

Cambridge Centre for Risk Studies

2022 ANNUAL RISK SUMMIT

SYSTEMIC RISKS AND INTERLINKED GLOBAL CHALLENGES

Plenary Session 3:

Climate Change Risk and Systemic Impacts

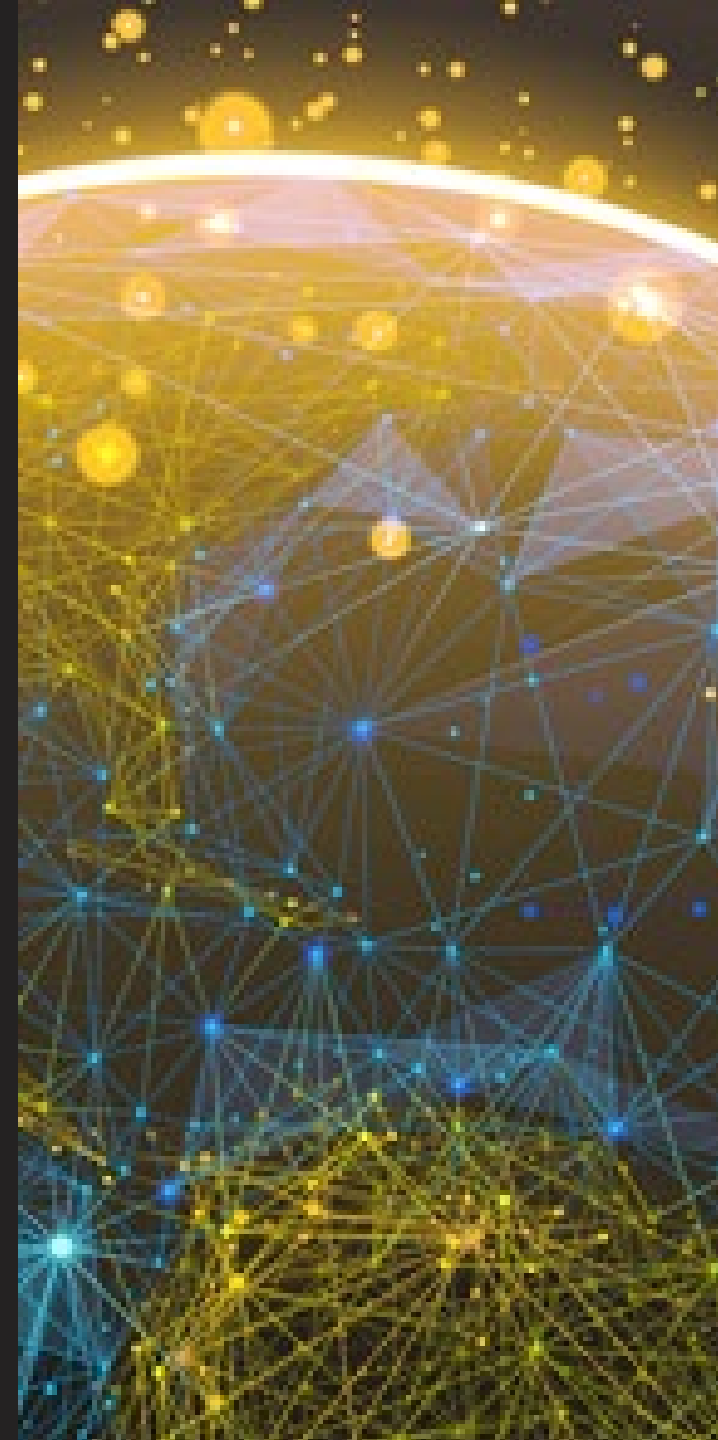
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McKinsey
& Company

Platform Partner



Climate Change Risk and Systemic Impacts

Andrew Coburn

Chief Scientist, Cambridge Centre for Risk Studies and
CEO, Risilience

Centre for
Risk Studies



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Risilience[®]

An aerial photograph of the Mapocho Reservoir in Santiago, Chile. The reservoir is a large, irregularly shaped body of water. The water level is significantly low, exposing a large area of light-colored, silty sediment in the center and along the edges. The water that remains is dark and still. Surrounding the reservoir is a dry, hilly landscape with sparse vegetation. A paved road with a white line runs along the top edge of the image, with a small truck visible on it. A dirt road or path runs along the right side of the reservoir.

Water Rationing Introduced in Santiago, Chile, April 2022

Mapocho Reservoir

Changing Patterns of Rainfall with Climate Change

Less
Frequent
Droughts

More
Frequent
Droughts

Santiago

Change in Deficit from Seasonal Average Rainfall
with a 1-in-10 likelihood per year, from 2000 to 2040



