

# **Draft Application Paper on climate scenario analysis in the insurance sector**

**November 2023**



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International Association of Insurance Supervisors  
c/o Bank for International Settlements  
CH-4002 Basel  
Switzerland  
Tel: +41 61 280 8090

This document was prepared by the Climate Risk Steering Group (CRSG) in consultation with IAIS members.

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## Acronyms

ACPR	Autorité de contrôle prudentiel et de résolution (French Prudential Supervision and Resolution Authority)
APRA	Australian Prudential Regulation Authority
BoE	Bank of England
BMA	Bermuda Monetary Authority
EIOPA	European Insurance and Occupational Pensions Authority
ERM	Enterprise risk management
FSB	Financial Stability Board
GHG	Greenhouse gasses
IAIG	Internationally active insurance groups
ICP	Insurance Core Principle
IEA	International Energy Agency
IPCC	Intergovernmental Panel on Climate Change
MAS	Monetary Authority of Singapore
NGFS	Network for Greening the Financial System
ORSA	Own risk and solvency assessment

# 1 Introduction

1. Climate change is a source of financial risk, which has the potential to impact the resilience of individual insurers<sup>1</sup> and financial stability<sup>2</sup>. It poses risks to both sides of insurers’ balance sheets. It will result in significant economic and social change globally. Current failures to implement agreed policies to move to net zero increase both the physical and transition risks to which insurers are exposed. As a result, climate change is a key strategic theme for the IAIS. In May 2021, the IAIS published an initial Application Paper on the Supervision of Climate-related risks in the Insurance Sector (“2021 Application Paper”).<sup>3</sup> Since then, the IAIS has closely monitored developments in global climate change mitigation efforts, climate science and how supervisory practices to manage climate-related risks have evolved. In 2022, the IAIS performed a gap analysis of existing IAIS supervisory material to assess how climate risk is already captured and to identify possible further work in terms of standard setting and/or providing further guidance on supervisory practices. This is the second in a series of consultation documents.
2. The focus for this paper is the use of climate-related scenario analysis by both supervisors and insurers to understand the risks to which the insurance sector is exposed at a micro- and macroprudential level. The paper considers why and how climate-related scenario analysis exercises should be used and the extent to which they can overcome some of the shortcomings of existing methods for assessing risks. It does not consider the development of climate scenarios themselves, which are issues to be considered by bodies such as the Network for Greening the Financial System (NGFS).
3. This application paper focuses in particular on how climate-related scenario analysis should be considered in light of the standards set out in the Insurance Core Principles (ICPs) 16 (Enterprise Risk Management for Solvency Purposes) and 24 (Macroprudential Supervision). In particular:

**Table 1 Overview of ICP standards discussed**

ICP	Topic	ICP	Topic
16.2	Risk quantification	24.1	Scenario analysis data collection
16.3	Risk appetite	24.2	Sector analysis
16.4	Risk appetite statement	24.3	Assessing systemic importance
16.5	Asset and liability management	24.4	Supervisory response
16.6	Investment policy	24.5	Transparency
16.7	Underwriting policy		
16.10	Own risk and solvency assessment (ORSA)		
16.11	Board accountability		
16.12	Performing ORSA		
16.14	Time horizons		

<sup>1</sup> Paragraph 7 of the Introduction to the ICPs notes “Generally, the ICPs are equally applicable to the business of insurers and reinsurers. Where the ICPs do not apply to reinsurers, this is indicated in the text”. Therefore, broadly in this Application Paper any reference to insurance covers both primary insurers and reinsurers. However, where necessary the text will distinguish between these.

<sup>2</sup> [The macroeconomic and financial stability impacts of climate change: research priorities | Banque de France \(ngfs.net\)](https://www.ngfs.net/en/about-us/our-work/our-research/the-macro-economic-and-financial-stability-impacts-of-climate-change-research-priorities)

<sup>3</sup> <https://www.iaisweb.org/uploads/2022/01/210525-Application-Paper-on-the-Supervision-of-Climate-related-Risks-in-the-Insurance-Sector.pdf>

4. Climate-related scenario analysis is still in its early stages as a risk assessment tool but continues to evolve rapidly and, for this reason, the IAIS expects to supplement this work in the coming years as new tools, techniques and data becomes available. It also means the utility of climate-related scenario analysis will increase over time as data gaps are filled, the relationship between climate risks and financial risks is better understood and the capacity of supervisors and insurers improves.
5. The use of scenario analysis as a supervisory tool should be proportionate to the supervisor's assessment of the current uncertainty and limitations of scenario analysis (and the confidence in the validity of assumptions).
6. The IAIS is also working with partners including the Financial Stability Institute of the Bank for International Settlements to support capacity building of insurance supervisors as this field of work develops. It will continue to support members and an international dialogue in this evolving area.

## 2 Scenario analysis versus stress testing

7. As noted above, this application paper focuses on the role of climate-related scenario analysis within ICP 16 (Enterprise Risk Management for Solvency Purposes) and ICP 24 (Macroprudential Supervision). The IAIS distinguishes scenario analysis from stress testing as follows:
  8. Stress testing is defined in the IAIS Glossary as:

“A method of assessment that measures the financial impact of stressing one or more factors which could severely affect the insurer.”

Although climate-related stress testing is not the focus of this Application Paper, the concepts described in the paper may also be relevant for stress testing exercises.
  9. Meanwhile, scenario analysis is defined as:

“A method of assessment that considers the impact of a combination of circumstances to reflect historical or other scenarios which are analysed in light of current conditions. Such analysis may be conducted “deterministically or stochastically.”<sup>4</sup>
10. Climate change is a driver of existing risks and therefore supervisors expect insurers to consider the potential impact of climate change when assessing the existing risk categories. Given the long-term nature of the risk, the significant impact it will have on economies and the dynamics of physical, transition and climate-related litigation risks, it is well suited to scenario analysis. However, historic data is not a good predictor of risks because climate change is an emerging phenomenon and because its effects are nonlinear. As a result, when conducting scenario analysis, supervisors should ensure that scenarios are sufficiently forward-looking to capture the specifics of climate change. These considerations add significant additional complexity to this task. As a result, supervisors need to consider the proportionality of exercises.

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<sup>4</sup> The IAIS Glossary defines a deterministic scenario as “An event, or a change in conditions, with a set probability in which the underlying assumptions are fixed”. It defines stochastically as: “A methodology which aims at attributing a probability distribution to certain financial variables. It sometimes uses closed form solutions, often involves simulating large numbers of scenarios in order to reflect the distributions of the capital required by, and the different risk exposures of, the insurer.”

## 2.1 Identifying and applying climate change risk drivers

11. Climate change is a driver of existing risks. To understand how climate change may impact the insurance sector, it is important for supervisors and insurers at all levels to both understand the transmission channels for climate-related risks and to keep abreast of scientific climate change developments.
12. Table 2 below, for the purposes of this paper sets out definitions for some key issues that are discussed:

**Table 2 Definitions**

Term	Definition
Climate change	A change in the state of the climate that can be identified by changes in the mean and/or the variability of its properties and that persists for an extended period, typically decades or longer.
Climate-related risk/Climate risk <sup>5</sup>	Risk posed by the exposure of an insurer to physical, transition and/or liability risks caused by or arising from climate change.
Climate-related litigation risk	Cases brought before judicial and [quasi-judicial] bodies that raise issues of law or facts regarding the science of climate change and climate change mitigation and adaptation efforts. <sup>6</sup>
Physical risk	Physical risks, including both longer-term changes in climate (chronic risk) as well as changes to the frequency and magnitude of extreme weather events (acute risk), can cause direct damage to assets or property, changes to income and costs, and changes to the cost and availability of insurance.
Transition risk	Transition risks include risks related to changes in domestic and international policy and regulatory settings, technological innovation, social adaptation and market changes, which can result in changes to costs, income and profits, investment preferences and asset viability.

13. Climate-related scenario analysis exercises can be used to identify and assess emerging risks that may arise over time and use that information to make forward-looking business strategy and investment decisions. For example, certain assets may present increased risks if those sectors become negatively impacted by policy shifts or technological changes related to climate change. Climate-related scenario analysis can highlight these risks so that insurers can take appropriate action to effectively and proactively manage them. Insurers could also use scenario analysis to guide and prepare for changes that may be needed to their investment limits framework.
14. Similarly, climate-related scenario analysis can be an impactful tool for managing underwriting risks. Non-life insurers could use scenario analysis to measure the compounding impact of several catastrophe risk perils occurring consecutively in short order. For example, heavy precipitation causing floods is followed by extreme drought conditions causing wildfires, with the pattern repeating itself in the following years. Climate change is projected to increase the frequency and severity of these compounding extreme weather events, and some geographical regions have experienced similar weather manifestations already.

