

A wide-angle photograph of a sunset over the ocean. The sun is a bright, glowing orb on the horizon, casting a golden light across the sky and water. The sky is filled with wispy, white clouds that catch the light of the setting sun. The ocean is dark blue with white-capped waves breaking near the shore. The overall mood is serene and contemplative.

How can insurers prepare today for climate change

Singapore Actuarial Society – 15 October 2024

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**Climate change and
natural disasters in
figures**

01

**Natural catastrophes
protection schemes**

02

The role of Munich Re

03

Climate change and natural disasters in figures

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Natural catastrophes
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The role of Munich Re

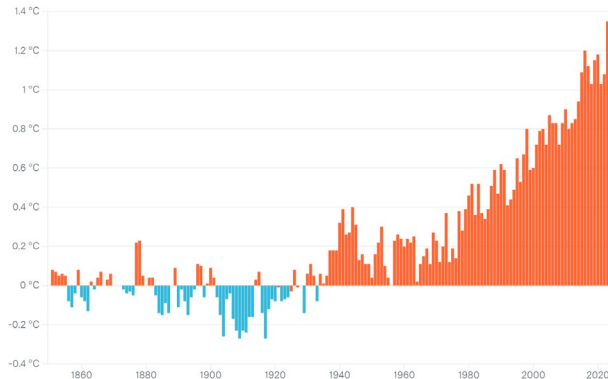
03

The effects of climate change = Risk of Change

Small increase in average temperatures -> large increase in probability of extremes

Primary effect

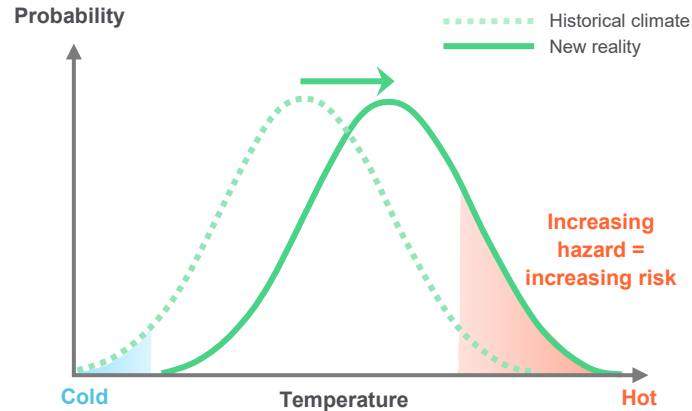
2023: hottest year on record
Last 10 years warmest on record



Global temperature anomalies (°C)
compared to 1850-1900 average

Secondary effect

Changing probabilities of extremes
--> new risks/loss levels



Increase of global average temperatures
changing probability distributions

Tertiary effect

Increased probability of
extreme events



Higher risks

Effect of global warming: Global impact on natural hazards

Latest state of science (IPCC): Increase in frequency and/or intensity of natural perils



More frequent temperature extremes



Increase in wildfire hazard



Increase in extreme drought conditions



Sea level rise and increase in storm surge risk



Environments favorable to severe thunderstorms, shifts in tornado activity and severe hail (“Severe Convective Storms”)



Increase in frequency and intensity of heavy rainfall events



More intense tropical cyclones with more rain and higher storm surges



Longer persistence of weather patterns due to slowdown in west-east movement

Impact of climate change on flooding becoming more evident

Scientific attribution studies show increasing probabilities of extreme precipitation events

Heavy precipitation in UAE and surrounding countries (2024):
10-40% more intense than pre-industrial times



Autumn and winter storm rainfall in the UK and Ireland (2023/24):
20% heavier by human-caused climate change



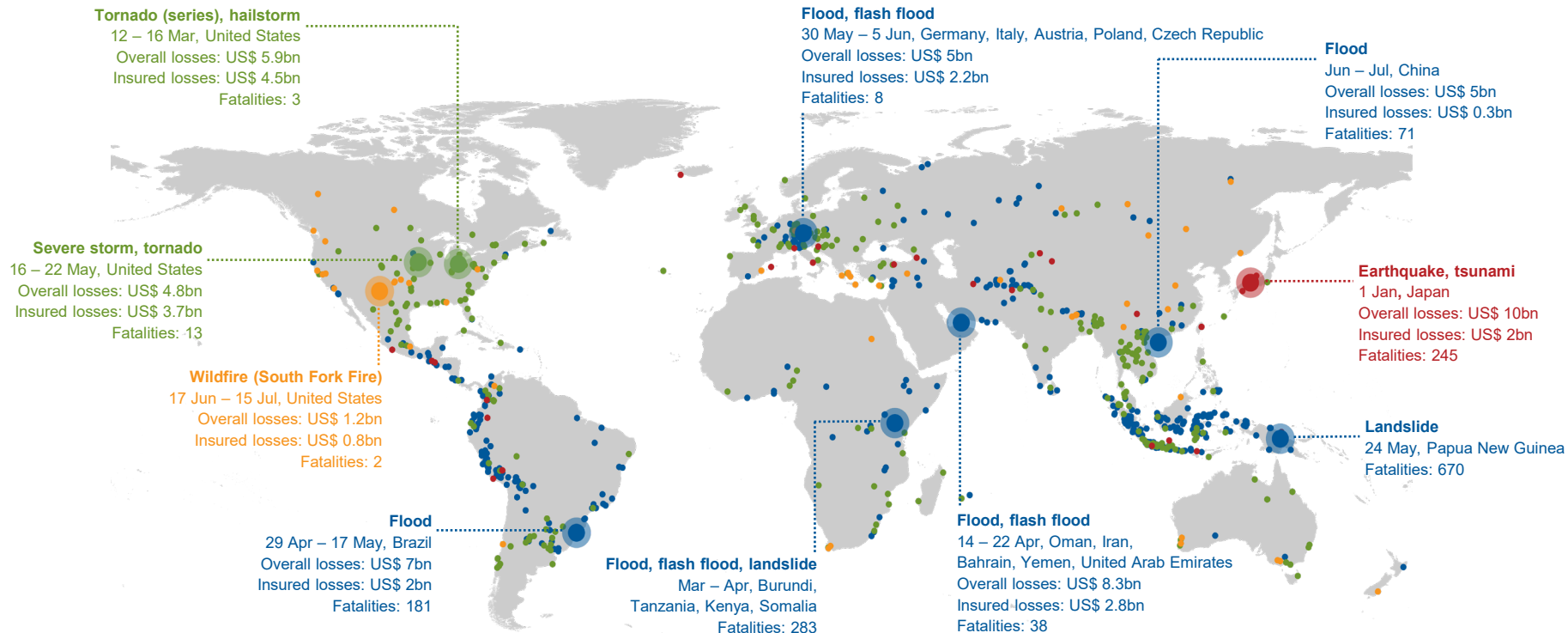
Torrential downpours in Louisiana / Central U.S. Gulf Coast (2016) expected to occur
at least 40% more often than pre-industrial