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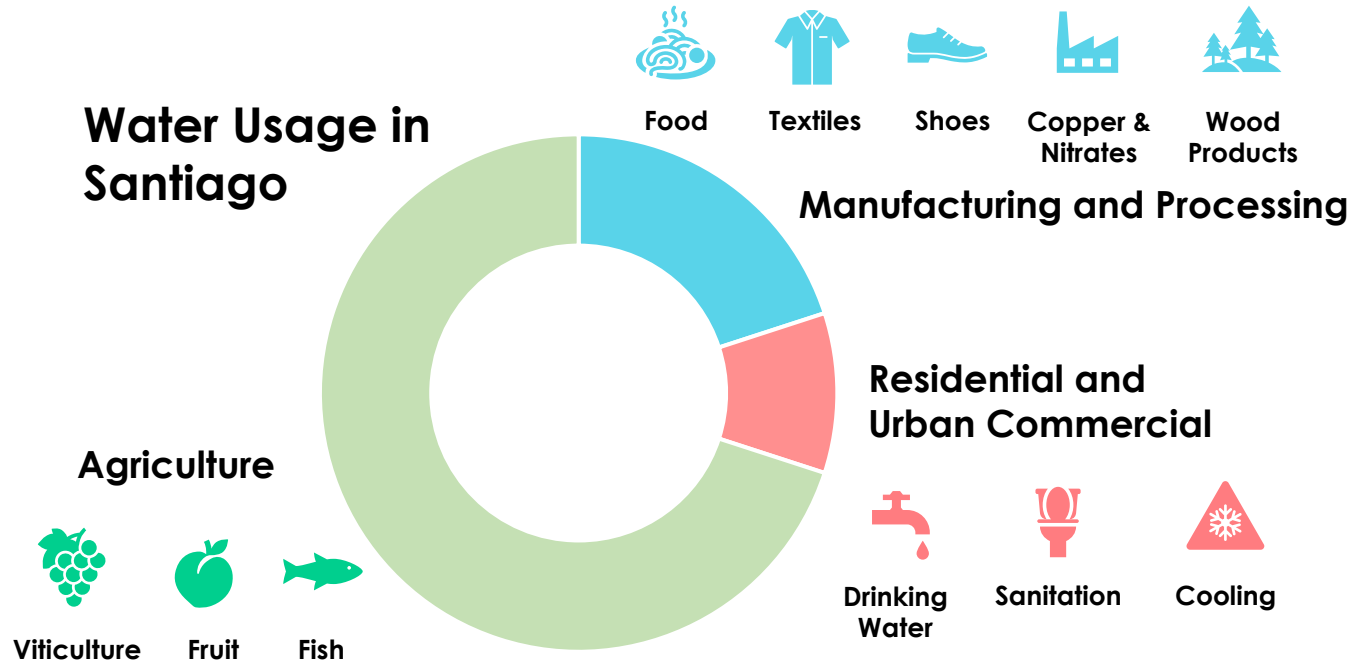
Santiago

- Home to 6.8 million people
- Capital city and economic engine of Chile
- Santiago Metropolitan Region accounts for half of Chile's \$352 Bn GDP
 - Chile's GDP is now larger than Portugal and Greece
- Well-educated workforce, major universities, and hub of the largest corporations of Latin America
- Centre of food processing; textiles, shoes and clothes; chemical processing, wood processing



Water Shortages are Cramping Santiago's Economic Growth

Water Usage in Santiago



Water shortages are causing short-time working in clothing factories in Santiago

- Water shortages could cause 10s of Billions of lost GDP for Chile
- Individual businesses suffering reduced output

Water Disputes Throughout Latin America



Chile: **New regulations** passed by Senate to **appropriate water rights** from being private and permanent to 20- or 30-year renewable concessions, classing water as a national good for public use.



Puebla, Mexico: A private **water-bottling plant forced to cease operations** after a four-month-long blockade by 'Peoples' Front for Water Defence' (Frente de Pueblos en Defensa del Agua)



Baja California, Mexico: **Cancellation of a US company's brewing project** after a referendum prompted by local community's concerns over water scarcity



Mexico: **Revoked water use permits** by National Water Commission (Comisión Nacional del Agua: CONAGUA) for five European and US manufacturing and agribusiness companies after public protests

