Institute and Faculty of Actuaries

Practical guides to climate change for insurance practitioners

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18 November 2019

What will be talking about:

- A reminder of the evidence (Mark)
- General insurance practical guide (Mark)
- Life insurance practical guide (David/Yvonne)
- Future technical needs (David)
- Communication (Mark)
- Questions
- Closing Comments (Simon)

During the event, you can submit questions and participate in polls at:
https://app.sli.do/event/awlfsbak (Event code: # 7309)

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Reminder of the evidence

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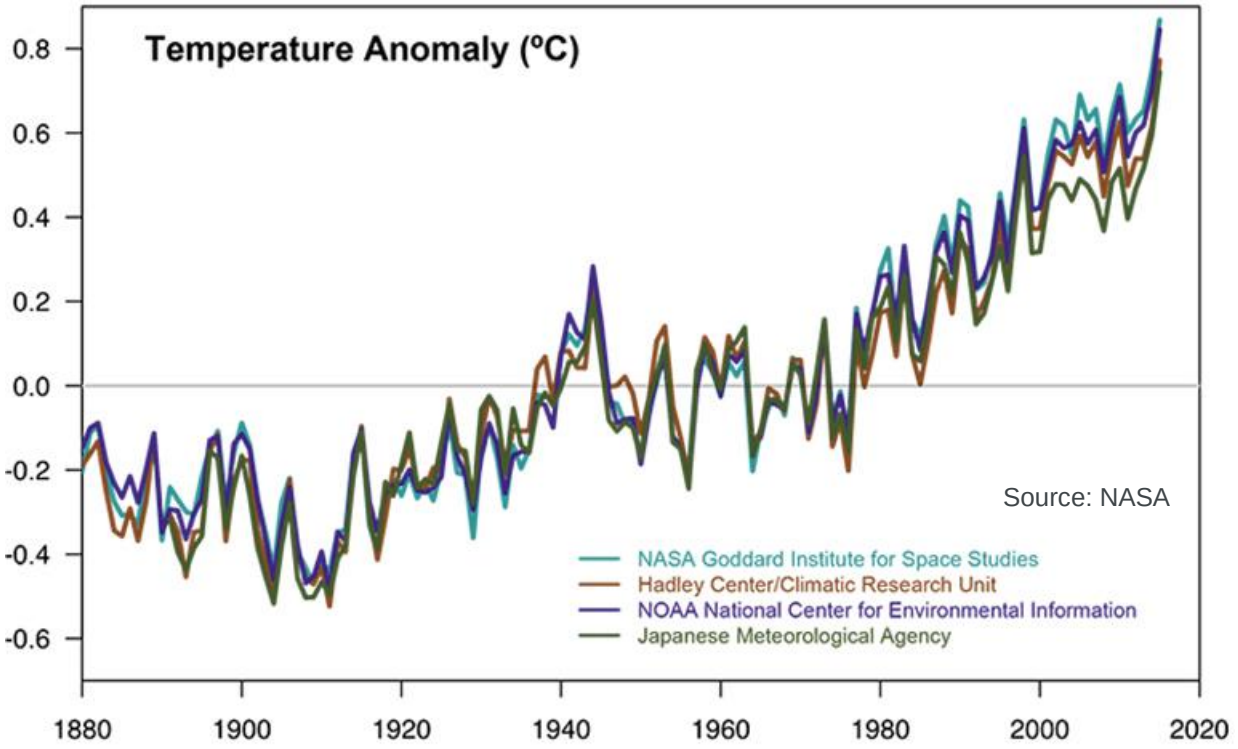
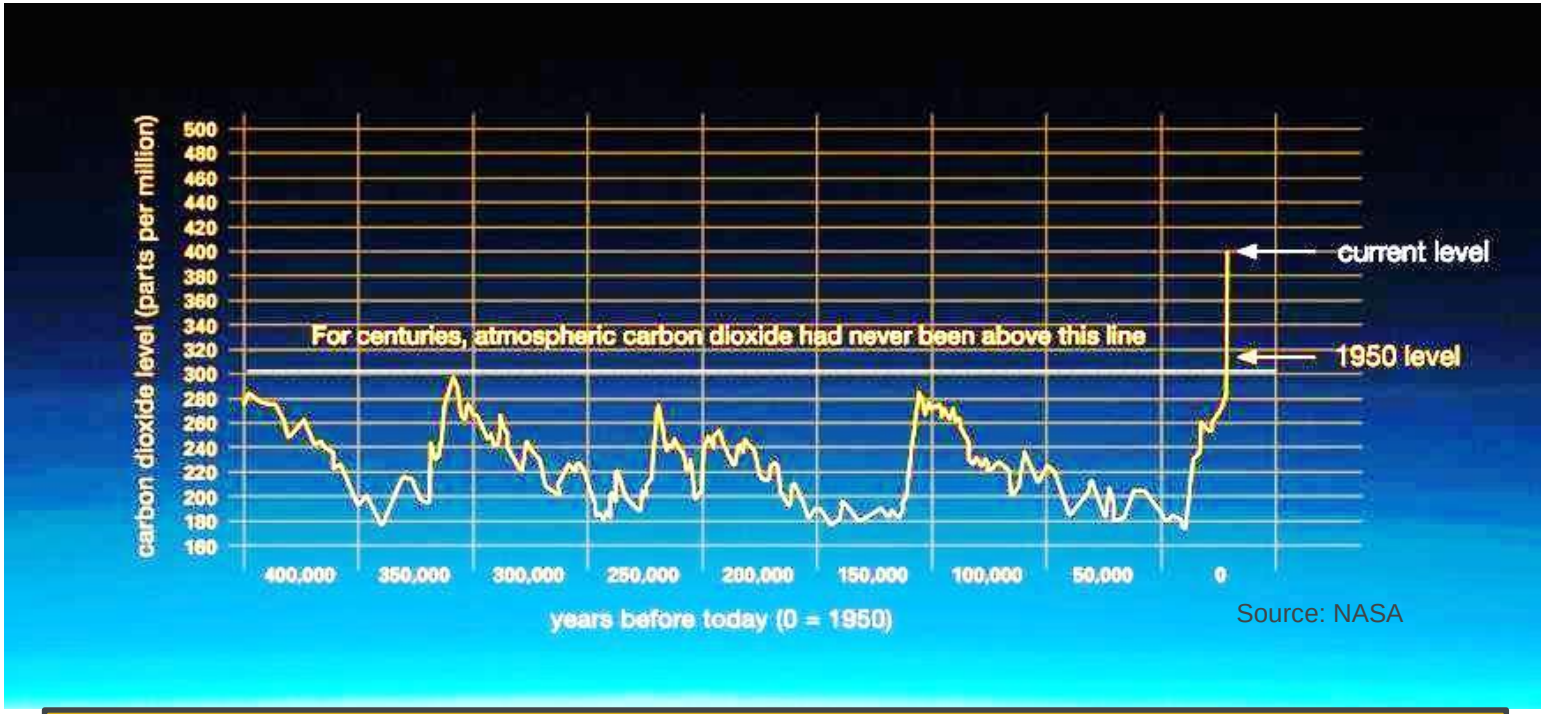
Temperatures continue to rise



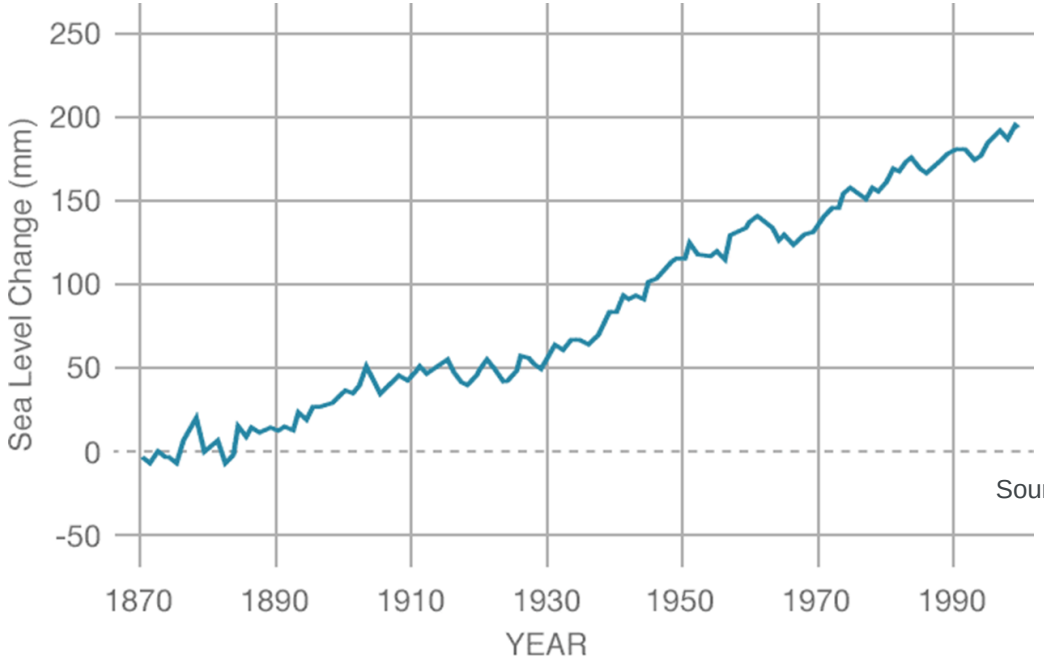
"Earth is now as warm as it was during the prior (Eemian) interglacial period, when sea level reached 6–9m higher than today" *(Hansen, et al., 2017)*

