## Climate Change: Actuarial Roles and Strategies



November 2021



## Agenda for Today's Discussion

- 1. Climate change insurance regulatory considerations and stakeholder overview
- 2. Climate change risk assessments and integration into risk management frameworks
- 3. Climate change scenario testing and CAT model adaptations
- 4. Net Zero in insurance greenhouse gas quantification and business integration
- 5. The actuary's role in climate risk management and strategies for future climate uncertainties

Our ESG team members with you today



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Climate change insurance regulatory considerations and stakeholder overview



## What are the key drivers of insurers considering environmental risk?

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#### **B** Customers (Commercial Lines)

- Increasing demand for environmentally-friendly insurance products, investments and related disclosures, particularly from institutional clients
- Demand is **likely to grow across all insurance lines** (beyond catastrophe risk property coverages)

#### Customers (Personal Lines)

- ~73% of millennials are altering their buying habits with the environment in mind<sup>1</sup>
- Customers will increasingly include environmental risk as a consideration when choosing an insurance company to buy protection from

22

#### ↔ Value chain partners

- Brokers and reinsurers will increasingly assess insurers' sustainability policies as part of partnership due diligence checks
- Insurers that do not respond to climate change adequately risk narrower partnership opportunities across the value chain

#### Internal drivers

- Corporate vision, mission and values
- Management sustainability 'tone from the top'
- Proposition and business model (e.g. environmental growth opportunities)

#### Employees

- 64% of millennials consider sustainability when deciding where to work<sup>2</sup>
- Research shows that **employee satisfaction** drives **higher productivity** and is positively correlated with **company performance**

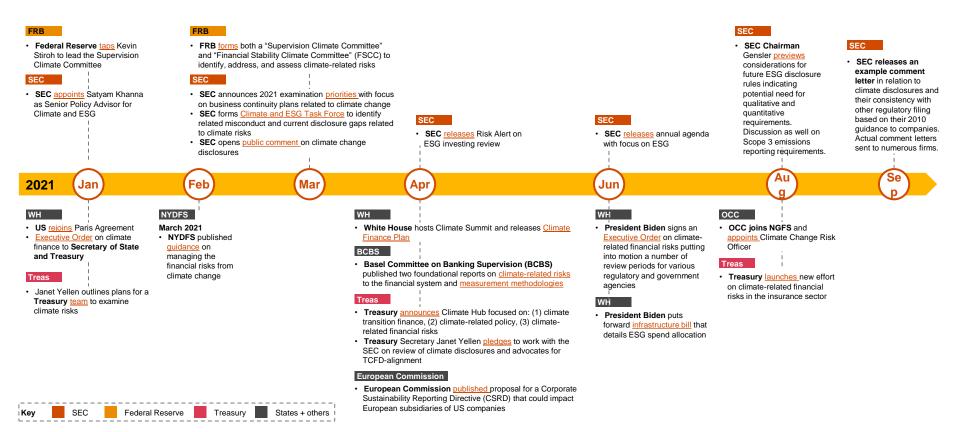
#### ✓ Regulators and Rating Agencies

- Regulators are requiring that insurers embed climaterelated risks within risk management frameworks
- Rating agencies are starting to include sustainability considerations in their frameworks
- Increased SEC rulemaking and enforcement expected around human capital and climate related disclosures

#### Investors

- Institutional investors are putting pressure on companies to act on climate change - Blackrock, Vanguard and State Street are leaders in this space
- Companies that do not meet standards risk potential reputational impacts, which may increase in frequency and severity

## 2021 US regulatory timeline on ESG & Climate



## What are the key regulatory and rating agency ESG drivers?

Movement from regulators and rating agencies on ESG topics is as key driver for many insurers to consider integration of ESG into their businesses.



The NAIC hosts an <u>annual climate</u> <u>change disclosure survey</u> consisting of 8 questions that cover topics including climate risk governance, climate risk management, modeling and analytics, stakeholder engagement, and greenhouse gas management. About 1,200 companies participate every year (covering 70% of the U.S. insurance market in terms of direct premiums written).

The NAIC also has a <u>Climate and</u> <u>Resiliency Task Force</u> which meets quarterly and seeks to serve as the coordinating NAIC body for discussion and engagement on climate-related risk and resiliency issues, including dialogue among state insurance regulators, industry, and other stakeholders.



NYDFS issued <u>Circular Letter No. 15</u> in Sept 2020, and then <u>proposed</u> <u>guidance</u> for integration of climate change for insurers it regulates in March 2021. Key components of its expectations included:

- Incorporate climate risks into existing ERM framework
- Carry out scenario analysis of impacts of climate change on both investment and liability portfolios
- Describe how climate change is categorized, managed, and monitored in ORSA report
- Disclose the understanding of climate risks and how these risks inform the insurer's assessment of the materiality of climate risks
- Disclosures should include qualitative/quantitative metrics and targets as well as considerations of internal environments



The California DOI established a climate insurance working group which seeks to work with environmental and industry leaders to find innovative solutions to the risks posed by climate change. Their <u>July</u> <u>2021 report</u> addressed the developing protection gap and recommended that parametric insurance be considered as a solution.

On June 8, 2021 the commissioners of the California and Washington DOIs <u>issued a letter</u> to all carriers they regulate encouraging them to publish a TCFD report, rather than submitting the NAIC climate change disclosure survey. They pointed out that TCFD is rapidly emerging as the leading international standard for climate reporting for all industries.



