

MARSH | CARLYLE

Investing in resilience

Building an insurance-centric framework
for resilience investment



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The resilience imperative

Physical risk has crossed a threshold. It is no longer a long-dated sustainability concern, it is an active capital allocation, underwriting, and financial stability issue reshaping the economics of insurance, infrastructure, and enterprise value globally.¹ Yet the market infrastructure required to consistently recognize and reward resilience investment remains underdeveloped.

This paper introduces the Investing in Resilience Framework: a proposed insurance-centric operating overlay designed to help translate documented resilience investments into insurer-recognized risk reduction and potential insurance benefits. The framework repositions insurance not as post-loss recovery, but as an important signal that can encourage proactive resilience investment.

The core thesis

Insurance may represent one of the most systemically important, yet underutilized, mechanisms available for supporting resilience to extreme weather events investment. When properly structured, insurance can help strengthen the business case for resilience by recognizing and rewarding documented risk reduction. While insurance benefits alone are unlikely to justify many resilience investments, they can form an important component of a broader resilience value proposition that includes avoided losses, reduced operational disruption, enhanced business continuity, and improved long-term asset performance. The market does not lack awareness, capital, or engineering capability, but it does lack the operating infrastructure needed to consistently translate resilience investments into insurer-recognized value.

US\$327B

2024 global natural catastrophe losses

Swiss Re, 2024

US\$186B

Global protection gap

Swiss Re, 2024

14.5%

Estimated loss in GDP by 2050

Moody's, 2025

What the framework proposes

A four-step, closed-loop operating protocol:

- Forward-looking, CMIP¹-aligned hazard and loss modeling at the asset level
- Vulnerability and gap assessment against recognized resilience standards
- Documentation of resilience investments and quantified reductions in average annual loss (AAL)
- Structured translation of documented risk reduction into potential insurance pricing, terms, and coverage considerations

Why this matters now

Insurance markets are repricing physical risk in real time. State-level carrier withdrawals,^{4,5} reinsurers reducing capacity and becoming more selective in their exposure to natural disaster risk, and tightening underwriting terms in exposed areas are early signals that the availability of risk transfer options may increasingly depend on how effectively underlying risks are understood, managed, and reduced.^{7,8,9} Without a scalable mechanism to reward proactive investment, the protection gap widens, the cost of capital for climate-exposed assets rises, and downstream credit, mortgage, and infrastructure markets absorb the spillover.

“The future resilience of global economies may depend not simply on how well we understand physical risk, but on whether markets can create the incentives necessary to act before losses escalate beyond what businesses can efficiently absorb.”

— Investing in resilience initiative

The emergence of a new physical risk reality

Physical risk is no longer a distant or theoretical challenge. It is already affecting economic activity, business operations, infrastructure systems, insurance markets, and investment decisions around the world.^{2,3} Severe weather events, once considered rare, are becoming increasingly frequent, extreme, costly, and operationally disruptive.^{2,3} The world is entering a new normal in which physical volatility must be treated as a core business, investment, and financial stability issue — not a sustainability footnote.

The economic signal is unmistakable

In 2024, global natural catastrophe losses reached approximately US\$327 billion, with roughly US\$140 billion insured, leaving an estimated US\$186 billion protection gap absorbed by businesses, governments, households, and investors.³ Insured catastrophe losses have now exceeded US\$100 billion for six consecutive years, a pattern unprecedented in the modern insurance era.³ By 2050, Moody's estimates that the global economic impact of physical risk may reach US\$41.4 trillion, or a 14.5% loss in gross domestic product (GDP).

The implications extend well beyond direct physical damage. Physical risk disruption is increasingly potentially significant across:

- Supply chain continuity and counterparty exposure
- Facility operations, downtime, and workforce safety
- Infrastructure reliability and operating cost inflation
- Long-term asset valuations and capital expenditure planning
- Financing terms, credit spreads, and insurability

“By 2050, the global economic impact of physical risk may reach US\$41.4 trillion, or a 14.5% loss in gross domestic product.”

— Investing in Resilience Initiative

Insurance markets under strain

Historically, many corporates and investors operated under assumptions of relative climate stability, relying on traditional insurance markets as the primary mechanism for managing natural catastrophe risk. That assumption appears to be breaking down.