Western Europe floods (2021), €46bn in losses:
Likelihood of such event has increased by a factor between 1.2 and 9

Thunderstorms and flooding drive losses in the first half of 2024


Natural disasters January – July 2024





 **Geophysical events**
Earthquake, tsunami, volcanic activity

 **Meteorological events**
Tropical storm, extratropical storm, convective storm, local storm

 **Hydrological events**
Flood, mass movement

 **Climatological events**
Extreme temperature, wildfire

 Significant catastrophes
 Small, medium and large loss events

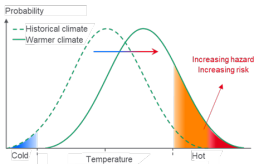
Increase in natural disaster losses globally

Driven by the severity of extreme weather and socio-economic factors

HAZARD

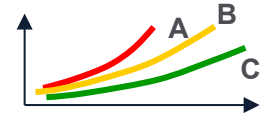
Characteristics of extreme weather, e.g. precipitation amount, hail size, flood height, wind speed, heat, drought, water shortage ...

→ Climate Change



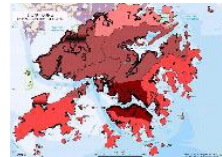
VULNERABILITY

- Building regulations & building standards
- Land use & compensation areas
- Protective green and gray infrastructure
- Warning systems and emergency services



EXPOSURE

- Value of real estate, equipment inventory & vehicle fleet
- Disruption to supply chains and business operations

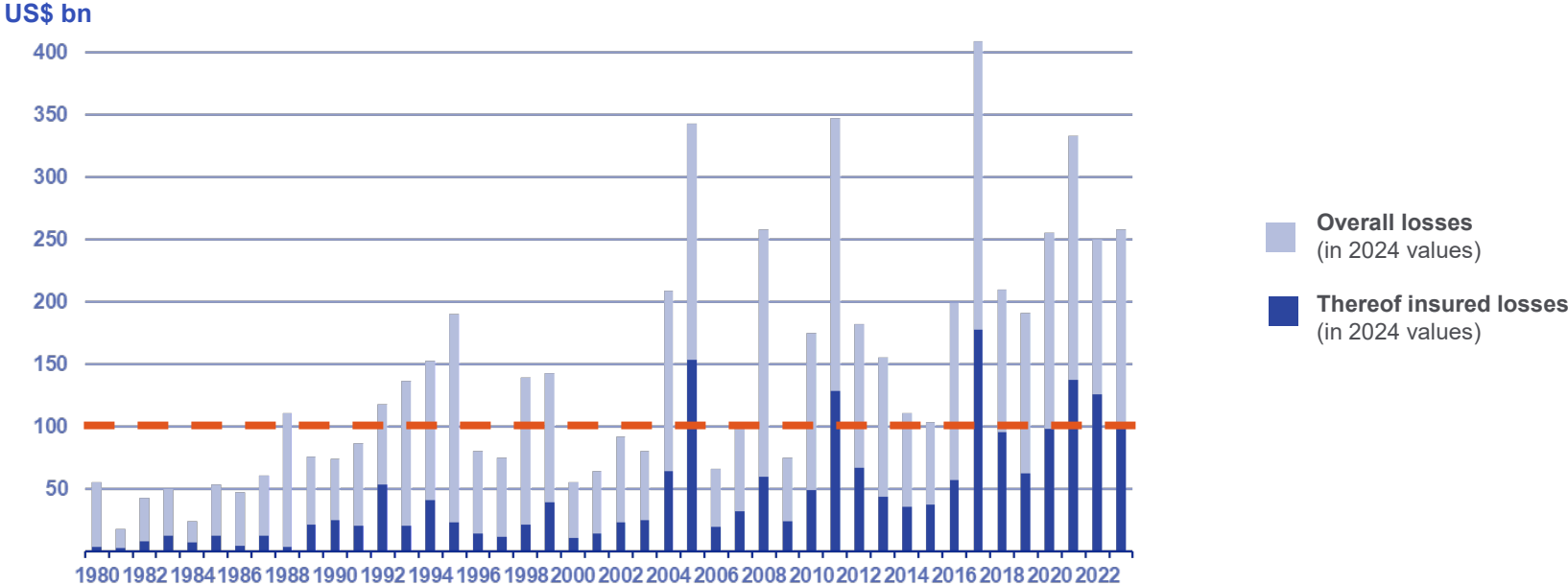


→ Socio-economic factors

Natural catastrophe loss data

US\$ 100 bn insured loss years on the rise – a “new normal”?