AM Best

In the <u>November 2020 update</u> to its credit rating methodology AM Best incorporated ESG factors into its credit opinions. Specifically AM Best now considers ESG factors across the following components of its assessment:

- Balance Sheet Strength environmental factors across both liabilities and assets
- Operating Performance - considering toxic risk within underwriting portfolios
- Business Profile consideration of ESG factors within products sold, and data privacy considerations
- Country Risk e.g. social stability
- Enterprise Risk Management corporate governance and environmental stress testing

### What is the TCFD?

The Task Force on Climate-related Financial Disclosures (TCFD) issued guidance for climate risk disclosure for all sectors, and specific recommendations for certain sectors (not applicable to Telecommunications)

<b>01</b> Insufficient disclosure	The TCFD is an advisory body set up by the G20 to address concerns around insufficient disclosure of climate-related risks and opportunities for businesses.	\ - -
<b>02</b> Led by industry leaders	The TCFD is chaired by Michael Bloomberg and consists of 32 industry leaders, including representatives from Blackrock and Unilever	N a i
03 Informed investment decisions	The TCFD recommendations aim to enable better understanding of exposures to climate risks and opportunities.	f
<b>04</b> Progress	The Task Force released a monitoring report in in 2020, highlighting the progress made in companies' climate risk disclosure over the past year. In 2021 the TCFD issued proposed guidance on climate-related metrics, targets, and transition plans. An additional report specific to the insurance industry, "Insuring the Climate Transition", was issued in January 2021.	

While the guidelines are still relatively new, TCFD has quickly become the industry standard for how companies should orient around climate risk, and how they should disclose on it publicly

More than 2,600 organizations have announced support for the guidelines, including global financial firms responsible for assets of \$194 trillion

## TCFD has four disclosure components

	TCFD description	Relevance to insurers
Governance	The organization's <b>governance</b> around climate- related risks and opportunities.	Ensure the integration of the climate-related risks into your risk function goes beyond catastrophe models.
Strategy Risk Management	The actual and potential impacts of climate- related risks and opportunities on the organization's businesses, <b>strategy</b> , and financial planning where such information is material.	Consider all stakeholders when assessing the impacts on strategy, including insureds, reinsurers, cedants, agents, and brokers.
Metrics and Targets	The structures and processes used by the organization to identify, assess, and <b>manage climate-related risks.</b>	Insurance-specific climate risks are driven by underwriting, investment, and operational activities.
	The <b>metrics and targets</b> used to assess and manage relevant climate-related risks and opportunities where such information is material.	Key metrics include the financial impact from climate related risks and greenhouse gas emissions from underwriting and investment portfolios.

## Overview of sought disclosures



Disclosures are generally qualitative information (narrative) with supporting quantitative information, i.e., scenario analysis results and in the Metrics & Targets section)



#### Governance

Disclose the organization's governance around climate-related risks and opportunities.

#### **Recommended disclosures**

- Describe the **board's oversight** of climate-related risks and opportunities.
- Describe **management's role** in assessing and managing climaterelated risks and opportunities.



Disclose the actual and potential impacts of climaterelated risks and opportunities on the organization's businesses, strategy, and financial planning where such information is material.

#### **Recommended disclosures**

- Describe the climate-related risks and opportunities the organization has identified over the short, medium, and long term.
- Describe the **impact** of climate-related risks and opportunities on the organization's businesses, strategy, and financial planning.
- Describe the resilience of the organization's strategy, taking into consideration different climate-related scenarios, including a 2°C or lower scenario.

## Overview of sought disclosures (continued)



Disclosures are generally qualitative information (narrative) with supporting quantitative information, i.e., scenario analysis results and in the Metrics & Targets section)



#### **Risk management**

Disclose how the organization identifies, assesses, and manages climate-related risks.

#### **Recommended disclosures**

- Describe the organization's processes for **identifying and assessing** climate-related risks.
- Describe the organization's processes for **managing** climate-related risks.
- Describe how processes for identifying, assessing, and managing climate-related risks are integrated into the organization's overall risk management.



### Metrics and targets

Disclose the metrics and targets used to assess and manage relevant climate-related risks and opportunities where such information is material.

#### **Recommended disclosures**

- Disclose the **metrics** used by the organization to assess climaterelated risks and opportunities in line with its strategy and risk management process.
- Disclose **Scope 1, Scope 2**, and, if appropriate, **Scope 3** greenhouse gas (GHG) emissions, and the related risks.
- Describe the **targets used by the organization to manage** climaterelated risks and opportunities and performance against targets.

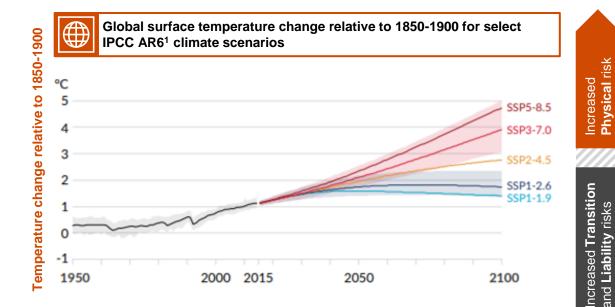






## Climate change poses new business risks to insurance companies

Depending on future efforts to curb climate change, or lack thereof, insurers will be faced with a new set of risks to consider as part of ongoing operations.