Carbon dioxide in the atmosphere continues to increase



"The last time the Earth experienced broadly comparable levels of atmospheric carbon dioxide was during the mid-Pliocene, 3-5 million years ago. To find levels consistently above those of today you have to look much further back to the mid Miocene some 15 million years ago." *(British Antarctic Survey, 2018)*

Sea levels continue to rise



Source: NASA

Lloyd's estimated that sea-level rises contributed c. 30% extra to the cost of storm surge claims in New York from Hurricane Sandy (2012)

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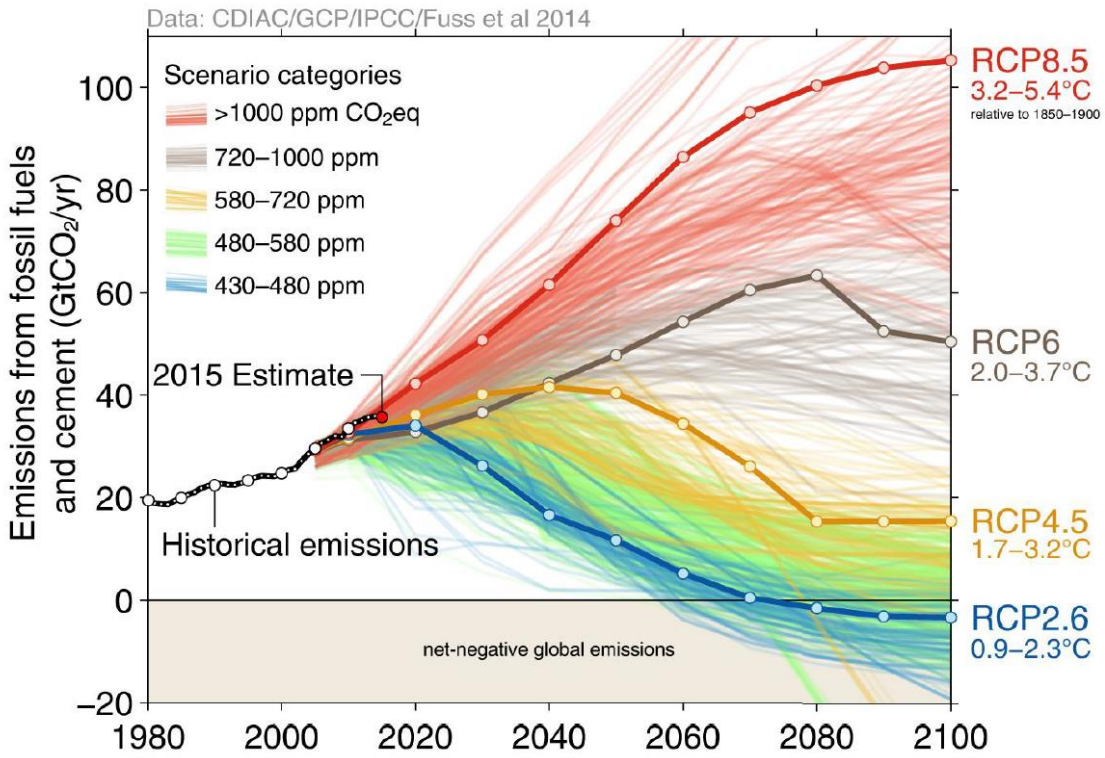
Wide range of possible future pathways…



"Four pathways have been selected for climate modelling and research, which describe different climate futures, all of which are considered possible depending on how much greenhouse gases are emitted in the years to come. The four RCPs, namely RCP2.6, RCP4.5, RCP6, and RCP8.5, are labelled after a possible range of radiative forcing values in the year 2100 relative to pre-industrial values (+2.6, +4.5, +6.0, and +8.5 W/m2, respectively)."

(Moss, et al., 2008)

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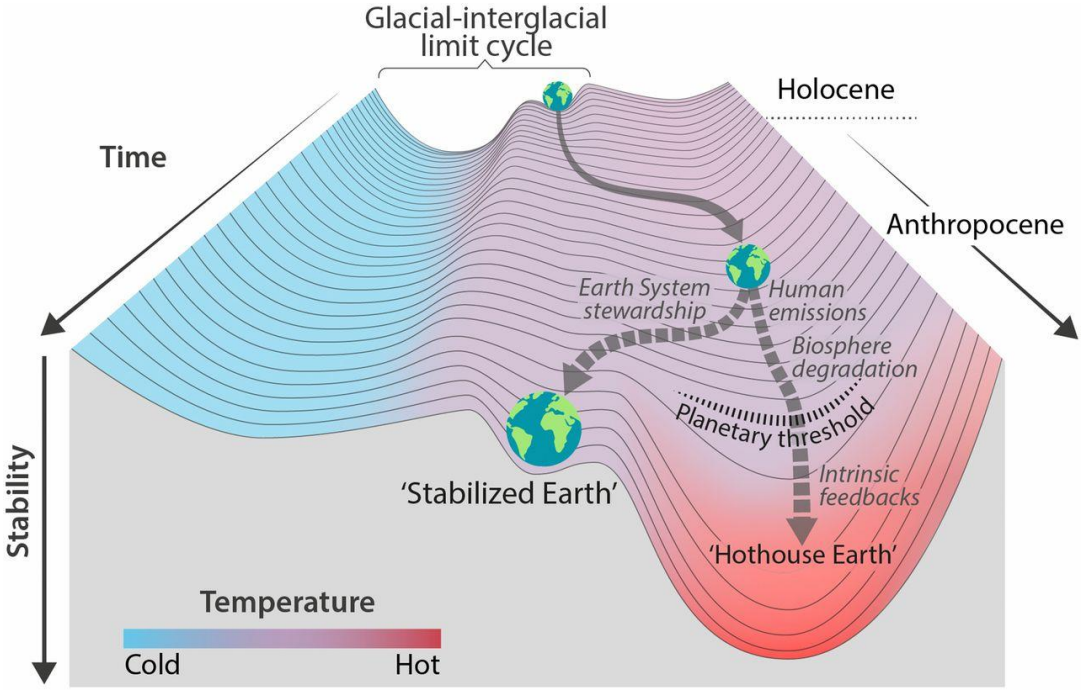
Tipping points might exist

As the planet continues to warm, it may be approaching a critical climate threshold beyond which rapid (decadal-scale) and potentially catastrophic changes may occur that are not anticipated—because of complex feedback dynamics and existing computational limitations—by climate models that are tuned to modern conditions."

(The National Research Council, 2011)



Source: Steffan et al, 2018

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How certain are we?

According to the Intergovernmental Panel on Climate Change (“IPCC”), there is scientific consensus that warming of the climate is “unequivocal” and that human activities, particularly greenhouse gas (“GHG”) emissions, are “extremely likely to have been the dominant cause of the observed warming since the mid-20th century”

"The science linking human activities to climate change is analogous to the science linking smoking to lung and cardiovascular diseases. Physicians, cardiovascular scientists, public health experts, and others all agree smoking causes cancer. And this consensus among the health community has convinced most Americans that the health risks from smoking are real. A similar consensus now exists among climate scientists, a consensus that maintains that climate change is happening, and that human activity is the cause."

