

EARTHQUAKE INSURANCE AND RESILIENCE

Leveraging Insurance and Risk Reduction to Close the Earthquake Protection Gap
and Build Resilience

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Why resilience?



Life safety

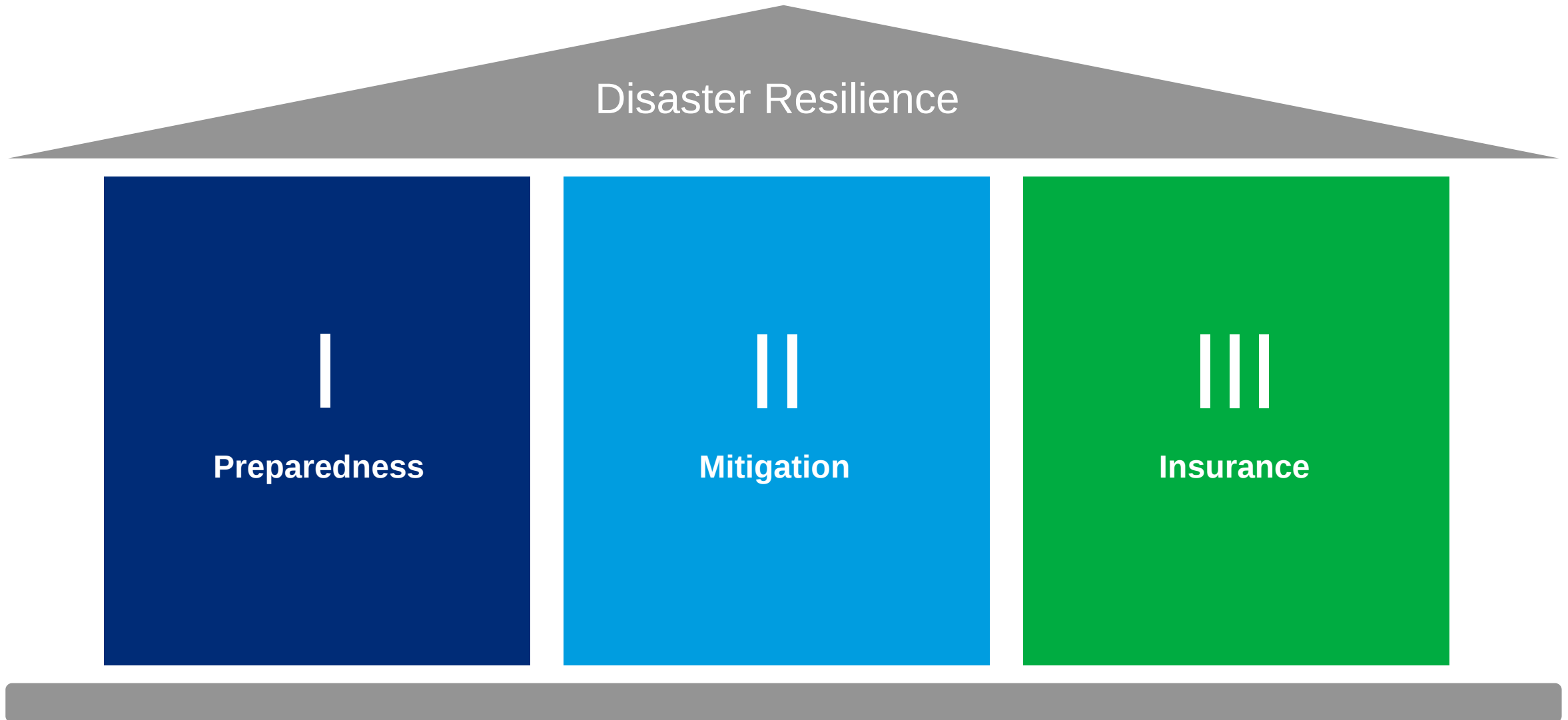
Resilience actions save lives and reduce human suffering



America's Growing Disaster Liability

- America's growing disaster liability costs the nation \$100 billion annually and grows 6% per year, 10 times faster than the population.