<sup>1</sup> Intergovernmental Panel on Climate Change (IPCC) Assessment Report 6 (AR6) Climate Change 2021: The **Physical Science Basis** 

Physical risk: Risks which arise from short & long term weather events (e.g., auto underwriting losses increase over time driven by increasingly severe hailstorm events)

Physical risk is higher in climate scenarios with a temperature rise (relative to 1850-1900) greater than 2°C

Physical risk

Transition risk: Risks which arise from the process of adjusting towards a low-carbon economy (e.g., impact of a carbon tax, volatile underwriting due to lack of data on green technologies, reputational risk if slow to go to net zero)

Liability risk: Risks of potential climate-related legal claims or regulatory proceedings to companies and directors (e.g., increased D&O and third-party environmental claims)

Transition and liability risks are higher in forward looking climate scenarios with a temperature rise (relative to 1850-1900) limited to 2°C

## Example climate risks and opportunities

Climate changes risks and opportunities are typically considered across the following categories:

<b>Transition &amp; liability risks</b> as a result of transition to a low carbon economy		Physical risks resulting from changes in the climate	Opportunities	
<ul> <li>Policy and legal</li> <li>Increased carbon policy/pricing of GHG emissions</li> <li>Enhanced emissions- reporting obligations</li> <li>Mandates on and regulation of existing products and services</li> <li>Exposure to litigation</li> <li>Technology</li> <li>Substitution of existing products and services with lower emissions options</li> <li>Unsuccessful investment in new technologies</li> <li>Costs to transition to lower emissions technology</li> </ul>	<ul> <li>Market</li> <li>Changing customer behavior</li> <li>Uncertainty in market signals Increased cost of raw materials</li> <li>Reputation</li> <li>Shifts in consumer preferences</li> <li>Stigmatization of sector</li> <li>Increased stakeholder concern or negative stakeholder feedback</li> </ul>	<ul> <li>Acute</li> <li>Increased severity of extreme weather events, e.g. <ul> <li>Floods</li> <li>Wind storm</li> <li>Storms and cyclones</li> <li>Wildfire</li> <li>Storm surge</li> <li>Hail</li> </ul> </li> <li>Chronic <ul> <li>Changes in precipitation patterns</li> <li>Changes in extreme variability in weather patterns</li> <li>Rising mean temperatures</li> <li>Rising sea levels</li> </ul> </li> </ul>	<ul> <li>Resource efficiency</li> <li>More efficient resource use</li> <li>Move to more efficient buildings and modes of transport</li> <li>Energy source</li> <li>Use of lower emission energy sources</li> <li>Use of supportive policy structures</li> <li>Use of new technologies</li> <li>Participation in carbon markets</li> <li>Products and services</li> <li>Development/expansion of low emission goods and services</li> <li>Climate adaptation and insurance risk services</li> </ul>	<ul> <li>Markets</li> <li>Access to new markets</li> <li>Use of public sector incentives</li> <li>Resilience</li> <li>Resource substitution/diversificatio</li> <li>Renewable energy programs, efficiency initiatives</li> </ul>

## Climate risk to insurers can be classified into three buckets



**Investment Risks** 



& Liability	Policy & legal	Increased climate-related litigation significantly increasing claim and defense costs for D&O coverages	Investment in sectors where bottom lines are impacted most by carbon taxes (e.g., parts of the energy sector) negatively affecting asset value.	Onerous enhanced reporting requirements leads to issues with adequately disclosing information required by regulators and investors
	Market	Shifting demand or carbon taxes lead to market movement away from fossil fuels, leading to reduced premiums from carbon intensive sectors.	Shift in customer preferences for climate friendly goods and services (e.g. electrical cars and transport vehicles) puts investments in producers of conventional, carbon-based goods and services under pressure.	Shift in customer preferences for sustainable companies diminishes demand for certain insurance products and services, as business strategies not sufficiently taking into account the long term impact of sustainability factors.
Transition	Technology	High claims ratios on new insurance products covering green technologies because of underpricing due to lack of data.	Investee companies or sectors invest in new low- carbon technologies but some of those prove unsuccessful, depressing their asset values & creating credit risk.	Failure to take into account disruption of conventional industrial organization induced by technology- driven transition to low-carbon economy; new firms in the space demand insurance products/services where traditional players lack expertise, leading to a drop premium.
-	Reputation	P&C underwriting in economic sectors contributing to climate change damages the reputation of insurance carriers, making it difficult to attract and retain customers and staff.	Investments in certain companies perform poorly because of their reputation of contributing to climate change.	Insureds may prefer insurers who demonstrate climate risk awareness and have incorporated climate risk into their strategy publicly and in a way that aligns with their own values.
hysical	Acute	Property underwriting losses increase over time due to increased severe weather events, if pricing not proactively adjusted.	Values of real estate portfolios decline due to properties being located in areas highly sensitive to the increase in extreme weather events.	Inappropriate strategy relating to acute physical climate risk mitigation reduces the insurer's competitiveness.
Ч	Chronic	Increase in temperatures may make some areas of the country uninhabitable, which can lead to reduced premiums.	Higher credit spreads on government bonds issued by countries that are highly susceptible to chronic physical risks.	Climate change-induced sea level rise renders office buildings and operations in vulnerable areas uninsurable.