<sup>5</sup> These terms are used interchangeably in this paper.

<sup>6</sup> [CFRF: Scenario analysis working group: climate litigation risk chapter \(fca.org.uk\)](https://www.fca.org.uk/scenario-analysis-working-group-climate-litigation-risk)

15. Climate-related litigation risks are emerging in various jurisdictions across the globe and are similar to both transition and physical risks in that they can reduce asset values and create additional costs for insurers (including legal fees) through rising claims for business lines such as directors’ and officers’ cover. They arise from a variety of bases such as environmental damage, human rights violations, greenwashing or simply failure to disclose climate exposures. The materiality of these risks is not currently clear, however large settlements could pose financial risks for insurers. Equally, the likelihood and impact of this risk is highly influenced by local legal regimes. In some jurisdictions, class actions may present significant risks for corporates while for others there may be little risk. In considering these risks in scenario analysis, it will therefore be important for supervisors and insurers to be clear on the specific climate-related litigation risks posed in the jurisdictions in which the insurer operates.
16. Efforts to address climate change are accelerating globally although progress is currently falling behind internationally agreed targets, which poses significant risks for insurers. New approaches and technologies to address climate-related risks are emerging at a rapid pace. Supervisors should consider including both downside scenarios in which the greenhouse gas (GHG) emissions stay elevated resulting in extreme physical risks, like the Current Policies scenario,<sup>7</sup> and other scenarios under which the transition to a lower emissions economy is achieved in a smooth manner, like NGFS’ Orderly Net Zero 2050 scenario. Finally, they should also consider scenarios in which the most extreme physical risks are avoided at the cost of a disruptive transition, such as the Delayed Transition scenario. In all scenarios, insurance markets will be impacted and, therefore, the focus is not on “if” insurers will be impacted but “when” and “how much” they will be impacted. Insurers should also assess the need to adjust publicly available scenarios to meet their needs to better understand emerging climate risks, but in doing so should document these modifications in disclosures.
17. Climate-related scenario analysis, when designed and implemented appropriately, is a tool that can help insurers build resiliency in their business models over the long-term, spanning multiple decades, which goes beyond the regular business planning cycle.
18. The table below provides a non-exhaustive set of examples of the risks that can be identified and assessed using scenario analysis for different lines of business:

**Table 3 Climate risks by business line**

Type of insurance business	Examples of physical risk impact	Examples of transition risk impact
All types of business	<ul style="list-style-type: none"> <li>• Impact of a certain Natural Catastrophe (NatCat) risk perils on both sides of the balance sheet. For instance, where an insurer may hold mortgage-backed assets on their balance sheet in a region exposed to NatCat risk and have an underwriting exposure to properties in the same region. As a result, both sides of the balance sheet are exposed to the same risk.</li> </ul>	<ul style="list-style-type: none"> <li>• Assets may lose value and liquidity due to climate-related policy shifts, changes in consumer demand or technological changes, especially in a delayed transition scenario.</li> <li>• Insurers may face reputational risks and/or government policy intervention as a result of insuring certain emissions</li> </ul>

<sup>7</sup> <https://www.ngfs.net/ngfs-scenarios-portal/>



	<ul style="list-style-type: none"> <li>• Corporate bond and equity exposures on insurers' balance sheets may be subject to increased credit risk as a result of physical risks to these issuers. For example, supply chain disruption because of a storm may impact profits and increase the risk of default.</li> <li>• Increased frequency and severity of certain catastrophe risk perils can negatively impact the value of certain asset classes, like real estate lending and infrastructure investments.</li> </ul>	<p>intensive sectors, which may reduce certain business lines.</p> <ul style="list-style-type: none"> <li>• Long-lived assets may lose value and liquidity due to climate-related policy shifts or technological changes.</li> <li>• Real estate investments may face transition risks. For instance, buildings with low energy efficiency may be prone to transition risks, if new regulation forces all properties to meet certain higher sustainability standards, leading to either stranded assets or significant investments to meet the higher standard.</li> </ul>
Non-life specific	<ul style="list-style-type: none"> <li>• Increased frequency and severity of NatCat perils on liabilities (and its impact on the damage function used to translate perils impacts to financial losses).</li> </ul>	<ul style="list-style-type: none"> <li>• As economies transition to net zero, key markets such as car insurance will change. As these changes occur, insurers will need to understand the impact on their underwriting risks. For instance, the move to electric vehicles will present different fire risks to vehicles powered by combustion engines.</li> </ul>
Life specific	<ul style="list-style-type: none"> <li>• Chronic physical risks like heat waves or persistent droughts can lead to increased or altered mortality and morbidity experience, impacting underwriting risks.</li> <li>• Life insurers in particular may have significant sovereign asset exposure creating a sovereign/insurer nexus. This depends on the intrinsic exposure of a jurisdiction to physical risk events (for instance, the debt of jurisdictions most exposed to a rise in sea levels may suffer in case of a global warming quicker than anticipated).</li> </ul>	
Health specific	<ul style="list-style-type: none"> <li>• Increased heat and moisture content in the atmosphere can increase or alter the likelihood of breakouts of water borne diseases like malaria and increase infectious diseases, etc. Global warming will increase zoonotic transfer of diseases and increase the probability of infectious disease pandemics.</li> </ul>	

19. Climate-related litigation risk scenarios could involve assessing underwriting liabilities (claim settlement, for instance, from directors' and officers' policies and legal costs) that a corporate could incur as a result of climate litigation. Or it could consider the extent to which litigation risk is adequately captured in the assessment of investment risks (eg on corporate bonds and equity), and the extent to which insurers could be liable for some of these losses; including the insurers' view on the robustness of any explicit contract exclusions in place.
20. While climate risk will be universal, risk factors will be jurisdiction-specific. Physical impacts will be regional or even more local. Transition risks will be driven by a range of national factors (eg the ambition of governments on net zero transition plans) and legal liability risks will vary depending on the local legal system. Supervisors will therefore need to understand these dynamics and ensure they are factored into scenario design.

### **3 Scenario analysis objectives and scenario design (ICP 24 and 16)**

#### **Context**

21. This section provides guidance on how supervisors could consider data collection within the context of climate-related scenario analysis (ICP 24.1), how it could be a tool to support sector-wide analysis (ICP 24.2) and relevant time horizon considerations for climate-related scenario analysis, including considerations within the insurer's ORSA related to time horizons (ICP 16.14). ICP 24.1 is embedded across Section 5 whilst ICP 24.2 is covered in Section 3.2.

#### **Recommendations**

##### **3.1 Objectives of climate-related scenario analysis exercise**

22. It is important to clearly define the objectives of the exercise from the onset. Supervisors will need to make this decision based upon their knowledge of the insurance sector they supervise, as developing an effective scenario will be specific to the characteristics of that market or the insurers that will be within the scope of the exercise. The objectives of the exercise will also depend on the supervisory mandate and may differ depending on whether it includes a microprudential, macroprudential and/or conduct supervisory mandate. As described in section 4.1.1, climate-related scenario analysis may, for instance, help assess protection gaps (see Box 2), which is relevant for both conduct and prudential supervisors. It may also help assess possible transmission channels between the insurance sector and the financial system and real economy more widely.
23. Considerations will be specific to the jurisdiction's insurance sector, such as examining and concluding on the impact of climate change on insurer assets and liabilities, how to define benchmarking of insurers for specific regulatory requirements and how to assess the longer-term soundness of the industry.
24. Climate change is a long-term risk and climate science is evolving as observations, models and physical understanding of climate improve. To understand the full range of impacts of climate change on insurer risks, it will be important to run a range of scenarios over time. Running each scenario requires considerable time and resources, therefore supervisors should consider how their use of scenarios will develop over time and how the different exercises will build on each other. Supervisors should think strategically about which scenarios should be used when and

how they can build on each other. Coordination with other supervisors, in the case of overlapping jurisdiction, will help maximise resource efficiency and capabilities.

25. Jurisdictions should decide on the scope of insurers to include in a scenario analysis exercise after defining their objectives. It is desirable that when the aim is to analyse financial stability implications, such exercises cover at least all domestic systemically important insurers or locally headquartered internationally active insurance groups (IAIGs).

### 3.1.1 *Analysing objectives and design considerations*

26. As set out above, there are a range of considerations that inform the objectives for a scenario analysis exercise. The table below sets out how these objectives and design considerations can be considered together. This is not an exhaustive list and a number of these objectives may be captured in one exercise, however the table is designed to help supervisors consider relevant issues.