Rising losses, increasing volatility, reinsurance repricing, and modeling uncertainty from new perils have prompted insurers to raise premiums, reduce limits, increase deductibles, and tighten underwriting in highly exposed markets, or exit them altogether. The signals are visible across geographies.

Market signals

Visible stress across insurance markets

California: One of the largest insurers in the US, announced in 2023 it would cease accepting new applications for certain property lines, citing construction costs, growing catastrophe exposure, and reinsurance market challenges.

Florida: Multiple property insurers were declared insolvent between 2022 and early 2023 following Hurricane Ian.⁶

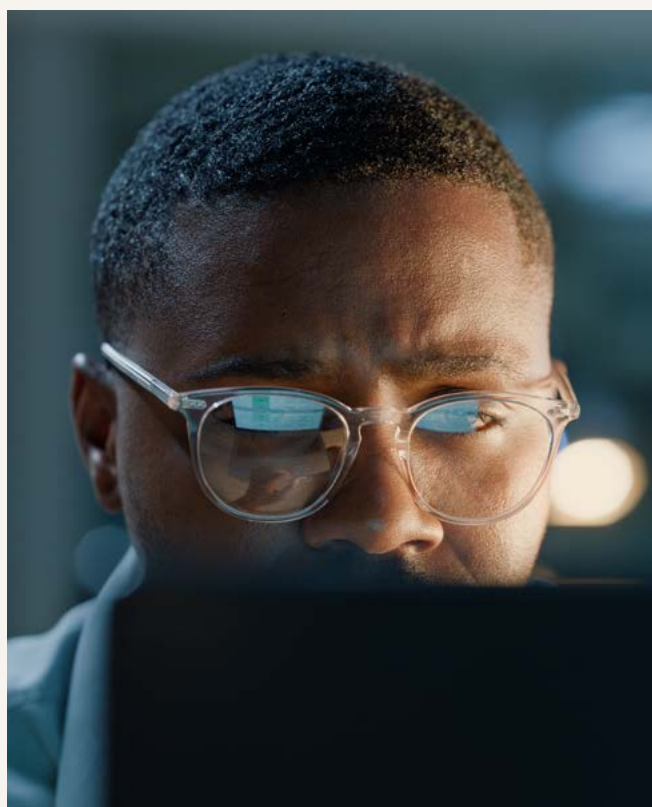
Global reinsurance: Property natural catastrophe reinsurance has repriced sharply since 2022, with higher attachment points and tighter capacity flowing through to primary carriers and policyholders.^{7,8,9}

Renewals: Catastrophe-exposed property renewals face increased underwriting scrutiny and tighter terms and conditions for flood, wildfire, wind, hail, and severe convective storm.^{7,8,9}

Why this is a capital markets issue

Insurance is deeply embedded into the functioning of modern financial systems. It supports mortgage origination, project finance, infrastructure lending, commercial real estate valuation, supply chain continuity, and broader economic stability. If risk transfer options deteriorate significantly, the consequences could extend far beyond insurance markets and could directly impact capital formation and enterprise value.¹⁰

Major insurers and members of the Geneva Association, have repeatedly emphasized the need for adaptation and resilience investment to address rising losses, protection gaps, and long-term affordability challenges.^{3,10,11} The concern within insurance markets therefore creates both a warning signal and a strategic opportunity: resilience investments that measurably reduce expected losses may become necessary, not only to reduce operational disruption, but to preserve longer-term risk transfer and, as a result, access to financing itself.



Key insight

Insurance as a systemic economic stabilizer

Insurance is not merely a risk-transfer product. It is foundational infrastructure for lending, investment, property valuation, and business continuity — a systemic stabilizer that, if eroded, could cause ripple effects through credit, real estate, and infrastructure markets.

In an era of accelerating physical risk, insurance cannot be treated as either a permanent guarantee of protection or a substitute for proactive resilience investment. A growing body of research suggests that proactive resilience investments can generate significant economic benefits by reducing future losses, disruption, and recovery costs, reinforcing the importance of risk reduction alongside traditional recovery and risk-transfer mechanisms.