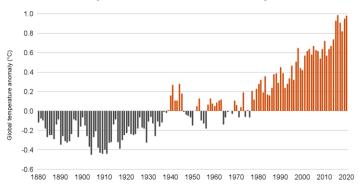
# Examples of exposure to climate-related risks by P&C insurance coverages

(1) Coverage Type	Workers' Compensation	Commercial Property / Homeowners	D&O	General / Products Liability	Auto liability	Others
2 Transition Risk	Medium	Low	High	Medium	Low	Unknown
	Workers transition from jobs with credible loss history to newer technology where claims development trends are not yet known	Technologies required to meet new environmental building regulations may fail, leading to increased business interruptions	Climate-related litigation being brought against insureds requiring unexpected levels of claim and defense costs	Increasing litigation against heavy polluters for their contributions to climate change creates latent claim risks	Greater adoption of electric vehicles could lead to underpricing/higher claims ratios due to limited historical data on repair costs	Transition risks may continue to emerge from unexpected sources as changes are made to move towards a low carbon economy
3 Physical Risk	Medium	High	Low	Medium	Medium	Unknown
	Heatwaves leading to heat stress of more workers, particularly in the agricultural, construction, and manufacturing fields	Increased frequency and severity of claims related to damage to buildings, storefronts, etc from severe weather events	N/A	Coverages such as contractors' liability could see rise in weather-related damages claims	Increased personal auto comprehensive coverage claim costs due to severe weather	Physical risks may result in downstream effects not currently felt or identified

## Historically, climate related physical risks have led to far-reaching financial and societal consequences

Global surface temperatures have risen by roughly 1.1°C through 2011 - 2020 compared to the pre-industrial period (1850 - 1900<sup>1</sup>). As temperatures have risen, chronic physical risks (from long term changes in weather patterns<sup>2</sup>) including extreme heat, drought, and rising sea levels have intensified, and acute physical risks (from extreme weather events<sup>1</sup>) such as hurricanes, floods and wildfires have become more frequent and severe.

Physical hazards have had a direct, measurable impact on local businesses and economies through property or commodity damage and business interruption. Furthermore, due to global interdependence, they have also frequently had downstream effects beyond the locally impacted businesses and communities. Differences in global surface temperature compared to the average global surface temperature in the 20th century



Source: NOAA National Centers for Environmental Information, Climate at a Glance: Global Time Series

#### Case study: Financial impact of 2011 Thailand floods across the globe<sup>3</sup>

What happened?	Extreme precipitation in Thailand in 2011 triggered extensive flooding, resulting in significant supply chain disruptions among many industries. Western Digital, a firm that produced one-third of the world's hard disks at the time, experienced heavy flooding within its factories.			
Impact on Western Digital	<ul> <li>Loss of 45% of shipments</li> <li>60% drop in YOY quarterly revenue</li> <li>10% drop in market share from prior quarter</li> <li>Share price dropped by 9% in October 2011</li> </ul>	Ripple effects	<ul> <li>10% rise in hard disk drive prices in 2011 Q3</li> <li>Dell's and Nvidia's share prices dropped by 5.4% and 5%, respectively</li> <li>Downstream supply chain disruptions</li> </ul>	

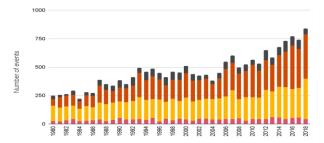
<sup>1</sup>Source: AR6 Climate Change 2021: The Physical Science Basis. (IPCC). August 2021.

<sup>2</sup>Source: Final Report: Recommendations of the Task Force on Climate-related Financial Disclosures. June 2017.

<sup>3</sup>Source: "Understanding Physical Climate Risks and Opportunities." The Institutional Investors Group on Climate Change (IIGCC), 2020.

### Recent history shows physical risk driven financial losses have been increasing each year and are likely to do so at an accelerating pace

#### Number of natural catastrophes worldwide, 1980-2018

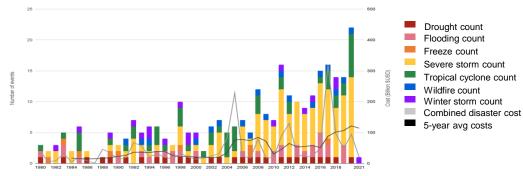


Geophysical events (Earthquake, tsunami, volcanic activity) Meteorological events (Tropical storm, extratropical storm, convective storm. local storm) Hydrological events (Flood, mass movement) Climatological events (Extreme temperature, drought, forest fire)

Accounted events have caused at least one fatality and/or produced normalized losses  $\geq$  US\$ 100k. 300k, 1m, or 3m (depending on the assigned World Bank income group of the affected country)

Source: © 2019 Munich Re. Geo Risks Research. NatCatSERVICE. As of March 2019.

#### US billion-dollar disaster events, 1980-2021 (CPI-adjusted)



Source: NOAA National Centers for Environmental Information (NCEI) U.S. Billion-Dollar Weather and Climate Disasters (2021). PwC | CAS

Since 1980, the number of natural catastrophes occuring around the globe annually has more than tripled. In the US alone, the five year average cost of billion dollar disaster events rose from 11.5B to 123.3B USD between 1985 and 2020 (consumer price index (CPI) adjusted)<sup>1</sup>.

These substantial increases in the frequency and loss severity of extreme weather events during this time has coincided with the roughly 0.7°C rise in global surface temperatures.