“Three Pillars” of Disaster Resilience



Preparedness – Governments and Businesses

1 Risk assessment

2 Planning

3 Training

4 Equipment

5 Exercises



Governments:

FEMA provides \$2+ billion/year in preparedness grants to State and local governments



Businesses:

Business Continuity Planning

Preparedness – Individuals & families

1. Kit – food, water, medications
2. Evacuation route
3. Communications plan
4. Reunification plan
5. **Financial preparedness**
 - Emergency savings
 - **Insurance**



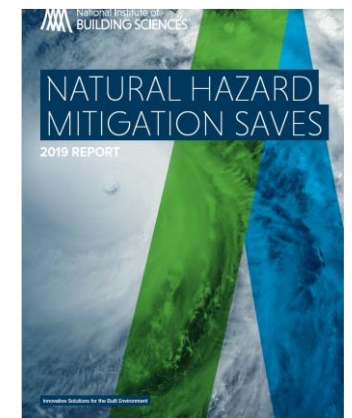
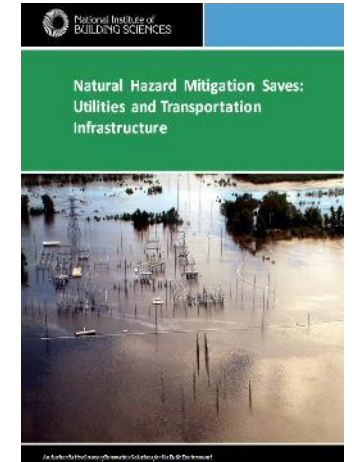
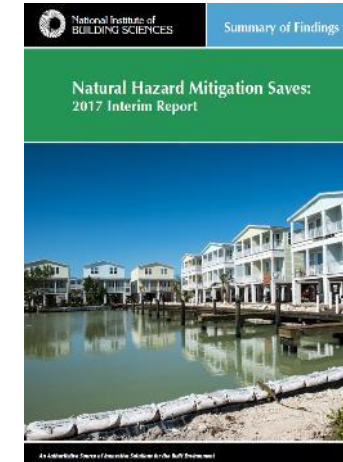
“Consider obtaining an earthquake insurance policy. A standard homeowner’s insurance policy does not cover earthquake damage.”¹

Benefits of Hazard Mitigation

Natural Hazard Mitigation Saves

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	6:1
Cost (\$ billion)		\$1/year	\$4/year	\$520	\$0.6	\$27
Benefit (\$ billion)		\$13/year	\$16/year	\$2200	\$2.5	\$160
	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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Millions of homes are underinsured against natural disasters as construction costs keep rising

CNBC, May 2019

Natural disasters expose huge insurance protection gap

The Actuary, Jan 2021

In soaked California, few homeowners have flood insurance

CP24, Jan 2023

Hurricane Ian's toll is severe. Lack of insurance will make it worse.

New York Times, Sep 2022



The US Is Currently Underinsured Against Natural Hazards



Market Context for Catastrophe Insurance

- Insurance is a vital source of adequate and available funds that help individuals and communities finance post-disaster recovery and rebuilding
- However, there is a large and widening protection gap, as millions exposed to disaster risk are uninsured or underinsured
- For example, even though floods are the most frequent and costly disaster (with 10% of US households at high risk), only about 4% of households have flood coverage
- Although the gap is a pressing issue, mayors are balancing fiscal challenges from competing needs and need cost-effective solutions
- As a result, many communities don't receive disaster relief in a timely manner and aren't incentivized or financed to enhance their resilience

Low earthquake insurance take-up rates

And data is limited

California ~ 10%

- *“Of the western states surveyed, only [California](#) does such a data call annually. The 2019 report shows the uptake was 13.89 percent, while the 2020 report indicates a slight decline to **13.77 percent**. Uptake rates, however, don't include the number of people who lack residential insurance entirely. Thus, Glenn Pomeroy of the California Earthquake Authority speculates that the percentage of the total population with earthquake insurance in California is probably **nearer 10 percent**.”²*

Oregon 14.8%, Washington 11.3%

- *“Two other western states have done isolated data calls: [Oregon](#)'s 2017 report showed an uptake rate of **14.8 percent**; [Washington](#) likewise produced a data call in 2017, showing residential uptake was **11.3 percent**.”²*

“Few state insurance regulators do (or have done) data calls.”^{2, 10}

- ¹⁰ *To track uptake, some regulators may need greater statutory authority to collect and report data and still protect insurance companies' proprietary and basic information.*

² Cascadia Region Earthquake Workgroup (CREW), [Earthquake Insurance Snapshot: Results of a survey of earthquake insurance outreach and promotion in the Western U.S.](#), Page 7, December 2021

