



Sustainable scenarios for the actuary

Michiel Evers

Ted van der Aalst

VSAE Actuarialcongres 2022

Sustainable scenarios for the actuary

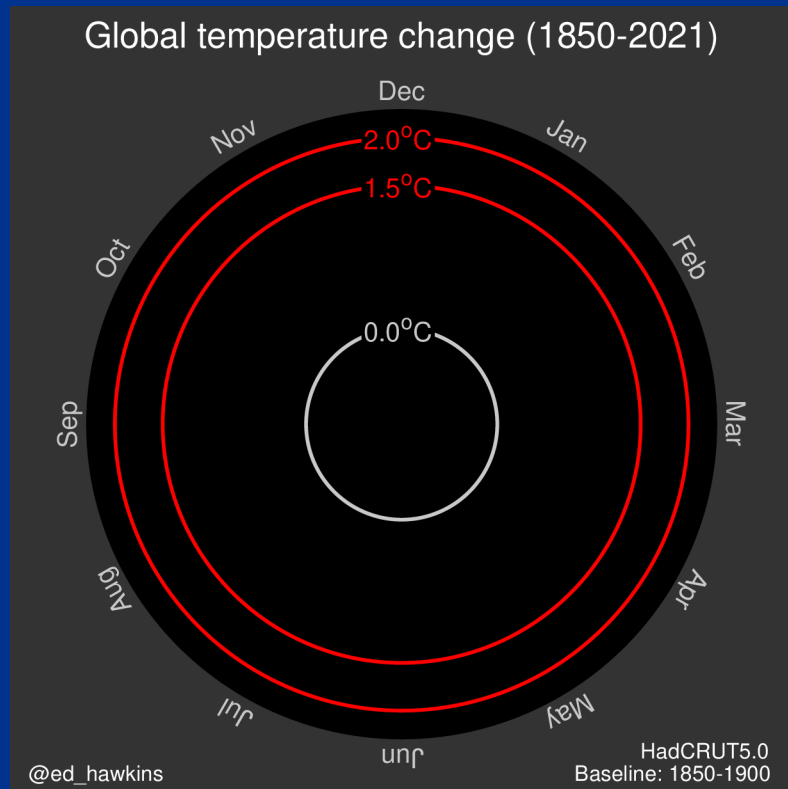


Michiel Evers
Sustainability & Climate
Change Services

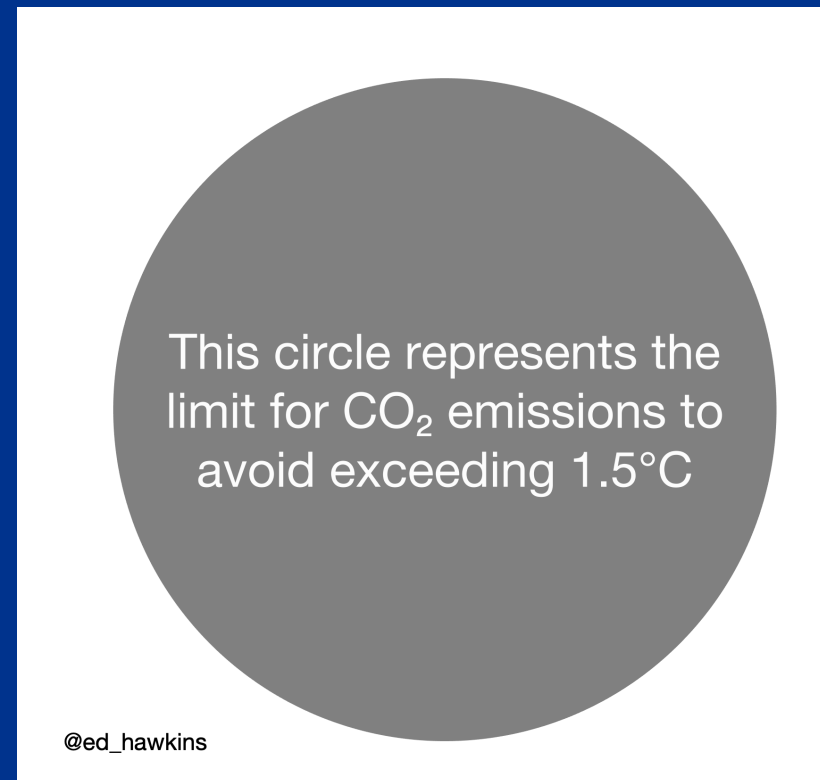


Ted van der Aalst
Actuarial & Insurance Risk

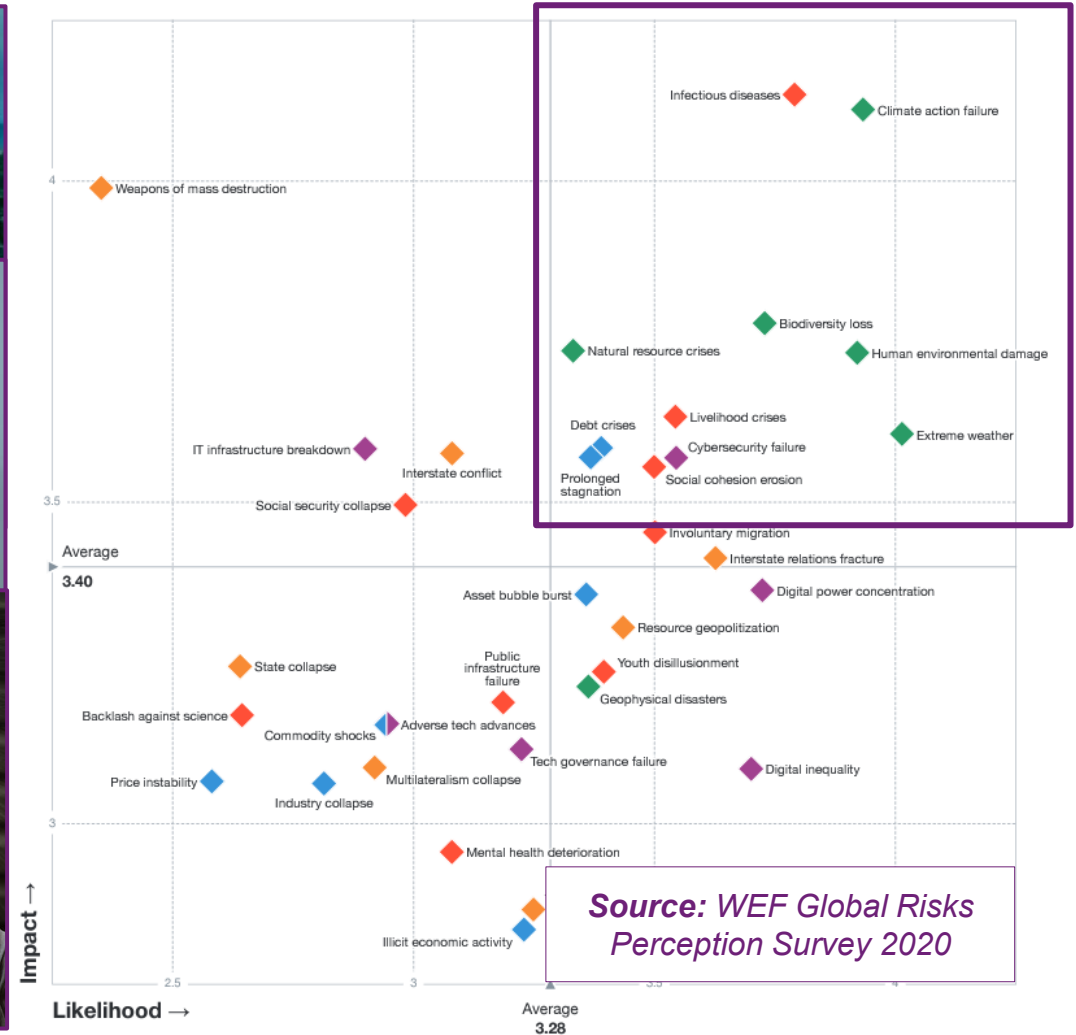
Our climate is changing...



