UNEP FINANCE INITIATIVE

PSI Principles for Sustainable Insurance

Using hindsight and foresight

Enhancing the insurance industry's assessment of climate change futures

A progress update on the project of UN Environment Programme's Principles for Sustainable Insurance Initiative to pilot the TCFD recommendations

September 2020

About UN Environment Programme's Principles for Sustainable Insurance Initiative

Endorsed by the UN Secretary-General and insurance industry CEOs, the Principles for Sustainable Insurance (PSI) serve as a global framework for the insurance industry to address environmental, social and governance (ESG) risks and opportunities—and a global initiative to strengthen the insurance industry's contribution as risk managers, insurers and investors to building resilient, inclusive and sustainable communities and economies.

Developed by UN Environment Programme's Finance Initiative, the PSI was launched at the 2012 UN Conference on Sustainable Development (Rio+20), and has led to the largest collaborative initiative between the UN and the insurance industry.

The vision of the PSI Initiative is of a risk-aware world, where the insurance industry is trusted and plays its full role in enabling a healthy, safe, resilient and sustainable society. Its purpose is to better understand, prevent and reduce ESG risks, and to better manage opportunities to provide quality and reliable risk protection.

www.unepfi.org/psi

"The Principles for Sustainable Insurance provide a global roadmap to develop and expand the innovative risk management and insurance solutions that we need to promote renewable energy, clean water, food security, sustainable cities and disaster-resilient communities."

UN Secretary-General (June 2012)

Cover photo: Reichenau Island in Germany, a UNESCO World Heritage Site

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Contact

International Environment House
11–13 Chemin des Anémones
1219 Châtelaine, Geneva
Switzerland

+41 22 917 8777
psi@unepfi.org
unepfi.org/psi

1. Introduction

Over the past eight months, 22 leading insurers and reinsurers from across the globe ("the pilot group") have been collaborating under the auspices of UN Environment Programme's Principles for Sustainable Insurance Initiative (PSI) to explore and pilot methodologies that insurers can use towards implementing the recommendations of the Financial Stability Board's Task Force on Climate-related Financial Disclosure (TCFD); with valuable advice to the pilot group and review by PwC and the Sabin Center for Climate Change Law. The TCFD recommendations are structured around four thematic areas that correspond to core operations of an organisation—governance, strategy, risk management, and metrics and targets.[1] This study on insurance follows the TCFD studies done by UNEP Finance Initiative on banking and investment. This document discusses the overall approach and outlines the key insights so far. It serves as a prelude for the final report to be published by the end of 2020.

Insurance companies hold a significant portion of global economic assets and liabilities on their balance sheets and are therefore likely to have exposure to both risks and opportunities linked to a changing climate. As risk managers, insurers and investors, the insurance industry can play a leadership role in driving positive impact, both in terms of climate change mitigation and adaptation. Climate change presents not only downside risks, but also upside opportunities for the industry to create new insurance products and services. The insurance industry has a long track record of innovation in risk analysis, risk reduction and product design, and this project seeks to enhance climate-related risk assessments and inform potential disclosure methodologies in line with TCFD recommendations.

The insurance industry's core business is to understand, manage and carry risk. Many of the methods and tools that insurers have developed over the years can be directly used or enhanced to capture climate change-related risks and opportunities. For example, catastrophe models used to assess physical risks can serve as a basis to evaluate potential future weather-related insurance losses, assuming climate change-related pathways for future exposure and vulnerability can be developed. Models for assessing macroeconomic impacts on long-tail insurance contracts can provide a building block to integrate climate-related transition risks. This PSI-TCFD pilot project focuses on insurance underwriting portfolios in the context of climate change-related physical, transition and litigation risks.

