Institute and Faculty of Actuaries

Chair's Welcome

09:30 – 09:45

17 October 2025

Institute and Faculty of Actuaries

Planetary Crossroads: Re-aligning Our Understanding of Risk and Climate Goals

09:45 – 10:30

Sandy Trust
Oliver Bettis

17 October 2025

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Climate sensitivity

- An actuarial review

Planetary Solvency

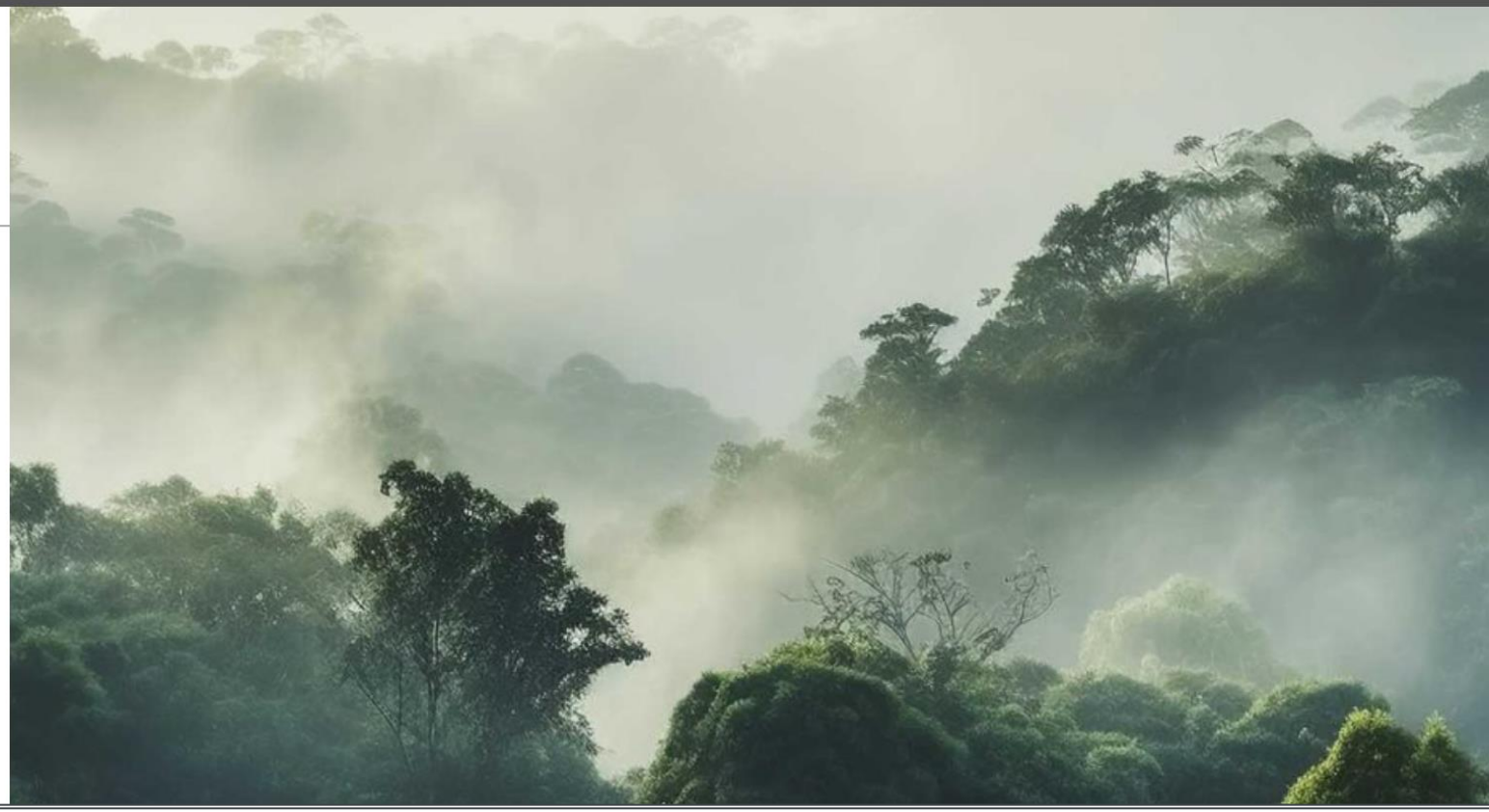
Supplementary Risk report

University of Exeter

‘at risk of leaving ‘the safe operating space’ for the Earth system and entering the high risk zone

and Faculty of Actuaries

Paris Agreement goals will not be met without immediate policy action, risking ruin



Risk position AMBER

Impact ***Severe*** in 2024 with globally increased $billion+ loss events and 10k+ mortality events. Now >1.5C (12 mth average) implying overshoot of Paris goals. Ongoing increase of emissions and GHG levels, continued fossil fuel investment. Transition is accelerating.

Risk trajectory RED

Tipping points increase risk exponentially past 1.5C. Emissions and GHG levels imply >2C by 2050. Highly likely ***Catastrophic*** warming levels experienced pre 2050 with ***Extreme*** warming Possible. Policy support required to radically accelerate transition, reduce emissions and leverage natural solutions.

Physical risk

- Warming accelerated in 2023, above 1.5°C on 12 mth average, overshoot.
- >GHGs + emissions also breaking records, more warming in pipeline.
- Climate impacts increasingly severe globally: fire, flood, heat, drought.
- Nature an undervalued ally that continues to be degraded.

Energy transition

- Energy transition accelerating supported by rapid scaling of transition finance.
- $1 trillion investment in fossil fuels and an all time record for coal investment.
- GDP requires energy, implying more fossil fuel use if renewables absent.
- Energy security and geo-political implications if transition is executed.

Risk & uncertainty

- Tipping point risk increases >1.5C and several tipping points now triggered.
- Climate sensitivity, Earth may be much more sensitive to GHGs than we think.
- Additional factors driving accelerated warming - aerosol cooling, loss of albedo.
- Climate models understate risk, miss nonlinear risk impacts and cascading risks.

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Actuarial review of Climate sensitivity

Oliver Bettis

University of Exeter

Actuarial review of climate sensitivity

A. Reviewing the evidence base for climate sensitivity
- satellite data, recent temperature trends, and paleoclimate studies.

B. Risks of higher warming, including climate tipping point
- withdrawal of insurance, tipping points and hothouse earth

C. High sensitivity reinforces the under-estimation of climate change risks
- reduces carbon budget and increases proximity of catastrophic risks

D. Climate change as a risk to Planetary Solvency
- Impacts on vital ecosystem services that support human society and economy.

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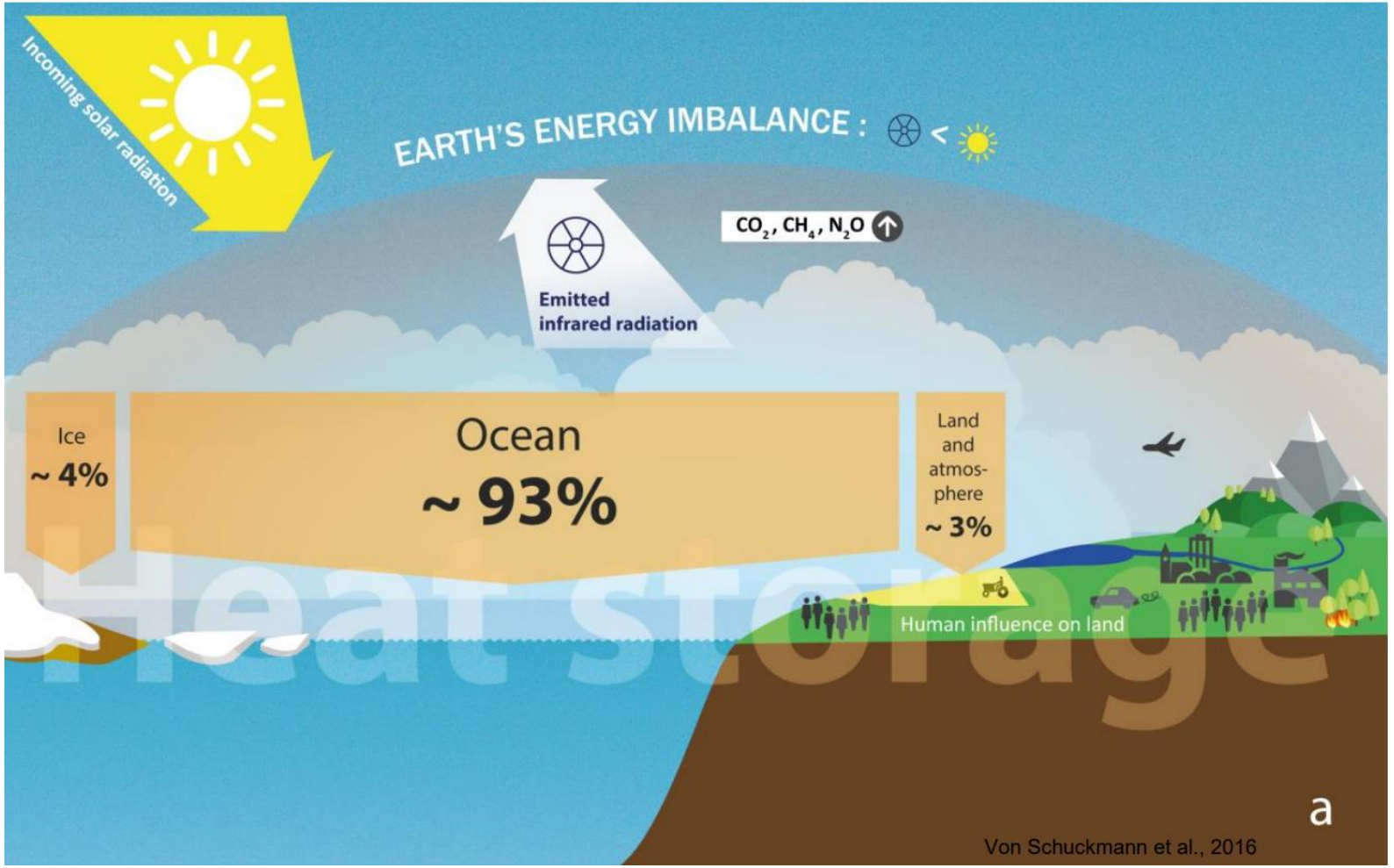
Earth's Energy Imbalance (EEI) – a fundamental climate indicator



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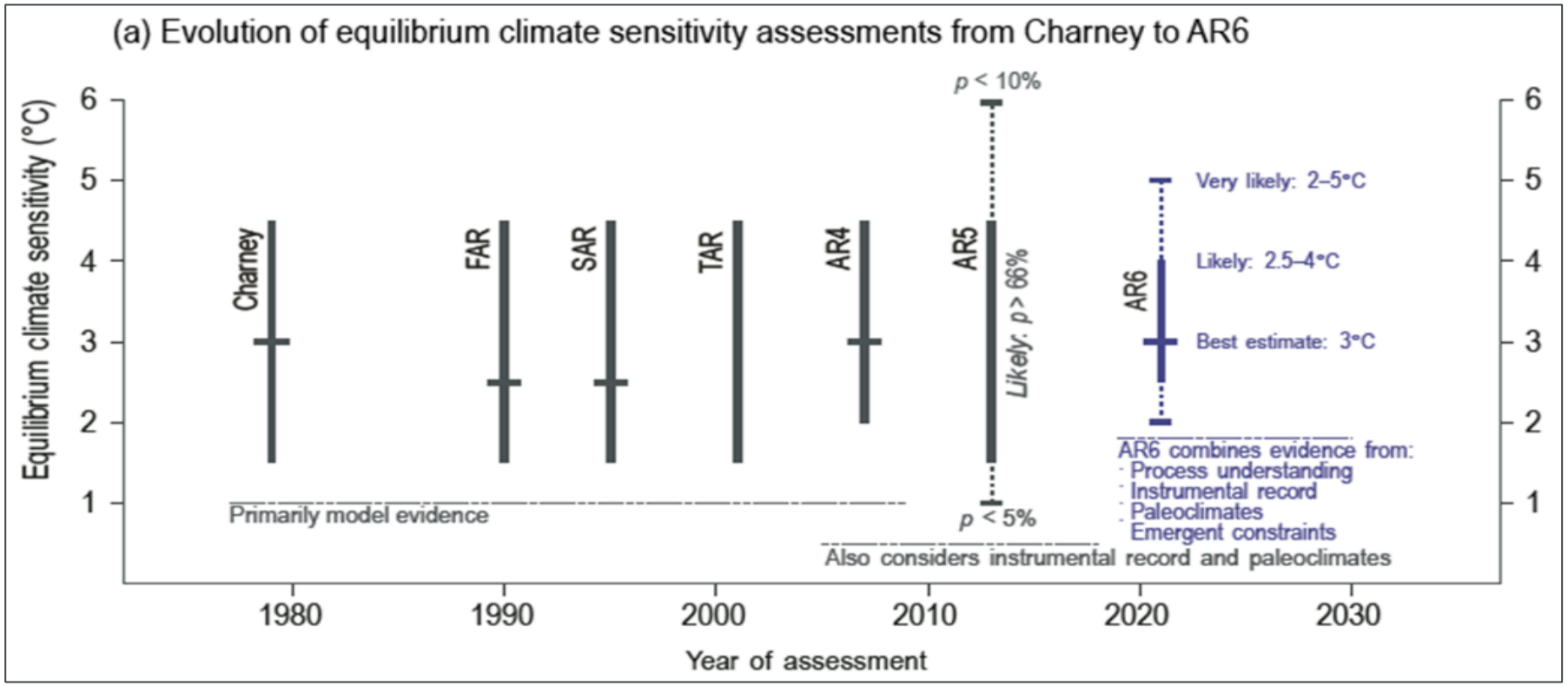
Equilibrium Climate Sensitivity (ECS)



