

# PUERTO RICO FINANCIAL SERVICES FORUM

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## **Climate Risk: Innovative Solutions**

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A gray chevron graphic consisting of two nested right-pointing arrows, located in the bottom right corner of the slide.

# **Agenda**

## **Climate Risks**

- **Hurricane Maria (2017)**
- **Benchmarking Largest Hurricanes in the US**
- **Future Climate Change**

## **Financial Impact and Protection Mechanisms**

- **Reinsurance and CAT Bonds**

## **Resilience Through Innovation**

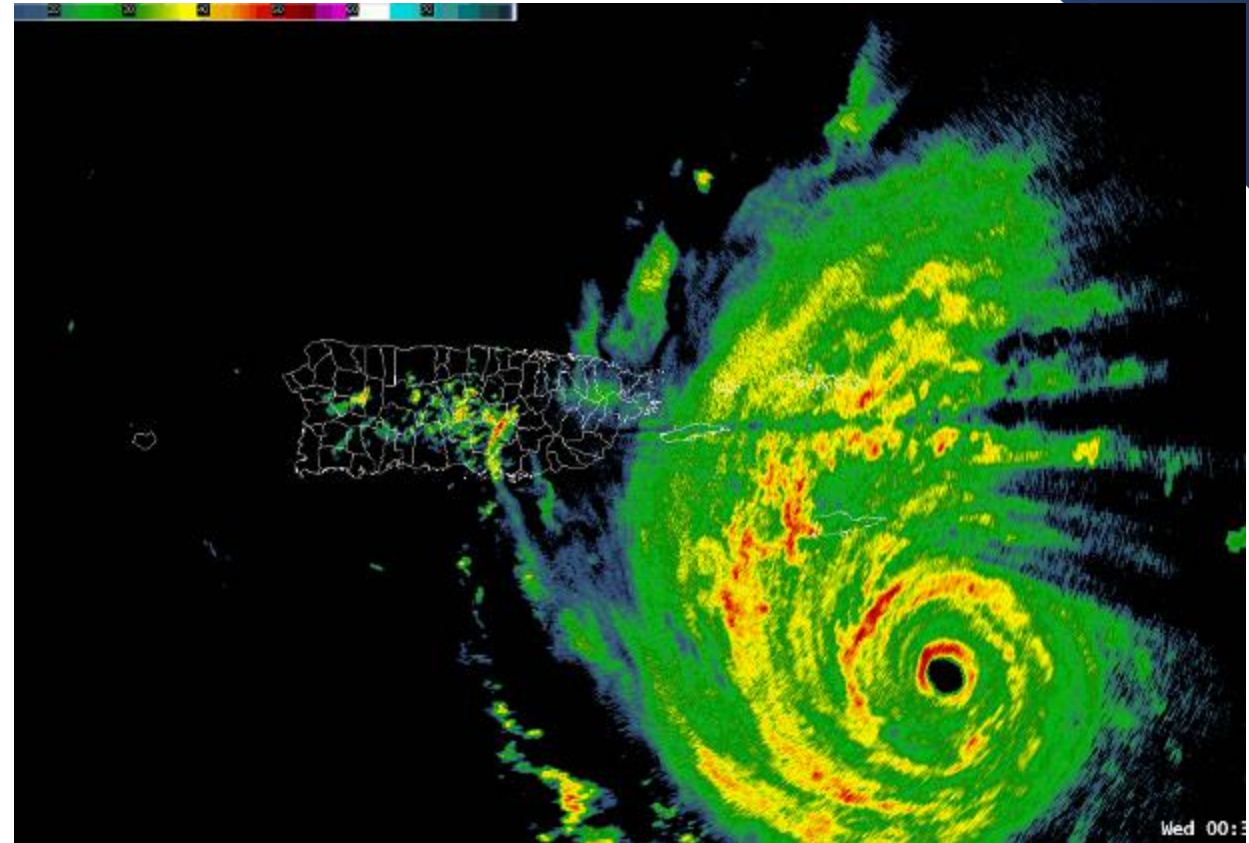
- **3D-Printed Homes**

# Climate Risks

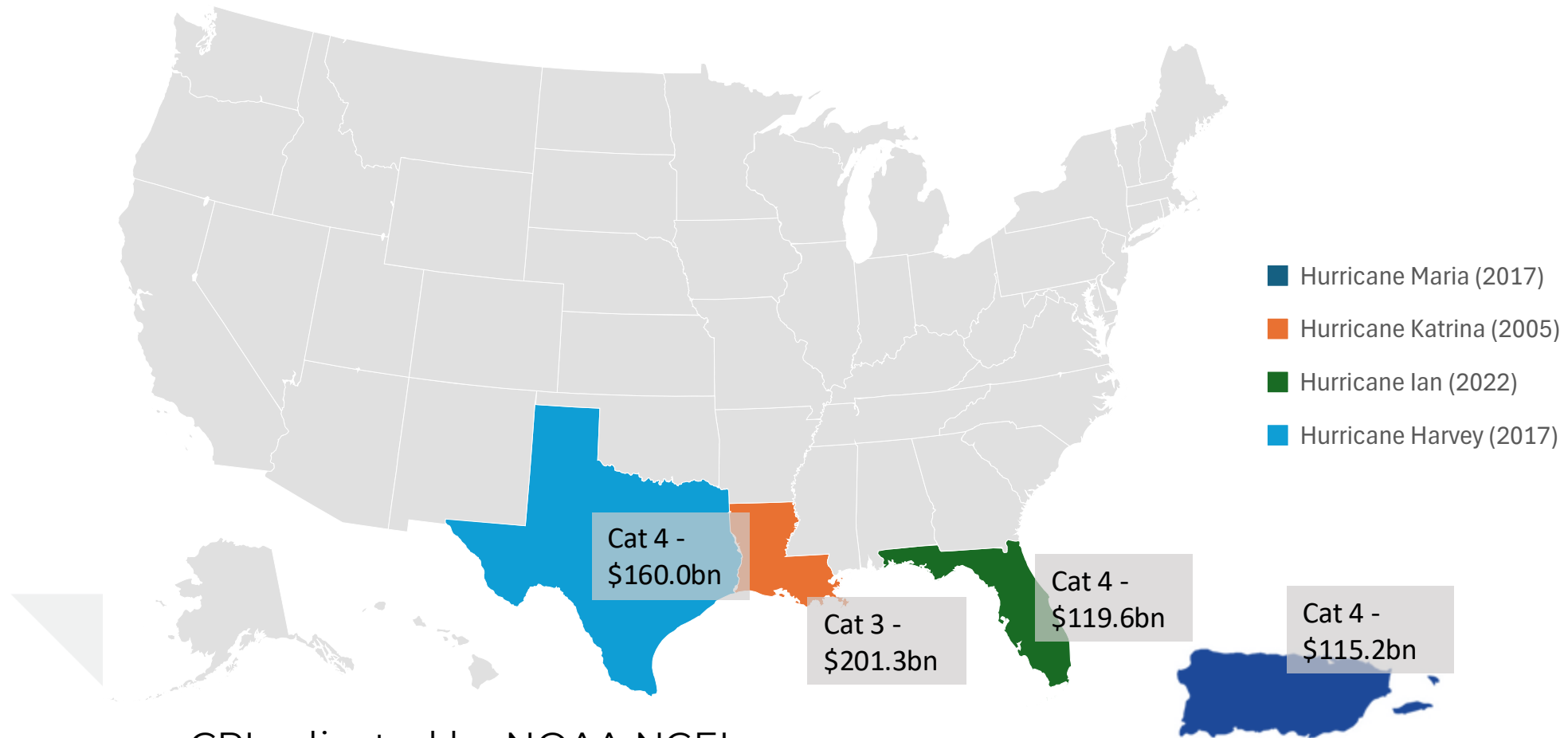
## Hurricane Maria (2017)

- Made landfall as a Category 4 in southeast Puerto Rico.
- Maria's high winds caused widespread devastation to Puerto Rico's transportation, agriculture, communication, and energy infrastructure
- CPI-Adjusted Estimated Cost: **\$115.2B**
- Insured loss estimate between **US\$15B to US\$30B** (RMS, Moody's)

From 1980-2024, there were **8** confirmed tropical cyclone events with losses exceeding \$1 billion each to affect **Puerto Rico**.



# Benchmarking Largest Hurricanes in the US



All figures are CPI-adjusted by NOAA NCEI



## Future Climate Change

With every additional increment of global warming, changes in extremes continue to become larger.