(Molina, et al., American Association for the Advancement of Science, 2014)

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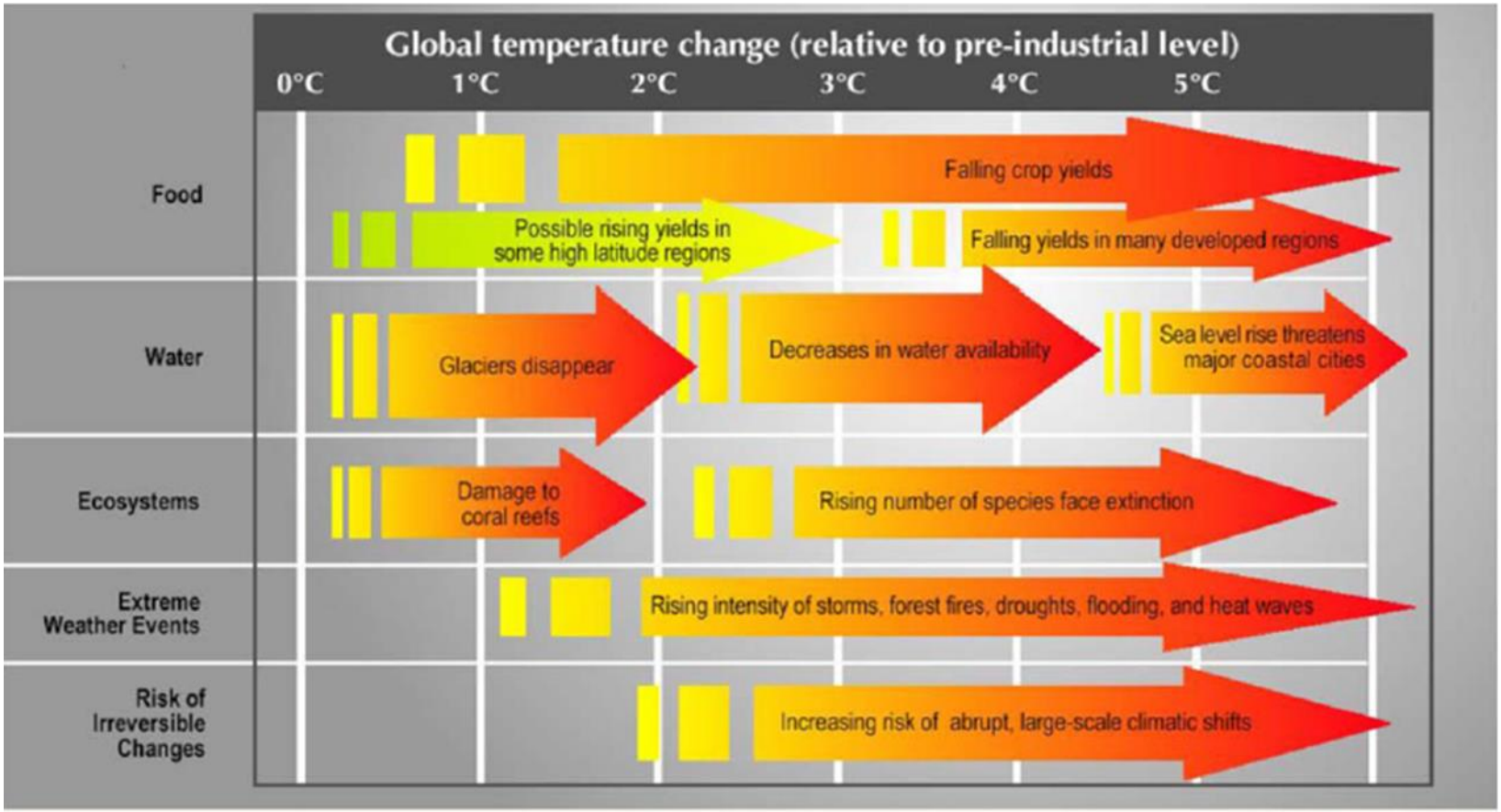
Wide range of impacts for society



C = Celsius; CO_2 = Carbon Dioxide
Source: Adapted from the *Stern Review on the Economics of Climate Change*.

Source: http://www.challengetochange.org/climate.htm

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… and the political response

UK Government:

- 2008: Climate Change Act
- 2019: declared a climate emergency, set a net zero emissions target by 2050 and launching the Green Finance Strategy
- 2020: Hosting COP 26

International:

- 2015 Paris Agreement
- 2016 Establishment of G20 Green Finance study group
- 2017 TCFD Recommendations from FSB

"Government action to tackle climate change has so far been highly insufficient to achieve the commitments made under the Paris Agreement, and the market's default assumption appears to be that no further climate-related policies are coming in the near-term. Yet as the realities of climate change become increasingly apparent, it is inevitable that governments will be forced to act more decisively than they have so far.

"The question for investors now is not ***if*** governments will act, but ***when*** they will do so, ***what*** policies they will use and ***where*** the impact will be felt.

("Inevitable Policy Response", UN Principles for Responsible Investment)

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Physical risks are the direct impacts of a changing climate

"The first-order risks which arise from weather-related events, such as floods and storms. They comprise impacts directly resulting from such events, such as damage to property, and also those that may arise indirectly through subsequent events, such as disruption of global supply chains or resource scarcity."

(Prudential Regulation Authority, 2015)

Examples of physical risks include:

- Increased frequency of heavy localised rainfall resulting in flood events.
- Rising sea levels makes coastal flooding more likely.
- Warmer drier weather increasing the risk of subsidence and wildfires.
- Changing Atlantic conditions altering the frequency, size and intensity of Atlantic storms.

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Transition risks arise from efforts to combat climate change

"The financial risks which could arise for insurance firms from the transition to a lower-carbon economy. For insurance firms, this risk factor is mainly about the potential re-pricing of carbon-intensive financial assets, and the speed at which any such re-pricing might occur. To a lesser extent, insurers may also need to adapt to potential impacts on the liability side resulting from reductions in insurance premiums in carbon-intensive sectors."

(Prudential Regulation Authority, 2015)

Sources of Transition Risk:

- Policy and legal changes
- Technological advancement
- Changes in demand
- Reputational risk

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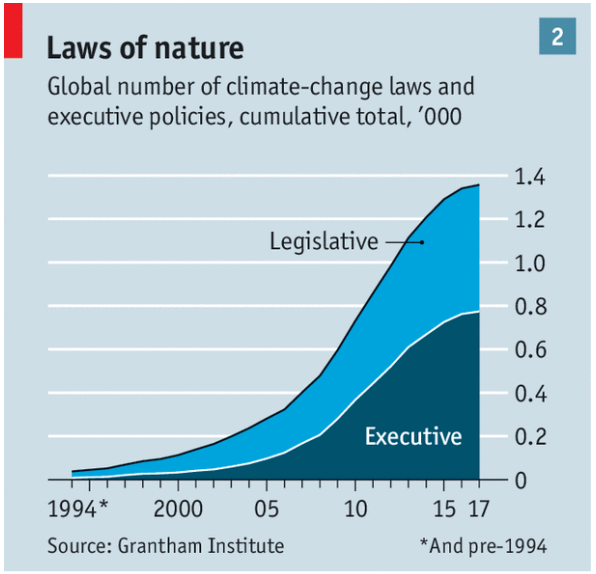
Liability risks arise from legal action

"Risks that could arise for insurance firms from parties who have suffered loss and damage from climate change, and then seek to recover losses from others who they believe may have been responsible. Where such claims are successful, those parties against whom the claims are made may seek to pass on some or all of the cost to insurance firms under third-party liability contracts such as professional indemnity or directors' and officers' insurance."

(Prudential Regulation Authority, 2015)



Liability for a failure to:

- Mitigate
- Adapt
- Disclose

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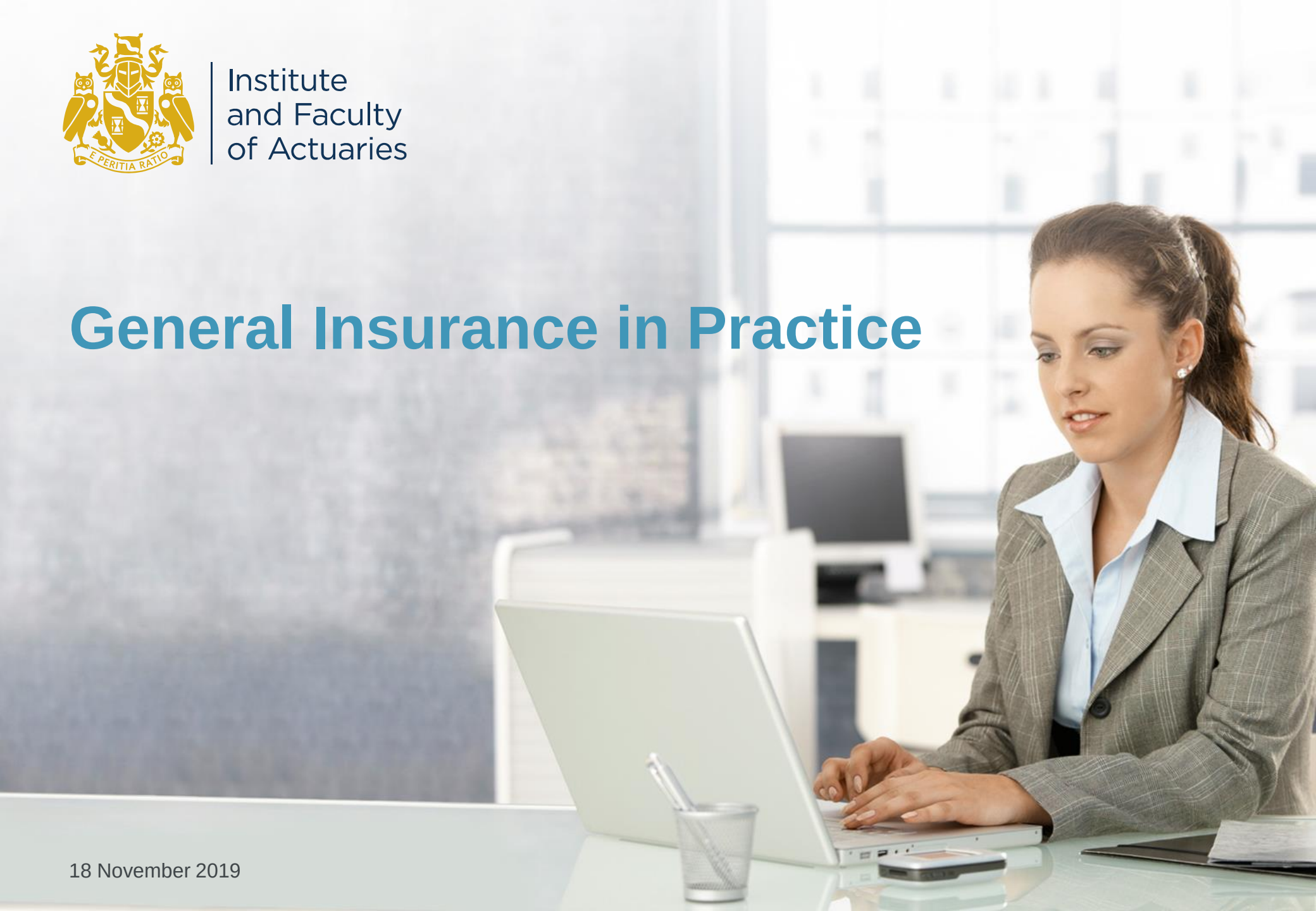
General Insurance in Practice



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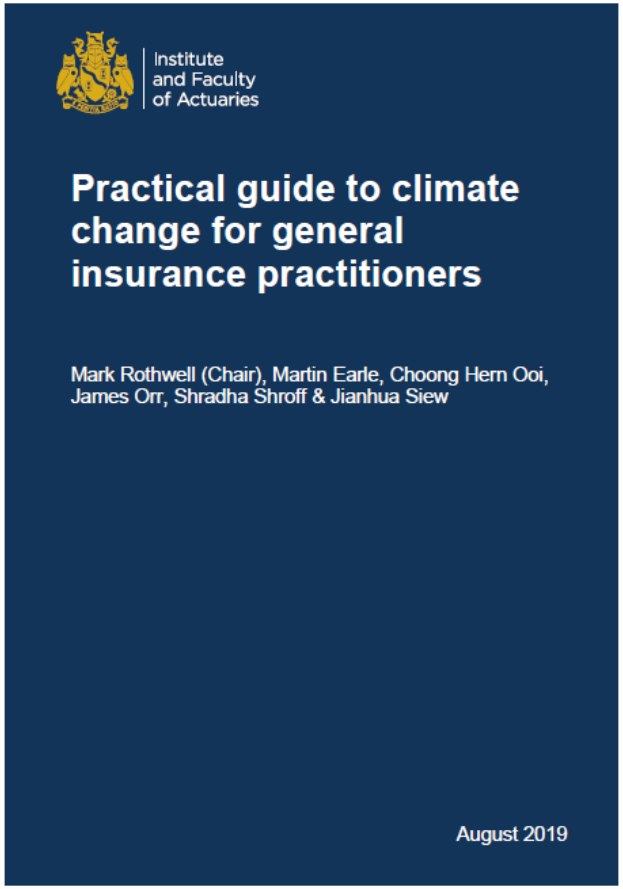
Areas of work

The following areas of focus are considered in the GI practical guide:

- Pricing and underwriting
- Reserving
- Catastrophe modelling
- Reinsurance
- Investment
- Risk Management
- Capital Management



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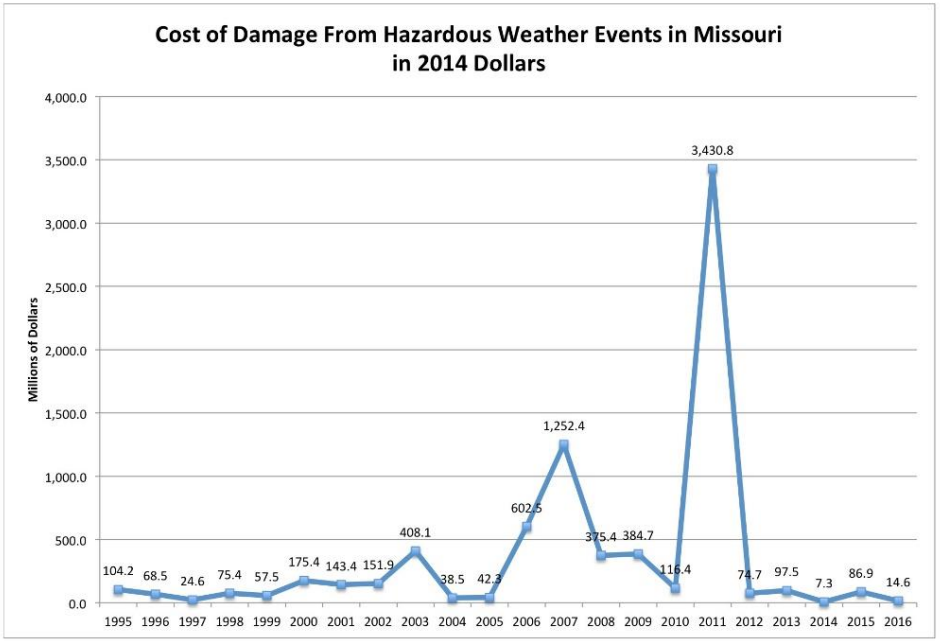
Pricing needs to think beyond the annual renewal…

Experience and exposure rating are both reliant on extrapolating past trends…

> "It may be tempting to assume that slow gradual changes in the climate will be experienced and only small differences in premiums will be needed to reflect these changes. However, acute physical risks include changes in the frequency of large cat events, where trends are difficult to identify."
>
> *(Practical Guide to Climate Change for GI Practioners, August 2019)*

Pricing practitioners may need to think about:

- how climate change influences past data,
- the likely impact it has on trends, and
- the outlook for the future



Source: mogreenstats.com

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… and think about new risks

Transition Risks, for example:

> "Storing large amounts of energy, whether it's in big batteries for electric cars or …, is still a young field. It presents challenges, especially with safety."
> *(Irfan, 2011)*

Liability Risks,

London School of Economics highlighted several US municipality-lead lawsuits against fossil fuel companies alleging liability for public nuisance, failure to warn, design defect, private nuisance, negligence, and trespass. (Grantham Research Institute on Climate Change and the Environment, 2018)

… and alternative levers to manage the risks coming onto the books.

For example. underwriting rules may need to be adapted.