“

Equilibrium climate sensitivity” (ECS) gauges the eventual global temperature increase—after the Earth system has stabilised—following a doubling of atmospheric CO_2

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Source: IPCC AR6 WG1 Technical Summary p94 Fig. TS16 &

3 Lines of Evidence on ECS

1. Satellite data on Earth's Energy Imbalance (2 papers published this year)
2. Evidence from the history of Earth's climate (paleoclimatology)
3. Observations of the recent rate of warming

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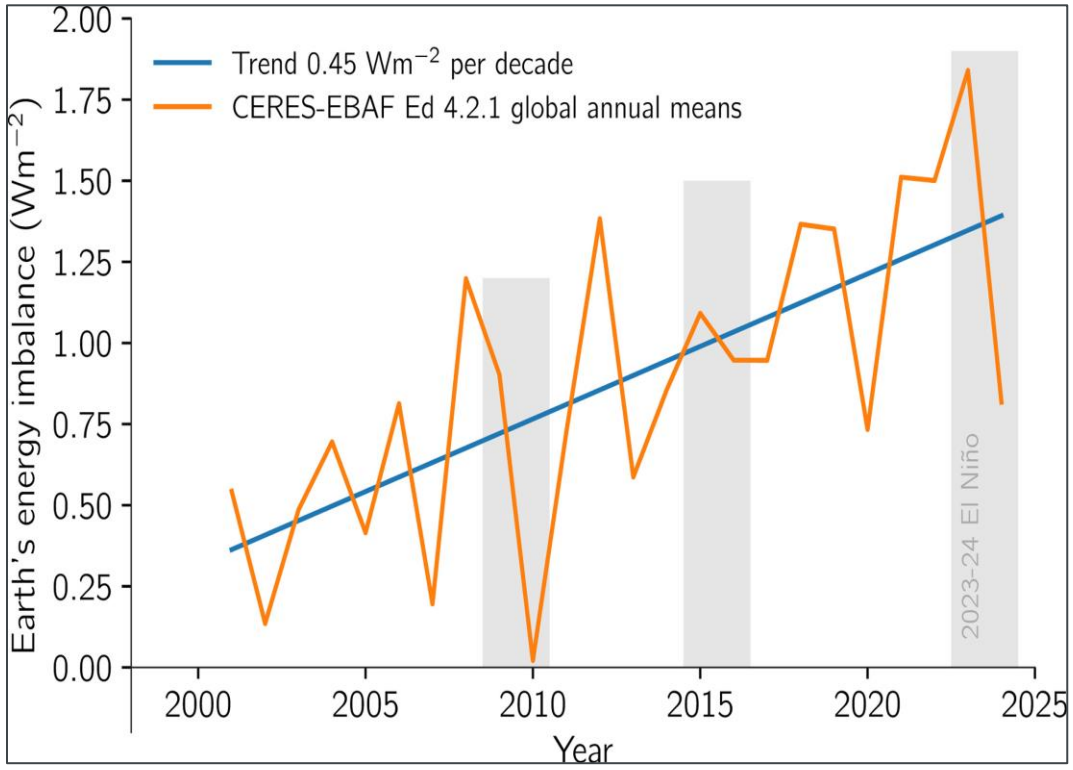
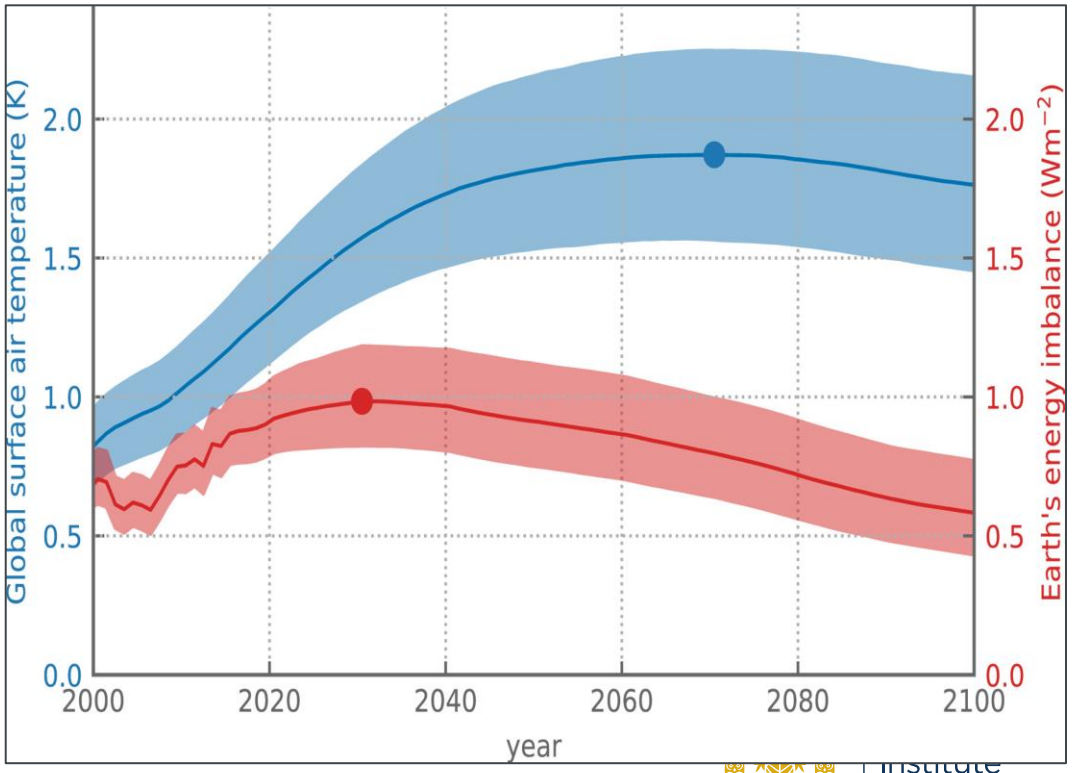
Satellite data 1: Earth's Energy Imbalance (EEI) more than doubled in recent decades

Observed EEI from satellite data



EEI from climate model output for a 2°C scenario (SSP1-2.6)



"the real world signal has left the envelope of model internal variability"

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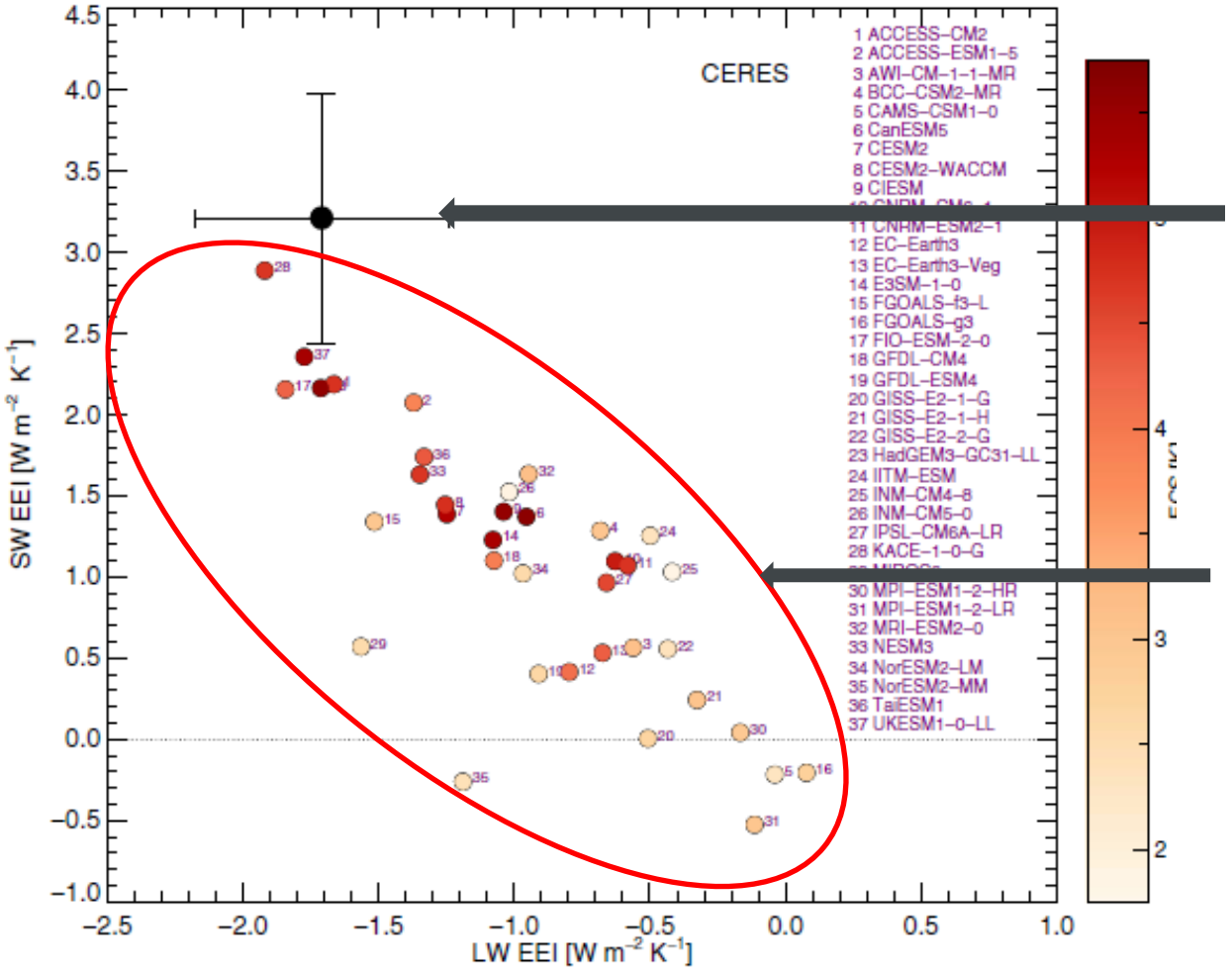
Mauritsen et al 2025 AGU Advances, Volume: 6, Issue: 3, First published: 10 May 2025, DOI: (10.1029/2024AV001636)

Satellite data 2: Comparing EEI to climate models rules out ECS below 2.9°C and points to higher ECS