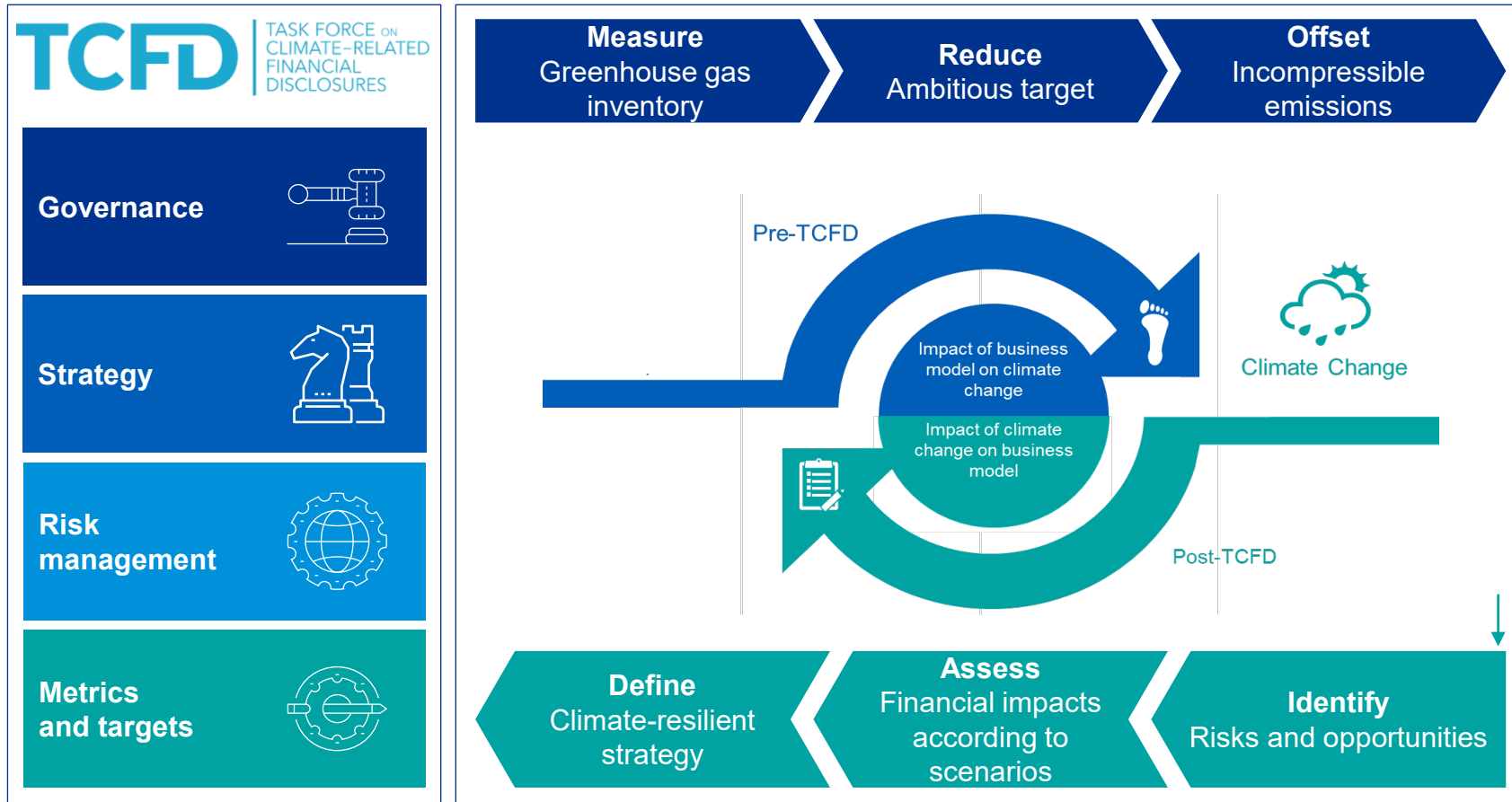
...and our window of opportunity to limit the change is closing rapidly



Climate change has everybody's attention



Understanding the financial impact of climate change



Source: TCFD

Task force on climate-related financial disclosures

Governance	Strategy	Risk Management	Metrics and Targets
Disclose the organization's governance around climate-related risks and opportunities.	Disclose the actual and potential impacts of climate-related risks and opportunities on the organization's businesses, strategy, and financial planning where such information is material.	Disclose how the organization identifies, assesses, and manages climate-related risks.	Disclose the metrics and targets used to assess and manage relevant climate-related risks and opportunities where such information is material.
Recommended Disclosures	Recommended Disclosures	Recommended Disclosures	Recommended Disclosures
a) Describe the board's oversight of climate-related risks and opportunities.	a) Describe the climate-related risks and opportunities the organization has identified over the short, medium, and long term.	a) Describe the organization's processes for identifying and assessing climate-related risks.	a) Disclose the metrics used by the organization to assess climate-related risks and opportunities in line with its strategy and risk management process.
b) Describe management's role in assessing and managing climate-related risks and opportunities.	b) Describe the impact of climate-related risks and opportunities on the organization's businesses, strategy, and financial planning.	b) Describe the organization's processes for managing climate-related risks.	b) Disclose Scope 1, Scope 2, and, if appropriate, Scope 3 greenhouse gas (GHG) emissions, and the related risks.
	c) Describe the resilience of the organization's strategy, taking into consideration different climate-related scenarios, including a 2°C or lower scenario.	c) Describe how processes for identifying, assessing, and managing climate-related risks are integrated into the organization's overall risk management.	c) Describe the targets used by the organization to manage climate-related risks and opportunities and performance against targets.

