



CARIBBEAN
ACTUARIAL
ASSOCIATION



EMBARKING ON CLIMATE CHANGE SCENARIO ANALYSIS WITHOUT BOILING THE OCEAN

DECEMBER 1, 2023

This presentation has been prepared for the 2023 Caribbean Actuarial Association (CAA) Conference.

The CAA wishes it to be understood that opinions put forward herein are not necessarily those of the CAA and the CAA takes no responsibility for those opinions.

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Agenda

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 - 2 Upcoming CAA Actuaries Climate Index**

 - 3 Unpacking Regulatory Forces and Scenario Analysis**

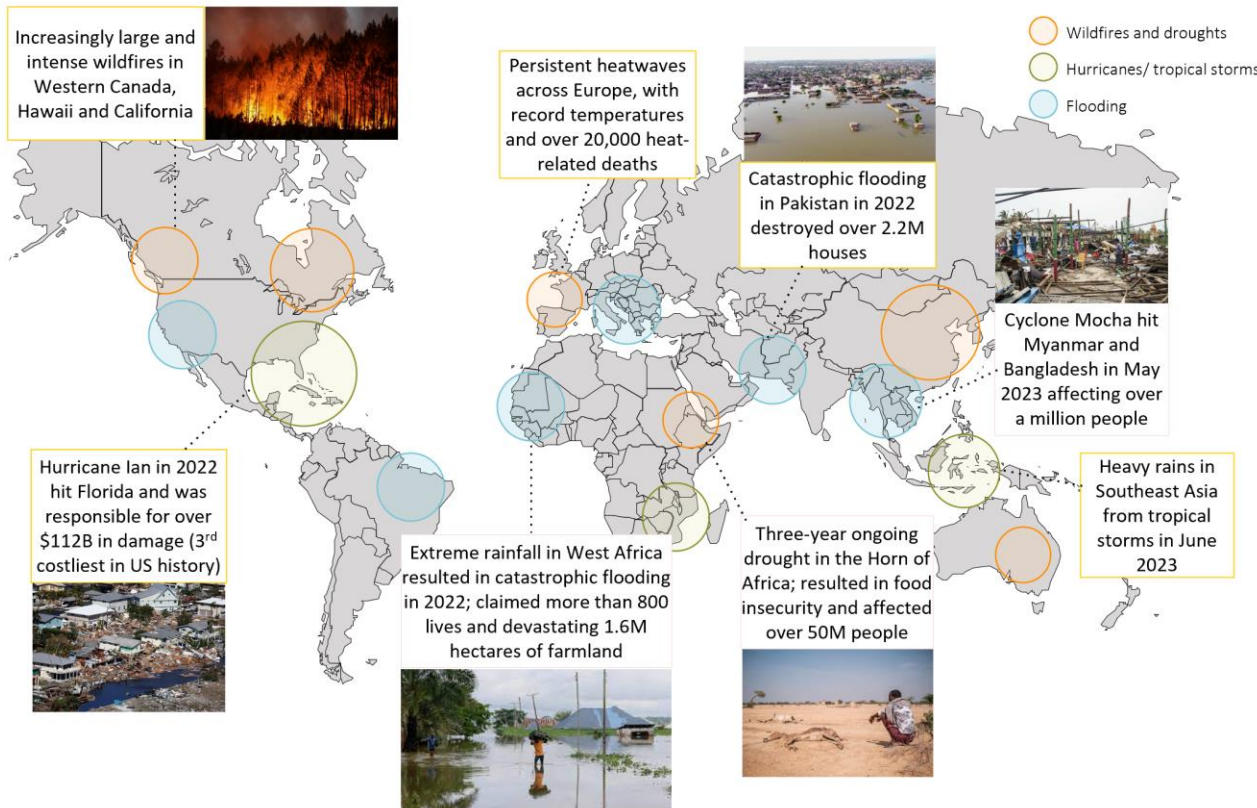


1

Overview of Climate-Related Risk

Extreme weather events have increased significantly in recent years

We're at 1.1°C of warming, current policies are projected to increase warming by 3.2°C by 2100