A key opportunity for climate change analysis is the use of forward-looking, climate scenarios by insurers in assessing risks, as well as opportunities—such as the development of new insurance products and services. Such analysis reflects climate information on various timescales and in line with various possible changes in global temperatures. The use of climate change scenarios is also being considered by a growing number of insurance and financial supervisory and regulatory authorities, as shown by the work of UNEP's Sustainable Insurance Forum (SIF), the International Association of Insurance Supervisors (IAIS), and the Network for Greening the Financial System (NGFS).[2] For example, in the UK, the Bank of England's Prudential Regulation Authority (PRA) has started to use climate scenarios to conduct stress tests of banks and insurers, while the European Insurance and Occupational Pensions Authority (EIOPA) is considering the possibility of setting requirements for climate change scenario analysis.

1 www.tcfdhub.org

2 For example, see the SIF-IAIS Issues paper on the implementation of the recommendations of the Task Force on Climate-related Financial Disclosures (Feb 2020), the SIF half-yearly report (Aug 2020), and the NGFS Guide to climate scenario analysis for central banks and supervisors (Jun 2020)

Insurers can also enhance their assessment of risks and opportunities related to possible economic transitions that climate change may trigger. This project has evaluated methods for these types of risks as well, starting with developing samples of qualitative risk pathway approaches. Financial analyses of several case studies are being carried out to demonstrate how insurers can progress beyond qualitative assessments and growth-centric market predictions when the data supports it.

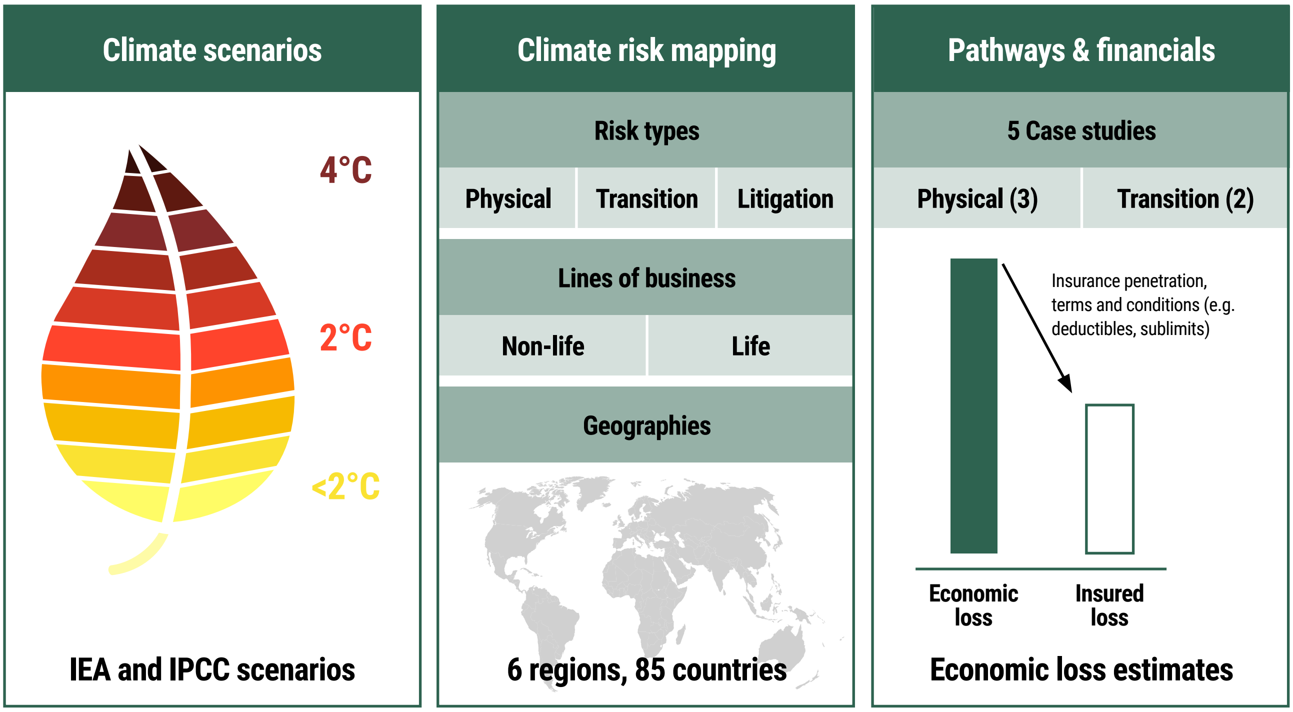
Furthermore, the project is evaluating climate change-related litigation risks, although it is important to note that, according to the literature review conducted to date for this project, insurers and insurance coverages have not yet paid out claims based on climate change litigation.

