Wildfire Cat Models

Wildfire Mitigation and Resiliency Standards Work Group
Washington OIC

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Who we are

The American Property Casualty Insurance Association (APCIA) is the primary national trade association for home, auto, and business insurers. APCIA promotes and protects the viability of private competition for the benefit of consumers and insurers, with a legacy dating back 150 years. APCIA members represent all sizes, structures, and regions—protecting families, communities, and businesses in the U.S. and across the globe.

While we do not sell insurance, part of our mission is to provide education regarding home, auto, and business insurance.

We seek to inform consumers so they can make better decisions on how to protect their property and assets.

Why Insurers Use Cat Models: Manage Risk

Insurers must look at ***extensive data*** to better ***understand risk*** and determine what ***level of exposure*** they can ***responsibly assume*** without risking insolvency

Catastrophe models have existed for decades and are a ***critical tool*** used by insurers for numerous types of risk, though have become ***increasingly important*** as our industry is facing more climate-intensified loss events.

What is a Cat Model: Financial Tool

Catastrophe model (or "cat" model):

A ***computerized process*** that simulates potential catastrophic events and estimates the amount of loss due to the events.

A cat model is designed to help ***quantify the financial impact*** of a range of potential future disasters by informing ***where future events are likely to occur*** and ***how intense they are likely to be***.

How Cat Models are Used

Assess overall risk and exposure to inform:

- ✓ *Underwriting and pricing risks*
- ✓ *Incorporate evolving climate risk with historical loss trends*
- ✓ *Portfolio management*
- ✓ *Risk transfer needs (e.g., reinsurance)*
- ✓ *Mitigation opportunities*
- ✓ *and more*

Types of Cat Models

RISK AGGREGATION

Portfolio Management

Considers ***all covered risks*** that could experience a loss in a policy period, and the ***total rate*** that must be collected, including ***reinsurance or other capital***, to cover all potential losses.

For example:

- *Lines of business (e.g., property, auto, business)*
- *Geographic region*
- *Perils (e.g., hail, fire, earthquake)*

RISK SEGMENTATION

Assessment & Pricing

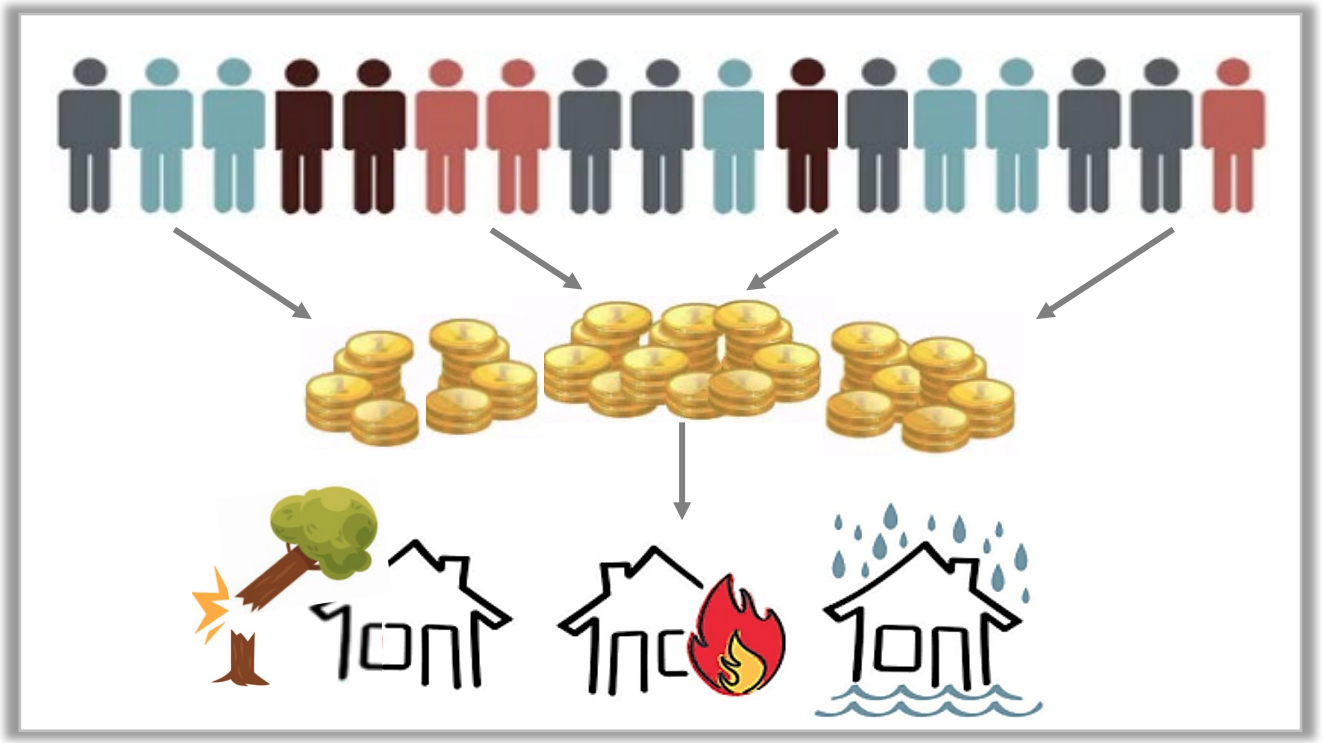
Considers ***individual property risk factors*** that contribute to the likelihood or severity of a loss in a policy period, and the ***premium*** that should be charged.