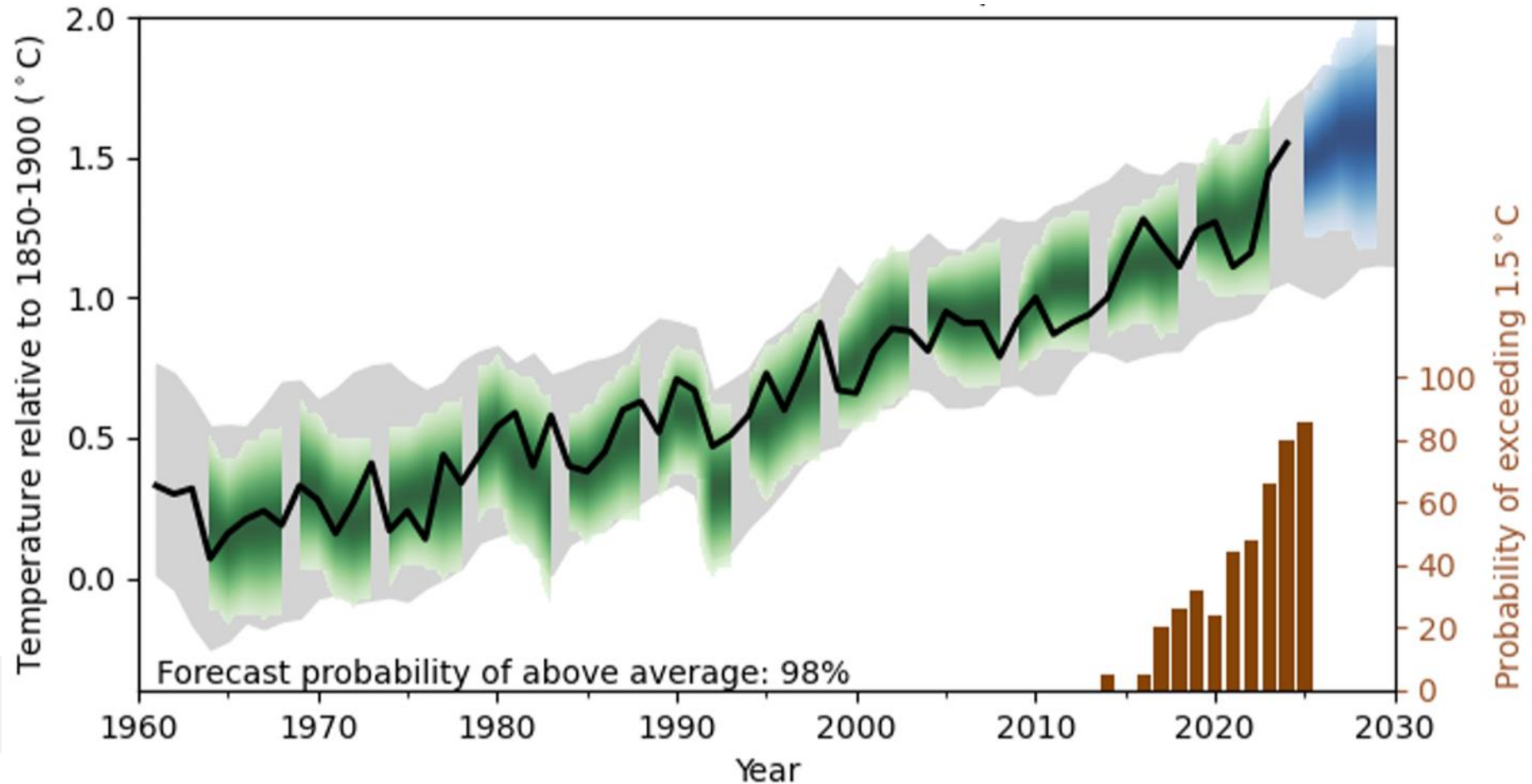
In the near term, global warming is more likely than not to reach **1.5°C** even under a very low greenhouse gas (GHG) emission scenario.

Compound **heatwaves** and **droughts** are projected to become more frequent, including concurrent events across multiple locations.