Insurance depends on risk reduction

Insurance is often viewed as the primary mechanism for managing catastrophe risk. However, insurance is fundamentally a risk-transfer mechanism, not a risk-reduction mechanism. As the frequency and severity of extreme weather events increase, insurers can continue to absorb and distribute risk, but they cannot eliminate it.

Insurance functions most effectively when underlying risks remain measurable, manageable, and economically transferable. As physical risks increase and losses grow, maintaining affordable and available insurance will increasingly depend not only on how risk is transferred, but also on how effectively underlying risk is reduced through resilience and adaptation measures.

In this sense, resilience investment is not simply about protecting individual assets. It is also about preserving the long-term effectiveness of insurance as a mechanism that supports lending, investment, economic activity, and recovery following disasters.

For insurance to continue playing its critical role within the financial ecosystem, asset owners, businesses, communities, and governments will need to invest in risk reduction alongside risk transfer. This raises an important question: if resilience investment is becoming increasingly important, why has it remained fragmented and difficult to scale?

Why resilience investment has failed to scale

Despite growing awareness of physical risk, investment in resilience measures designed to reduce physical damage, operational disruption, and business interruption has remained fragmented, inconsistent, and insufficiently scaled. There are many reasons for this, including collective-action challenges, public infrastructure funding gaps, long investment horizons, competing capital priorities, and the difficulty of quantifying avoided losses.

Some of the most significant barriers arise in areas where resilience benefits extend beyond individual asset owners. Many resilience investments, particularly those related to community infrastructure, flood protection systems, and other place-based interventions, exhibit characteristics of a "tragedy of the commons," where benefits accrue across multiple stakeholders while costs are borne by individual actors. Addressing these collective action challenges will require additional public sector, policy, and financing solutions.

This paper focuses on a different, but potentially complementary, opportunity: improving incentives for asset-level resilience investments within insurable assets through stronger recognition of documented risk reduction.

The economic asymmetry

In our view, most resilience investments today face a difficult internal economic challenge:

What the market sees today	What the market needs
Immediate upfront capital costs	Near-term, visible cash flow benefit
Uncertain, probabilistic avoided losses	Credible, underwriter-recognized evidence of risk reduction
Indirect or unquantified financial benefits	Clearer linkage to insurance value
Inconsistent or opaque insurance incentives	More consistent underwriter recognition
Long-duration defensive risk mitigation	Stronger near-term resilience investment case

This challenge is especially acute for institutional investors and corporate operators allocating capital against competing return expectations. While resilience investments may generate meaningful long-term avoided losses, investment committees prioritize initiatives capable of producing visible near-term cash flow improvements.

The resilience dividend

If resilience investments can generate measurable reductions in insurance premiums, deductibles, business interruption exposure, financing costs, or operational downtime, they can begin creating a more compelling economic value proposition rather than functioning solely as a defensive long-duration risk mitigation exercise. The framework seeks to create what we term a “resilience dividend” — an economically tangible stream of potential benefits generated through lower expected losses, reduced insurance friction, improved business continuity, and enhanced asset durability. When properly structured, portions of a resilience investment may become partially self-funding over time, helping strengthen the economic case for adaptation investment.

Defining the resilience dividend

Components of potential tangible seconomic return

- Lower annual insurance premiums tied to measurable risk reduction
- Reduced natural catastrophe deductibles and improved coverage features
- Lower expected downtime and faster post-event recovery
- Reduced supply chain interruption and business continuity exposure
- Improved asset durability and long-duration valuation support

Four structural barriers

Beyond economic asymmetry, insurers have faced four legitimate, persistent barriers to systematically rewarding resilience investments at scale.

1. Lack of accepted forward-looking risk assessment

Traditional catastrophe modeling has historically relied heavily on historical weather patterns. But a changing climate is altering hazard frequencies, severities, and geographic distributions in ways historical data alone cannot reliably capture. Although forward-looking climate modeling providers have proliferated, insurers face inconsistent methodologies, divergent physical risk assumptions, limited cross-vendor comparability, and uncertainty around adaptation-adjusted loss projections. Without confidence in a standardized forward-looking baseline, insurers cannot consistently price resilience improvements.