Looking ahead, in the best case scenario where we meet the most optimistic targets laid out by the Paris Agreement, global surface temperatures will still rise by 0.4°C by the year 2100, in addition to the temperature rise already observed of roughly 1.1°C compared to the pre-industrial period (1850 - 1900).

History, in conjunction with scientific projections of warming behavior during the 21st century, indicates that even in the best case scenario where warming is limited to 1.5°C, physical risks will continue to intensify and threaten financial interests at an increasing pace.

<sup>1</sup>We note that during this time, there were other factors such as changes in wealth, development and population that also impacted these results.

# General industry approach to climate change risk management and scenario testing

#### **Risk assessment**

In the marketplace, we observe insurers conducting a **comprehensive risk assessment** of the risks to its business from climate change. This typically covers both transition risks and physical risks. Such a risk assessment may include:

- a.High/Medium/Low assessment of the business across risks types, investments, products and key assumptions
- b. Isolating the top 5 risks to the business and measuring their impact accordingly

This risk assessment is used to inform the scenario testing exercise.

#### **Scenario testing**

Insurers may perform scenario testing exercises after completion of the risk assessment; these typically focus on three specific areas of an insurer's business:

#### 1.Asset portfolio

 Calculate the impact of climate change on the investments held under different climate change scenarios and time horizons

#### 1. Underwriting portfolio

 Stress the key assumptions and processes used to understand and manage accumulations and exposure

#### **1.Operational impact**

 Assess the operational impact of extreme/intensifying weather events on corporate locations and employee homes

Where possible, companies may seek to leverage existing scenario testing framework to streamline this process.

#### **Business integration**

Insurers may assess how the results of the risk assessment and scenario testing exercise integrate into the business, specifically considering:

- a.Governance framework
- b.Risk management processes
- c. Business strategy

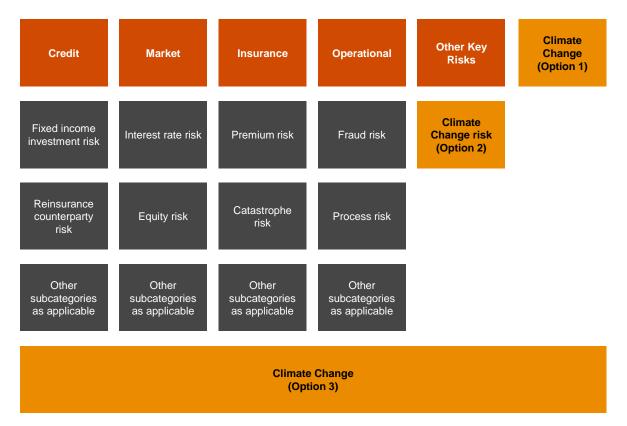
d.Integration into ESG or other disclosures

## Ways to implement the risks of climate change into ERM framework

**Option 1:** Recognize climate change risk is a key risk similar to insurance, market and credit risks

**Option 2:** Recognize climate change could fit into a company's risk management framework as a new sub-risk category under an existing key risk category

**Option 3:** Recognize climate change affects financial risks as well as non financial risks such as operational risk



Polling Question 1: What area(s) of climate change risk management are actuaries involved in at your organization?

- 1. Assessment and quantification
- 2. Management
- 3. Strategy and Reporting
- 4. Other
- 5. My company is not involving actuaries



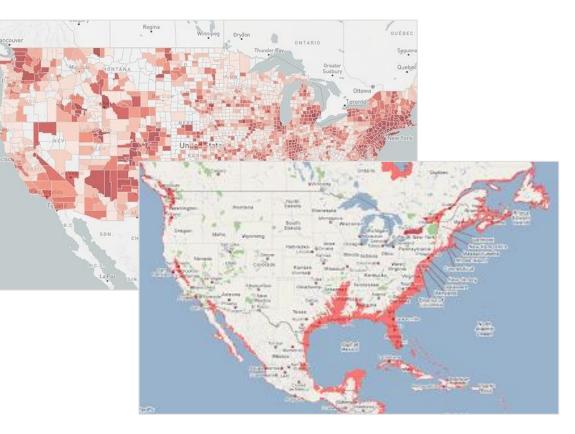
### Climate change scenario testing and CAT model adaptations



### Key considerations for the integration of climate change into underwriting operations and scenario testing

Companies should consider the following questions:

- How do I expect climate change to affect my key risk metrics in different locations and what calculation mechanism should I use to assess this?
- What would my current exposures look like when adjusted to take into account the effect of climate change in a 2C or 4C global warming scenario at different time horizons?
- How should I adjust my underwriting/ pricing today to allow me to transition to my target portfolio incorporating climate change factors?
- How should I incorporate expected climate related change into my reinsurance strategy and reinsurance credit risk analysis?