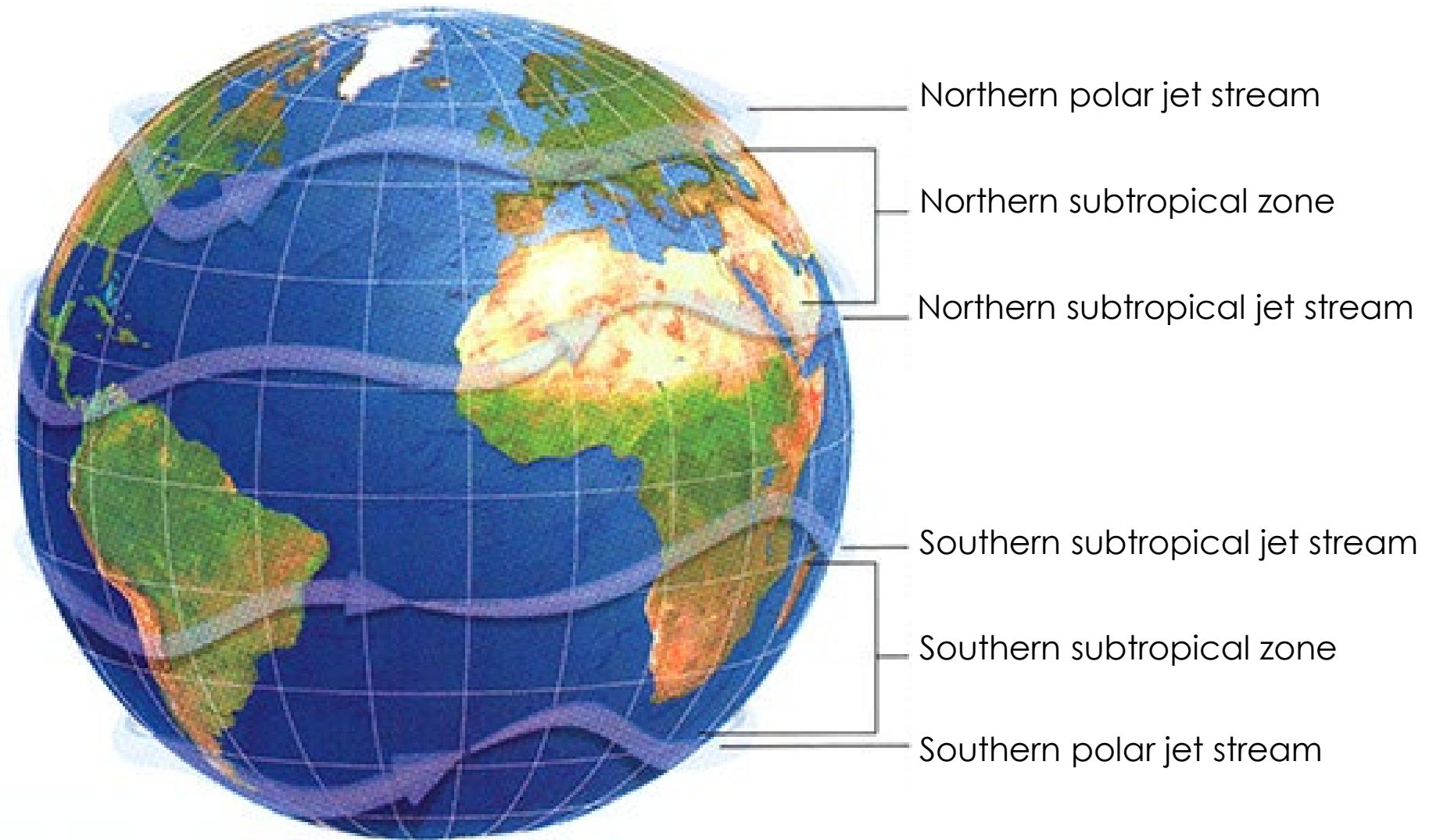


Peru: **Development project cancellations** after Las Bambas blockades and take-over attempts against companies operating water-intensive businesses - 65% of social conflicts focused on environmental issues, with water pollution a major trigger



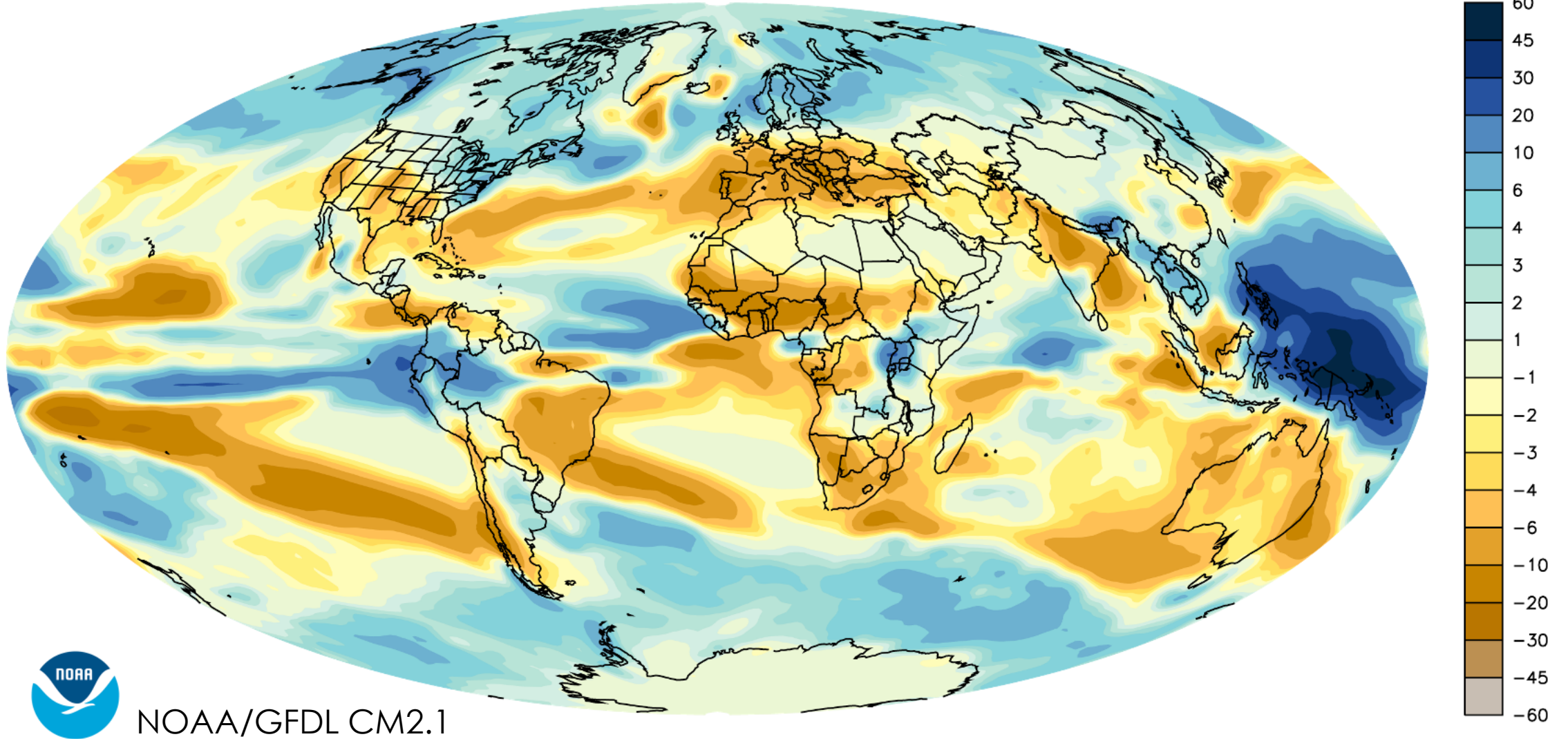
Ecuador: **Closure of potentially-polluting major projects** near population centres ordered by Sucumbios department municipal court after protests by indigenous organizations about access to clean water

Systemic Destabilizing of the Weather Systems with Global Warming



Changes in Rainfall Patterns

Average change by 2100
Inches of liquid water per year



Not Just Chile...