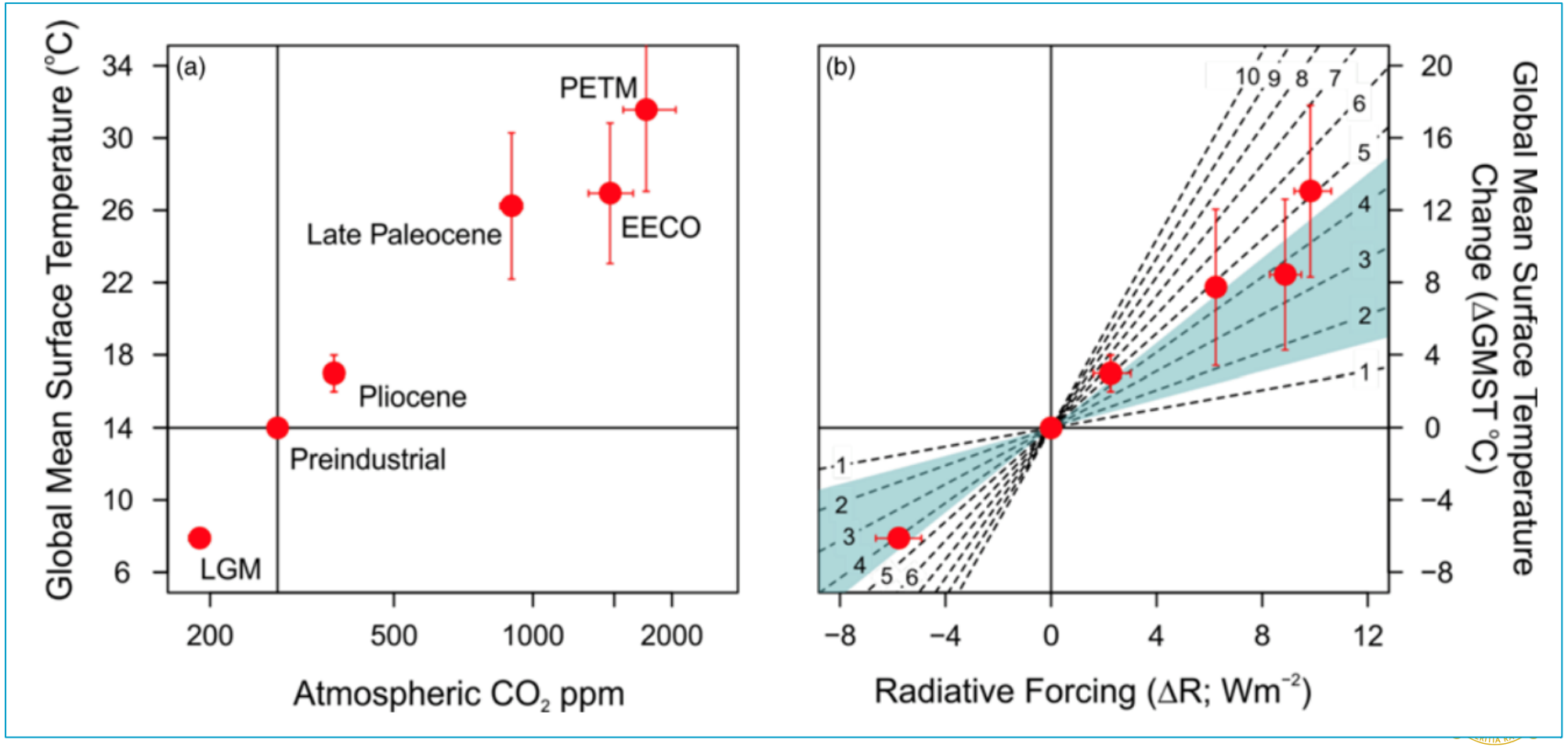


Ceres satellite data with 90% confidence intervals

Outputs from 37 climate models used in the IPCC's 6th assessment report.

Source: Myhre et at Science June 2025

Paleoclimate data shows ECS towards the top of the IPCC range



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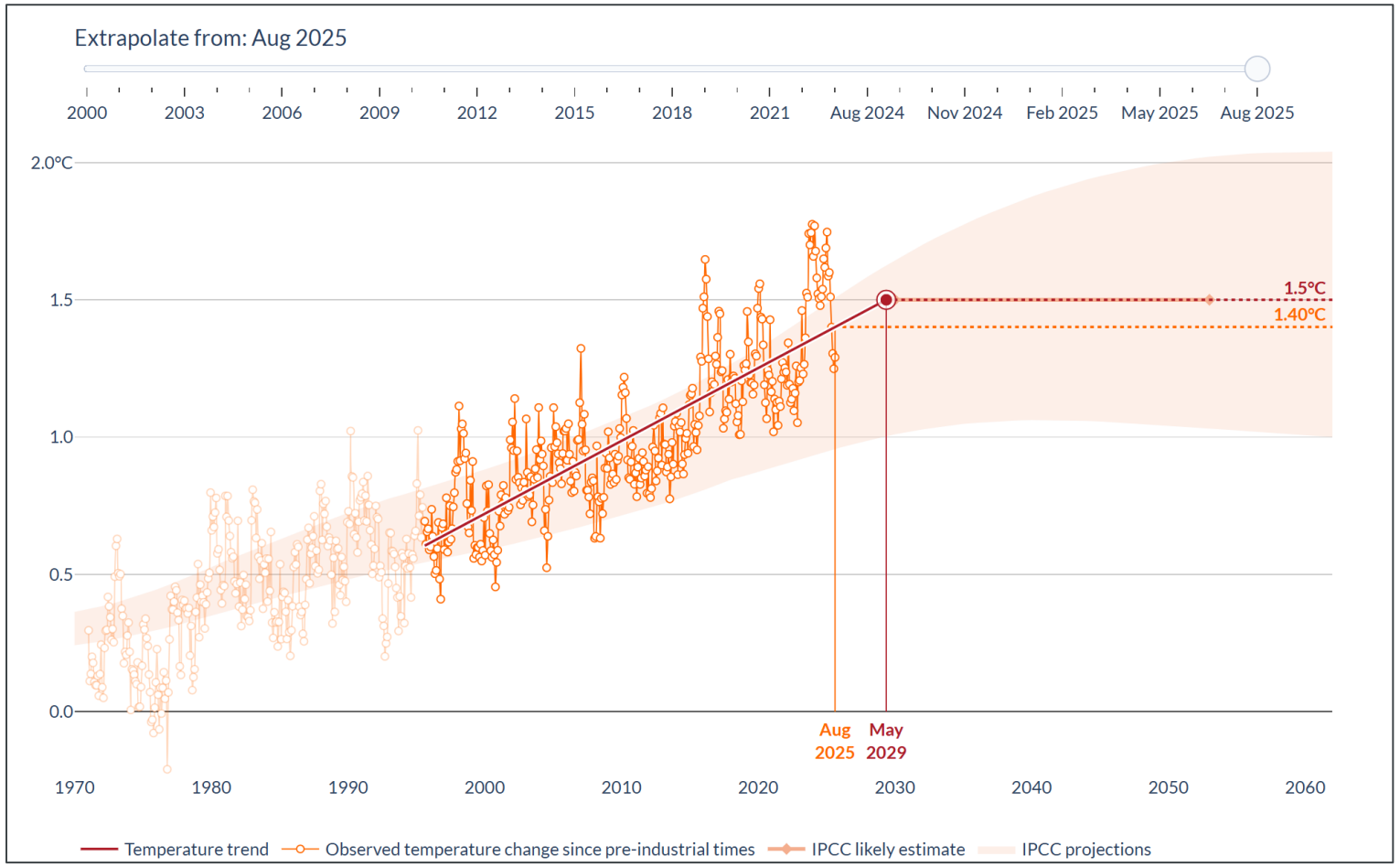
Lear et al 2020 Geological Society of London Scientific Statement: what the geological record tells us about our present and future climate

Increased warming rate matches better with higher climate sensitivity



Rate of warming has accelerated in recent years.

Global warming reached an estimated 1.4°C in August 2025

If the 30 year trend continued, global warming would reach 1.5°C in May 2029

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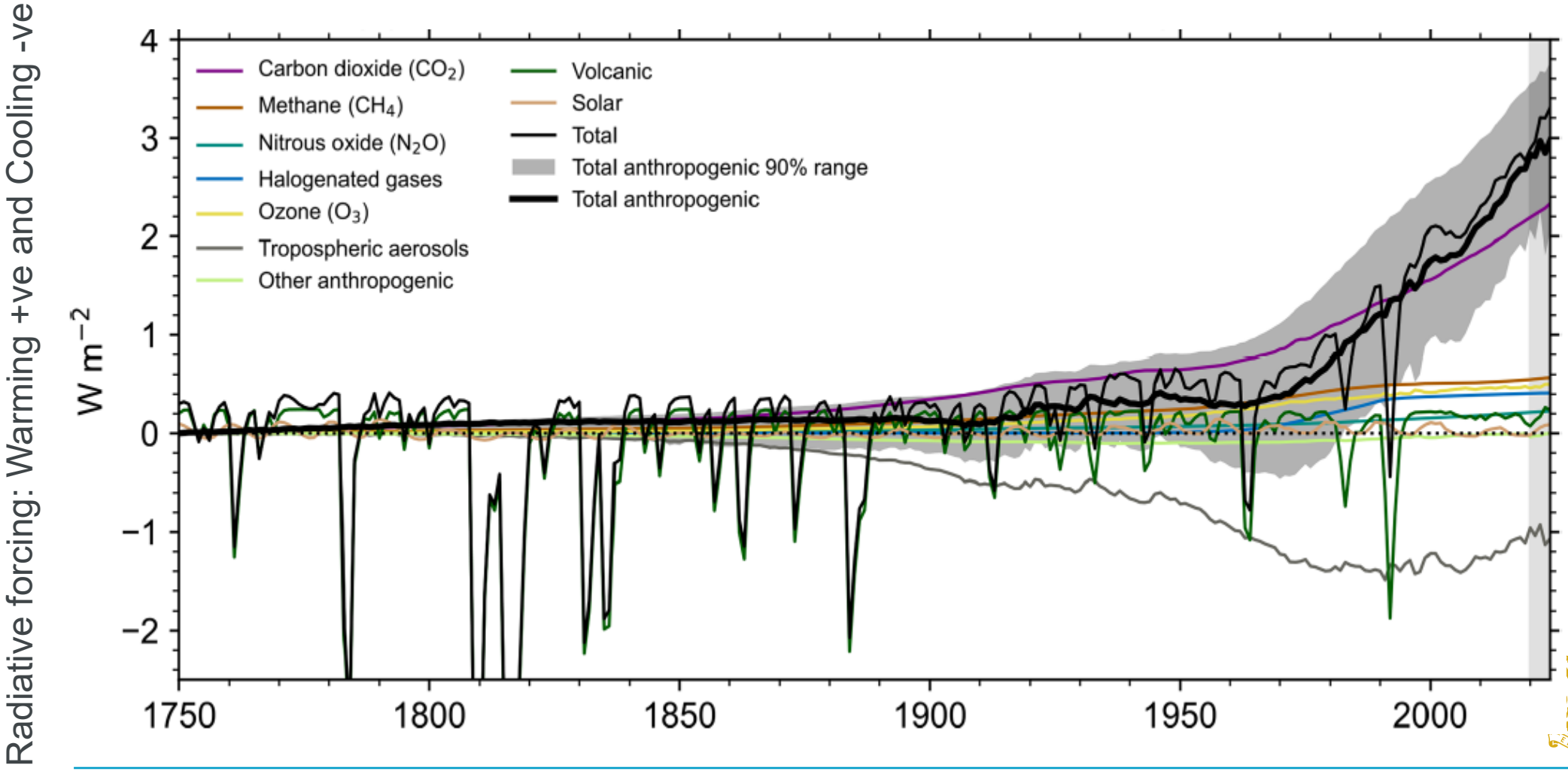
Source: Copernicus https://climate.copernicus.eu/

Increased warming rate could be from reduced cooling from aerosols (sulphate) due to air pollution cleanup



Sulphate pollution from fossil fuel burning cools the Earth.

Global sulphur dioxide (SO_2) emissions have fallen by around 40% since the mid-2000s.