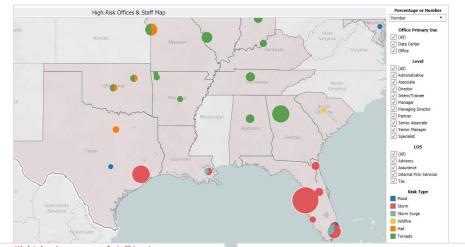


## Operational stress testing approach

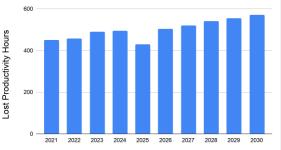
### Potential operational stress testing approach

- 1.Use peril risk scoring datasets to assess office locations at High/Medium/Low risk of different perils
- 2.Use peril risk scoring datasets to calculate the **number of employees** at High/Medium/Low risk of different perils within each US zip code
- 3. Using climate change data trend forward these risk scores to **understand how risk levels change** under different time horizons and climate change scenarios
- 4. Reassess operational resiliency and business continuity plans under different climate scenarios









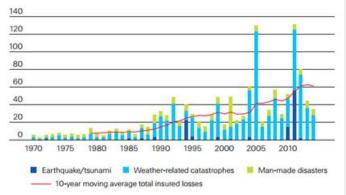
## Physical risk example: Deep dive on changes to hurricane manifestations due to climate change

- Catastrophe models used by most insurers today are calibrated to generate losses expected over a 1-5 year time horizon (depending on the model/peril) and do not allow for the effect of climate change on the frequency and severity of weather events
- Hurricanes are subject to three primary climate change related influences:
  - 1. Warmer sea surface temperatures could intensify tropical storm wind speeds, potentially delivering more damage if they make landfall. This could result in more category 4 and 5 landfalling storms,

and lead to hurricane windspeeds increasing by up to 10%.

- 2. <u>Sea level rise</u> is likely to make future coastal storms more damaging, as storm surge events occur more frequently as hurricanes push sea water inland.
- 3. Hurricane are expected to <u>track north more</u> <u>frequently</u> due to expanding tropics because of higher global average temperatures.

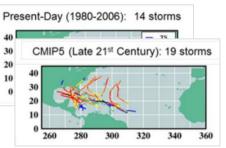




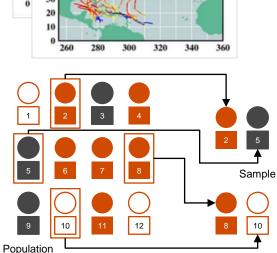
# How can the results of catastrophe models be adjusted to allow for climate change impacts: "Bottom up adjustment" (1 of 2)

**AIR** has used a subsampling method to adjust the frequency of landfalling **hurricanes** and create a new collection of simulated hurricane seasons to reflect a future climate.

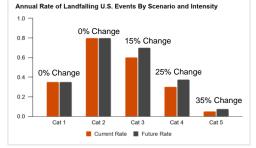
Analyze literature to understand climate impacts on frequency and severity of landfalling events under different climate scenarios



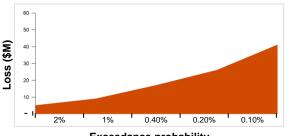
Subsample by extracting seasons from the existing catalog that are likely to occur in a warmer climate, to hit landfalling frequency targets



2 Use literature review to create landfalling event frequency targets



4 Recalculate aggregate loss statistics using pre simulated parent loss catalogue



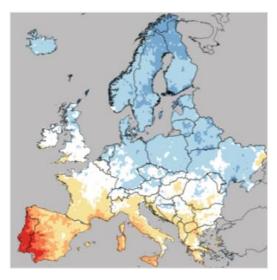
Exceedance probability

Lead to an aggregate increase in modeled losses by 20% by 2050  $\,$ 

# How can the results of catastrophe models be adjusted to allow for climate change impacts: "Bottom up adjustment" (2 of 2)

**RMS** reweights the simulated years in its Year Loss Table ("YLT") for **European Flood** based on the seasonal change in the 95th percentile of daily maximum precipitation under climate change scenarios

Derive projections of changes in the annual seasonal 95th percentiles of daily maximum precipitation under different climate scenarios and time horizons



Reweight the years in the YLT such that the projected future distribution of precipitation for the scenario is suitably matched by the modeled distribution across the corresponding reweighted set of simulated years

Event ID	Rate	Mean	Sdi	Sdc	Exposure
1	.10	500	500	500	10,000
2	.10	300	400	800	5,000
3	.50	200	300	400	4,000

Recalculate aggregate loss statistics using pre simulated parent loss catalogue

	2050 AAL RP 200		20	90
			AAL	RP 200
wer Bound (RCP2.6)	+34%	+31%	+33%	+31%
per Bound (RCP8.5)	+75%	+66%	+264%	+161%

1 01

## How can the results of catastrophe models be adjusted to allow for climate change impacts: "Top down adjustment"

UNEP FI calculates scaling factors based on available scientific data to scale the AEP curve at different return periods

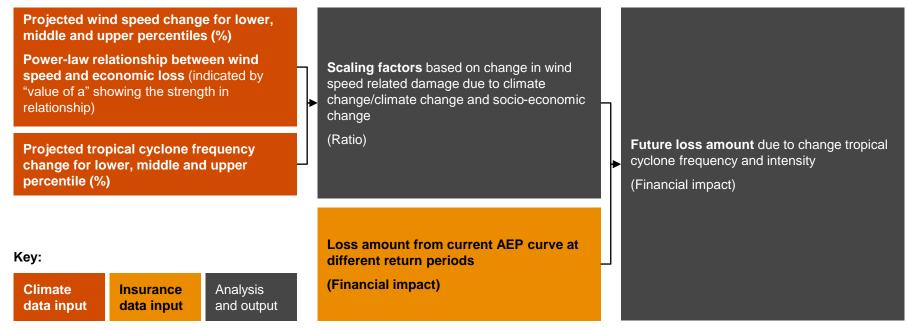
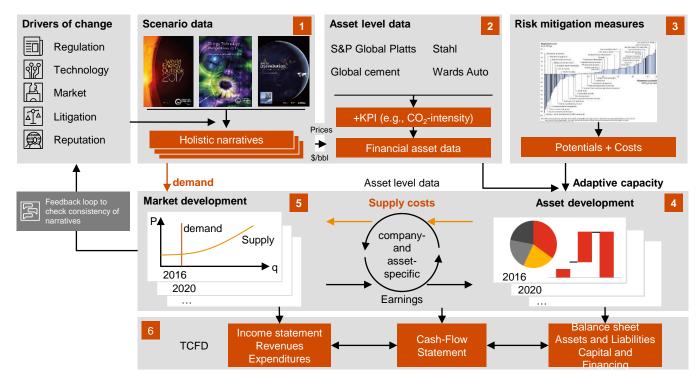