Other projected regional changes include intensification of **tropical cyclones** and/or **extratropical storms** and increases in aridity and **fire weather**.

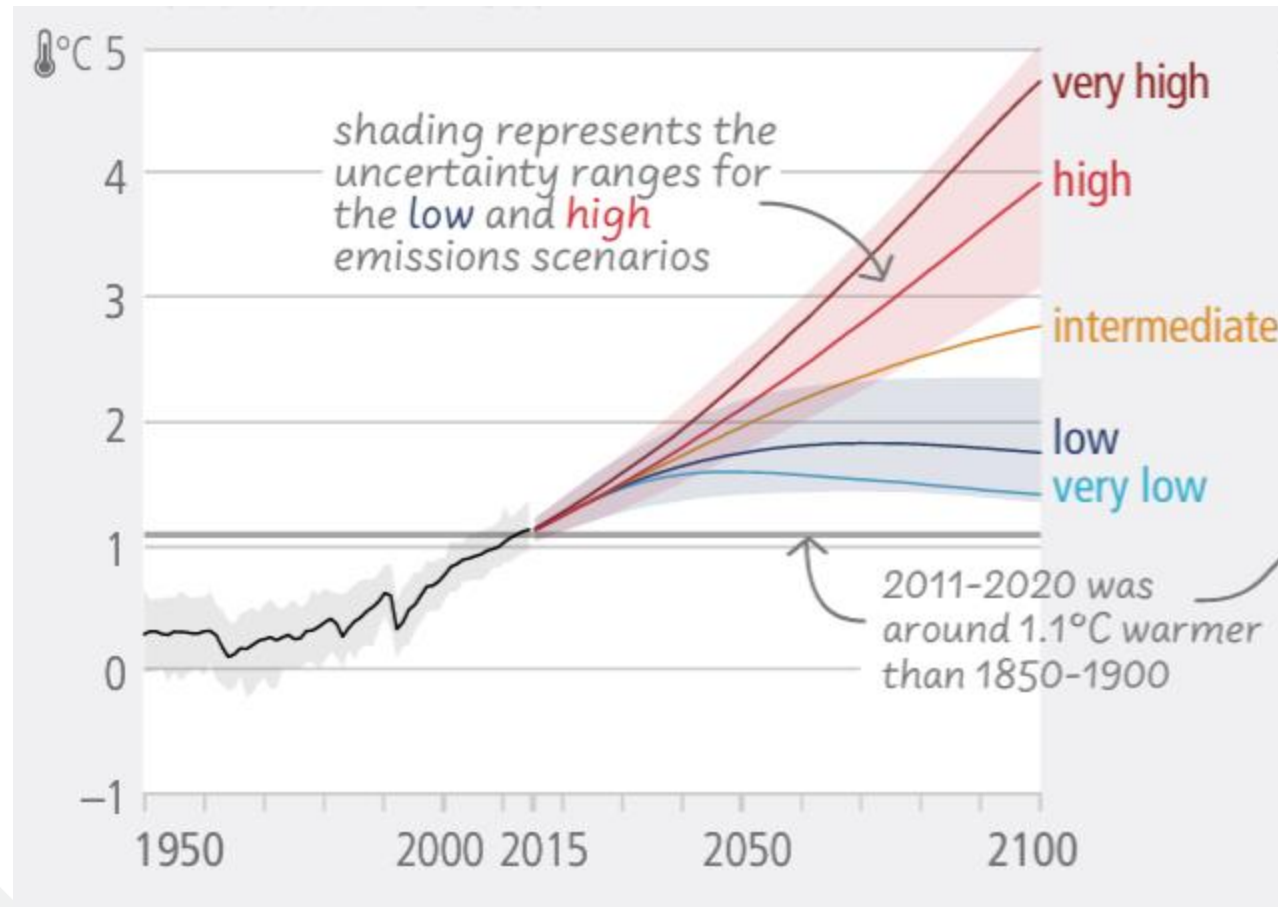
*Source: IPCC, 2023: Summary for Policymakers.*