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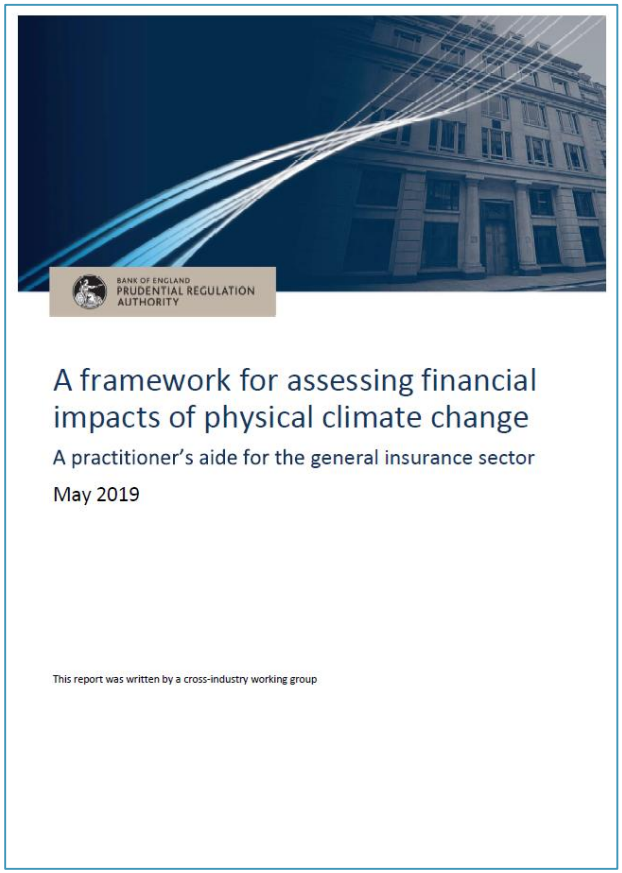
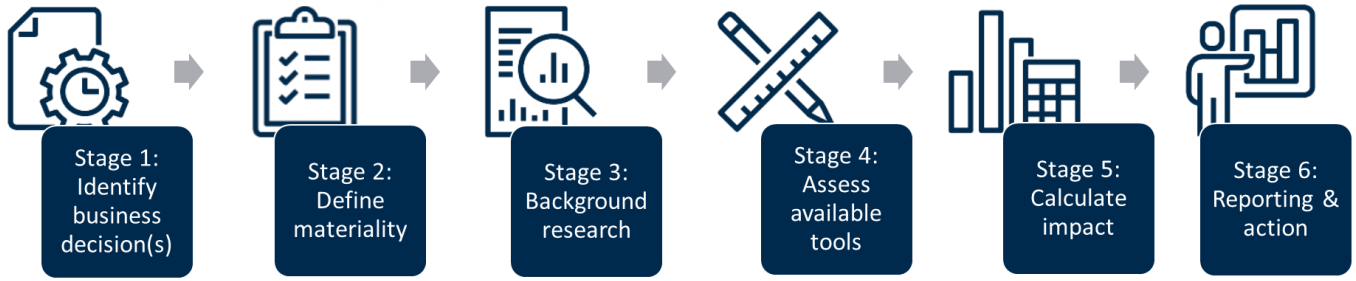
A framework for assessing impacts from physical climate change





- 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 of financial impacts from climate change
  - We hope that once firms use it, they can propose improvements and evolve it further
  - It can support firms needing to undertake the IST 2019 Climate Scenario Analysis

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Risk management and capacity building

> "Firms would be expected to identify, measure, monitor, manage, and report on their exposure to these [climate-related] risks. Firms should be able to evidence this in the written risk management policy, management information and board risk reports."
>
> *(PRA SS3/19, 2019)*

Where understanding, and awareness is lacking, the Risk Management function may need to consider "capacity building" within the business, e.g. providing:

- training,
- guidance,
- case studies, and
- supporting research,

with the aim of building "carbon literacy" and integrating climate change risks within the firm's systems of governance and control.

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Risk management responses

A Risk Management function may respond to the risk from climate change by:

- Assessing the potential climate change impacts for short, medium and long-term time horizons, their impact on the firm's viability, future strategy and capital requirements.
- Incorporating climate risk within the risk register, including its classification, quantification, potential mitigants and recommended actions.
- Carrying out forward looking stress and scenario tests. The tests could aim to check the insurer's resilience to physical risks, transition risks and liability.
- Making appropriate disclosures of current and future risks such as those based on TCFD recommendations.
- Defining and assessing Key Performance Indices (KPI) to monitor exposures, and emerging trends

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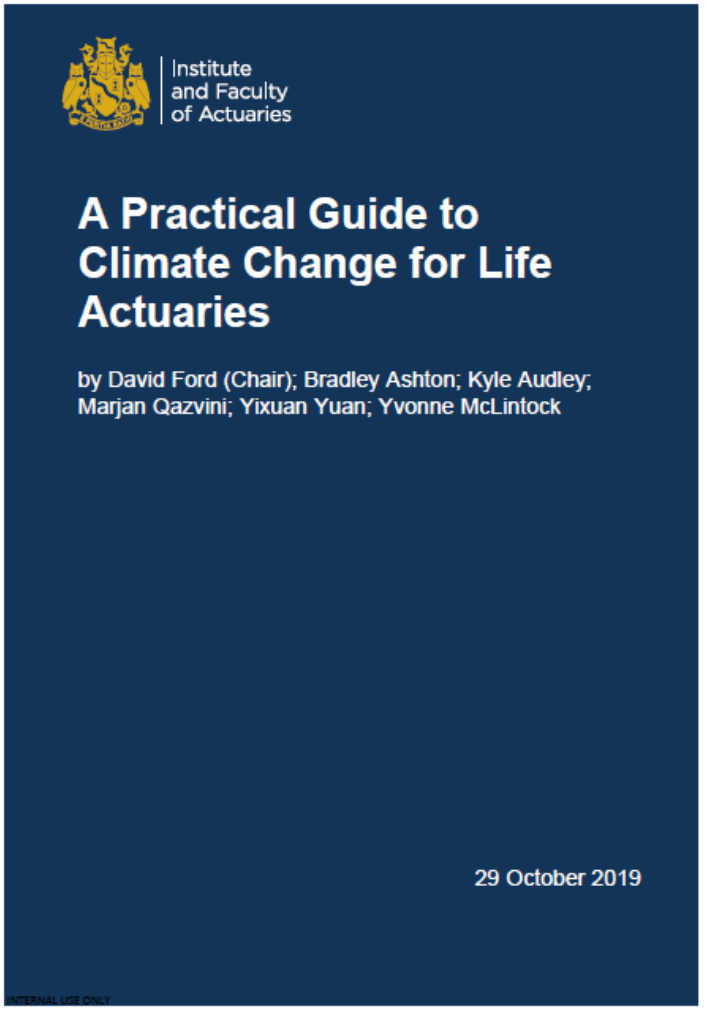
Life insurance practical guide

18 November 2019

Agenda

- Life Actuaries and Climate Change
- How can life actuaries allow for climate change in their work?
- Regulatory and disclosure aspects of climate change
- Climate change risk and ERM frameworks
- The role of models in life insurance
- Modelling climate change risk: mortality and morbidity
- Next steps



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Climate Change and Life Actuaries: Why?

Because you should do?

- Is climate change happening or likely to happen?
- Does it lead to financial uncertainty and risk?
- Could this be material over the short, medium or long term?

Because you must do?

- As an actuary: Institute and Faculty of Actuaries (IFOA) Risk Alert on Climate-Related Risks (IFOA, 2017). *"Actuaries should ensure they understand, and are clear in communicating, the extent to which they have taken account of climate-related risks in any relevant decisions, calculations or advice."*
- On behalf of an Insurer? What are the regulations that are or could impact them?

Because you can?

- What is possible in day to day actuarial work?
- What more can we do to progress knowledge and capability?

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Climate Change and Life Actuaries: What?

Changes to **investment performance** from direct climate impacts, regulation or restrictions; **Investment opportunities** in mitigation or transition

Changes to **economic growth** and performance in wider economies. Effects on the **demand for insurance products and their pricing**