2. Aims of the PSI-TCFD pilot project

The overall aim of this PSI-TCFD pilot project is to contribute to the development of consistent and transparent analytical approaches that can be used to identify, assess and disclose climate change-related risks and opportunities in insurance portfolios in a forward-looking, scenario-based manner. Climate change risk assessment based on forward-looking information and climate change scenarios is a central component of the TCFD recommendations, and is arguably the most challenging to implement.

Insurers are generally comfortable with quantitative assessments of physical risks traditionally based on historical data. Transition risks and potential litigation risks need further research, as their assessments usually rely on more qualitative information due to uncertainty in future trends.

Overall, the project specifically aims to help insurers develop approaches to scenario-based risk and opportunity analyses and disclosures, but it does not aim to represent a comprehensive solution to this critical issue. In particular, the financial analyses performed in the context of this project focus on economic losses (i.e. losses before the application of insurance policy terms and conditions). The specificities associated with various insurance schemes and structures are dealt with differently across companies and are usually of a proprietary nature. The work that has been conducted is therefore a first step in the direction of a comprehensive solution for insurance portfolio-wide climate change assessment and disclosure. Standardising the analytical framework across risk types within a common disclosure framework has yet to be considered.



3. Methodology and initial results

There is increasing action by the insurance industry, as well as rising expectations from insurance supervisors and regulators, investors, civil society organisations and other key stakeholders, for risk management processes to include the identification, assessment, management and disclosure of climate change-related risks and opportunities. The methodologies introduced in this progress update are focussed on climate change risk identification and assessment.

For this project, the first step was to evaluate how to select climate change scenarios, which help frame future time windows and magnitudes of potential impacts.

The second step was to evaluate how to create global risk relativities for both physical and transition risks by combining current risk and opportunity hotspots and forward-looking information. This step can help identify risk types, key zones of materiality, and timeframes for more detailed analysis.

The ongoing third step is to explore the development of financial analysis for risk and opportunity hotspots by using case studies. This method applies to physical and transition risks, and may apply to possible litigation risks if material to the insurance industry.

3.1 Climate change scenarios

One of the first steps to identify climate-related risks is to select climate change scenarios. Scenarios aim to combine hazard projection, economic, technology and policy considerations to estimate consistent and coherent future, potential world views. Scenarios describe development pathways leading to particular outcomes. They are hypothetical constructs—rather than forecasts or predictions—which aim to highlight key factors that will drive future developments.[3] For physical risks, they project possible future greenhouse gas emissions, temperatures, acute and chronic weather conditions, and estimate economic conditions linked to specific global warming pathways. Changes in exposures and vulnerability, which are needed for insurance portfolio assessments, are not explicitly included. Insurers should consider a range of scenarios as prevailing risks are likely to differ based on different underlying conditions. Furthermore, prerequisites, assumptions, limitations and weaknesses of models and/or scenarios should be carefully considered when evaluating climate-related risks and opportunities.

The project has focussed on three distinct climate change scenarios:

A rapid energy transition achieving a well-below 2°C target, with a focus on transition risks (based on IEA scenarios)	A 2°C target, analysing both transition and physical risk impacts (based on RCP4.5 scenario)[4]	"Business as usual" potentially leading to a 3–4°C increase relative to pre-industrial levels, with a focus on physical risks (based on RCP8.5 scenario)

3 www.tcfdhub.org/scenario-analysis

4 RCP4.5 used in this context has a mean temperature projection of 1.8°C in the period 2081–2100

The project assumes that development pathways leading to global temperatures remaining well below 2°C over pre-industrial levels would experience less adverse physical impacts than pathways with higher global temperatures. The brunt of the impact would instead be in changes resulting from the energy transition. While this may not be entirely accurate, it is an appropriate assumption given the principle of materiality underlying the TCFD recommendations. Conversely, in a business-as-usual scenario, the project assumes that physical risks will be more material than transition risks, so the analysis focuses on physical risks in such a scenario. The third scenario, with a global average temperature increase of about 2°C, considers the impact of both physical and transition risks. To achieve this target, significant energy and societal transformations are likely to take place, but they are not expected to be sufficient to avoid major physical impacts.