Acute and Chronic Risks

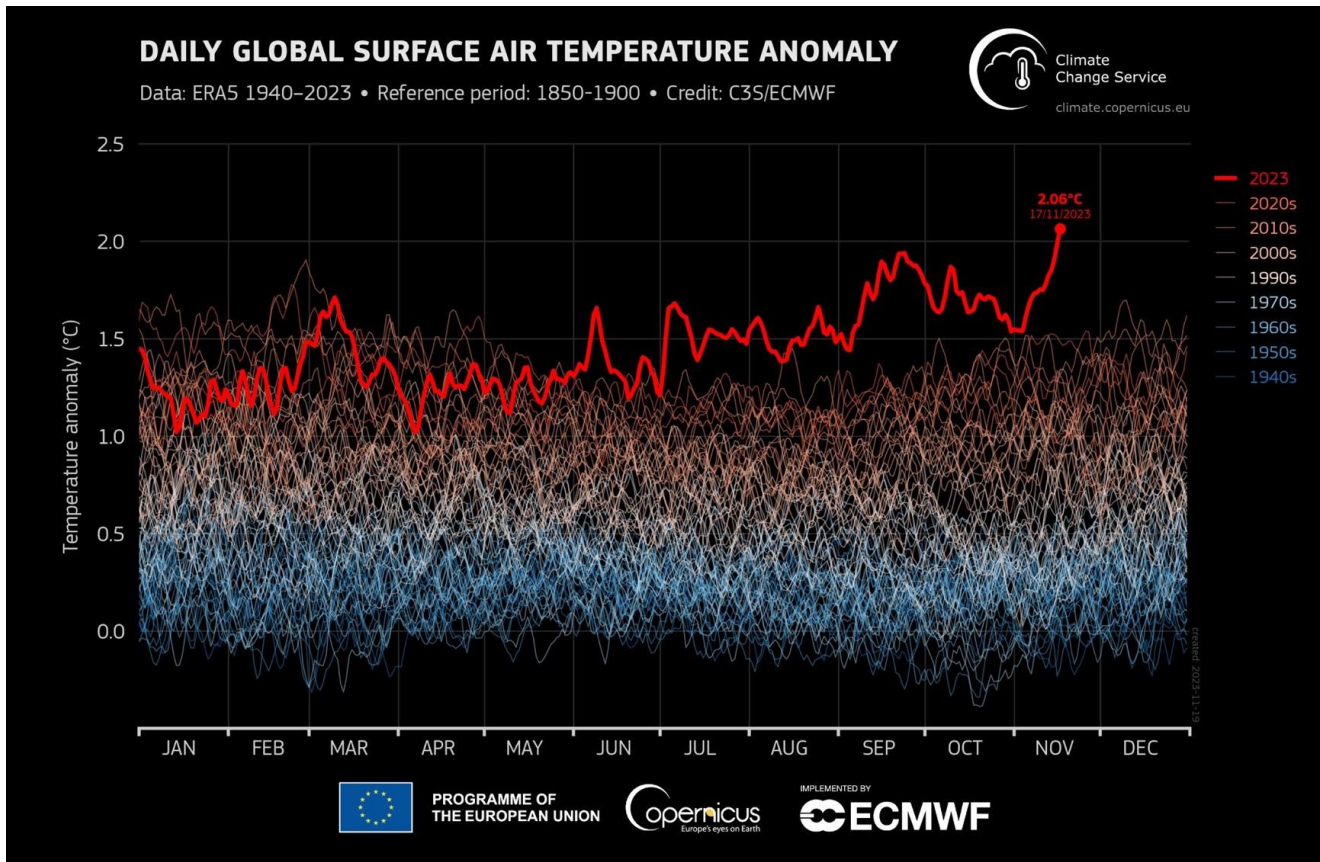
- **Loss of lives from extreme weather-related events**
 - **Damage to houses**
 - **Supply chain interruptions**
 - **Food insecurity**
 - **Respiratory diseases from poor air quality (increase PM_{2.5})**
 - **Increase in morbidity claims from water- and vector-borne diseases**
 - **Increased climate migration**
 - **Increased insurance premiums**
- ...and many more**



We are the last generation that can prevent irreparable damage to our planet.

- U.N. Secretary General Antonio Guterres

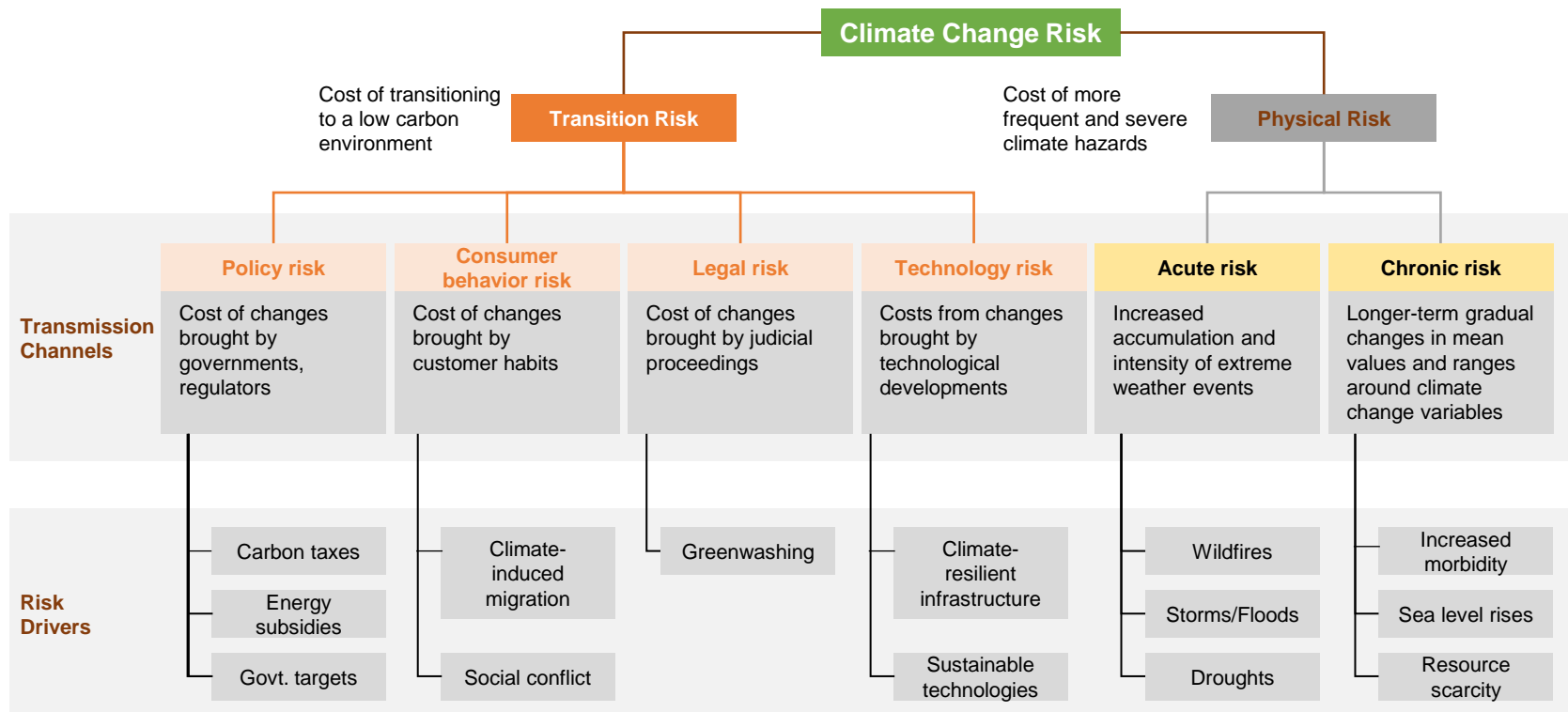
July to September 2023 were the three hottest months recorded globally