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Implies catastrophic warming of >2°C by 2050

Catastrophic Warming (Highly Likely)

With no further increases in the rate of warming (and no further policy action to limit warming), catastrophic warming is highly likely pre-2050:

- 2025 temperature – 1.4°C
- Decadal rate of warming - 0.3°C
- 2035 temperature – 1.8°C
- 2045 temperature – 2.1°C

Extreme warming (Possible to Likely)

Further increases in the rate of warming (and no further policy action to limit warming), imply extreme warming is possible by 2050:

- Decadal rate of warming – increases 0.2°C per decade for next 3 decades
- 2035 temperature – 2.0°C
- 2045 temperature – 2.6°C
- 2055 temperature – 3.3°C

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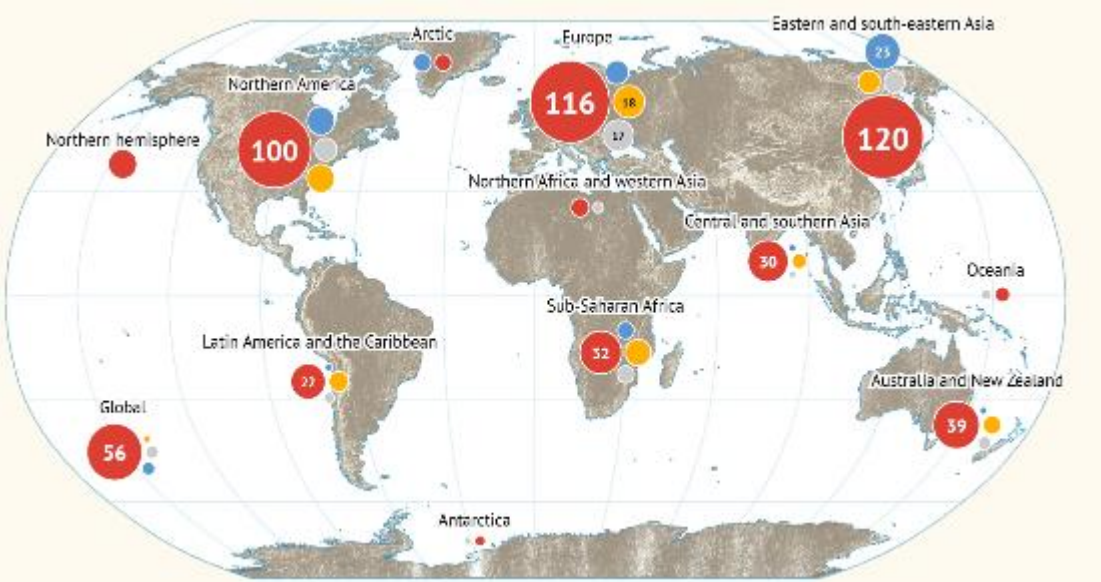
Risk acceleration – entering uncharted territory

Driving potential insurance withdrawal…

Global attribution map of extreme weather events

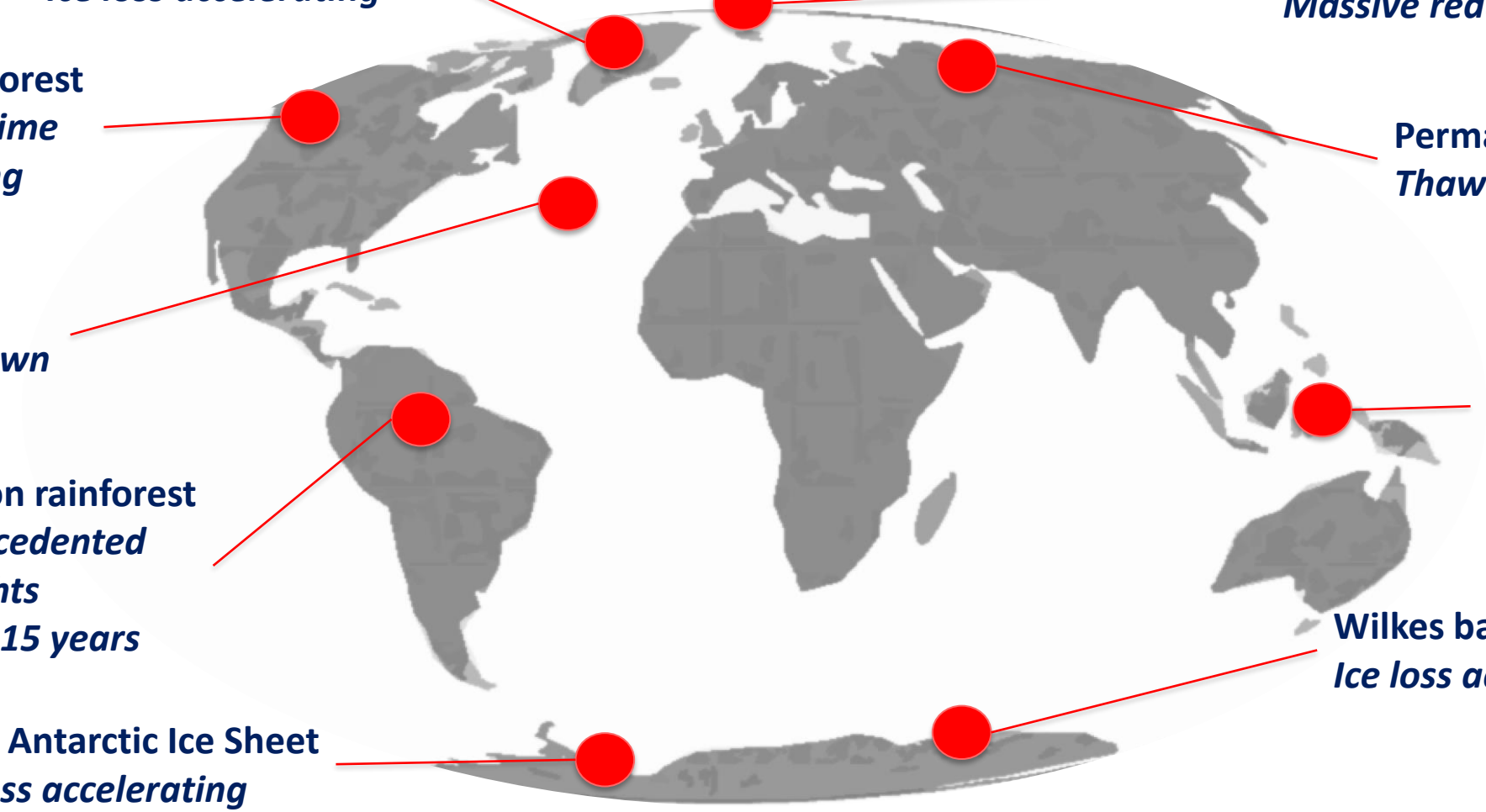


Of over 700 events studied, nearly 75% were made more severe or more likely as a result of climate change.

Leading to economic impacts trending towards trillions

- In 2024, natural disasters caused $320 billion of losses ($140 billion insured).
- USA averages 9 billion dollar loss events per year since 1980.
- In the 5 years to 2024, this increases to 23 events per year, with 2023 (28 events) and 2024 (27 events).
- Total economic losses average $400 billion per annum, with a 5% chance of an annual insured loss of $250 billion or more in the next decade.
- A climate driven food system shock could lead to economic losses of $5 trillion.

The stability of the Earth system is threatened



Greenland ice sheet
Ice loss accelerating

Arctic sea ice
Massive reduction in area

Boreal forest
Fire regime changing

Permafrost
Thawing underway

Atlantic circulation
15% slowdown since 1950s

Coral reefs
Massive die offs

Amazon rainforest
Unprecedented droughts in last 15 years

Wilkes basin, East Antarctica
Ice loss accelerating

West Antarctic Ice Sheet
Ice loss accelerating

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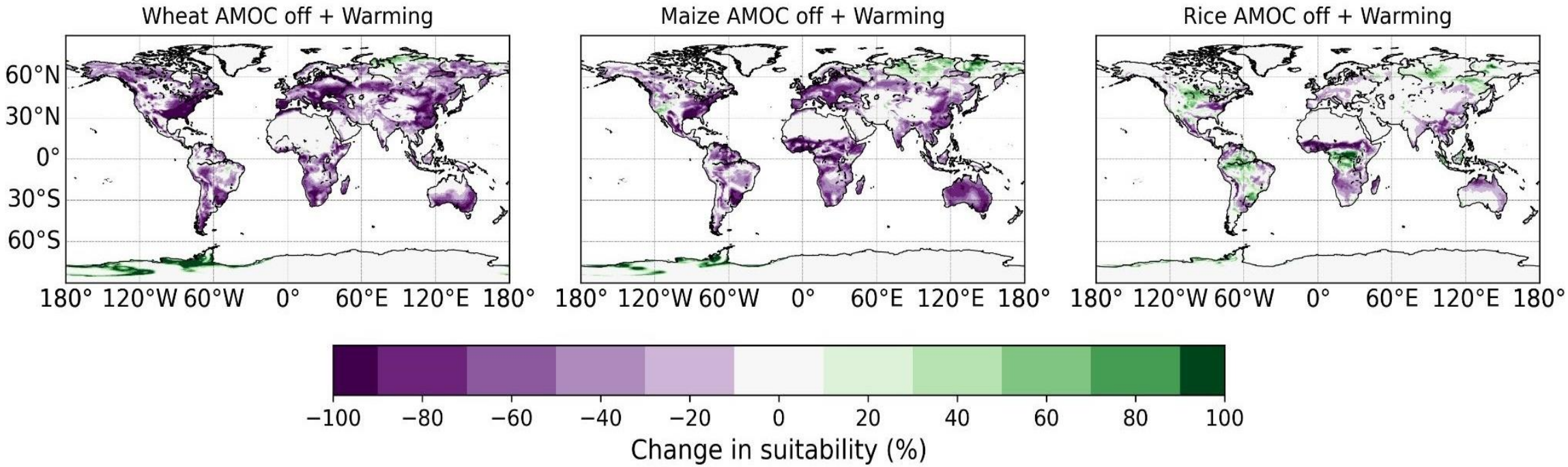
Lenton et al. (2019) *Nature*

Already severe impacts could become catastrophic

Wheat

Maize

Rice



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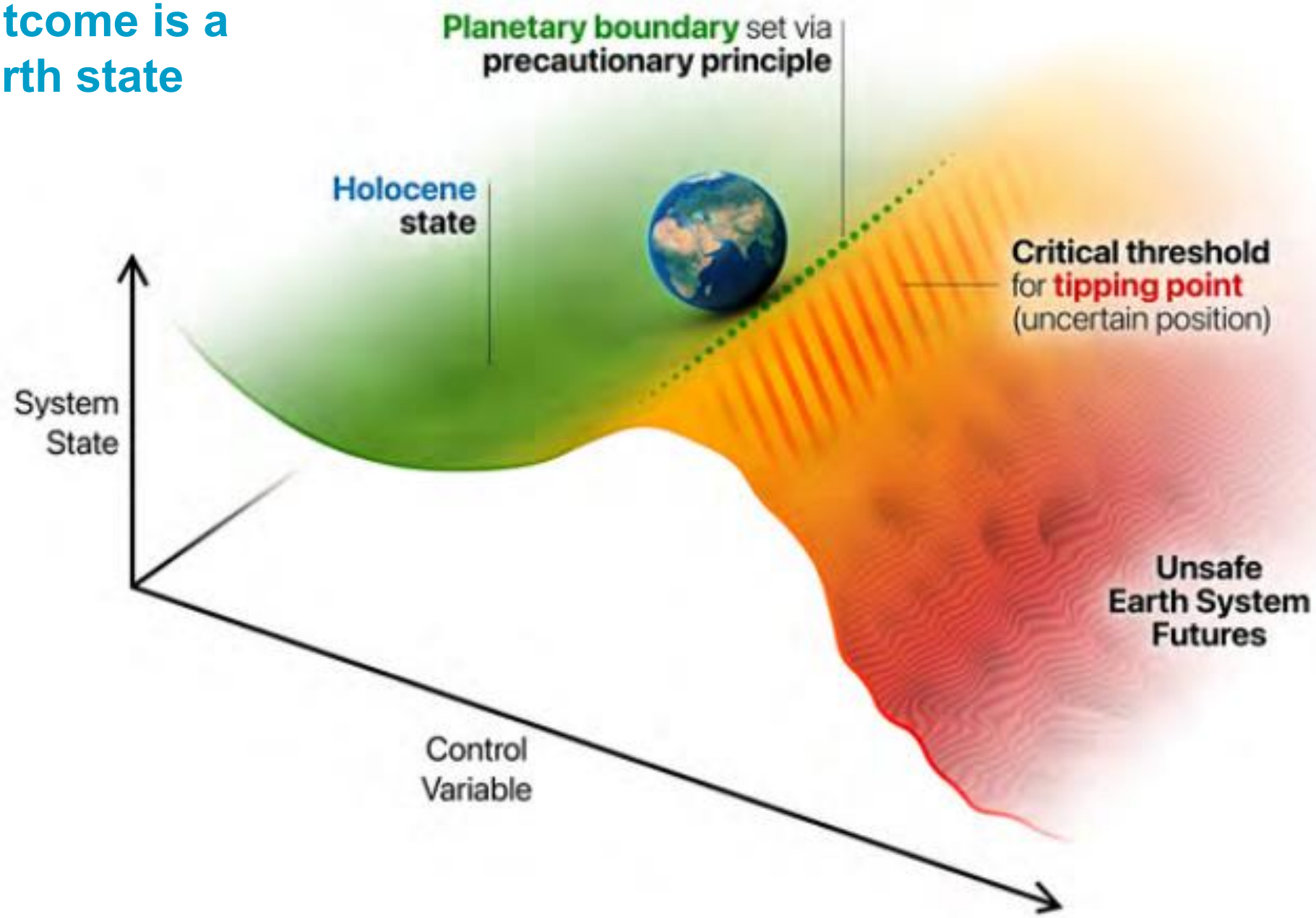
Lenton et al. (contribution to OECD report 2022)

Worst-case outcome is a hothouse earth state



Unmitigated climate change is a risk to planetary solvency:

> *Managing human activity,*
>
> *to minimise the risk of societal disruption,*
>
> *from the loss of critical support services from nature.*

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Planetary Solvency Recovery plan

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Planetary solvency recovery plan

- We have agency and options to intervene structurally
- Focus on reducing Earth's Energy Imbalance
- Timeshift to now – to complement future action
- Focus on materiality, avoid distractions
- Bold, radical action
- Informed by realistic risk assessment

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Questions?

