of the USAA Realty Company and national director of its multifamily development program.

Project data

PROJECT TYPE
Residential, mixed use

OWNER
USAA Real Estate Company, Cambridge Development Group

DEVELOPMENT TEAM
Looney Ricks Kiss, J. Robert Anderson Landscape Architecture, Jordan Foster Construction

PROJECT SIZE
150-acre master-planned community, 425,697-square-foot multifamily and mixed-use building

PROJECT COST
$47 million

RESILIENCE FEATURES
Water conservation and recycling, cistern to capture stormwater runoff and condensate, native and drought-tolerant landscape

RESILIENCE INVESTMENTS
Not available

RESILIENCE RETURNS
Protection of $1.4 million park, rental premiums, enhanced asset value of $500,000, $8,840 in annual water savings, marketing advantages

The Residences at La Cantera.
USAA Real Estate Company. Mark Humphrey's Studio, and LRK

https://developingresilience.uli.org/

Cities and states have committed to energy or greenhouse gas emissions goals

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C40 CITIES

USDN urban sustainability directors network

2030 DISTRICTS®

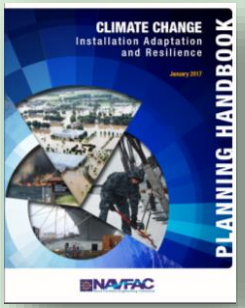
CITY ENERGY A JOINT PROJECT of NRDC + IMT

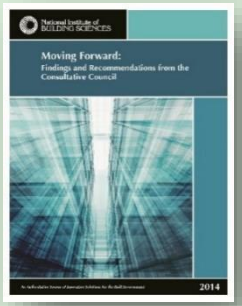
CLIMATE MAYORS

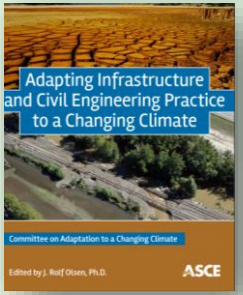
EcoDistricts

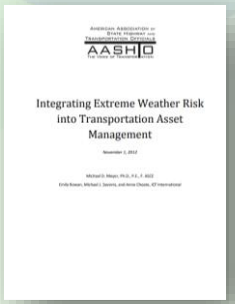
Pledge, Compact, Commitment, or Initiative	Number of Participating US Local Governments
Climate Mayors	407
We are Still In	307
Ready for 100	148
Under2MOU	26
Bloomberg American Cities Climate Challenge	25
Rockefeller 100 Resilient Cities	24
2030 Districts	21
DOE Zero Energy Schools Accelerator	14
DOE Energy Accelerator	11
DOE Zero Energy Districts Accelerator	4

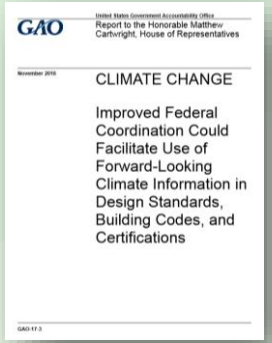
An Emerging Resilience Issue: Designing for Future Risk

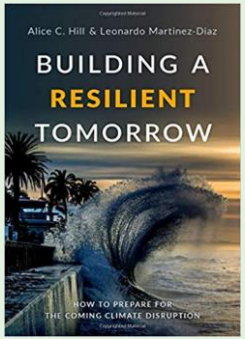


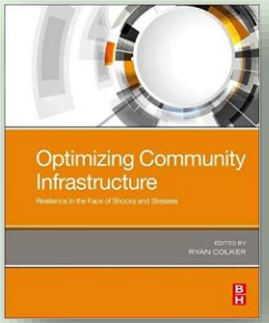












Resilience Opportunities For Energy Entities

- Continued advances in energy storage, renewables
- Support for microgrids and islanding
- Facilitate distributed generation
- Preparing buildings & industrial facilities to be good grid-citizens
- Advance zero energy [buildings, communities, campuses, portfolios]
- Examine evolution to DC-power
- Conduct interdependencies analysis
- Talk about the energy/resilience nexus
- Participate in code development and adoptions
- Encourage policymakers to think holistically (infrastructure, DRRA, etc.)

Questions?

Alliance for National & Community Resilience

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