

Cambridge Centre for Risk Studies

2022 ANNUAL RISK SUMMIT

SYSTEMIC RISKS AND INTERLINKED GLOBAL CHALLENGES

Plenary Session 3:

Climate Change Risk and Systemic Impacts

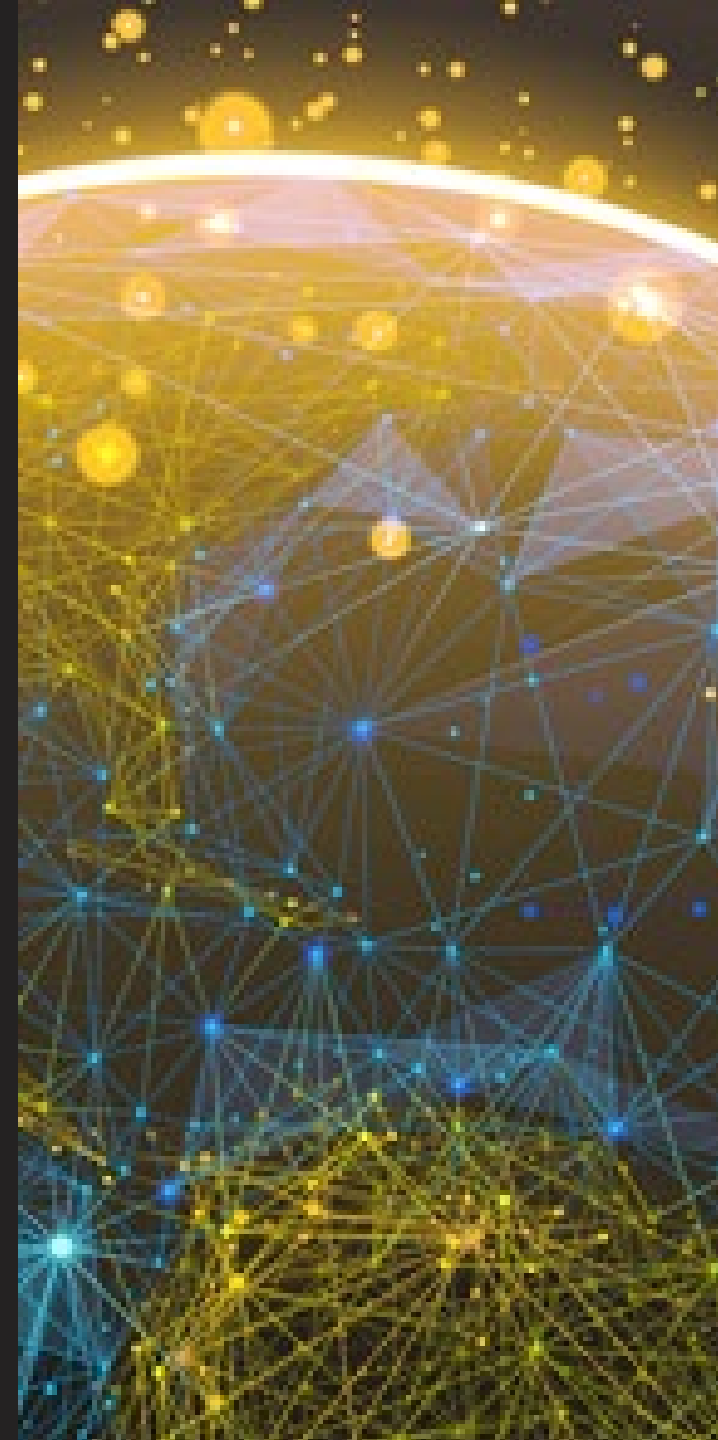
Centre for
Risk Studies



Principal Knowledge Partner

McKinsey
& Company

Platform Partner



Lightning Talks: The Changing Landscape of Business Risk and the Environment

- **Oliver Carpenter**, Head of Environmental Risk Analytics, Resilience
- **Richard Newton**, Climate Change Modeller, Resilience
- **Clare Allen**, Senior Environmental Risk Modeller, Resilience
- **Tom Harvey**, Vice President of Product Management, Resilience

Centre for
Risk Studies



UNIVERSITY OF
CAMBRIDGE
Judge Business School

The State of Climate Risk: Developments & Disclosures

Oliver Carpenter

Head of Environmental Risk Analytics, Risilience

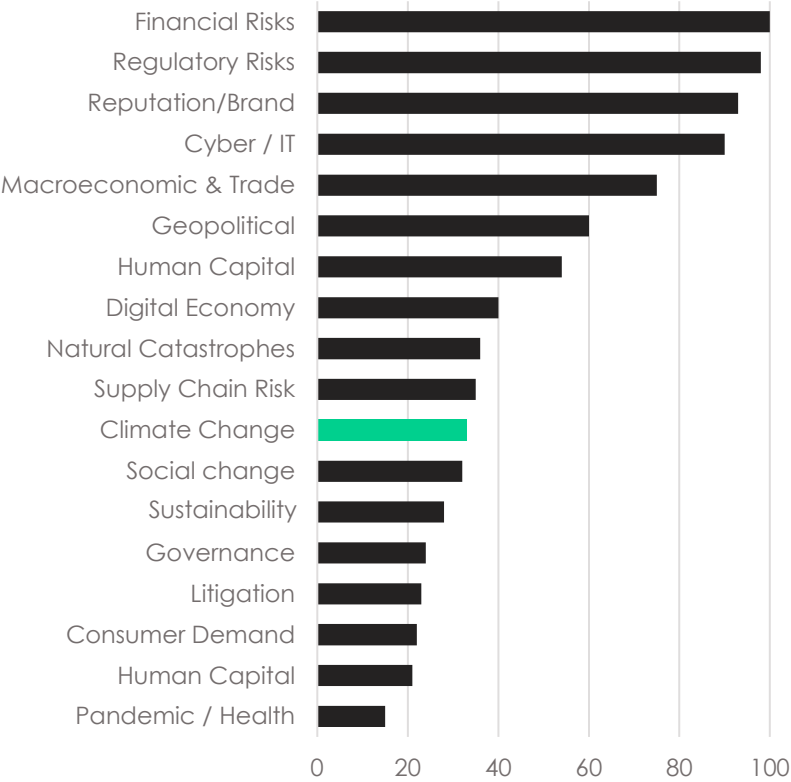
Centre for
Risk Studies



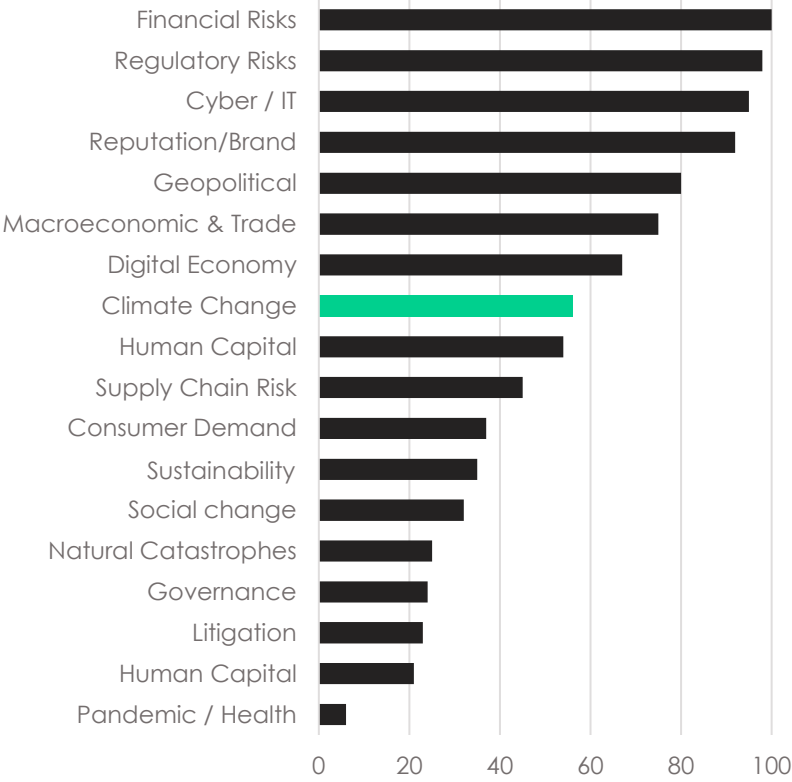
The Rise of Climate Change Risk as a Corporate Concern

