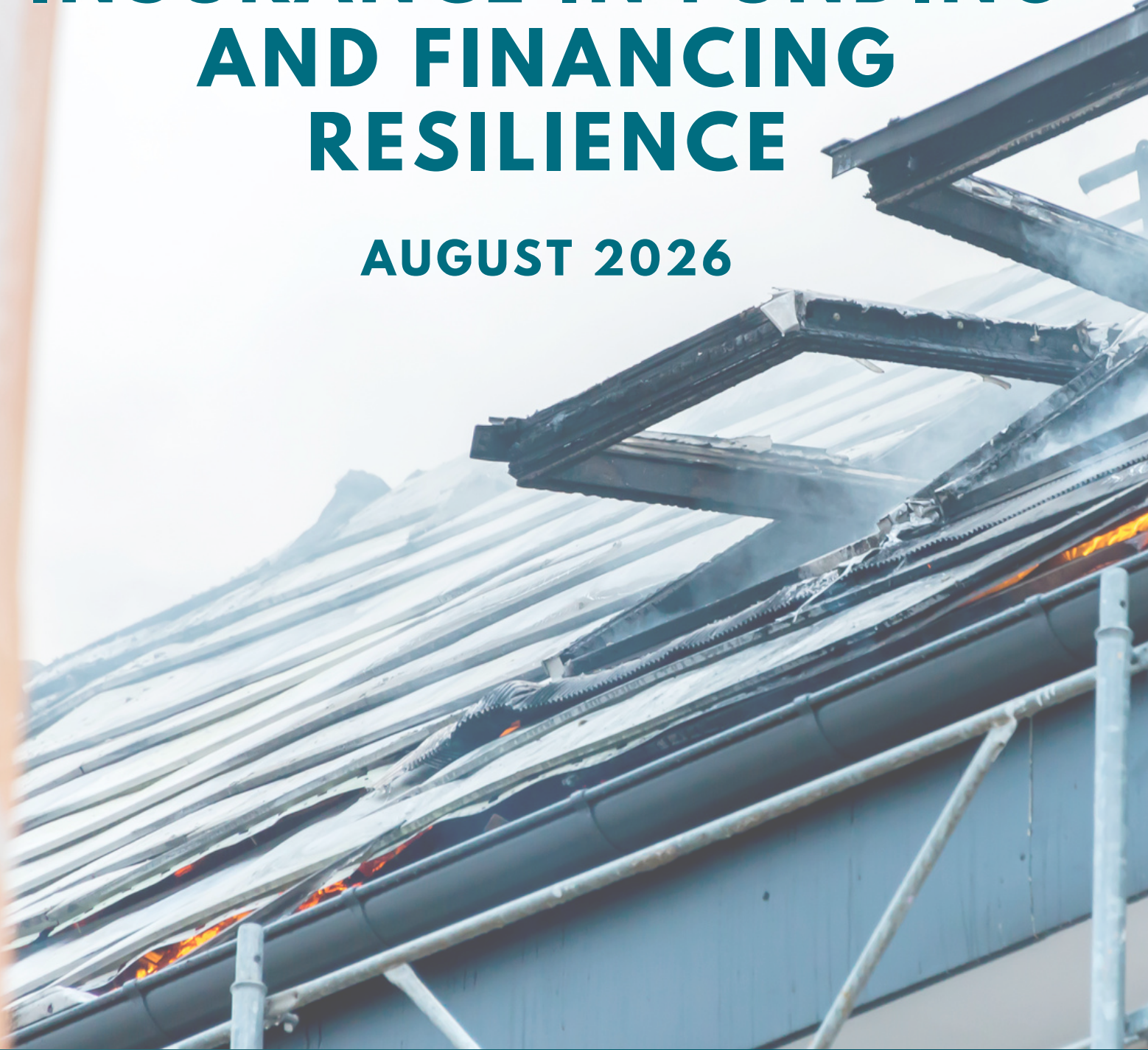


THE ROLE OF INSURANCE IN FUNDING AND FINANCING RESILIENCE

AUGUST 2026



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INTRODUCTION

Insurance transfers risk; it does not reduce or eliminate risk. When a policyholder pays a premium, they are shifting part of the financial burden of a potential loss onto the insurer, but the underlying risk itself remains unchanged. In the context of natural disaster insurance, the ability to transfer risk enables much economic activity and will be increasingly important for managing the growing economic burdens associated with physical climate-related impacts. Insurance, though, is more expensive when risks are greater, such as when disasters occur more frequently or are more severe. Insurance is also harder to provide and less available when risks, and how they are changing, are highly uncertain. As such, investments to reduce damages can make insurance easier to provide and less expensive. As the risk of weather-related extremes grows, preserving available and affordable risk transfer will require a strong focus on risk reduction and resilience.