For example:

- *Property address*
- *Size (e.g., square footage, # of rooms)*
- *Mitigation*

Function of Insurance: Pool and Distribute Risk

The Risk "Pool"



"Distribution" of the Pool

History of Cat Models

1992 Hurricane Andrew

1994 Northridge Earthquake

2005 Hurricane Katrina

Cat Models Exist for Many Perils

Primary Perils:

(high severity events)

Hurricane, earthquake

Secondary Perils:

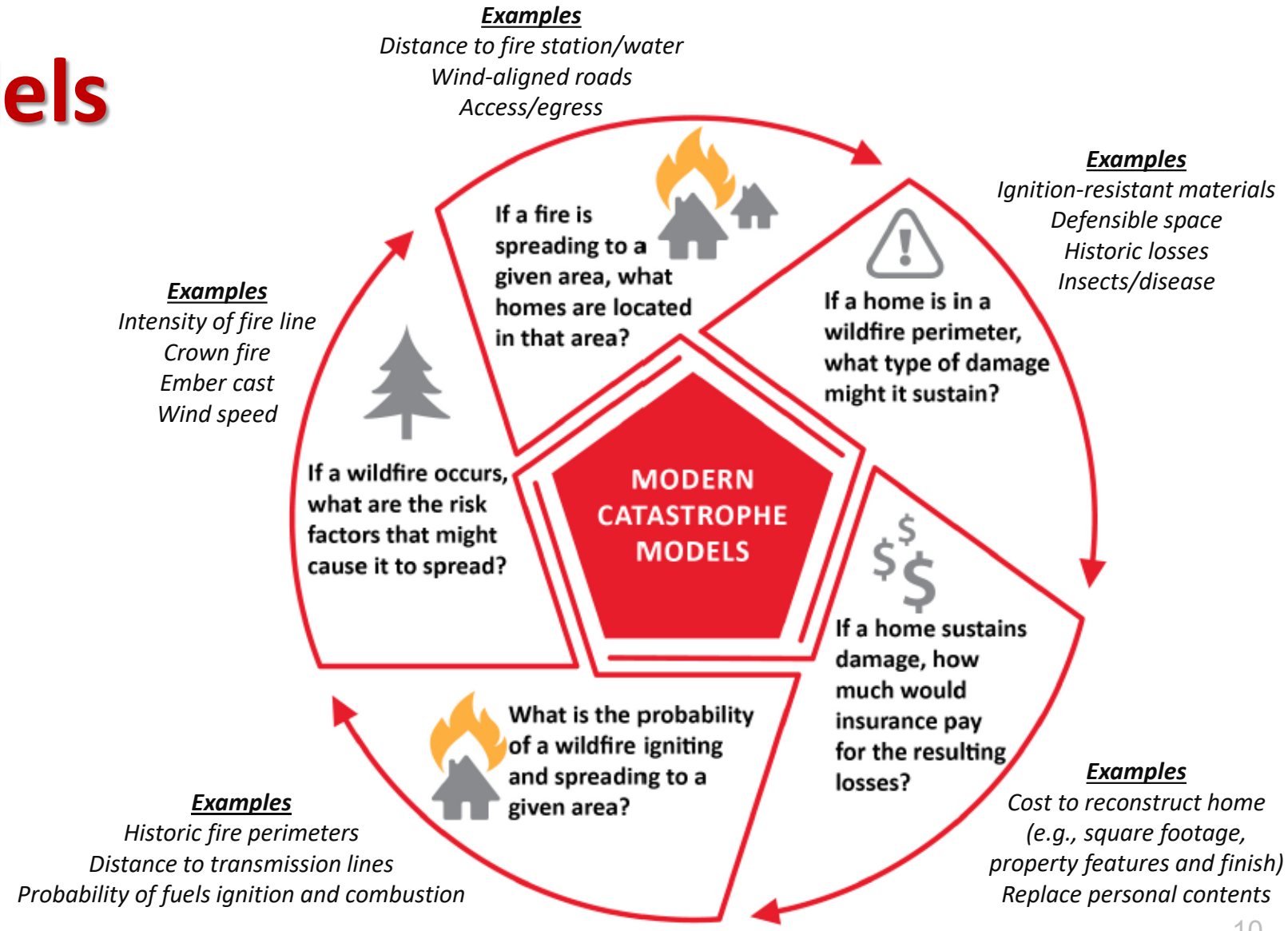
(high frequency events)

Flood, severe convective storm (e.g., tornados, hail), wildfire, winter storm, etc.