Listing of Principal Risks in Corporate Risk Register

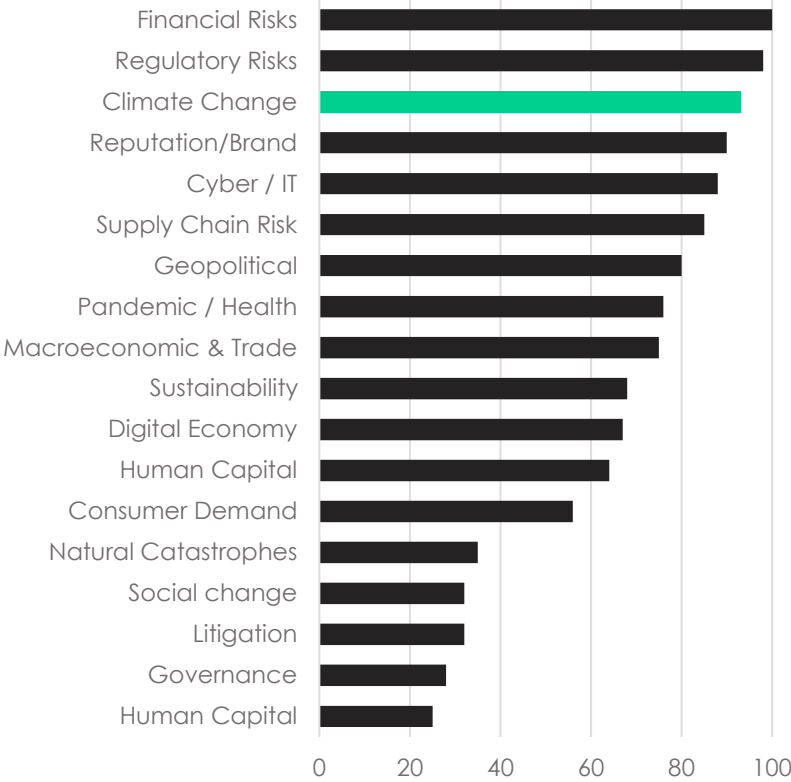
2016



2018

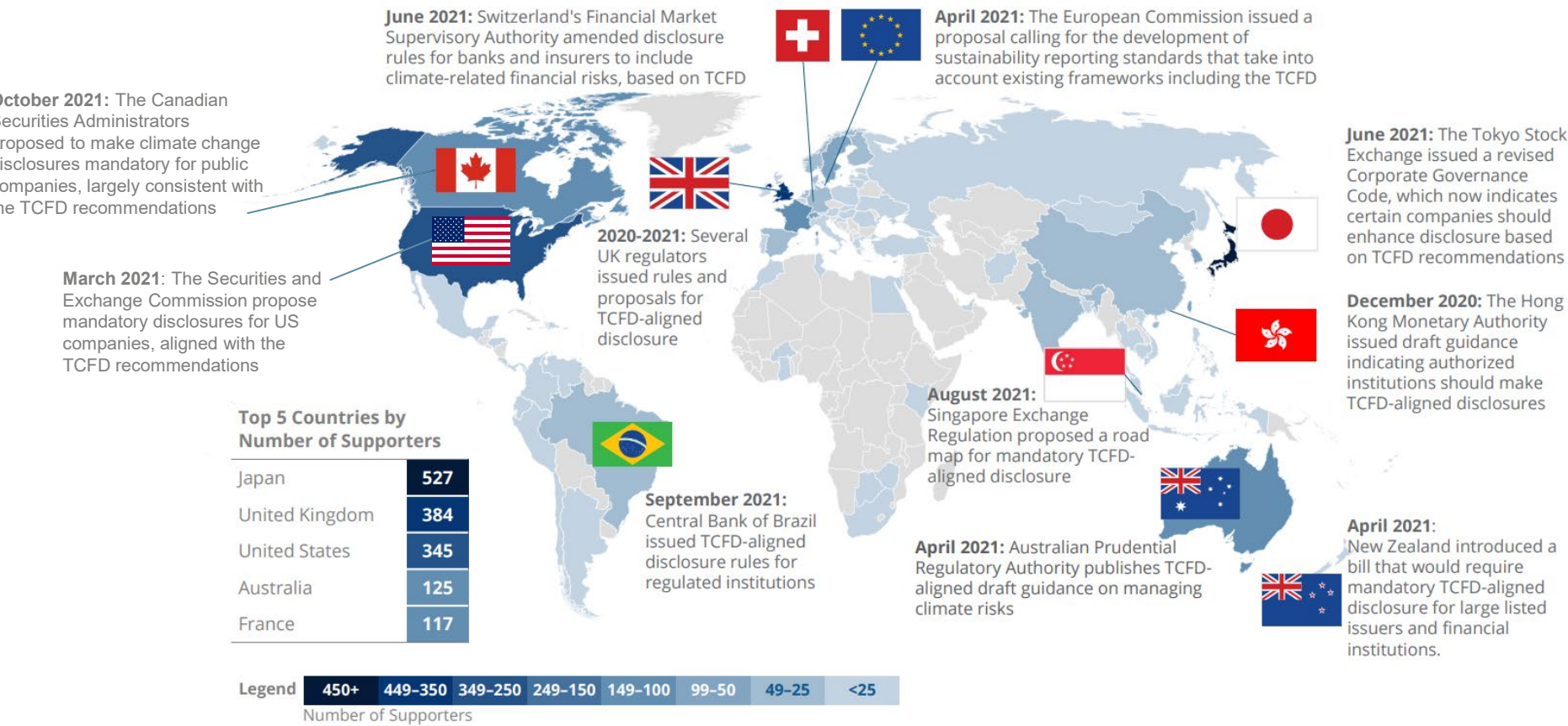


2020



Cambridge Centre for Risk Studies ERM Survey
in collaboration with the Institute of Risk Management
Index of Principal Risks declared in Annual Reports and SEC Filings (All Sectors)

Global Support and Alignment with the Task Force on Climate-Related Financial Disclosures



Support from International Standards Setters and Regulators



FINANCIAL STABILITY BOARD



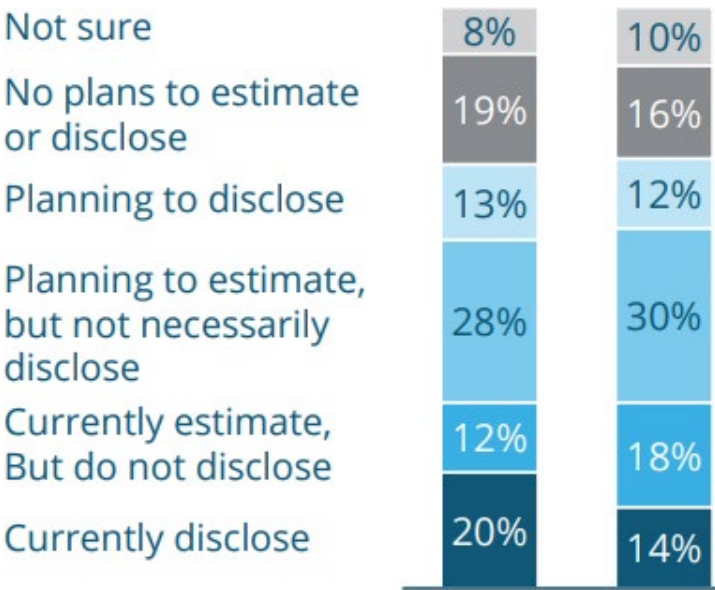




2021 Reporting Season: Climate-Related Disclosures



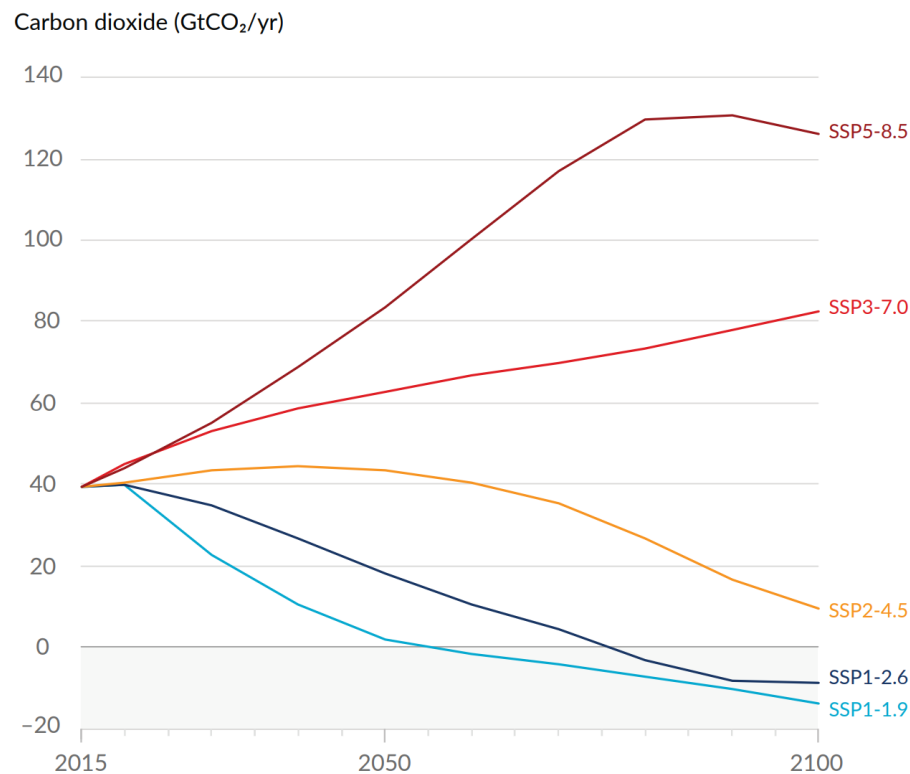
% of Companies Indicating Disclosure of Financial Impact¹



Source: TCFD Status Report 2021

The Nature of Climate-Related Systemic Risks Depend on the Future Pathways of Global GHG Emissions

Future annual emissions of CO₂

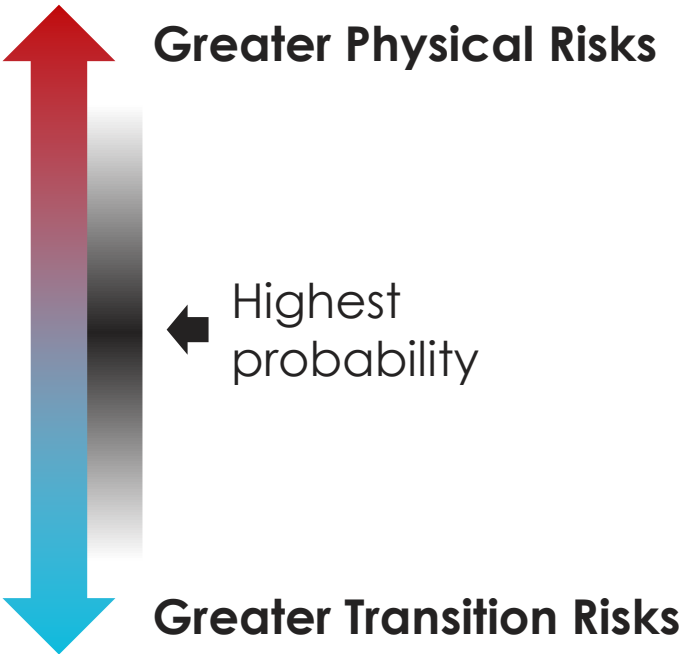


Increase in global temperature

	Near-term, 2021-2040	Mid-term, 2041-2060	Long-term, 2081-2100
SSP5-8.5	1.6°C	2.4°C	4.4°C
SSP3-7.0	1.5°C	2.1°C	3.6°C
SSP2-4.5	1.5°C	2.0°C	2.7°C
SSP1-2.6	1.5°C	1.7°C	1.8°C
SSP1-1.9	1.5°C	1.6°C	1.4°C

Values are best estimates relative to 1850-1900 baseline

Source: IPCC AR6 WGI SPM



Transition Risks: System Transformations to Mitigate Climate Change

Policy, Regulation & Geopolitics



Consumer Behaviours & Demand Shifts



Energy Systems & Stranded Assets



Investor Sentiment & Market Shocks

"We focus on sustainability not because we're environmentalists, but because we are capitalists and fiduciaries to our clients..... It is not woke"