Earlier this month, global air temperatures exceeded 2 degrees Celsius above pre-industrial levels for the first time-ever.

The Paris Agreement's overarching goal is to hold "the increase in the global average temperature to well below 2°C above pre-industrial levels".

The forces of Climate Change pose a significant threat to the planet, including the financial system



Source: [Embarking on Climate Change Scenario Analysis](#)

Organizations are receiving increasing pressure from a wide range of stakeholders to understand risks and act to protect the climate

Regulators

Increasing expectations to identify and manage climate risk, and abate emissions

Increasing expectations to quantify & disclose climate risk

Employees

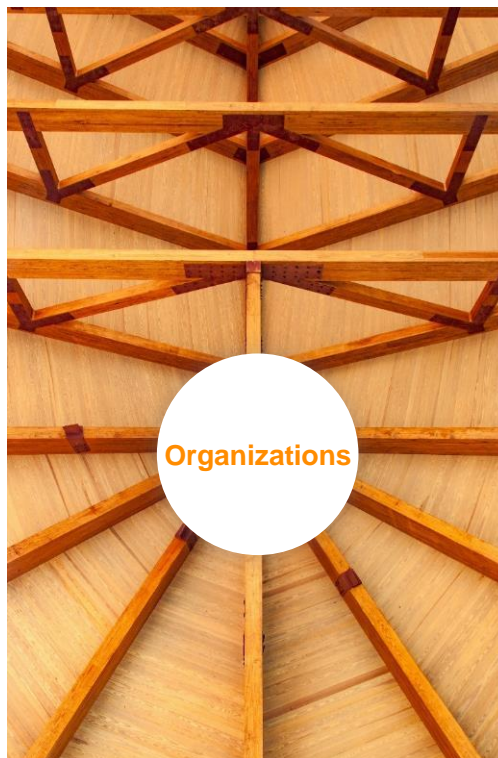
Top talent will want to work at firms with sustainable practices

Higher attrition for firms that don't implement sustainable practices

Customers

Increasing demand for greener products and options, but there is no willingness to pay price premium for it

Increasing expectations for more transparency in investment activities



Investors

Increasing demand for transparency

Increasing pressure to reduce and justify portfolio financed emissions

Tightened processes for lending carbon intensive firms

Society

Public, NGOs and activists are creating movements supporting climate activism

Competitors/Peer pressure

Pressure on laggards to keep pace with the industry

Significant investment leading to rapid acceleration of capabilities

Raising the bar on disclosure expectations

The role of the insurance sector



investors

As **investors**, insurers can contribute to re-address capital flows towards more sustainable economic activities



Protection provider

As **protection providers**, they can contribute positively to the sustainable transition through underwriting practices and the design of products and services



**RISK
MANAGE
R**

As **risk managers**, they contribute to social system stability in a context where natural disasters are exacerbated by climate change