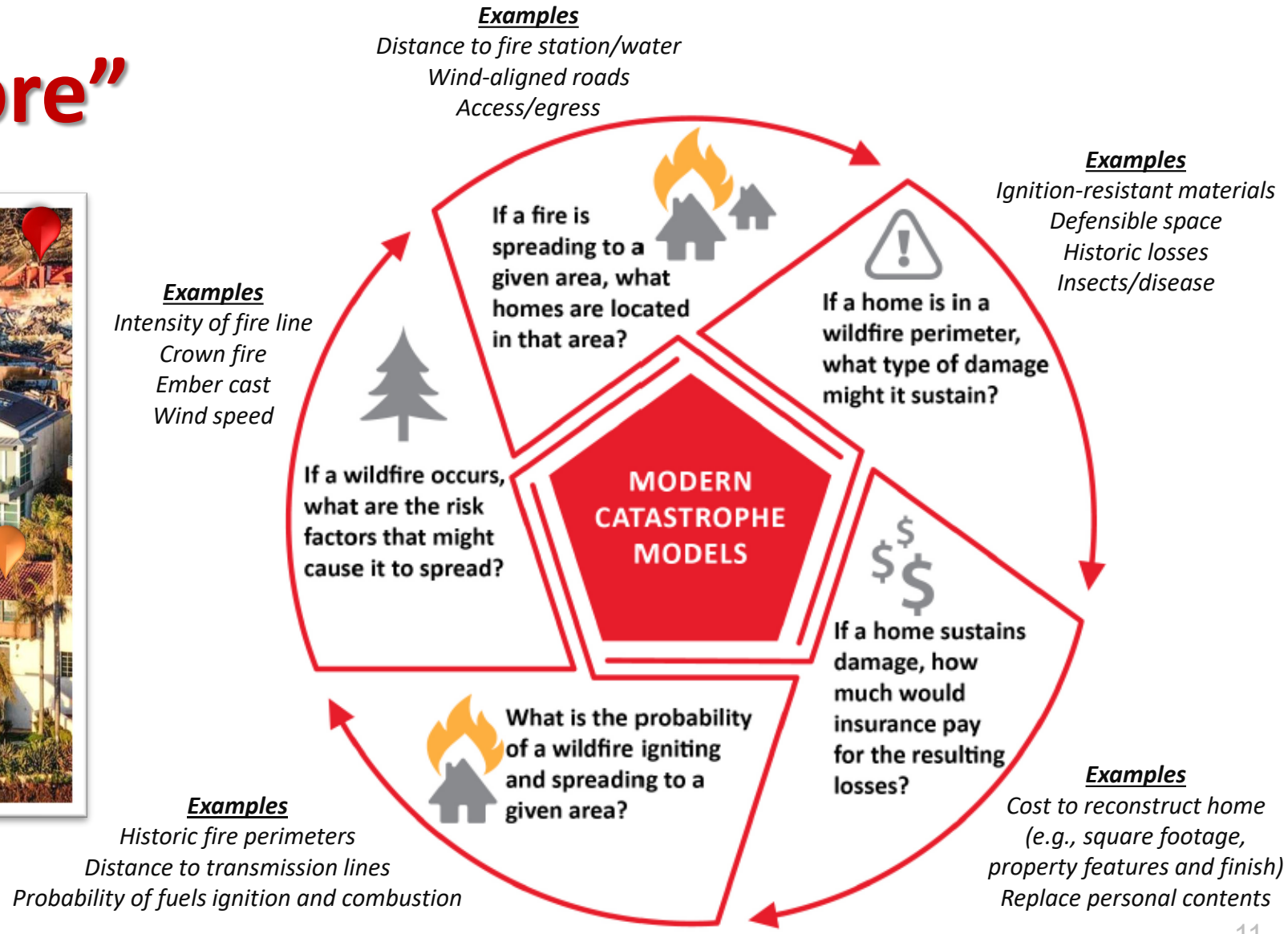
Wildfire cat models

Help identify the interactions between weather, local vegetation, and topography.

Becoming increasingly more granular by considering additional parcel-specific factors such as defensible space and construction materials, as well as mitigation efforts.