LARRY FINK'S 2022 LETTER TO CEOs

The Power of Capitalism



Liability & Environmental Litigation



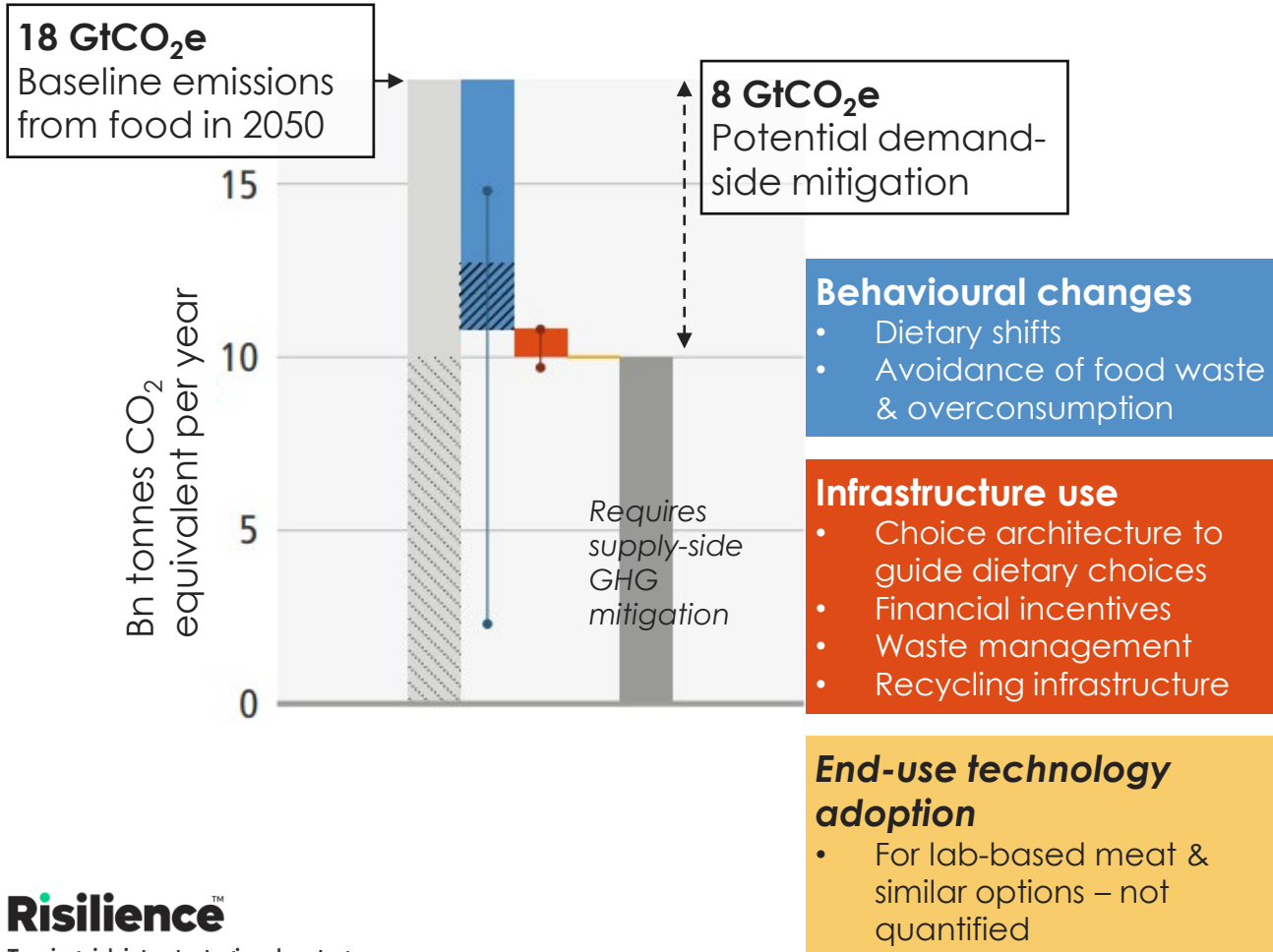
Disruptive Technology



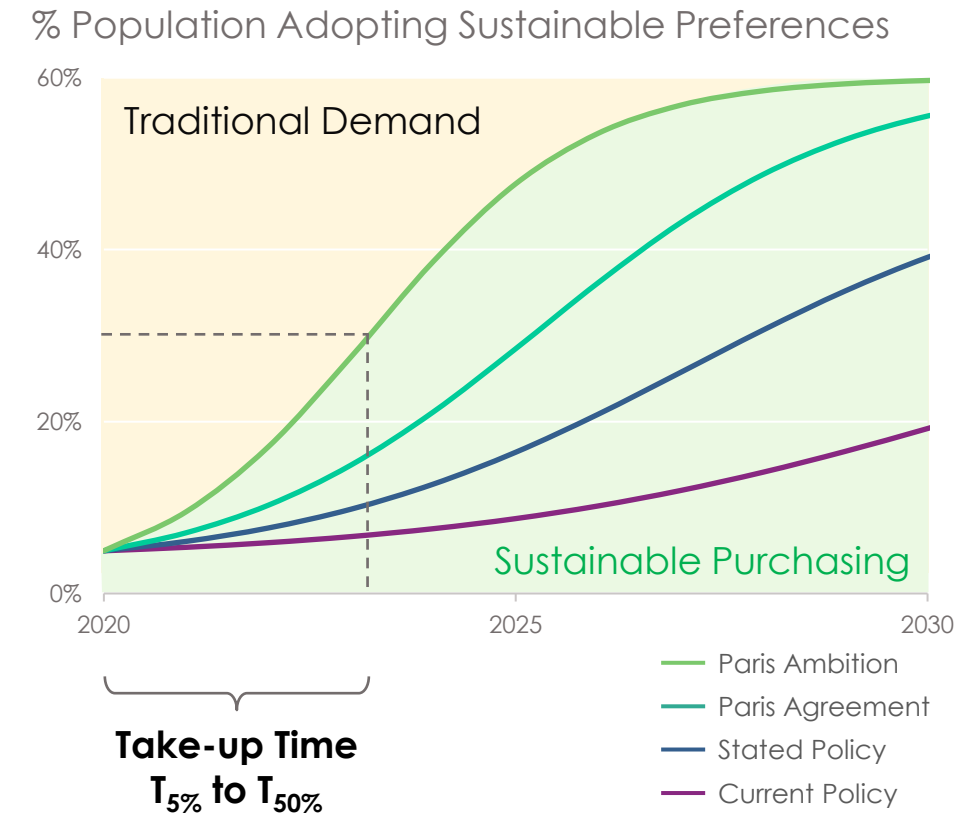
Structural Demand Changes Present Untapped Potential to Reduce Emissions

e.g. Food Sector

Demand-side GHG emissions mitigation potential in the food sector

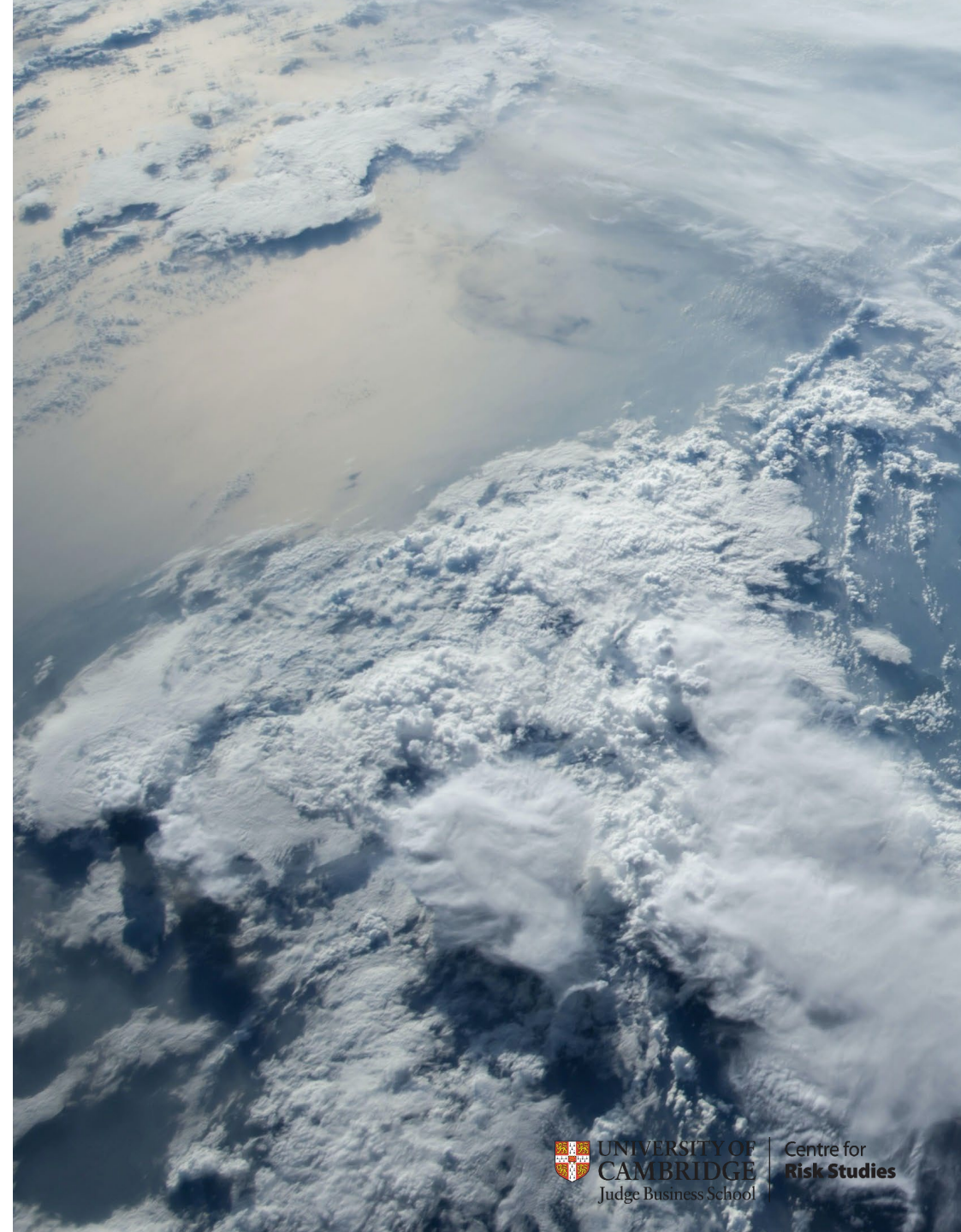


Modelling future consumer uptake of sustainable alternatives



Conclusions

- The climate risk landscape continues to evolve rapidly, despite global economic and geopolitical headwinds
- Physical risks from extreme weather and environmental changes will manifest in all scenarios, with extreme systemic impacts on human systems
- Radical system transformations are required in the immediate term to mitigate climate change, presenting existential risks to carbon-intensive firms
- Businesses must respond by transforming their own systems to mitigate transition risks



Centre for
Risk Studies



UNIVERSITY OF
CAMBRIDGE
Judge Business School

<https://www.jbs.cam.ac.uk/>



RisilienceTM

risilience.com

Turning risk into strategic advantage

Business disruption from physical risk

Dr. Richard Newton

Climate Change Modeller, Resilience

Centre for
Risk Studies



UNIVERSITY OF
CAMBRIDGE
Judge Business School



Resilience[®]