This white paper explores how insurance and related risk transfer instruments can support investment in risk reduction and resilience—and discusses the complexities and limitations of these tools. The paper begins by examining the potential opportunities and constraints in using premium reductions as an incentive for loss reduction investments, drawing on examples from wind and wildfire risk. It then turns to the role of insurance in post-disaster rebuilding, with a focus on endorsements that can fund higher-resilience reconstruction. Next, the white paper discusses the broader educational and advocacy role that insurers can play in helping policyholders and policymakers better manage risks and protect households and communities from growing losses. Finally, it explores the emerging potential of parametric financial instruments as a resource for resilience in the wake of a disaster. It concludes with a caution that advancing risk reduction and resilience requires coordinated and synergistic efforts across sectors—insurance cannot do it alone.

PREMIUM REDUCTIONS FOR MITIGATION: POTENTIAL AND LIMITATIONS

Economists have argued that if insurance is priced to reflect property-specific risk, premium reductions for quantified and verified loss reduction can create a financial incentive that leads to more economically optimal investments in risk mitigation (Boomhower et al. 2023; Jarzabkowski et al. 2026). Consumer and advocacy groups have pressed for these reductions to reward households and communities focused on resilience and to help improve the affordability of coverage (see, e.g., Cornelissen et al. 2025). Insurance availability and pricing that accurately reflects loss reduction can help maintain trust in the market, align incentives for risk reduction, open up financing, and convey risk information to policyholders. When policyholders can see a direct and transparent connection between the measures they take to lower risk and the premiums they pay, it reinforces the sense that the insurance market is responsive and working effectively. And when insurers share the benefits of reduced future claims with policyholders through premium reductions, it not only helps build trust, but also creates financial incentives for greater household investment in mitigation. Those lower premiums have the potential to contribute to financing and indicate priority investments.



Actualizing a direct link between certain investments and insurance market outcomes is not always straightforward, however, and misunderstandings can hinder policy conversations. Premium reductions are required by state laws to be actuarially sound—that is, to reflect actual changes in the expected losses incurred by insurance companies. They are a market signal, not a subsidy. Before insurers are willing to offer premium discounts and before regulators will approve them, a robust evidence base must connect the specific investments to well-quantified reductions in claims.



In the context of natural disasters, one of the most successful examples in the United States has been the FORTIFIED roof standard and accompanying wind premium reductions mandated in Southeast states for properties that adopt it. FORTIFIED building standards were first established in 2010 by the Insurance Information Institute for Business & Home Safety (IBHS), a non-profit scientific research organization focused on building safety supported by the insurance industry. The standards are designed to reduce property damage from very high winds, including hurricane-force winds. FORTIFIED design increases the strength of the roof where it is attached, including along the perimeter. Also, it requires the roof to be sealed to prevent water from entering the home if the roof cover is damaged.¹

Post-storm research has validated the loss reduction associated with FORTIFIED construction. Analysis of insurance claim data following Hurricane Sally, which struck Alabama in 2020, found that FORTIFIED construction reduced the number of claims by 55–74 percent, lowered average claim costs by 14–40 percent, and cut overall insured losses by 51–72 percent (AL DOI and Center for Risk and Insurance Research 2025). A study by the Institute for Advanced Analytics at North Carolina State University found similarly strong results, determining that homes with FORTIFIED roofs had 35 percent fewer insurance claims and 23 percent lower loss per building per storm (NCIUA 2024). A recent report from the Louisiana Department of Insurance finds that FORTIFIED roofs reduce a homeowner's uninsured losses by an average of \$213 per year (LA Legislative Auditor 2025). The post-storm findings are in addition to considerable lab-based evidence on the effectiveness of FORTIFIED from IBHS's testing facility.