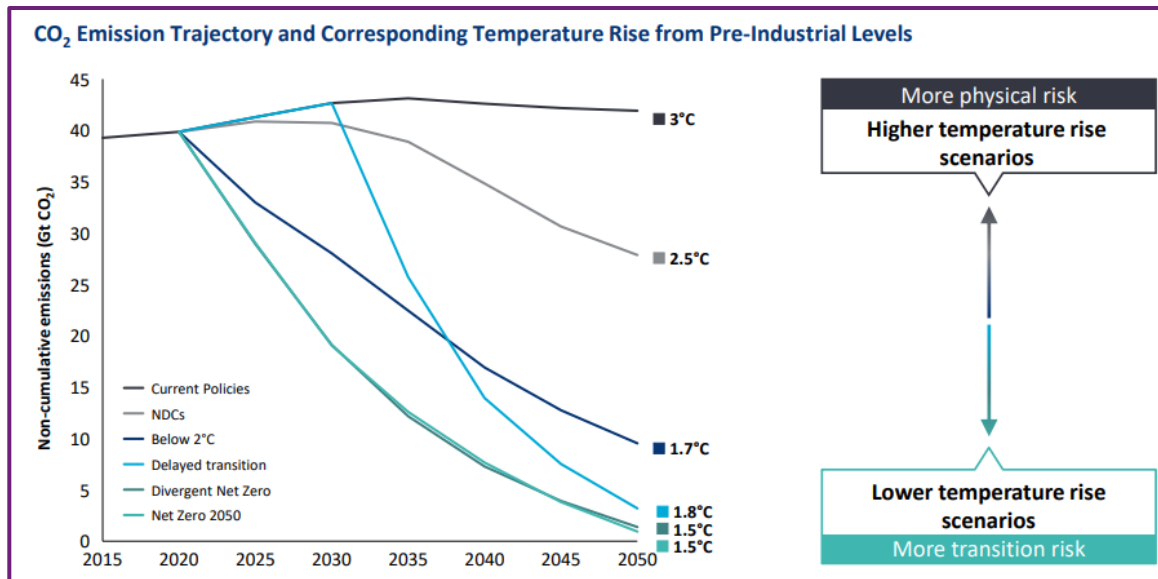
Source: TCFD

Task force on climate-related financial disclosures

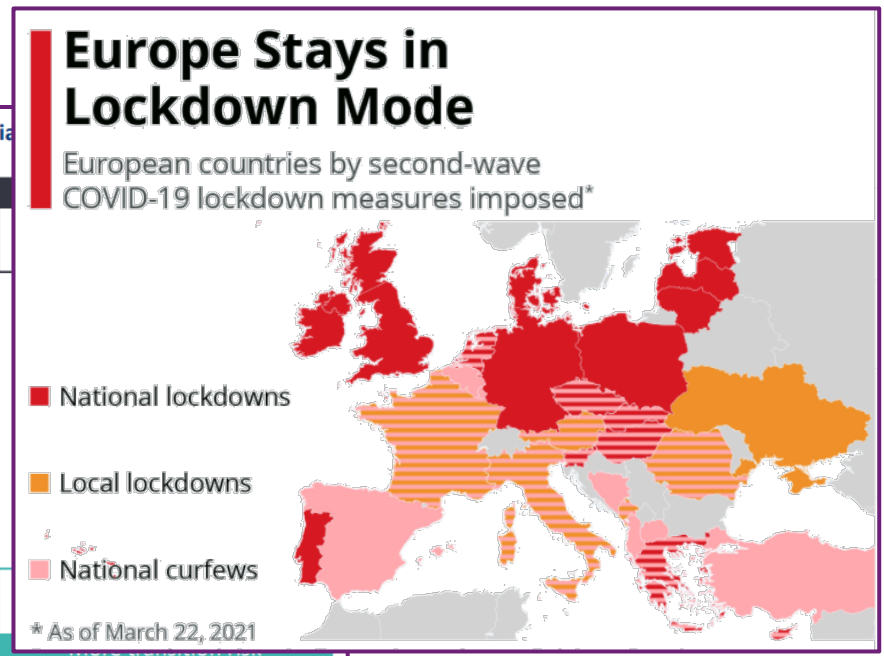
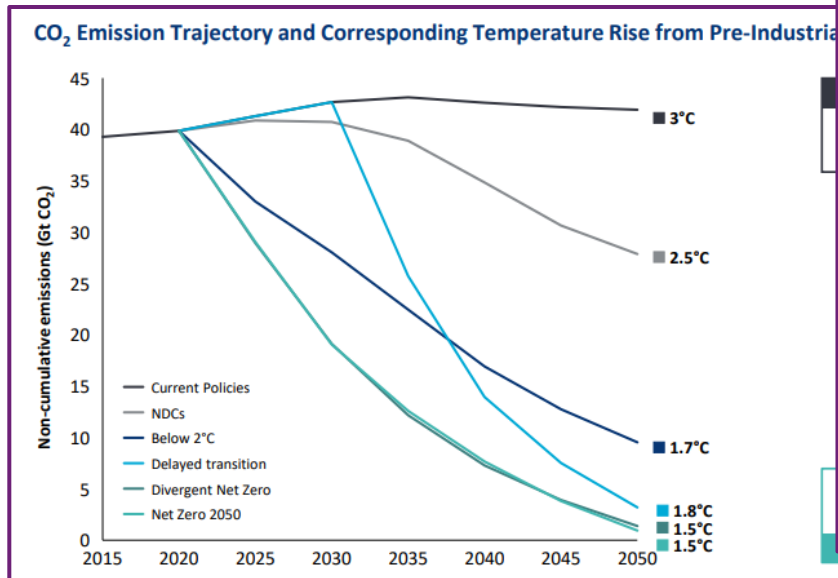
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<p>In order to disclose, companies first need to assess the financial implications of their material climate-related risks and opportunities, for different climate related scenarios.</p>			

Source: TCFD

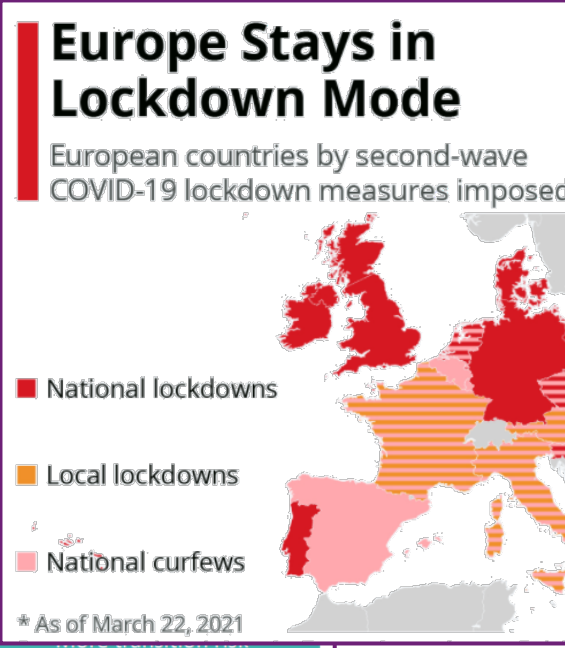
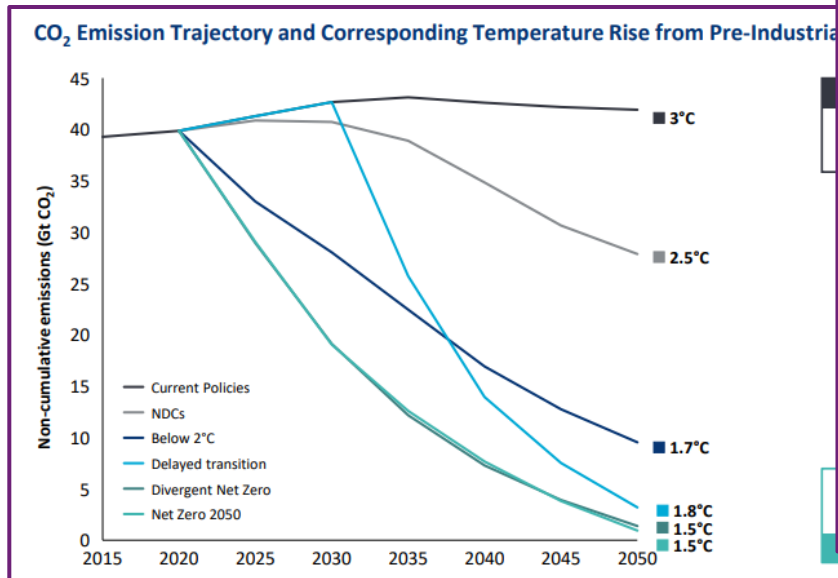
Climate change impacts through multiple channels



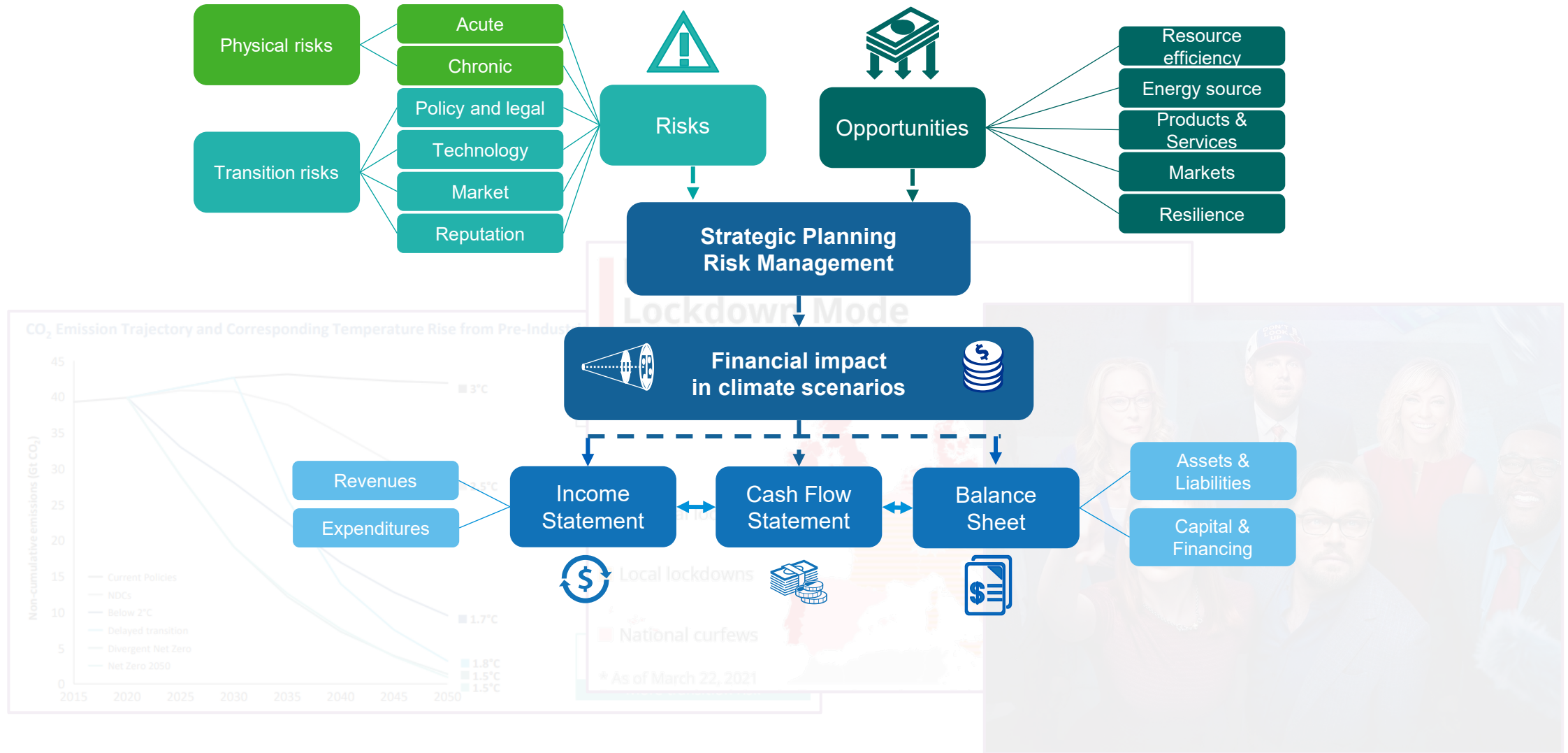
Climate change impacts through multiple channels