California

BAY AREA

California slips into its worst mega-drought in 1,200 years



Kurtis Alexander

Feb. 14, 2022 | Updated: May 12, 2022 9:03 a.m.



1 of 2

A family walks over cracked mud last August near Lake Oroville's shore, as water levels remain low because of continuing drought conditions.

Ethan Swope/Associated Press 2021

Italy

Green | Weather & Science

Worst Drought in 70 Years Threatens Northern Italy's Food, Power

Hydroelectric reservoir levels are at historic lows and towns are bracing for shortages of drinking water.



Boats on the exposed bed of the Po in Caltto, Italy, on June 17. *Photographer: Francesca Volpi/Bloomberg*

By Marco Bertacche

18 June 2022, 05:00 BST

Spain

FEBRUARY 15, 2022

Drought Depletes a Reservoir in Spain, Revealing a Ghost Village

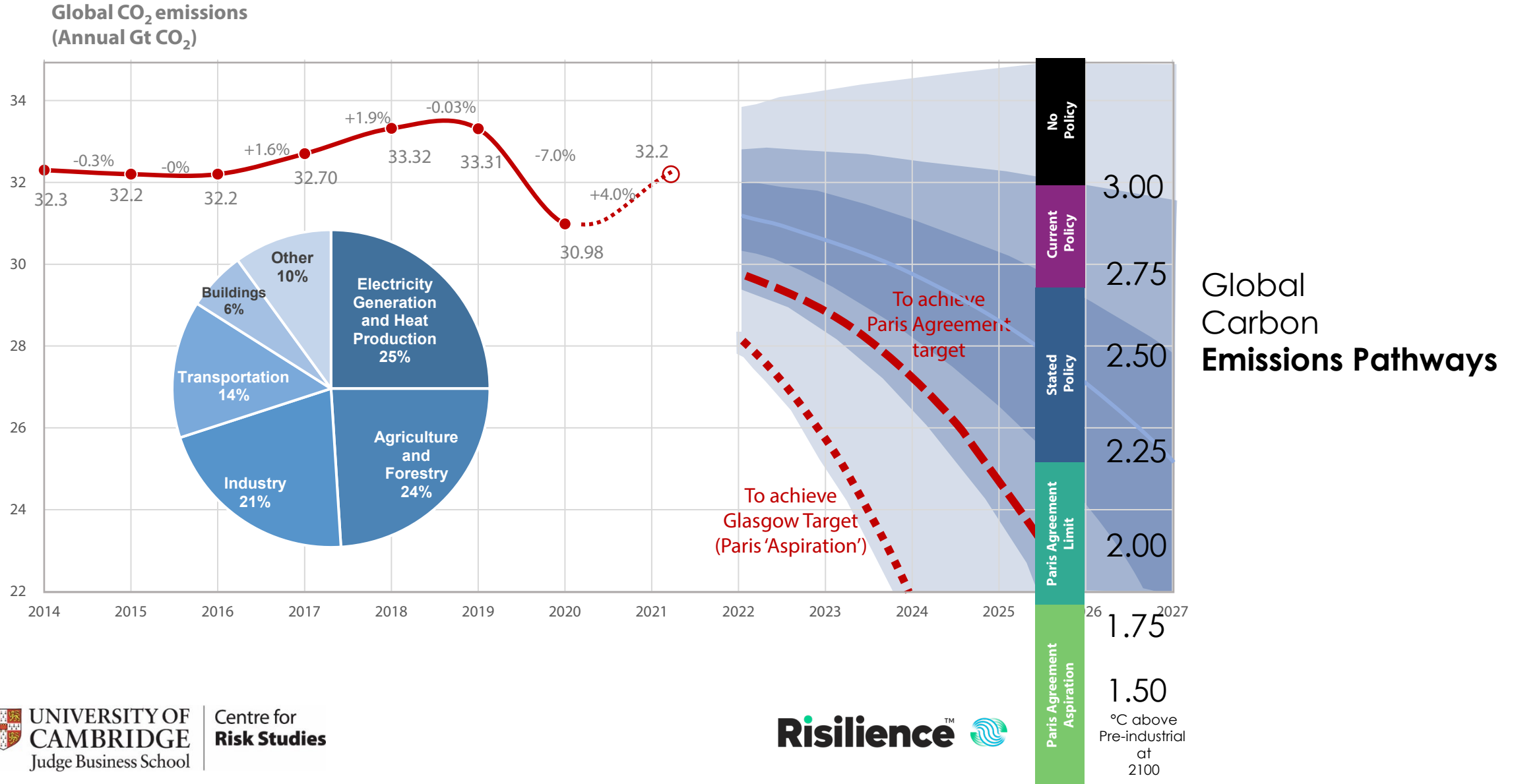


The ghost village of Aceredo, Spain. [ESTEVOAEI VIA WIKIPEDIA](#)

The 1992 opening of the Alto Lindoso Dam on the border of Spain and Portugal flooded the town of Aceredo, Spain. Now, as an ongoing drought drains the reservoir, a ghost village is re-emerging from the receding waters.

The reservoir is currently at 15 percent capacity, low enough to reveal

How Fast Will the World Reduce its Emissions to Address Climate Change?