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A Decade From Paris: Challenges in Reaching a Sustainable Economy

10:30 – 11:15

Lauren Juliff, Storebrand Asset Management
Neha Dutt, Department for Environment, Food and Rural Affairs
Charlie Dixon, Green Finance Institute

17 October 2025

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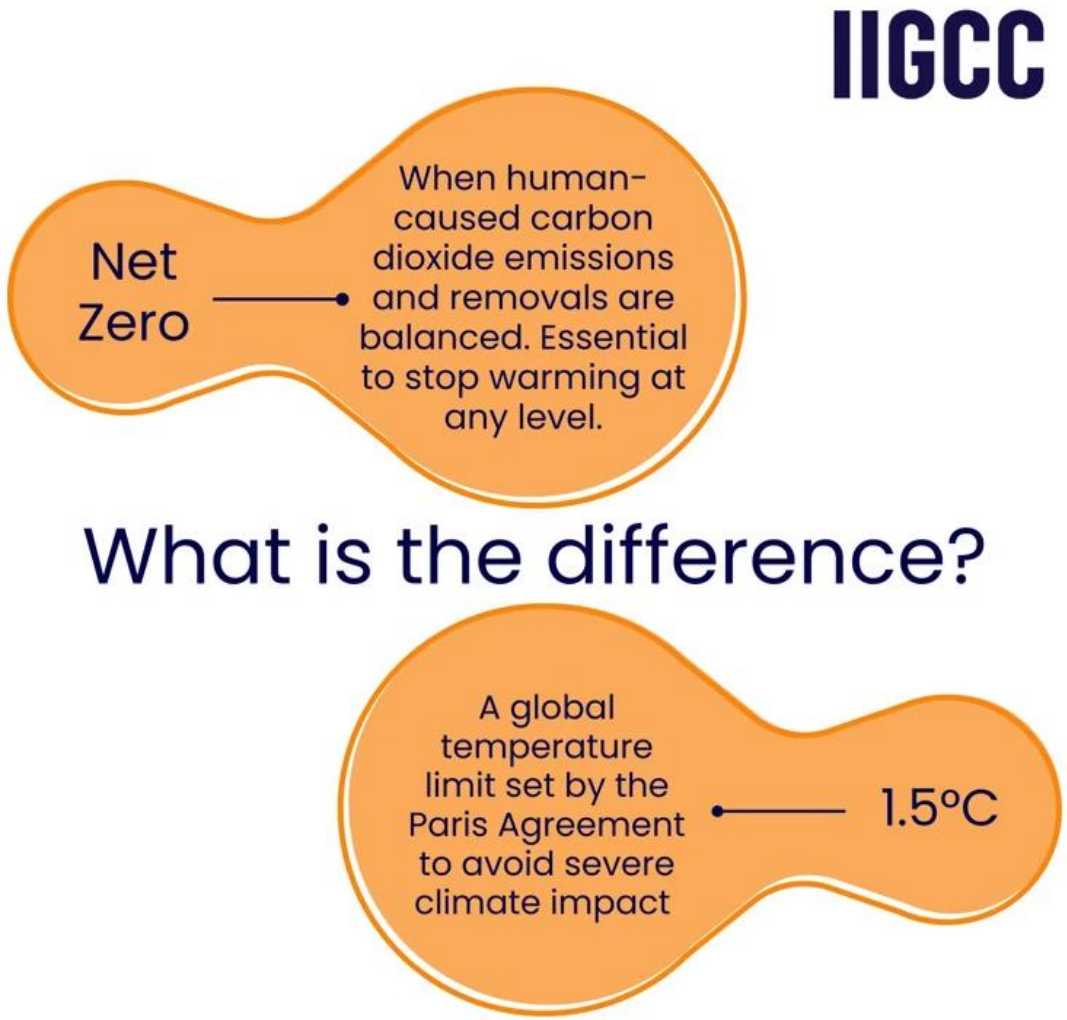
A decade from Paris: challenges in reaching a sustainable economy

Lauren Juliff
Climate and Sustainability Product Lead, Head of UK Institutional at Storebrand Asset Management

17 October 2025

What is 'real world' Paris alignment?



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Source: IIGCC - What net zero means and why it matters

What is an EU defined 'Paris aligned' portfolio?

Minimum Standards	EU CTB	EU PAB
Risk Oriented		
Minimum Scope 1 + 2 (+3)[1] carbon intensity reduction compared to investable universe	30%	50%
Scope 3 phase-in	Up to 4 years	Up to 4 years
Baseline Exclusions	Line 1: Yes Line 2: Controversial Weapons Line 3: Societal Norms Violaters[2]	Line 1: Yes Line 2: Controversial Weapons Line 3: Societal Norms Violaters
Activity Exclusion	No	Coal (1% + revenues) Oil (10% revenues) Natural Gas (50% revenues) Electricity producers with carbon intensity of lifecycle GHG emissions higher than 100g CO_2e/kWh (50%+ revenues)

Opportunity Oriented		
Year-on-year self-decarbonisation of the benchmark	At least 7% on average per annum: in lline with or beyond decarbonisation traiectory from the IPCC's 1.5°C scenario (with no or limited overshoot)	
Minimum green share/brown share ratio compared to investable universe (Voluntary)	At least equivalent	Significantly larger (factor 4)
Exposure Constraints	Minimum exposure to sectors highly exposed to climate change issues is at least equal to equity market benchmark value	
Corporate Target Setting	Weight increase shall be considered for companies which set evidence-based targets under strict conditions to avoid greenwashing (see Article 9 in section 5.12 re conditions)	
Disqualification from label if 2 consecutive years of misalignments with trajectory	Immediate	Immediate
Relevance Oriented		
Review Frequency	Minimum requirements shall be reviewed every three years to recognise market development as well as technological and methodological progress	

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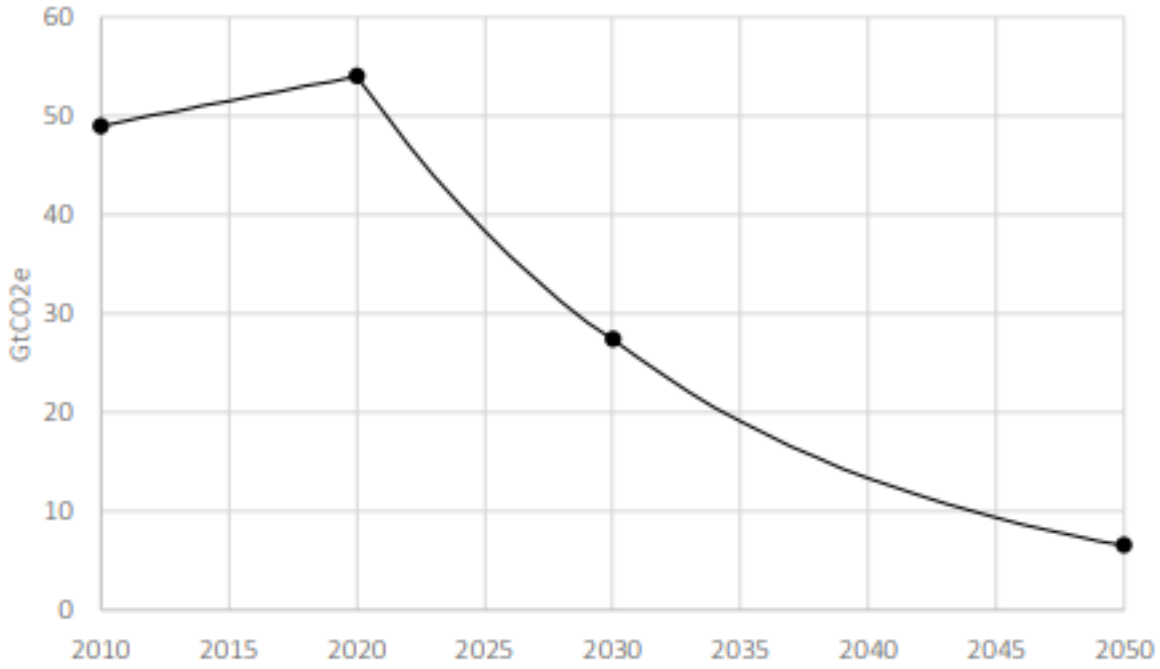
Source: State Street; EU
Delegated regulation - 2020/1818 - EN - EUR-Lex

Why 7% p.a. reductions in emissions?

Worldwide emissions trajectory, based on data from IPCC AR5 Climate Change 2014 Synthesis Report, IPCC SR15 report Chapter 2 and Global Carbon Budget, 2018



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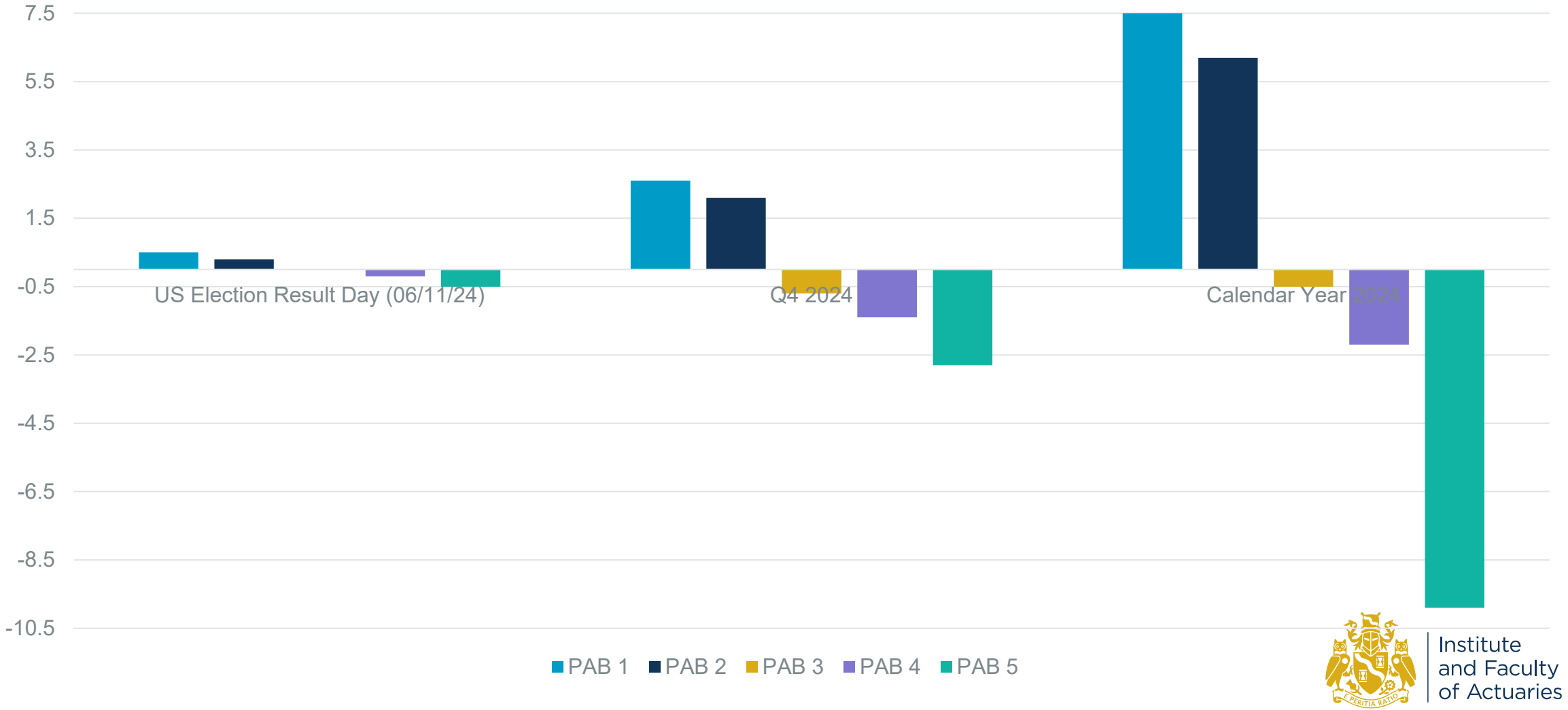
Source: TEG final report on EU climate benchmarks and benchmark ESG disclosures, 30 September 2019

