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A Stab at Physical Climate Change

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What we want to cover today

- We will NOT
 - Tell you that the planet is warming up, or include a IPCC emission trajectory graphs.
- We will:
 - Share the regulatory paradigm shift on climate change
 - Focus on how industry is making tangible steps to assess financial impacts from physical climate change risk: TCFD, Supervisory Statement, Physical Climate Change Risk Framework, Insurance Stress Tests, Climate Financial Risk Forum
 - Make the discussion as relevant to practitioners as possible



We will focus on physical risk but don't forget transition



Physical Risk

Physical risks can arise from climate and weather-related events, such as heatwaves, droughts, floods, storms and sea level rise. They can potentially result in large financial losses, impairing asset values and the creditworthiness of borrowers

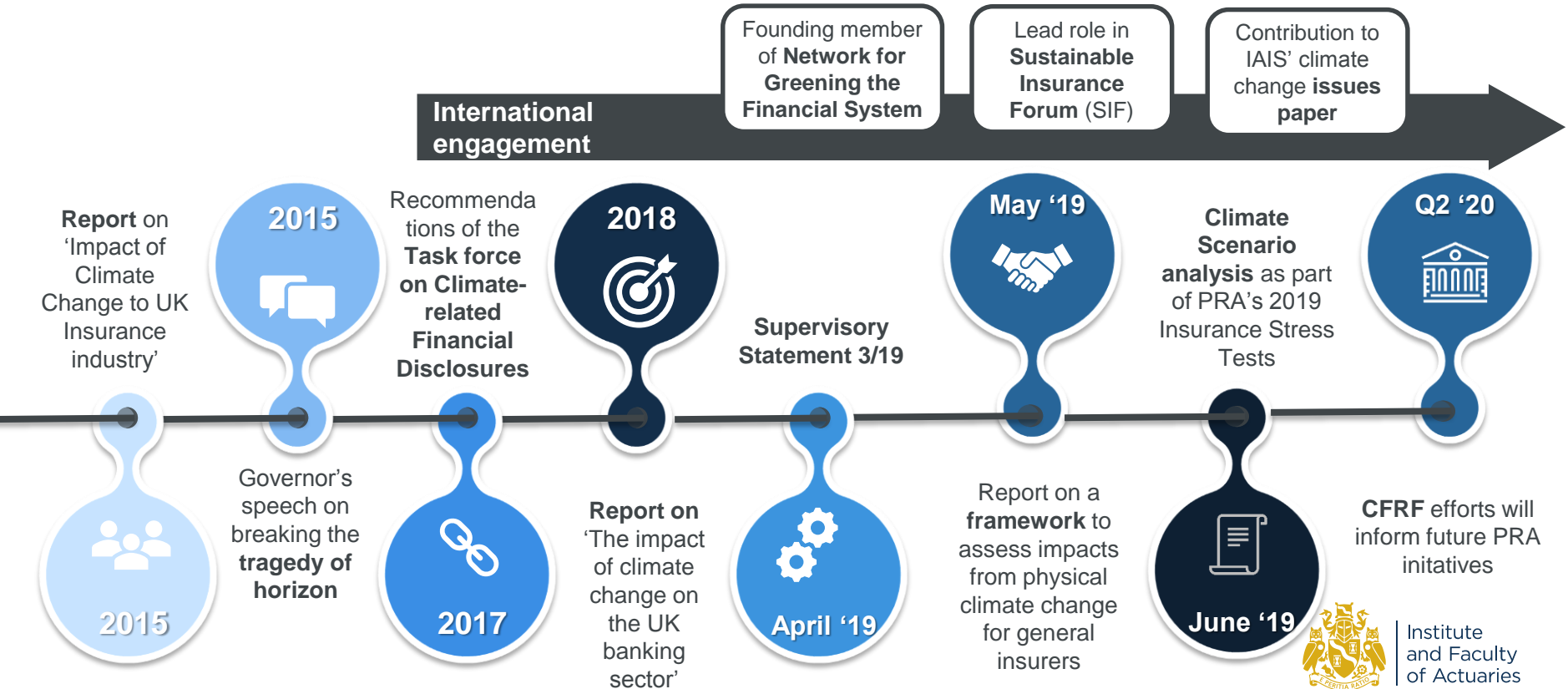


Transition (and liability)