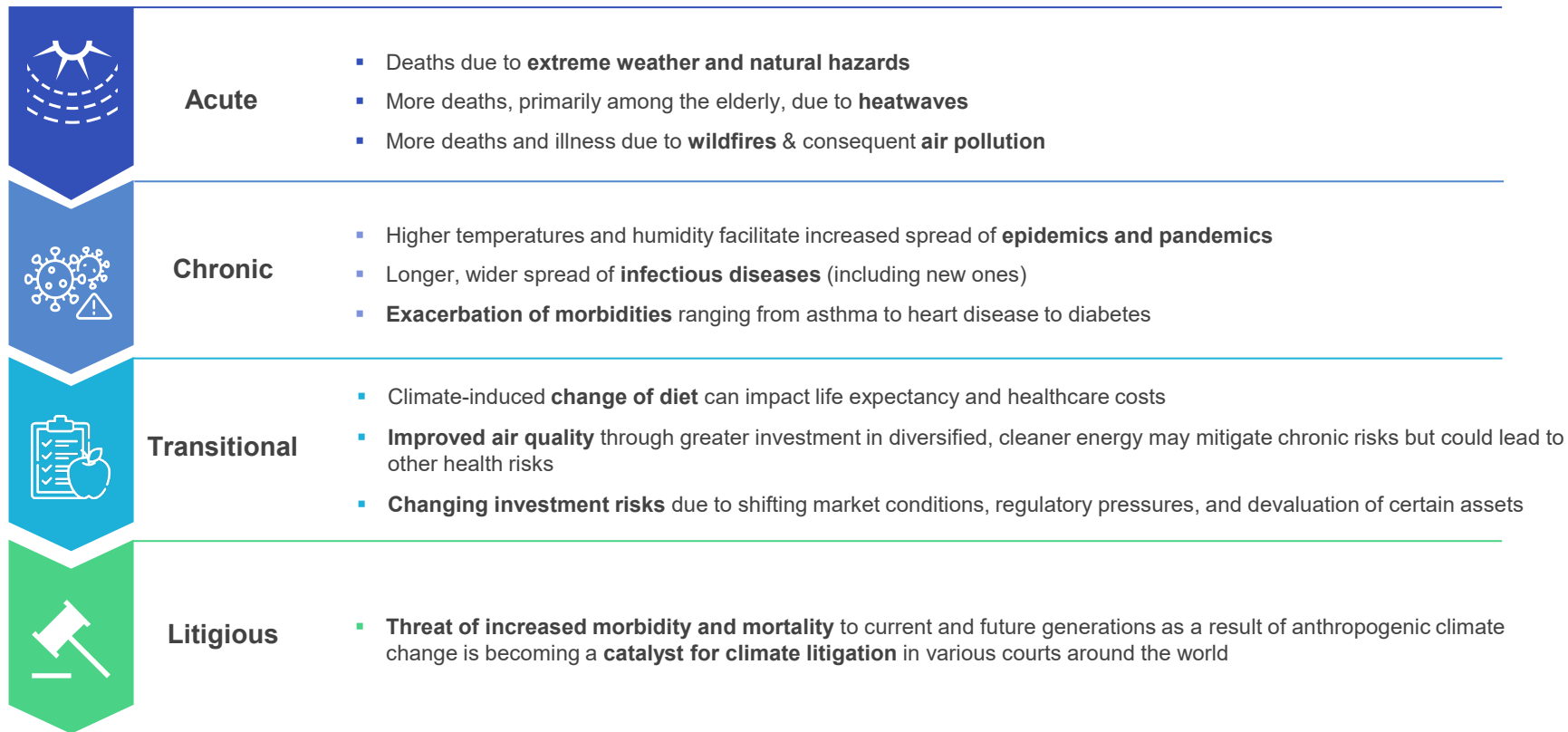
Significant loss events of natural disaster losses worldwide 1980 – 2023



Inflation adjusted via country-specific consumer price indexes and consideration of exchange rate fluctuations between local currency and US\$.
Excludes famine, heatwave, drought
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Climate-related risks on mortality and morbidity

Long-term perspective should be considered for Life & Health (L&H)

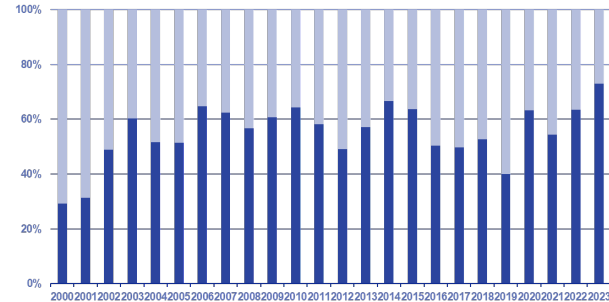


Natural catastrophe protection gap¹ 2000-2023

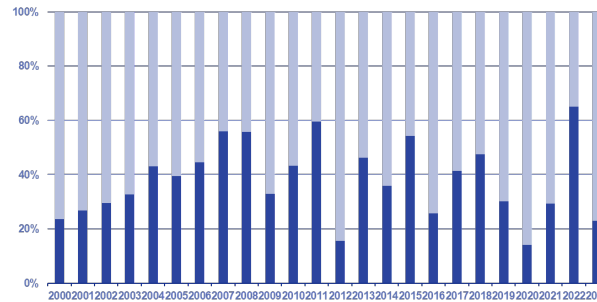
Share of uninsured catastrophe losses varies significantly by region and peril