PABs and Trump



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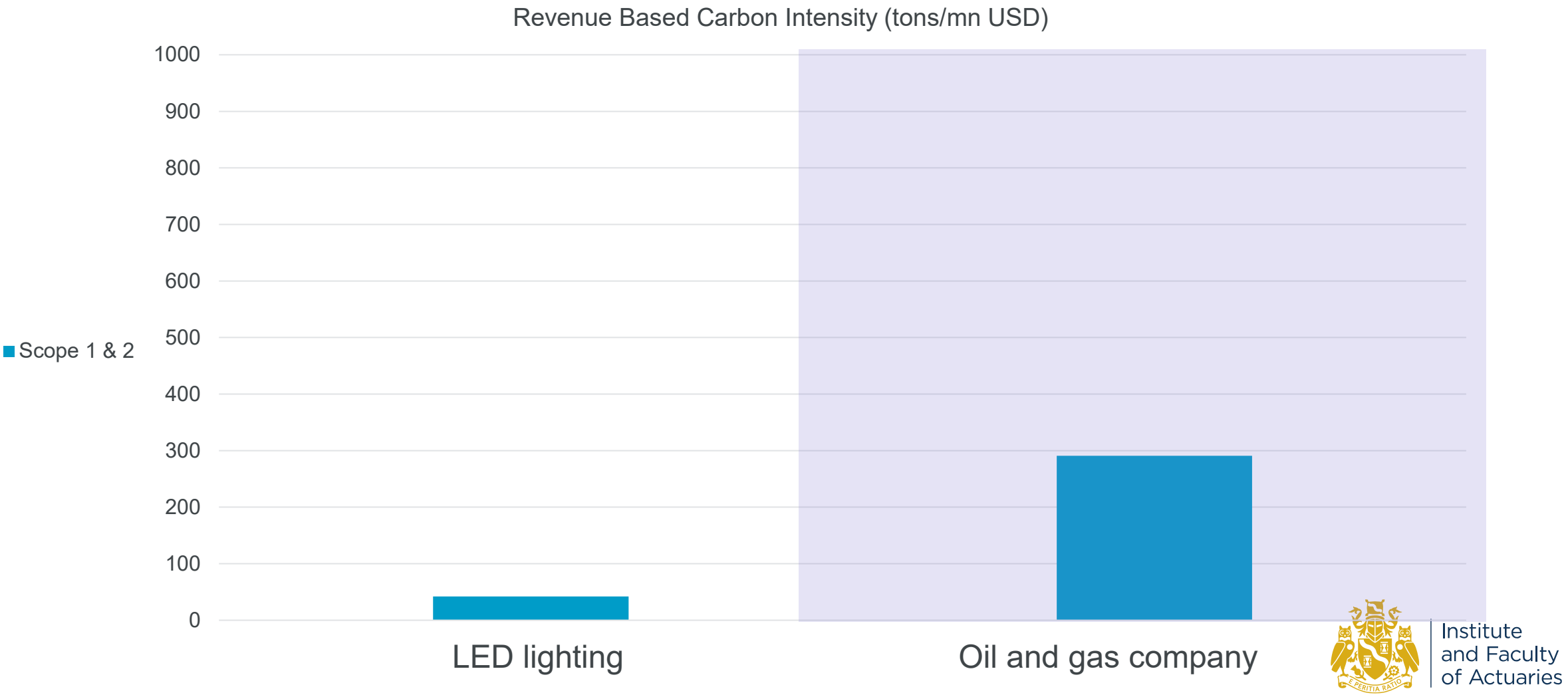
Source: Storebrand analysis using performance from Bloomberg for Paris Aligned Index trackers. For illustration only. As at 31/12/24. Taken from our whitepaper: The Future of Paris Aligned Investing

Is carbon intensity a good indicator of transition risk?



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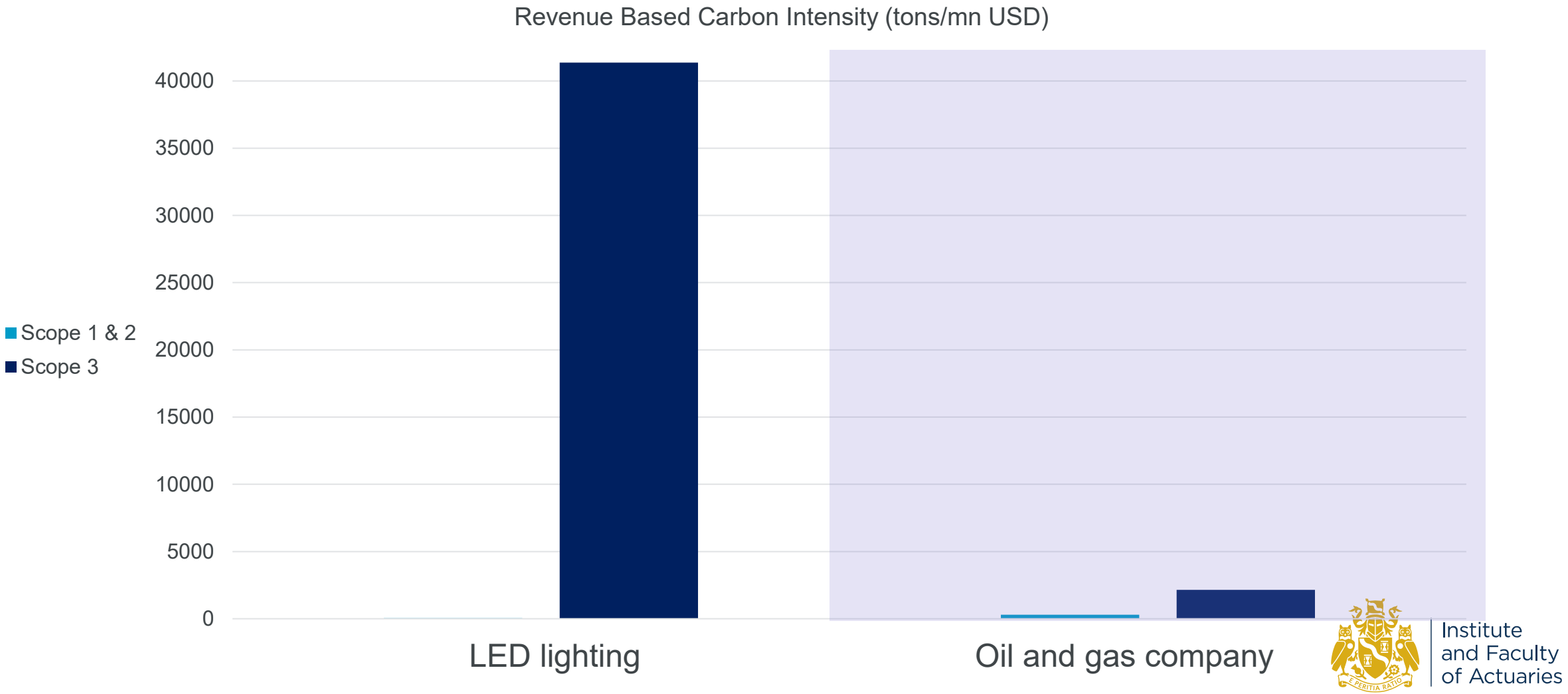
Source: Storebrand, Trucost. Company data for Financial Year 2023. Note: EVIC based Carbon Intensity metric required by EU for PAB/CTB regulations. We use revenue-based carbon intensity in portfolio construction and client reporting due to volatility and growth style bias associated with EVIC based metric. For illustration only. For further details see our whitepaper: The Paris Alignment Paradox: Scoping Out Solutions - www.storebrand.com

What gets (mis)measured gets (mis)managed



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Source: Storebrand, Trucost. Company data for Financial Year 2023. Note: EVIC based Carbon Intensity metric required by EU for PAB/CTB regulations. We use revenue-based carbon intensity in portfolio construction and client reporting due to volatility and growth style bias associated with EVIC based metric. For illustration only. For further details see our whitepaper: The Paris Alignment Paradox: Scoping Out Solutions - www.storebrand.com

Important Investor Information

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This document has been prepared for investors in those countries, where the fund is registered with the respective Financial Services Authority.

Historical returns are no guarantee for future returns. Future returns will depend, inter alia, on market developments, the fund manager's skills, the fund's risk profile and subscription and management fees. The return may become negative as a result of negative price developments. Statements reflect the portfolio managers' viewpoint at a given time, and this viewpoint may be changed without notice.

Future fund performance is subject to taxation which depends on the personal situation of each investor, and which may change in the future. The tax treatment of the gains and losses made by the investor and distributions received by the investor depend on the individual circumstances of each investor and may imply the payment of additional taxes. Before any investment is made in the Fund, investors are urged to consult with their tax advisor for a complete understanding of the tax regime, which is applicable to their individual case.

The fund's NAV is calculated in foreign currency and returns may vary as a result of currency fluctuations.

Subscriptions are carried out in fund units and not directly in shares or other securities.

Please note that we are currently developing our webpages and not all translations are in place yet.

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Distribution Country: United Kingdom

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AMX UCITS CCF has appointed Storebrand Asset Management AS as investment manager. Storebrand Asset Management AS is a management company authorised by the Norwegian supervisory authority, Finanstilsynet, for the management of UCITS under the Norwegian Act on Securities Funds. Storebrand Asset Management AS is part of the Storebrand Group. Storebrand Asset Management AS has appointed Storebrand Asset Management UK Ltd ('SAM UK Ltd') as Facility Agent in the UK. The SAM UK Ltd London Office is located at 15 Stratton Street, London, W1J 8LQ.

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The decision to invest in the Fund should take into account all the characteristics or objectives of the Fund as described in its prospectus.

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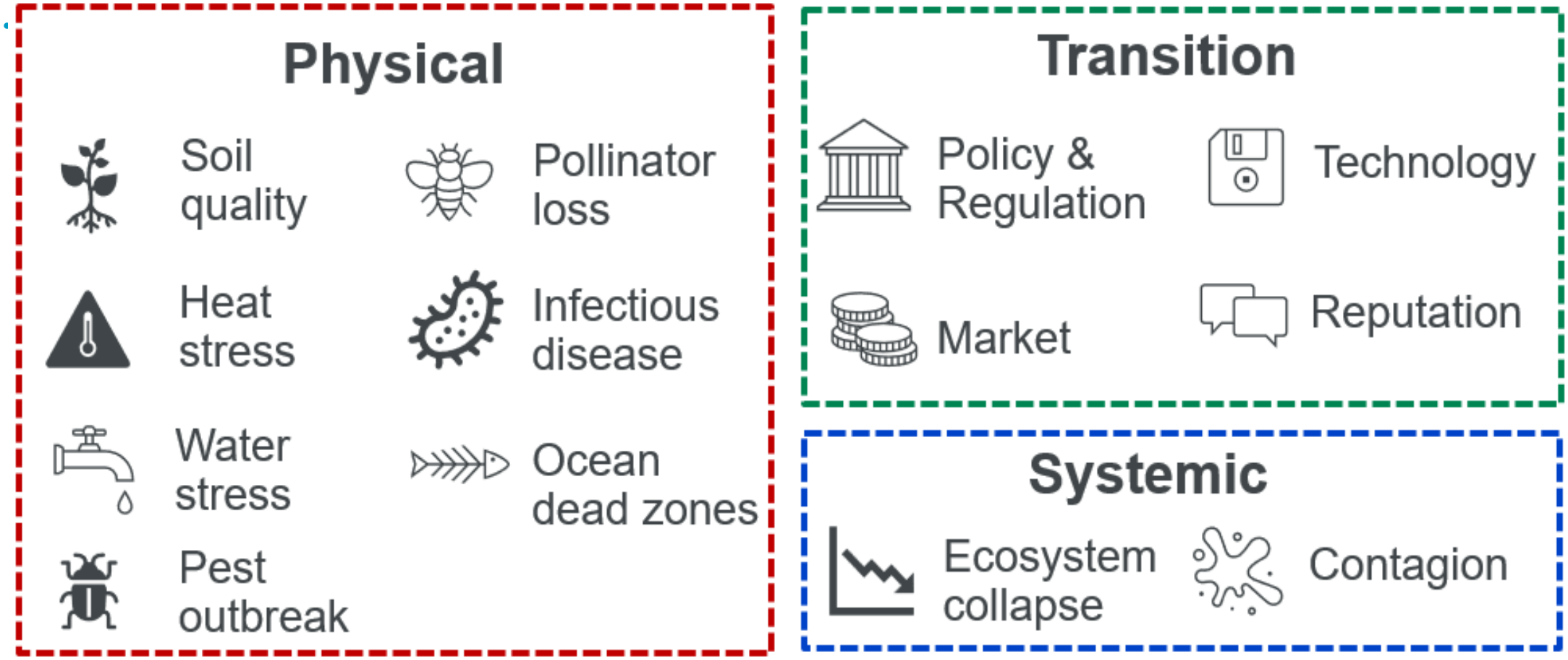
Department for Environment Food & Rural Affairs

A decade from Paris: challenges in reaching a sustainable economy

Neha Dutt
UK Government Taskforce on Nature-related Financial Disclosures (TNFD) Lead, Defra.