Scenario	Risk type	Timeframes	Scenario source
Well-below 2°C target	Transition risks	2030	IEA ETP 2017 well-below 2°C Scenario (WB2D) WEO 2018 Sustainable Development Scenario (SDS)
2°C target	Transition and physical risks	2030 (both), 2050 (physical)	IEA ETP 2017 2°C Scenario (2DS) WEO 2016 450 Scenario IPCC RCP4.5
3–4°C Target	Physical risks	2030, 2050	IPCC RCP8.5

For physical risks, the scenarios that were selected are from the Intergovernmental Panel on Climate Change (IPCC) Fifth Assessment Report (AR5). IPCC is the leading reference for physical risk scenarios and therefore a natural choice in the context of this study. Throughout scientific literature, projections of greenhouse gas emissions to the end of this century vary substantially. Therefore, the IPCC defines four Representative Concentration Pathways (RCPs). The RCPs capture different pathways of greenhouse gas concentrations in the atmosphere throughout this century, and analyse the resulting changes in global temperatures, precipitation and various climate hazards against pre-industrial levels. RCP4.5 and RCP8.5 were selected for the physical risk analysis in this project. The IPCC RCP4.5 scenario was chosen as an intermediate emissions scenario, while the RCP8.5 scenario was used to model a business-as-usual scenario (AR5 synthesis, TCFD scenarios supplement). This project acknowledges that in IPCC AR5, the only RCP scenario meeting the 2°C target within the timeframe considered in this project, is RCP2.6, while RCP4.5 results in temperatures exceeding the 2°C target, and RCP8.5 results in temperatures exceeding the 4°C limit that might be seen as unlikely based on recently published work.[5]

5 An assessment of Earth's climate sensitivity using multiple lines of evidence https://agupubs.onlinelibrary.wiley.com/doi/abs/10.1029/2019RG000678

For transition risks, scenarios were selected from the International Energy Agency (IEA).[6] IEA scenarios reflect various target temperatures using assumptions for energy production, growth in demand, and changes in the technology landscape. They are well suited for stress-testing purposes and enable the analysis of a broad range of possible impacts to business. Released in 2017, the latest IEA climate change scenarios are as follows:

Current Policies Scenario (2.7°C)	Stated Policies Scenario (2°C)	Sustainable Development Scenario (SDS) (well below 2°C)

IEA scenarios are peer-reviewed, allow analysis at the sub-sector level (which is needed for the analysis of individual policyholder types by line of insurance business), and are readily accessible. The Energy Technology Perspective 2017 (ETP) well-below 2°C and 2°C scenarios, as well as the World Energy Outlook WEO 2018 (WEO) Sustainable Development Scenario (SDS), were used for this project.

The IEA SDS scenario aims to reflect global temperature increases well below 2°C[7] over the pre-industrial period by the end of this century. It achieves this result by reducing CO_2 emissions to about 10 gigatonnes (Gt) by 2050, and reaches the state of net-zero emissions by 2070. The scenario excluding carbon removal technology brings the global temperature to 1.65°C increase by 2100.[8] Additional temperature decreases can be achieved with a more rapid integration of carbon removal technology, essentially creating a negative emission situation in the latter part of the century. ETP 2017 released a set of scenarios for which the IEA explicitly evaluated how far clean technologies could help in moving the energy sector towards higher climate change ambitions.

The analysis was conducted over two timeframes—2030 and 2050. 2030 was selected to represent a 10-year business planning window. 2050 is representative of longer term societal impacts and therefore more relevant in the context of mitigating and adapting to climate change.