**Table 4 Scenario analysis design considerations**

Objectives	Design considerations
To develop capacity for insurers and supervisors in undertaking scenario analysis.	A dynamic balance sheet approach will allow insurers to consider the management actions they take to deal with the impact of climate change, thus building capacity. However, it will make cross-sector comparison more difficult. Equally, a simpler static balance sheet approach may help supervisors and insurers that are new to scenario analysis develop their understanding of first order impacts of various climate risk scenarios.
To assess underwriting risks to insurers from climate change.	Depending on the geographic footprint of the insurer, supervisors may wish to limit the exercise to the most relevant material geographies and/or those with the most exposures.
To assess risks to assets from climate change.	Asset values will be affected by direct impacts (eg increased credit risks for certain assets given physical risks from climate change and, more broadly, because of macroeconomic impacts from change). Whilst it may not be possible to include all of these elements, it will be important to be clear on what is and isn't in scope.
To assess the impact of physical risk to individual insurers.	Physical risks can differ considerably in relatively small areas. For instance; an elevation of one metre may significantly change the underwriting risks to which an insurer is exposed. Adaptation measures may also reduce exposure. In developing the scenario, it will be important to understand what physical risk related data is available and the limitations that this may pose.
To assess the long-term impact (more than 30 years) of climate change on the insurance sector.	A long time horizon will highlight the broader strategic considerations for the impact of climate change. However, the long-term nature increases uncertainty and complexity. This exercise could be useful when trying to understand likely management actions and the impact these would have on the insurance sector. An exercise can also contain several scenarios with different time horizons, although, in the interest of limiting the complexity and burden, a balance will need to be sought between the number of scenarios and the added value of having different time horizon perspectives.

<p>To assess the impact of transition risk to individual insurers.</p>	<p>Transition risks will depend on the geographic footprint of the insurer. Supervisors may find it easier to understand the transition risks in their own jurisdiction and, therefore, may decide to limit the scope of the exercise to their jurisdiction or may look to third parties to help verify the assessments.</p>
<p>To assess macroprudential risks to large insurers from climate change.</p>	<p>To assess macroprudential risks supervisors may need greater consistency across insurers, for instance, taking more of a top down approach and setting more parameters for the exercise. In such instances it will be useful to work with insurers both before and after the exercise to understand the different approaches they have taken.</p> <p>Whilst it might be proportionate to limit the exercise to larger insurers, supervisors may wish to consider how to communicate the findings to smaller insurers to increase capacity across the sector.</p>
<p>To assess macroprudential risks to the financial system from climate change.</p>	<p>The scenario may look at the spillover effects of climate risk to the rest of the financial sector, for example possible increased credit risk on mortgage books for banks if insurance coverage is reduced (ICP 24.2). Or increased liquidity risks on certain assets as they are quickly repriced when climate risks crystallise.</p> <p>Such exercises are likely to be very complex to run, therefore, when designing a scenario, it is important to know which macroprudential spillover effects to measure. Such exercises are most likely conducted in a second stage, after other sectoral-specific scenario exercises.</p>
<p>To understand the impact of climate change on protection gaps.</p>	<p>In a twin peaks model, prudential and conduct supervisors may wish to work together on the exercise. Design may look at how demand for cover will change as pricing increases, which is relevant from both a prudential and policyholder protection perspective (see Box 2).</p>

### 3.2 Scenario design

27. Scenario design is driven by the objectives for which scenario analysis is being undertaken. This is likely to differ between supervisors and insurers. Supervisors may consider risks from a microprudential and/or a macroprudential perspective as well as broader macroeconomic impacts of climate change. Insurers, meanwhile, may use scenario analysis to understand the potential impact of climate change on their business, strategy, investment portfolio and capital position.
28. If the exercise is performed to support microprudential risk analysis, insurers in scope should ideally be selected according to their exposures to specific risks and the scenarios to be assessed. If the exercise aims to enhance macroprudential analysis, it is desirable that such exercise include at least all systemically important insurers or locally headquartered IAIGs (see also ICP 24.2.6-8).

#### 3.2.1 Supervisory design considerations

29. Scenarios should reflect the current market environment and potential unfavourable evolutions in terms of changes in market conditions and other risks to which insurers are exposed. Historic data typically does not capture the frequency and severity of future climatic scenarios and the

impacts of tipping points.<sup>8</sup> For these reasons, sector analysis should be forward looking, to the extent possible, when developing scenarios to capture potential future developments.

30. Science-based scenarios, such as the Intergovernmental Panel on Climate Change (IPCC)-sourced scenarios used by the NGFS, can be utilised as reference scenarios, providing a common starting point for supervisors to analyse climate risks to the economy and financial system.
31. Such ready-made scenarios provide a range of possible outcomes, based on different future paths of climate policies, technological developments and consumer behaviour aimed at limiting the rise in global temperatures and reducing emissions pathways, in combination with the corresponding projected temperature rises.
32. The technical scoping of a climate-related scenario analysis exercise is driven by its objectives. Supervisors should decide on the key sources of scenario specification and if any modifications are required when using ready-made scenarios. The scenario architecture is supported by the different types of scenario analysis (top-down vs bottom-up, see table 5 below) and other key design decisions. Supervisors may also wish to add elements from authoritative sources such as the analysis by the International Energy Agency (IEA) or the IPCC. However, in making changes they should clearly document all relevant changes and adjustments.
33. There are four categories of primary design decisions. Advanced climate-related scenario analysis exercises can be supported by two further design decisions. These decisions are explored further in the table below:

**Table 5 Scenario analysis design decisions**

Primary design decision	Key considerations
Scenario design	A supervisor can choose between using ready-made scenarios (such as those developed by the NGFS), modifying ready-made scenarios and developing reverse stress tests. <sup>9</sup> A variety of factors including resourcing, relevant skillsets and data availability should be considered. Where ready-made scenarios contain limitations (eg data provided is not sufficiently granular), supervisors should be aware of such limitations and could consider modifying ready-made scenarios to address these limitations.
Time horizon and interval of analysis	To assess impact, climate change scenarios could be generated by comparing the climate risk and impacts in a baseline (or reference situation) with scenarios inducing various impacts on the risks at different time horizons: short-term, medium-term or long-term.  Common time periods currently being used are three to five years for short-term (consistent with NGFS short-term scenarios), between five and 15 years for medium-term and around 30 years for long-term, although a longer target horizon of 50 years or greater can also be considered.

<sup>8</sup> [Economic impacts of tipping points in the climate system | PNAS](#)

<sup>9</sup> ICP 16.2.21: Reverse stress testing may help identify scenarios that could result in failure or cause the financial position of an insurer to fall below a predefined level. Whilst some risk of failure is always present, such an approach may help to ensure adequate focus on the management actions that are appropriate to avoid undue risk of business failure. The focus of such reverse stress testing is on appropriate risk management actions rather than the assessment of its financial condition and so may be largely qualitative in nature although broad assessment of associated financial impacts may help in deciding the appropriate action to take.

Supervisors will want to consider the most appropriate timelines based on the specifics of their insurance market and/or insurers in scope of the scenario analysis. Supervisors may also wish to align these time horizons with any horizons specified in any other disclosures where companies may be reporting on these exercises.

Each time horizon has advantages and disadvantages when designing climate scenarios, and the choice is driven by the expected purpose and intended outcomes of the exercise.

Given the uncertainty surrounding the timing of the impact of climate-related risks and the dependency on short-term actions, transition risks would be best captured within a shorter- to medium-term time horizon as they require more pressing actions, whilst physical risk would be best captured within medium- to longer-term horizon as events can take years to unfold and most material physical risks are currently expected to materialise later in the century. They are also most of the time aligned with net zero commitments of either the insurers themselves, where net zero commitments are required by law or voluntarily committed, or of the government of the jurisdiction in which they operate, that are themselves of a medium- to longer-term nature.

Alternatively, some supervisors, such as the Bank of England, have looked at the impact of bringing forward long-term climate risks to consider what impact their crystallisation would have on current balance sheets.<sup>10</sup>

In addition to the time horizon of the exercise, risks can be assessed at different intervals (eg one year, two years, five years, 10 years, etc) over the course of the time horizons.

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Balance sheet choices (static vs dynamic vs hybrid)

Static balance sheets require insurers to hold their portfolios constant over time and replace maturing assets with new, similar assets whilst maintaining a consistent insurance policy profile. Its focus is on risks in the current balance sheet and it is more concerned with understanding current exposure and is not as dependent on assumptions. Management actions are, therefore, not included in this approach. The outcomes of the exercise may, however, be used to inform management actions.

Dynamic balance sheets allow for the inclusion of management actions in the scenario analysis itself, where institutions can assume to react to future events including changing their exposure profile, regulatory changes, technology developments and changes in customers' preferences. It is thus dependent on assumptions about behaviour.