Changes to **insurance regulatory environment**

Changes to **mortality and morbidity** and **uncertainty** around trends

Overall **uncertainty around timing, magnitude and response to climate change**

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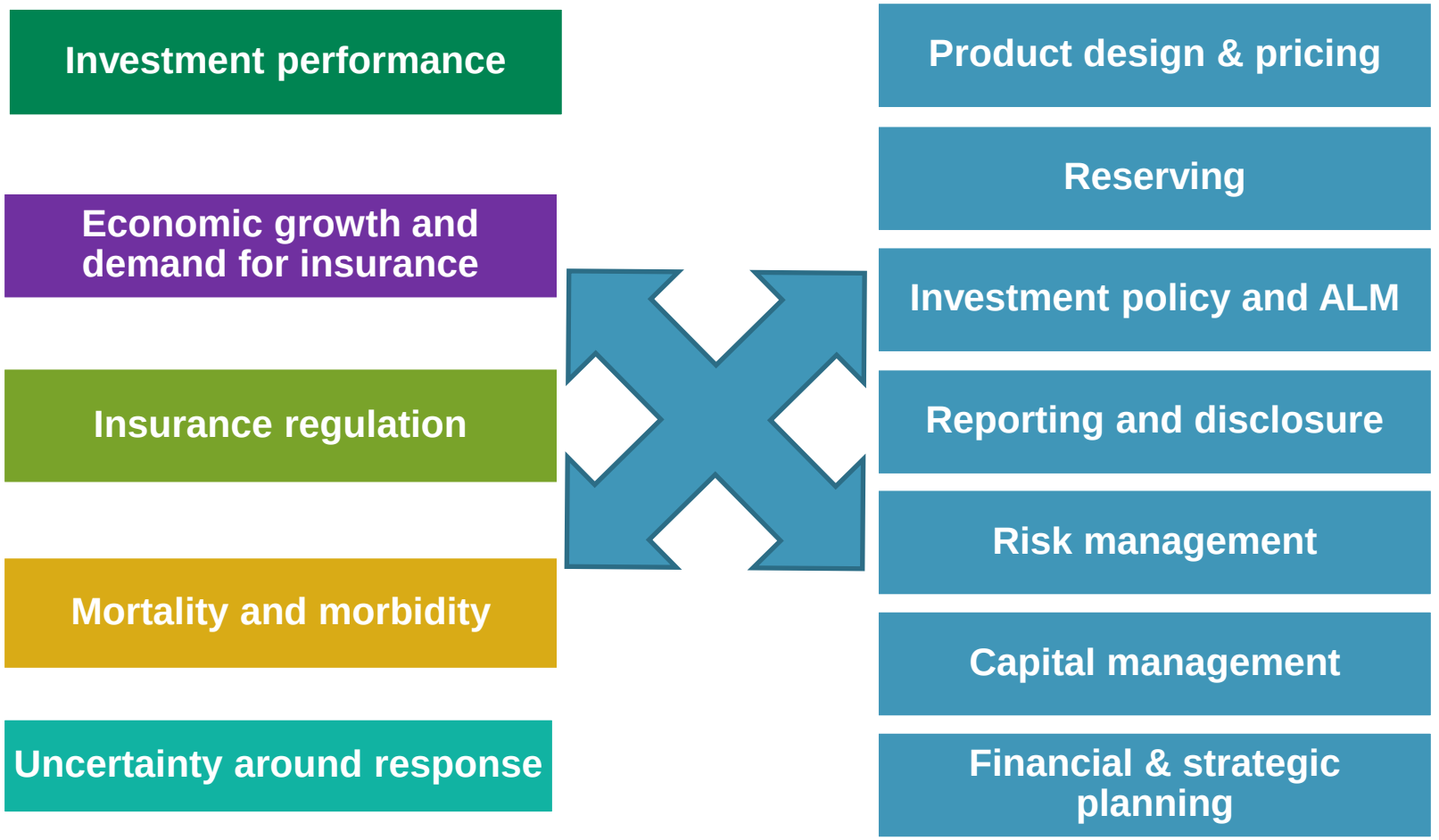
Climate Change and Life Actuaries: Who?



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Regulatory development and disclosure

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Regulatory development and disclosure: where are we today?

The level of regulation explicitly and specifically related to climate change for life insurance actuaries and companies is developing. In terms of the current status we can consider:

- **Explicit, Current Requirements**: for actuaries - IFOA Risk Alert. For firms - increasing explicit references to climate change in pensions law and regulation may have an impact for some product lines. PRA expectations in SS3/19
- **Implicit, Current Requirements:** since actuaries and firms have explicit obligations to assess financial and strategic risks as a whole, are they adequately including consideration of climate change risk? What are their implied obligations to disclose climate change related risk / approach as part of wider shareholder reporting or to customers?
- **Current recommended / best practice:** eg TCFD disclosures, wider best practice around (non) investment in coal related industries. Firms' practice and disclosure here may be impacted by external lobbying

…and regulators continue to engage on climate change risk

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UK Regulation is setting out expectations for firms: for example the latest PRA Supervisory Statement

SS3/19 sets out the PRA's expectations on banks and insurers' approaches to managing the financial risks from climate change. They see this as requiring a strategic approach and set out four key areas of expectation:

- embed the consideration of the financial risks from climate change in the firm's **governance arrangements**;
- incorporate the financial risks from climate change into **existing financial risk management** practice;
- use **(long term) scenario analysis** to inform strategy setting and risk assessment and identification; and
- develop an **approach to disclosure** on the financial risks from climate change

How has your firm responded? How should you respond?

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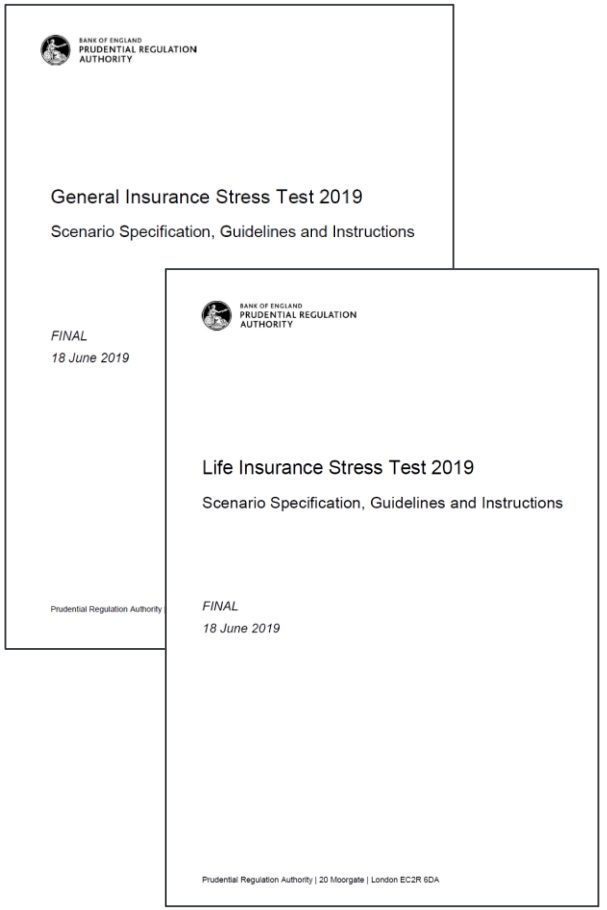
The PRA's 2019 Insurance Stress Test, exploratory climate change sections

Published in June 2019, sent out to largest Life and GI firms

- exploratory scenario designed to provide market impetus
- Part 1: prescribed shocks under three scenarios
  - 'Disorderly Transition', 'Paris Agreement', 'Hot House'
  - based on temperatures as at 2022, 2050 and 2100 respectively
  - applied as instantaneous shocks to current balance sheets,
- Part 2: qualitative description of own scenarios
  - including quantification of impacts to inform future practice
- captured data to inform Bank's (and others') approach
  - *TCFD identified that few firms using scenario analysis systematically*
  - *to inform future Network for Greening the Financial System's (NGFS) work*

Returns submitted at end of October; analysis is underway



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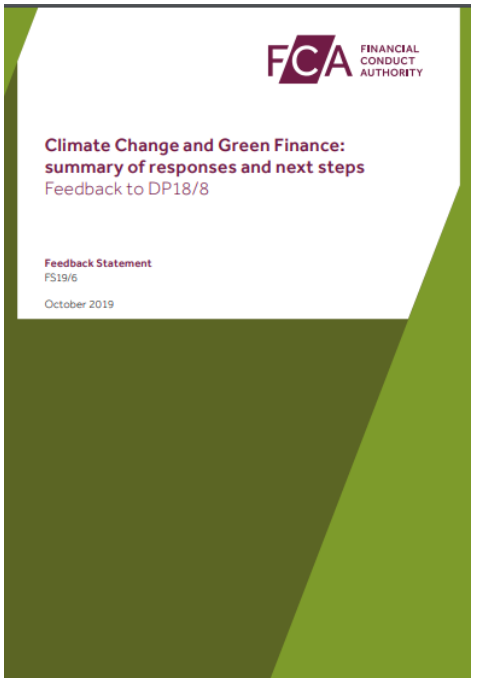
The latest FCA Feedback Statement is also of relevance to life insurers

FS19/6 sets out the FCAs actions and next steps following a discussion paper on climate change and green finance. The actions and next steps are to:

- consult on new rules to improve climate-related disclosures by certain issuers and clarifying existing obligations
- finalise rule changes requiring Independent Governance Committees (IGCs) to oversee and report on firms' ESG and stewardship policies, and separate rule changes to facilitate investment in patient capital opportunities
- publish a feedback statement in response to a joint Discussion paper with the Financial Reporting Council (FRC) on Stewardship setting out actions to address the most significant barriers to effective stewardship
- challenge firms on potential greenwashing, clarifying expectations and taking appropriate action to prevent consumers being misled



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How is Practice Evolving on Disclosure?

- At an international level, the Financial Stability Board (FSB) has created the Task Force on Climate -related Financial Disclosures (TCFD)
- The TCFD's goal is to promote voluntary, consistent, comparable, reliable and clear disclosures around climate-related financial risk using a four pillar approach:

Governance	Strategy	Risk management	Metrics and Targets
Disclose the organisation's governance around climate-related risks and opportunities	Disclose the actual and potential impacts of climate-related risks and opportunities on the strategy and financial planning of the business	Disclose how the organisation identifies, assesses, and manages climate-related risks	Disclose the metrics and targets used to assess and manage relevant climate-related risks and opportunities

- Supplemental guidance is issued at a more granular level, broadly categorised into financial and non-financial, with the financial sector further sub-categorised into banks, insurance companies, asset owners, and asset managers.