# Global Mean Near-Surface Temperature



Source: WMO Global Annual to Decadal Climate Update  
2025-2029

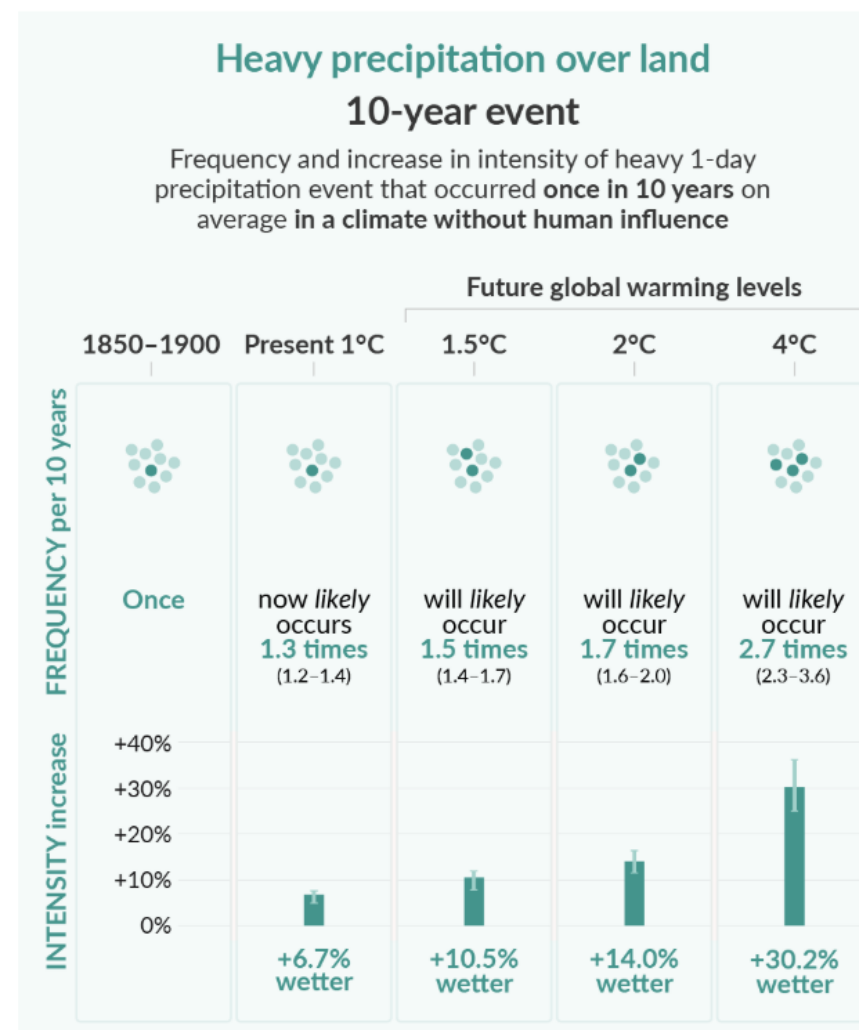
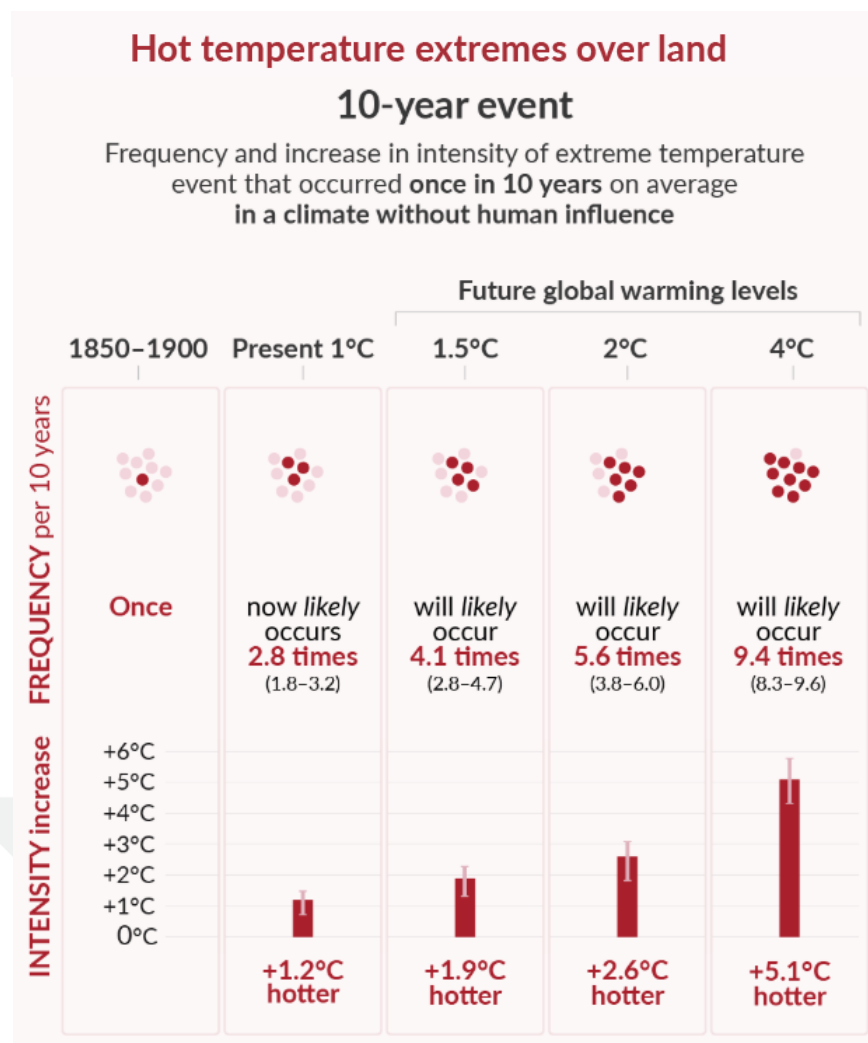
## Global Surface Temperature Change Relative to 1850-1900