Overall losses
Thereof insured losses

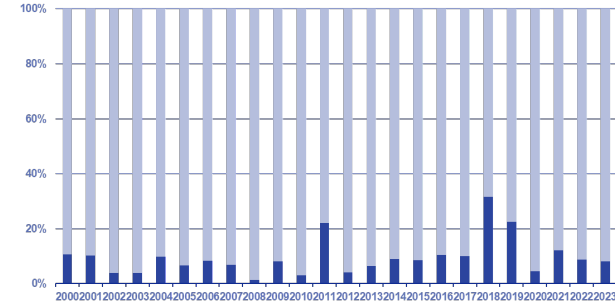
USA



Europe



Asia



Closing the protection gap: Two major challenges



1. Availability
Capacity limitation



2. Affordability
Holistic concepts for affordable insurance cover



Risks remain insurable at an adequate price

1) Protection gap definition in line with Geneva Association: the broader risk protection gap which describes the difference between total losses and insured losses
Source(s): Munich Re NatCatSERVICE – As at May 2024

Climate change and natural disasters in figures

01

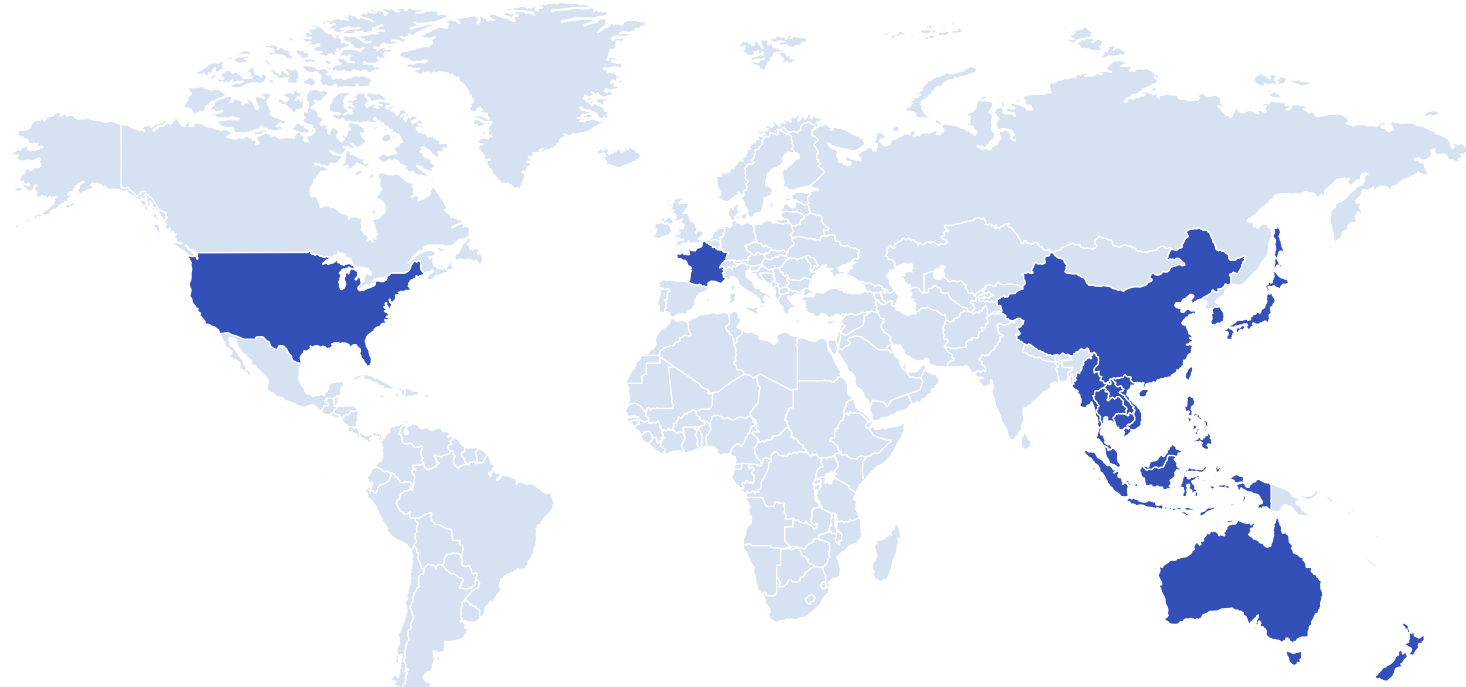
Natural catastrophes protection schemes

02

The role of Munich Re

03

Rapid study of several disaster relief initiatives



Our goals over the next few slides:

1. Identify the different initiative's benefits and limitations
2. Try and portray what a „best-in-class“ disaster relief scheme should look like

Existing Natural Catastrophes funds have a limited scope

They do not allow a comprehensive climate change strategy

Japan

Japan Earthquake Reinsurance - JER (since 1966)



Voluntary contribution



For private
individuals only

Funding: Premium paid by private individual on an “earthquake” add-on to the household fire insurance policy.

Backed by the government (limit payout per event JPY 12Tr.)

Australia

Australian Cyclone Pool (since 2022)



Mandatory contribution



For private individuals
and small businesses

Funding: All eligible general insurers contribute to the cyclone fund by charging a fee to their policy holders.