Dimensions of Business Risk



**Regulation
&
Taxation**

Policy Risk



**Sustainable
Consumers
of the Future**

Market Risk



**Investors
&
Finance**

Reputation Risk



**Litigation
&
Penalization**

Liability Risk



**Disruptive
New**

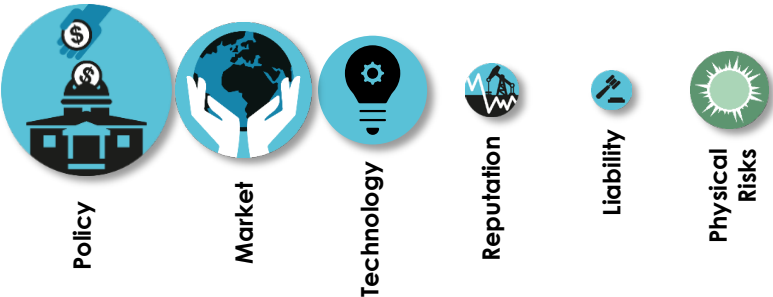
Technology Risk



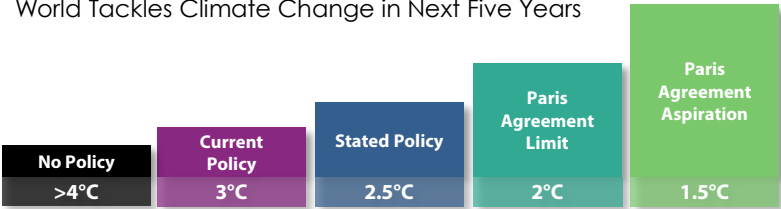
How Does Climate Risk Affect a Typical Consumer Business?

Impact if No Adaptation Next 5 Years

Causes of Loss to Company Earnings



Impact From Different Scenarios of How Aggressively the World Tackles Climate Change in Next Five Years



Expected Loss

3-10% of earnings value loss over next five years

1-in-10 Chance of 5-20% loss
1-in-100 Chance of 15-35% loss

How Does Climate Impact the Business?

- Increased cost from carbon tax
- Reduced revenues
Changes in consumer preferences leads to loss of market share against more sustainable competitors
- Impairment write-offs
on old technology retired before end of economic lifespan
- Increased cost of capital
- Fines, litigation, and liability costs

Raw Material Supply Impacted by Climate Change



Key Facilities - Operational Disruption from Extreme Weather



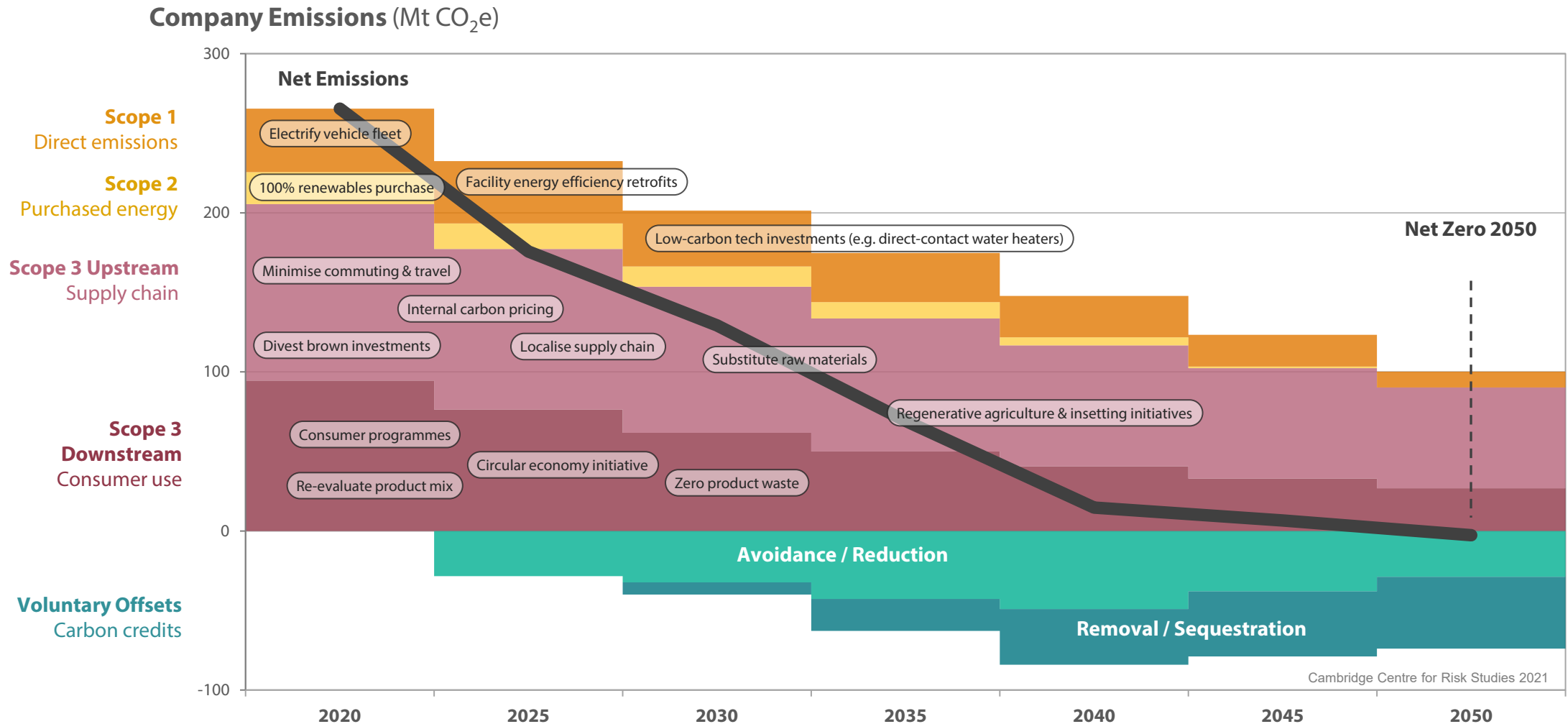
What Actions are Companies Taking?