410

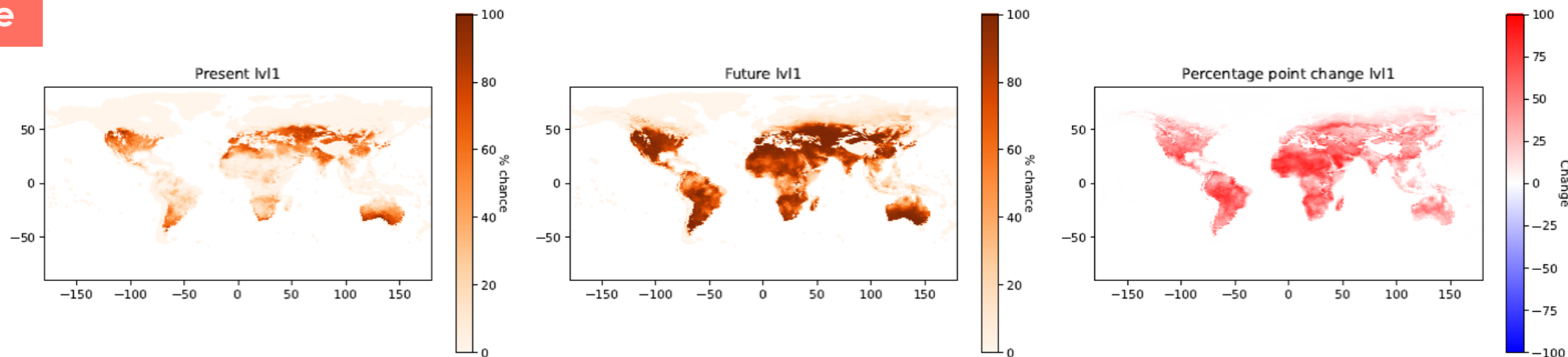




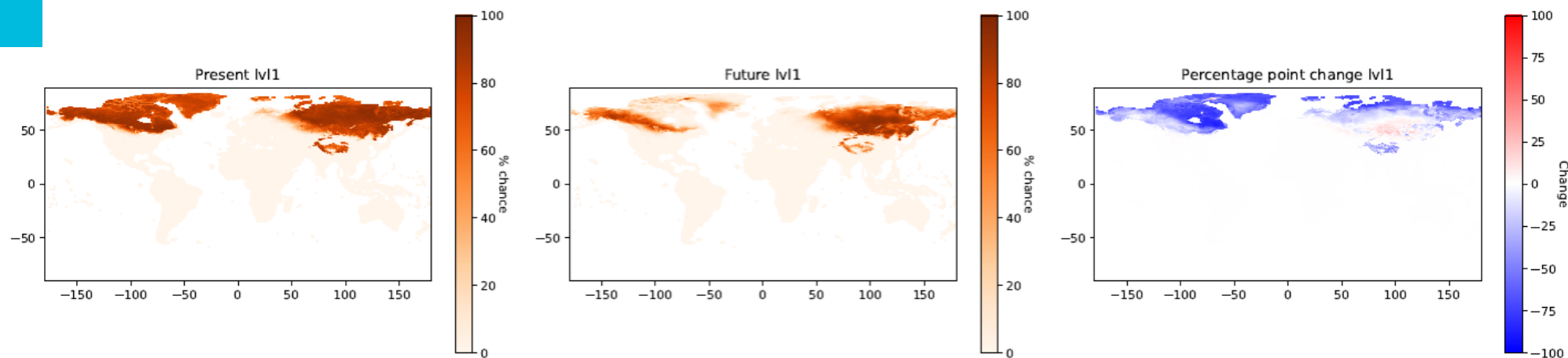


Heatwaves and cold outbreaks

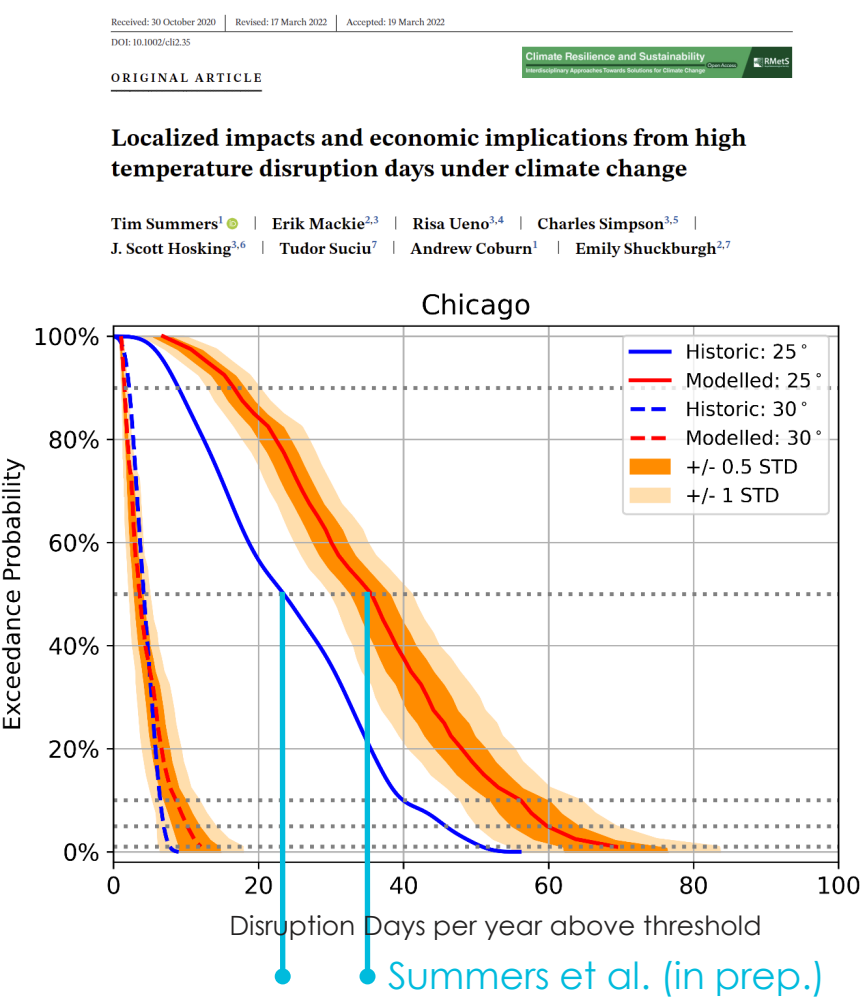
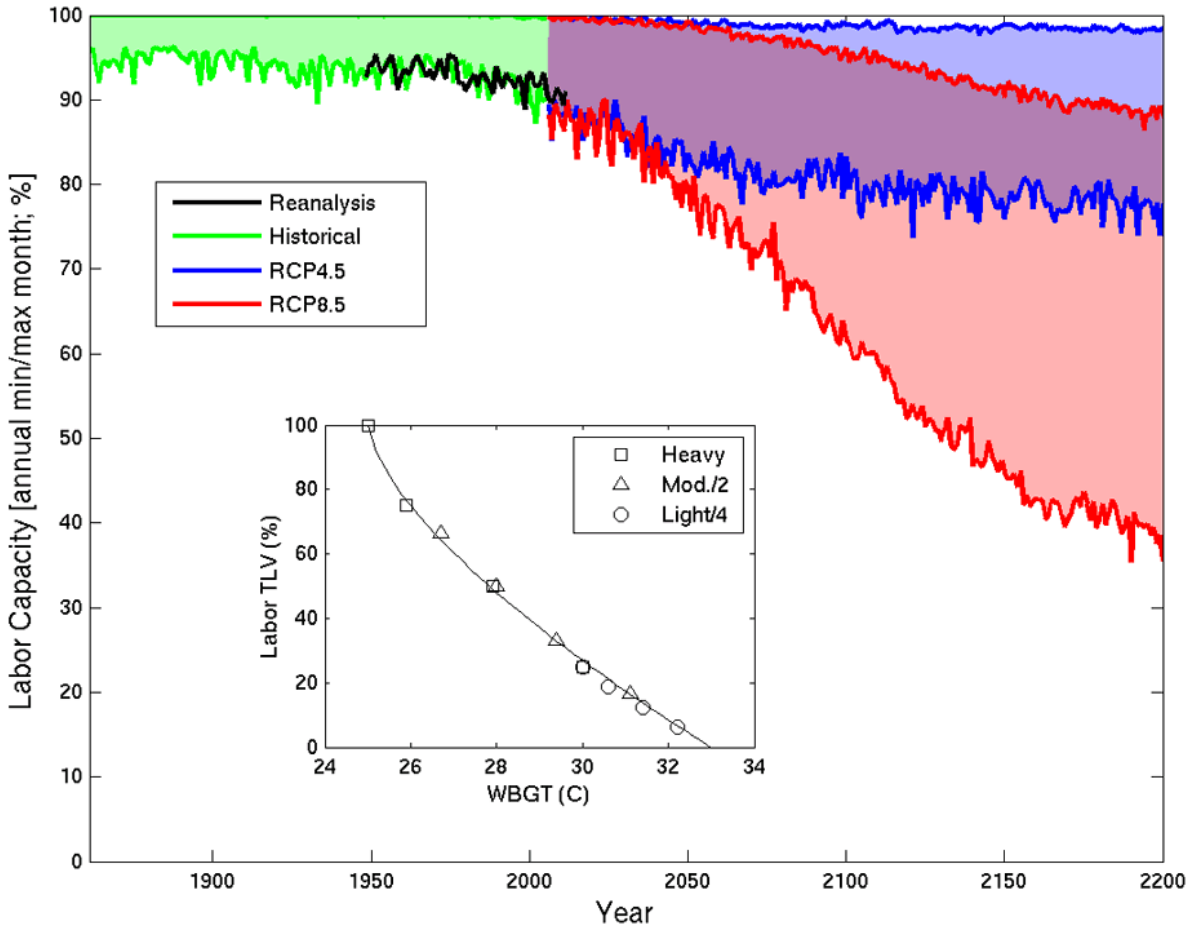
Heatwave



Freeze

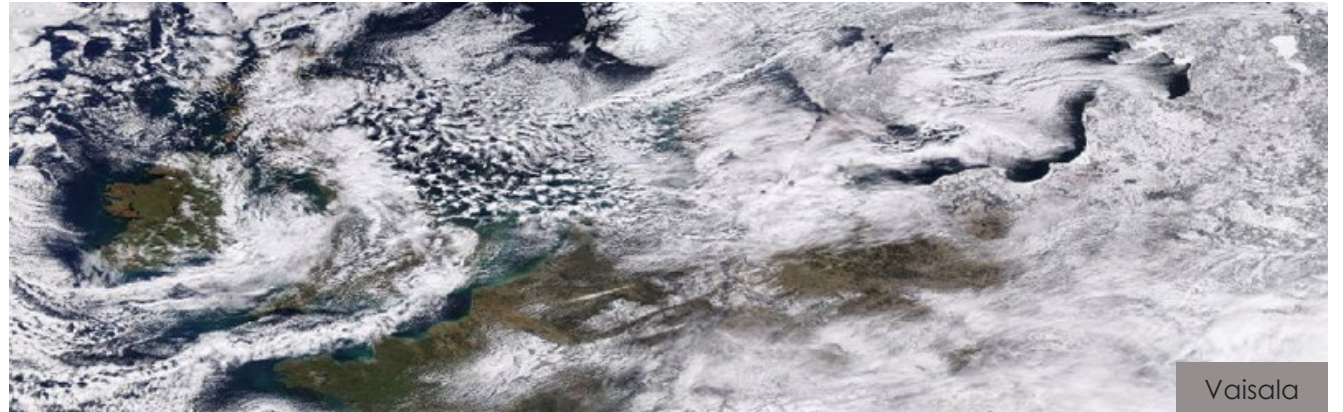
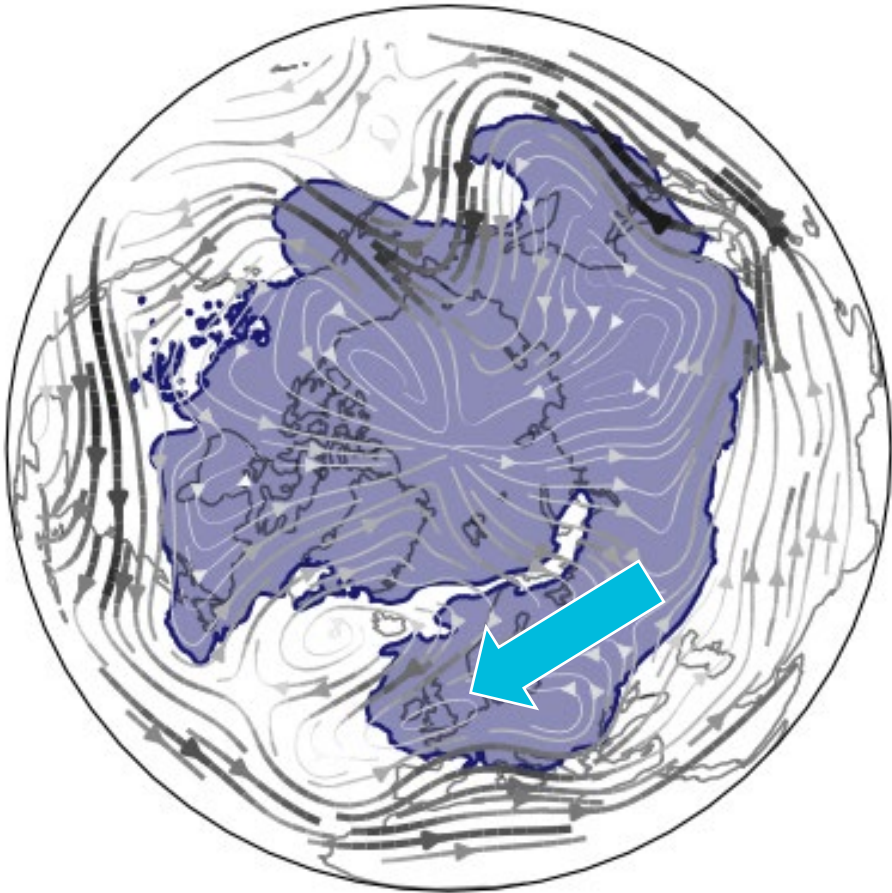