Diagram shows illustrative calculation logic based on frequency/intensity only, for tropical cyclones

## Asset portfolio/climate change transition risk modeling approach

Example bottom-up model quantifies financial implication from climate scenarios:



- 1. Derive the **key risk drivers** to translate a scenario into a narrative. **Extend scenario data** with country-level and market-data information.
- Build an asset-level database with financial information on individual technologies.
- 3. Conduct a techno-economic assessment of **risk mitigation measures** ("adaptive capacity) e.g., battery electric vehicles
- Assumptions about companies' portfolio development with and without adaptive capacities under different scenarios.
- Calculate financial performance of individual assets in market models in consideration of global competitiveness.
- 6. Calculate **financial impacts** on company.





Net Zero in insurance - greenhouse gas quantification and business integration



## What is Net Zero and why are we talking about it?

### To avoid the most dangerous impacts of climate change, planetary warming must be limited to 1.5°C.

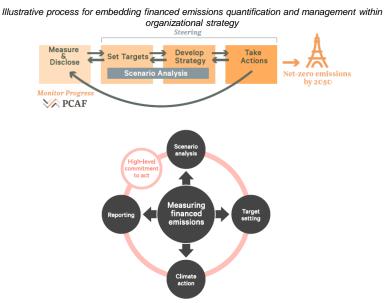
51 Billion

To do this, the amount of greenhouse gases added to the atmosphere each year must be reduced from **51 billion** tons to **zero**, no later than 2050.

What does this mean for an insurance carrier? **Net Zero** is the balance between emissions produced by and emissions taken out of the atmosphere. Reaching net zero means a company is no longer contributing to planetary warming.

For an insurance company, achieving this means tackling emissions from a company's **entire value chain** including not only operations, but also emissions of investee companies and from the use of sold insurance policies.

Insurers will need to manage emissions from these activities embedded in their investment and underwriting portfolios. By doing so, they can better identify and manage risks, navigate emissions reduction goals, act to reduce their portfolio climate impact, and disclose progress.



## Net zero: Diving deeper into the reasons for action

**Capital allocation** to a low carbon economy is critical in reaching global net zero goals

The transition to net zero will require significant **capital contributions towards institutions focused on decarbonization.** 

- The importance of the financial sector's role in this transition is directly recognized in the Paris
   Agreement, with one of its critical aims to "make finance flows consistent with a pathway towards low greenhouse gas emissions.
- Transitioning to a low carbon economy is virtually impossible without financial institution participation.

Capital markets are requiring disclosure and encouraging action

**Investor initiatives** for climate action are growing.

- Climate Action 100+ involves over 500 global investors with over \$54 tn AUM, assessing company progress in line with net-zero transition.
- 30 institutional investors are committed to net zero portfolios by 2050 under the UN-convened Net Zero Asset Owner Alliance, representing over \$5.7 tn AUM.
- This is the tip of the iceberg, with a much larger number of financial institutions committing to green financing and partial decarbonisation targets.

**Customers (B2B & B2C)** are requiring suppliers to act

Business to business motivation

- 1000+ companies have science based targets. 300+ companies have net zero targets.
- As a result, procurement policies requiring disclosure and action on carbon or Net Zero targets are becoming more common<sup>2</sup>

### Business to consumer motivation

• **55% of consumers** surveyed indicated that they buy from companies that are conscious and supportive of protecting the environment<sup>1</sup>

War for talent will hinge on companies aligning to Net Zero

#### Millennial and Gen Z

- 64% of millennials consider sustainability when deciding where to work<sup>3</sup>
- Millennials and Gen Z want organizations that provide meaningful work that is aligned to their values<sup>4</sup>
- By 2025, these two population groups will comprise **75% of** the workforce

Governments are aggressively focusing on Net Zero with taxes and regulations

#### **Government targets**

• 28 countries have Net Zero targets

#### **Mandatory Carbon Pricing**

- 46+ countries have mandatory carbon pricing
- 73% of Americans approve of taxing corporate carbon emissions<sup>5</sup>
- Potential average price/tax of \$100+ per ton CO2e by 2030

#### Regulation

- Phase out of gasoline and diesel car sales<sup>6</sup>
- Mandatory climate risk and sustainable finance disclosures

## What are financed emissions?

#### **GHG** Protocol

Carbon accounting is rooted in the fundamentals set forth in the Greenhouse Gas Protocol (GHG protocol), which divides emissions from all activities into Scope 1, 2, and 3 activities

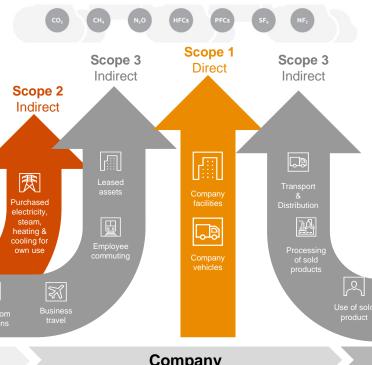
#### Scope 1 & Scope 2

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loods & services

Scope 1 emissions are all direct emissions from the activities of an organization or under their control including on-site fuel combustion. Scope 2 emissions are all indirect emissions from electricity purchased and used by the organization. Emissions are created during the production of the energy and eventually used by the organization.