3.2 Climate change risk heat maps

For this project, the second step of the approach was determining risk relativities to help focus on key climate-related physical and transition risk and opportunity hotspots. This was done by using heat maps based entirely on publicly available and widely recognised industry data, particularly given the pre-competitive nature of this project. It can therefore be readily tested or reproduced by market participants and by supervisory and regulatory authorities. However, this approach does not explicitly take into account individual insurers' exposures, which is beyond the scope of this project. Any individual company assessment would need to take their own portfolio and risk exposure profile into account to support risk prioritisation. The approach that was developed enables insurers to integrate their own risk exposure data in order to identify risk and opportunity hotspots within their own portfolios.

6 Other scenario sources exist and have been used in framing UNEP FI-TCFD pilot projects on banking and investment. For example, the Potsdam Institute for Climate Impact Research (PIK) & the International Institute for Applied System Analytics (IIASA) regularly release scenarios that are used to support financial analysis. Please refer to the UNEP FI banking and investment reports for more details on these scenarios.

7 The 2019 WEO states that the SDS charts a path fully aligned with the Paris Agreement, including pursuing efforts to limit temperatures to 1.5°C. IEA (2019), World Energy Outlook 2019, OECD Publishing, Paris, p. 23.

8 IEA scenarios have been chosen to provide sub-sectoral granularity in a sufficient manner. While the project acknowledges that the SDS would not fully achieve the 1.5°C target, it currently represents the best available source for sub-sectoral granularity.

a. Physical risks

To produce the physical risk heat map (see figure below), data for nine physical hazards[9] was aggregated and ranked on a cross-geography, cross-scenario, and cross-timeline basis. Higher-hazard exposures received higher rankings and the resulting heat map illustrates each country's relative magnitude of exposure to the nine physical hazards. This output was then combined with data to represent vulnerability[10] and exposure[11] to inform risk and opportunity hotspots across geographies, hazards, scenarios and timeframes. All data that was used in this study is publicly available.

9 World Bank Climate Change Knowledge Portal; INFORM GRI 2020; Global emergence of anthropogenic climate change in fire weather indices. Abatzoglou *et al.* (2018); Long-Term Macroeconomic Effects of Climate Change: A Cross-Country Analysis. Kahn *et al.* (2019); Evolving Understanding of Antarctic Ice-Sheet Physics and Ambiguity in Probabilistic Sea-Level Projections. Kopp *et al.* (2017)

10 ND GAIN data (Notre Dame Global Adaptation Initiative - Country Index)

11 Insurance penetration data (Swiss Re Sigma Report No. 3/2019)

The table below provides a snapshot of the physical risk hazard heat map output, showing the result for a sample of countries for 2030 and 2050 and several climate change response pathways (as represented in the IPCC scenarios RCP4.5 and RCP8.5).

Country	Time	Scenario	Heatwave	Coldwave	Drought	General/ River flood	Flash flood	Cyclones	Fire	Sea level rise	Chronic tempera-tures
Australia	2030	2DS	Low	High	Medium	Low	Medium	High	No data	Medium	Low
Australia	2030	4DS	Low	High	Medium	Medium	Medium	High	No data	Medium	Medium
Australia	2050	2DS	Low	Medium	Medium	Medium	Medium	High	No data	High	Medium
Australia	2050	4DS	Medium	Medium	High	Medium	High	High	Medium	High	High
Canada	2030	2DS	Low	High	Low	Medium	Medium	Medium	No data	Low	Medium
Canada	2030	4DS	Low	Medium	Low	Medium	Medium	Medium	No data	Low	High
Canada	2050	2DS	Low	Medium	Low	Medium	Medium	Medium	No data	Medium	Medium
Canada	2050	4DS	Medium	Low	Low	High	Medium	Medium	Medium	Medium	High
Germany	2030	2DS	Low	High	Low	Low	Low	Not impacted	No data	Low	Low
Germany	2030	4DS	Low	Medium	Low	Medium	Low	Not impacted	No data	Low	Medium
Germany	2050	2DS	Low	Medium	Medium	Medium	Low	Not impacted	No data	High	Low
Germany	2050	4DS	Medium	Low	Medium	High	Low	Not impacted	Medium	High	Medium
Japan	2030	2DS	Low	High	Low	High	High	High	No data	Medium	Medium
Japan	2030	4DS	Medium	High	Low	Medium	High	High	No data	Medium	Medium
Japan	2050	2DS	Medium	Medium	Low	High	High	High	No data	High	Medium
Japan	2050	4DS	High	Medium	Low	High	High	High	Medium	High	High
Kenya	2030	2DS	High	Medium	Low	Medium	Medium	Not impacted	No data	Medium	Low
Kenya	2030	4DS	High	Medium	Low	High	Medium	Not impacted	No data	Medium	Medium
Kenya	2050	2DS	High	Medium	Low	High	Medium	Not impacted	No data	High	Low
Kenya	2050	4DS	High	Low	Low	High	High	Not impacted	Low	High	Medium
UK	2030	2DS	Low	High	Low	Low	Low	Not impacted	No data	Low	Low
UK	2030	4DS	Low	High	Low	Medium	Low	Not impacted	No data	Low	Medium
UK	2050	2DS	Medium	Medium	Low	Medium	Low	Not impacted	No data	Medium	Low
UK	2050	4DS	Medium	Low	Medium	High	Medium	Not impacted	Medium	Medium	High