Heatwaves and cold outbreaks

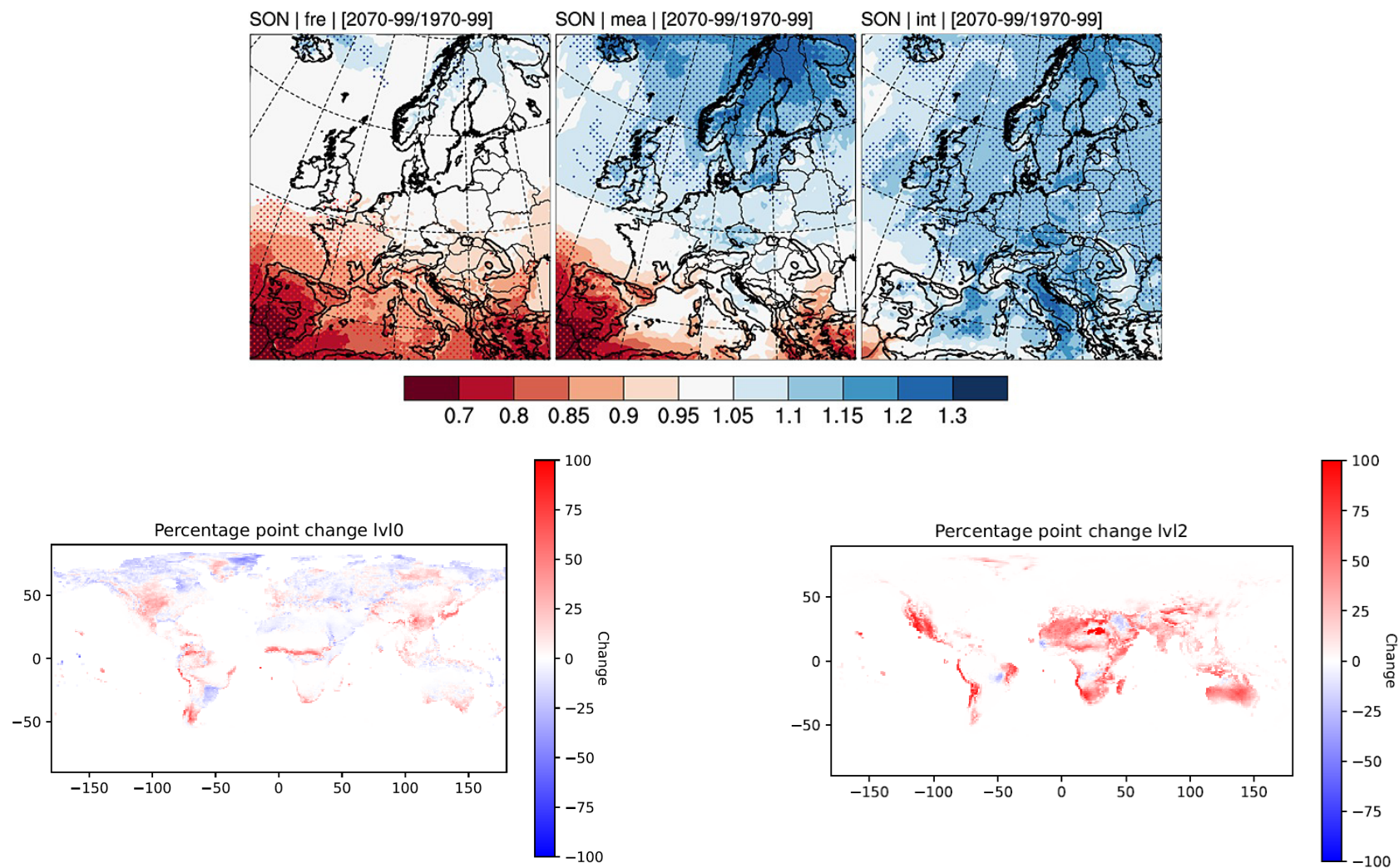


Heatwaves and cold outbreaks

28 February, 2018



Flooding and drought



Business Disruption

Supply
risk

Facility
disruption

Market
disruption

Business Disruption

Supply
risk

Facility
disruption

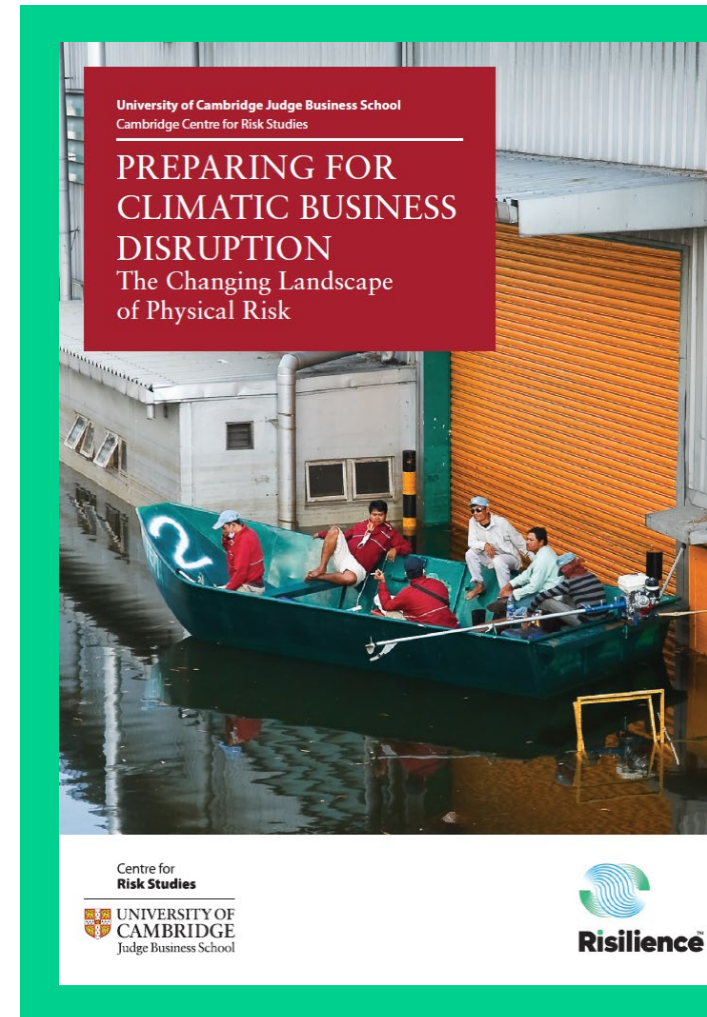
Market
disruption

Business Disruption



Key messages

- Climate change will increase disruption for most businesses in the coming decades.
- Climate affects all parts of the supply chain: raw materials upstream, key facilities in the business, and market demand downstream will all be affected.
- Mitigation is required to lessen the impact of climate change and strategies should consider the most damaging hazards and most susceptible facilities.



Centre for
Risk Studies



UNIVERSITY OF
CAMBRIDGE
Judge Business School

<https://www.jbs.cam.ac.uk/>



RisilienceTM

risilience.com

Turning risk into strategic advantage

Natural Capital as the Next Business Risk

Dr. Clare Allen

Senior Environmental Risk Modeller, Risilience

Centre for
Risk Studies



UNIVERSITY OF
CAMBRIDGE
Judge Business School



Risilience®



- Reporting of climate-related financial information



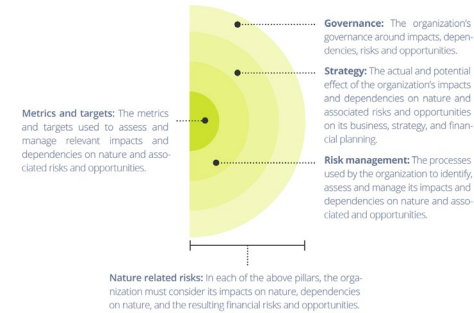
- Business-like language
- Target: to reduce GHG emissions to achieve only a 1.5°C warming by 2050
- A clear currency tons of CO₂e
- Location not so important
- Mandatory in many countries



Taskforce on Nature-related Financial Disclosures

- Reporting of nature-related financial information

Figure 1 – Core elements of recommended nature-related financial disclosures



Source: IWG TNFD's Informal Technical Expert Group drawing from TCFD (2017): Recommendations of the Task Force on Climate-related Financial Disclosures

- Business-like language
- Target:
 - no net nature loss by 2030
 - net gain nature by 2050
 - long-term 2050 vision for biodiversity to be “valued, conserved, restored and wisely used maintaining ecosystem services, sustaining a healthy planet and delivering benefits essential for all people.”
- Currency?
- Geospatial data will be critical
- Released in autumn 2023

**“\$44tn of economic value generation,
more than 50% of global GDP, is
moderately or highly dependent on
nature”**

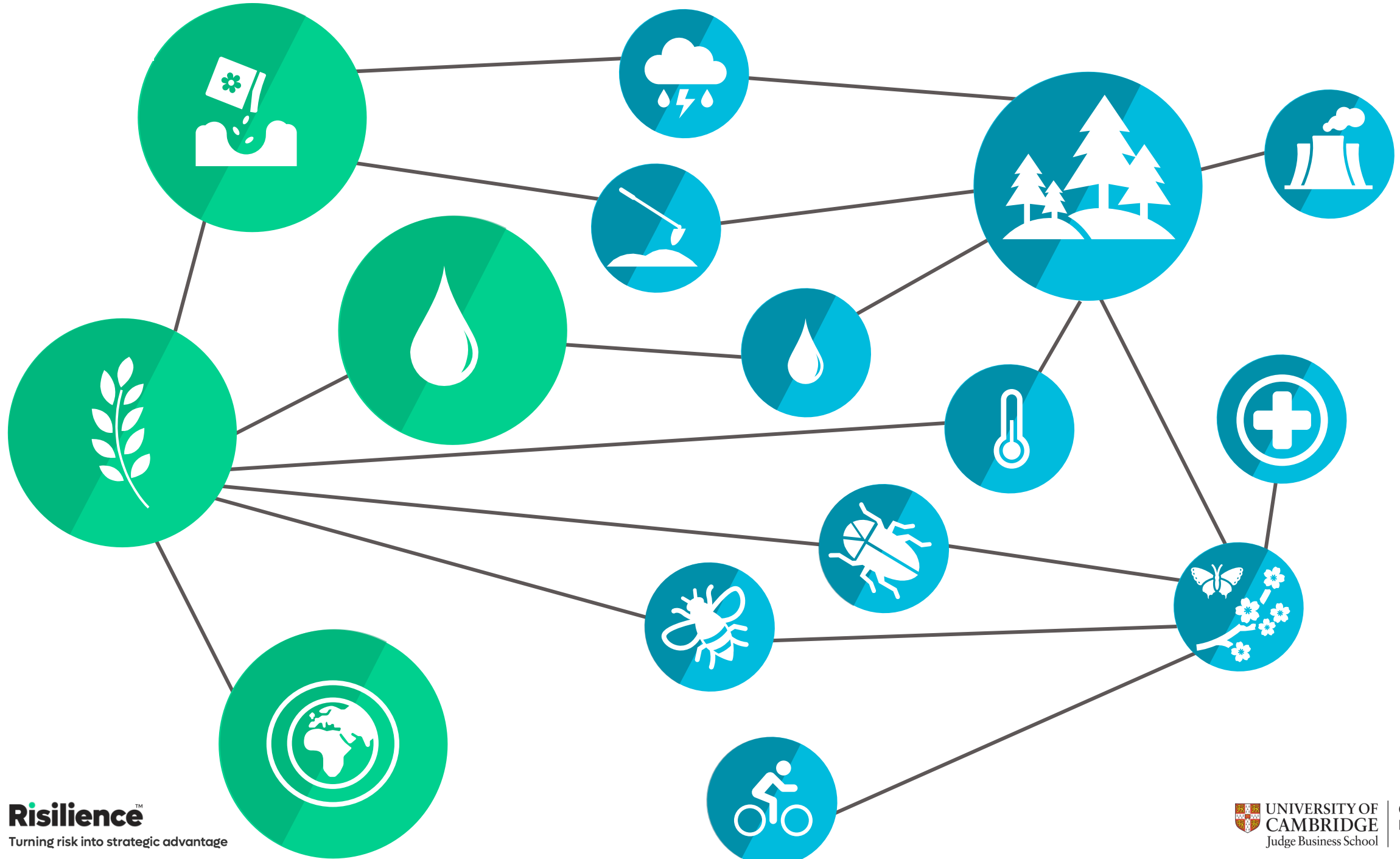
(World Economic Forum)

**Our current demands now exceeds the
planet's biocapacity by 56%**

(LIVING PLANET REPORT 2020 WWF & ZSL)

**Assessing Natural Capital and nature-
dependencies will be critical for managing
future financial stability**





Ecosystem tipping points – systemic risk

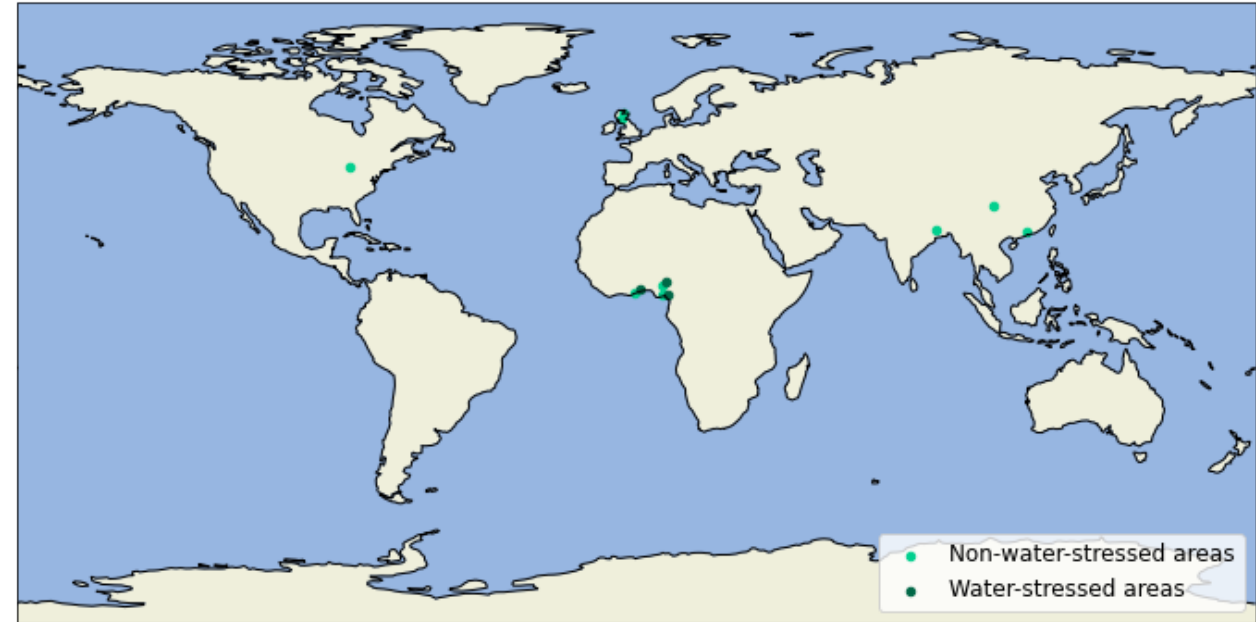


Natural Capital assets will depreciate over time without nature-positive investment