TCFD recommendations may be relevant both for life insurer's own disclosures but also for the companies they invest in

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Climate change risk and ERM frameworks

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Developing risk management

Applying ERM key principles

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Components of ERM - examples

ERM Component	Potential Climate Change Considerations
Governance and an Enterprise Risk Management Framework	The governance framework should enable climate change risk to be appropriately and proportionately assessed and included
Risk Management Policy	The policy needs to outline how the firm manages each relevant and material category of risk and describe how it brings together tolerance limits, capital requirements, processes, and monitoring and managing risk. Policies need to be flexible and extensive enough to incorporate climate change risk based on current understanding and as thinking evolves
Risk Tolerance Statement	Appropriately include climate change in the Risk Tolerance Statement, for example considering its impact on product types offered or not offered, the firm's investment strategy for its shareholder investments or on behalf of clients, or climate change implications for its tolerance of demographic exposures
Risk Responsiveness and Feedback Loop	Appropriately include climate change consideration in forward looking emerging risk assessment, current Key Risk Indicator (KRI) assessment and backward looking 'lessons learned' from unexpected losses or control failures

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Risk identification

Example: A simple risk framework to combine climate risk factors with common insurance framework risks. This can help with ORSA and Economic capital considerations. **Actual ratings will vary by firm and business model…**

Risk Class	Physical	Transition	Liability
Market	Yes	Yes	Yes
Longevity	Yes	Less material	No
Mortality/Morbidity	Yes	Less material	No
Lapse	Less material	Yes	No
Counterparty	Yes	Yes	Yes
Operational	Less material	Yes	No
Strategic	Yes	Yes	Yes
Reputational	n/a	Yes	Yes

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Mortality focus

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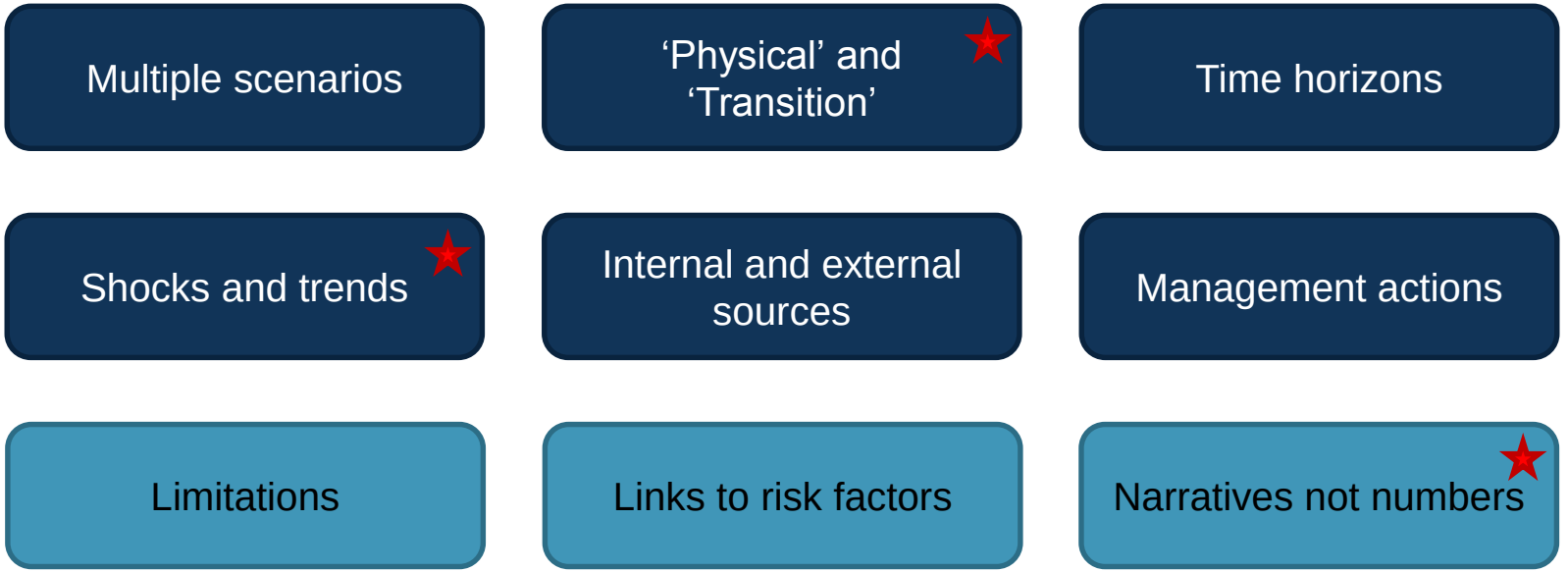
Scenario analysis – practical steps

Some considerations when planning scenario analysis…..



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Considerations – examples for mortality

Shocks and trends

Shock (sometimes referred to as 'acute') or

Trend ('chronic') type risks

Shock: increased mortality due to extreme weather events

Trend: longer-term risk due to progressive changes in temperature

'Physical' and 'Transition'

Physical: temperature related health issues due to extreme weather (pre-existing health conditions or vulnerabilities i.e. elderly populations)

Transition: not material

Narratives not numbers

Qualitative scenario analysis is an appropriate way to start understanding an insurer's financial exposures to climate-related risks

Consider how previous exercises and existing processes for identifying and exploring **emerging risks** could be applied to the risks arising due to climate change

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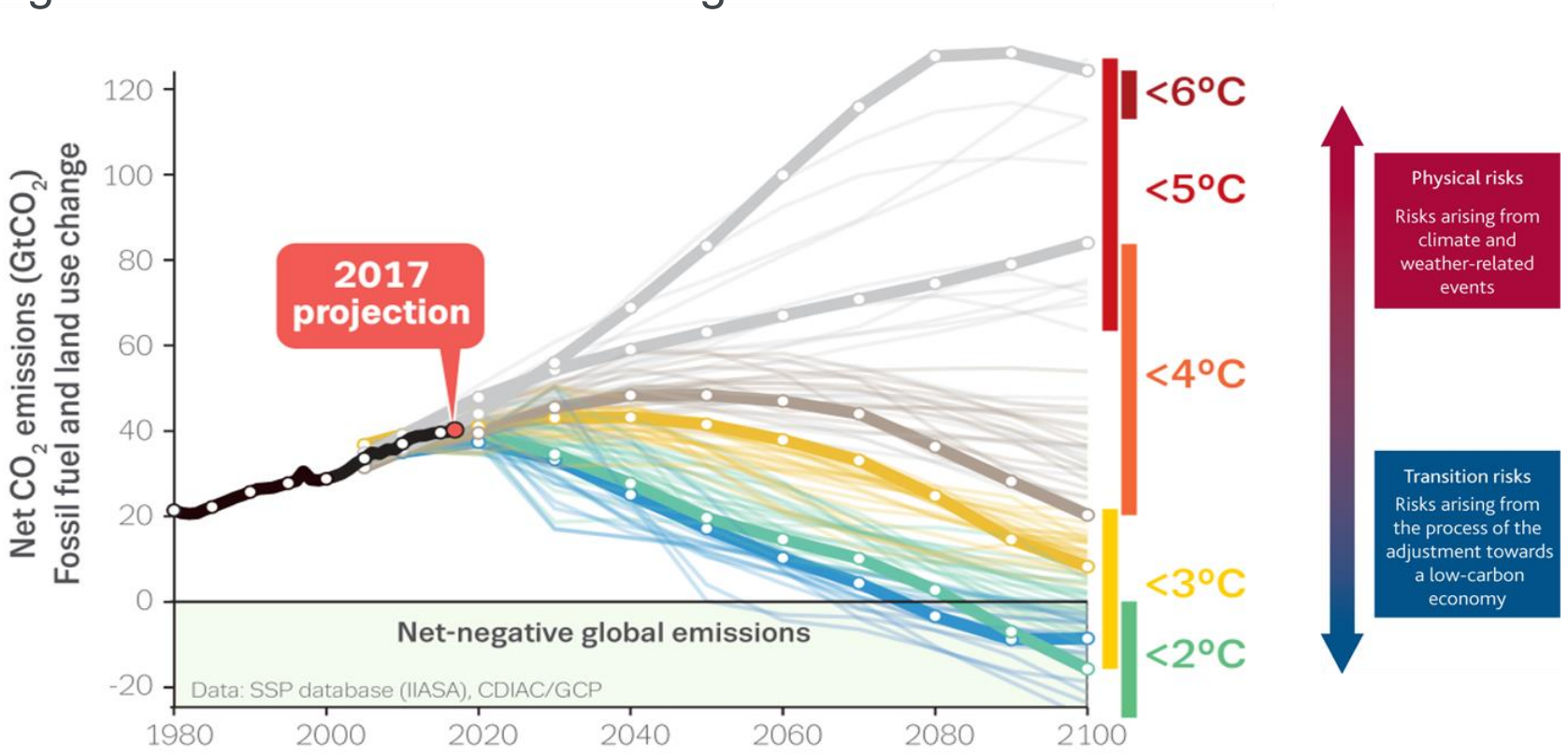
Representative Concentration Pathways (RCPs)