2. Limited evidence of resilience measures

Even when organizations invest in resilience upgrades, the measures may not be communicated clearly to and be well understood by insurers, leaving the underwriter unable to assess their impact in reducing loss severity. Without engineering articulation and credible evidence, insurers cannot confidently translate resilience investments into risk reduction and therefore policyholder benefits.

3. Weak translation between risk reduction and pricing

Even when risk reduction is measurable, there has historically been no widely accepted underwriting framework translating reductions in AAL into reliable insurance benefits. In short, the market has lacked a scalable resilience-to-insurance incentive engine.

4. Misalignment between resilience investment horizons and insurance renewal cycles

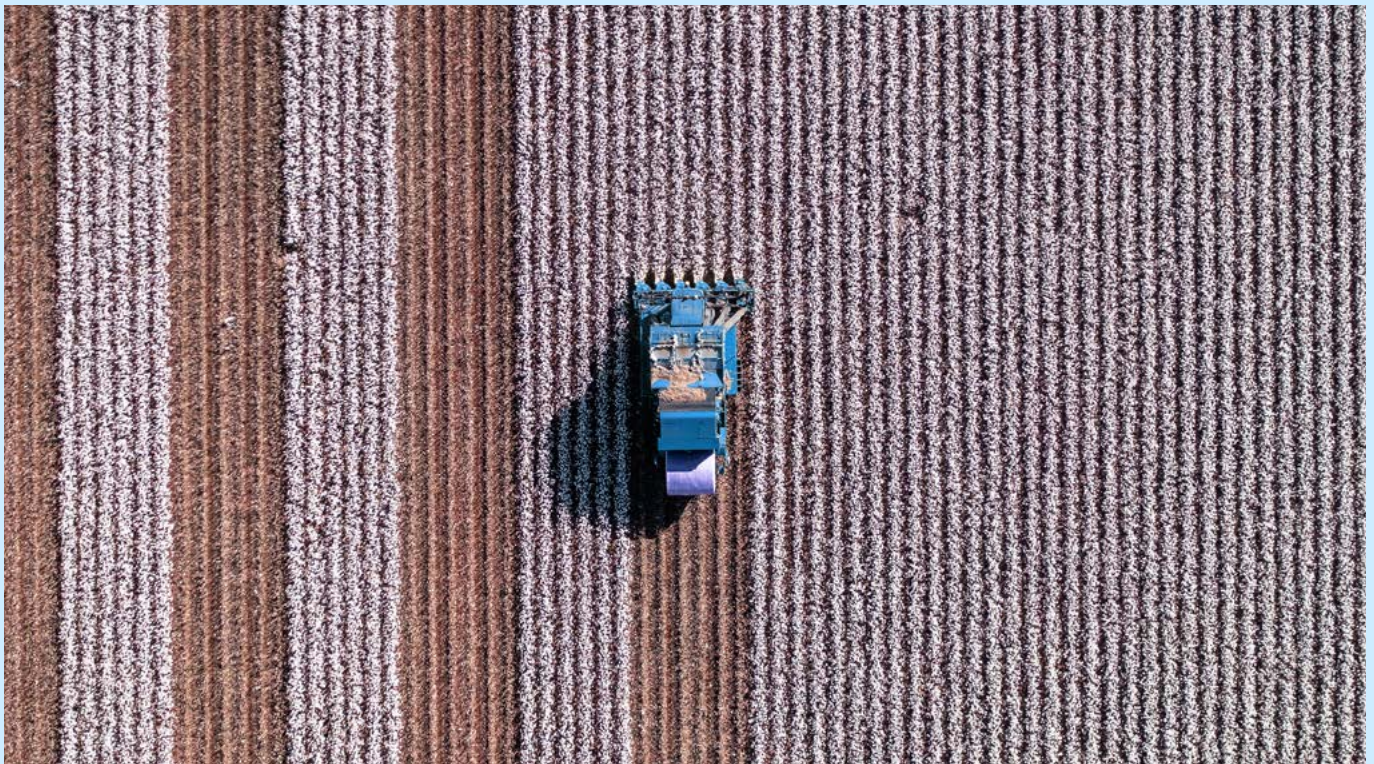
Resilience investments are often designed to generate benefits over many years or even decades. Insurance policies, by contrast, are typically renewed annually. This creates a potential misalignment of incentives. An insurer may recognize that a resilience investment is expected to reduce losses over the long term, but may be reluctant to provide significant upfront economic incentives if the policyholder can simply move to another carrier at the next renewal. In effect, the insurer funding the incentive may not be the insurer that ultimately realizes the benefit of the improved risk profile.