Transition risks can arise from the process of adjustment towards a low-carbon economy. Changes in policy, technology and sentiment could prompt a reassessment of the value of a large range of assets and create credit exposures for banks and other lenders as costs and opportunities become apparent



The regulatory paradigm shift



Taskforce on Climate-related Financial Disclosures

Background to TCFD

- TCFD founded in 2015 by FSB, led by Mark Carney
- Encourages voluntary, climate-related disclosures for investors, lenders and insurers
- Just under 1,000 firms have supported TCFD so far
- The 2019 TCFD report found firms' responses underwhelming



2019 report key findings

- Disclosure has increased, but is still insufficient
- More clarity is needed on the financial impacts of climate change
- The majority of companies do not disclose information on the resilience of their strategies using scenarios
- Disclosure requires the involvement of multiple functions

Insurers: from front-runners to laggards in FS

Disclosure by Industry: 2018 Reporting

Recommendation	Recommended Disclosure	Banking (104)	Insurance (147)
Governance	a. Board Oversight	48%	29%
	b. Management's Role	54%	35%
Strategy	a. Risks and Opportunities	51%	39%
	b. Impact on Organization	55%	26%
	c. Resilience of Strategy	20%	12%
Risk Management	a. Risk ID & Assessment Processes	52%	30%
	b. Risk Management Processes	46%	33%
	c. Integration into Overall Risk Management	32%	16%
Metrics and Targets	a. Climate-Related Metrics	51%	27%
	b. Scope 1,2,3 GHG Emissions	42%	22%
	c. Climate-Related Targets	50%	24%

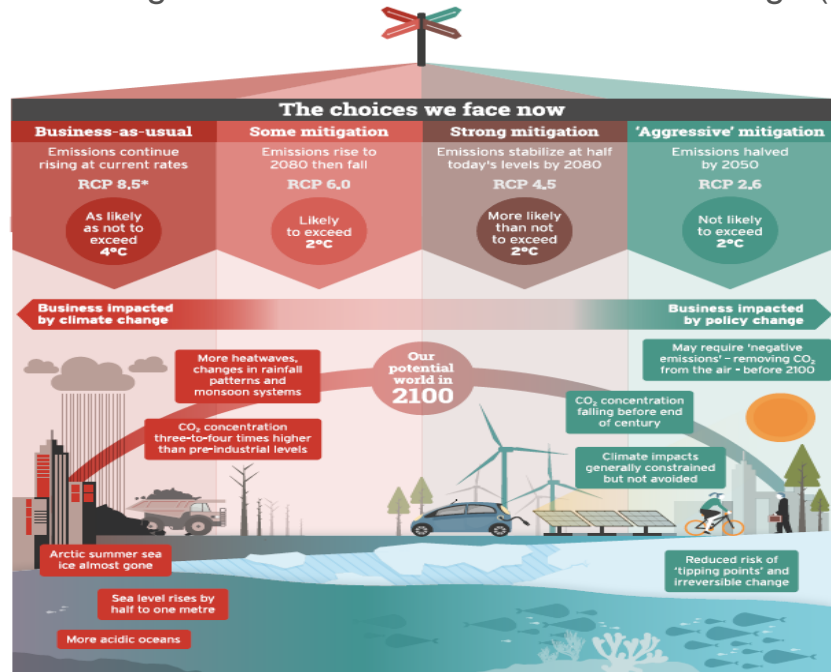
- Disclosure of climate-related financial information in key areas by banks and insurers.
- The percentage of banks disclosing in these key areas is higher in all areas than the proportion of insurers disclosures.



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Aviva's 2018 Climate-related financial (TCFD) disclosure

- Aviva has been developing a Climate VaR measure, in conjunction with the UNEP FI investor pilot project, to assess the potential business impacts of future climate-related risks and opportunities in each of the Inter-governmental Panel on Climate Change (IPCC) scenarios and in aggregate.



The choice we face now. Source: TCFD.

- The IPCC has identified four potential future scenarios with respect to climate change:
 - 1.5°C (emissions halved by 2050),
 - 2°C (emissions stabilise at half today's levels by 2080),
 - 3°C (emissions rise to 2080 then fall) and
 - 4°C BAU (emissions continue rising at current rates).