High hazard rating
Medium hazard rating
Low hazard rating
No data available
Not impacted by hazard

This method, when implemented using an insurers' portfolio exposures and in-house high resolution hazard information, can help determine where their regional business stands in terms of risk exposure compared to global trends. It can also help a company decide which perils or lines of business may be more materially impacted and therefore help them assign analytical resources efficiently. Finally, it can serve as an additional tool to explore potential growth strategies, particularly in areas where insurers may not have proprietary data to rely on.

Being global in nature and given the type of data used to support the analysis, the heat map method is not intended to capture risk at a high resolution. Given the country resolution, detailed changes in risk geography may not be captured, particularly in large geographic markets. For example, recent publications covering the northern and southern hemispheres have shown that the average track of tropical cyclones in some basins has shifted polewards.[12] In a large geographic area, the aggregate view might be that the risk decreases, when in fact it might be increasing as the new average track distribution might make it more likely for storms to cross high exposure areas, for instance. The opposite might happen as well, creating relative opportunities to grow an insurance portfolio.

12 Kossin *et al.*, 2014: The poleward migration of the location of tropical cyclone maximum intensity. In Nature 509 (7500): 349–52. See also the IAG and NCAR report, Severe weather in a changing climate (Nov 2019)

Given constraints in data availability, correlations between risks across different geographic markets or risk sources were not analysed. For example, flood risk is expected to be affected in many areas. Under certain conditions, such as those created by El Niño or La Niña, large-scale spatial correlations in flood risk may change as a result of climate change.[13] Modelling individual countries separately could miss peak-risk conditions. Conversely, the omission of negative correlations may result in conservative outcomes. It is important to note that catastrophe models generally capture risks in countries and for perils individually. Therefore, a quantitative framework from spatial and peril correlations could also be part of the approach.

b. Transition risks

Unlike physical risks, the quantitative analysis of transition risks relies on forward-looking information on potential future market changes, technology shifts and regulatory updates that could trigger a change in business dynamics. This is inherently based on assumptions directly derived from the climate change scenario selected, but may not necessarily reflect potential rapid changes, particularly after major catastrophic events, for example. The scenario provides information about the required decarbonisation, translating into market, technological and regulatory changes in an interdependent manner across sectors. Changes in those parameters are mostly based on transformations in energy and food systems, as well as other macroeconomic variables such as population and GDP growth. While forward-looking information is commonly used in the insurance industry for financial projections and the pricing of long-tail risks, its use in risk management frameworks is less widespread, and therefore presents new opportunities to better understand and manage climate-related risks.

The analytical framework presented for transition risks provides an overview of potential risk and opportunity hotspots on a global level that is applicable to all insurers. Heat maps indicate impacts on potential financially material lines of insurance business, sector and geography combinations based on underlying value chain analysis and subsequent changes in profitability compared to the average economic growth. Therefore, heat maps serve as an initial basis to focus analytical efforts on a further, more detailed review of sector drivers, and to understand which lines of business are likely to be most affected by underlying sector dynamics.