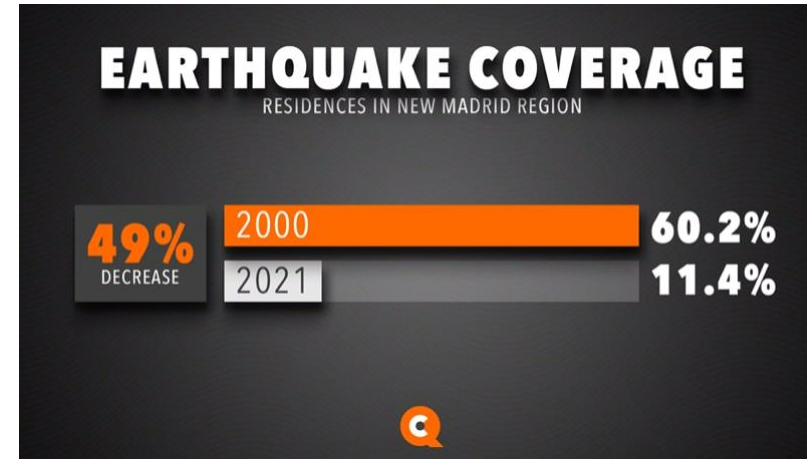
Example: Missouri Earthquake Risk & Homeowner Protection

Despite geologist's conclusion there is significant **earthquake risk** in southeast Missouri and neighboring states, the percentage of homeowners with earthquake insurance remains low:

- The market has contracted significantly over the last twenty years. In the six-county New Madrid region of the state, the percentage of residences with earthquake coverage declined by an astonishing 49 percentage points between 2000 and 2021, from 60.2 to 11.4 percent.
- In other high-risk counties, only 39% of homeowners have earthquake coverage.³

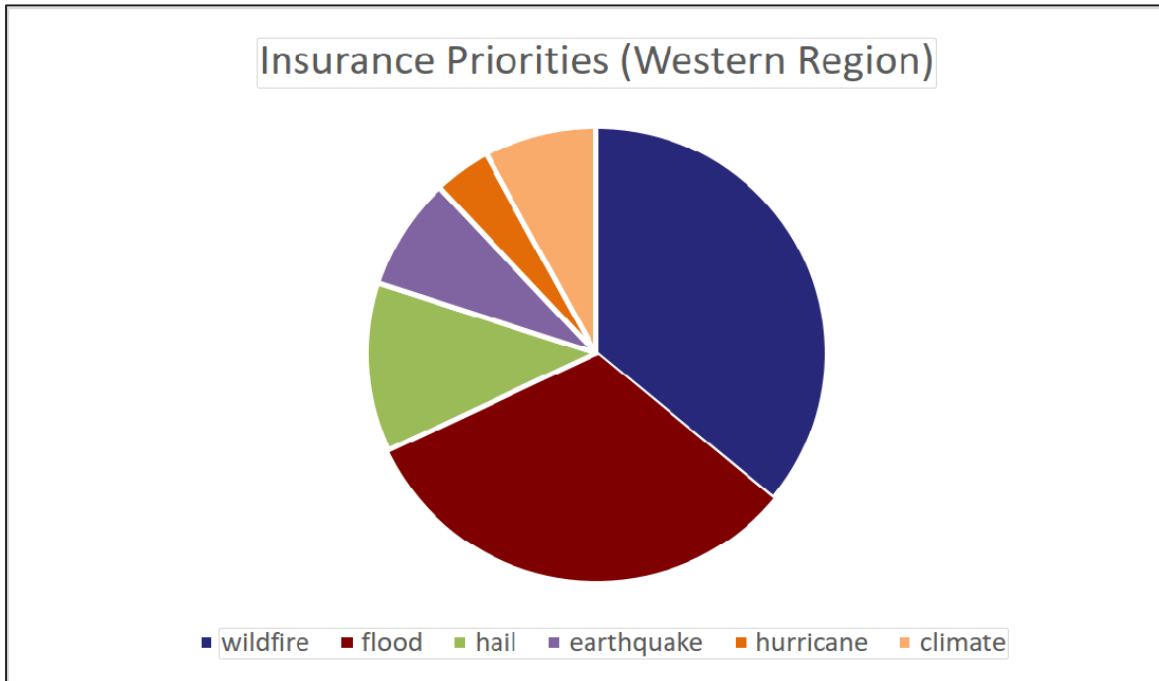
This demonstrates a **large 'protection gap', which places a strain on:**

- State budgets and their credit rating
- Tax base as impacted homeowners and businesses struggle to rebuild
- Low-income communities with limited access to insurance or financial support



Priority Perils

Wildfire and flood dominate as the perils of greatest concern in Western states



Among the insurance regulators consulted, **earthquake insurance is considered a low priority**. While limited awareness of the state's earthquake hazard seemed to play a role in this ranking in some cases,⁷ the overwhelming consideration was regulators' preoccupation with seasonal perils, which currently make more demands on their time and resources and are the source of immediate and often urgent concern. Issues associated with wildfire, for example, include rising costs for consumers and the refusal of insurers to offer policies in high-risk areas.⁴

⁷ All but one of the states/territories in the survey have High or Very High earthquake risk, as identified in FEMA NEHRP's State Assistance Target Allocation List.