Noting these benefits, several states have required premium discounts for FORTIFIED homes, including Alabama, Mississippi, Oklahoma, and Louisiana. In Alabama, mandatory premium reductions range from 25–55 percent depending on the county's hurricane risk (IBHS 2025). In Louisiana, the discounts, subject to regulatory approval, are to target 20–30 percent (Araullo 2025); the Louisiana Legislative Auditor found an average premium savings of 22 percent after a homeowner installed a FORTIFIED roof (LA Legislative Auditor 2025). In other states, insurers may voluntarily offer such discounts.

¹ See <https://fortifiedhome.org/roof/>



Premium reductions for wildfire mitigation measures, on the other hand, are newer and also more complex to accomplish. The only state to require wildfire premium discounts to date is California. In 2022, the California Department of Insurance adopted new regulations, *Safer from Wildfires*, requiring insurers to offer a premium discount for properties that have one or more of a dozen risk reduction measures in place. The list of measures includes two community-level designations, five defensible space-related measures, and five home hardening measures. The regulation does not mandate what percentage the discounts for each mitigation measure has to be, only that insurers must offer some amount of reduction. An analysis of those discounts by Insurance for Good finds wide variation and that one-off upgrades for only a single measure tend to be minimal with more substantial discounts requiring sets of measures being adopted together (You and Kousky 2025).

This may be an attempt to reflect findings that significantly bending the loss curve requires many measures being undertaken to the structure and surrounding area simultaneously. Similarly, some carriers vary discounts depending on distance from neighbors since when homes are close together, an unmitigated neighbor poses a risk that can overwhelm mitigation. Greater insurance market discounts may require groups of property owners to act together—and potentially coordinate with land owners (public or private) for fuels management in surrounding natural lands since wildfire mitigation requires mitigation at household, yard, and community scales (see., e.g., Maranghides et al. 2022). As the models and evidence base on these actions continues develop, discounts will likely also evolve.

Indeed, wildfire mitigation building science and standards are still finding their way into home design, construction, and property insurance markets. Immediately after the launch of Safer from Wildfires, IBHS introduced its Wildfire Prepared Home™ (WPH) standards,² which require a comprehensive set of mitigation actions spanning construction materials, ember-resistant vents, and defensible space. In 2025, IBHS also launched its Wildfire Prepared Neighborhood standard,³ which recognizes collective mitigation efforts at the neighborhood level. Some California insurers have started offering discounts for WPH due to a growing body of evidence supporting the loss reduction associated with these standards and the measures they include, even though they are not mandated in the regulation.

To offer premium discounts, insurers need some way to easily and affordably verify that the specific mitigation measures have been adopted. Having clear standards and trusted evaluation programs is thus critical. This is one of the reasons, beyond their strong scientific basis, for industry support for the IBHS standards. In order to achieve the designation, a home must be evaluated and approved by IBHS. This designation can then be given to the insurance company assuring them the work has been done—and done correctly. A recent analysis in Alabama found that on average, FORTIFIED roofs that were inspected and received IBHS certification performed more than 50 percent better in a hurricane than homes built to a similar code but not evaluated (AL DOI and Center for Risk and Insurance Research 2025). While defensible space has also been shown in studies to lower losses (e.g., Zamanialaei et al. 2025), another distinction between wind and wildfire is that verification for defensible space must be done frequently since it can easily be lost if not maintained.

Across perils, household- or community-level investments in loss reduction require upfront funds that can at times be sizeable, depending on the measure being adopted. In the climate resilience and adaptation field, there have been many efforts to design programs that could use premium reductions as a cash flow to pay back a loan to finance the upfront investment in mitigation. Unfortunately, making such a model operational is challenging, and none have yet been successful at scale.

One challenge is that often the premium reductions are insufficient to fully cover the initial installation costs. Discounts on a one-year insurance contract may be a modest amount per year compared to much higher retrofit costs. Of course, retrofits can produce greater economic benefits than only lower insured losses, such as enhanced property value or improved safety, for example, but those will not be reflected in insurance savings.