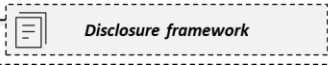
Public opinion/
Customers' preferences



Regulatory framework

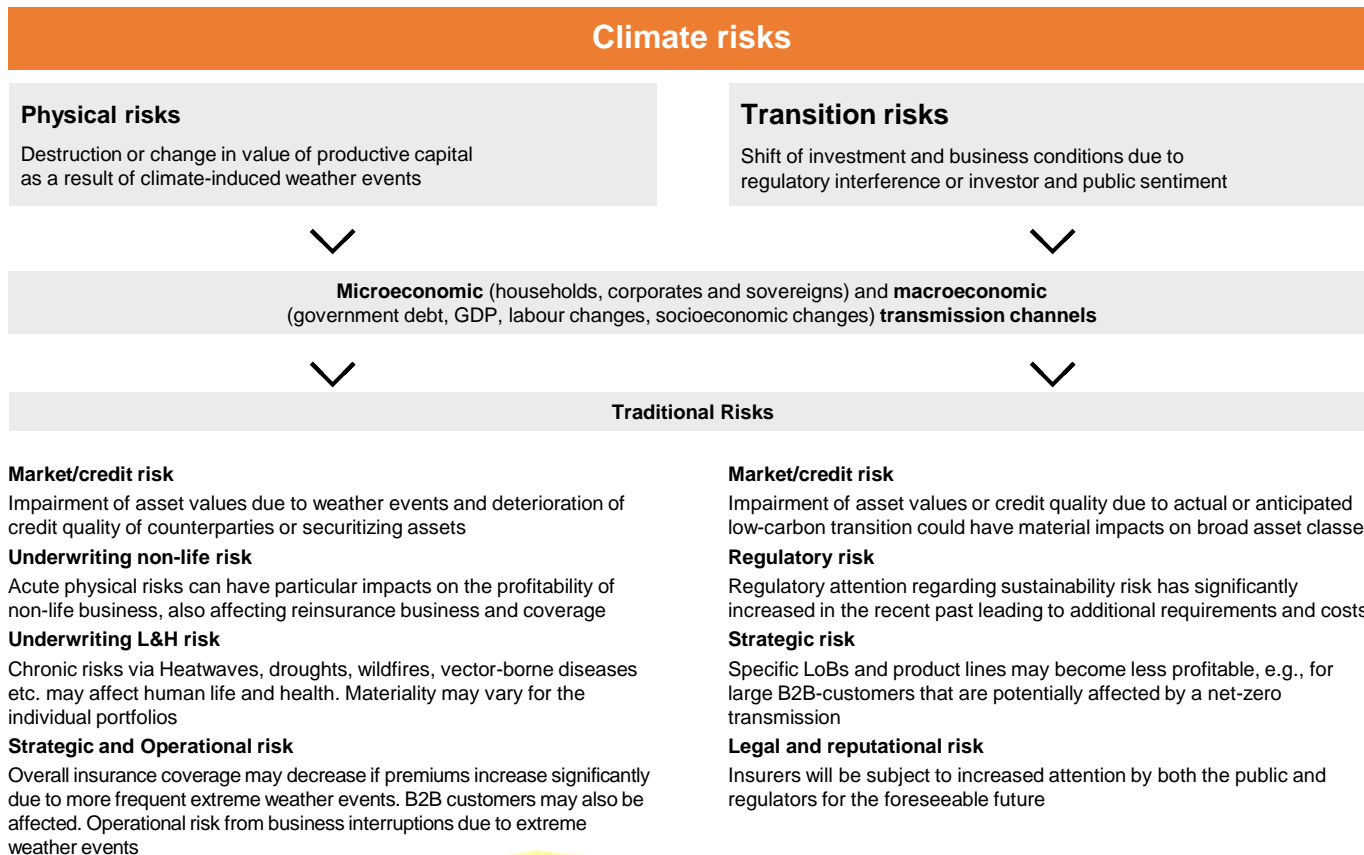


Voluntary initiatives



Impacts on business,
organization and
processes

Dependent on the business context, insurers are exposed to physical and transition risks via different transmission channels





2

Upcoming CAA Actuaries Climate Index

Actuaries Climate Index (ACI)

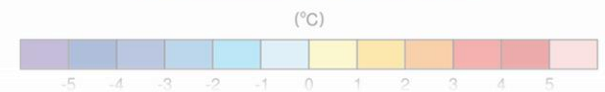
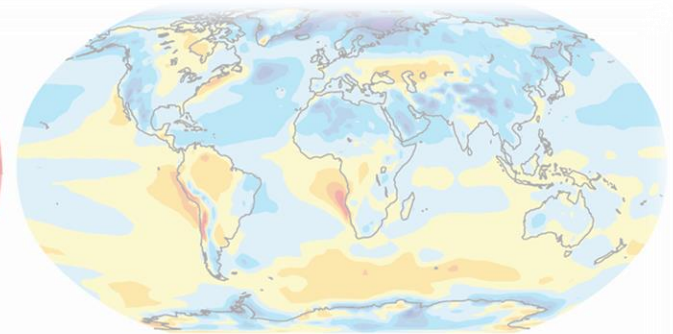
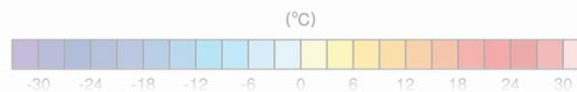
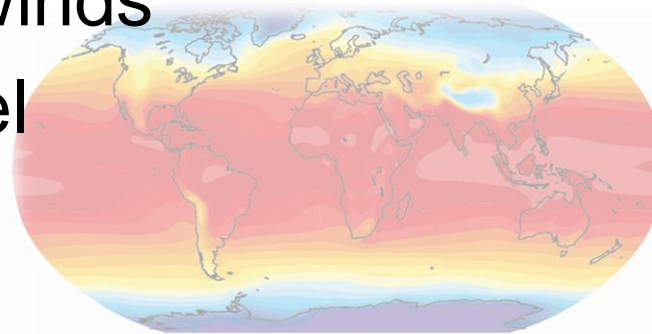
- An educational tool designed to help inform about climate trends and some of its potential impacts
- Target Audience - Actuaries, public policymakers, and the general public
- Territory – North America (United States and Canada)
- Developed by consortium of North American actuarial bodies – AAA, CAS, CIA and SOA.