Parametric Insurance

What is it? And why is it a key resource for Public Sector?

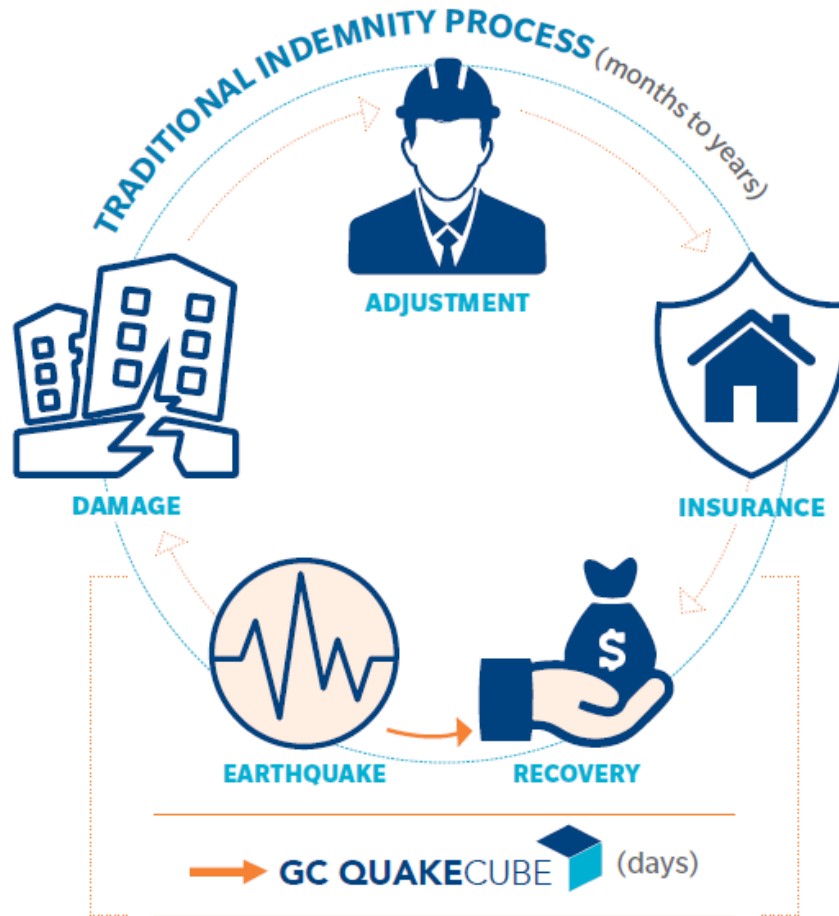
Parametric insurance policies pay as a function of the characteristics (parameters) of an event and independently from the actual sustained loss

- Payouts are **FAST** because parametric insurance does not require a loss adjustment process and the parameters needed are often available in real time
- Payouts are **TRANSPARENT** because they are based on objective measurements provided by a respected third party (like NOAA, NASA or the USGS)
- Payouts are **VERSATILE**, not tied to any specific piece of property and can be used as required to support emergency operations, purchases, repairs, financial impacts, business interruption, etc.

The speed and transparency of payouts make parametric insurance a key resource for risk management in the public sector

They are an ideal mechanism to attract capital market and reinsurance support to fund state emergency response and reconstruction operations

Differences Between Parametric & Indemnity Insurance



Parametric Offers...

- ✓ **Speed:** Payments are fast as there is no claims adjusting process
- ✓ **Transparency:** Payments are pre-tabulated in the contract and triggering parameters are reported publicly
- ✓ **Versatility:** Freedom to use proceeds as needed with no or very relaxed exclusions and specifications
- ✓ **Customization:** Cover can be designed to guarantee certain levels of payment for desired scenarios

Indemnity Offers...

