

# CLIMATE RISK & ITS IMPACT IN INSURANCE INDUSTRY

*Research Paper*

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## Abstract

*As we all experience in our daily life, Climate change is certainly a reality of the world. It is affecting every species in the world and is also reshaping industries and markets from a business angle. Insurance industry is affected in a unique way as climate risk impacts both sides of balance sheet namely assets and liabilities. Over many years, Insurance industry has developed many models based on past trend data including catastrophe models to handle the risk associated with uncertainties. But this is not enough as the climate risk can be handled only with a sophisticated future looking data analysis and a model needs to be developed for handling the impact of climate risk. By combining the perspectives of catastrophe and climate risk models insurance industry can handle climate risk much better. The sooner businesses and investors understand their climate related financial risks; they will be better placed to handle it and also create a market differentiation to grow profitable business.*

*Keywords: Climate Risk, Insurance Industry*

## 1 Introduction

### 1.1 What is climate risk

**Climate risk** - refers to risk assessments based on formal analysis of the consequences, likelihoods and responses to the impacts of climate change and how societal constraints shape adaptation options.[1][2].

One of primary roles of the **Intergovernmental Panel on Climate Change (IPCC)**, which was created by the United Nations Environment Programme (UNEP) and the World Meteorological Organization (WMO) in 1988, is to evaluate climate risks and explore strategies for their prevention and publish this knowledge each year in a series of comprehensive reports.[3] International and research communities have been working on various approaches to climate risk management including climate risk insurance.

According to the IPCC Fifth Assessment Report:[4] the following future impacts can be expected:

- Temperature increases
- Extreme weather
- Bumper crops and crop failure
- Polar cap melting

- Changes to Earth's ecosystems
- Epidemics
- Disruption of the North Atlantic current

Climate risk can be categorized into Physical or Transition Risks

- **Physical Risk** - Resulting from climate change can be event driven (acute) or longer-term shifts (chronic) in climate patterns. Categories of physical risk include:
  - pluvial (rainfall) flooding,
  - fluvial (coastal) flooding,
  - heat/cold stress,
  - water stress,
  - wildfire, and
  - Extreme weather events (storms).
- **Transition Risk** - May entail extensive policy, legal, technology, and market changes to address mitigation and adaptation requirements related to climate change as global systems shift towards a green and low-carbon economy. The risks arising from these changes can be categorized into
  - policy & regulatory,
  - technology,
  - market, and
  - Reputational.

Both physical and transition risk categories can represent material risks and opportunities to financial market players and operating companies.

## 1.2 Climate risk insurance

Climate risk insurance is a type of insurance designed to mitigate the financial and other risk associated with climate change, especially phenomena like extreme weather.[5][6] The insurance is often treated as a type of insurance needed for improving the climate resilience of poor and developing communities.[7][8][9] It provides post-disaster liquidity for relief and reconstruction measures while also preparing for the future measures in order to reduce vulnerability.

Critics of the insurance, say that such insurance places the bulk of the economic burden on communities responsible for the least amount of carbon emissions.[8] For low-income countries, these insurance programmes can be expensive due to the high start-up costs and infrastructure requirements for the data collection.[10] It is theorized that high-premiums in high risk areas experiencing increased climate threats, would discourage settlement in those areas.[5] These programmes are also usually timely and financially inadequate, which could be an uncertainty to national budgets.[10] A considerable problem on a micro-level is that weather-related disasters usually affect whole regions or communities at the same time, resulting in a large number of claims simultaneously.[11] This means that it is needed to be sold on a very large, diversified scale.[11] However a well-designed climate risk insurance can act as a safety net for countries while improving resilience.[9][12]

The international community invested in developing further support for this kind of insurance through the InsuResilience Global Partnership launched at COP23.[8] That group, supports regional programs

such as Climate Risk Adaptation and Insurance in the Caribbean (CRAIC) and international organizations like the Munich Climate Insurance Initiative.[8] The ACT Alliance published a guidebook for equitable and climate justice oriented model for climate risk insurance in 2020.[13]

## 2 How does insurance industry respond to climate risk

Insurers face a complex challenge because climate change risk affects **both sides of the balance sheet, namely assets and liabilities.**[14] With Net Zero commitments now a reality, from a corporate perspective, insurers need to define their own Net Zero strategy, sustainability policies, and the steps they are taking to achieve it.

Only recently, financial and economic impacts of climate change have been defined under physical risks, liability risks and transition risks & this is enabling quantification and monitoring of these risks and integrating these into core business.[15]

According to a survey conducted by PwC [16] on the global insurance market, ESG-C (Environment, Social, Governance, and Climate (ESG-C) ) was the number eight on the list of senior Management priorities in 2018; in 2021, it is now the second priority behind COVID-19.

As strategies evolve and converge when it comes to communicating with external stakeholders, the most frequently referenced standards are the UN Sustainable Development Goals (SDGs). Many insurers, both life and P&C, have found the SDGs useful in defining their targets and ambitions. Consequently, insurers have sought to acquire ESG-C data and metrics that use the SDGs as reference points, allowing them to align with these standards.

The focus has shifted from looking at ESG-C purely from a downside/defensive point of view to a forward looking, revenue generating point of view. As such, those insurers who are better able to adapt their business models for these new risks are most likely to capture these growth opportunities. This requires obtaining data on transition risks for sectors and insurers, and then deploying capacity and expertise into sectors that are likely to benefit from the transition to a low-carbon economy.