- Investments in lower-emission operations
- Restructuring portfolio of products and services
- Mergers, acquisitions and divestments
- Restructuring supply chains
- Substitution of raw materials
- Renewable energy supplies
- Realigning management incentives, shadow carbon pricing

Typical Investments in Net Zero Commitment

1-4% of annual earnings

Net Zero Planner



Climate Reporting and Regulation

Annual Reports



Sustainability Reports



Net-Zero Roadmaps



TCFD & Climate Impact Reports



SEC Form 10-K Filings



SEC
Climate
Disclosure
Rulings



European
Corporate
Sustainability
Reporting
Directive

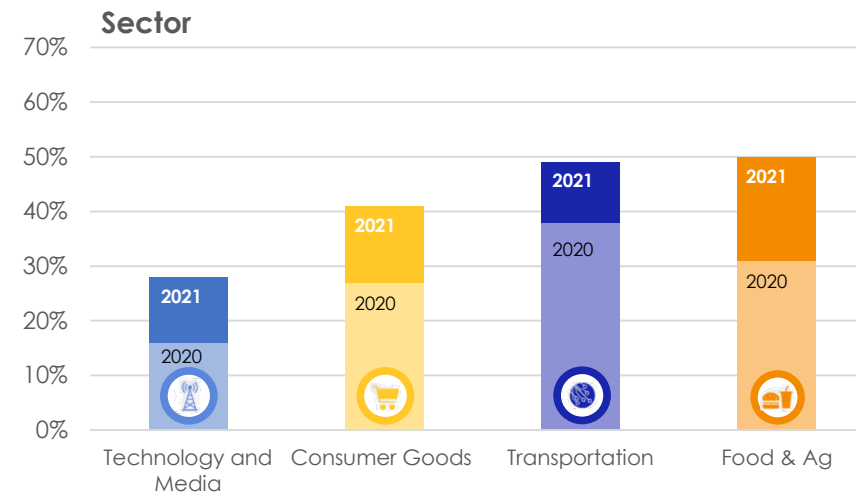
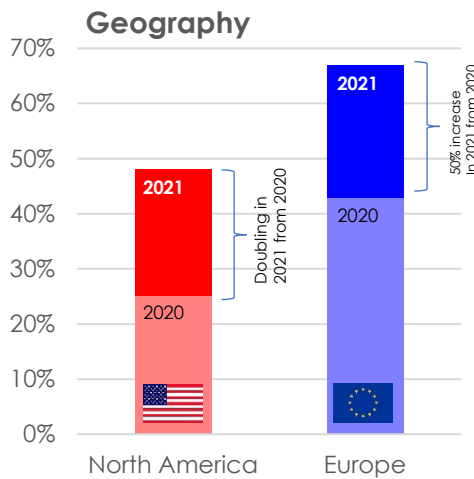
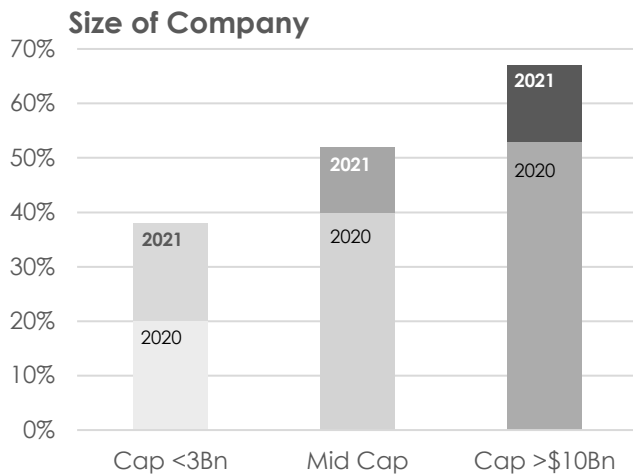


BANK OF ENGLAND
PRUDENTIAL REGULATION
AUTHORITY



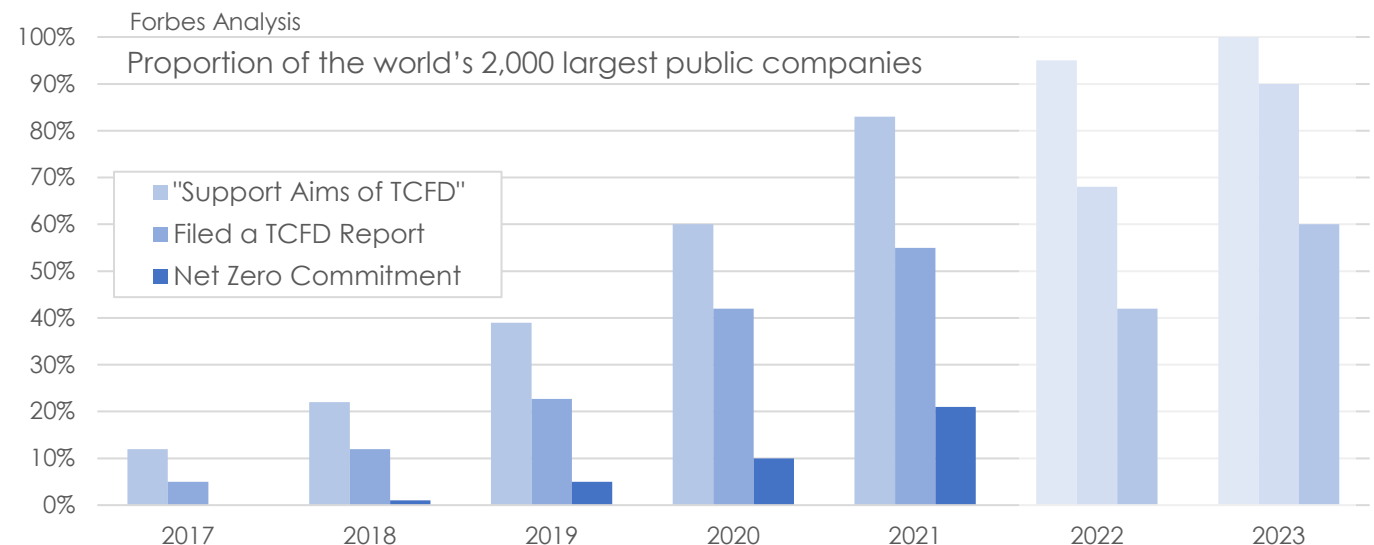
Increasing Pressure for Voluntary Climate-Related Disclosures