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#### Scope 3

All other indirect emissions from activities of an organization, occurring from sources that they do not own or control. These are usually the greatest share of the carbon footprint.

The protocol further divides scope 3 emissions into 15 different categories, and within scope 3 lies category 15 investments, otherwise referred to as "financed" emissions. For financial services companies, financed emissions are almost always the the largest sources of emissions.

F

Investment

Upstream activities

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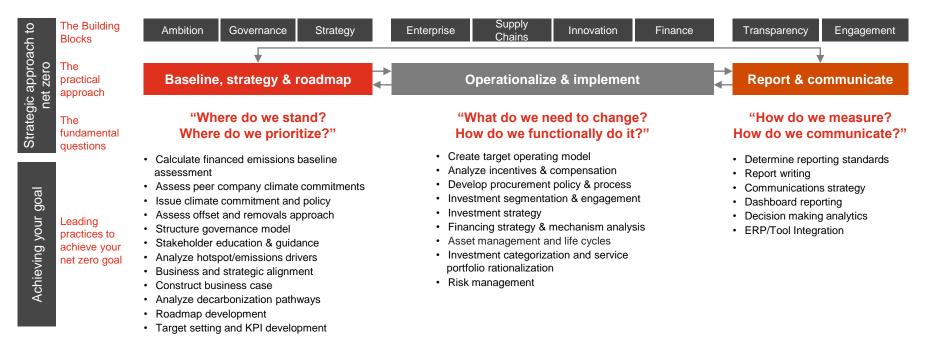
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#### **Downstream activities**

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# Illustration – net zero financed emissions and what the journey looks like

The lifecycle of a net zero financed emissions commitment promotes transparency and stakeholder awareness of progress. The following illustrates a leading practice example of how goals are established and reporting is developed:









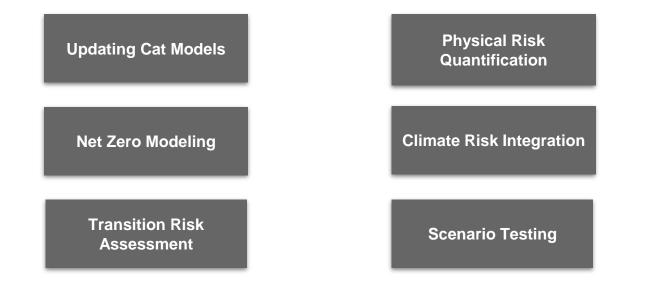
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## Reserving considerations related to climate risk

1	Longer claims handling process due to increasingly more severe weather	Claims development patterns may begin to lengthen, rendering historical development experience future weather events: a) It may become more challenging for claims adjusters to get out to start evaluating exposure b) More severe events will likely result in damages that are more difficult to reserve for accurate	e post-event.
2	Severity of natural catastrophes steadily increasing over time	It will be challenging to predict the impact of weather events on a carrier's portfolio given that the volatility of severity) has uniformly increased in recent years and is predicted to continue to do so Misevaluation of this trend could lead to significant underestimation of reserves for these events.	o in the future.
3	Underestimating historical experience may hide the uninsurability of locations	Given the accumulation risk of natural catastrophes, consistently underestimating reserves asso events may preclude a carrier from understanding the long-term insurability of certain locations a patterns associated with those locations change over time.	
4	Transition and physical risks causing changes in reinsurance program	The changing landscape of many different insured sectors and the increasing threat of severe w leave existing reinsurance programs either too expensive to maintain at current levels or ineffect sufficient protection to the changing risk profile of the cedant's portfolio. This could lead to greate uncertainty as primary insurers may participate in higher layers than today.	ive to provide
5	Impact of events not in data (latent claims)	This may include insureds subject to climate-related litigation (e.g., depending on coverages pro liability of insureds in a high-emitting industry resulting from climate change lawsuits).	vided, covering the

## What is the Actuary's role in Climate Risk Management?

As actuaries, we possess strong modeling, quantification, and risk assessment skills, while also understanding the ins and outs of the insurance business. This makes us uniquely positioned to take ownership of many different aspects of climate risk to an organization. These new challenges present an exciting opportunity for all actuaries to put our analytical mindsets to work and broaden traditional actuarial horizons. Some examples of how actuaries can be involved are included below. How are you helping your organization address its climate-related challenges and risks?



Polling Question 2: What activities do you think are most important for P&C insurers as they think about ESG integration?

- 1. Climate change risk assessment
- 2. Climate change investment scenario analysis
- 3. Climate change underwriting scenario analysis
- 4. "Green" product design / strategy
- 5. GHG quantification



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