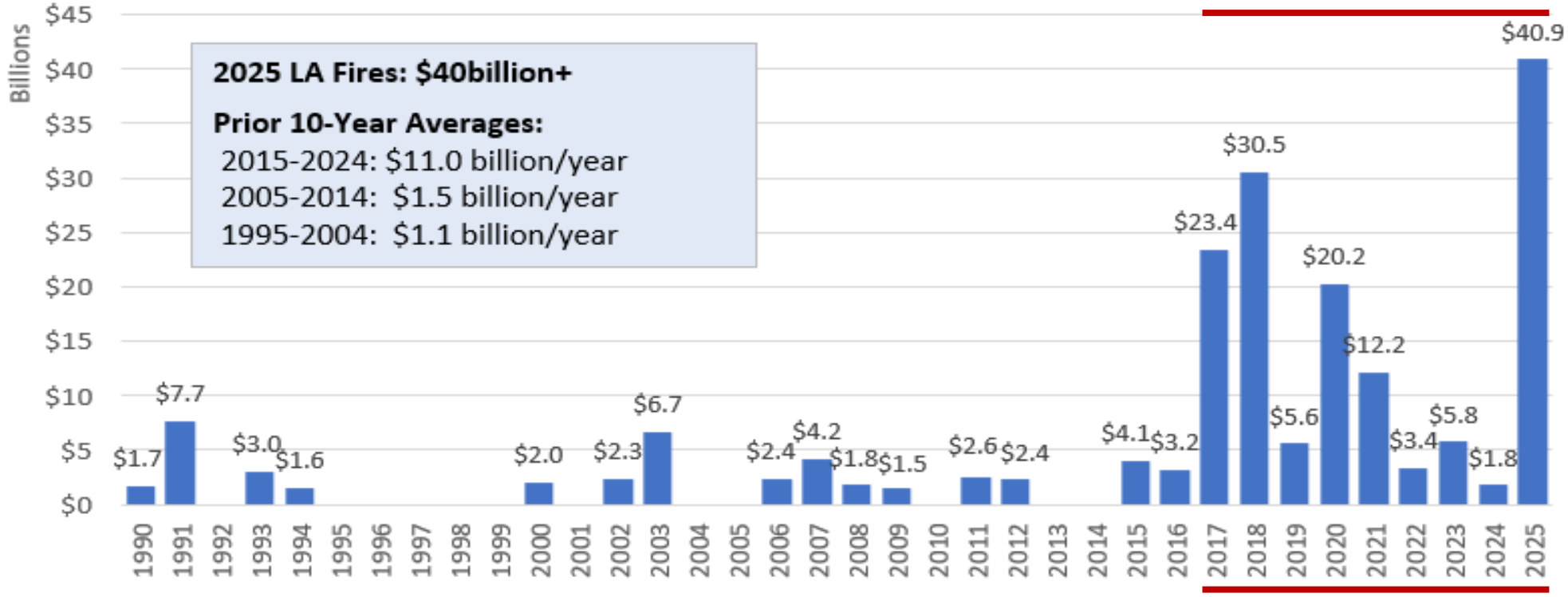


Wildfire "risk score"



Estimated annual cost wildfires

(for wildfires events exceeding $1 billion, since 1990)



CPI-adjusted as of March 2025.

Source: APCIA, via Allianz Commercial (Wildfire: Emerging Risk Trend Talk 4)

2017 marked a new era for the wildfire peril.

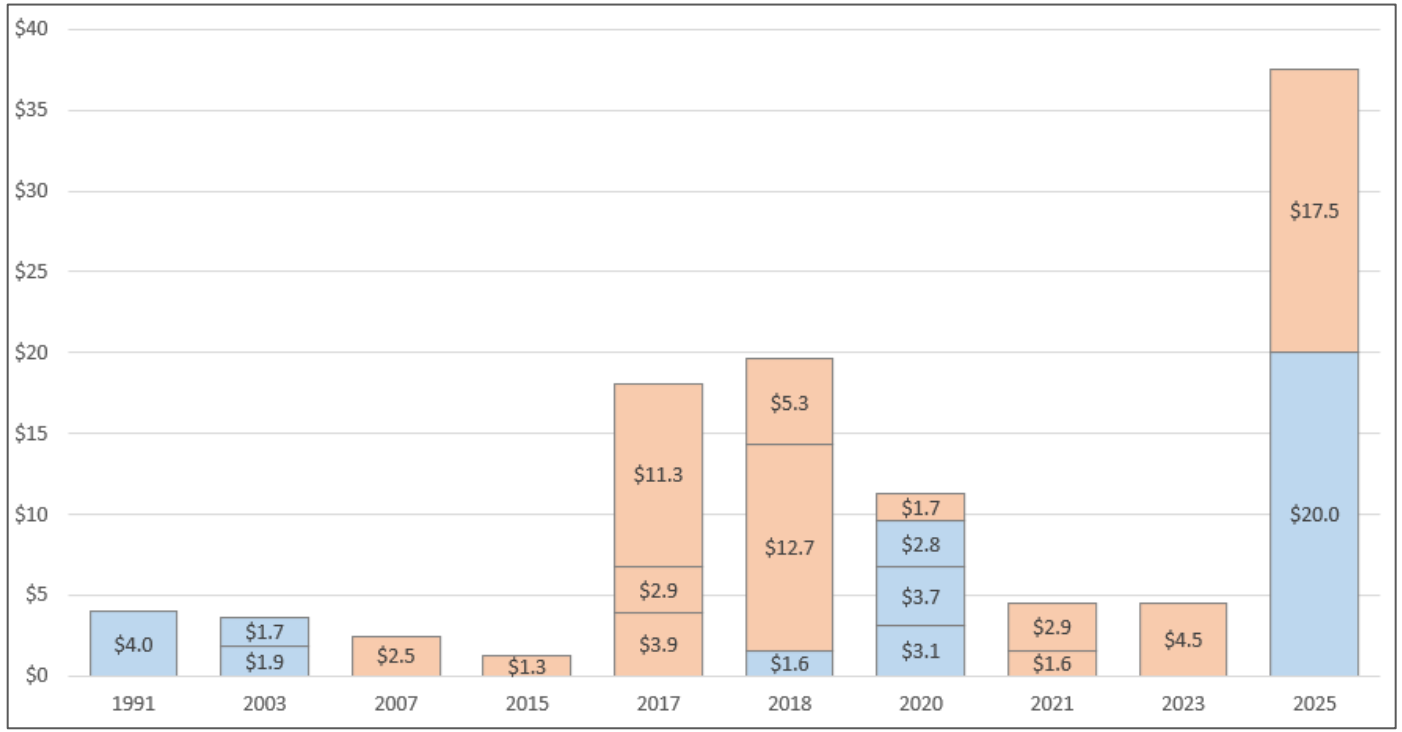
Annual losses in the last decade have averaged nearly **10 times** higher than earlier decades.