² See <https://wildfireprepared.org/wp-content/uploads/January-2023-WFPH-Standard-v2.pdf>

³ See <https://wildfireprepared.org/wp-content/uploads/Wildfire-Prepared-Neighborhood-Standard-2025.pdf>



Second, premium discounts vary from carrier to carrier and are often expressed as a percentage off the base premium. This premium varies based on many factors, making it very difficult for the consumer to be certain about a specific dollar savings from the measure once adopted. Nor can those savings be guaranteed over time, as insurance pricing is influenced not just by property- and community-level mitigation efforts but many other factors, such as an insurer's concentration of exposure; macroeconomic variables, such as inflation; regulatory restrictions related to pricing; legal system dynamics; and rebuilding costs drivers, such as supply chains, labor market conditions, and tariffs. At times, these other factors can swamp any improvements made through investments in resilience, complicating the link between mitigation and the discount a homeowner actually receives. This uncertainty makes it difficult for financing models that would need to rely on the premium reduction.



Third, many loss reduction measures, particularly for wildfire and flood, are at a community-scale, yet no good institutional structure exists to allow a local government that invests in community loss reduction to harness hundreds or thousands of small, individual, insurance reductions across many firms or households as a financing mechanism. A possible approach, albeit without a direct financing connection, is for local governments to tax residents, with the expectation that the investments in risk reduction would provide premium reductions to offset some portion of the tax. This approach may face political resistance and may come with equity considerations based on how the tax and premiums are distributed.



A final challenge is that for insurance premiums to accurately reflect investments in risk reduction, the catastrophe risk models that the sector uses for pricing must incorporate these measures. Many current catastrophe models do not include all mitigation measures, are not updated frequently, and/or do not include localized investments when estimating potential losses. Carriers can thus be “blind” to loss reduction work done locally. Improving this will require the efforts and cooperation of multiple actors across the insurance value chain. Modelers need to update their methods to account for mitigation, which means they need to draw from research studies that can quantify and demonstrate the material benefits in terms of avoided insured losses. Insurers then need to adjust their pricing models to account for verified risk reductions. Both of these need to reflect local investments as they occur. To do that, however, requires a change in data collection practices so modelers and insurers have up-to-date information on such investments in a way that is easy to use and inexpensive to access. Startups and public-private collaborations are taking promising steps to begin filling these gaps.

Some stakeholders have asked why insurers themselves do not pay for or subsidize loss reduction for their policyholders. Since insurers have no easy way to lock-in customers to longer-term financial contracts, they are unable to subsidize retrofits and recoup the costs through lower future losses. Unlike a mortgage or a loan, which involves multi-year financial commitment, an insurance policy does not guarantee renewal or consistent pricing once the one-year contract ends. If a policyholder switches carriers after completing a retrofit, the insurer who supported the investment bears the cost while its competitor captures the benefit of a lower-risk property. This creates a dynamic that discourages insurers from engaging in such investments. While multi-year insurance contracts have been discussed, they are not typically viable in the market. Insurers require higher prices for multi-year contracts to account for potential changes in risk and consumers have historically been unwilling to pay more for the guarantee of a renewal.



Loss reduction investments, however, may have insurance benefits beyond pricing in enhancing the fundamental availability of coverage. California, for example, has seen a decline in the availability of private market coverage in the highest wildfire-risk areas of the state; restoring market capacity will require substantial investments in loss reduction. Some insurers have begun signaling this, for example by only ensuring renewals for homes that are built to high wildfire standards (You and Kousky 2025).