Growth in the Past 12 Months - Companies submitting TCFD report identifying 'Risks and Opportunities' in their 'Strategy' Submission



Dec 2021 Publication of Status of the Taskforce on Climate Related Financial Disclosures (TCFD)

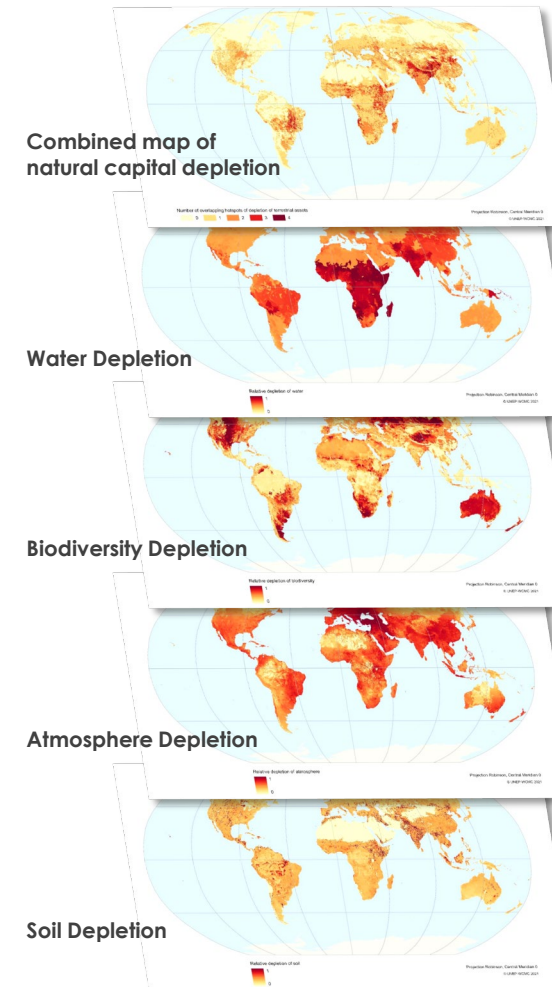
- Market survey information shows that there is rapid growth in companies reporting their climate change risk
- 2021 reporting of TCFD and publishing Net Zero plans increased significantly from previous years
- Boosted by regulators in major jurisdictions signalling that reporting will become mandatory



Beyond Climate – to Natural Capital Risk

- We are developing an application for a company to assess their risk from Taskforce on Nature-related Financial Disclosures (TNFD)
- This will utilize the same digital twin base model for a company
- This will incorporate the recommendations of the TNFD Taskforce and conform to their requirements and objectives

Global geography of natural capital depletion



Raw material dependencies and impact drivers on natural capital

e.g.
large-scale rainfed *Palm Oil* crops

Impacts	Materiality
Water use	V High
Terrestrial ecosystem use	V High
Freshwater ecosystem use	V High
Marine ecosystem use	N/A
Other resource use	Low
GHG emissions	High
Water pollutants	High
Soil pollutants	Medium
Ecosystem Services	Materiality
Direct physical input	
Fibres & materials	Medium
Ground water	V High
Surface water	V High
Enables production	
Pollination	High
Soil quality	High
Water quality	High

The Risilience Research Team



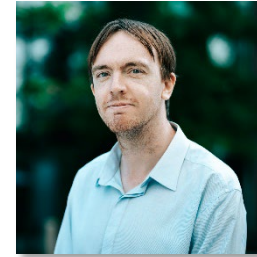
Tom Harvey
VP, Product Management



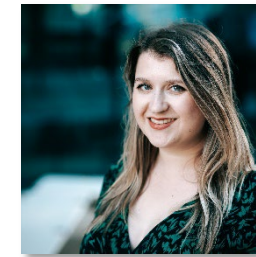
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Senior Climate Modeller



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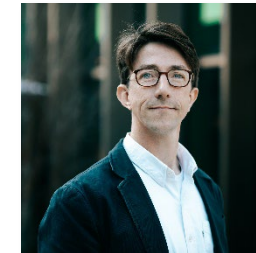
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Dr Alexandra Dixon
Senior Data Scientist



Andrew Garraway
Climate Change Policy Analysis



Dr Andy Skelton
Ideation and Prototyping



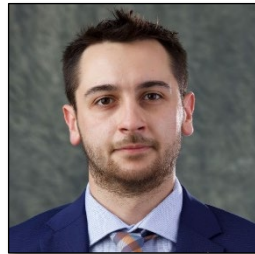
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Lead, Enterprise Risk Analytics



Jacob Barrett
Risk Researcher



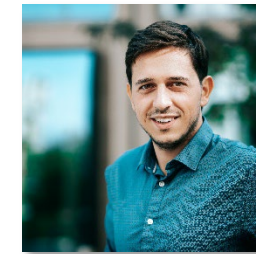
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Risk Researcher