- ✓ **Precision:** The claims adjustment process ensure recoveries approximate experienced losses

GC QuakeCube Simple Response Protocol



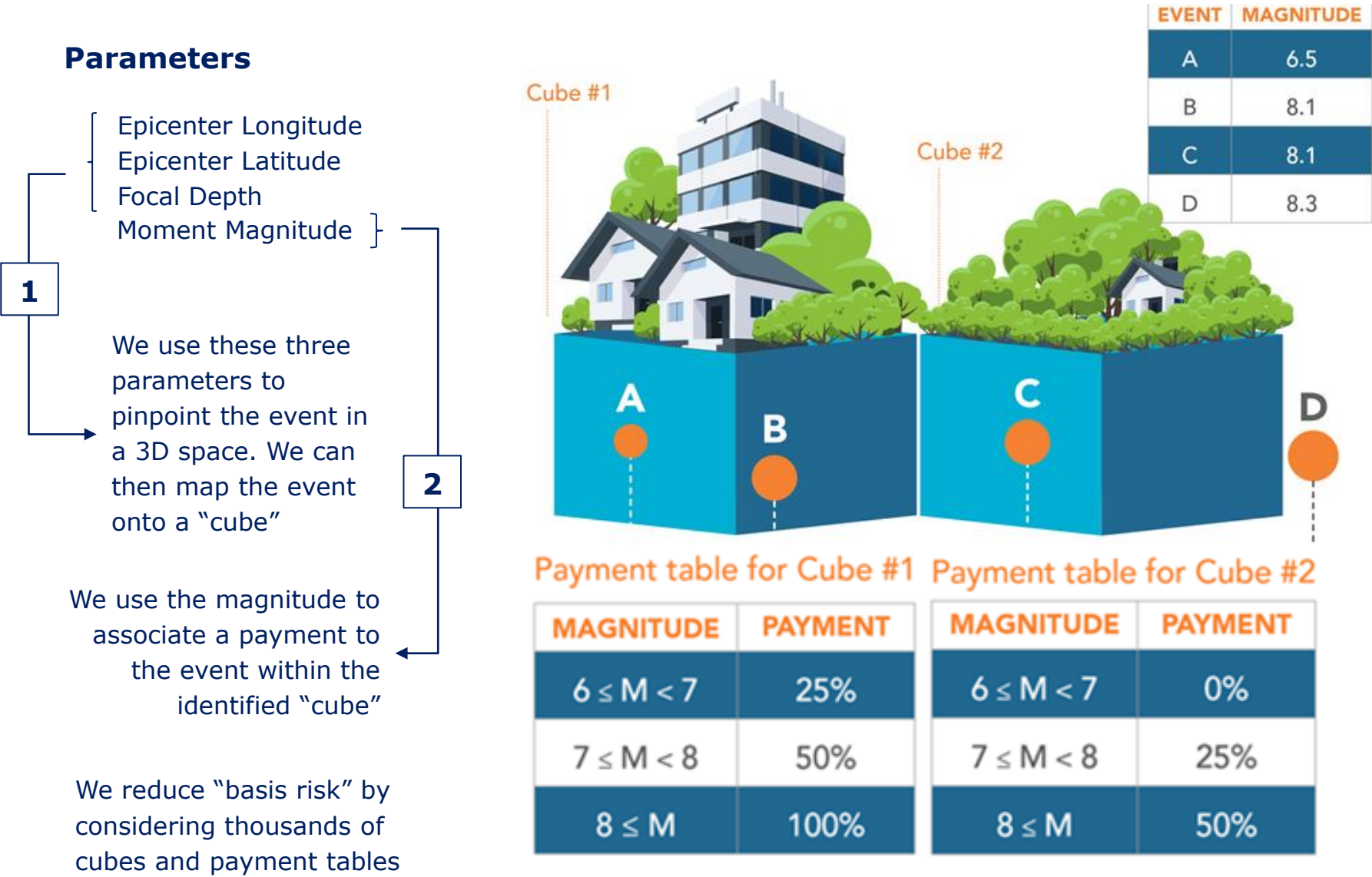
After an earthquake occurs, the US Geological Survey (USGS) releases epicenter location, focal depth, and magnitude

After 15 business days (time for the USGS to address potential corrections to the parameters), we extract the event epicenter location, depth, and magnitude from the USGS website and identify what “cube” the earthquake fell in – Each “cube” and magnitude are associated with a payment

After 30 business days* from the event, the corresponding payment is received

(*) Contractual time windows may vary depending on insurer/reinsurer

GC QuakeCube Basic Mechanism



Precedents

Who uses these types of solutions already?