Source: https://commercial.allianz.com/content/dam/onemarketing/commercial/commercial/pdfs-risk-advisory/ARC-Emerging-Risk-Trend-Wildfires.pdf

Data Notes: Compiled by Tom Carmichael. Data from 1990 to 2024 was sourced from the National Oceanic and Atmospheric Administration (NOAA) National Centers for Environmental Information (NCEI) U.S. Billion-Dollar Weather and Climate Disasters.
Data for 2025 represents the Los Angeles Wildfires of January 2025, based on mid-range of cost estimates ($28bn to $53.8bn) by the Los Angeles County Economic Development Corporation.
Wildfire events with costs of less than $1bn are not represented. Data predominantly relates to physical property, infrastructure, business interruption and wildfire suppression costs.

Top 20 U.S. Insured Loss Events due to Wildfire

Orange shading = utility-involved ignitions



	Year	Name	Location	Insured Loss (Nominal $B)	Insured Loss (Inflated $B)	Utility-involved ignition
1	2025	Palisades Fire	California	20.0	20.0	
2	2025	Eaton Fire	California	17.5	17.5	Yes
3	2018	Camp Fire	California	10.0	12.7	Yes
4	2017	Tubbs Fire	California	8.7	11.3	Yes
5	2018	Woolsey Fire	California	4.2	5.3	Yes
6	2023	Maui/Hawaii Fires	Hawaii	4.3	4.5	Yes
7	1991	Oakland Fire (Tunnel)	California	1.7	4.0	
8	2017	Atlas Fire	California	3.0	3.9	Yes
9	2020	Glass Fire	California	3.0	3.7	
10	2020	CZU Lightning Complex Fire	California	2.5	3.1	
11	2017	Thomas Fire	California	2.3	2.9	Yes
12	2021	Marshall Fire	Colorado	2.5	2.9	Yes
13	2020	LNU Lightning Complex Fire	California	2.3	2.8	
14	2007	Multiple Fires (Inc. Witch)	California	1.6	2.5	Yes
15	2003	Cedar Fire	California	1.1	1.9	
16	2003	Old Fire	California	1.0	1.7	
17	2020	Beachie Creek Fire	Oregon	1.4	1.7	Yes
18	2018	Carr Fire	California	1.3	1.6	
19	2021	Dixie Fire	California	1.4	1.6	Yes
20	2015	Valley Fire	California	1.0	1.3	Yes

Source: APCIA, via Aon and fire investigation reports

In billions, adjusted to 2024 dollars, except 2025 LA fires

Top 20 Costliest Insured Wildfires in U.S. (since 2017)

Rank	Insured Losses	Event	Location
1	$37.5 B	2025 LA Fires	California
2	$12.7 B	2018 Camp	California
3	$11.3 B	2017 Tubbs	California
4	$5.3 B	2018 Woolsey	California
5	$4.5 B	2023 Maui	Maui
7	$3.9 B	2017 Atlas	California
9	$3.7 B	2020 Glass	California
10	$3.1 B	2020 CZU Lightning Complex	California
11	$2.9 B	2017 Thomas	California
12	$2.9 B	2021 Marshall	Colorado
13	$2.8 B	2020 LNU Lightning Complex	California
18	$1.7 B	2020 Beachie Creek (aka, Labor Day)	Oregon
19	$1.6 B	2018 Carr	California
20	$1.6 B	2021 Dixie	California

(Losses adjusted to 2024 dollars, except 2025 LA fires)

Impacts on Insurers

INSOLVENCY:

Merced P&C following the 2018 Camp Fire (Paradise, CA)