Linking emissions to levels of warming……



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Developing the narrative

Consider different RCPs and implications for physical and transition risk types

RCP(p): there are extensive physical risks, as temperatures and sea levels rise and also the potential for more extreme weather events, but little change in industry types or the economy and hence limited transition risk

RCP(t): there are lower physical risks but significant (and potentially relatively short term) transition risks as societal / economic change results in significant attempts to reduce overall greenhouse gas emissions and look for their capture

Qualitative scenario analysis

- Describe what conditions your firm could be operating in under a range of RCPs
- Identify a short list of these narratives (where the firm is most exposed)
- Explore the causal links between the prevalent conditions and impacts on mortality – using external research and internal R&D resources
- **Result: an informed analysis of the impact of physical risk on mortality shocks and trends**

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Quantitative analysis

Baby steps?

Step 1: the qualitative analysis can be used to identify areas for quantitative assessment: how is the in-force portfolio exposed to the risks identified (e.g. by age, location, impairment)?

Step 2: perform sensitivity testing on mortality assumptions related to high risk segments

Step 3: maintain an awareness of, and contribute to, research in the area of modelling the impacts of climate change on demographics

Step 4: use developments in modelling to refine scenario analysis, introducing more quantitative analysis to supplement the qualitative analysis

Step 5: adjust pricing, reserving and capital assumptions accordingly

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Modelling barriers

Data

- Limited availability of demographic data that would allow any assessment of the impacts of climate change historically
- Sources of global demographic data: few are generally accepted as credible
- Not rich enough: true of many emerging fields where it takes time for practitioners to challenge the data and form a view on its reliability

Time horizon

- Significant uncertainty related to how the effects of climate change will emerge over time
- A flexible model that can be applied over different time horizons is needed. However, it is difficult to build a model with parameters and variables that remain suitable and stable over different time horizons

Models and parameters

- The best models are robust i.e. they react well to new information and have proven predictability power when back-tested over different time periods
- When modelling impacts to mortality, there is an intermediate step in interpreting the correlation between parameters derived from observable data collected from the wider environment and parameters concerned with the impacts on health

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Pic 5

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Future Technical Needs

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Questions on technical support

1. What are the most significant barriers to developing a narrative for the potential impacts of climate change?
   A. I don't know where to start!
   B. Lack of a framework within which to develop this
   C. Lack of case studies from other firms or external providers
   D. Insufficient time and resource
   E. Insufficient internal engagement

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Questions on technical support

2. What are the most significant enablers needed for you to be able to quantify the potential impacts of climate change?
   A. Knowing where to start…
   B. Availability of relevant underlying research
   C. Sufficient time and resource to engage with the underlying research
   D. Availability of solutions from external providers
   E. Time and resource to apply this to our business model and risk profile
   F. A consensus view on the potential impacts of climate change

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Questions on technical support

3. How might the IFoA help you in identifying and assessing the potential impacts from climate change?
   A. Provide a digest and links to relevant research
   B. Establish working parties to consider specific risk factor impacts
   C. Create discussion forums around specific risk factors
   D. Commission research from relevant experts

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Institute and Faculty of Actuaries

Communication

18 November 2019

Climate change is “wicked”

A wicked problem “is a problem that is difficult or impossible to solve because of incomplete, contradictory and changing requirements that are often difficult to recognise. Moreover, because of interdependencies, the effort to solve one aspect of a wicked problem may reveal or create other problems.”

(Anon, Wikipedia, accessed April 2018)

Stakeholders may have hugely different views of the problem, meaning that they will think of different issues and solutions. The problem may never be solved definitively and may require changing resources through time to address the issue. This makes it harder to define, understand and predict the risks before suggesting possible solutions. These solutions are then unlikely to last forever – at some point new solutions may need to be found.

(Climate Change for Actuaries: An introduction, IFoA, March 2019)

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Engaged or not?

What stops engagement?

- Distance
- Doom
- Dissonance
- Denial
- Identity

What enables engagement?

- Social
- Support
- Simple
- Signal
- Story

https://app.sli.do/event/awlfsbak (Event code: # 7309)

Questions

Comments

Expressions of individual views by members of the Institute and Faculty of Actuaries and its staff are encouraged.

The views expressed in this presentation are those of the presenter.

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Institute and Faculty of Actuaries

Opportunities and Next Steps

18 November 2019

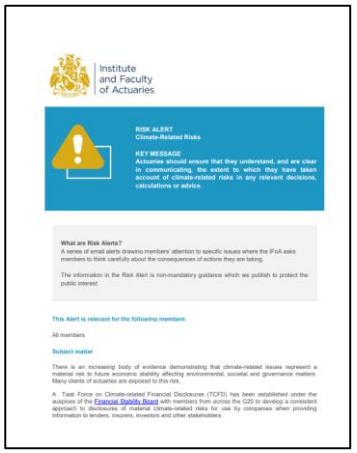
Next steps

- Your role and climate change
- Your company and climate change
- Publications
- Risk framework
- Scenario analysis
- Internal working parties

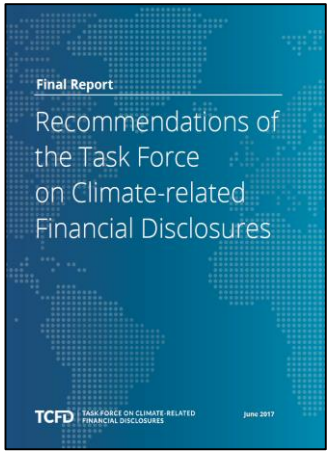
Further reading

FCA: DP18/08

PRA: SS3/19



IFoA: Risk Alert



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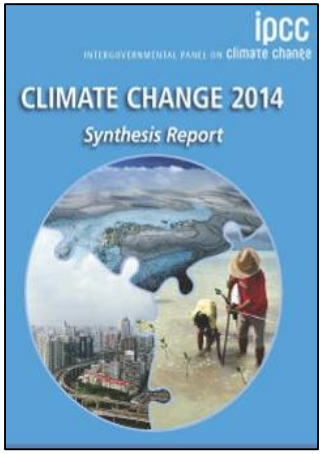

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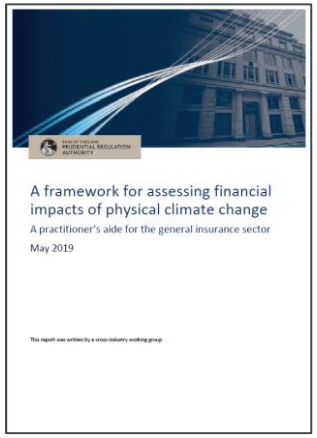
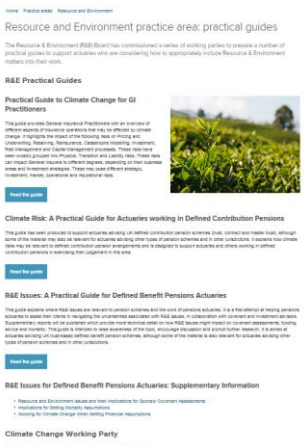
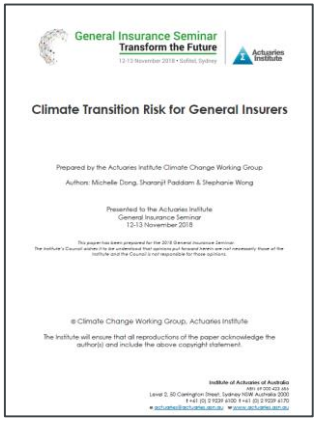


PRA: Framework for assessing physical climate change



IFoA: Practical Guides

CRO Forum: The heat is on



AIA: Climate Transition Risk for General Insurers

How to get involved

- Registering your interest in Resource and Environment newsletters by logging into the Profession's website (www.actuaries.org.uk) and amending your preferences.
- Attending one or more of the many R&E events organised by the profession
- Volunteering to support the work of the R&E Board, its sub-committees or one of its working parties: https://www.actuaries.org.uk/get-involved/volunteering-ifoa