13 https://www.pnas.org/content/111/44/15659

	Line of business	Economic sector / Geography (regional level) — Preferably to be considered jointly
Objective	▪ Understand which lines of business are impacted by region- and sector-specific transition risks	▪ Scenario interpretation: How do global, regional and national dynamics impact economic sector performance, i.e. impact on the regionally different build out of electric vehicles, changing global battery costs, differential trade development and thus impact on the construction of warehouses etc. ▪ Development of financial indicators for insurance business impacts: a) volume impact (number of policies), b) volume-driven change in profitability, and c) volume-driven change in sum insured
What we did	▪ Development of an assessment matrix ▪ Identification of sector risks per line of business on a global level	▪ Analysis of extent of regionality of impacts for sectors across scenarios ▪ For each insurance product, highlighting of regions and sectors differing from the global trend (general materiality assessment)
Potential for individualisation	▪ Review own business today and in the future by geography and product / line of business ▪ Frame the heatmap correspondingly ▪ Include individual profitability expectations	▪ Conduct an individual weighting of the results ▪ Use individual historical damage and claims data to understand volume-driven financial impacts stemming from a change in risk concentration or technological characteristics of insured assets

Climate-related transition risk heat maps were derived by identifying sector risks per line of insurance business at a global level and individual regional developments within sectors. Global insurance impacts were then aggregated, highlighting regions and sectors with risks and/or opportunities differing from the global trend (see sample of heat map on the next page). Insurers have the opportunity to tailor heat maps to their specific needs (e.g. own profitability or market expansion plans) and business context. For this project, the heat maps contributed to the selection of case studies by reflecting how transition risks might affect the market outlook across insurance lines and products.

Clientele	Line of business	Heatmap	Risks (sector)	Opportunities (sector)	Risks (region)	Opportunities (region)	Disruptive impacts
Corporate	Agricultural		Meats	N/A	Agriculture (EU, NA), meats (high risk globally)	N/A	Meats
Corporate	Aircraft		N/A	N/A	Air (EU)	Air (NA, AP)	Air
Corporate	Construction		Construction materials	N/A	Risks across all regions	N/A	Construction materials
Corporate	Energy		Fossils (oil, gas and coal)	N/A	Risks across all regions	N/A	N/A
Corporate	Hull/ transport		N/A	Rail, trucking services, maritime transportation	N/A	Rail (AP), trucking services (AP, ME), maritime transportation (global)	Air, maritime transportation, rail, trucking services
Corporate	Motor		N/A	Automobiles	N/A	Global	Automobiles
Corporate	Property		Fossils (oil, gas and coal), cement construction materials, meats	Maritime transportation, truck manufacturing, automobiles	Automotive components (AP, EU, NA), real estate (EU), agriculture (EU, NA)	Chemicals (LA)	Air, maritime transportation, rail, trucking services, truck manufacturing, automotive components, chemicals, real estate, beverages, meats, packaged foods
Corporate	Liability		Fossils (oil, gas and coal), cement construction materials, meats	Maritime transportation, truck manufacturing, automobiles	Automotive components (AP, EU, NA), real estate (EU), agriculture (EU, NA)	Chemicals (LA)	Fossils (oil, gas and coal), trucking services, automobiles, chemicals
Personal	Motor		N/A	Automobiles	N/A	Opportunities across all regions	Automobiles
Personal	Property		Real estate	N/A	EU	N/A	Real estate

Potential risk
Potentially resilient
Potential opportunity

AF: Africa
AP: Asia Pacific
EU: Europe
LA: Latin America
ME: Middle East
NA: North America

2.0°

2030

Overall, transition risks are more difficult to analyse than physical risks due to the number of assumptions involved and the level of uncertainty associated with the outcomes. At the same time, societal transitions provide insurers with opportunities to create new insurance products and services. Most policyholders are directly affected by societal transitions which, in turn, impact insurance product offerings. It would be ideal to analyse a range of possible assumptions under the framework of climate change scenarios, resulting in a range of possible outcomes. Explanations on assumptions (as detailed in the scenarios) can then be used to qualitatively describe how the outcome may change under different conditions. Furthermore, case studies are being used to highlight key methodological elements that can help quantify and disclose risks.