A hybrid approach combining a static and dynamic balance sheet may also be pursued.

The decision on balance sheet assumptions is interdependent with decisions on time horizons. Over long-term horizons, management actions will be a primary driver of impacts but are very difficult to predict.

A benefit of allowing for management actions is the ability of supervisors to understand aggregate industry actions, eg if all insurers intend to sell the same classes of asset under stress (ie a fire sale), asset prices may be significantly lower than insurers expect, or where insurers in aggregate

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<sup>10</sup> <https://www.bankofengland.co.uk/stress-testing/2021/key-elements-2021-biennial-exploratory-scenario-financial-risks-climate-change>



might want to withdraw coverage in a geographical area or for type of business. It may, thereby, help the assessment of possible systemic risks (see ICP 24.0.3), ie “the risk of amplification and transmission of shocks to the financial system and real economy caused by (...) collective actions of a sufficiently large number of insurers undertaking similar activities and thus exposed to common risks.”

Top-down or bottom-up

In a top-down exercise, the analysis is primarily run centrally by the supervisor, using a centrally defined model and limited input from insurers. In contrast, a bottom-up exercise is run by participating insurers, using a company-specific model.

Supervisors may also take a hybrid approach where the scenarios and output variables are highly prescribed by the supervisor but are run by the insurer, using a company-specific model.

The relative advantages and disadvantages of both approaches is explored in more detail within the IAIS’ [Application Paper on Macprudential Supervision](#) (pg 16).

Advanced design decision

Key consideration

Shock calibration (prescriptive vs descriptive shocks)

Different climate economy models offer different levels of sectoral and geographic coverage and, therefore, it is important to understand which financial and macroeconomic shocks are most relevant. Prescriptive shocks involve specifying additional detail to define the shocks that insurers should apply, whereas descriptive shocks will provide guidance on the impacts that the supervisor is looking to explore as part of the exercise.

Supervisors can decide between including prescriptive or descriptive shocks. Prescriptive specifications of macroeconomic scenarios will minimise the assumptions made in different models used by insurers. As a result, it leads to greater consistency between insurers taking part in the exercise. Descriptive shocks can make the magnitude of shocks intuitive, but are hard to translate into financial market impacts.

Modelling freedom

The flexibility of the modelling methodology provides a further dimension in which results from the scenario analysis can be aligned to strategic objectives.

A standardised approach can help to improve consistency and ensure some degree of comparability, enhancing the usefulness of the information received by supervisors. Allowing a degree of freedom for insurers can avoid a “one-size-fits-all” situation, acknowledging the different time horizons and different impacts that are meaningful for insurers. However, it can make consistent interpretation of conclusions more difficult.

### 3.2.2 Insurer design considerations

34. The previous section considered scenario objectives that are more likely to be relevant for insurance supervisors. Whilst these considerations may also be relevant for insurers, there are additional considerations for insurers that conduct scenario analysis exercises to support their own enterprise risk management (ERM), including:

- a. Strategy: insurers may want to run a scenario to understand the extent to which climate change will impact their business strategy. For example, will certain business lines continue to be profitable in 10 years' time; or how will insured losses change. Will certain industries continue to exist or substantially diminish with the transition to net zero and what does this mean for certain business lines?
- b. Pricing: to what extent will climate risk impact pricing and what price elasticity is to be expected in certain lines of business, eg commercial lines vs retail? What impact may such pricing changes have on the rest of the business?
- c. Operational risks: the insurer may want to consider the extent to which climate-related physical risks may increase the risks to their business operations. For instance, direct impact on their own assets (eg risks to data centres) or significant supply chain disruption, which could pose material challenges to their business model.
- d. Capital position and risk management: scenario analysis could help assess the potential future impact on the capital position from climate-related scenarios. Caution should be used when determining the impact to capital, given the high degree of tracking error, use of subjective assumptions, numerous variables, varying time horizons, range of possible outcomes associated with each scenario and overall uncertainty of scenarios. Over time, supervisors and insurers will hopefully be able to address these issues. Despite these challenges, climate-related scenario analysis outcomes can still provide meaningful input for the assessment of its risk management and current, and likely future, solvency position (see ICP 16.10), as it still provides an indication on the relative magnitude of capital impacts under different scenarios.

#### Box 1: Examples of technical design decisions in recent climate scenario exercises

	Banque de France	Bank of England	Office of Superintendent of Financial Institutions (Canada)	De Nederlandsche Bank	Monetary Authority of Singapore
Time horizon	30 years	30 years Physical risks 60 years	30 years	5 years	30 years
Balance sheet	Static for first 5 years Dynamic 6-30 years	Static Dynamic element in questionnaire	Static	Static	Static Dynamic element in questionnaire
Scenarios	3 NGFS scenarios + 1 other	3 NGFS scenarios	3 NGFS scenarios + 1 other	3 shocks	3 NGFS scenarios, one overlaid with a flood event
Types of risk	Transition, physical insurers only	Transition, physical + litigation	Transition	Transition	Transition, physical
Firm-based	Bottom-up	Bottom-up	Bottom-up	Top-down	Bottom-up
Granularity	Sectoral	Sectoral + counterparty	Sectoral + some counterparty	Sectoral	Sectoral + counterparty
Insurance sector risks	Assets and liabilities	Assets and liabilities	Assets	Assets and liabilities	Assets and liabilities



## 4 Macprudential considerations for supervisors (ICP 24)

### Context

35. This section provides guidance on how supervisors could integrate climate-related scenario analysis into supervisory processes to assess the potential systemic importance of individual insurers and the insurance sector (ICP 24.3), using climate-related scenario analysis to inform supervisory response (ICP 24.4), and publication of relevant data and statistics on the insurance sector from climate-related scenario analysis exercises (ICP 24.5).

### 4.1 Assessing systemic importance (ICP 24.3)

36. ICP 24.3 requires supervisors to have an established process to assess the potential systemic importance of both individual insurers and the insurance sector as a whole. In particular, guidance under ICP 24.3.3 states that, as part of their assessment under ICP 24.3, supervisors should consider emerging developments that may affect the insurance sector's risk exposures.

### Recommendations

37. Supervisors may include climate risks considerations through climate-related scenario analysis exercises in scope of their quantitative analyses – considering both inward and outward risks<sup>11</sup> – as required under ICP 24.2. The output of climate-related scenario analysis could then help to assess the impact and trend of climate-related risks on the insurance sector's exposures – both in terms of assets and liabilities – which can ultimately help to serve the overall assessment of the potential systemic importance of insurers.

38. As highlighted above, the focus of the scenario analysis can be on the insurance industry as a whole, or on a selection of insurers that are identified based on specific criteria. It can also be carried out on other financial sectors, in combination with the insurance sector, to gain a better idea of risks across the financial system.

#### 4.1.1 Challenges at a national level

39. In instances where spillover effects on other parts of the financial sector (eg banking) are detected, a cross-sectoral approach might be needed. Some supervisors have narrow sector-specific mandates. For example, they may only supervise insurers or a twin peaks model may operate in their jurisdiction (ie separation of prudential and conduct regulation). It will be important, therefore, to consider how to overcome these structural hurdles. For instance:

- a. Insurance-only supervisors: where supervisors only supervise the insurance sector, they should take steps to collaborate with other financial supervisors in a way that allows them to more effectively identify and address spillovers. For instance, this could be addressed by developing a cross-agency standing committee or a similar structure.
- b. Twin peaks model: where one supervisor has responsibility for prudential supervision and the other for conduct of business supervision, there are also significant benefits in collaborating. For instance, a prudentially focused climate scenario may provide useful information on the extent to which insurers expect to alter their pricing policy to take into account climate risks. This is relevant information for a conduct supervisor to the extent it

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<sup>11</sup> Assessing inward risks refers to the extent insurers may be exposed to, or vulnerable to, a certain risk within the insurance sector, whereas the outward risk refers to the situation in which these vulnerabilities would generate externalities which may then propagate to other financial markets or the real economy.

may highlight consumer protection issues, especially where a supervisor has pricing powers. In this case, the two authorities could strive to share information.

- c. Unitary authorities: even in authorities that have a mandate across prudential and conduct supervision, and across different parts of the financial sector, it will be important to share experiences across banking, insurance and markets teams given that there could be potential spillover effects between sectors. For example, reduced insurance availability and affordability could pass additional physical risk exposure through to banks where mortgage customers cannot secure adequate insurance.