Source: IPCC, 2023: Climate Change 2023: Synthesis Report.



# Projected Changes in Extremes



Source: IPCC AR6, 2021: Summary for Policymakers.





## Impact on Hurricanes

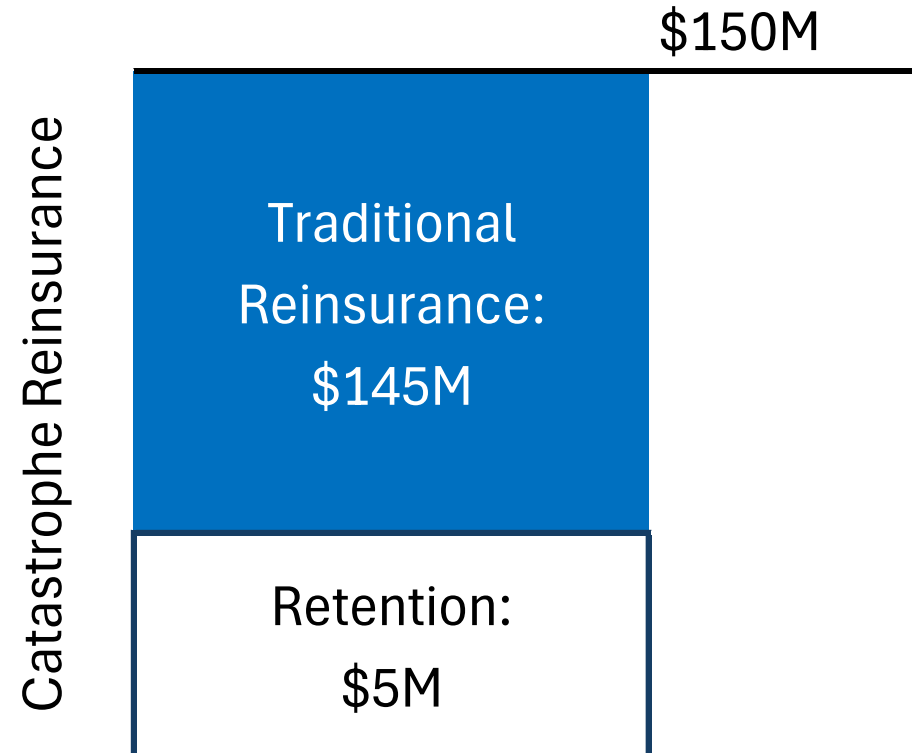
The **frequency of hurricanes** is governed by oceanic and atmospheric conditions such as warmer sea-surface temperature, low wind shear, and El Niño/La Niña phases.

Climate models suggest that while total **number of hurricanes may stay stable** or even decline slightly, a larger share of them will be **major storms (Category 3–5)** producing heavier rainfall.