17 October 2025

Risks: What are Nature Risks?



Source: IPBES, TNFD

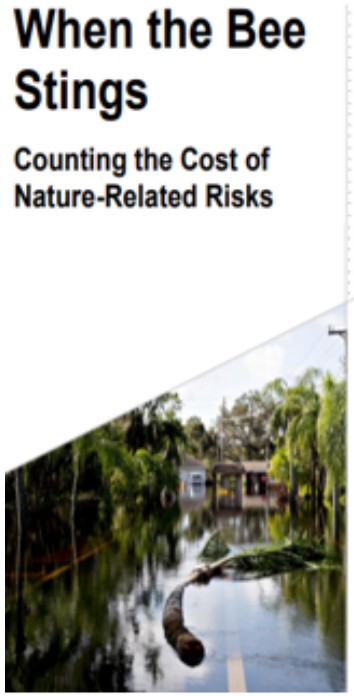
Drivers of Nature Loss & Insurance Relevance

Driver of Nature Loss	Relevance to Insurance
 Land and ocean use change	Higher Flood & Drought Risk, **Higher Claims/Payouts, Increased Protection Gap**
 Resource exploitation	Supply Chain Risk, **Higher Claims/Payouts, Increased Protection Gap**
 Climate change	**Premium volatility, reinsurance complexity**
 Pollution	**Premium inflation** in affected regions/**withdrawal of coverage** in high-risk areas
 Invasive alien species	Supply Chain Risk, Premium inflation/volatility, **Higher Claims/Payouts, Increased Protection Gap**

Source: IPBES

Nature Risk to Financial Loss

10 CASE STUDIES



- SPECIALITY CHEMICALS
- GRAIN & OILSEED MILLING
- OIL & GAS
- CONTAINER SHIPPING
- BASIC & DIVERSIFIED CHEMICALS
- METALS AND MINING
- PACKAGED FOOD – MEAT PRODUCTS
- ELECTRIC TRANSMISSION & DISTRIBUTION
- PACKAGED FOOD
- AUTOMOTIVE

ALL SECTORS ARE EXPOSED TO NATURE RISK.

NATURE RISKS AMOUNTED TO USD 83.2 BN IN FINANCIAL IMPACT.

NATURE DEPENDENCIES
⇨ PHYSICAL NATURE RISKS
⇨ FINANCIAL LOSS.

Source: Bloomberg New Energy Finance 2023

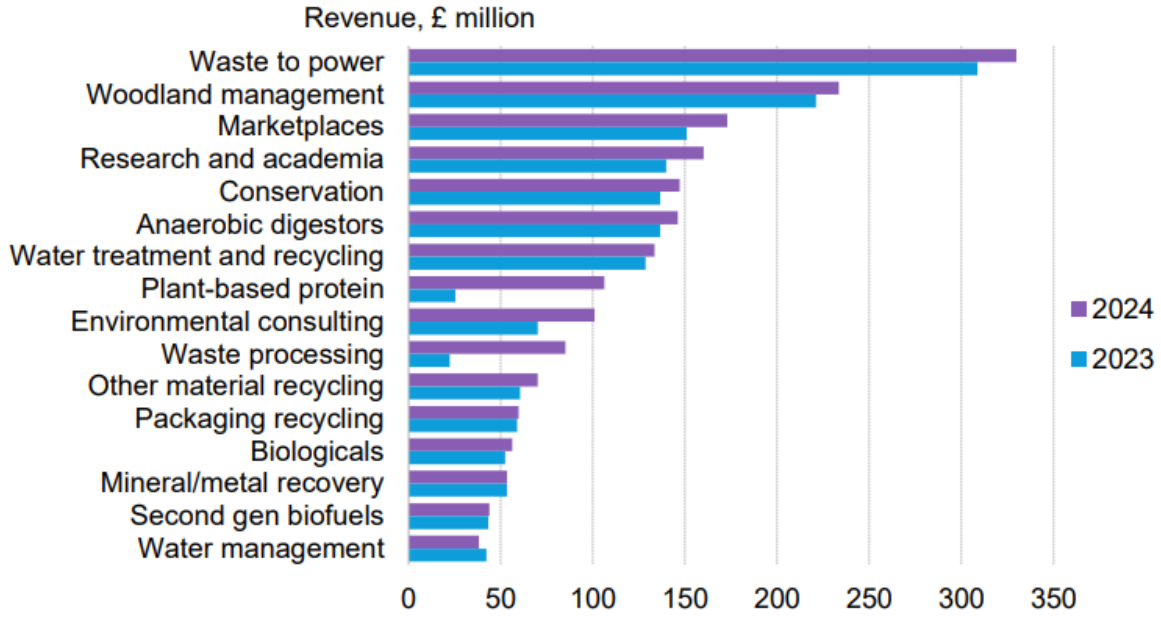
Nature-related Opportunities: Ag/Nature Tech

BloombergNEF

June 24, 2025

The Growing Role of Nature-Related Business in the UK Economy

A transformation opportunity



Source: BloombergNEF, Companies House, company responses, Pitchbook.

900 UK Domiciled Companies

£2.2 billion

Estimated collective revenue of nature-related business activities in the UK in 2024

21,445

Estimated employment in UK nature-related businesses

£2.8 billion

Total funding raised by companies included in the analysis

25% y/y Revenue Growth

Source: Bloomberg New Energy Finance 2023

Gov & Fin Regulator Role: Aligned Signalling

1. **UK Gov: Nature Risk Signalling: Supporting TNFD integration:**

- Move industry from risk management/disclosure to action and investment – funding GFI – TNFD UK CG;
- TNFD LEAP Integration: Defra Group; core Defra supply chains

2. **Financial Regulator Signalling:**

- tPR communication on nature risk integration in fiduciary duty;
- FCA urging ISSB to rollout a nature standard and incorporate TNFD.

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Gov Role: Growth Enabling Policies & Funding

- **Setting the conditions for the private sector to invest in nature by:**
- **Developing the policy, standards and governance framework** to ensure the integrity of Voluntary Carbon and Nature Markets
- **Creating revenue streams:** obligating developers to pay for nature's services (BNG/NN)
- **Investment readiness and capacity building:** NEIRF; LINC; funding the GFI and EKN to provide capability-building support
- **Investment:** Landscape Recovery Fund, Big Nature Impact Fund (BNIF), Farming Innovation Programme (£200m venture growth funding for Ag Tech SMEs)

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Question for Audience

- **How well-positioned is your organisation to harness these expanding corporate opportunities arising from nature as risk mitigation?**

- **Provide feedback/ask questions:**
- **Through GFI Led TNFD UK CG Insurance Sector TNFD UK NCG (TNFDNCG@gfi.green)**
- **Email: neha.dutt@defra.gov.uk**

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A decade from Paris: challenges in reaching a sustainable economy

Charlie Dixon
Associate Director, Green Finance Institute
UK Market Engagement Lead, TNFD

17 October 2025

Businesses globally are viewing nature on par with climate

500+
1st and 2nd generation reports have now been published aligned to the TNFD recommendations

620
organisations have publicly committed to get started with reporting aligned to the TNFD from 64 of 77 SICS industries

$20tr AUM
represented by financial institutions that have committed to getting started with TNFD-aligned reporting

78%
Of TNFD survey respondents who have published nature-related disclosures integrate them with climate-related reporting

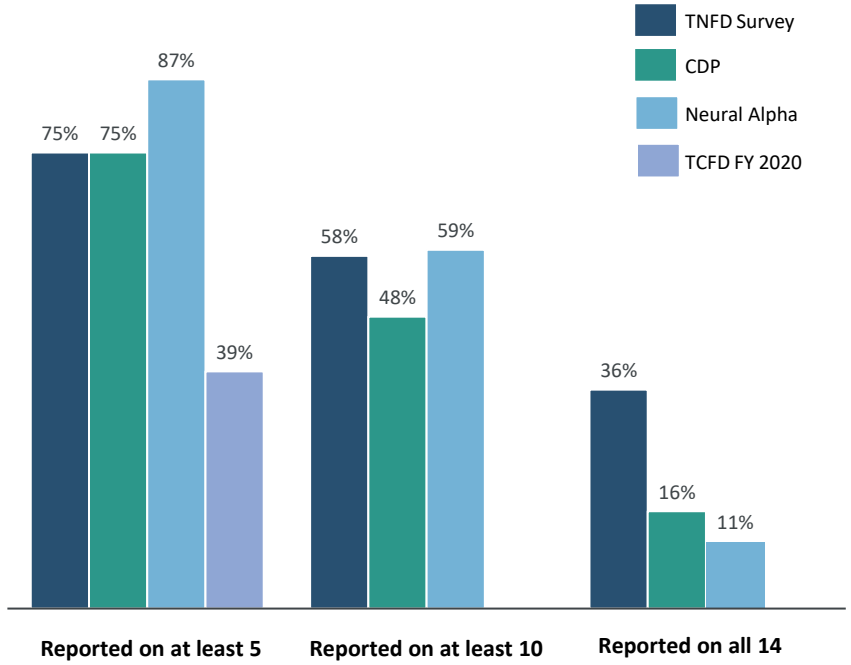
63%
Of TNFD survey respondents believe their nature-related risks and opportunities are more significant or as significant to their future financial prospects compared to their climate-related risks and opportunities.

8.7
The average number of TNFD recommended disclosures reported (out of 14)

77%
Of Asset Managers and Asset Owners surveyed by Responsible Investor Magazine want a dedicated nature standard based on TNFD

41%
of companies have 1-2 full-time employees working on nature-related reporting over the last 12 months

Among companies reporting at least one TNFD recommended disclosure



388K downloads
of TNFD recommendations and guidance

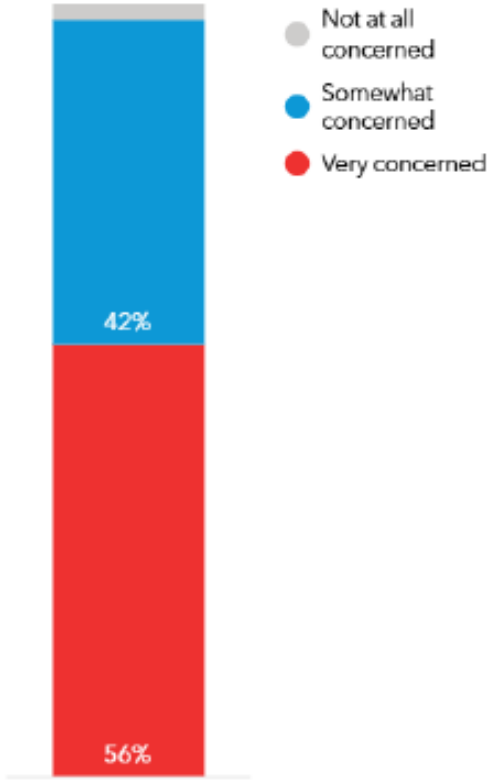
690K unique users
to the TNFD website since recommendations launched

Institute and Faculty of Actuaries

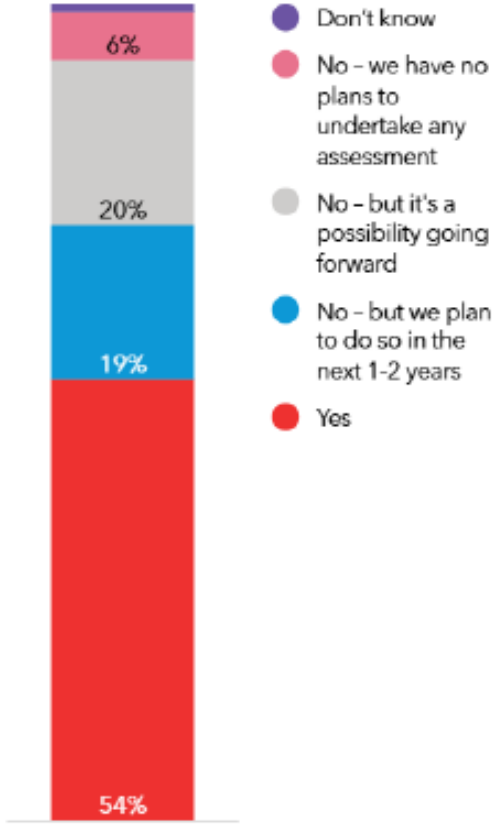
Source: TNFD 2025 Status Report

Most institutional investors are now managing their nature-related risks

How concerned are you about the impact of nature loss on financial markets?



Has your organisation undertaken an assessment of the nature-related risks, impacts and dependencies of investment portfolios?



Is your organisation engaging with corporates on nature-related risks, impacts and dependences?