#### **4.1.2 Challenges at an international level**

40. When conducting a climate-related scenario analysis on IAIGs, supervisors should consider coordinating with other involved supervisors<sup>12</sup> and regional or global insurance standard-setters (eg the IAIS). This is a useful exercise to the extent it reduces the number of overlapping requests that insurers receive, helps to build a greater understanding across the insurance group's supervisors of the climate risks it is exposed to and also helps build capacity amongst the supervisory community. There are significant benefits to aligning the design and frameworks of climate-related scenario analysis at an international level and sharing best practice.
41. Supervisors leading a scenario analysis exercise may wish to collaborate with other involved supervisors via supervisory colleges in a number of different ways:
  - a. Design: collaboration in the design phase of the exercise could benefit supervisors in gaining a better understanding of insurers' exposures. It will also reduce the number of separate requests that insurers may receive.
  - b. Data gathering: supervisors may be able to share information on useful data sources and assumptions about the impact of climate risks in their jurisdiction.
  - c. Results: sharing the results in a college discussion will help develop a common understanding across supervisors of the extent of the insurer's exposure to climate-related risks.
42. At the international level, the international financial organisations cooperate in order to provide shared examples of best practice and to avoid areas of overlap, eg through the NGFS or the FSB.

#### **4.1.3 Risk concentration**

43. Scenario analysis can be carried out to assess potential systemic risk concentrations, and whether indications exist for spillover effects not only into the real economy in general but also into other sectors and/or other assets, due to potential financial sector and market interlinkages. Assessing risk concentrations is relevant when assessing the potential systemic importance of individual insurers and/or the insurance sector as a whole.
44. Concentrations may exist in the following areas, amongst others:
  - Physical risk concentrations manifest in underwriting liabilities, which are significantly impacted by the increasing severity and frequency of natural catastrophe losses. For instance, where an insurer has a particular geographic focus, or its underwriting risks are highly correlated (eg an insurer with a large property insurance portfolio that is affected by an increase in fire risk, driven by rising temperatures). This could impact individual insurers

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<sup>12</sup> See ICP 25 (Supervisory Cooperation and Coordination), in particular ICP 25.2, 25.3 and ComFrame integrated in ICP 25.6.

or could be common across many insurers and, therefore, poses a macroprudential risk through its cumulative impact. See examples of risk correlation in section 5.5.

- Transition risk specific to:
  - carbon-intensive assets concentrations (fixed income or equity) and their credit quality. This has the potential to be both a micro and macroprudential risk;
  - exposure to green assets (eg those likely needed for the transition to net zero); and
  - underwriting certain lines of business.
- Assets vulnerable to physical risks: where a jurisdiction faces significant physical risks and assets are largely invested in that jurisdiction, there is potential for an increased macroprudential risk.
- Reinsurance: given the importance for primary insurers of ceding risks and the increased risks reinsurers will face from climate change, scenario analysis can help to understand how market dynamics may change. For instance, what concentrations will reinsurers face (eg increased correlation across the globe of extreme weather events may limit the ability for diversification of risk) and what action will they take to mitigate this risk (eg reducing cover for certain primary insurers in certain jurisdictions, increasing prices). Scenarios analysis should critically challenge assumptions to understand what impact climate change will have on different parts of the insurance sector.

## Box 2: Scenario analysis and protection gaps

Gaps in protection against climate-related risks are, in many cases, significant and supervisors anticipate they will continue to grow, which is why this will be an increasing area of focus for the IAIS.<sup>13</sup> Supervisors expect the impact of climate change to widen and materially affect how the insurance sector sets pricing, risk appetite and coverage. Particularly in concentrated markets that are dependent on a small pool of large insurers, a change in their settings could lead to a widening of protection gaps, which could carry potential wider systemic implications. The strengthening of supervisory tools to assess and monitor the availability and affordability of insurance products could play a key role in addressing some protection gap concerns.

Scenario analysis of climate-related risks is relevant for both prudential and conduct supervisors with regards to natural catastrophe protection gaps (see section 3.1). For prudential supervisors, it can be used as a tool for assessing the viability of business lines and models and assessing the potential systemic importance of insurers and the insurance sector (ICP 24.3). Meanwhile, for conduct supervisors, it can be used as a tool to assess how the market may change in the face of increased climate risk, what consumer risks may emerge and whether certain policyholder groups are most likely to be negatively impacted.

Scenario analysis exercises may explore the impact of climate change on pricing and identify vulnerable regions/communities (eg those exposed to transition and/or physical risks), vulnerable socio-economic groups, and other protection gaps. Such exercises can also be used to explore the impacts of climate change on reinsurance affordability and availability/capacity.

### Impact on policyholders

As climate change impacts physical risk in the form of increasing frequency and severity of losses from weather extremes, insurers could decide to reprice their products to reflect the

<sup>13</sup> <https://www.iaisweb.org/2023/11/iais-outlines-actions-for-insurance-supervisors-in-addressing-natural-catastrophe-protection-gaps/>

change in risk. This could lead to either a decline in the availability and/or affordability of property catastrophe lines, as individuals and businesses are priced out of the market. A sufficiently material increase in physical risks could reduce insurers' risk appetite. Insurers may reduce their exposure to certain geographies or perils, which could lead to an exit or substantial reduction in the provision of catastrophe insurance cover. This may also apply to other lines of business.

Competition could be reduced if insurers exit markets or product lines to mitigate their climate risk. This could also prompt government intervention, such as public bodies directly offering weather disaster insurance, thereby potentially reducing the size of a market-based insurance sector. Supervisors should consider finding methodologies that allow them to assess the likelihood, extent and implication of such developments, where appropriate, as part of scenario analysis. For instance, where scenario analysis exercises use dynamic balance sheets and allow for management actions, supervisors will be provided with a cross-industry view of issues related to pricing and availability. By looking at the proposed collective management actions, supervisors will gain a better understanding of possible dynamics on pricing and availability.

Consistent with ICP 24.5, transparency over protection gaps identified in scenario analysis exercises will help to bring these issues to the attention of a range of different stakeholders and foster a broader policy discussion.

### **Financial stability considerations**

Protection gaps could also have broader financial system implications. Increasing protection gaps could:

- Impact bank balance sheets (through increased credit risk);
- Force governments to take a more direct role as the “insurer of last resort”; and/or
- Result in a slower recovery of the overall economy as the public (private persons and/or enterprises) incur greater losses after a catastrophe event.

In the case of additional government intervention, this could put additional fiscal pressure on governments, which could affect the broader financial system and economy (for example, through increased government borrowing to fund reconstruction and adaptation, putting credit stress on sovereigns).

Climate-related scenario analysis could be used to better understand the risks posed to the financial system, and vulnerabilities that may arise in the local economy and community, stemming from less affordable insurance coverage. It may be beneficial for scenario analysis to be used to better understand the potential:

- Size, scale and location of insurance affordability challenges and to identify the most vulnerable communities;
- Concentrations of risk, which could impact other lending institutions and their lending portfolios (uninsurable collateral);
- Potential fiscal pressure created by governments becoming the insurer of last resort in order to support consumers facing unaffordable insurance;
- Opportunities for prevention and mitigation efforts, such as flood levies or nature-based solutions, thereby reducing the risks faced by financial institutions and their customers. Or work to look at adaptation measures (eg build back better) to reduce exposure to future claims;
- Extent of increasing natural catastrophe losses that result in insurers and reinsurers choosing to stop, or decrease significantly, writing a specific line of business, which would impact insurance or reinsurance capacity; and

- Changes in the appetite of reinsurers to take on climate risks. Scenarios could be used to assess whether increasing severity and frequency of weather events could reduce global reinsurance risk appetite. This may indirectly contribute to the widening of domestic protection gaps in individual countries. For example, increased occurrence of hurricanes in the United States and winter storms in Europe, occurring concurrently with increased wildfires in other countries, could lead to increased reinsurance costs globally, thereby indirectly amplifying insurance costs and protection gaps in each individual domestic market.

Cross-sectoral supervisors may assess risks to the financial system from the transfer of physical risk from the insurance sector to the banking sector. For example, bank mortgages being left without adequate insurance coverage against weather catastrophes due to unaffordability or unavailability of insurance coverage. The falling collateral value leads to a higher loan-to-value ratio for the bank and thus higher credit risk, all things being equal.

In cases of scenario analysis using dynamic balance sheets (ie insurers are allowed to take management actions), supervisors should look to understand the risks that these management actions may pose for the sector as a whole. For instance, from a demand perspective, what assumptions are insurers making about demand and price elasticity for coverage of products. Equally, from a supply perspective, will the accumulation of indicated management actions increase protection gaps. Insurers may well take logical actions from a microprudential perspective (eg to reprice or reduce/remove cover), but the collective impact could lead to significant protection gaps with associated consumer and macroprudential risks. Looking at management actions during a scenario analysis exercise has the potential to cast new light on these issues.