Natural Capital business risks

Develop Natural Capital Baseline

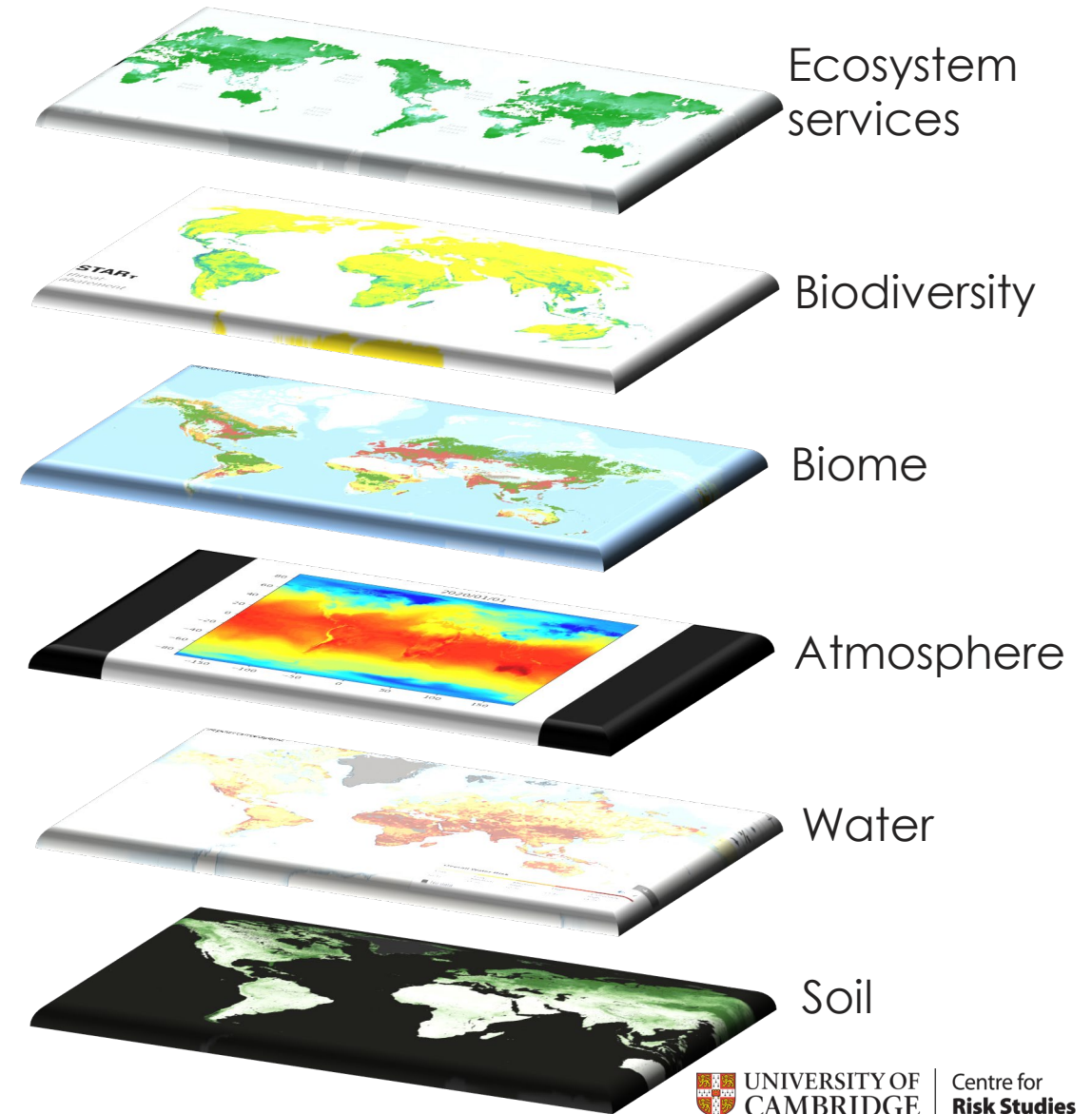
1. Determine the location of Natural Capital
2. Determine the quality and availability of Natural Capital



Natural Capital business risks

Develop Natural Capital Baseline

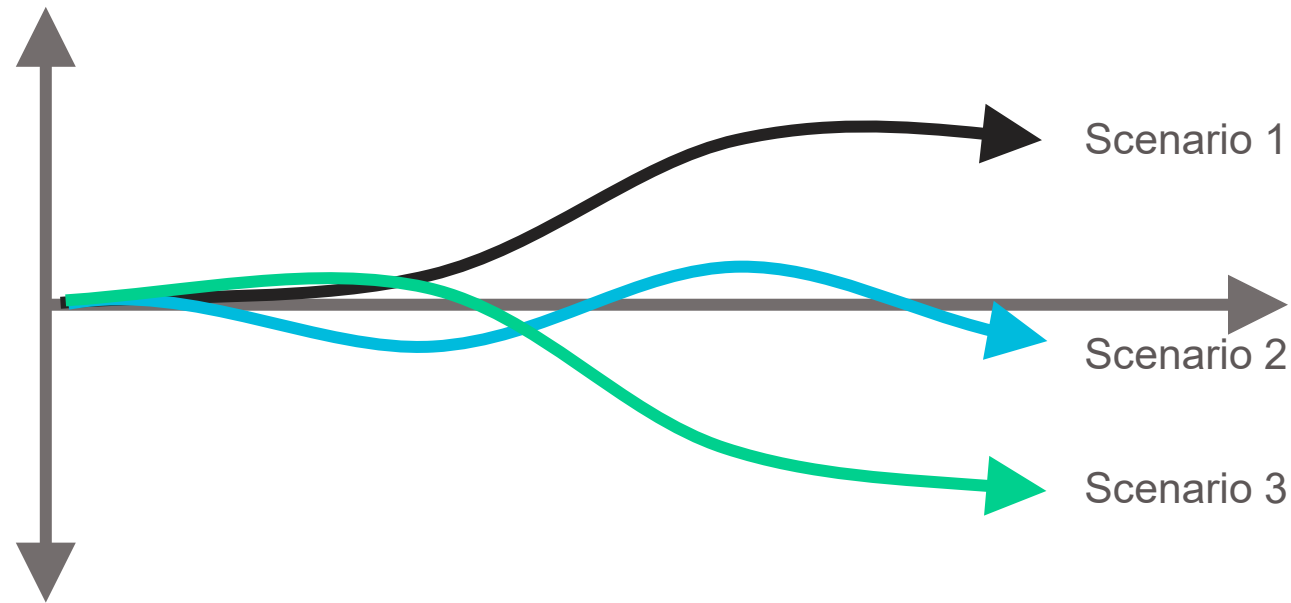
1. Determine the location of Natural Capital
2. Determine the quality and availability of Natural Capital
3. Determine which ecosystem service provide benefit to productivity?
 - Sector specific
4. Quantify these benefits in terms of productivity



Natural Capital business risks

Build scenarios to evaluate risk to Natural Capital in the Future

- Business as usual
- Climate scenarios
- Other scenarios





Financial exposure to deteriorating Natural Capital

**Nature positive financial flows to maintain
and strengthen Natural Capital**

Centre for
Risk Studies



UNIVERSITY OF
CAMBRIDGE
Judge Business School

<https://www.jbs.cam.ac.uk/>



RisilienceTM

risilience.com

Turning risk into strategic advantage

Putting a Price on Environmental Risk

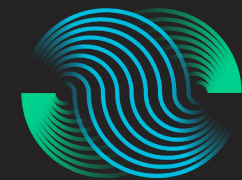
Tom Harvey

VP Product Management, Risilience

Centre for
Risk Studies



UNIVERSITY OF
CAMBRIDGE
Judge Business School

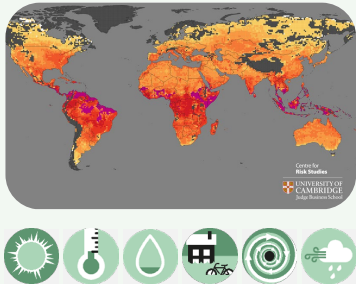


Risilience®

External Risk Factor Models

Scenario suite applies climate science to model **business impacts**

Climate Hazard Atlas



Physical Risks

- Operation Disruption
- Asset Damage
- Market Disruption
- Raw Material Supply

Emissions Pathways

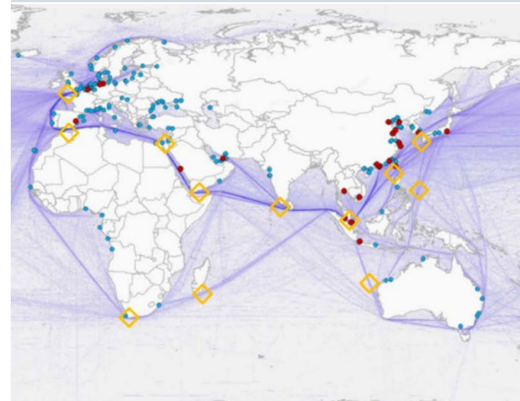


Transition Risks

- Policy
- Liability
- Reputation
- Market
- Technology

Company Digital Twin

Data-driven representation of **value chain** defines exposures to climate risks



Risk Quantification

Standardised **quantification** of financial impact

5-year Earnings Value @ Risk

Balance sheet impacts

Financial & Operational planning

20-year Risk Outlook

Trends in key drivers & business exposures

Strategic & Capital planning



Climate Risk KPIs

Monitor key business risk drivers



Climate Strategy

- Strategic what-if analysis
- Inform climate roadmap
- Assess opportunities

Transformation

Business plan

Risks and opportunities

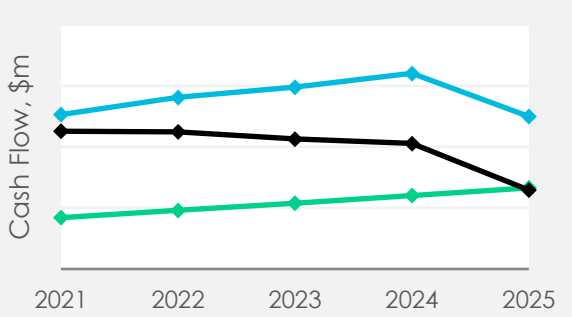
Net-zero plan

Structured for TCFD disclosure

The Company Digital Twin

Commercial Footprint

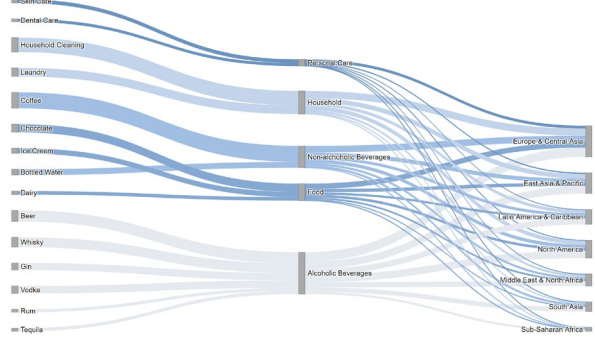
Corporate 5-Year Financial Cashflow



Discounted cashflow model:

- Revenue
- Operating costs
- Non-routine costs
- CapEx
- Cost of Capital

Downstream Market Breakdown

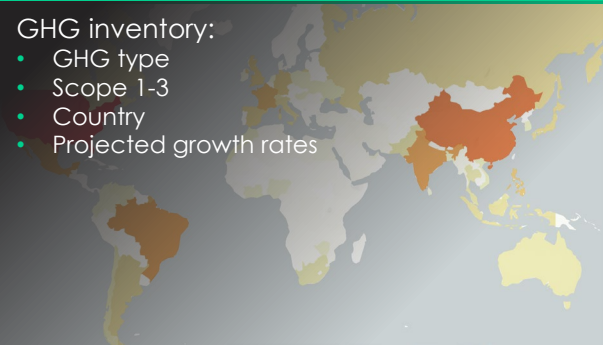


Revenue distribution:

- Country markets
- Business units, categories & brands
- Matrix of markets & products

Physical Footprint

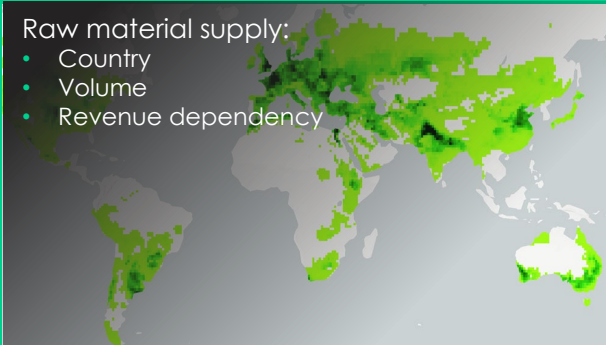
GHG Footprint



Facilities & Critical Networks

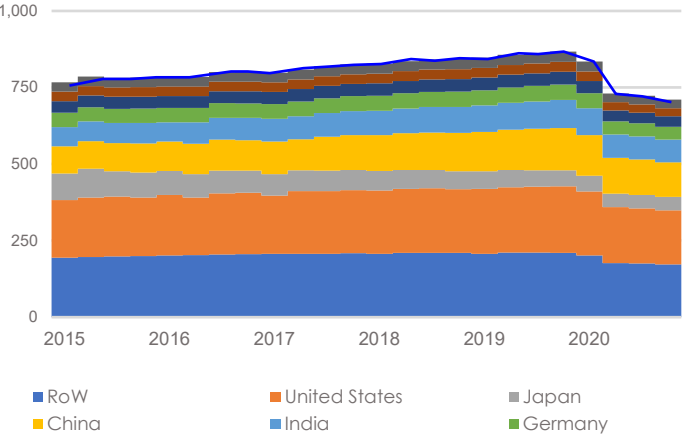


Natural Raw Materials

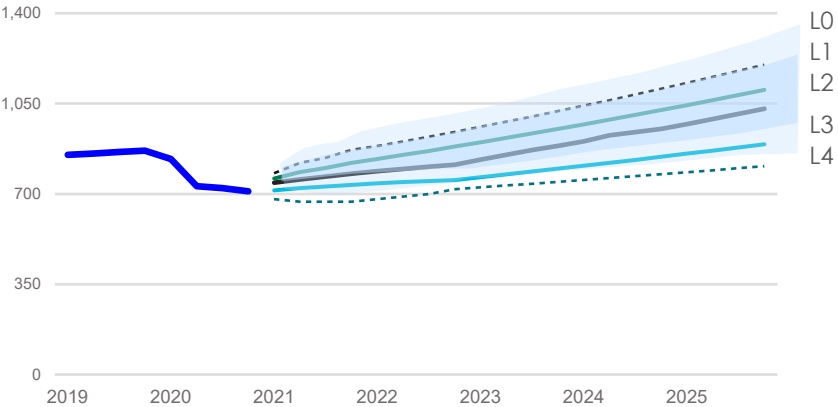


Quantifying Risks to a Company's Business Plan

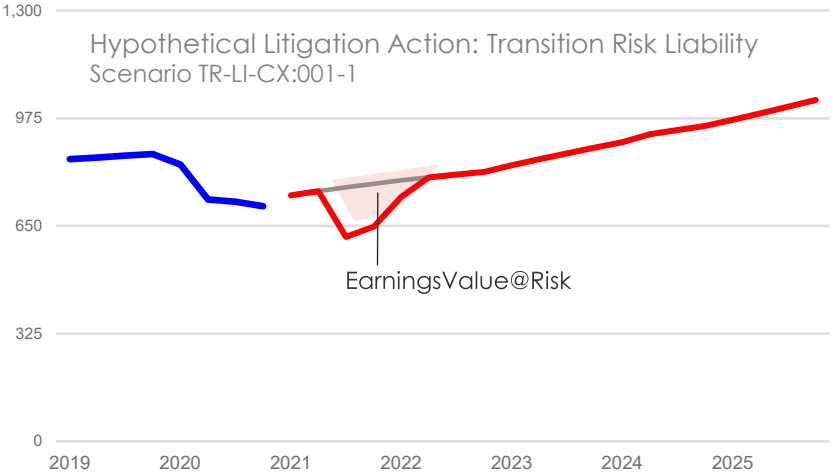
Past Results



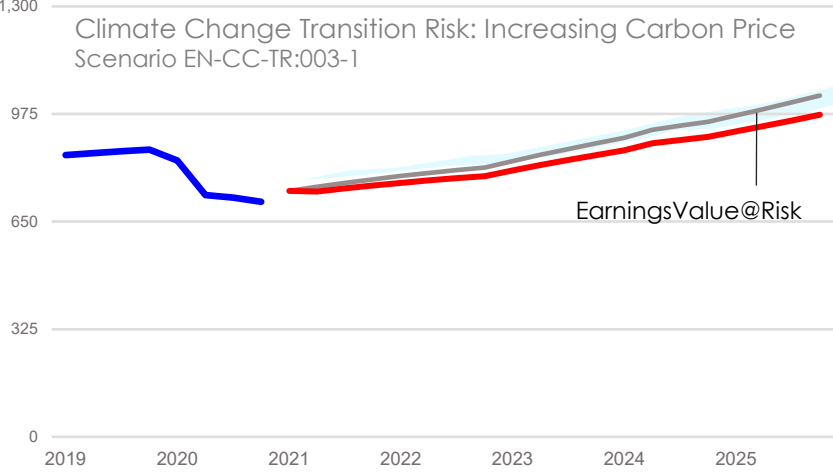
Baseline Multi-Year Forecast



Shock Risks

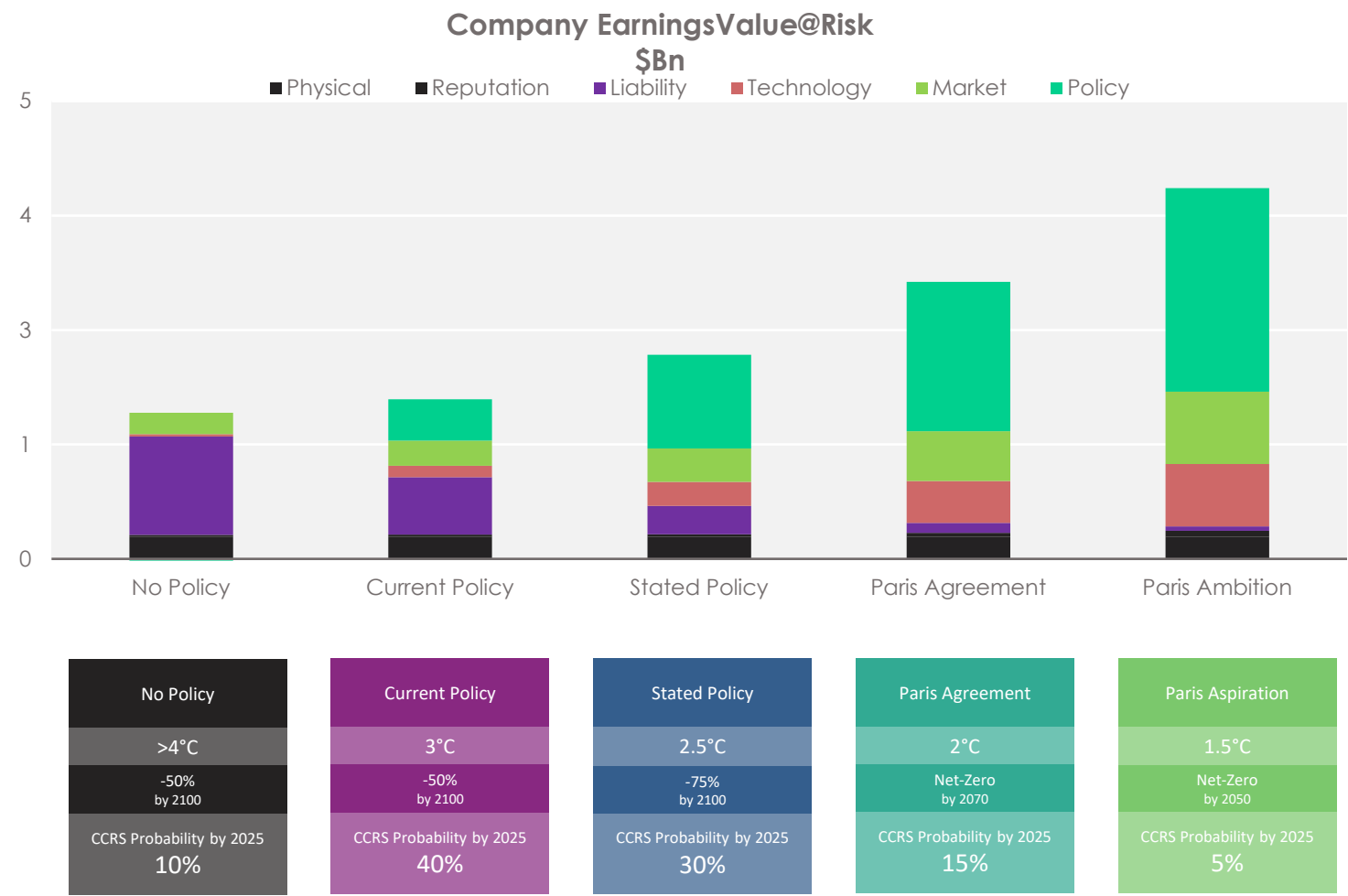


Trend Risks















Standardized Output Risk Metric: **Earnings Value @ Risk** (EV@Risk)

Calculating the value of risk using EarningsValue@Risk



Taxonomy of Decarbonization Strategies

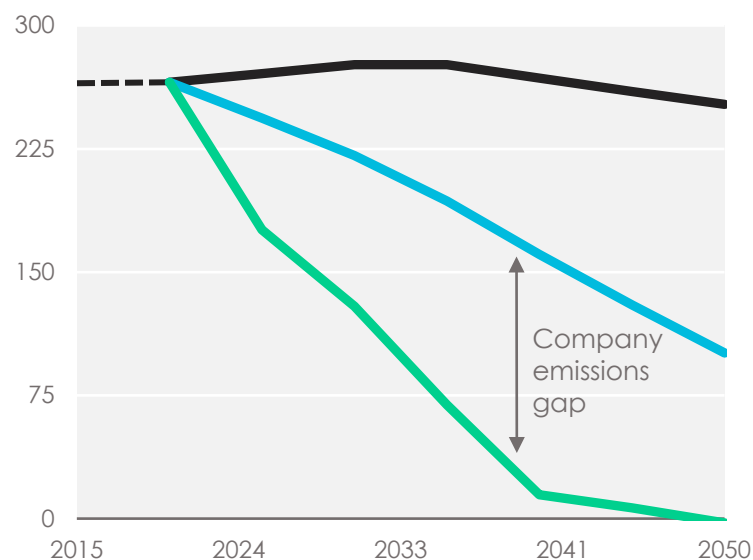
Decarbonisation Initiatives		Value Chain Emissions				
Initiative category	Example initiatives	Scope 1		Scope 2	Scope 3	
		Facilities	Vehicles	Purchased Electricity	Upstream	Downstream
 Low-Carbon Energy Use	<ul style="list-style-type: none"> Switch energy provider to renewables 	●	●	●		
 Low-Carbon Energy Production	<ul style="list-style-type: none"> Build renewable energy capacity for direct operations 	●	●	●		
 Industrial Processes	<ul style="list-style-type: none"> Equipment replacement Process material substitution/efficiency Carbon capture and storage 	●				
 Transportation	<ul style="list-style-type: none"> Vehicle efficiency (e.g. sustainable fuels) Vehicle replacement Switch transport mode (e.g. rail) 		●			
 Supply Chain Engagement	<ul style="list-style-type: none"> Third party & peer engagement Raw material substitution & procurement practices Policy advocacy 				●	
 Energy Efficient Production	<ul style="list-style-type: none"> Electrification Smart control systems Energy/water technology & recovery 	●				