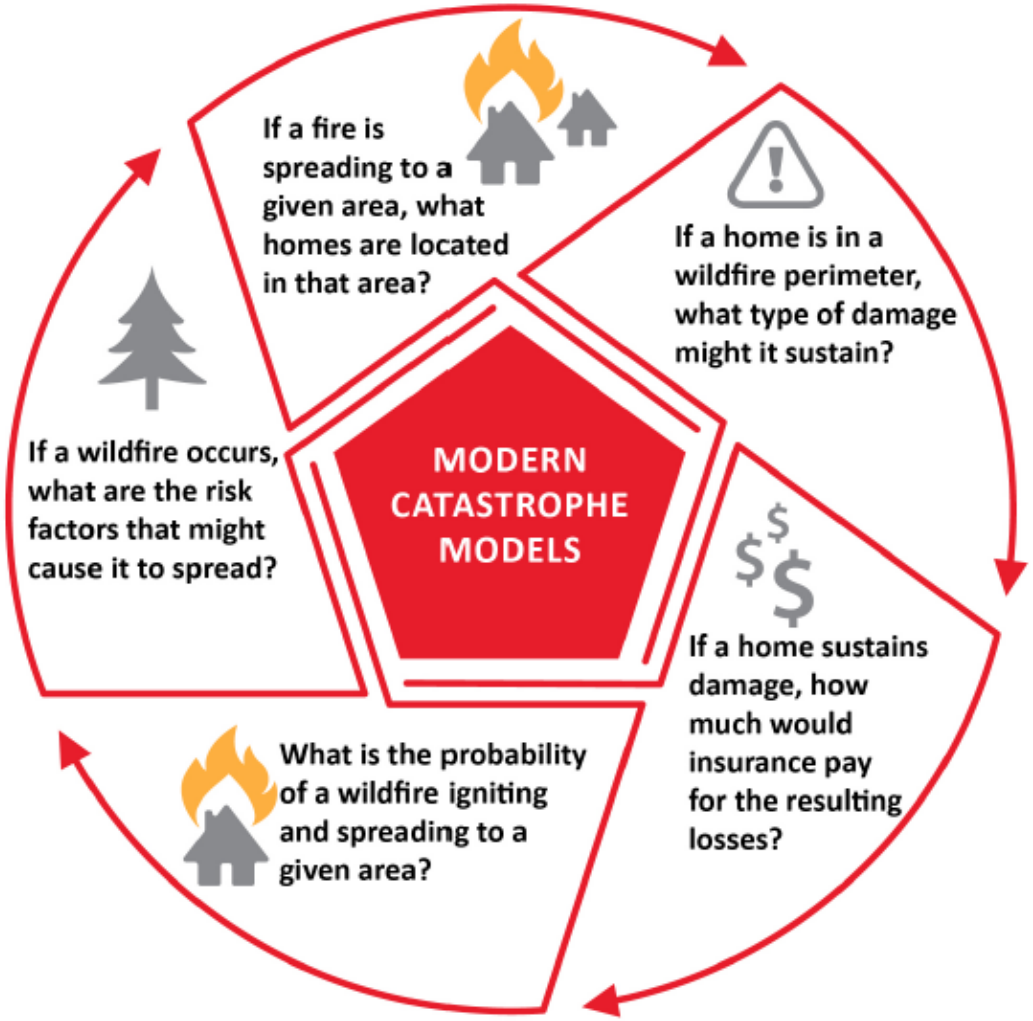
- Small carrier, wildfire in rural area -

FINANCIAL DISTRESS:

The largest private homeowners insurer in CA and the CA FAIR Plan (state residual market plan) following the 2025 LA fires

- Large carriers, wildfire in urban area -

Higher Severity Events, More Often



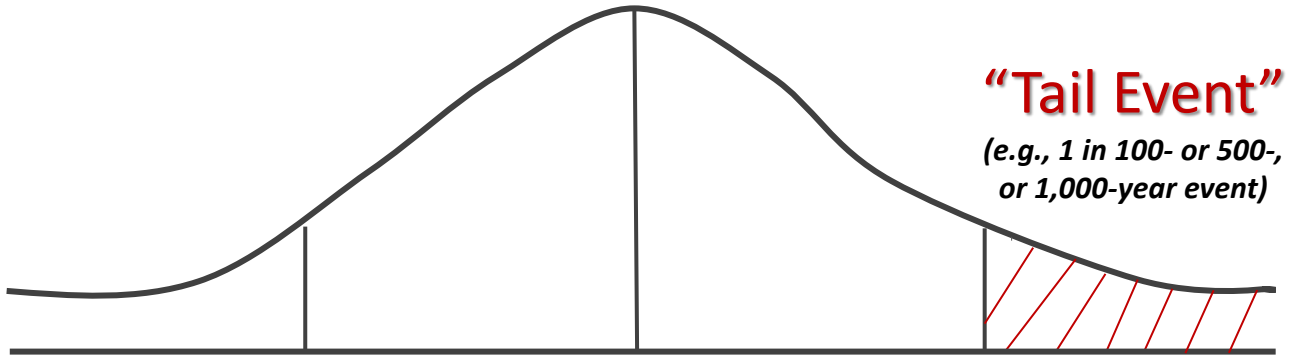
Rennaissance RE (RenRe) on the 2025 L.A. Fires

Jan 29, 2025

https://www.reinsurancene.ws/renre-expects-new-opportunities-to-deploy-capacity-as-la-wildfires-show-value-of-reinsurance/

*"First, this is a **tail event** for the wildfire peril, both in terms of **absolute dollar loss**, but especially with respect to **return period**," said CEA and President O'Donnell.*

*"While our models performed well in our assessment of return period, a loss of this magnitude implies that both our models, as well as the vendor models, will **need to steepen the curve in the tail** to better reflect the **higher frequency of severe events**."*