### **Using data to assess protection gaps**

Consistent with ICP 24.1, supervisors with access to adequately granular data, specific to protection gaps and other societal and financial stability impacts, could use scenario analysis for the following purposes:

- To create a national climate peril map (showing risk today and future projections), for use by government agencies responsible for land planning, building codes and mitigation work;
- Overlay the climate risk map with the mortgage portfolio of the entire banking system, or individual lenders, to better understand insurance coverage of collateral as well as potential concentration risks;
- Potentially consider the impacts to different socio-economic groups, which may better inform government policy and prioritisation; and
- In combination with transition risk and socio-economic data, understand where economic circumstance such as job losses in climate-relevant sectors, combined with physical risk, drive unaffordability in general insurance.

If a protection gap issue is projected or observed, supervisors may wish to inform and collaborate with other public bodies to find solutions. Other agencies dealing in land use, building standards and public works, may be best placed to develop an appropriate and feasible response. Such findings may also be relevant when discussing double materiality, whereby the possible transition plans of insurers could contribute to the mitigation of climate change and aid in the reduction of protection gaps in the long-term.



## 4.2 Supervisory response (ICP 24.4)

### Context

45. Insurance supervisors may choose from a wide range of supervisory responses, including both macroprudential and microprudential supervisory tools, to address the outcomes of their scenario analysis exercises.

### Recommendations

46. A number of actions or follow-up work that could be taken:

#### a. Further supervisory work

The scenario analysis outcomes may also reveal certain vulnerabilities or risk exposures that warrant further supervisory action at the level of the individual insurer or the insurance market.

Where there are common issues identified across a number of insurers by the scenario analysis exercise, further thematic initiatives may need to be undertaken to address weaknesses. For instance, thematic work on ERM integration, setting out preventive and corrective measures (eg restrictions on business activities or restricting exposures, see ICP 10.2) and where there are significant concerns looking at issues related to crisis management and planning (see ICP 24.4.4).

Further work may take a macroprudential perspective, for instance, scenario analysis may highlight climate change risk concentrations across the sector and, therefore, could be a useful early indicator for the need to undertake further thematic supervisory activity. Such work could be used to better quantify the cross-sector impact of climate change. The exploration could focus on whether climate change risk is adequately reflected and quantified in financial returns. Additionally, in the case of transition risk, if insurers face difficulties quantifying risk, then further supervisory work could explore what can be done to support insurers adequate risk quantification. For example, the sharing of best practices or the formation of cross-sector groupings to map out responses to these issues.

Finally, further action may be needed to address insurer-specific issues, highlighted by the scenario analysis. This may include weak integration of climate risk into ERM. Here supervisors should consider whether individual remediation plans need to be developed.

#### b. Climate change financial disclosure requirements

Scenario analysis exercises demonstrate that climate-related financial disclosures help build a wider understanding of the effects of climate change on insurers, and provide more transparency as to the financial implications on insurers. Disclosure requirements provide supervisors and other stakeholders – in an ideal case – with comparable, clearly defined data.

It may not be possible, due to resourcing constraints or limited expertise, for supervisors to regularly conduct scenario analysis exercises; which is where disclosure requirements, typically built on certain standards, can be utilised to provide detailed information on how insurers assess, manage and mitigate climate-related financial risks and opportunities. Whilst disclosure requirements tend to have a microprudential focus, they can be used to assess macroprudential impacts when sufficiently harmonised. Supervisors should ensure alignment with international standards such as those developed by the International Sustainability

Standards Board<sup>14</sup> and other standard-setting activity (eg US Securities and Exchange Commission and European Financial Reporting Advisory Group).

**c. Scenario analysis to inform further scenario exercises**

The outcomes of scenario analysis can also point to vulnerabilities in other areas that may need to be further explored to better understand climate-related risks to which insurers are exposed. The conclusions of a previously carried-out scenario analysis exercise may, for example, show the volatile and changing nature of climate risks or lack of precision in climate change exposure quantification, which could necessitate such an exercise to be conducted on an incremental basis.

Conducting follow-up scenario analysis exercises will allow supervisors to observe how an exposure is trending for a specific jurisdiction from a macro perspective and to take note of any emerging risks or trending topics. Supervisors can better quantify climate-related risks if they are well informed of developing capabilities of insurers and systems. A number of jurisdictions that have already conducted scenario analysis exercises have experienced some limitations in the precision and granularity of the data inputs used, resulting in data quality issues, which may require that they repeat the exercises (in a similar, or altered, format).

Given that no single scenario analysis exercise design can address all risks on all time horizons, follow-up scenario analysis exercises also present an opportunity to address new risks and scopes that may not have been prioritised in the initial exercises.

**d. Policy work**

Where issues identified through a scenario analysis exercise cannot be addressed by supervisory actions, new policy tools may be needed to address the issues identified. In this case, the scenario analysis exercise could be a key input to defining the problem and helping to find a policy-oriented solution.

### 4.3 Transparency (ICP 24.5)

#### Context

47. When considering transparency of scenario analysis exercises, the purpose and objectives of the exercise will ultimately define which results are published. Publishing results can send a clear message about the potential climate-related risks posed to the insurance sector, and also highlight any shortcomings such as data quality and modelling issues.

#### Recommendations

48. Supervisors should communicate results as these can be used to increase transparency on the impact of climate risk, build industry capacity and ensure that the market more broadly appreciates climate risks to the insurance sector.

49. The focus of the scenario analysis exercise will determine what information is published. Before publishing any data, it is important to ensure its validation. Limitations may exist for a number of insurers in properly quantifying climate-related risks so it is important to ensure the quality of data.

50. Depending on the focus of the exercise, the following data/statistics could be published:

- Quantitative assumptions and caveats for the scenarios itself;

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<sup>14</sup>[IAIS response to ISSB climate exposure draft \(iaisweb.org\)](https://iaisweb.org)

- Asset/liability splits, exposure to physical and transition risk under certain scenarios, over specific time horizons;
- Business developments, lines of business, geographic distribution of coverage, certain supply/demand developments and the impact on availability of reinsurance;
- Soundness of the insurance sector under the different scenarios and time horizons (eg solvency impacts);
- Conduct of business issues (eg availability and cost of coverage);  
Any qualitative considerations such as embedding climate-related risks into strategic decisions or reputational impacts of climate change; and
- Data quality challenges, key material assumptions, modelling uncertainty and limitations.

The level of transparency is expected to increase as climate scenario analysis capabilities evolve over time.

51. Additionally, reports may highlight lessons learnt from the exercise and share examples of best practice to help build capacity across the industry. For example, where scenario analysis has highlighted problems with ERM integration, these could be mentioned together with the steps taken to mitigate them. Alternatively, good examples of the tools that insurers use to translate climate risks into financial risks could be shared to spread best practices.

### **Box 3: Case study on regulatory example of published scenario analysis conclusions**

The Bermuda Monetary Authority (BMA) published their [2021 Climate Risk Exposure Survey Report](#), including outcomes of a scenario analysis exercise that sought to obtain early indications of the industry's climate change risk exposures, based on several relatively simple quantitative metrics focusing on physical risk. The survey identified particularly affected perils and related loss cost increases, and concluded that physical risk is the most significant driver of climate risk-related exposures due to the nature of risks underwritten in Bermuda, particularly NatCat exposures. The exercise also found that the modelling of mid- to long-term physical climate risk is still in the development stages and requires improvements.

## **5 Scenario analysis to inform assessment of insurers' risk management and governance (ICP 16)**

### **Context:**

52. This section provides guidance on how supervisors could integrate climate-related scenario analysis into ERM for solvency purposes, including:
- ERM framework review (ICP 16.16);
  - Risk appetite statements (ICP 16.4);
  - Asset-liability management (ICP 16.5):
    - in investment policies (ICP 16.6)
    - in underwriting policies (ICP 16.7); and
  - Board accountability (ICP 16.11).



## 5.1 ERM framework review (ICP 16.16)

### Context

53. The nature and materiality of the relevant risk (eg insurance, credit, market, concentration, operational or liquidity) will vary depending on the exposure to climate change of each insurer. Hence, the ORSA is a particularly useful tool for insurers to assess the adequacy of their ERM and capital position, as it summarises the main outcomes of the risk management process to ensure proper communication to the management board.

### Recommendations

54. Supervisors should base their expectations of the ERM framework on the nature, scale and complexity of the business (ICP 16.16.5). Climate risk is one key risk driver that should be considered as part of the ORSA assessment. As such, the supervisor should assess whether the scenario analysis and modelling approaches commensurate with the insurer's vulnerability to climate risks, based on the insurer's risk profile.