Mexico has used parametric insurance solutions since 2007, when they launched the CAT-Mex Cat bond series. Each year, they have placed \$100-300m in the market for emergency response and governmental assets



The Pacific Catastrophe Risk Assessment and Financing Initiative has used parametric insurance solutions to protect its member island nations from various perils



The Caribbean Catastrophe Risk Facility was the first multinational pool to use parametric solutions to compensate its member countries via parametric policies



After hurricane Sandy, the MTA placed a Cat bond called MetroCat to protect its infrastructure from storm surge impact based on tidal gauges in the Bay of New York



Corporations like Kaiser Permanente use parametric insurance to protect their property and operations from financial impacts in the event of a catastrophic event

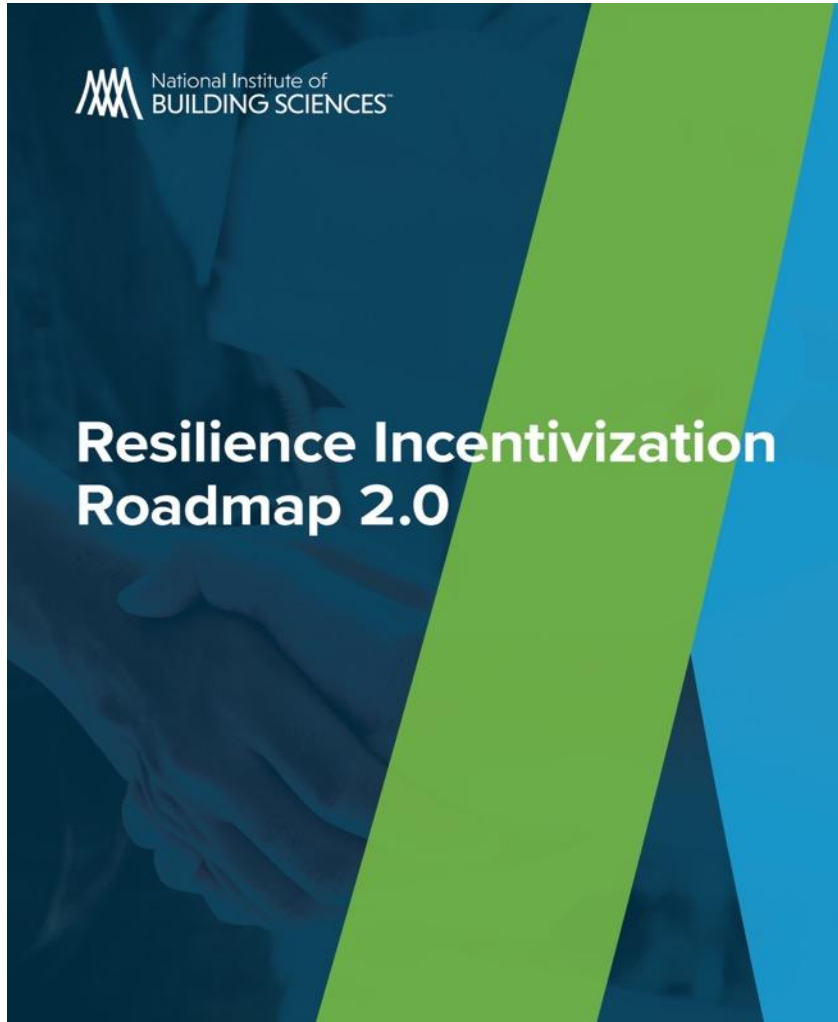


The Pacific Alliance risk transaction was the biggest parametric transaction ever, reaching \$1.4b of protection against earthquakes and covering the countries of Peru, Colombia, Chile and Mexico

Governments and corporations find it of interest to access capital market capacity on a parametric basis to avoid complex loss adjustment operations and to fund immediate response

These solutions have been transacted in the market since 1997 when the first solution, Parametric Re, was launched for coverage in Japan

Resilience Incentivization Roadmap 2.0



A report by

Committee on Finance, Insurance and Real Estate
Multi-Hazard Mitigation Council
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Resilience Incentivization Roadmap 2.0



Co-beneficiaries can help pay

Chapter 1: Background and Approach

Chapter 2: Technical and Business Case for Resilience

Chapter 3: Roadmap to the Technical and Business Case

Chapter 4: What Developers Need

Chapter 5: Role of Insurers

Chapter 6: Finance and Investor Incentives

Chapter 7: Real Estate Agents

Chapter 8: Government, Public Assistance and Policy

Chapter 9: Conclusions, Recommendations, and Next Steps



Insurance incentives

FEMA Community Rating System: Voluntary program that encourages community floodplain management that exceeds NFIP requirements. Premium rates are discounted to reflect reduced flood risk from community efforts. Discounts range from 5% to 45%.