Actuaries Climate Index (ACI)

- ACI is an objective index that measures extreme changes in climate similar to Consumer Price Index which measures change in average prices
- Reference Period for ACI: 1961 to 1990

Key Elements of ACI

1. High temperatures
2. Low temperatures
3. High precipitation
4. Drought
5. Strong winds
6. Sea level



Caribbean ACI

- CAA created its own Actuaries Climate Index Working Party to develop a Caribbean ACI
 - Bertha Pilgrim (Chair)
 - Stephen Robinson
 - Lachmi Connell
 - Britta Hay
 - Mike McLaughlin
 - Cesar Davila
- SOA has provided significant technical assistance

Caribbean ACI

- CAA reviewing data for creation of the local index
- SOA developed a climate analytics tool which will aid in Studying Weather Trends in the Caribbean Region
- Webinar on the demo of the climate analytics tool was held on November 21

Climate Webinar

Demo of a
Tool for
Studying
Weather
Trends In the
Caribbean



CARIBBEAN ACTUARIAL ASSOCIATION



ONLINE WEBINAR

REVEALING WEATHER WONDERS:

Unveiling the CAA Climate Index SOA Tool for Caribbean Weather Trends

Our Guest Speaker
Patrick Wiese
ASA, SOA Research Institute

Tuesday, 21 November
1:00 PM EST

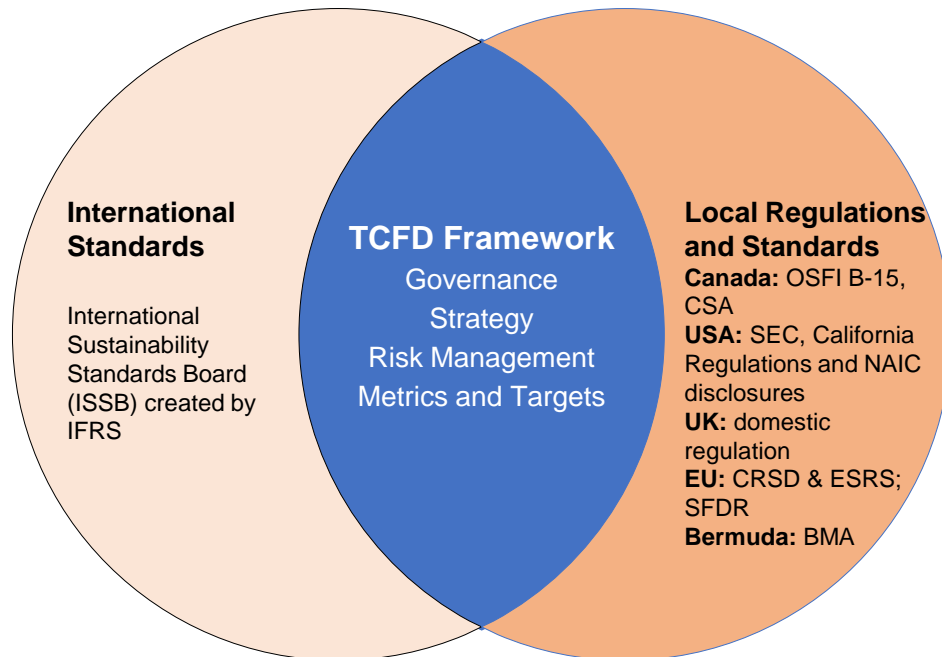


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Unpacking Regulatory Forces and Scenario Analysis

Incoming regulations are spurring the launch of multi-year climate management programs globally

Motivation for financial regulations born out of the recognition that climate-related (CR) risks are financial risks



The most widely recognized framework for CR risk management which global financial regulators are aligned to is the **global, industry led Task Force on Climate-related Financial Disclosures (TCFD)**

G20 endorsed TCFD and it forms the basis for financial regulations in many other jurisdictions. This recognizes the **importance of a coordinated approach to climate risk** and that reduces the risk of redundancy

IFRS formed the ISSB in 2021 and released the ISSB S1 and S2 disclosure requirements in June 2023 with the goal to bring **more standardization, transparency and comparability** in climate-related financial disclosures.

The International Organization of Securities Commissions (IOSCO) has announced that it has decided to endorse IFRS S1 and IFRS S2.

OSFI's B-15 Guideline is largely aligned with the TCFD. However, still expected to further evolve, in particular to align to incoming ISSB standards.

The TCFD collaborated with industry stakeholders to develop a voluntary disclosure framework

- Considered the **challenges** for preparers of disclosures as well as the **benefits** of such disclosures to investors, lenders, and insurance underwriters.
- Engaged in **significant outreach and consultation** with users and preparers of disclosures and other stakeholders.
- Drew from existing climate-related disclosure regimes and sought to develop a decision-useful framework to **align and supplement existing disclosure frameworks**.
- Emphasized disclosure of the **financial impacts** of climate-related risks and opportunities on a company.