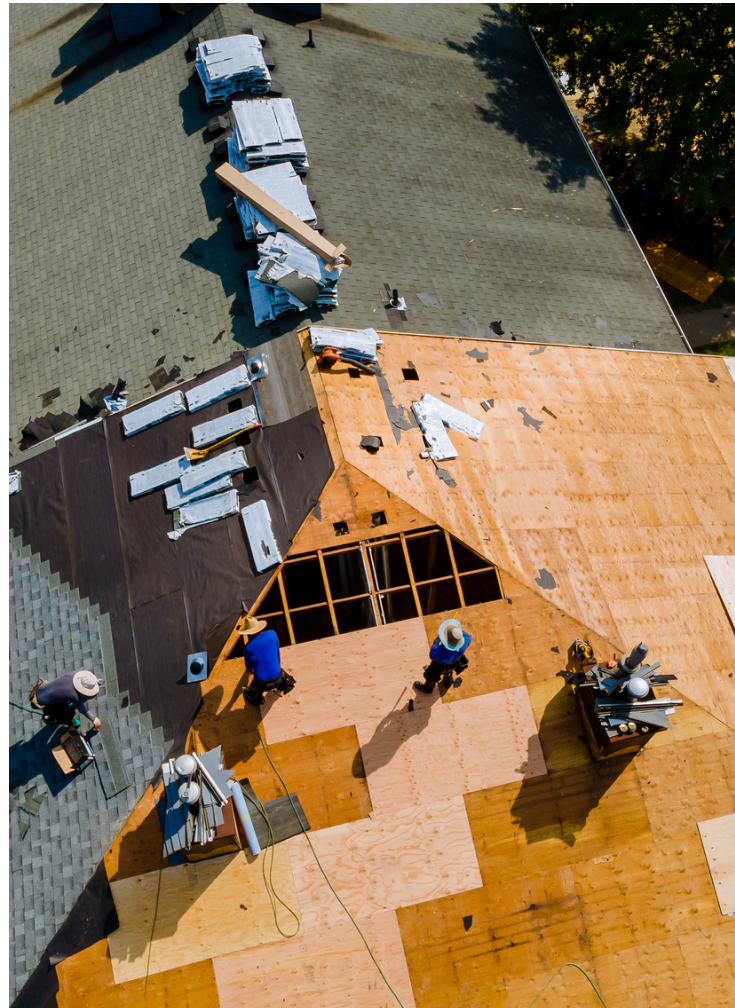
In addition, loss reduction creates economic value outside insurance, and insurance cannot be the only motivation for such investments: investing in climate resilience may raise property values, limit pain and suffering, reduce public health impacts, lower uninsured losses, reduce non-property costs such as evacuation expenses, protect local tax bases, and shield lenders from default risk. If premium reductions are the only motivation for investments in loss reduction, society will continue to be woefully underinvested in resilience, for the reasons discussed here and since only a fraction of disaster losses are insured.⁴ That said, as part of a comprehensive approach to driving greater investment, premium reductions can be an important piece of the larger puzzle.

⁴ For example, insurance covered approximately 73 percent of US natural disaster losses in 2025, according to Aon's natural catastrophe estimates (Insurance Information Institute 2026).

POST-DISASTER “BUILD-BACK-BETTER” FUNDING

Building upgrades that reduce future losses are almost always more cost-effective when incorporated at the time of (re)construction rather than undertaken as retrofits later. Post-disaster rebuilding, therefore, represents a critical opportunity for building to the highest levels of disaster resilience, particularly in an environment of growing risk. Unfortunately, this opportunity is too often missed, leaving vulnerabilities unchanged. A range of factors contribute to this pattern, including misperceptions that upgrades will cause delays, limited access to funding, difficulty finding trusted professionals who can identify and carry out the work, and building permit inspectors who do not understand loss reduction needs. Insurers are part of the rebuilding process for many homeowners and can thus play an important role in shifting post-disaster rebuilding toward more resilient construction. One way this can be done is through a post-disaster “build-back-better” endorsement.

An endorsement is an add-on coverage to a standard policy. A so-called “build-back-better” endorsement provides additional funds at the time of rebuilding for policyholders to build to higher levels of resilience. When safer construction has already been adopted into state and local building codes, upgrades will be covered through code-upgrade or law and ordinance coverage, which is in many property insurance policies (or in flood insurance under the term “increased cost of compliance coverage”). Some states, such as California, require a minimum level of code upgrade coverage in policies by default. In much of the country, however, building codes lag behind our knowledge of safe building and are almost nowhere set to provide adequate risk reduction over the life of the structure as disaster risks grow. This makes building code upgrade coverage inadequate to reduce losses, as homes will need to be built to higher standards than existing code. Build-back-better endorsements can be an add-on to provide the extra funding for this type of rebuilding.





One example of this already in use is FORTIFIED endorsements, which provide extra dollars to meet that standard during rebuilding. Three state residual insurance programs (in Alabama, Mississippi, and North Carolina) have adopted FORTIFIED roof endorsements at no added cost to policyholders (Kousky et al. 2025). Upgrading to a FORTIFIED roof at the time of rebuilding has been estimated to add only 1–3 percent on the cost of new construction.⁵ IBHS conducted an analysis for Alabama that found the extra costs to upgrade roofs to Fortified standards ranged between \$700 and \$1,700 (note that current 2026 costs may be higher due to recent price increases and inflation), excluding the certification, which is an additional fee of several hundred dollars.⁶ The costs may be possible to lower further; Habitat for Humanity, for example, has been building homes to FORTIFIED standards and maintain affordable housing in many locations around the country (see, e.g., Habitat for Humanity 2025).