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Aviva 2018 Climate-related financial (TCFD) disclosure

1.

Aviva is most exposed to the 4°C scenario where physical risk dominates, negatively impacting long-term investment returns on equities, corporate bonds, real estate, real estate loans and sovereign exposures. The aggressive mitigation 1.5°C scenario is the only scenario with potential upside.

2.

When aggregated together to determine an overall impact of climate-related risks and opportunities across all scenarios, the plausible range is dominated by the results of the 3°C and 4°C scenarios, reflecting that neither existing or planned policy actions are sufficiently ambitious to meet the Paris agreement goal.

3.

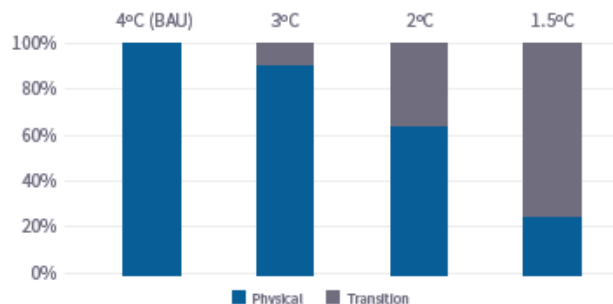
The 1.5°C scenario is dominated by transition risk, even after taking into account mitigating technology opportunities. In the 2°C scenario, transition and physical risks are more evenly balanced, whereas in the 3°C and 4°C scenarios physical risk dominates.

Initial Climate VaR output by scenario for Aviva's shareholder funds as at 31/12/2018. Source: Aviva.



The grey bars represent the range of outputs between the 5th Percentile and the central estimate for each scenario and the orange bars the range between the central estimate and the 95th Percentile.

Physical versus transition risks by scenario for Aviva's shareholder funds as at 31/12/2018. Source: Aviva.



Impact to Aviva

- Increased internal and external awareness of climate risks and opportunities
- Identify the major areas of physical and transition risk sensitivity supporting prioritisation of future work
- Enhanced internal quantitative and qualitative capability and development of network and partnerships with external stakeholders



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Regulatory push to accelerate walking the walk



The stick: Supervisory Statement 3/19

Sets the regulatory expectations and requires financial services firms to assess impacts from climate change, making a Senior Manager (SMF) accountable



The road: A supporting Framework

Report setting out a framework to assess physical climate change risk and provides example case studies developed by specialists across the market



The whip: IST2019 - Climate Scenario

The first time a regulator issues a climate scenario to assess impacts from climate change across the different insurance firm activities



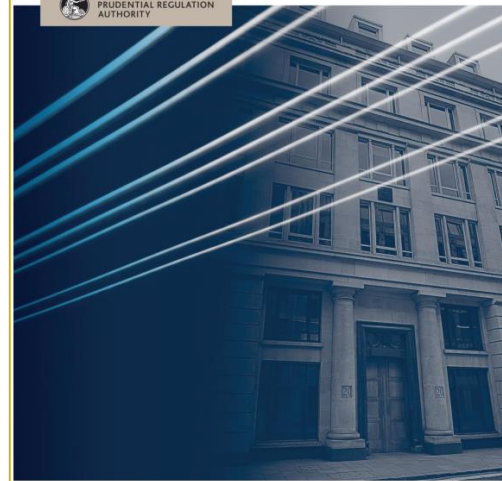
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Supervisory Statement 3/19

- The PRA expects that by 15 October 2019 firms will:
 - Identify a senior management function (SMF) responsible for managing financial risks from climate change
 - Have an initial plan to address PRA's expectations
- The Supervisory Statement has four main areas
 - Governance
 - Risk Management
 - Scenario Analysis
 - Disclosure

Supervisory Statement | SS3/19
Enhancing banks' and insurers'
approaches to managing the
financial risks from climate change

April 2019



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A framework for practitioners to assess impacts from physical climate change