Climate change impacts through multiple channels



Climate change impacts through multiple channels



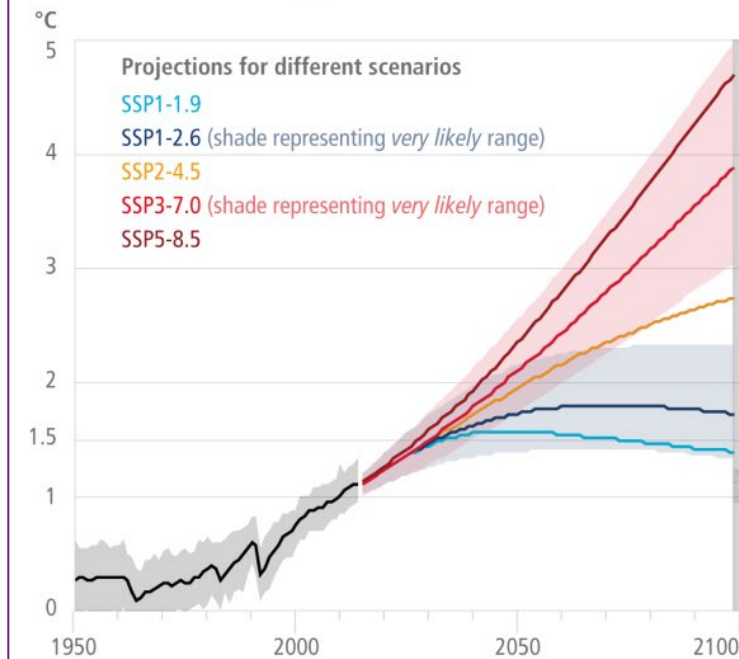


Scenarios

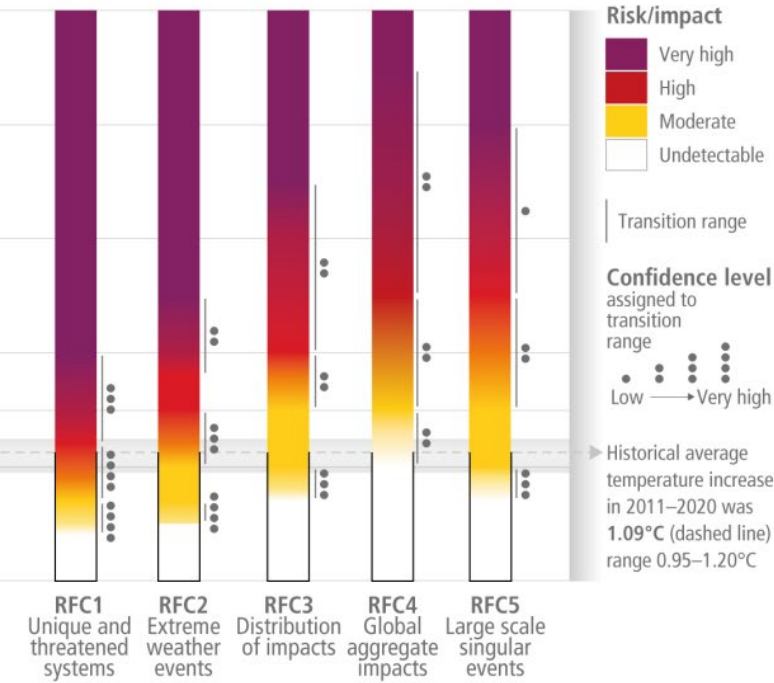
Risk management of complex risks

Global and regional risks for increasing levels of global warming

(a) Global surface temperature change
Increase relative to the period 1850–1900



(b) Reasons for Concern (RFC)
Impact and risk assessments assuming low to no adaptation