The recommendations are structured around four thematic areas that represent core elements of how companies operate.

Governance

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

Risk Management

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

Strategy

Disclose the actual and potential impacts of climate-related risks and opportunities on the company's businesses, strategy, and financial planning where such information is material.

Metrics and Targets

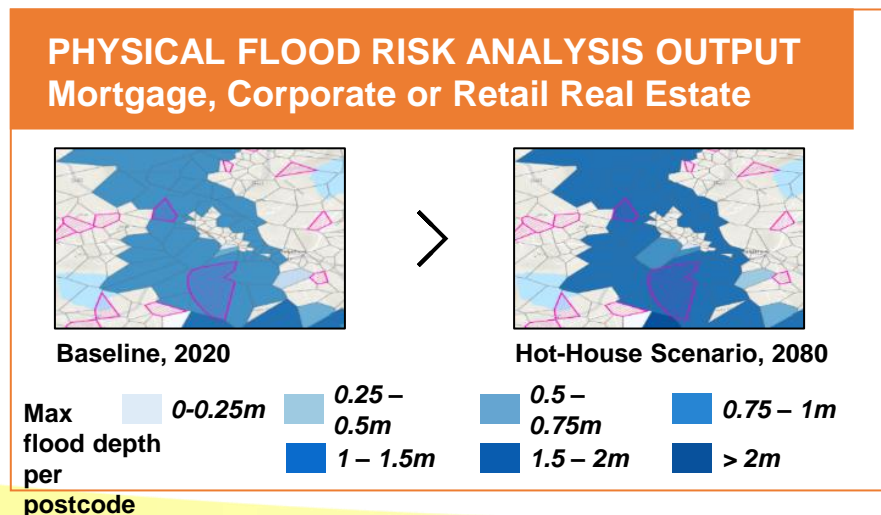
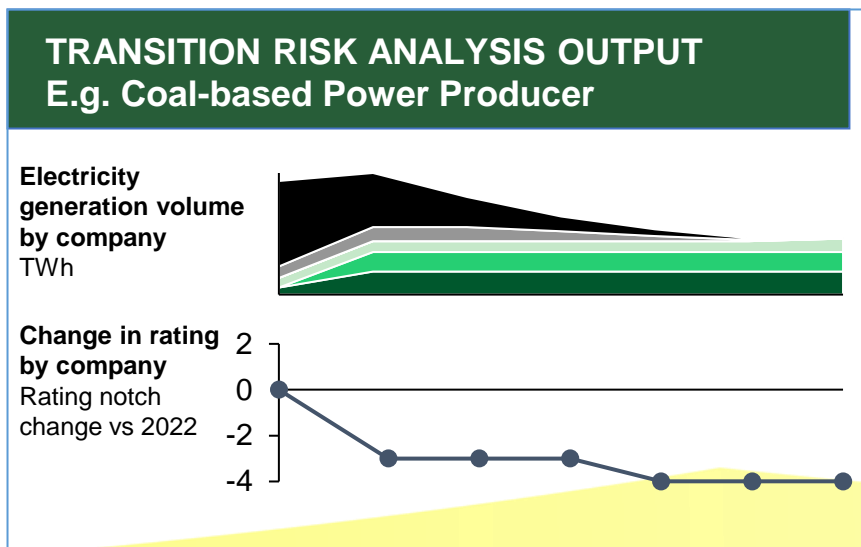
Disclose the metrics and targets used to assess and manage relevant climate-related risks and opportunities where such information is material.

Note: The four recommendations are supported by 11 recommended disclosures

Scenario analysis is used to enable organisations to answer a range of key questions from internal and external stakeholders

| | |
|---|---|
| 1 | Where are the key climate risks within your portfolios? |
| 2 | How do you measure your exposure to climate risk? How are transition risks and physical risks interlinked? |
| 3 | How do key climate risks challenge your business model and how would you strategically act to mitigate them? |
| 4 | How do key climate risks challenge your client's business models and how well prepared are they to mitigate them? |

Example outputs



The approach for Scenario Analysis is highly dependent on the granularity of the data available and the relevance of the portfolio

Overview of climate scenario analysis process



| | | | | | |
|-------------------------------------|--|--|----------------------|--------------------------|---------------------------------|
| Data requirements identification | Climate scenario definitions and variables | Corporate Portfolios | RE Portfolios | Retail Portfolios | Risk Embedding |
| Data sourcing | Expanded sector-specific variables | 1 Transition A Bottom Up forecasting B Credit Rating C Portfolio extrapolation (top down approach) | | | Capital allocation |
| Data consolidation and coordination | Other approaches for transition risks include regulatory approaches e.g. slotting and score cards and adjustments to existing stress testing methodologies | 2 Physical Natural Catastrophe Models Property Valuation Impact Affordability/NOI ¹ Impact | | | Credit decisioning and approval |
| | | | | | Client engagement |
| | | | | | Product offering |


Governance (incl. Process and Control Management & Internal Audit)
Documentation and Disclosures