This dynamic can limit the willingness of insurers to reward resilience investments, even when risk reduction is credible and measurable. Addressing this challenge may require mechanisms such as multi-year policy structures, rate stability provisions, portable resilience documentation, or other approaches that help align resilience benefits with underwriting time horizons.

The market failure

A coordination problem, not a capital problem

- Investors lack clear financial signals to assess the value of resilience.
- Property owners lack certainty around returns on resilience investment.
- Insurers lack the operating infrastructure to systematically reward it.
- The result is a textbook coordination failure: capital is available, engineering solutions exist, and risk is rising — but the market lacks the connective tissue to translate one into the other.



Why existing frameworks have not solved the incentive problem

The market does not lack resilience frameworks. Over the past several years, organizations across engineering, insurance, sustainability, and investment communities have developed sophisticated frameworks to improve physical risk assessment and resilience planning. Yet the incentive problem persists. Understanding why is essential.

The existing ecosystem

Each of the following frameworks provides important value — and the Investing in Resilience Framework is designed to operate alongside, not replace them.

Framework	Primary orientation	Domain
PCRAM 2.0	Physical climate risk appraisal integrated with investment decision-making	Investment diligence
ASTM E3429	Structured property resilience assessment against natural hazards	Engineering
FORTIFIED Commercial	IBHS beyond-code resilience standards and verification	Engineering
ASCE 7/ASCE 24	Structural design loads and flood-resistant design baselines	Engineering
RELI	Resilience-oriented building and community rating framework	Engineering/sustainability
ISO 22301	Business continuity and operational resilience planning	Operations
TCFD/ISSB	Climate-related financial risk governance and disclosure	Disclosure
BRI	IFC’s Building Resilience Index	Engineering

The critical gap

Despite the progress these frameworks represent, they remain largely disparate pieces of a broader ecosystem. None were singularly designed around the following organizing objective:

A scalable insurance-centric incentive mechanism capable of systematically converting resilience investments into reliable underwriting benefits.

Most existing frameworks focus on assessment, governance, disclosure, engineering, sustainability, or investment diligence — not on underwriting operations. They help organizations understand, measure, or report resilience, but they don't provide the underwriting infrastructure needed to consistently translate risk reduction into insurance benefits at scale.

Specifically, most existing frameworks do not establish:

- Leading practices for preparing underwriting submissions that insurers can readily review and assess
- Consistent approaches for documenting and maintaining resilience information in an insurer-ready form
- A repeatable translation of AAL into insurance incentives benefiting policyholders (PCRAM 2.0 introduces AAL, AEL, and PML as resilience metrics and proposes comparing them to insurance premiums, but establishes no repeatable method for converting them into pricing actions)
- A commonly accepted, insurer-focused approach for documenting and communicating resilience measures and their risk-reduction benefits

- Clear methodologies linking resilience upgrades to premium credits, deductible adjustments, or coverage enhancements

This distinction is critically important. Insurance markets operate through evidence, comparability, standardization, and actuarial confidence. Without a simplified insurance-operational framework capable of consistently translating resilience into underwriter action, resilience investment incentives remain fragmented and difficult to scale.

Positioning

Operating overlay, not replacement

The Investing in Resilience Framework is intentionally designed not as another broad resilience framework for extreme weather events, but as an insurance-first operating overlay capable of connecting and operationalizing existing resilience standards through a reliable incentive architecture.

PCRAM, in particular, represents one of the most sophisticated attempts to integrate physical climate risk, adaptation analysis, and investment valuation. The framework presented here is complementary: PCRAM provides the institutional appraisal lens; the Investing in Resilience Framework provides the underwriting translation layer.

The investing in resilience framework

The Investing in Resilience Framework was launched to address this gap directly. Developed through a collaboration between Carlyle and Marsh, the initiative brings together leading institutional investors, insurers, engineers, and physical risk experts to develop what may become one of the first scalable insurance-centric frameworks focused on resilience investment.