3.3 Case studies of financial risk analysis

Heat maps can help insurers determine risk and opportunity hotspots. These hotspots then need to be evaluated with a more detailed risk assessment methodology, including quantitative analysis, where possible, to understand risk drivers and impact chains on insurance product performance.

The methodology developed for this project includes an assessment of risk factors material to a case study, such as event frequency and severity for physical risks, and macroeconomic trends for transition risks. This assessment is generally qualitative and includes a pathway analysis, which will be discussed in detail in the project's final report. Thereafter, quantitative analysis can be performed to derive economic impacts, where possible. In insurance terms, the metric derived is called "ground-up loss", which corresponds to the total economic loss covered by insurance prior to the application of insurance policy terms and conditions (e.g. deductibles, sublimits). The application of specific insurance policy terms and conditions is, in general, proprietary to each insurer and therefore out of scope for this pre-competitive project involving 22 insurers and reinsurers.

This project has applied the methodology described above to five case studies—three on physical risks and two on transition risks—spanning different regions, perils and insurance lines. The physical risk case studies cover flood and tropical cyclone risks, while the transition risk case studies cover impacts and opportunities in the real estate and energy sectors. The results will be discussed in the upcoming final report.

3.4 Litigation risks

Initial work has been carried out on litigation risks. This includes an overview of litigation risks in the context of insurance company activities at the business and corporate levels, a literature review of cases brought against governments that may suggest lessons for the insurance industry, and a discussion on a potential framework that can be used by insurers to better understand and assess litigation risks. Such an assessment framework could include factors such as:

The likelihood that a litigation will be brought	The chance the case will rule in favour of the plaintiff	The cost of the remedy sought

It is important to note that, according to the literature review conducted to date for this project, insurers and insurance coverages have not yet paid out claims based on climate change-related litigation. This observation applies mainly to North America and Europe. Limited information has been available so far for this project with respect to other regions and jurisdictions.

In order to better understand climate-related litigation risks to the insurance industry, a working group has been established, comprising a subset of insurers involved in this project.

4. Next steps

This progress update on the PSI-TCFD pilot project discussed the general analytical framework, the selection of climate change scenarios, and a heat-mapping methodology to identify key climate-related risk and opportunity hotspots. Combined with an understanding of current key risk areas, this work has informed the selection of case studies in order to help the insurance industry develop methods to assess climate change-related financial impacts. The results of the financial analyses on these case studies along with other key findings and insights, will be presented in the project's final report, which is scheduled to be published by the end of 2020.

The 22 insurers and reinsurers participating in this PSI project to pilot the TCFD recommendations are listed below together with their respective countries of domicile:

Allianz (Germany)
Aviva (UK)
AXA (France)
Desjardins (Canada)
Generali (Italy)
IAG (Australia)
ICEA LION Group (Kenya)
Intact (Canada)
MAPFRE (Spain)
MS&AD (Japan)
Länsförsäkringar (Sweden)
Lloyds Banking Group (UK)
Sompo Japan (Japan)
Munich Re (Germany)
NN (The Netherlands)
QBE (Australia)
Storebrand (Norway)
Swiss Re (Switzlerand)
TD Insurance (Canada)
The Co-operators (Canada)
Tokio Marine (Japan)
Zurich (Switzerland).

With valuable advice to the pilot group and review by PwC GmbH WPG (Germany) with support from PricewaterhouseCoopers LLP (UK) and PricewaterhouseCoopers AG (Switzerland). The litigation work of this project is being supported by the Sabin Center for Climate Change Law at Columbia University in the USA.

For more information, please contact:

Butch Bacani (butch.bacani@un.org)
Manuel Lonfat (manuel.lonfat@un.org)
Kai Remco Fischer (kai.fischer@un.org).