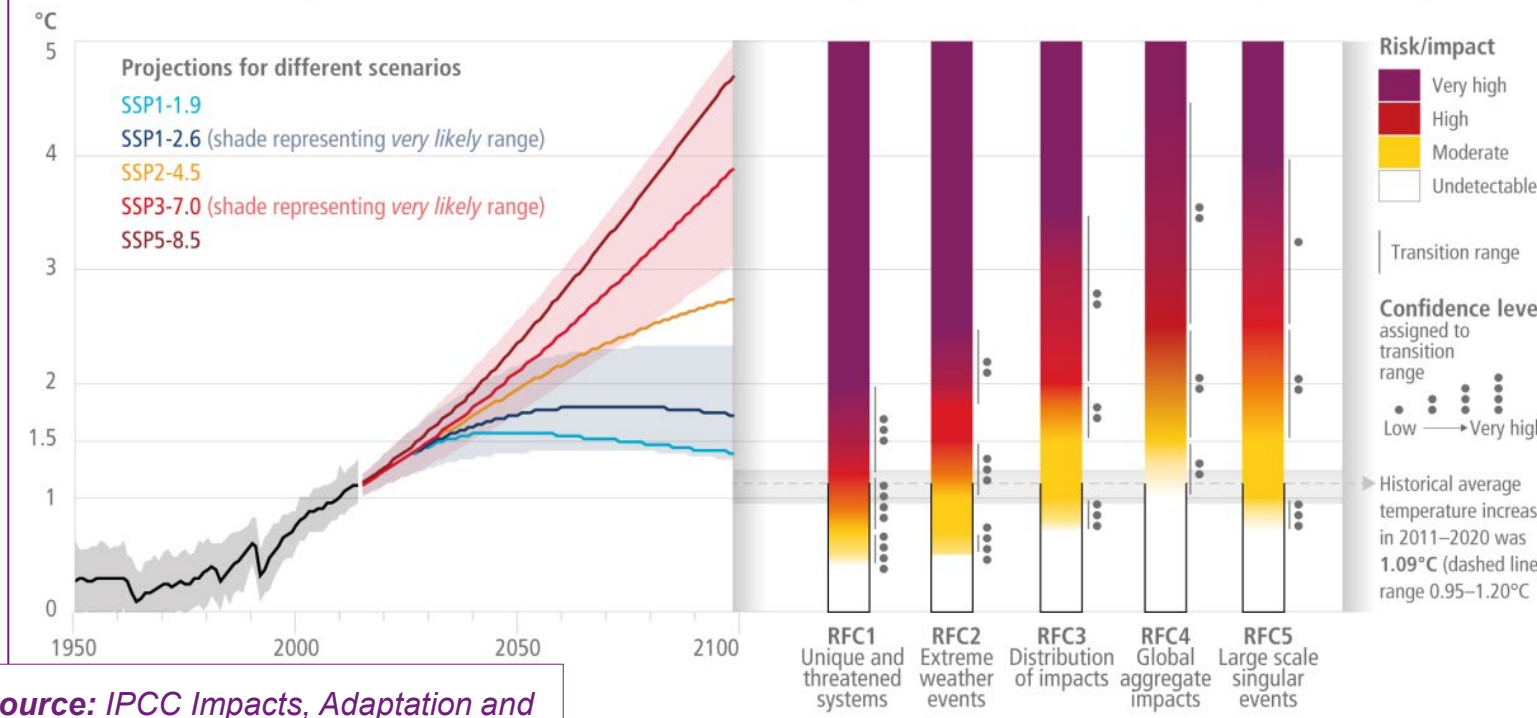


Source: IPCC Impacts, Adaptation and Vulnerability 2022

Risk management of complex risks

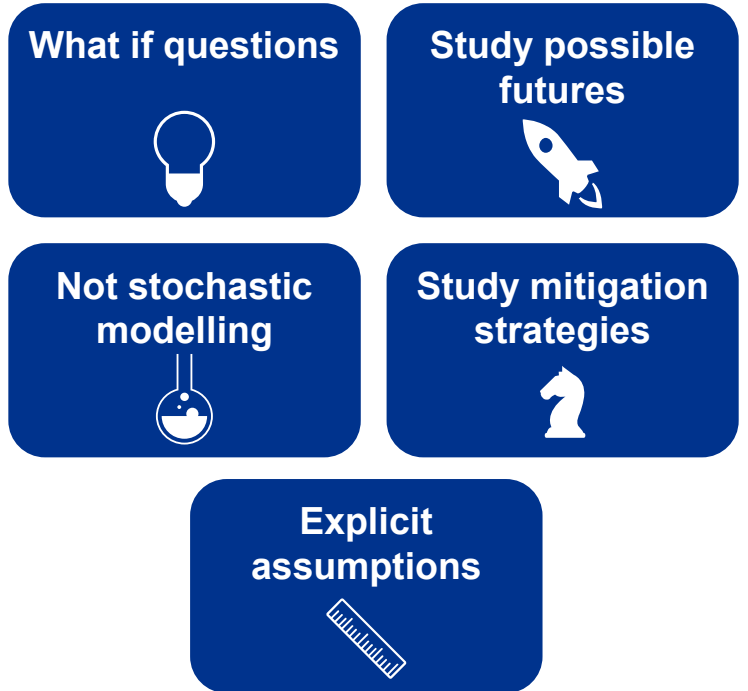
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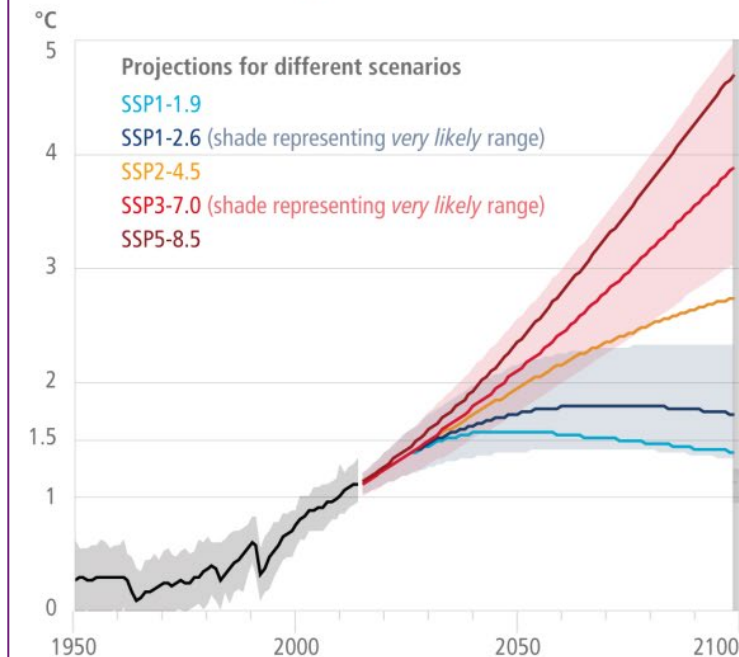
Scenario analysis



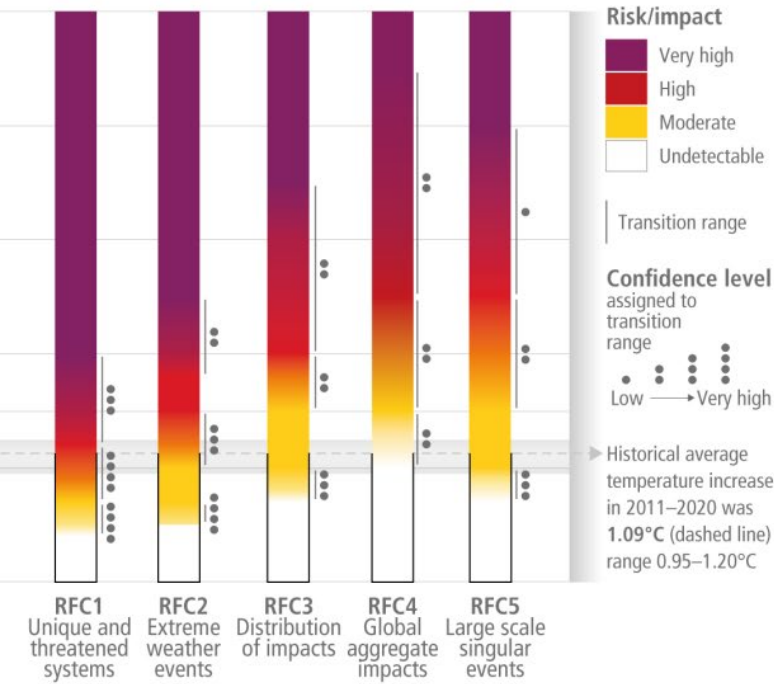
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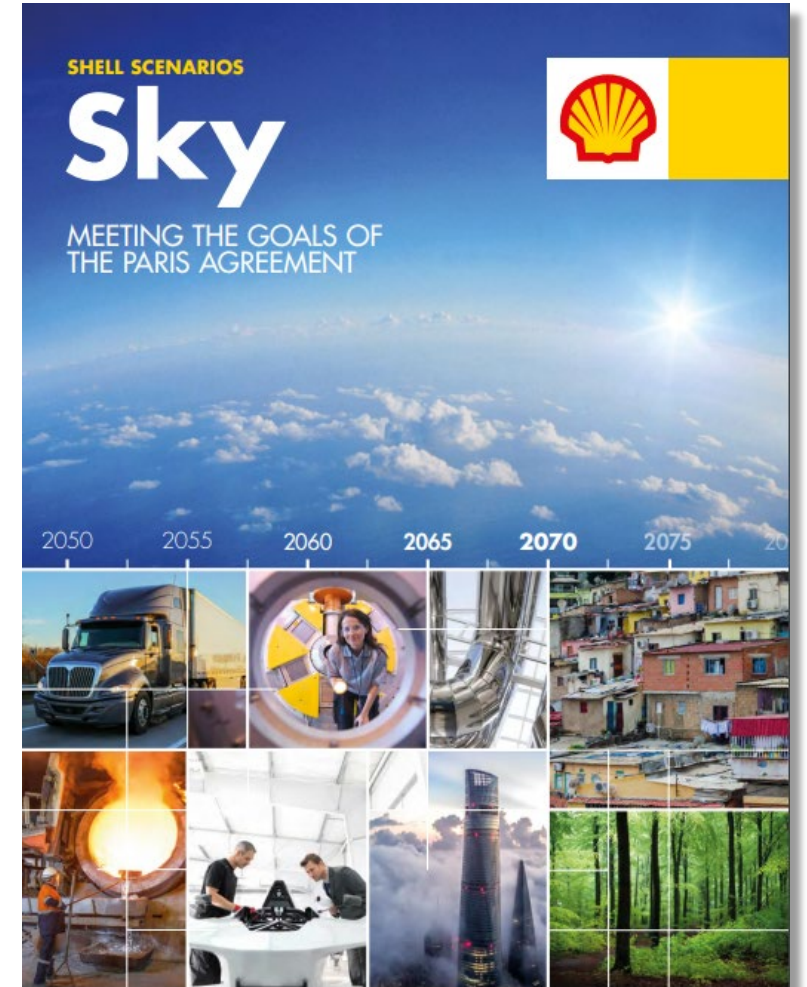
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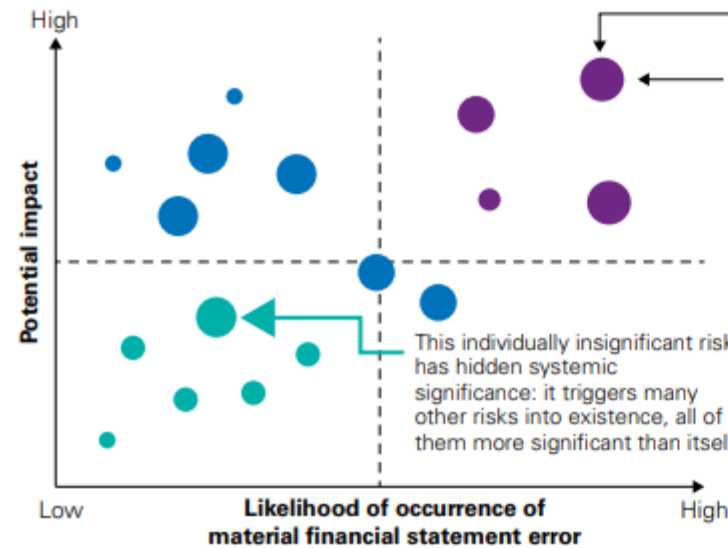