While not tracked explicitly by regulators, anecdotal evidence suggests that the private sector has not widely adopted these endorsements, despite Alabama requiring carriers to offer them. In the private market, these usually come with an additional price tag, with anecdotal evidence indicating around an extra \$100 a year. This is enough to deter some policyholders from purchasing the endorsement.

Expanding to other perils may be more difficult, as the associated home upgrades may be more expensive. For wildfire, the “resilience delta,” or extra amount above the cost of typical construction to upgrade to the highest levels of property resilience (Knobloch and Kousky 2025), has been estimated by Headwaters Economics and IBHS as adding less than 10 percent (Handy et al. 2025), and sometimes less than 3 percent to the cost of rebuilding (Barrett and Hawks 2025). It thus seems an endorsement of up to 10 percent of the replacement cost could cover all necessary upgrades. Flooding mitigation measures can vary from very low cost, such as replacing carpet in the lowest floor with water-resistant flooring, to elevating the home. One option in this case is to cap the payout, and let the policyholder choose the best approach. For example, in the United Kingdom, a “build-back-better” endorsement for flood insurance offers up to £10,000 (a bit over \$13,000 in 2026 dollars) for adoption of flood resilience measures. A report from the Environmental Defense Fund provides additional guidance on designing a “climate-ready rebuilding” endorsement that could be a model for one targeted at disaster resilience (Kousky and Burley 2025).

⁵ See <https://fortifiedhome.org/frequently-asked-questions/>

⁶ See <https://ibhs.org/alabama-fortified-roof-endorsement/#1564510227254-d3931cb9-69aa>

BEYOND DOLLARS: EDUCATION AND POLICY ENGAGEMENT

Policyholders need more than just funding or financing to invest in loss reduction. Households often face multiple barriers to adopting home upgrades that go well beyond financial constraints. Many consumers are unaware of the risk reduction measures available to them, and even those who are motivated to act often face significant transaction costs that deter investment. Finding reliable, knowledgeable contractors and builders—professionals who understand mitigation standards and can implement them properly—can be a daunting task, and the effort required to identify and vet them deters many homeowners from pursuing upgrades at all. There is also a deeper information gap: individuals and communities generally lack access to the sophisticated risk assessment tools that insurers use to evaluate and price risk, leaving many policyholders with a limited understanding of their own exposure and of which investments would be most effective and impactful.

Insurers are uniquely positioned to help address these barriers. Through targeted outreach—during the claims process, for instance, when risk and resilience are already top of mind—insurers could provide practical guidance on priority investments and connect policyholders with vetted professionals, turning a moment of loss into an opportunity for meaningful improvement. For example, the American Property Casualty Insurance Association recently launched a website, My Resilient Home (my-resilient-home.com), which serves as a digital platform providing science-based resources, home-hardening tips, and mitigation strategies to reduce wildfire risk and lower insurance costs for carriers to share with policyholders, with other perils to be added. IBHS has helped develop lists of trained and vetted contractors who can install a FORTIFIED roof to help interested consumers.





Beyond their direct relationships with policyholders, insurers and their trade associations wield political influence that can be brought to bear in support of public-sector loss reduction measures. Insurers have a clear financial interest in public policies that reduce the frequency and severity of claims, giving them a natural incentive to advocate for stronger building codes, mandatory retrofits, and public investment in mitigation programs. In some cases, this advocacy has translated into concrete action. IBHS, for example, has worked closely with state legislatures and insurance regulators to encourage adoption of FORTIFIED standards and incentive programs.

Industry groups have also supported legislation funding home-hardening grant programs, such as the Strengthen Alabama Homes program and the Louisiana Fortify Homes Program, which help offset the upfront costs that can prevent homeowners from making upgrades. More broadly, insurers have engaged with federal efforts around flood risk and resilience, including reforms to the National Flood Insurance Program, aimed at better aligning premiums with actual risk. This shift, while sometimes controversial, can send clearer signals to property owners about their exposure. As climate-related losses continue to mount, the insurance industry's political voice on mitigation and resilience is likely to grow in importance.