55. Supervisors should consider the extent to which climate risk is integrated into ERM. The outcome of the scenario analysis, shall define the resilience of the business strategy of the insurer, providing insights into material exposures and business risks as well as testing the robustness and adequacy of its solvency position. These insights should be taken into account when defining both short- and long-term strategy and the most appropriate management actions to properly react to occurring risks (eg a limit breach).

56. Supervisors may wish to consider taking a proportionate approach. The requirements could apply to the insurance industry as a whole, or only to insurers with a certain risk profile, size or complexity, depending on whether the outcomes of the scenario analysis demonstrate that only select entities are affected. However, using only size as a criteria for inclusion will not capture smaller entities that may be materially exposed to climate change risks; or any potential change in climate risk concentrations of smaller entities. For this reason, a broader criteria for the scope might be more appropriate.

57. The ORSA requirements may also be applicable to entities in phases, where specific requirements will be rolled-out over a number of years or according to entities' size (ie where smaller entities will be required to enhance their ORSA a year or two later than larger groups and/or IAIGs). Additionally, distinction can exist between requirements across the insurance sector, such as having separate requirements for life vs property and casualty insurers.

## 5.2 Investment policies (ICP 16.6)

58. Physical and, especially, transition risks can have complex and non-linear impacts on insurers' investments. Where material, these risks must be taken into account regardless of whether the insurer invests directly, or through a third-party asset manager or investment advisor. Supervisors and insurers could use scenario analysis to better understand:

- a. The gaps in knowledge that need to be filled to understand the climate risks to which their assets are exposed. Insurers may need to engage more with investee companies to understand the steps they are taking to reduce their exposure so that the insurer has a better understanding of the evolution of these risks. Insurers should also consider engaging with investee companies (through proxy voting or sector collaboration as appropriate) to help positively shape the corporate behaviour of investee companies. This includes supporting

investee companies' efforts in their transition over time towards more sustainable business practices, while maintaining their risk management standards.

- b. How and when different climate tipping points will impact risks, including capturing the non-linear impacts on credit, market and liquidity risks. Insurers could use this information to consider what conclusions from scenario analysis exercises mean in terms of the assets they hold and the extent to which they may be able to diversify some of their risks.

### 5.3 Underwriting policies (ICP 16.7)

59. Physical, transition and liability risks arising from climate change can impact the business risk profile, underwriting strategy and underwriting processes of insurers. When material, supervisors should expect insurers to identify the relevant physical, transition and liability risks inherent in their business portfolios, assess the implications for their underwriting strategy and develop policies and procedures to integrate the management of these risks in their enterprise risk management framework and risk appetite statement. Supervisors and insurers should use scenario analysis to:
- a. Understand climate risk exposure in certain geographic areas (eg flood plains, areas of increased drought or fire risk), economic sectors (eg energy intensive sectors) or lines of business (eg property, agriculture) that have higher exposure to climate risk; and
  - b. Understand how areas of new business and the overall insurance market may be affected by climate change, including from a macroprudential perspective.
60. Consideration should be given to how results from climate-related scenario analysis can be integrated into underwriting processes and what additional data or decision points may be needed to make scenario analysis more actionable.
61. Scenario analysis may also be useful for understanding second or third order impacts and how these may impact on underwriting decisions. For instance, will a move to net zero lead to fewer cars per household, increased community pooling of cars or different risks. These changes will have a significant impact on business models.

### 5.4 Insurer ORSAs (16.12) (16.14)

#### Context

62. Climate-related scenario analysis could be used as an input to ORSAs. As per ICP 16.12, it is required that ORSAs “encompass all reasonably foreseeable and relevant material risks (...) and, as necessary: to assess the insurer’s resilience against severe but plausible macroeconomic stresses through scenario analysis or stress testing; and assess aggregate counterparty exposures and analyse the effect of stress events on material counterparty exposures through scenario analysis or stress testing”.
63. The unique business strategy, investment portfolio and risk profile of each insurer will affect the degree of impact from climate-related risks. The nature and materiality of the relevant insurance, credit, market, concentration, operational and liquidity risks will vary depending on each insurers’ exposure to climate change. Hence, the ORSA is a particularly useful tool for insurers to assess the adequacy of their ERM and capital position. Supervisors should expect insurers to consider all material, physical, transition and liability risks arising from climate change in their ORSA process, and adopt the appropriate risk management actions to mitigate the identified risks. Insurers may consider the risks on both a qualitative and quantitative basis, with the

understanding that quantitative capabilities should improve over time as the ability to access the necessary data is improved.

## Recommendations

64. As part of the ORSA, the insurer assesses its risk management and financial resources over a longer time horizon than the time horizon used to determine regulatory capital requirements. Given the systemic nature of climate risk, it is important for scenario analysis to go beyond normal business planning cycles of three to five years, to take account of medium- and longer-term risks, thereby addressing what has been described as the “tragedy of the horizons”<sup>15</sup>. The time horizon should be consistent with the nature of the insurer’s risks and business planning. Some climate-related risks may take longer to fully materialise and, therefore, it would be expected that the ORSA also include appropriate scenarios that cover a more extended time horizon. When assessing the appropriateness of time horizons used by insurers, supervisors should consider the nature and types of business written by the insurer.
65. As part of the ORSA, an insurer is required to perform a continuity analysis to assess its ability to manage its risks and meet its capital requirements under a range of plausible adverse scenarios with a forward-looking perspective in mind. When material, this analysis should include the identification and assessment of the direct and indirect impact of climate-related risks (for instance, including as part of the scenario analysis a (reverse) stress testing process). This would enable insurers to assess their resilience to financial losses with respect to climate change. This process should incorporate an assessment of physical, transition and liability risks across the different risk categories, for example:
- Assessment of physical risks includes the use of catastrophe modelling, covering a number of different scenarios (eg 1-100, 1-500 or 1-1000 year events), to assess the impact on both assets and liabilities. Asset-focussed assessments should include both financial as well as operational assets, such as office buildings and data centres. Liability assessments should not only look at natural catastrophe exposures but also consider how hotter climates may impact life and health insurance liabilities, due to the increased occurrence of heat waves and the expected wider geographical spread of tropical diseases;
  - Assessment of transition risks may cover how increases in carbon taxes and moves towards a low-carbon economy would impact both financial assets and technical provisions. Also, any risk of deterioration of future new business volumes or increase in lapses should be assessed to avoid any negative reputational impact in the event an insurer’s activities are considered to be supporting carbon intensive industries; and
  - Climate-related litigation risk assessment involves the risks resulting from potential changes in societal, litigation and judicial environments. These are likely to differ significantly across jurisdictions and over time. The assessments should cover litigation risk from existing or future insurance contracts as well as from the insurers’ own activities (eg any potential greenwashing risk).
66. Supervisors should encourage insurers to use models that are pertinent to their geographical scope and the nature of their business. It is important for insurers to fully understand these models, the uncertainties of the results and their underlying assumptions and methodologies when deciding on their relevance.
67. Climate-related risks are material to the insurance industry and are expected to potentially have an impact on all insurers; therefore, these risks should be considered for inclusion in the ORSA. If climate-related risks are assessed to be immaterial by an insurer, the insurer should document

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<sup>15</sup> <https://www.bankofengland.co.uk/speech/2015/breaking-the-tragedy-of-the-horizon-climate-change-and-financial-stability>

the reason for this assessment. The rationale for immateriality could be included in the documentation that summarises the risks that the insurer considered for incorporation in the ORSA and may be concise.

#### **Box 4: EIOPA guidance on scenario analysis and ORSA<sup>16</sup>**

The European Insurance and Occupational Pensions Authority (EIOPA) has recognised the importance of climate change and its potential impact on the insurance sector. The authority has developed application guidance to assist insurance companies in conducting climate change materiality assessments and utilising climate change scenarios in the ORSA process.

The application guidance from EIOPA provides insurers with practical guidance on how to conduct these assessments, including the identification of relevant climate change risks, the assessment of their materiality and the integration of the findings into their risk management frameworks.

In addition, the guidance emphasises the use of climate change scenarios in the ORSA process. Climate change scenarios are hypothetical future pathways that capture different climate outcomes and their potential impacts on the insurance sector. By using these scenarios, insurers can assess their resilience and evaluate the effectiveness of their risk management strategies in different climate change scenarios.

The application guidance is neither binding nor prescriptive to promote a diversity of approaches, which would support the development of technical knowledge and tailored risk assessments.