Back by the government (up to AUD10bn per calendar year)

Taiwan

Taiwan Residential Earthquake Pool - TREIP (since 2002)



Voluntary contribution



For private
individuals only

Funding: Flat, compulsory levy paid by private individuals on their household insurance premiums.

3 layers of compensation (up to NTD 120Bn):

1. Co-insurance pool (NTD 5bn)
2. TREIF (NTD 95bn)
3. Government (NTD 20bn)

Sources: Japan Earthquake Reinsurance Co (JER Co); Australian Reinsurance Pool Corporation (ARPC); Taiwan Residential Earthquake Insurance Fund (TREIF)

Advantages:

- Large budgets
- Stability guaranteed by the respective governments

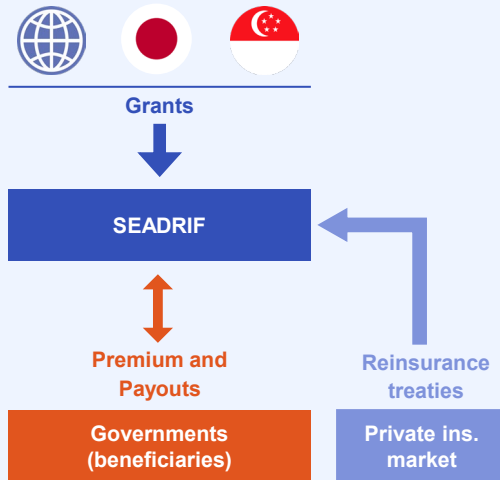
Limitations:

- Each regime only covers a specific hazard
- No overarching climate change strategy

SEADRIF: an efforts to bridge the insurance gap

An interesting format that still need to prove itself

SE Asia Disaster Risk Insurance Facility - SEADRIF



- + Insurance vehicle incorporated in Singapore
- + Any ASEAN+3 (China, Japan, South Korea) can benefit from one of the SEADRIF insurance products
- + Their first product, a flood parametric insurance, was offered in 2021 to Laos
- + The first claims were made in August 2023 covering flood disaster relief efforts in 10 provinces.
- + So far only flood risk are covered but more products to come

Advantages:

- Regional initiative involving different type of actors (pooled-effort)
- Governments have a stake in the risk

Limitations:

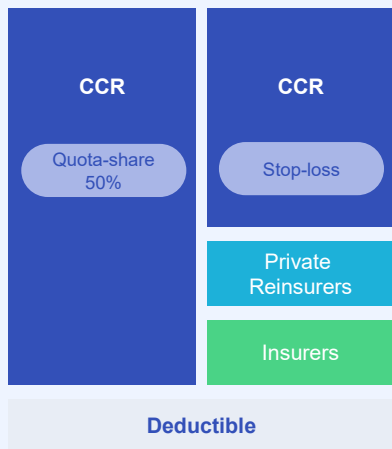
- Unclear how the cost of future initiatives will be split
- Coverages will probably remain limited

Two schemes outside of Asia

And the lessons they teach us

France

Caisse Centrale de Reassurance (CCR) its "NATCAT" scheme started in 1982



- + Universal system: private individuals, companies and collectivities all contribute
- + Insurers charge a levy on every property damage coverage that is transferred to the fund
- + The levy is 12% until Dec 31st, 2024, and will increase to 20% thereafter.

Advantages:

- Take-up rate = 100%
- Most natural hazard covered

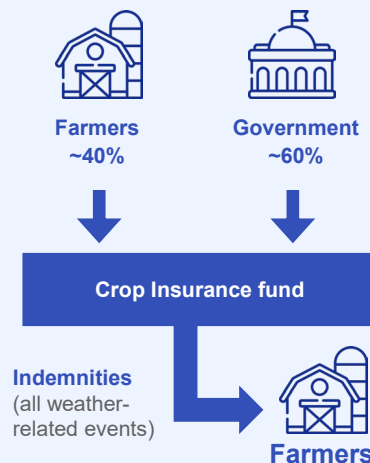
Limitations:

- No incentive for the private sector to engage in climate change
- Plan to launch prevention initiatives but nothing major has been done

Source: FCIP, CCR

USA

Federal Crop Insurance Program (FCIP) funded in 1938



- + Limited scope: only 20% of farmers participate
- + 65% of indemnities go to farmers in 10 states
- + Programme under the spotlight since a record payout of USD 19bn in 2022
- + Subsidy in disguise, help keep food prices stable

Advantages:

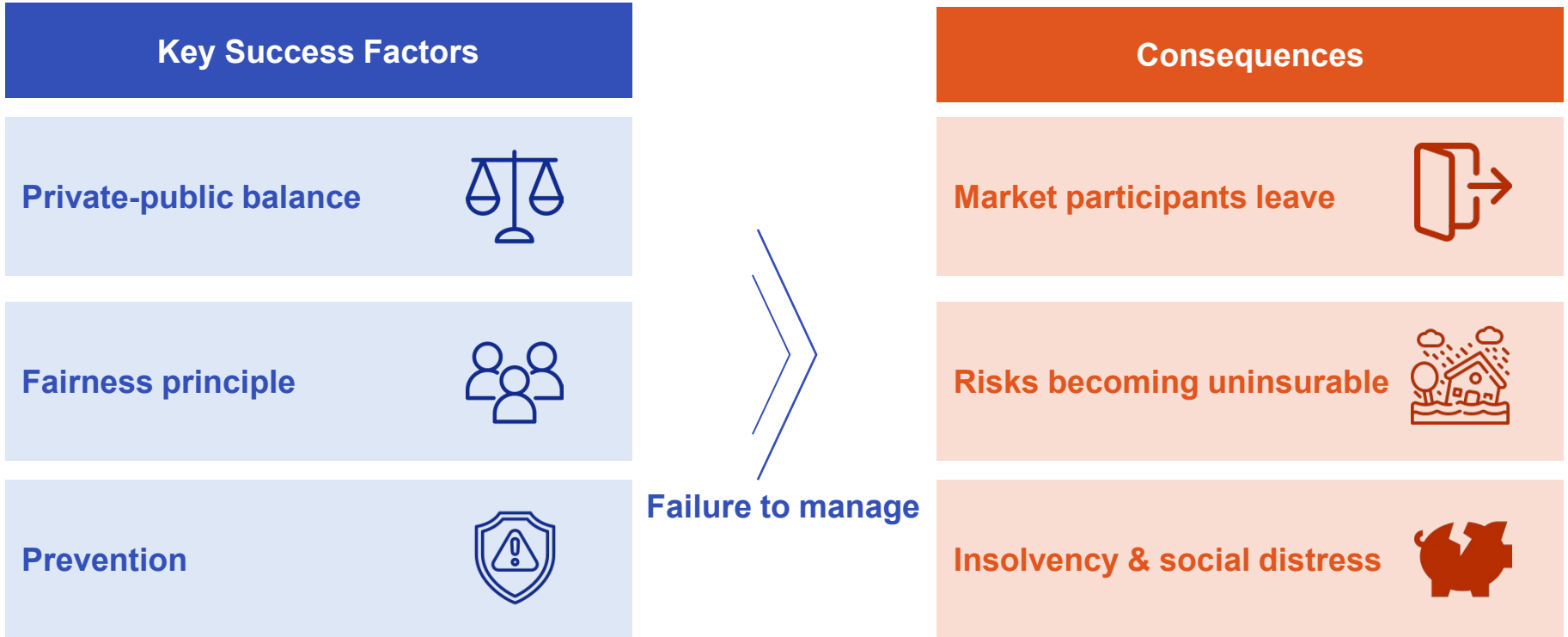
- Farmers receive more than what they contribute to
- Consumers pay less for their food

Limitations:

- Does not serve its initial purpose
- Indemnity fairness issues between small and large farms

Key success factors for a sustainable NatCat scheme

An ill-thought-out system could lead to dire consequences with a snowball effect



Climate change and natural disasters in figures

01

Natural catastrophes protection schemes

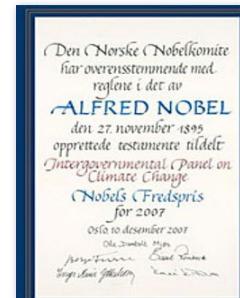
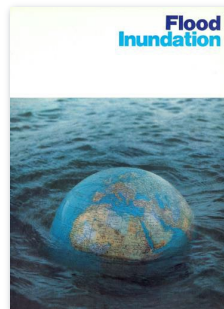
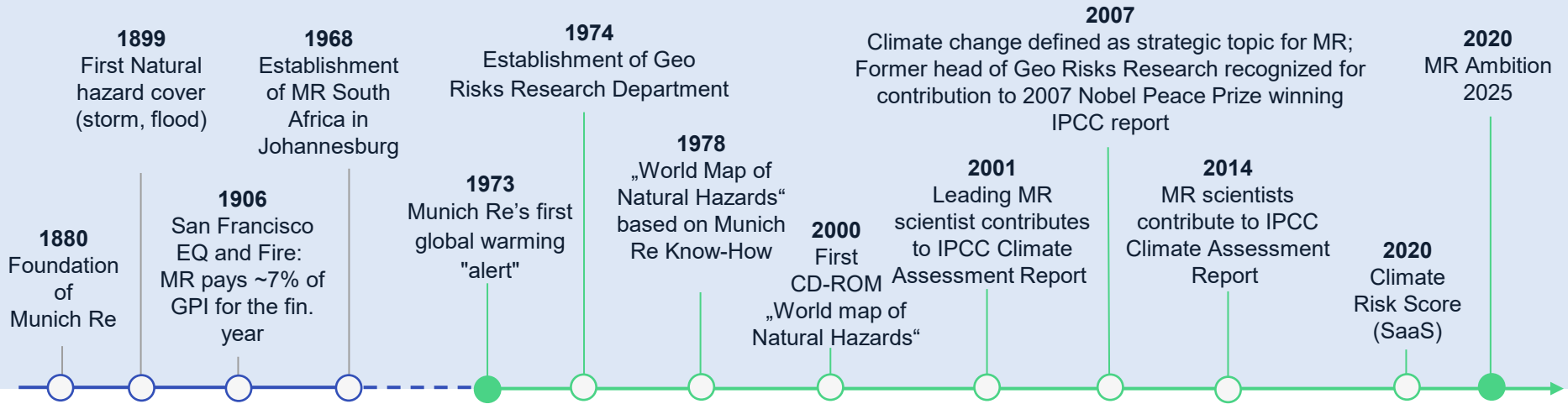
02

The role of Munich Re

03

Natural catastrophe risk management = MR's core business

Research on human-induced climate change since the early 1970s



Climate change: Munich Re's strategic elements

Disabling and focus on enabling/business development

Know-how and data sharing (SaaS)



Partnerships and cooperations (PPPs)



ENABLING

Products and services (Green tech / parametric solutions)