Sustainable scenarios

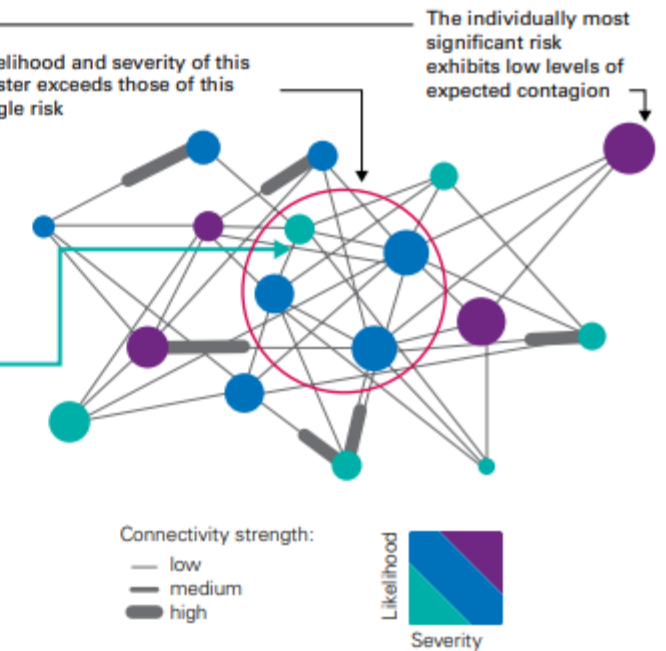
Challenges of climate risk

- 1 Long - Term
- 2 Non-linear effects
- 3 Systemic
- 4 Interconnectedness

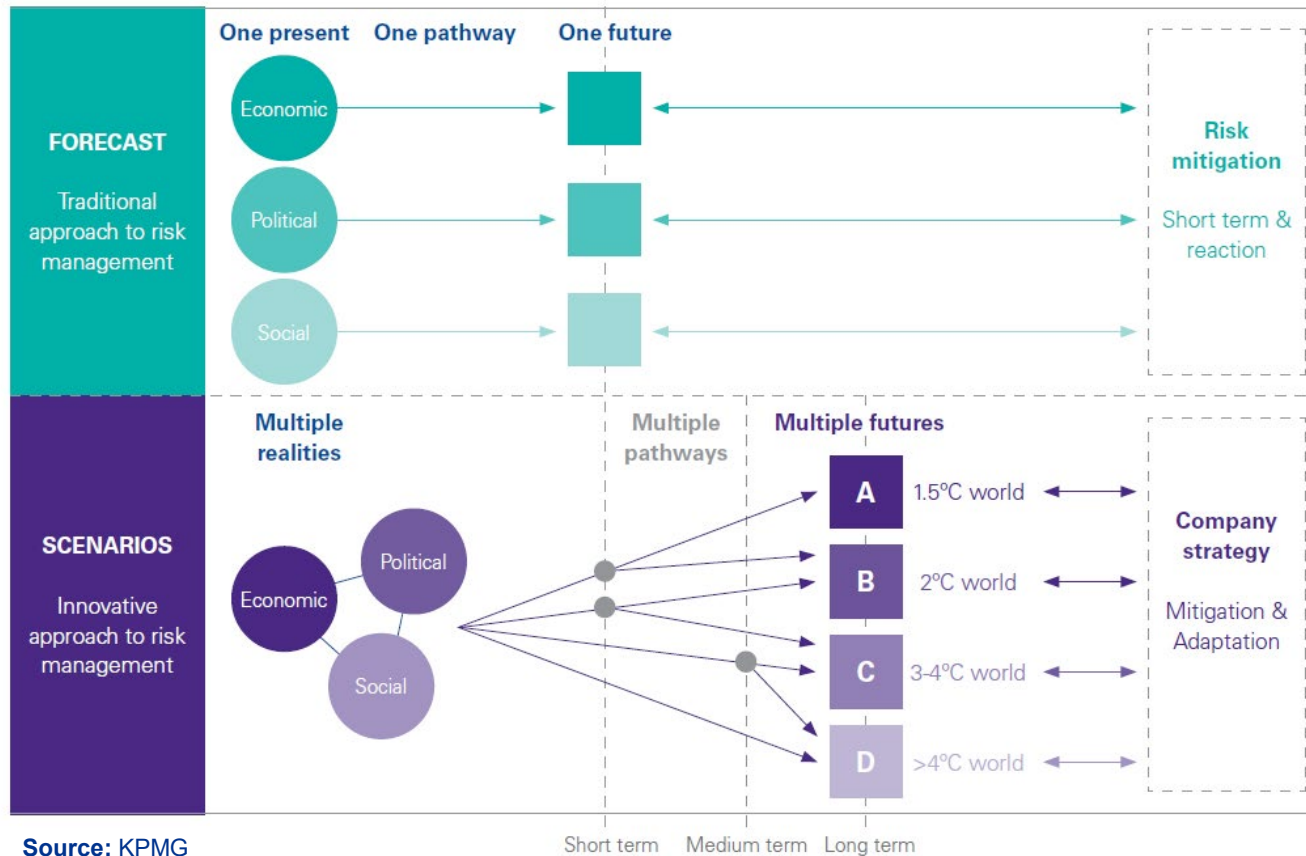
Traditional, two-dimensional risk map



Inter-connected view



Climate risk scenario analysis



Source: KPMG

Scenarios are not

- Predictions
- Variations of a single case
- Snapshots of endpoints
- Generalized views of feared or desired futures
- Products of outside futurists