For physical risk, the guidance informs on concrete approaches for scenario analysis, such as:

- Using NGFS climate impact explorer: this tool shows how the severity of climate change impacts will increase over time in continents, countries and provinces at different levels of warming, starting with 1.5°C;
- Using the PESETA IV study:<sup>17</sup> it aims to better understand the effects of climate change on Europe, for a number of climate change impact sectors;
- Using CAT models: catastrophe modelling is the practice of using computer programmes to mathematically represent the physical characteristics of natural catastrophes; and
- Using existing scenario analysis: previous scenarios could also be used to perform a climate change scenario analysis in the ORSA. The Bank of England (BoE), for example, launched a biennial insurance stress test in 2019, which included an exploratory exercise in relation to climate change.

For transition risk, examples are include:

- Using a traditional scenario analysis: offers flexibility for tailoring to the specific objective of the stress test exercise;
- Using the open-source tools: eg measuring the alignment of a portfolio to a range of climate transition scenarios via forward-looking comparisons of key outputs, such as emissions intensity of the investment portfolio and transition plans ; and
- Using existing scenario analysis: the 2020-2021 Autorité de contrôle prudentiel et de résolution (ACPR) pilot climate exercise scenarios have been presented as an example of the application of a climate stress test to a whole market using the NGFS transition pathways as a starting point.

<sup>16</sup> [Application guidance on climate change materiality assessments and climate change scenarios in ORSA \(europa.eu\)](https://www.eiopa.europa.eu/application-guidance-on-climate-change-materiality-assessments-and-climate-change-scenarios-in-orsa)

<sup>17</sup> The PESETA IV study aims to better understand the effects of climate change on Europe and how these effects could be avoided with mitigation and adaptation policies. [https://joint-research-centre.ec.europa.eu/peseta-projects/jrc-peseta-iv\\_en](https://joint-research-centre.ec.europa.eu/peseta-projects/jrc-peseta-iv_en)

## 5.5 Integrating scenario analysis into risk policies (ICP 16.5, 16.6 & 16.7)

### Context

68. Given the need to integrate climate risks into existing frameworks, this section considers how climate risk scenario analysis can be relevant for investment (ICP 16.6) and underwriting policies (ICP 16.7), together with asset liability management (ICP 16.5).

### Recommendations

69. Where material, supervisors should encourage insurers to include an assessment of climate risks as part of their overall review of investment and underwriting risks and have internal guidance on how the assessment and monitoring of such risks are embedded in the investment and underwriting processes.
70. Supervisors could also consider setting out expectations on the role of scenario analysis to determine the appropriate frequency for reviewing and making changes to investment policies, including the limits framework. For example, scenario analysis may highlight the need to review sectoral investment limits for certain vulnerable sectors that are more exposed to climate-related financial risks.
71. Scenario analysis can prompt early development of mitigation strategies like investee engagement, restricted lists<sup>18</sup> and divestment lists<sup>19</sup> for asset types that have been identified as vulnerable. Insurers could also use scenario analysis to determine the impact of these mitigation strategies on its balance sheet for solvency and liquidity purposes. For example, scenario analysis could highlight assets that become “stranded”<sup>20</sup> under certain scenarios, resulting in significant losses and adversely impacting the capital and liquidity position of the insurer. Hence, supervisors should require insurers to incorporate consideration of climate-related risks in their investment and underwriting policies, where there is material exposure of individual products to climate change risk.
72. ICP 16.5 requires insurer’s ERM frameworks to include an explicit asset-liability management (ALM) policy that specifies the nature, role and extent of ALM activities and their relationship with product development, pricing functions and investment management. Scenario analysis could help to identify correlation risks between assets and insurance liabilities that are not apparent (for instance, retail mortgage backed assets in areas subject to significant climate risk held as assets on an insurer’s balance sheet and where the insurer underwrites cover for residential property in the same area). A robust bottom-up approach in building the scenario analysis exercise could allow the insurer to isolate such correlated positions and address the risks, by either divesting or diversifying such exposures, before they are manifested.

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<sup>18</sup> A list of investments, normally in certain sectors, that investors will not invest in because it does not align with their climate risk tolerance.

<sup>19</sup> A list of investments that an investor chooses to sell because it is not aligned with their climate risk tolerance e.g. they do no longer wish to hold equity in a certain sector or with a company that undertakes certain activities.

<sup>20</sup> Assets that have suffered from unanticipated or premature write-downs, devaluations or conversion to liabilities.



## Box 5: Examples of risk correlation

### Physical risk correlation

For example, a physical risk correlation could exist as a result of a real estate portfolio that is exposed to the changes in value of properties that serve as collateral. Depending on their geographical location, these properties can be exposed to several natural catastrophe perils. A property and casualty insurer that might be exposed to certain natural catastrophe perils by holding mortgage loan assets in its portfolio might also be underwriting the same natural catastrophe perils on the liability side, and thus doubling down on the same risk.

### Transition risk correlation

Another example could be through a risk arising from transition risk correlation. A life and annuity insurance company might be underwriting minimum guarantee riders for its variable annuity liabilities. The underlying funds for these liabilities could be exposed to carbon-intensive sectors. It might also be owning assets from these sectors in its general account portfolio. In aggregate, it will have exposure to transition risk from similar vulnerable sectors on both sides of the balance sheet.

## 5.6 Risk appetite statement (ICP 16.4)

### Context

73. ICP 16.4 requires insurers to have a risk appetite statement that:

- Articulates the aggregate level and types of risk that the insurer is willing to assume within its risk capacity to achieve its financial and strategic objectives, and business plan;
- Takes into account all relevant and material categories of risk and their interdependencies within the insurer's current and target risk profiles; and
- Is operationalised in its business strategy and day-to-day operations through a more granular risk limits structure.

### Recommendations

74. Supervisors could consider setting expectations on scenario analysis design that allows for assessing alignment of the existing portfolio of assets and liabilities with the risk appetite statement, under different scenarios, over longer time horizons. Scenario analysis could also be used to assess the adequacy and appropriateness of the existing risk appetite statement under different plausible or potential future business environments. Certain lines of business could become riskier in the future as the nature of risk changes due to climate change, and certain traditional avenues of risk transfer could shrink or no longer exist. Increasing frequency and severity of catastrophe perils that are expected in the future may impact the pricing and reinsurance capacity available to the insurer. The insurer should consider incorporating such changes to the existing re-insurance capacity in the scenario analysis exercise. This information would be useful in assessing product viability and risk mitigation in a forward-looking manner.
75. Supervisors could consider the use of scenario analysis as a tool that could allow insurers to identify and assess the robustness of their risk appetite statement and evaluate the need to make any changes to the statement upfront. For example, scenario analysis can highlight time periods under different scenarios when capital levels may be at risk of breaching the thresholds dictated by the risk appetite statement.
76. Scenario analysis could be used to inform the insurer of the potential vulnerabilities in its business model that could result in breaches to the risk appetite statement in the future.

## 5.7 Board accountability (ICP 16.11)

### Context

77. The board of directors are responsible for setting and overseeing insurer's overall business strategy and risk appetite, including climate risk. The use of climate risk scenario analysis is an important tool to aid the integration of the risks from climate.

### Recommendations

78. Boards should ensure that they are provided with sufficient information to understand the climate change risk to which their business is exposed. They should explicitly consider how climate-related scenario analysis is integrated into existing governance frameworks. In particular, the board should be provided with:

- A materiality assessment, identifying the current exposure of the insurer as a starting point for the analysis;
- A set of scenarios aimed at assessing climate risk in a forward-looking manner, taking into account the long-term nature of climate risk. They should provide an adequate basis for the assessment of overall solvency needs; and
- Management actions to be undertaken in case of adverse scenarios. Management actions should be concrete, applicable within a short timeframe and tailored to the specific risk profile of the insurer.

79. When scenario analysis exercises are conducted, the board should dedicate time to understanding the results and what they mean for the insurer's strategy. Boards may discuss the more detailed findings in board subcommittees.

### Box 6: MAS guidelines on environmental risk management for insurers

The Monetary Authority of Singapore (MAS) recognises the critical role that the board of directors plays in incorporating environmental considerations (including climate risk) into the insurer's risk appetite, strategies and business plans. This includes taking into consideration both the short-term (within the insurer's business planning horizon) and the longer-term (given that the impact may arise beyond the maturity of current portfolios and run into decades) when assessing the impact of environmental risk and opportunities.

The MAS guidelines inform on responsibilities of the board, such as:

- Approving an environmental risk management framework and policies to assess and manage the insurer's environmental risk exposures on an ongoing basis. This includes using climate scenario analysis to assess these risk exposures;
- Setting clear roles and responsibilities of the board, including personnel who are responsible for oversight of the insurer's environmental risks; and
- Ensuring that directors have adequate understanding of environmental risk and that senior management is equipped with appropriate expertise for managing environmental risk.