Liabilities:
Underwriting guidelines



Assets:
Responsible investment guideline









Own emissions

DISABLING

Munich Re approach to greenhouse gas emissions

Group Ambition 2025 and achievements 2023

GHG emission reduction ¹			Ambition 2025	Achievements in 2023
Assets² Financed GHG emissions ³		Total	-25 to -29%	-47%
		Thermal coal	-35%	-54% 
		Oil and gas	-25%	-55%
Liabilities⁴ Financed GHG emissions ⁵		Thermal coal	-35%	Coal-fired power plants -41% Thermal coal mining -41% 
		Oil and gas	-5%	-80%
Own emissions GHG emissions from operational processes ⁶		Total per employee	-12%	-34% 

1 Reduction compared to base year 2019, measured in CO₂e. 2 Listed equities, corporate bonds and - for total - direct real estate. For total, if we were to use the nominal value instead of the market value for debt instruments, this would result in a reduction of 43% (instead of 47%). 3 Scope 1 and 2.

4 Applies to primary insurance, direct and facultative (re)insurance. 5 "Tonnes of thermal coal" and "installed operational capacity in MW" of insureds used as proxy for coal emissions. Oil and gas comprises operational property business for exploration and production with self-calculated scope 1-3 GHG life-cycle emissions, utilising the expertise of HSB Solomon, linked to the insurance policy. 6 Scope 1, 2 and 3 (business travel, paper, water, waste).

Tackling climate change: the Munich Re value chain

How we approach risk management for natural hazards



Location Risk Intelligence

“Master the physical risks caused by natural hazards and climate change”



Portfolio steering framework

“Best-in-class property portfolio segmentation and scoring methodology”

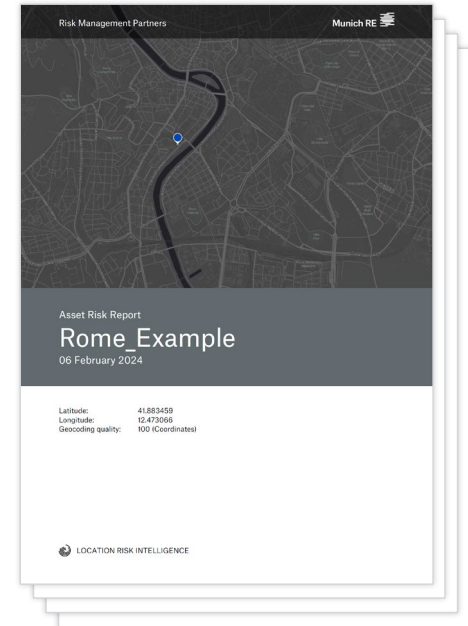


Munich Re's Location Risk Intelligence

Evaluate current and future physical risk on single assets or portfolios

High performance analytics platform for portfolio insights

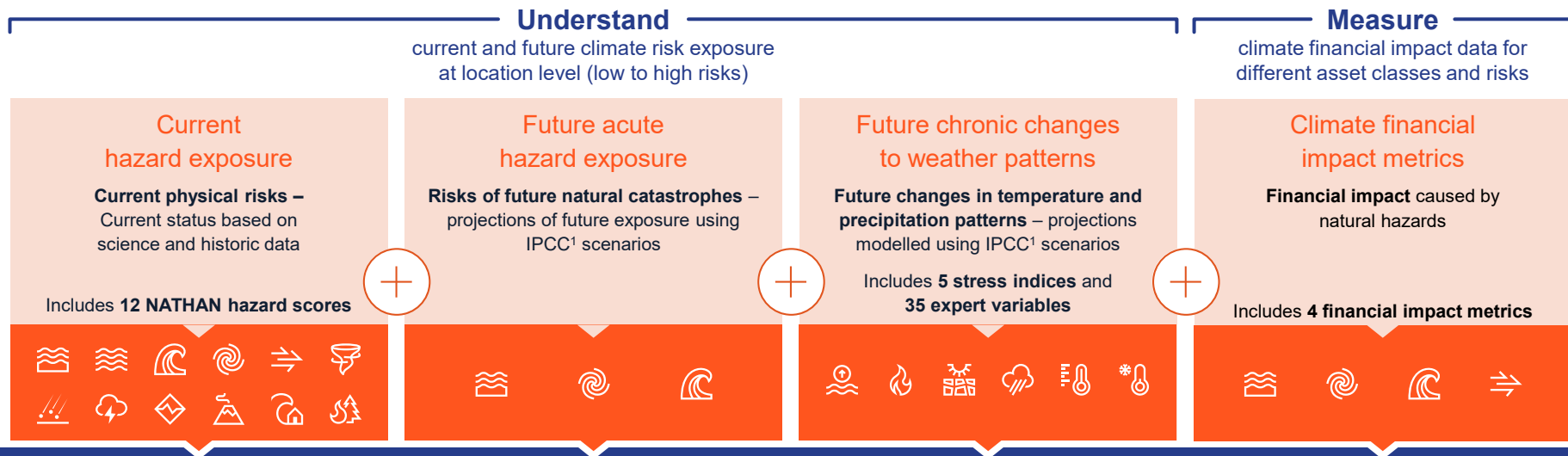
Risk reports for individual exposures



Location Risk Intelligence

Presentation video

The modular SaaS solution for mastering physical climate risks



Location Risk Intelligence Platform

A modular **SaaS platform** that meets your needs with three subscription plans, including a **web front-end** for unlimited users and easy **risk visualisation and report generation** as well as an **API interface** supporting climate risk management at millions of locations