Scenarios are

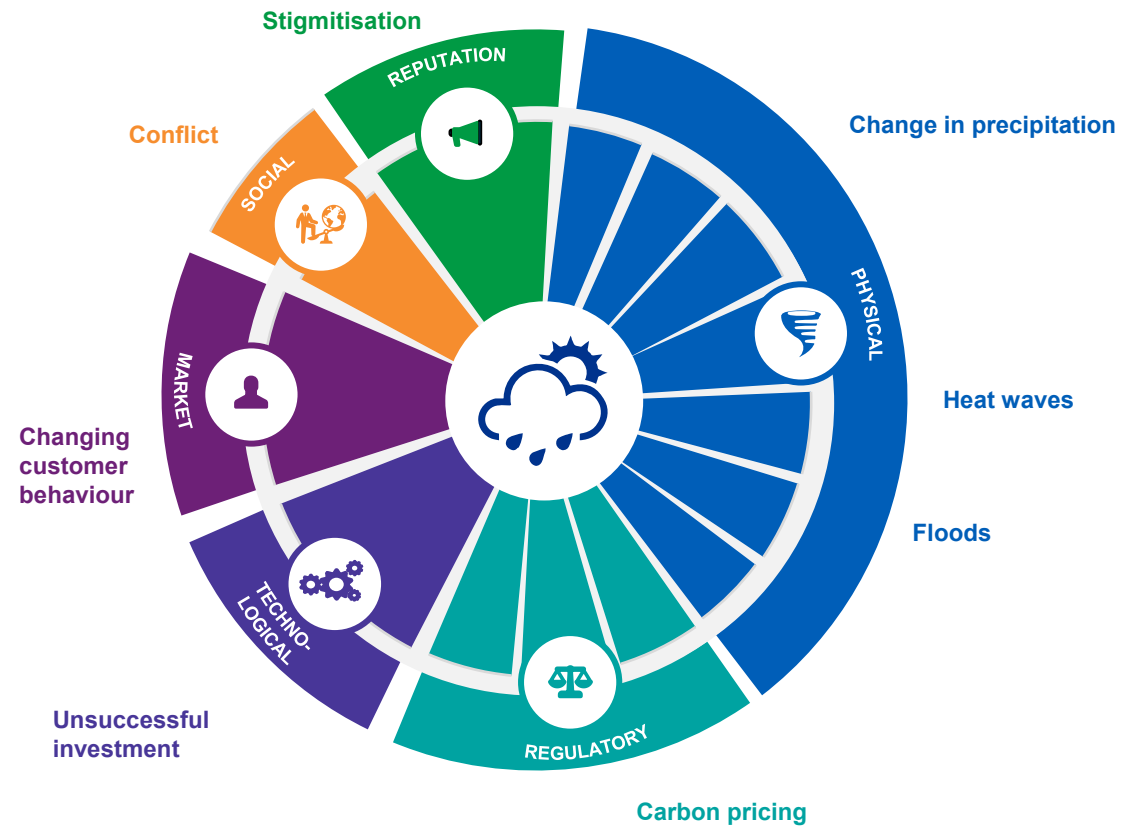
- Descriptions of alternative plausible futures
- Significantly different views of the future
- Movies of the evolving dynamics of the future
- Specific decision-focused views of the future
- Products of management insights/perceptions

A four-step approach to scenario analysis

- 1 **Climate related risks and opportunities identification**
- 2 **Climate scenario development**
- 3 **Business implication and quantification**
- 4 **Mitigation and integration**







A four-step approach to scenario analysis



A four-step approach to scenario analysis



Extract from SSP scenarios tailored into a scenario narrative for an energy company	
Sustainability scenario – Taking the Green Road The world shifts gradually but pervasively towards a more sustainable path, emphasizing a more inclusive development that respects perceived environmental boundaries. Management of the global commons slowly improves, educational and health investments accelerate the demographic transition, and the emphasis on economic growth shifts towards a broader emphasis on human well-being. Driven by an increasing commitment to achieving development goals, inequality is reduced both across and within countries. Consumption is oriented towards low material growth and a lower resource and energy intensity.	Political & Legal 	— Government-led rapid intervention — Electricity sector carbon prices in OECD countries increase to around \$250 per tonne by 2030.
	Economic 	— <20% fossil fuel use by 2040. Large scale renewables are built to replace centralized fossil fuel assets, with significant distributed energy mini grids in regional areas. — Green hydrogen takes off and displaces natural gas from 2030 onwards, especially in long-haul transport. — Electricity market achieves zero-carbon emissions and the price of electricity generation decreases substantially due to the high level renewable generation.
	Social 	— High level of consumer awareness for low carbon products. Consumers select Renewable Energy when possible, regardless of the higher price.
	Technological 	— Extensive investment in technological solutions.

A four-step approach to scenario analysis

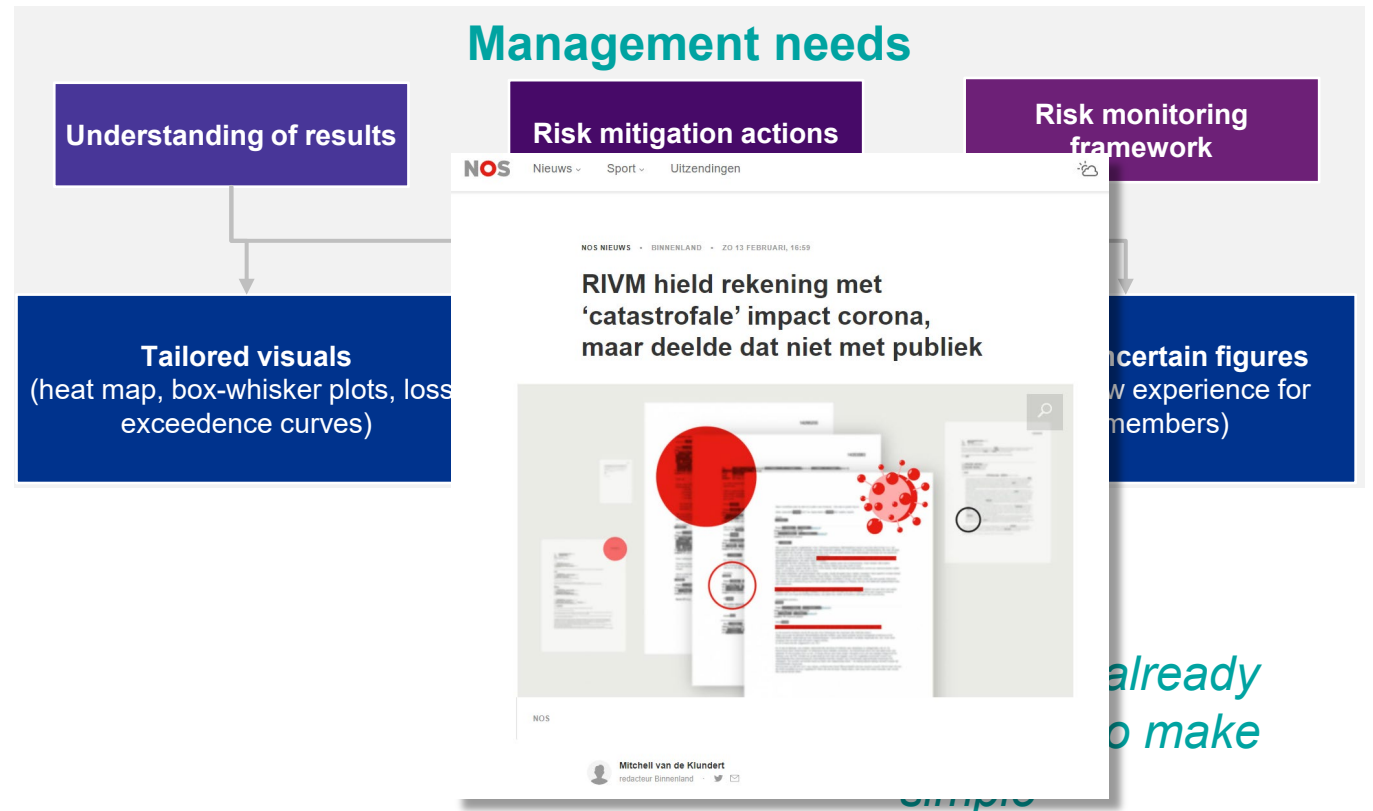
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“Climate change is already complex, we need to make it simple”