## 3 Climate change and financial stability

There are three broad channels through which climate change can affect financial stability :[17]

- Physical risks: the impacts today on insurance liabilities and the value of financial assets that arise from climate- and weather-related events, such as floods and storms that damage property or disrupt trade;
- Liability risks: the impacts that could arise tomorrow if parties who have suffered loss or damage from the effects of climate change seek compensation from those they hold responsible. Such claims could come decades in the future, but have the potential to hit carbon extractors and emitters – and, if they have liability cover, their insurers – the hardest;
- Transition risks: the financial risks which could result from the process of adjustment towards a lower-carbon economy.

Changes in policy, technology and physical risks could prompt a reassessment of the value of a large range of assets as costs and opportunities become apparent. The speed at which such re-pricing occurs is uncertain and could be decisive for financial stability. Risks to financial stability will be minimized if the transition begins early and follows a predictable path, thereby helping the market anticipate the transition to a 2 degree world.[18]

## 4 What are the models available to measure climate risk

Businesses and investors are already experiencing increased financial losses from catastrophic weather events. To help understand and mitigate these losses, the insurance industry has depended on sophisticated **catastrophe risk models**, but these do not currently take into account the threats from a changing climate.[19]

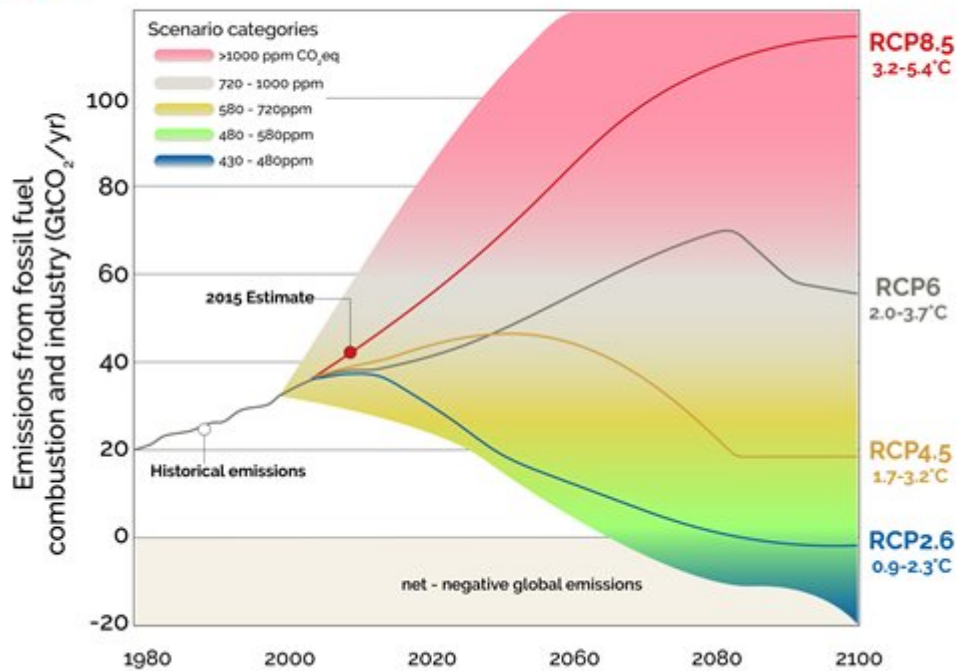
**Climate risk models** have emerged to estimate how temperatures will evolve in the future. Rather than rely on historical, backward-looking data, climate models provide forward-looking simulations of the interaction between energy and matter in the ocean, atmosphere and land based on levels of greenhouse gas emissions.

Combining the results from both catastrophe and climate risk models will enhance risk management and mitigation strategies by taking a holistic view and providing clarity on the impact adaptation investments, portfolio risk profiles, real estate values and insurability.[20]

### 4.1 Refining the approach to climate modelling

The process of modelling climate risk involves coupling climate model data with a vulnerability assessment of assets to produce a quantified estimate of financial loss for any asset at any location on the planet. By aggregating dozens of climate models, forward-looking hazard data is estimated, interpreted and managed by climatologists, expert data scientists, engineers, and financial analysts.

What the climate looks like in the future depends on expected levels of greenhouse gas (GHG) emissions.[17] Intergovernmental Panel on Climate Change (IPCC) scientists developed four Representative Concentration Pathways (RCP), which model the projected temperature increases and atmospheric warming expected by the end of the century. The below chart shows how the high emissions scenario, RCP8.5, might lead to an increase in temperature of more than five degrees Celsius.



Source: Fuss et al 2014; CDIAC; Global Carbon Budget 2014

Using these RCP scenarios, climate risk analytics providers like The Climate Service model the financial impact of physical hazards including extreme temperature, wildfire, drought, water stress, flooding and tropical cyclones, given the uncertainty and assumptions that climate change presents.

## 5 Conclusion

It is clear that catastrophe and climate models both have unique and valuable attributes. Combining climate risk analysis with catastrophe modelling and risk management can yield a more robust understanding of the financial implications of climate-related hazards in the future, under different climate scenarios. In turn, this enables more holistic preparation for the threats and opportunities that the future may present.

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