Founding participants

Participating limited partners and institutional partners include:

Mubadala	Sampension
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The founding participants participated in the initiative and contributed perspectives as institutional investors. The views expressed do not constitute a commitment by participants, nor investment, insurance, legal, actuarial, tax, or risk-management advice, and do not necessarily reflect the views of every participating organization.

The core belief

“Insurance may be one of the most powerful mechanisms available for accelerating resilience investment at a global scale.”

— Founding premise of the initiative

Rather than treating insurance simply as post-disaster risk transfer, the framework repositions insurance as a signal that can incentivize a daptation investment before losses occur.

Distinction from PCRAM

The framework is not intended to replace PCRAM or other existing methodologies. PCRAM provides a valuable institutional foundation linking climate science, engineering, and financial analysis to investment appraisal.

However, PCRAM was not specifically designed as an operational insurance standard. Notably, PCRAM 2.0, which now incorporates insurability considerations and a value-enhancement step oriented around risk-reward sharing across the value chain, explicitly identifies the alignment of resilience metrics with risk-based insurance pricing as an area for further work rather than an established capability. The most

advanced existing framework thus defines the underwriting-translation problem as open.

The Investing in Resilience Framework introduces what is best understood as a resilience-insurance incentive overlay, layered on top of existing methodologies. Its purpose is simpler and more targeted: to create a repeatable, underwriter-oriented operating framework capable of converting documented resilience investments into actionable insurance incentives at scale.

The comparison below illustrates the distinct but complementary roles of PCRAM and the Investing in Resilience Framework.

Dimension	PCRAM	Investing in Resilience Framework
Primary lens	Investment appraisal and valuation	Insurance underwriting translation
Output	Adaptation-adjusted financial analysis	Insurer-actionable submissions
End user	Investment committees, asset managers	Underwriters, brokers, risk engineers
Mechanism	Climate science > engineering > valuation	Documented ΔAAL > underwriting consideration
Role	Foundational diligence methodology	Operating overlay on top of diligence



A four-step insurance-centric operating framework

The framework is structured as a closed-loop resilience incentive system: a sequence of underwriting-grade inputs and outputs that

produces, on the back end, a quantifiable resilience dividend. Each stage is intentionally designed to be auditable, repeatable, and recognizable by insurers.

Framework architecture

The resilience incentive loop

Step 1 < Step 2 < Step 3 < Step 4 < Target outcome	Forward-looking hazard and loss modeling	- Forward-looking physical risk scenario analysis - Hazard modeling for flood, wind, wildfire, heat, and other perils - Asset-specific damage and loss curves	- Average annual loss (AAL) and probable maximum loss (PML) estimates - Business interruption analysis - Preference for vendors aligned with CMIP intercomparison protocols
	Vulnerability and gap assessment	- Existing structural and operational controls inventory - Alignment with ASTM E3429 Property Resilience Assessment - Flood barriers, drainage, wind resistance evaluation	- Operational continuity, maintenance, and emergency protocols - Backup systems and redundancy mapping - Identifies both strengths and remaining resilience gaps
	Resilience investment and evidence	- Targeted asset hardening and design modifications - Operational resilience enhancements and recovery acceleration - Alignment with FORTIFIED Commercial and ASCE 7, ASCE 24	- Evidence of implementation and effectiveness sufficient to support underwriting review - Quantified post-mitigation ΔAAL and downtime reductions - Ongoing maintenance and documentation expectations where appropriate
	Insurance incentive translation	- Pricing incentive credits linked to documented risk reduction - Deductible reductions and multi-year policy stability - Enhanced coverage terms and broadened BI protection	- Parametric overlays and deductible wrap products - Faster post-event liquidity solutions - Translation of AAL/PML into actions benefiting policyholders
	The resilience dividend	- Lower expected losses - Improved risk transfer options	- Better cash flow - Stronger asset value

Step 1 — Forward-looking hazard exposure modeling

The first step establishes a probabilistic, forward-looking physical risk baseline for the asset. Unlike traditional catastrophe modeling, which relies primarily on historical weather data, the framework emphasizes forward-looking climate modeling aligned with evolving climate science.