With global warming, hurricanes are expected to produce **more intense rainfall**, increasing **flood risk**. For example, at 1.5° C of global warming, the damage potential of a hurricane would be about 10.5% higher than it would have been in 1850-1900.

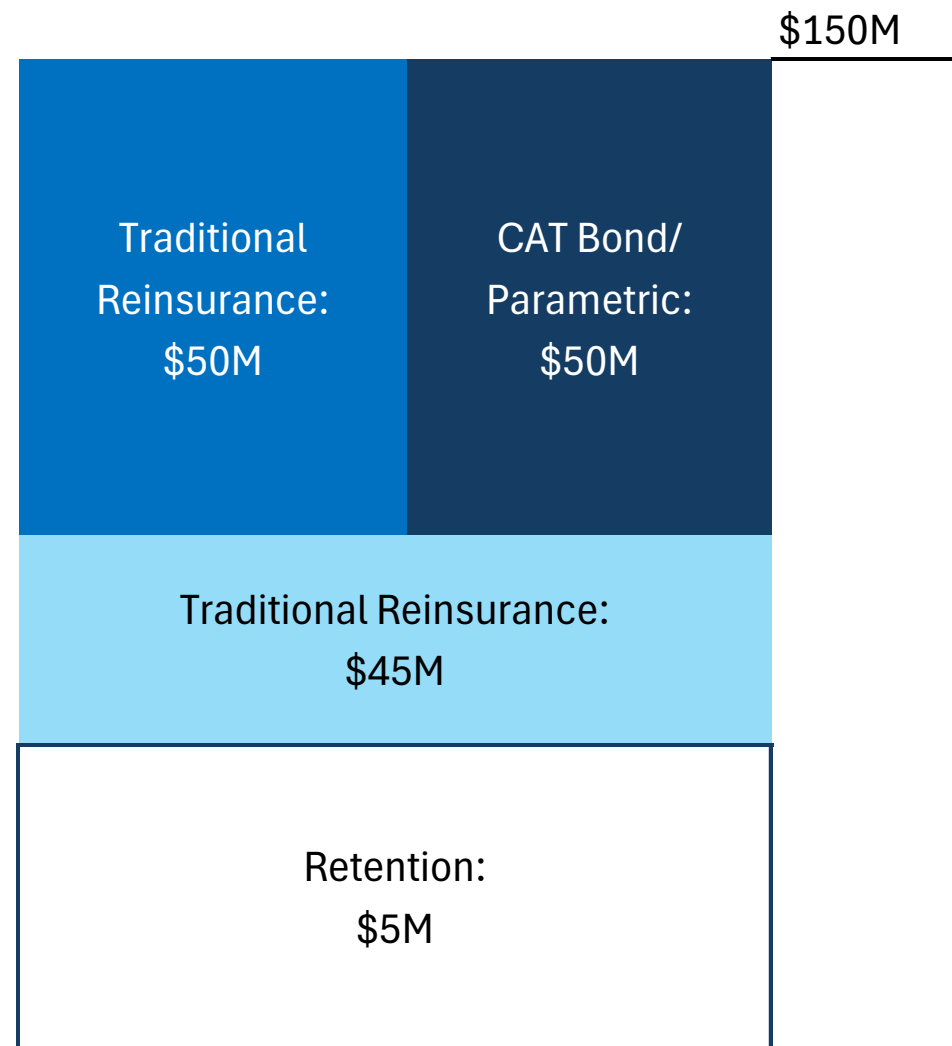
## Reinsurance: CAT (Catastrophe) Reinsurance

- Type of XoL reinsurance that specifically covers losses arising from a **single event** or occurrence (e.g., one hurricane).
- The reinsurer pays losses **above a certain threshold** (the retention) up to a specified limit per event.
- Typically protects against **low-frequency, high-severity events**, such as a 1-in-250 year hurricane