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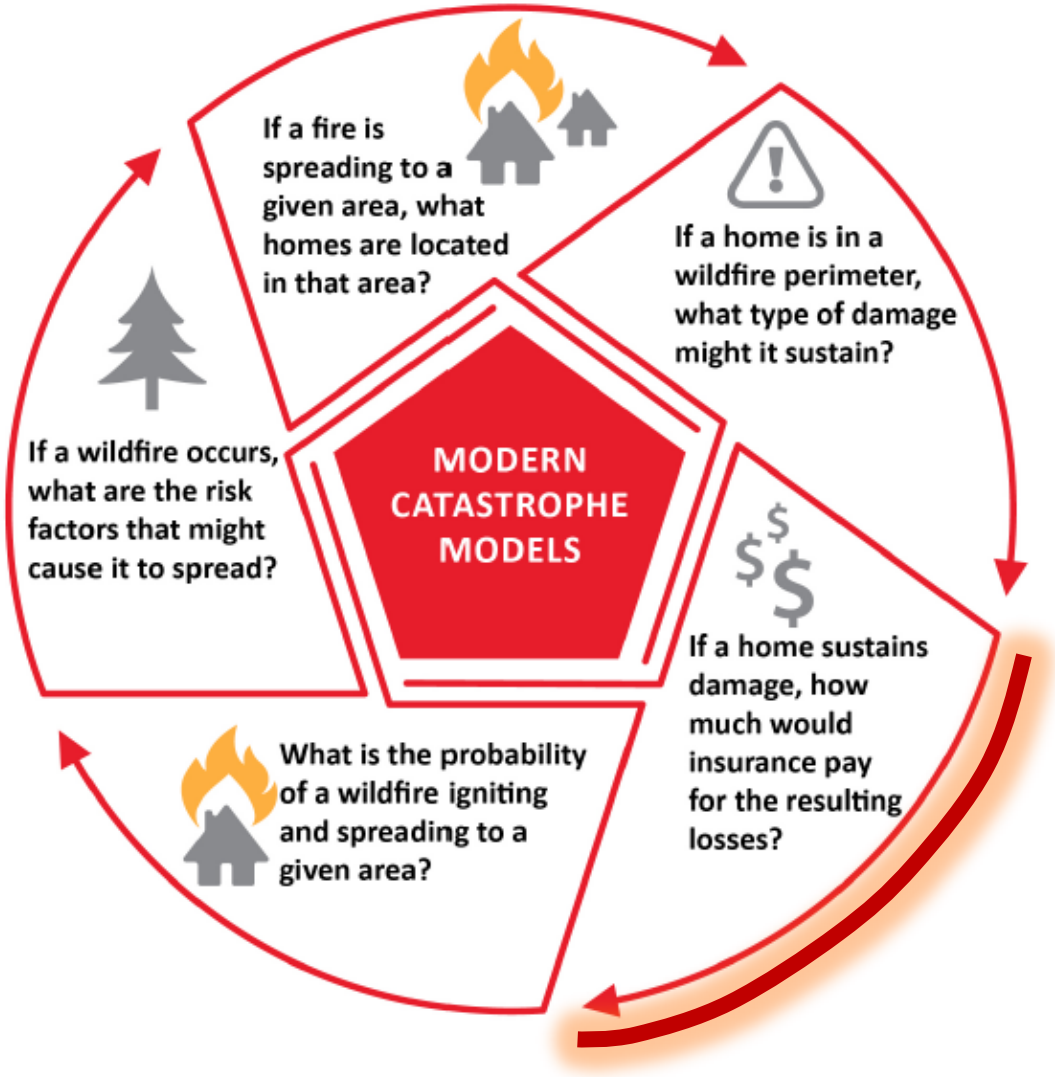

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"He went on to note the rise in the frequency and severity of natural catastrophe losses, explaining that while climate change is a driver, human behaviour is equally contributing to growing losses..

"For example, a dense building with combustible materials in wildlife, urban interface was a major contributor to the California wildfire loss, as was land management practices," said O'Donnell.

In terms of the $50 billion loss estimate, the CEO highlighted numerous factors contributing to the size. "Including, the relatively ***high values of the properties*** *located in the impacted areas, including a large component of fine art and other scheduled coverages. The influence* ***elevated demand surge*** *is likely to have on* ***replacement cost values****. The level of* ***additional living expense*** *exasperated by competition for temporary housing of a similar character to damaged properties. The prevalence of* ***smoke damage across a broad geographic area****.*

Catastrophe Models and Discounts

Insurers may provide discounts for actions that make homes more resilient to wildfire.

The **IBHS Wildfire Prepared Home** standard requires a set of actions to be taken together to meaningfully reduce risk of ignition from embers, direct flames, and radiant heat. Thus, homes that meet (and maintain) this standard are ***scientifically shown*** to be the most resilient.

Though, similar action must be taken (and maintained) at a community-scale to fully reduce risk of conflagration events.