Decarbonisation Initiatives		Value Chain Emissions				
Initiative category	Example initiatives	Scope 1		Scope 2	Scope 3	
		Facilities	Fleet	Purchased Electricity	Upstream	Downstream
 Energy Efficient Buildings	<ul style="list-style-type: none"> Insulation Energy management Heating & air conditioning 	●				
 Waste & Material Circularity	<ul style="list-style-type: none"> Product design & packaging Material substitution, reuse & recycling Waste reduction 				●	●
 Fugitive Emissions	<ul style="list-style-type: none"> GHGs reduction or capture Agriculture (methane, fertilisers) Industrial plants/pipe leakages 	●			●	●
 Behavioural Change	<ul style="list-style-type: none"> Internal carbon pricing Travel policy, commuting & teleworking 	●	●	●	●	●
 Business Model	<ul style="list-style-type: none"> Product portfolio transformation Divest investment portfolio Consumer engagement & sustainable behaviours 	●	●	●	●	●
 Voluntary Offsets	<ul style="list-style-type: none"> GHG avoidance/ reduction GHG removal/ sequestration 	Residual Emissions				

Building a Business Case for Net Zero

Visualise emissions reduction against **NetZero plan** to ensure you're meeting corporate goals

Company Decarbonisation Pathways
Net Emissions, MtCO₂e



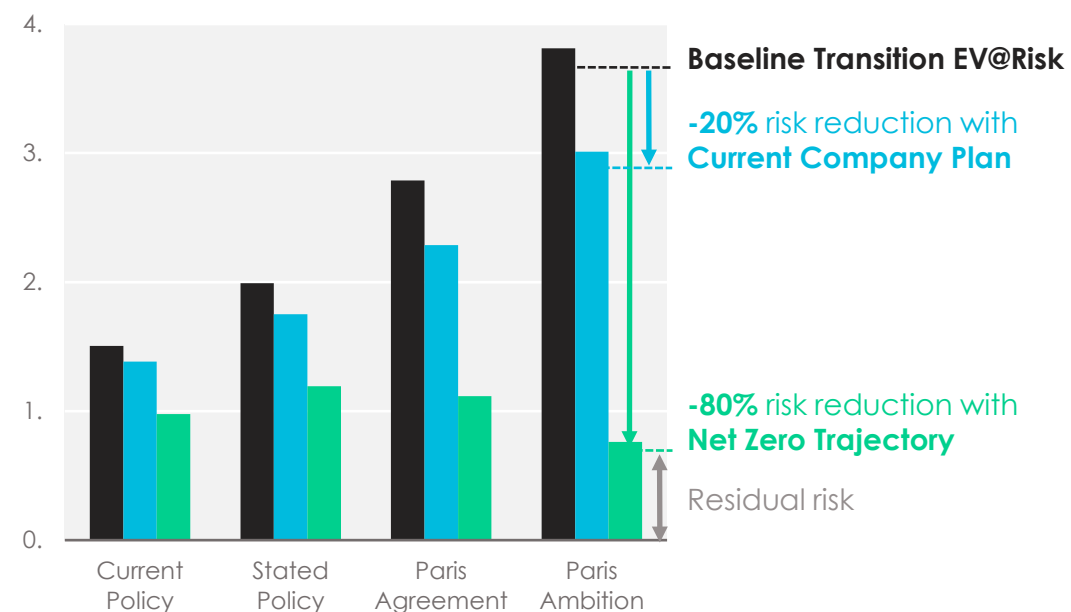
Business-As-Usual
Emissions track with company financial growth

Current Company Plan
Existing initiatives may be insufficient to reach Net Zero

Company Net Zero Target
Strategic target to align with global 1.5°C

Calculate **return on investment** of decarbonization initiatives and overall NetZero plan

Company Earnings Value@Risk
\$Bn



Baseline Transition EV@Risk

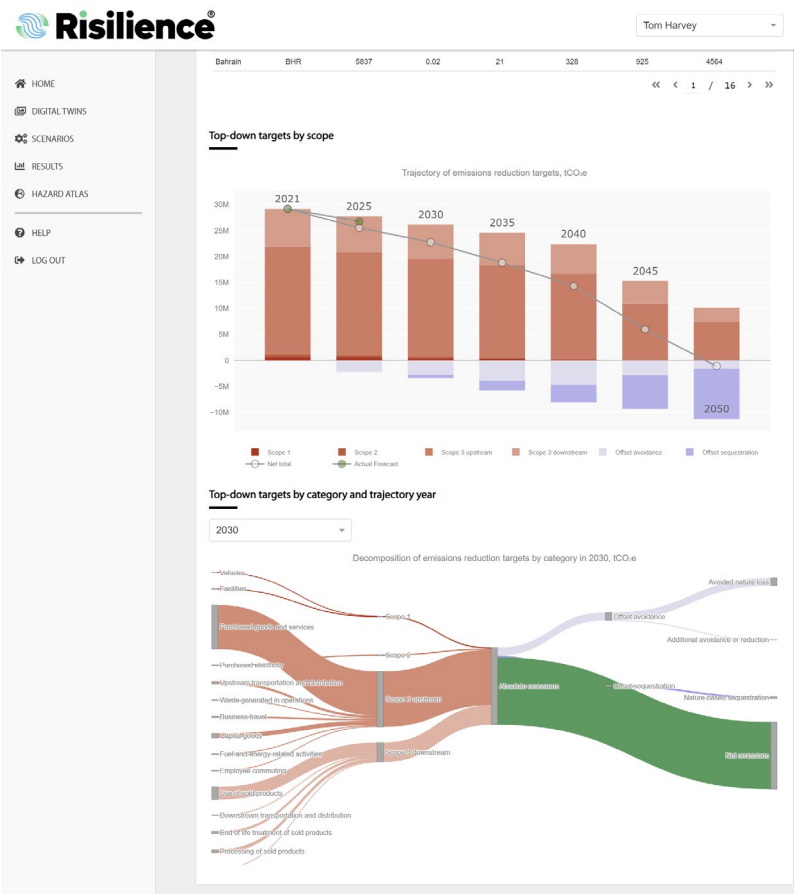
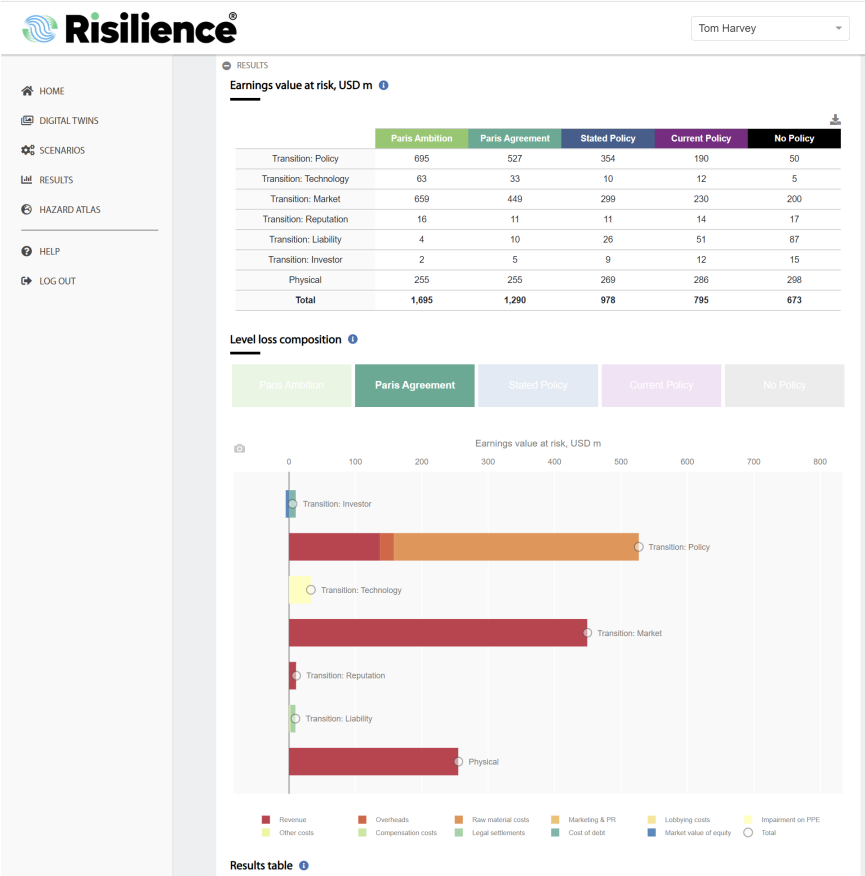
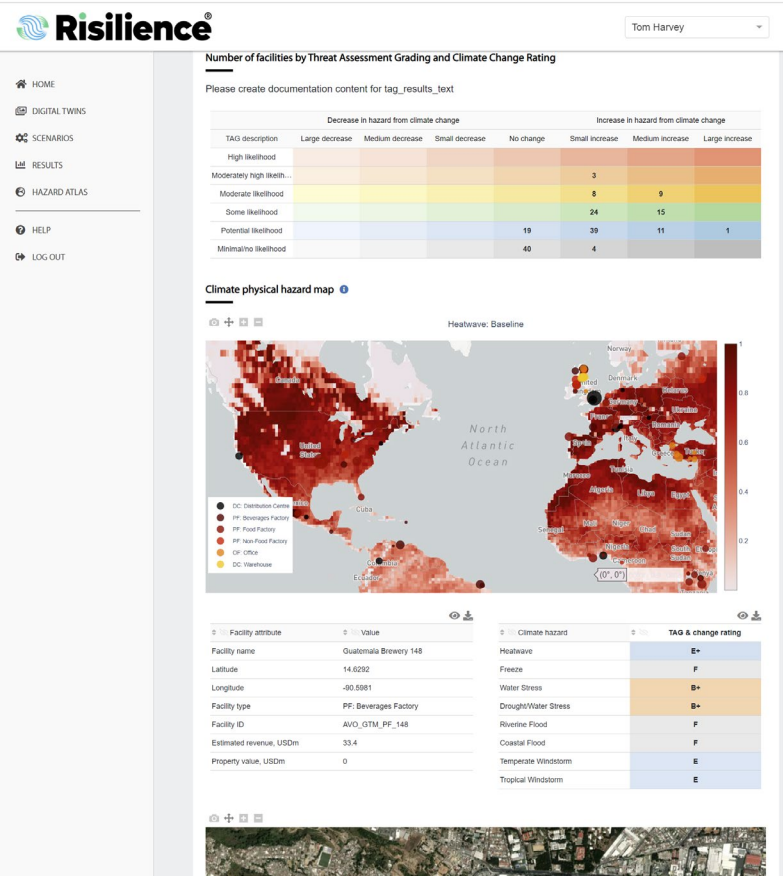
-20% risk reduction with
Current Company Plan

-80% risk reduction with
Net Zero Trajectory

Residual risk

Climate V2 Launch

Risilience™



Centre for
Risk Studies



UNIVERSITY OF
CAMBRIDGE
Judge Business School

<https://www.jbs.cam.ac.uk/>



RisilienceTM

risilience.com

Turning risk into strategic advantage

Centre for
Risk Studies



UNIVERSITY OF
CAMBRIDGE
Judge Business School