1. Net Operating Income, NOI and Affordability is used to assess how likely the borrower is to repay the loan

Scenario analysis can be integrated via complementary approaches or also be progressively implemented and adapted to the company's needs

Qualitative Risk Assessment

- Comprehensive ESG risk inventory and assessment of the exposure
- Assessment of risk mitigation measures in place
- Enables the identification of high-risk area (and opportunities) for further analysis


 Allows for compliance with most of the basic regulatory requirements


 Limited complexity

- Ensure all ESG risks exposures are properly identified
- Can be seen as a preliminary work to the bottom-up scenario analysis

Bottom-up Scenario Analysis 1

- Analysis at single position or issuer level, based on specific ESG drivers
- Asset side: impacts on cash-flows of individual issuers and valuation adjustments
- Liabilities: evaluation of individual contracts, e.g. geographical location, guarantees, etc.

 Represents a *best practice* compared to Regulatory expectations


 High complexity


- Can be seen as an evolution of the QRA
- Allows to build up taylor-made scenarios on company's portfolios/expositions

Scenario analysis

Top-down Scenario Analysis 2

- Reflects a set of economic and financial variables
- Regional and sectoral level impacts based on publicly available scenarios (e.g. NGFS)
- Potential need for adjustments in certain sectors and asset classes

 Represents a *good practice* in line with ker regulatory guidelines

 Medium complexity

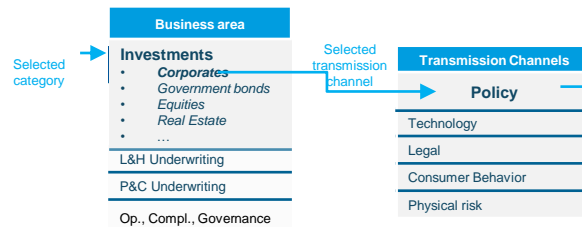
- Can be implemented regardless of the QRA
- Can contribute to validate bottom-up scenario analysis results

Qualitative Risk Assessment is a great first approach for managers to identify material risks and opportunities

The described approach, based on the definition of an **ESG risk inventory** and a **Qualitative Risk Assessment**, helps companies in:

- increasing their awareness of the ESG risks they are exposed to
- map potential mitigation in place
- identifying major risks to further explore from a quantitative perspective
- spot business opportunities

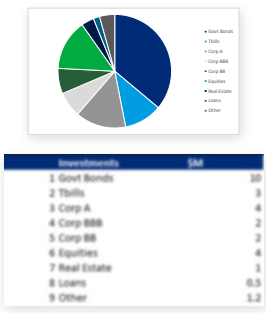
1 Step 1: Risk Drivers identification



2 Step 2: Elaborate on Risk Driver Impacts

| Risk Drivers | Possible risk drivers impacts | Short- to Mid-term (2022 - 2030) | Long-term (2031 - 2050) |
|---|--------------------------------------|--|--|
| Reduction targets for specific industries | Increasing costs and stranded assets | In the short- to mid-term, the amount of emission reduction targets for some sectors, especially carbon-intensive ones, is likely to have a negative impact on productivity due to the higher costs required to make production processes more efficient. Therefore, the issuer's creditworthiness could be negatively affected and the probability of default of the bond could increase. | If the impact is not mitigated in the short to medium term, it is likely to become even more significant in the long term, as the subsequent response to climate change will have to be more drastic in order to achieve the required objectives. Moreover, the increase in the physical manifestations of climate change risks may lead to unavoidable political responses and drastic measures by governments that may have an even more significant impact on the increase in efficiency costs to be faced. |

3 Step 3: Data gathering for materiality assessment



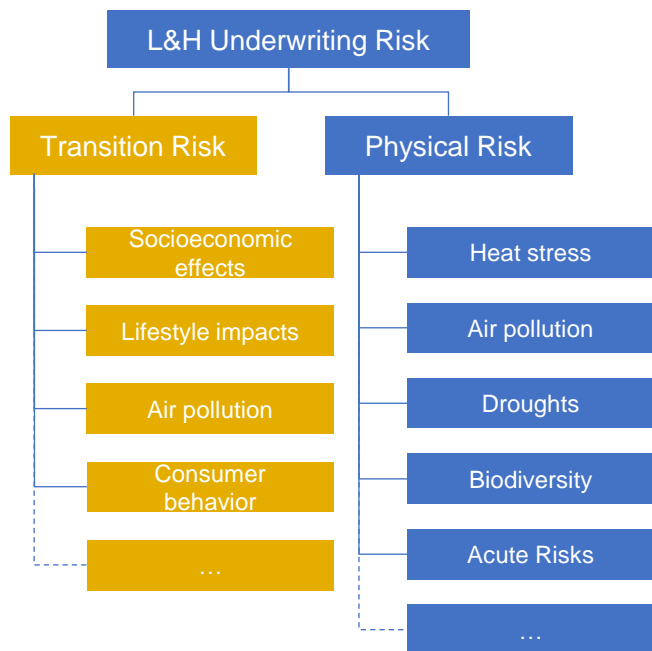
4 Step 4: Risk assessment methodology definition