Strengthen Alabama Homes: Provides grants up to \$10,000 to homeowners to upgrade them to IBHS FORTIFIED standard. Funding comes from the insurance industry in Alabama. Insurers are mandated to offer discounts as high as 55%.

Louisiana Fortify Homes Program – modeled after Alabama program – will provide up to \$10,000 in grants for eligible homeowners to meet IBHS FORTIFIED roof standard. Lawmakers also passed legislation to require insurers to provide actuarially justified discounts.

California Earthquake Authority provides \$3,000 grants to subsidize seismically retrofitting houses. Additional grants available for low-income homeowners. Insurance premium discount of up to 25%.

Non-traditional programs like one in NYC that incorporates parametric insurance. Supports resilience by getting money into citizens' hands quickly.

**Community Based
Catastrophe Insurance (CBCI)
is an innovative mechanism to
increase insurance coverage
and enhance resilience**



**Insurance arranged
by a local government,
community
organization, or other
entity, to cover a group
of designated
properties or
individuals within
the community's
jurisdiction.**

Community-Level Solutions Are Critical to Overcoming Drivers of the Protection Gap and Building Resilience

Benefits of Community-Based Solutions

Driver of Existing Protection Gap		How Does a Community-Based Solution Solve for This Driver?
	Lack of information about hazards or potential damages faced	Engages and educates members on potential risks and mitigation options
	Lack of financial literacy to understand the role of disaster insurance in recovery	Raises awareness of disaster insurance benefits and improves financial literacy amongst community
	Cost of disaster insurance coverage can either discourage purchase or be a fundamental barrier	- Lowers necessary premiums by securing broader participation in a risk pool, including among lower-risk individuals - Lowers administration costs by lessening marketing, distribution, and claims administration costs - Negotiates discounts, with ability to offer further support for certain disadvantaged groups - Facilitates payment for community members
	Decision-making biases resulting in inaction and/or underinvestment in protection against climate disasters	- Adopts regulations to encourage and or compel purchase - Obtains adequate coverage to meet recovery needs of community members
	Challenges funding risk reduction and mitigation interventions to reduce disaster recovery costs	Provides a reliable source of insurance that offer and sustain coverage within a given community
	Limited disaster coverage offerings from private insurers	Provides additional funding for risk reduction measures (e.g., through CBCS program savings)

Community-Based Catastrophe Insurance (CBCI) Uses Innovative Approaches to Risk Financing To Align Community Resources Around Key Natural Hazard Perils

CBCI is a framework where any community organization, special-purpose district, or public entity can arrange insurance coverage and develop risk mitigation strategies on behalf of its members.

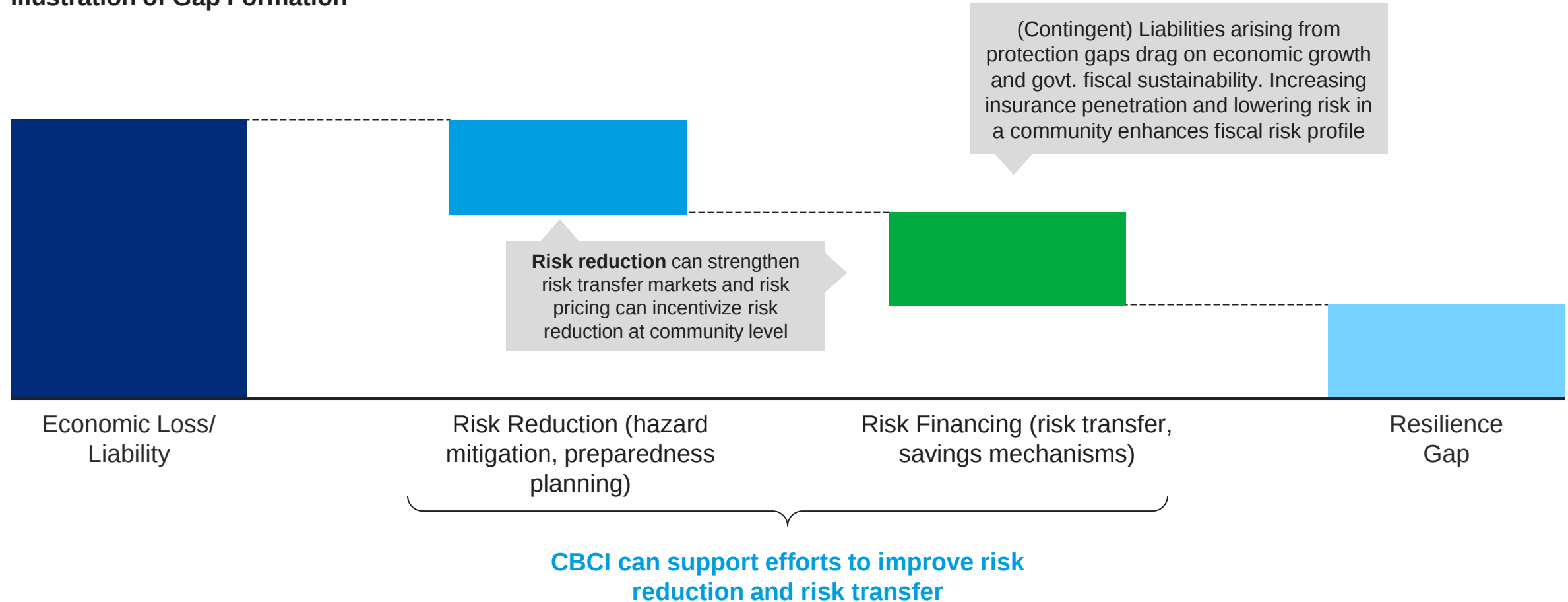
CBCI Can Deliver Four Important Benefits