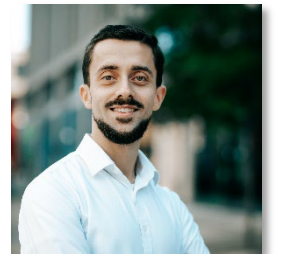
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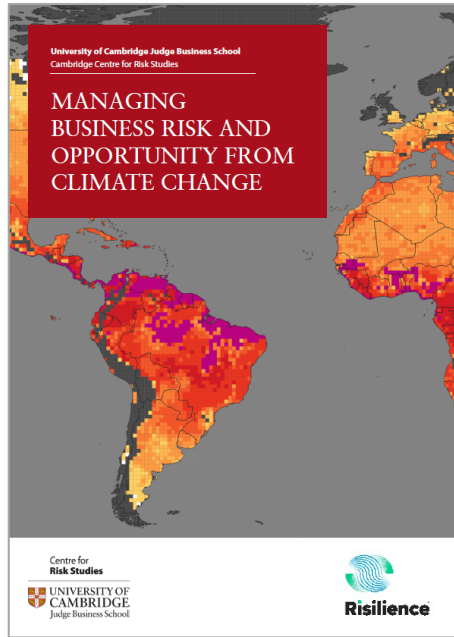


Matteo Ilardo - CRS
Risk Researcher



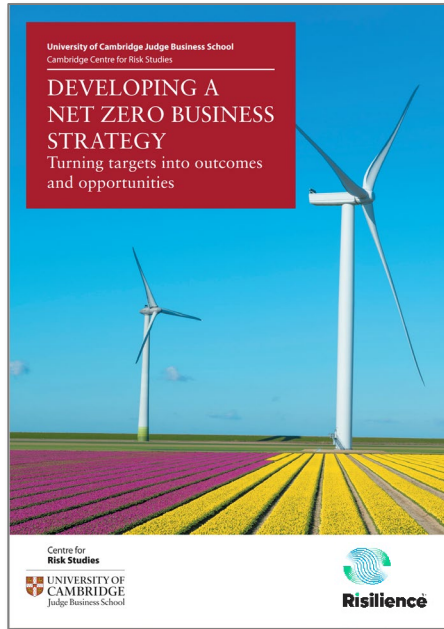
Gabrielle La Malfa - CRS
Risk Researcher

Managing Business Risk from Climate Change: Our Publication Series



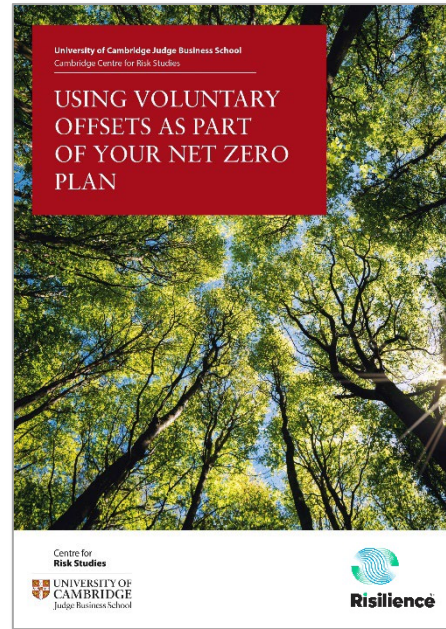
25 August

**Managing Business Risk and
Opportunity from Climate
Change**



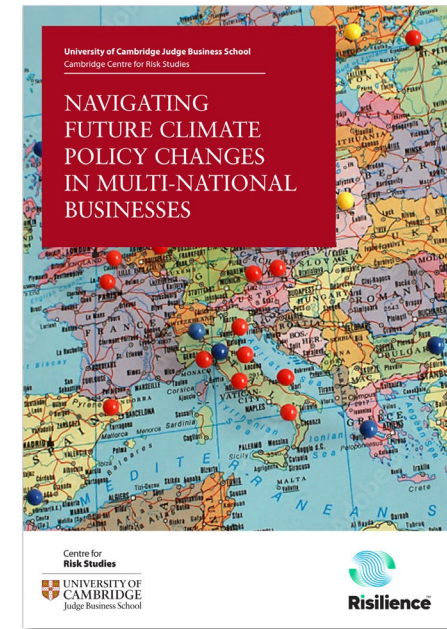
30 September

**Developing a Net
Zero Business
Strategy**



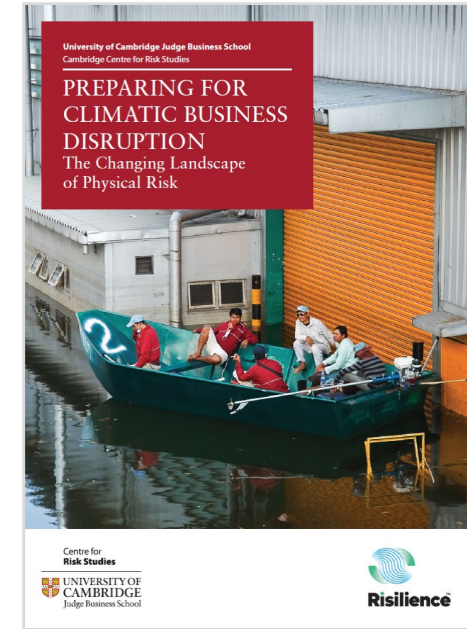
16 December

**Using Voluntary Offsets
as Part of Your Net
Zero Plan**



20 January 2022

**Navigating Future Climate
Policy Changes in Multi-
National Businesses**



21 April 2022

**Preparing for Climatic
Disruption: The Changing
Landscape of Physical Risk**

Research Agenda to Help Businesses Manage Risk from the Environment



- Understanding social and behavioural change



Trajectories of technological advance and projections of future economics of the environment



Macro-economic changes that will be brought about by Environmental Change



Key performance indicators that align with business transformation needs

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