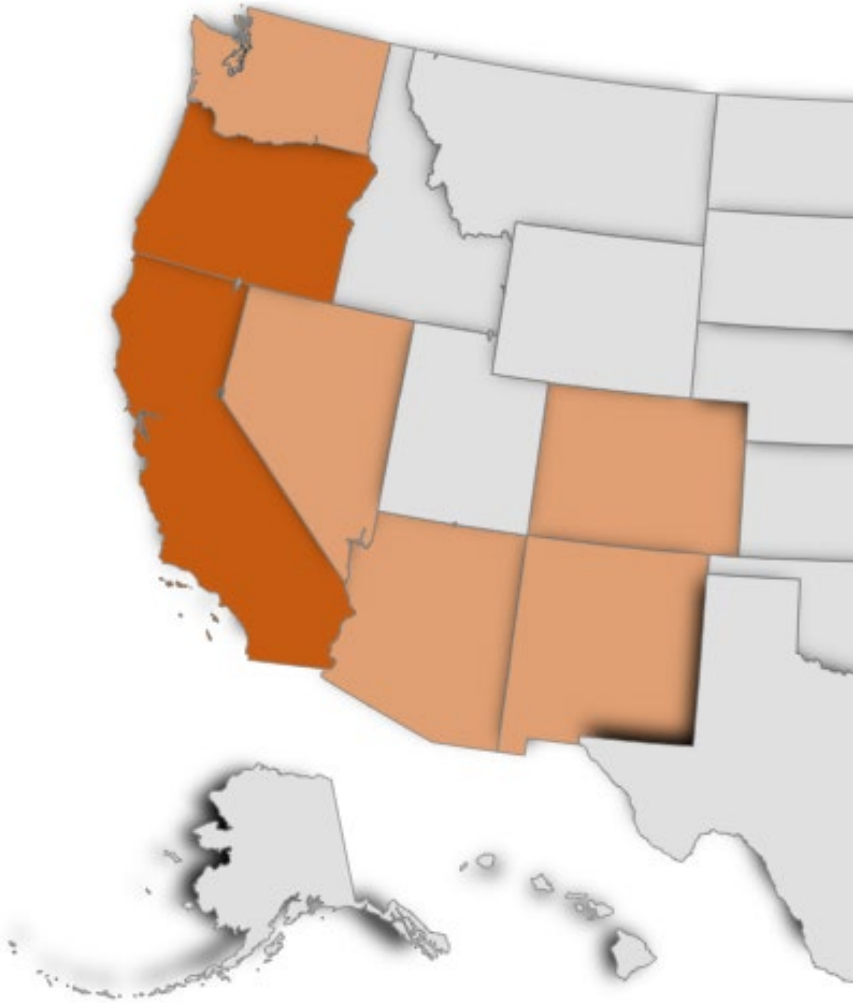
https://wildfireprepared.org/

IBHS Wildfire Prepared 'Home' program:

Now available *Considering*

IBHS Wildfire Prepared 'Neighborhood' program:

Pilot program launched in CA in 2025



Insurance Risk Models vs Public Wildfire Hazard Maps

*A "**hazard**" is anything that can cause harm, whereas "**risk**" considers the chance or likelihood a hazard will cause harm in addition to the extent of damage that would result.*

Catastrophe Risk models

- Leveraged by insurers
- Often internal, proprietary maps and methodologies that are more granular in nature to help assess individual parcel risk.
- Computerized models consider many additional factors that can change more frequently (e.g., mitigation done, evolving fuel loads, etc.)
- Helps inform the extent of potential loss that could occur in a policy term, for an individual insurer.

State/Local Hazard maps

- Developed for use by policymakers.
- Critical to helping inform land use policies, building codes, hazard disclosures and other allocation of resources.
- Do not influence insurance rates and coverage determinations.

THANK YOU

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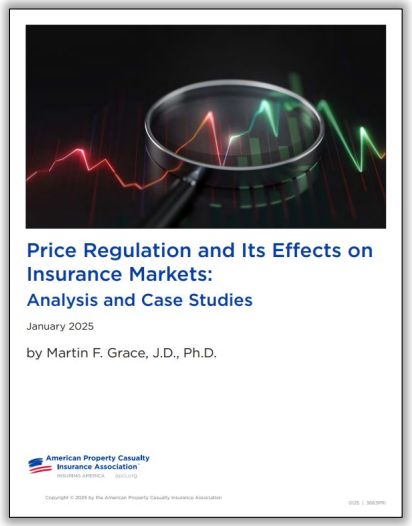
APCIA Research and Thought Leadership

February 2025 – Amid increasing pressure on insurance availability and affordability, examines the role and growth of residual market plans across the U.S., with individual state case studies.

Link: https://www.apci.org/attachment/static/11392/



January 2025 - Examines insurance market dynamics, including the impacts of trends and regulatory interventions on market stability, focusing on property and auto insurance across several U.S. states.

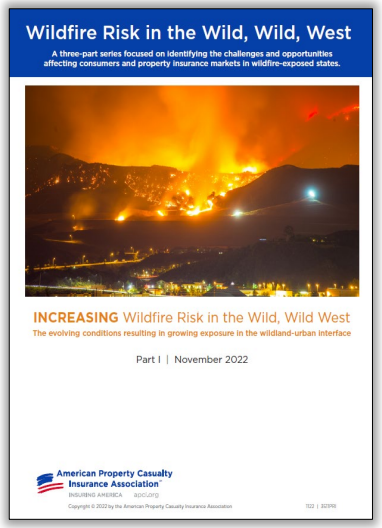
Link: https://www.apci.org/attachment/static/11269/

December 2023 - Provides a financial overview of insurance markets, the cost drivers of increasing losses, solutions to market disruptions, recent regulatory concerns, and other opportunities and challenges.

Link: https://www.apci.org/attachment/static/9245/

March 2023 - Highlights the top inflation trends, 2022 natural disaster losses and financial impacts resulting in significant pressure on property insurance markets that are impacting insurers, reinsurers and consumers.

Press release (and link): https://www.apci.org/media/news-releases/release/75202/



November 2022 - A three-part white paper series that identifies the challenges and opportunities affecting consumers and property insurance markets specifically in wildfire-exposed states.

Press release (and link): https://www.apci.org/media/news-releases/release/73621/

August 2022 - Examines factors beyond weather that are increasing losses and resulting in market instability, with emphasis on 3 states (FL, LA, CA) experiencing the most market instability.

Press release (and link): https://www.apci.org/media/news-releases/release/72898/