 Enhance Community Resilience	 Provide Accessible and Affordable Coverage	 Enable Risk Reduction	 Bolster Bond Ratings
• Speeds recovery of the insureds and supports post-disaster economic revitalization • Reduces contingent disaster liabilities • Enhances credit risk profile • Results in savings down the line which can be reinvested in resilience planning	• Reduces premium costs by: – Increasing buying power – Enhancing data provision – Supporting means testing • Guarantees coverage post-loss • Can act as a deductible buy-down or supplemental funds for assets currently excluded from other traditional insurance	• Align community resources on disaster risk mitigation by: – Enabling premium discount capture for mitigation efforts – Supporting financing of risk reduction via premium surcharge – Enhancing decision-making through risk analytics	• Improve or retain strong municipal bond ratings through: – Building resilience to extreme weather events – Clearly articulating and implementing a risk mitigation strategy

Channels for Communities to Close Resilience Gap via CBCI

CBCI is a potential mechanism for communities to increase insurance coverage, incentivize risk reduction and enhance fiscal solvency

Illustration of Gap Formation



CBCI Has Been Deployed To Promote Flood Resilience in Low to Moderate Income Households in New York City

Case Study



Project Goal

▶ Increase resilience of LMI households to escalating flood risk by making insurance coverage more accessible and available



Key Characteristics

- One of the first local governments in the US to harness the CBCI approach to increase community resilience and mitigate risk
- Partnership with the NYC Mayor's office and a local NGO to enable faster recovery from flooding by providing post-flood emergency cash grants to LMI households
- Design utilizes parametric insurance, which enables rapid pre-specified payouts that are triggered once satellite data detects the flooding in the covered neighborhoods
- Additionally, the project will promote community-level resilience by providing pre-disaster consultations to NYC households on risk reduction and insurance



Key Activities in the CBCI Stages

1

Risk Assessment and Opportunity Scoping

- Analysis of risk management and community flood risk

2

Strategy and Solution Design

- Definition of hazards, geographic coverage, and insurance beneficiaries

3

Solution Implementation

- Catastrophe risk transfer solution design
- Risk transfer to the (re)insurance market

4

Ongoing Administration and Evaluation

- Parametric insurance provides swift claims payout in case of flood
- Planned ongoing admin for 2023/24

Stafford Act amendments

FEMA can leverage its authorities to incentivize resilience

- Community Disaster Resilience Zones

- FEMA has designated communities most in need of hazard mitigation assistance, as identified by a risk analysis tool that considers such factors as social vulnerability, natural hazards loss exposures, and lack of resilience.
- CDRZ-designated communities are eligible for technical assistance and an increased federal share for BRIC grants, up to 90% (from the current 75%).⁵

- FEMA Public Assistance incentive measures

- The President may provide incentives to a State or Tribal government to invest in measures that increase readiness for, and resilience from, a major disaster by recognizing such investments through a sliding scale that increases the minimum Federal share to 85 percent.⁶

⁵ Federal Emergency Management Agency, [Community Disaster Resilience Zones](#)

⁶ Robert T. Stafford Disaster Relief and Emergency Assistance Act, Public Law 93-288, as amended, 42 U.S.C. 5121, 406(b)(3)(A). See also Daniel Kaniewski, "[Disaster Resilience Is A Trillion-dollar Challenge. Here's What FEMA Can Do To Help.](#)" January 17, 2023.



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