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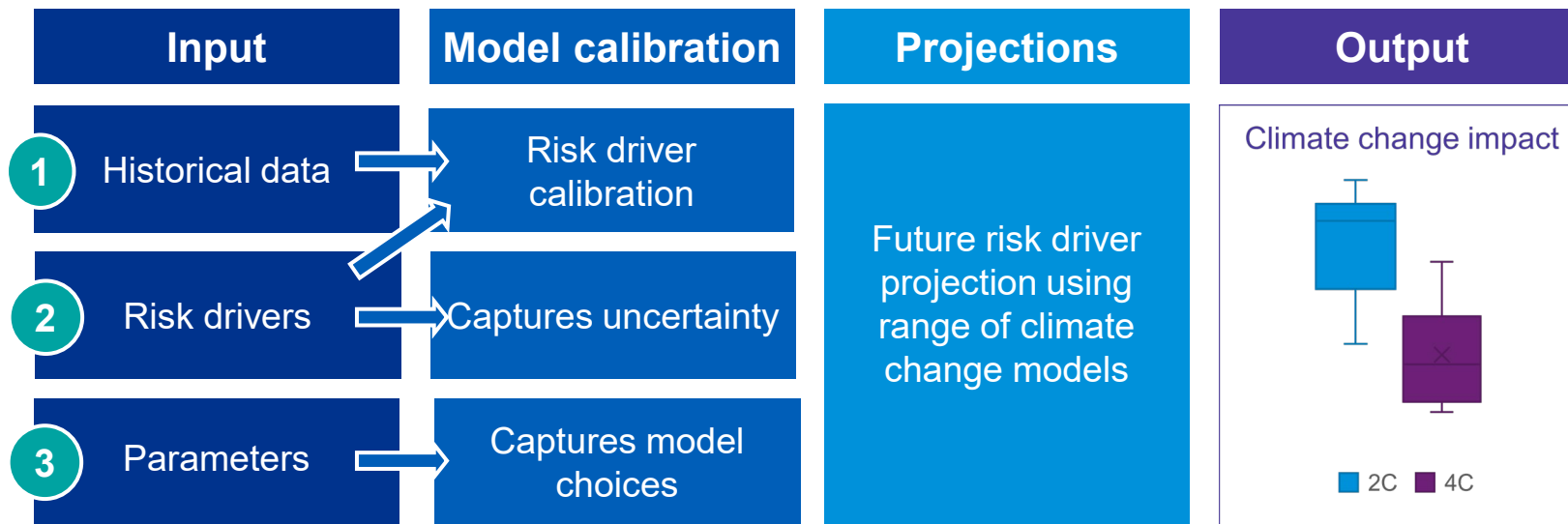


... for the actuary

Scenario quantification approach

3

Business implication and quantification

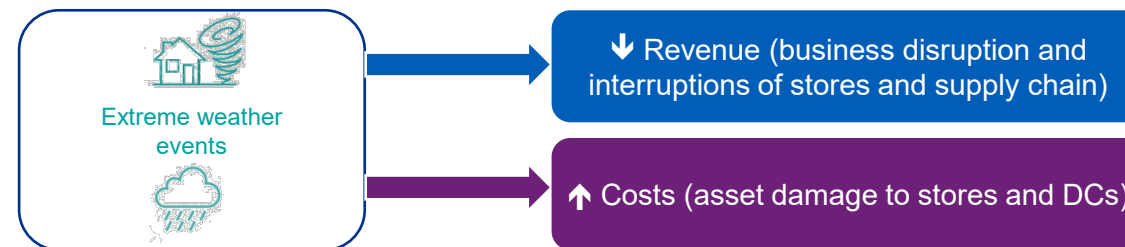


- Explicitly taking **uncertainty** into account
- **Uncertainty types**: calibration uncertainty, risk drivers, volatility
- **Monte Carlo** simulations to combine risk drivers

- **Graphical** expression: loss-exceedance, box-whisker
- Quantification forces **structure** and **accuracy**
- Actuaries bring **technical risk modelling expertise**

Case study: US retailer

Change in PDBI (property damage & business interruption) from extreme weather events



Change in store's energy cost



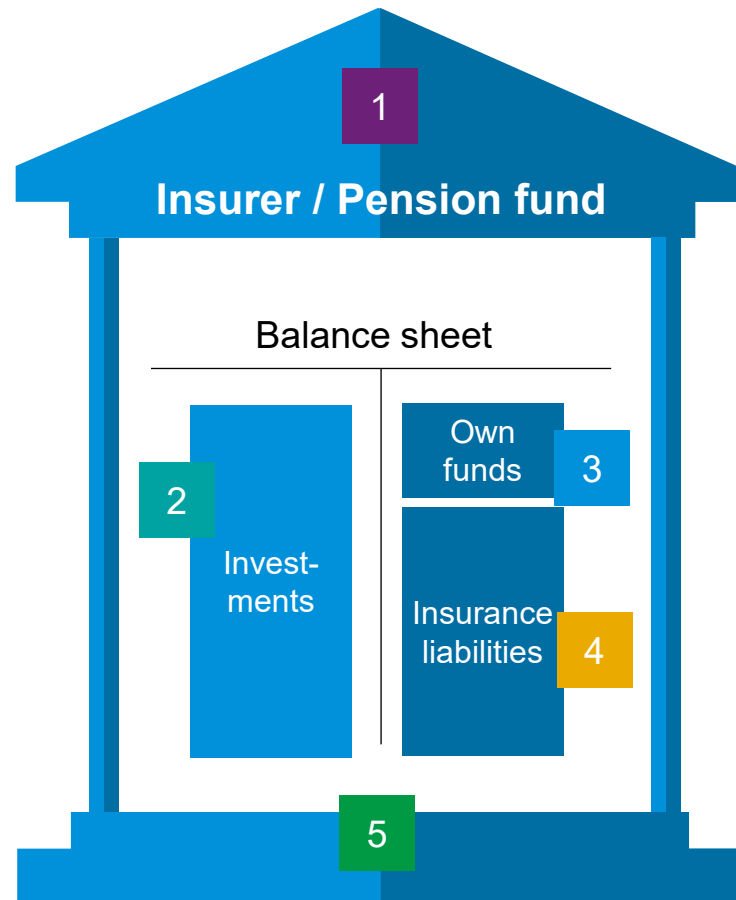


Sustainable scenarios for the actuary

The wider insurance/pension ecosystem



A holistic approach is required



- 1 Strategy, governance, targets
- 2 Identify and quantify impact of sustainable finance
- 3 Scenario analysis, integration in risk framework
- 4 Product offering and pricing
- 5 Process integration, disclosures

Role of the climate actuary

Actuarial modelling

- Review continued suitability
- Update modelling and assumptions
- **Financial impact assessment**
- Quantification of **corporate value**

Product management

- Risk identification in underwriting
- Impact on pricing and policy terms
- Green insurance product offerings
- Align with **policy holders needs**

The role of the actuary

Risk and capital management

- Modelling extreme (weather) events
- ORSA/ERB
- **ESG metrics & targets**
- Encourage improved governance & risk management
- Contribute to public debate

Investment management

- Investment strategies to support **sustainable finance**
- Update assumptions and risk drivers
- Impact assessment on investment portfolio

Disclosures

- Compliance with TCFD, EU Sustainable Finance Taxonomy, CSRD
- **Regulatory asks**

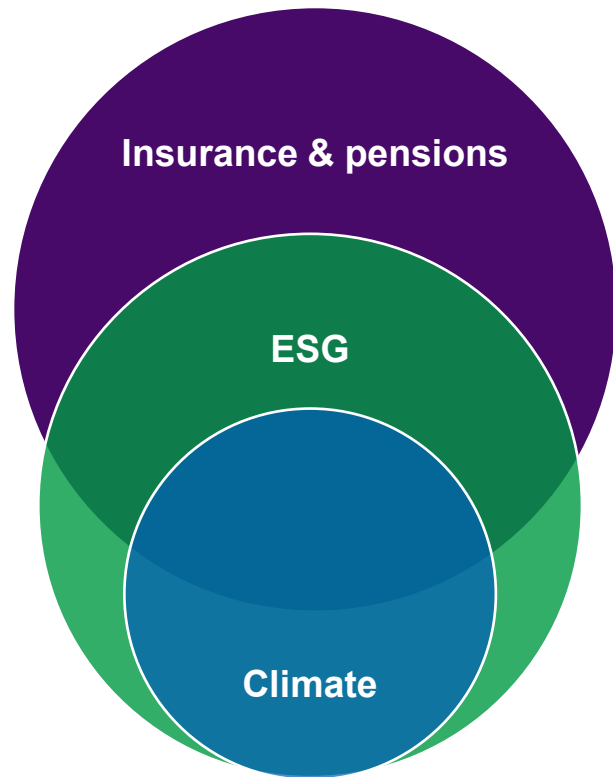
Source: International Actuarial Association



Sustainable scenario for the actuary

Future proofing the actuarial profession

Strategic decisions under extreme uncertainty



Visibility



Education

Terminology

Methods

Data





Conclusions

Conclusions

Scenario analysis is a crucial alternative risk management technique for complex, strategic risks

It supports well-informed **decision making**

Full scenario development requires both in-depth **domain expertise** and technical **risk modelling capabilities**

Actuaries contribute in many ways to understanding and managing climate risks

Education in scenario analysis expertise and ESG-related risks **future proofs** the actuarial profession



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