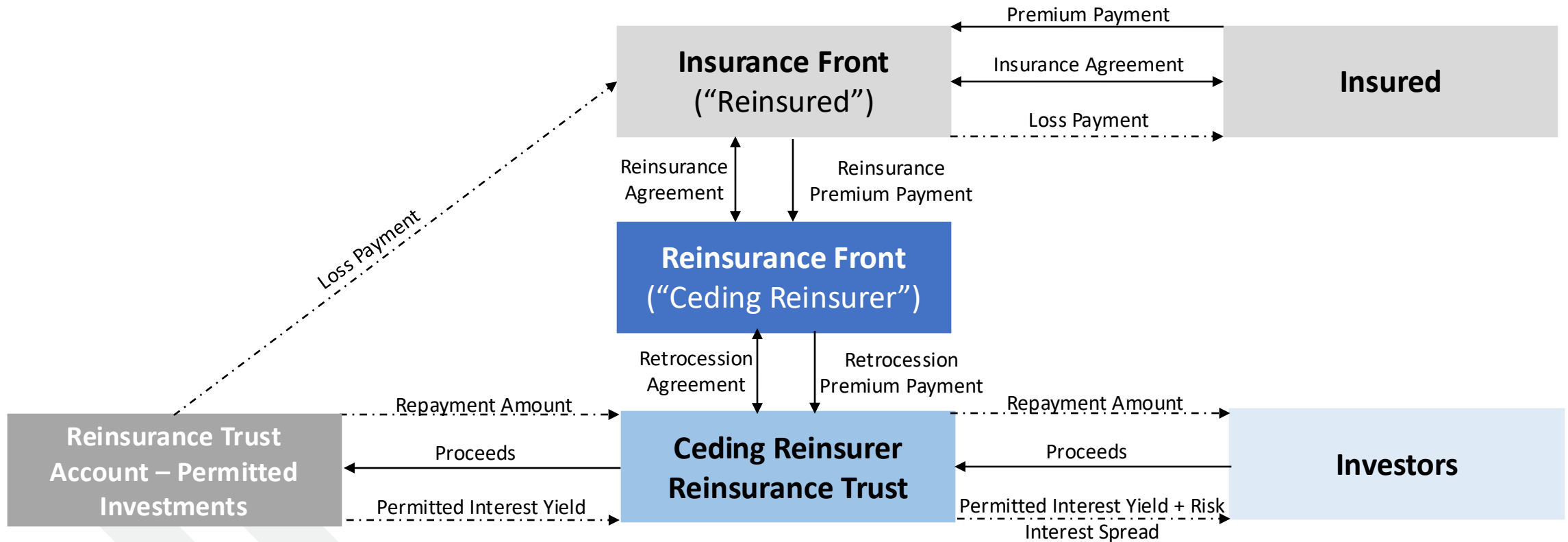


## Other Options: Catastrophe (CAT) Bond

- Debt instruments that transfer insurance risk to institutional investors. CAT bonds are one of the insurance-linked securities (ILS) that offer investors opportunities to diversify into insurance risks. The principal of a CAT bond is at risk if a defined event occurs – such as a hurricane, flood or typhoon.
- There needs to be a **trigger** for a payment to happen.
- For example, if a hurricane category 4 or higher occurs within a certain radius of Puerto Rico, and it was previously defined as the trigger for the payment, the CAT bond will pay a specified amount to the issuer regardless of the loss.



# Catastrophe (CAT) Bond Structure



# Catastrophe (CAT) Bond

## Advantages

- CAT bonds offer insurers an alternative to traditional reinsurance and allow catastrophe risk to be transferred to a wider set of investors. This allows access to the capital markets.
- CAT bonds have lowered the costs of diversifying insurer's exposure to natural disaster risk: by attracting alternative sources of capital such as mutual funds to compete with traditional reinsurance. There is a potential for savings.

## Disadvantages

- They are more complex than traditional bonds. Investing in catastrophe bonds requires a deep understanding of the specific terms of each bond issue.
- Catastrophe bonds carry inherent basis risk. For cat bonds using non-indemnity triggers (such as wind speed in the case of hurricanes) the payout may not align with the actual losses incurred.

# Resilience Through Innovation

Implementing an **early-alert protocol** to insureds to help reduce preventable losses during catastrophic events.

For financial institutions, investing in climate-resilient construction such as **3D-printed housing** represents a **risk-mitigation measure** and an insurance opportunity.

By improving structural resilience and affordability, they can **reduce insured losses** and **expand access to coverage** in high-risk zones.



Source: [iconbuild.com](https://iconbuild.com)



**Questions?**

**Thank you!**

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Happy to answer any questions or discuss further.