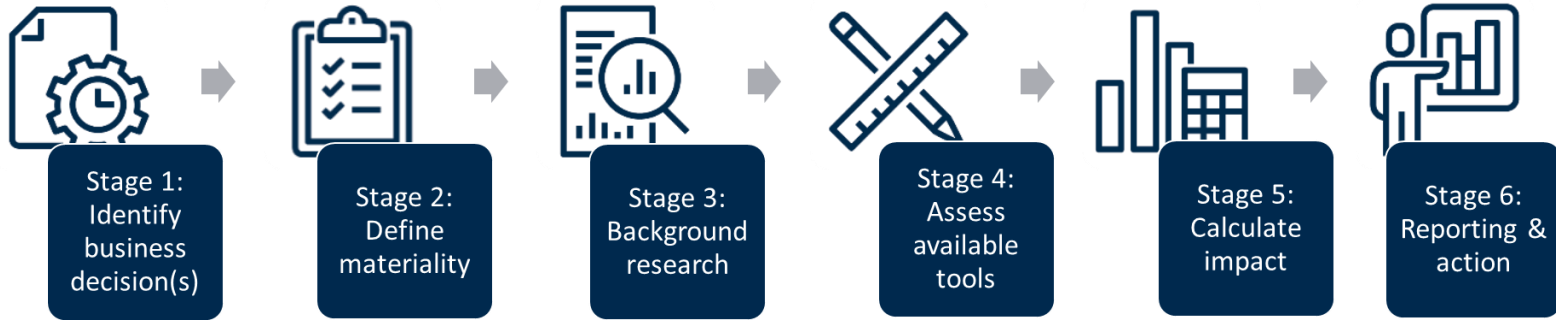
- Overview:

- The framework is an output of a joint effort by a PRA-led cross-industry working group
- The framework is not prescriptive in nature but is intended to be an aid to practitioners
- The purpose is to help (re)insurers commence analysis
- Once firms use it, they can propose improvements and evolve it further
- Support firms needing to undertake the IST 2019 Climate Scenario Analysis



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An outline of the framework



- The framework “A framework for assessing financial impacts of physical climate change: A practitioner’s aide for the general insurance sector” is available on the Bank website:

<https://www.bankofengland.co.uk/prudential-regulation/publication/2019/a-framework-for-assessing-financial-impacts-of-physical-climate-change>



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Framework Case Study – Aviva's UK Flood challenge 1/3



Stage 1:
Identify
business
decision(s)



Stage 2:
Define
materiality

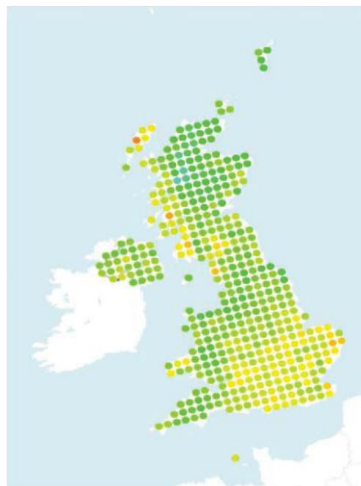
- Decision: How our UK flood ceding may evolve over time and by region
- Materiality:
 - UK flood is likely to be impacted by climate change and is a material risk for Aviva
 - It is partly managed by ceding certain policies to Flood Re (due to run until 2039)



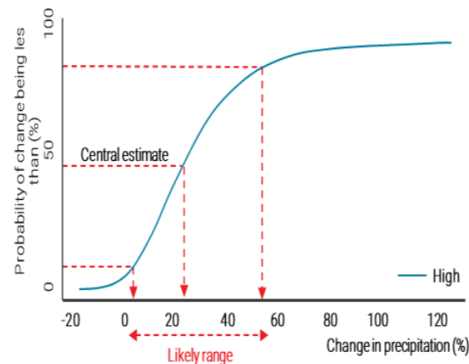
Stage 3:
Background
research

- Background research: literature research to understand the expected changes in inland and coastal flooding by 2040
- Sufficient and reliable UK Government climate data on changes to future rainfall, river flow and sea level risk by 2040

CHANGE IN RAINFALL ON WETTEST DAY OF WINTER



Source: © UK Climate Projections, 2009.



Source: © UK Climate Projections, 2009



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Framework Case Study – Aviva's UK Flood challenge 2/3



Stage 4:
Assess
available
tools

- Assess available tools: selection criteria is that the tool should be compatible with the currently-used pricing tools and can be linked with the background research findings.
- Flood hazard maps were chosen as the preferred tool.