PARAMETRIC INSTRUMENTS FOR RESILIENCE FINANCING

Parametric financial instruments, which operate similarly to insurance, are gaining attention as a potential source of financing for resilience-related investments in the event of disasters. Unlike traditional insurance, parametric products release a predetermined amount of funds when a specific trigger event occurs, such as a certain wind speed or flood depth measured by sensors. This allows for quick access to funds that can be used flexibly for various purposes, including investments in resilience and loss reduction.

In theory, any entity, such as a local government, NGO, or private institution, could purchase a parametric policy and use the funds for post-disaster resilience investments. For example, a recent report suggested that parametric flood products could be used to finance post-flood buyouts—that is, purchases of repeatedly flooded properties to return them to open space (Moore et al. 2025). Used in this way, the parametric product would not actually be insurance, but a parametric financial instrument. Insurance requires indemnification of loss. This would be a different financial structure for loss reduction: funding post-disaster resilience through forms of debt, such as bonds, requires repayment in the years after the disaster, while financing loss reduction through parametric instruments requires payment pre-disaster through annual premiums until the disaster occurs.





Another approach to using parametric approaches for resilience financing has been demonstrated in a recent transaction by the North Carolina Insurance Underwriting Association (NCIUA), the residual insurer in North Carolina providing wind or full homeowners coverage when residents are unable to find a policy in the private market. The NCIUA has long supported risk reduction, including through grant programs for FORTIFIED roof upgrades. More recently, it integrated resilience into its catastrophe bond purchases. Catastrophe bonds, also referred to simply as “cat bonds,” are an alternative source of reinsurance protection. In a cat bond, investors contribute capital held in secure assets, which pays claims if a qualifying disaster occurs within the bond’s term (typically three years), or is returned with interest if it does not. In the case of NCIUA, if a qualifying hurricane occurs, for example, the investors’ capital is moved to NCIUA to pay claims. If no qualifying disaster occurs during the term of the cat bond, the investors take back their capital, plus the returns they made from interest on the held assets and payments made by NCIUA.

Building on prior research from re:focus partners (now PRE Collective) and with support from Guy Carpenter (a broker), RMS (a catastrophe modeling firm), and Hannover Re (a reinsurer), NCIUA designed a novel resilience feature within a cat bond. They executed on this first-of-its-kind transaction last year and secured a second this spring. For the recent resilience-focused catastrophe bond, NCIUA contributes an extra 0.35 percent annually into a resilience account. If, in a given year, total annual losses stay below 60 percent of an established threshold (roughly \$1.68 billion), NCIUA receives a payment of over \$2 million to fund additional FORTIFIED roof upgrades. If losses exceed that threshold, the resilience fund and accrued interest flow to investors instead. This feature allows NCIUA to have additional funds in non-storm years to further reduce future losses of their policyholders and attract investors with some return even if the full amount of the cat bond is triggered.

CONCLUSION

The tools and mechanisms explored in this report—premium reductions, build-back-better endorsements, policyholder education, political advocacy, and parametric instruments—represent a meaningful and underutilized opportunity for the insurance sector to drive greater investment in physical resilience. Realizing their potential will require sustained effort and cooperation across sectors, from modelers and underwriters to regulators and policymakers; insurance cannot do it alone without support from other sectors. For instance, insurers cannot be the only institution correctly pricing climate risk (Kousky and Key 2025); otherwise, markets receive inconsistent signals. In addition, annual insurance policies are not well suited to price climate risk since they only reflect a narrow snapshot of increasing risk. However, other financial actors, like lenders and government-sponsored enterprises (e.g., Fannie Mae and Freddie Mac), operate on longer time horizons and are better positioned to incorporate that risk into loan pricing. Rating agencies could incorporate that risk into municipal bond ratings. Realtors could communicate place-based risk and risk mitigation (e.g., home hardening) to consumers. The public sector has a role in codifying cost-effective risk mitigation in building codes and supporting risk reduction through tools such as tax credits and grants. Only when pricing, information, and incentives are aligned across all these sectors can we collectively drive more significant investment in resilience and guide better decisions about where and how we build.



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