To improve consistency and credibility, the framework expresses a strong preference for modeling vendors that align with the Coupled Model Intercomparison Project (CMIP) — the coordinated protocol used in global climate model assessment. The objective is a forward-looking risk baseline that each insurer can reasonably incorporate into its own underwriting and pricing decisions.

Step 2 — Gap analysis of existing resilience controls

The second step evaluates the extent to which existing resilience measures adequately mitigate identified hazards. The framework recommends alignment with ASTM E3429, the emerging property resilience assessment standard. ASTM E3429 is the American Society for Testing and Materials (ASTM) Standard Guide for Property Resilience Assessments (PRA). Published in 2024, it establishes a structured methodology for assessing the resilience of commercial properties and other built assets to natural hazards and climate-related risks, providing a common framework for property owners, investors, lenders, engineers, and insurers to evaluate vulnerability and resilience measures.

Critically, the framework focuses not only on physical resilience measures, such as asset hardening and protective infrastructure, but also on operational resilience measures, including business continuity planning, maintenance protocols, emergency response procedures,

and recovery planning. Together, these measures can potentially significantly influence operational downtime, business interruption, and financial losses during physical risk events. This stage produces a vulnerability assessment identifying both existing strengths and remaining resilience gaps.

Step 3 — Selection and implementation of resilience measures

The third stage focuses on implementing targeted resilience upgrades designed to reduce expected losses (AAL). The framework strongly emphasizes credible documentation of resilience measures and alignment with recognized standards. Examples include FORTIFIED Commercial, which provides beyond-code resilience standards, and ASCE 7 and ASCE 24, which provide structural and flood design baselines.

This stage is critical because insurers require confidence not only that mitigation measures exist, but that they are properly designed, appropriately documented, and maintained over time. These investments and improvement measures should be selected to demonstrably reduce loss estimates (through modeled AALs and/or PMLs).

Step 4 — Translating resilience into potential insurance benefits

The defining innovation
An insurer-centric translation mechanism

Rather than treating resilience as a vague qualitative concept, the fourth step aims to create a structured methodology for translating documented resilience improvements into potential insurance benefits.

This is what the market has historically lacked: a direct, repeatable financial linkage between resilience investment and insurance economics.

A menu of potential insurance incentives

The framework does not prescribe a single insurance solution. Rather, it seeks to establish a common foundation that an insurer can use to evaluate and potentially recognize documented resilience investments using a range of underwriting and product mechanisms.

Potential approaches generally fall into four categories:

Category	Objective	Illustrative examples
Pricing incentives	Reward expected loss reduction	Premium credits, rate stability provisions, resilience-linked pricing adjustments
Deductible and retention structures	Align retained risk with resilience performance	Deductible reductions, contingent deductibles, deductible buy-downs
Coverage enhancements	Improve recovery and business continuity	Reduced waiting periods, expanded business interruption coverage, reinstatement enhancements
Alternative risk transfer solutions	Address residual risks and recovery speed	Parametric covers, deductible wraps, resilience-linked triggers

Illustrative concepts for future development

The collaboration has discussed a range of potential mechanisms that may warrant further exploration with insurers.

Contingent deductibles

A deductible structure in which catastrophe deductibles remain at the agreed level, provided resilience measures continue to perform as intended and are appropriately maintained, but increase if measures are not maintained. This approach could help create ongoing incentives for maintaining resilience investments rather than treating adaptation as a one-time exercise.

Resilience reinvestment premium credits

Premium reductions linked to documented risk reduction, potentially coupled with multi-year policy structures or commitments to reinvest a portion of insurance savings into additional resilience measures. Such structures could help reinforce a desirable cycle of risk reduction and resilience investment.

Resilience-linked hybrid insurance structures

A structure that combines traditional indemnity coverage with parametric features. For example, an insurer may continue to provide indemnity-based coverage. At the same time, resilience controls remain operational and maintained, while predefined parametric triggers could provide rapid liquidity following events that exceed design assumptions or result in control failure.

Multi-year stability structures

Where appropriate, an insurer could explore multi-year pricing commitments or rate-stability provisions that help address the timing mismatch between long-term resilience investments and annual insurance renewal cycles.