Stage 5:
Calculate
impact

- Calculate impact: Climate-change conditioned flood maps were used to examine the potential change in two sample areas (Warrington and Cambridge) for all three flood types between now and 2040.

Figure 1: Map showing the projected relative change in flood risk across Warrington.

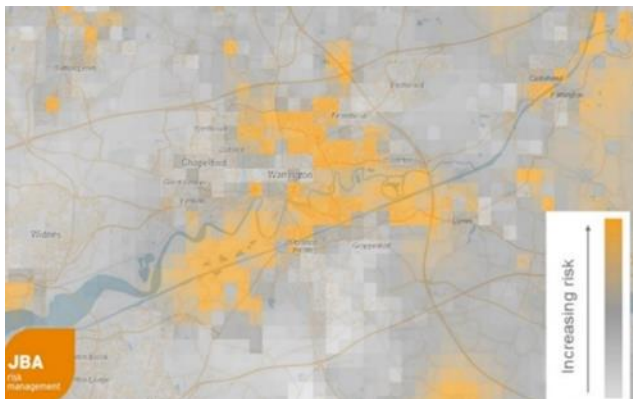
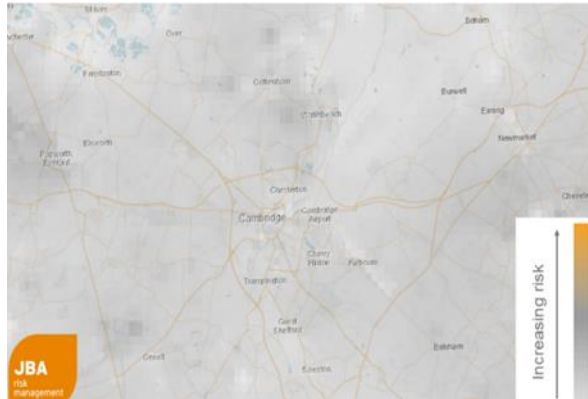


Figure 2: Map showing the projected relative change in flood risk across Cambridge.



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Framework Case Study – Aviva's UK Flood challenge 3/3



Stage 6:
Reporting &
action

- The two regions highlight how areas may be affected differently by climate change.
- In Warrington (Figure 1), the risk to flood is predominantly projected to increase, whereas in Cambridge (Figure 2) there is expected to be a reduction in flood risk or, in some locations, no change at all.
- The ratio change between future and current climate conditions informed the pricing model.

Area	% Ceded 2018	% Ceded 2040	Relative change
Warrington	4.07%	5.34%	31%
Cambridge	0.63%	0.59%	-6%

Impact to Aviva

- The results indicate that ceding activity is likely to evolve in light of climate change
- Evidenced need for comprehensive study to be performed to understand the likely impact on all regions.
- Analysis can also be used to support on-going public policy advocacy on importance public-private initiatives to help meet challenges of climate change



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A Climate Scenario in the 2019 Insurance Stress Tests

	Liabilities	Assets
Physical	✓	✓
Transitional	✓	✓



Insurance Stress Tests 2019

- First time a regulator issues a comprehensive stress test on the back of the TCFD and SS 3/19 recommendations for scenario use
- Scenarios are deterministic applied assuming the shocks are instantaneous across physical, transition, liabilities and assets
- Firms have ~5 months to undertake analysis (due 31st of October)

<https://www.bankofengland.co.uk/-/media/boe/files/prudential-regulation/letter/2019/general-insurance-stress-test-2019-scenario-specification-guidelines-and-instructions.pdf>

The three scenarios

- *Scenario A*: sudden, disorderly transition towards a carbon-neutral economy in the short term. Transition risks are maximised.
- *Scenario B*: a long-term orderly transition scenario in line with the Paris Agreement
- *Scenario C*: a 'hot-house' scenario assuming no transition. Physical risks are maximised.