| Impact rating | Asset value |
|-------------------|--|
| Strongly negative | Pricing and changes in valuation - Risk driver impacts cause, over the relevant time horizon, a significant re-pricing and devaluation of assets due to legislative and policy changes (e.g. a strong devaluation of real estate assets due to stricter energy efficiency standards), environmental constraints (e.g. flood, droughts) or technological innovations. Portion of portfolio market value and future cash flows associated with these assets (e.g. energy companies that have invested in fossil fuels reserves that cannot be burnt due to adherence to the Paris Agreement, centralised electric firms impaired by the exploitation of residential solar PV and electricity storage, residential property assets which value is reduced by mandatory energy efficiency improvements reducing the value of the least efficient housing stock) suffer strong declining returns and eventual asset impairments. |
| | Damages and write-offs - Risk driver impacts cause, over the relevant time horizon, significant direct damages on assets (e.g. to investee's factories during extreme weather events or after the adoption of new technologies to reduce emissions to meet new regulatory requirements) and unexpected write-offs (e.g. of assets situated in high-risk locations). Losses deriving from the impacts strongly reduce the value of investee's assets (e.g. for the real-estate that is more vulnerable to extreme events, the impact on revenues will mainly come from a change in their property value after a significant damage) and cause sharp declining returns. |
| | Pricing and changes in valuation - Risk driver impacts cause, over the relevant time horizon, a moderate re-pricing and devaluation of assets due to legislative and policy changes. |

5 Step 5: Qualitative Risk Assessment

| Transmission Channels | Risk Drivers | Possible risk drivers impacts | Revenues | Costs | Asset value | Business impact in the short to mid-term | Revenues | Costs | Asset value | Business impact in the long term |
|-----------------------|---|--------------------------------------|----------|----------|-------------|--|----------|-------|-------------|----------------------------------|
| Technology risk | Switch to more sustainable technologies | Increasing productivity and revenues | Positive | None | Positive | Positive | None | None | None | None |
| Policy risk | Reduction targets for specific industries | Increasing costs and stranded assets | Negative | Negative | Negative | Negative | None | None | None | None |

A wide array of physical climate change risks can potentially impact L&H underwriting factors



Physical climate change risk affects L&H underwriting in multiple ways, for example:

- Disease prevalence and severity impacted by **changing temperatures** and **air pollution**
- **Heat, drought, biodiversity stresses** can lead to crop failures & impact on food security, leading to malnutrition
- Expansion of vector borne and waterborne diseases due to changing **ecological conditions**
- Mental health impacts from **heat stress** or **acute risks**
- Damages or stress to healthcare infrastructure from **acute risks**



A wide array of diseases is likely affected by climate change to different degrees:

- Asthma, respiratory allergies and airway diseases
- Diabetes and metabolic diseases
- Vector borne and zoonotic diseases e.g. Dengue
- Waterborne diseases
- Cardiovascular disease and stroke
- Foodborne diseases and nutrition
- Neurological diseases and disorders, e.g. Alzheimer's
- Various forms of cancer

In their process to integrate sustainability factors into their strategy and operations, insurers are facing a number of concerns:

-  Data availability on investments is still limited, although the trend is improving thanks to the increasing public disclosure requirements. The treatment of government bonds is also a question mark
-  The forward-looking nature of sustainability risks implies a change in the approach as analysis based on historical data might not be significant
-  Scenario analysis and stress testing can only cover a small subset of ESG risks due to data availability
-  ESG risks are very much interconnected: difficulties arise when trying to manage them in a comprehensive matter

-  Develop a strategy and a business model compatible with the 1.5°C goal of the Paris agreement
-  Lack of internal competencies/awareness might slow down the integration processes of the ESG factors
-  The development of global disclosure standards, the mandatory and voluntary disclosure frameworks and more in general the customers' and public opinion attention to sustainability matters, call for the need to ensure consistency of public information and more in general to establish processes to monitor greenwashing risks

Lessons learned from our experience in building climate scenario analysis models and executing climate stress testing exercises

A broad set of stakeholders should be included in the model development process from risk, finance and the business to ensure that there is buy-in to the approach being developed

- **Approaches are nascent**, there will be many limitations and it will be easy for people to throw stones – bring them inside the tent and make them part of the solution
- **Approaches are almost always driver-based**– there is no historical time series to calibrate to – and people need to get comfortable with this

Data is a material challenge...

- Internal spreading data and other financial data into one place and at an appropriate level of granularity
- Internal data you have but that is not typically used for credit modeling (e.g., resilience measures in place for property collateral, geolocation of assets, occupancy rate of CRE buildings)
- Client data that has not been collected previously (e.g., transition plans, emissions)
- Industry-level data required for the analysis

... But is not an excuse not to get started – companies need to push ahead, identify required data, and put a strategy in place to collect it

Getting the right level of internal validation (given nascent approaches and fast evolving)

Need to mobilize the business to think about what actions the company would take in response to the scenarios

- Ensuring the exercise is business useful takes time, as it requires engaging people at the right level of seniority (i.e. those who can make decisions for the firm), as well as a granular (and credible) view of the scenario impacts to guide those discussions
- Requires moving away from a hypothetical thought exercise and what the business “could do” to really what the business “would do” in different situations



Q & A