Features

- Business
- Corporate
- Enterprise



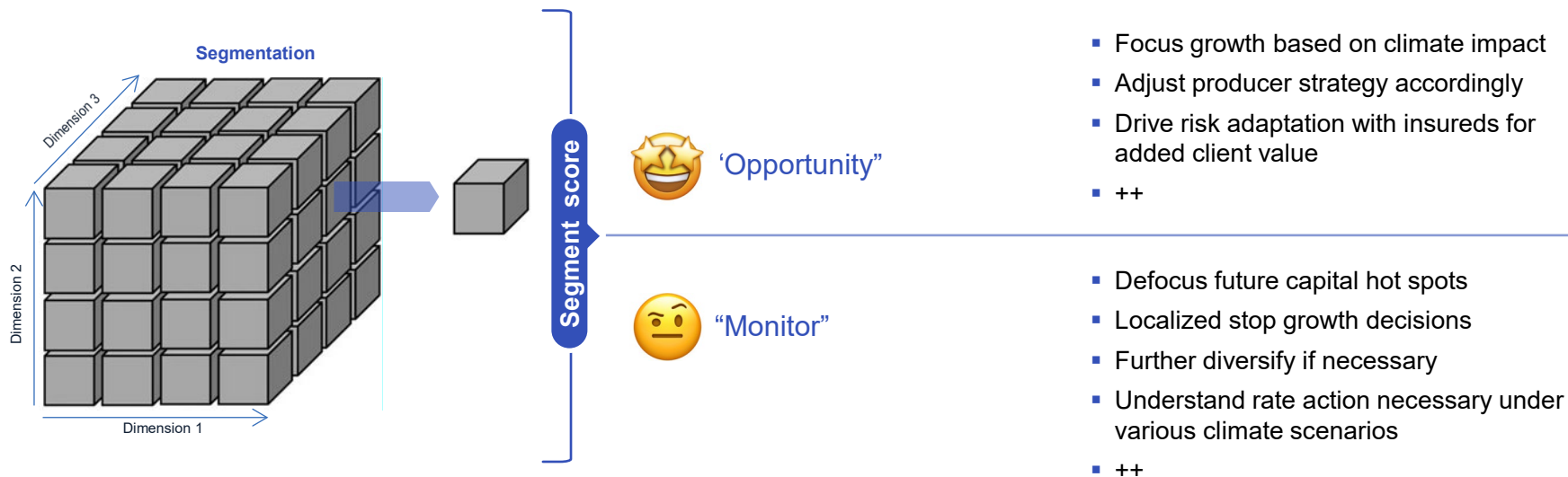
Our holistic Portfolio Management methodology

Multi-faceted segmentation and scoring is used to drive decisions

Step 1 | **Segment** the portfolio

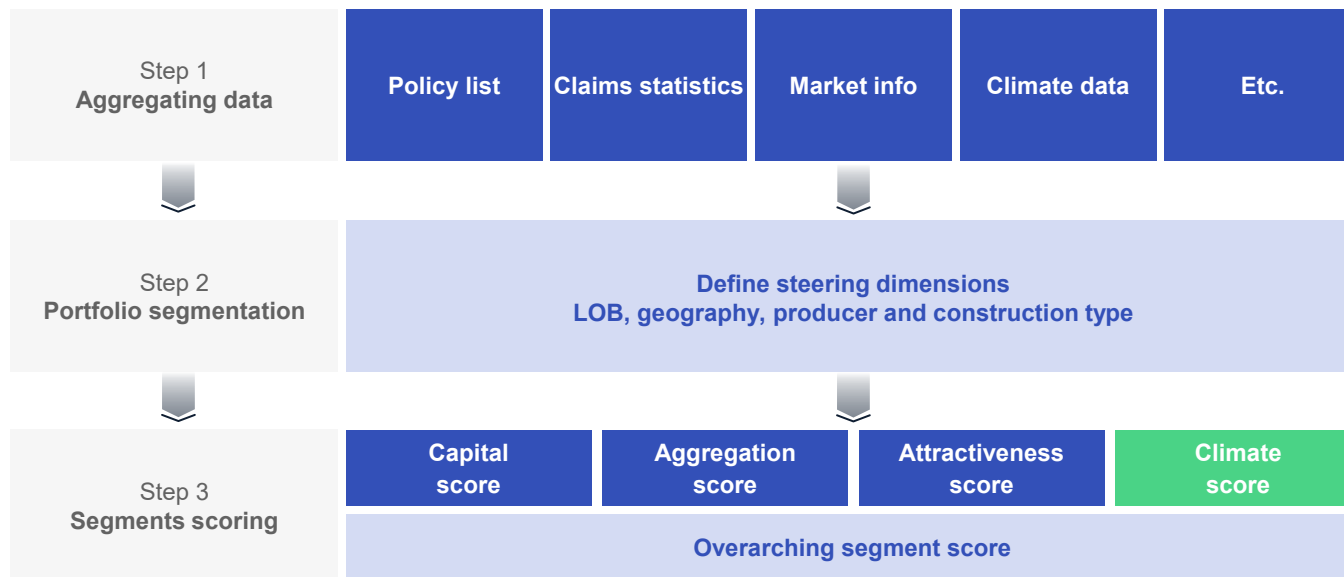
Step 2 | **Evaluate** the segment

Step 3 | **Take action**



Our approach to Portfolio Management scoring: USA use-case

Direct integration of Climate Change considerations in active decision-making



Climate Change impact according to selected scenarios / horizons
fully integrated in all Portfolio Management decisions

Location Risk Intelligence

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Webpage

Portfolio steering framework

Kaare Rasmussen

Principal, Insurance Solutions
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Webpage

Thank you very much!

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Thank You!

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