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Stress test physical shocks on liabilities

	Liabilities	Assets
Physical	✓	✓
Transitional	✓	✓



- **Design of shocks:** intentionally focused on a subset of material liabilities
- **Link to Framework:** purposely expressed shocks as if they were outputs of the background research, inviting firms to undertake Stage 4 (assess tools) and Stage 5 (calculate impact) themselves.
- **Shocks:**
 - US Hurricanes: uniform change in wind speed and frequency
 - US floods: uniform change in run-off (river discharge) from cyclone-induced precipitation and sea-level rise
 - UK floods: uniform change in run-off and sea-level rise
 - UK freeze and subsidence: change in frequency of property claims



Stress test: UK GI physical shocks example

	Scenario A	Scenario B	Scenario C
% increase in surface runoff resulting from increased precipitation		6%	10%
Uniform increase in cm in average sea-level		4cm	10cm
Increase in subsidence-related property claims using as a benchmark the worst year on record since 1990		10%	25%
Increase in freeze-related property claims using as a benchmark the worst year on record since 1990		10%	25%



Aviva's PRA Insurance Stress Test (IST) Experience

- Prior to the exercise there was good engagement from regulator with industry so the perils chosen for the stress test were in line with market expectations of those most exposed to climate change.
- In some cases the assumptions being stressed were not easily adjustable in the cat modelling tools generally used by the industry. Therefore firms had to find alternative ways to allow for the stresses, and with no convergence of methodology, comparisons across firms becomes increasingly difficult.
- Leading CAT modelling firms have responded to the stress test by releasing indicative views of the climate change stress impacts in their models. These impacts have been estimated by adjusting assumptions in the models that are not normally accessible to model users.
- Going forward we expect more development / sophistication in this area and hope greater functionality is made available in the industry CAT modelling tools to allow users to more easily stress climate change assumptions themselves.
- As a life as well as general insurer we also would expect stresses to mortality rates to be introduced to capture both the impact of physical climate changes such as more hot and cold days as well as the impact of the transition to a low carbon economy on pollution levels.



Engaging beyond UK and beyond insurance



Beyond UK: Network for Greening the Financial System (NGFS)

- Members comprise primarily central banks and supervisors across the world
- The network sets out recommendations for central banks, supervisors, policymakers and financial institutions to enhance their role in the greening of the financial system and the managing of climate and environment-related risks



Beyond Insurance: Climate Financial Risk Forum (CFRF)

- The joined FCA/PRA CFRF forum brings together expertise across financial services to build intellectual capacity and share best practice
- There are four working groups on: risk management, scenario analysis, disclosure, and innovation
- The scenario analysis working group drives the thinking on best practices on climate scenario development



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Climate Financial Risk Forum – Scenario Analysis Working Group

- The Scenario Analysis Working Group (SAWG) is a cross-industry group which commenced in May 2019. The membership of this Working Group includes banks, asset managers and insurers and is chaired by Angela Darlington Aviva's UK Life CEO.
- Other interested parties will be involved where appropriate in this Working Group (trade associations, insurance brokers, rating agencies, academics, specialised consultancies, etc).
- The output will be a 'handbook' style document covering best practice, case studies and barriers. It will identify the main challenges the industry is facing and potential solutions to those challenges as well as any other considerations relevant to the topic.
- Feedback will also be provided to regulators on how scenario analysis could be incorporated into the regulatory framework.
- The handbook will cover all risk categories impacting the balance sheet, through the channels of transition and physical risks as well as litigation risks. The aim is to provide a view of leading practices which can also act as a guide for those who have yet to fully consider the topic.



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Key messages



Regulatory push addresses the ‘why’

TCFD, the SS3/19 and IST2019 provides the impetus for GI firms to commence assessing impact from physical climate change. Regulatory direction has helped answer ‘why financial risk needs to be assessed’



The Framework report and CFRF can aid practitioners on the ‘how’

Practical challenges of undertaking analysis on physical climate change risk impacts are addressed by the report.

The framework report and CFRF will not give you answers to all questions but hopefully give you the tools to answer them yourselves



Professional support

The IFoA's Resource and Environment (“R&E”) Board has produced a practical guide to climate change for general insurance practitioners. It lists “A framework for assessing financial impacts of physical climate change: A practitioner’s aide for the general insurance sector” as a tool to help GI actuaries and other practitioners look at the physical impacts of climate change



Contribute to the emerging knowledge

The knowledge that collectively exists of assessing financial impacts from climate change is quickly developing.

Please contribute by providing feedback and your experiences:
PCCriskframework@bankofengland.gsi.gov.uk



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Questions

Comments

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