Illustrative pricing designations

The framework proposes potential underwriting actions tied to measurable reductions in AAL and PML, which each insurer may use as a reference point in its own underwriting decisions. These are designed to illustrate the concept and will be the subject of engagement during a future phase of the initiative.

Alignment with FORTIFIED standards designation level	Verified ΔAAL reduction	Potential insurance outcome
Bronze	5–10%	Modest premium credits and improved insurer engagement
Silver	10–20%	Larger premium credits, multi-year rate stability, meaningful tail-risk reduction recognition
Gold	>20%	Substantial premium improvements, enhanced coverage architecture, subject to insurance and reinsurance considerations

Illustrative only. Subject to insurer, reinsurer, actuarial, peril, and geographic calibration.

Why this framework matters

System-level outcomes

By creating a standardized resilience-insurance operating model, the framework has the potential to deliver outcomes across the financial system simultaneously:

Market stability

- Improved risk transfer options for climate-exposed assets
- Reduced volatility within insurance systems
- Contributing to efforts to narrow the protection gap
- Protection of lending and financing markets

Asset-level economics

- Reduced long-term economic losses
- Enhanced asset values and durability
- Improved business continuity
- Improved incentives for private-sector resilience investment

The transformation

Most importantly, the framework aims to introduce market-based financial incentives capable of scaling resilience investment beyond isolated pilot projects. It seeks to strengthen the economic case for resilience investment by creating a clearer connection between risk reduction and insurance value.

What remains unsolved

While the Investing in Resilience Framework seeks to strengthen incentives for asset-level resilience investments, it is not intended to address every dimension of climate adaptation financing.

Many of the most consequential resilience interventions operate at the community, regional, or national level, including flood defense systems, stormwater infrastructure, grid modernization, watershed management, wildfire mitigation, and other forms of public infrastructure. These investments often generate benefits that accrue across multiple stakeholders, creating collective-action challenges that cannot be solved through insurance incentives alone.

Addressing these broader adaptation needs will require additional policy frameworks, public-sector investment, innovative financing mechanisms, and new forms of collaboration between governments, insurers, investors, and communities.

The framework proposed in this paper should therefore be viewed as one component of a broader resilience ecosystem. Its focus is narrower but potentially scalable: improving incentives for resilience investments within insurable assets by creating a clearer connection between risk reduction and insurance value.

“The framework seeks to strengthen the economic case for resilience investment by creating a clearer connection between documented risk reduction and insurance value.”

— Investing in Resilience Initiative

Conclusion: A market architecture for an era of physical risk volatility

The world is entering a new era of increasing physical risk disruption. The traditional assumption that insurance alone can absorb worsening volatility is becoming increasingly difficult to sustain. Insurance remains a critical component of economic resilience, but long-term resilience will depend on a broader combination of risk reduction, adaptation, infrastructure investment, public policy, and risk-transfer solutions.

At the same time, investment in resilience remains insufficient relative to the scale of the challenge. While there are many barriers to scaling resilience, one important and potentially addressable challenge is the absence of a consistent mechanism through which insurers can recognize and reward documented risk reduction.

The Investing in Resilience Framework represents an early attempt to address that specific market gap by linking forward-looking risk analysis, resilience assessment and documentation, resilience investment, and insurance decision-making within a common operating framework.

By helping create a clearer connection between documented risk reduction and insurance value, the framework seeks to strengthen the economic case for resilience investment and encourage broader adoption of resilience measures. If successful, it could contribute to a more consistent approach for recognizing resilience within insurance markets and help improve incentives for investment in risk reduction.

This framework is not intended to solve the broader adaptation challenge on its own. Rather, it is designed to address one important piece of a much larger puzzle. In that sense, it should be viewed as a complementary market mechanism that can work alongside public-sector investment, community-level adaptation efforts, infrastructure resilience initiatives, and other approaches needed to strengthen long-term economic resilience.

Ultimately, the future resilience of economies, businesses, and communities will depend on a combination of risk reduction and risk transfer. The Investing in Resilience Initiative is an effort to help bring those two concepts closer together.

“The future resilience of global economies may depend not simply on how well we understand physical risks, but on whether markets can successfully create the incentives necessary to act before losses escalate beyond what businesses, communities, and institutions can efficiently absorb.”

— Investing in Resilience Initiative

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