Source: Responsible Investor Nature and Investors Survey

Access to data continues to improve enabling more sophisticated risk assessment

Recommendations to upgrade the nature data value chain

At COP30 in late 2025, the Taskforce will release a set of recommendations for systemically upgrading the nature data value chain in a way that provides market participants with streamlined access to a baseload of high-quality state of nature data while also creating much needed additional sources of funding for the upstream public institutions leading global efforts to collect this data.

The findings are based on extensive global consultations with nature data experts and end users, and the creation of a sandbox environment that tested over 100 nature data layers from more than 40 data providers. A set of integrated nature data principles underpin the proposal for a Nature Data Public Facility (NDPF).

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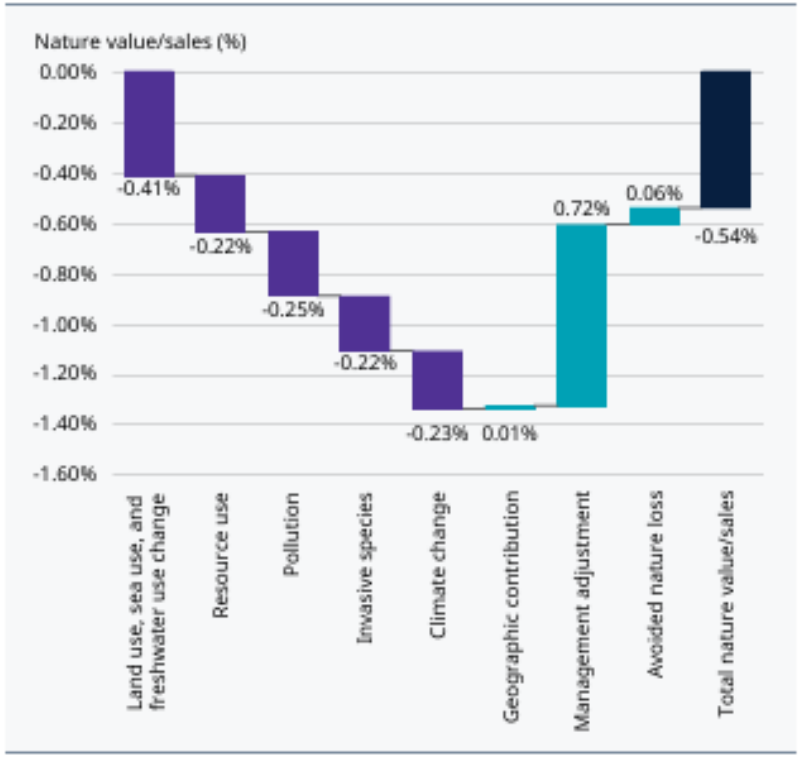
Source: TNFD 2025 Status Report

FIs are exploring different quantitative approaches

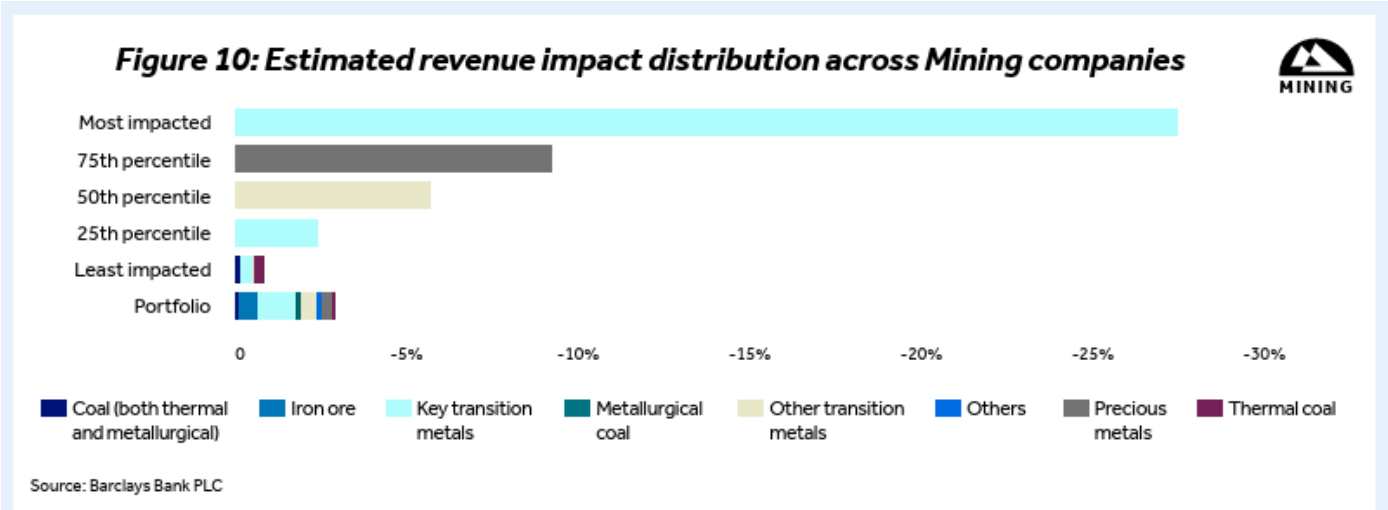
Schroders

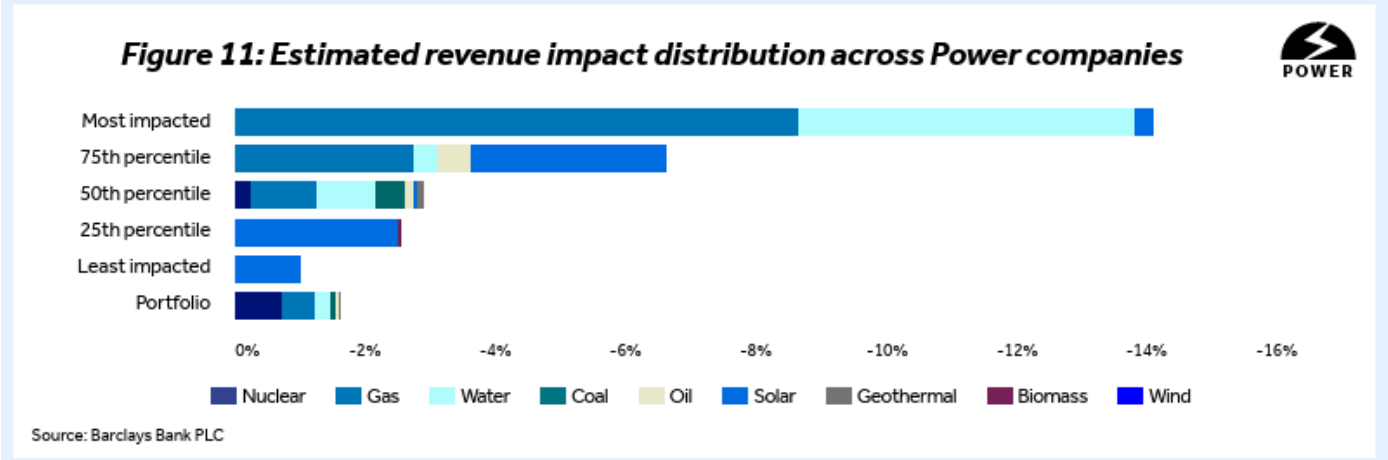
Figure 7: High level NatCapEx assessment of public asset holdings



Source: Schroders. Data is as of 31 December 2024 and covers publicly listed companies.

BARCLAYS



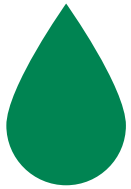


Source: Schroders Nature Report 2024, Barclays Navigating Nature Risk 2025

UK corporates are investing in nature to mitigate nature risks and build resilience

GFI and WWF-UK published an evidence paper with over 40 empirical examples of where corporates have invested in nature to mitigate climate and nature risks.

Impacts
Dependencies



Water quantity

Water quality

Flood and storm protection

Soil quality

Resource efficiency

- **Diageo** water efficiency schemes
- **United Utilities** developer incentive schemes
- **Southern Water** wetland water treatment
- **BMW-Mini** onsite measures to reduce harmful effluents
- **Sainsbury's** and **AWS** landowner payments for water storage
- **Severn Trent** Sustainable Urban Drainage systems
- **First Milk** pay farmer premiums for regenerative practices
- **Nestlé** paying into co-investment models
- **Descycle** extracts metals from e-waste

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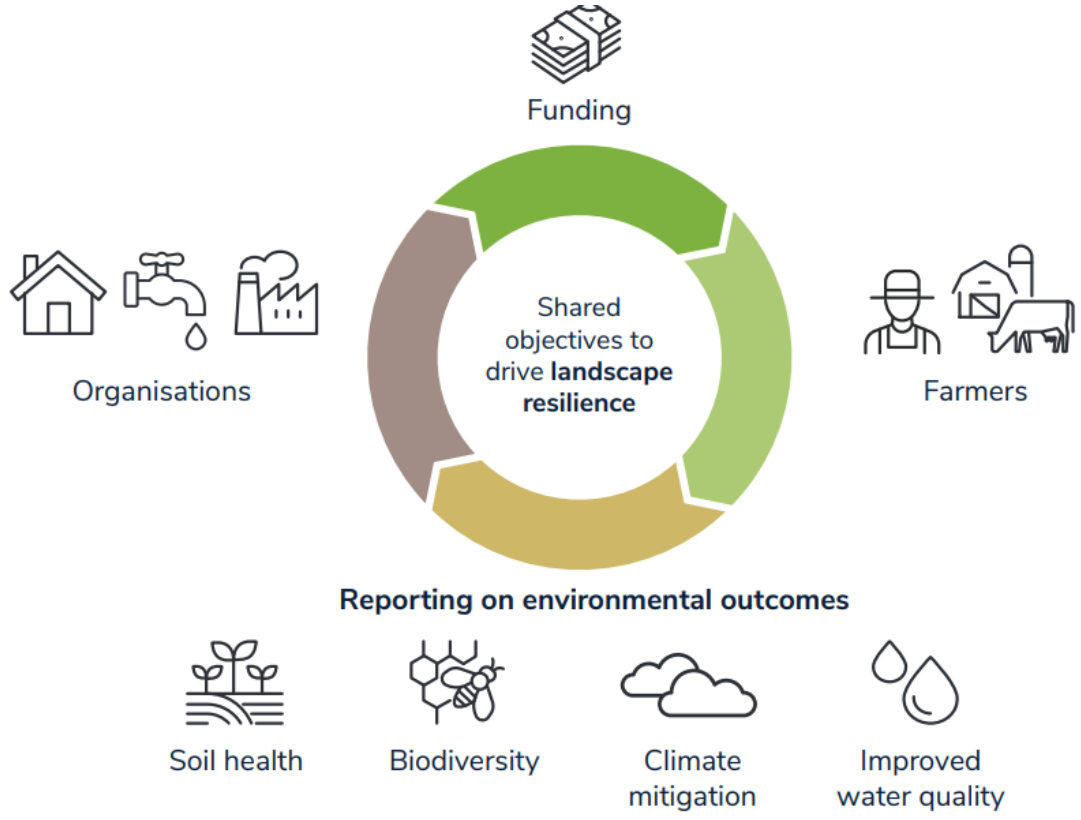
Source: GFI, WWF-UK, Business Investment in Nature (2025)

For nature-based solutions, corporates are working together to co-invest and strengthen the business case



Landscape Enterprise Networks (LENs) is one of many examples:

- Businesses pay for resilience outcomes delivered by landowners in the same landscapes
- Purchases from major global businesses e.g. Nestle, Diageo, PepsiCo, Cargill
- EUR 24 million transacted to date delivering NbS on >80k ha
- Operating in UK, Hungary, Poland and Italy

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Source: GFI Revenues for Nature Guidebook Series: Supply Chains

This represents a significant market opportunity for insurers

- Integrating nature risk assessment into:
  - Financial assessment of investee companies
  - Business insurance for exposed sectors (e.g. D&O Liability, Business Interruption)
- Evaluating efficacy of risk mitigation measures for:
  - Adjusted valuations for investors
  - Integration into product conditions / potential for premium reductions
- Development of specific insurance products for physical nature risks linked to resilience-building actions
  - E.g. Wildfire Resilience Insurance, WTW, TNC and Tahoe Donner (homeowners association) – reduced premiums and improved availability from ecological forest practices

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Q&A

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Break

11:15 – 11:35

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Impact Investing: Beyond Theory and Into Practice

11:35 – 12:20

Anita Bhatia, Apex Group
Amy Ingham, The Good Economy
Damien Lardoux, EQ Investors
Mark Bousfield, Aviva Capital Partners

17 October 2025

Scene-setting

1. **WHAT is impact investing?**
2. **HOW MUCH is happening?**
3. **WHERE is impact capital allocated?**
4. **HOW is the sector evolving?**

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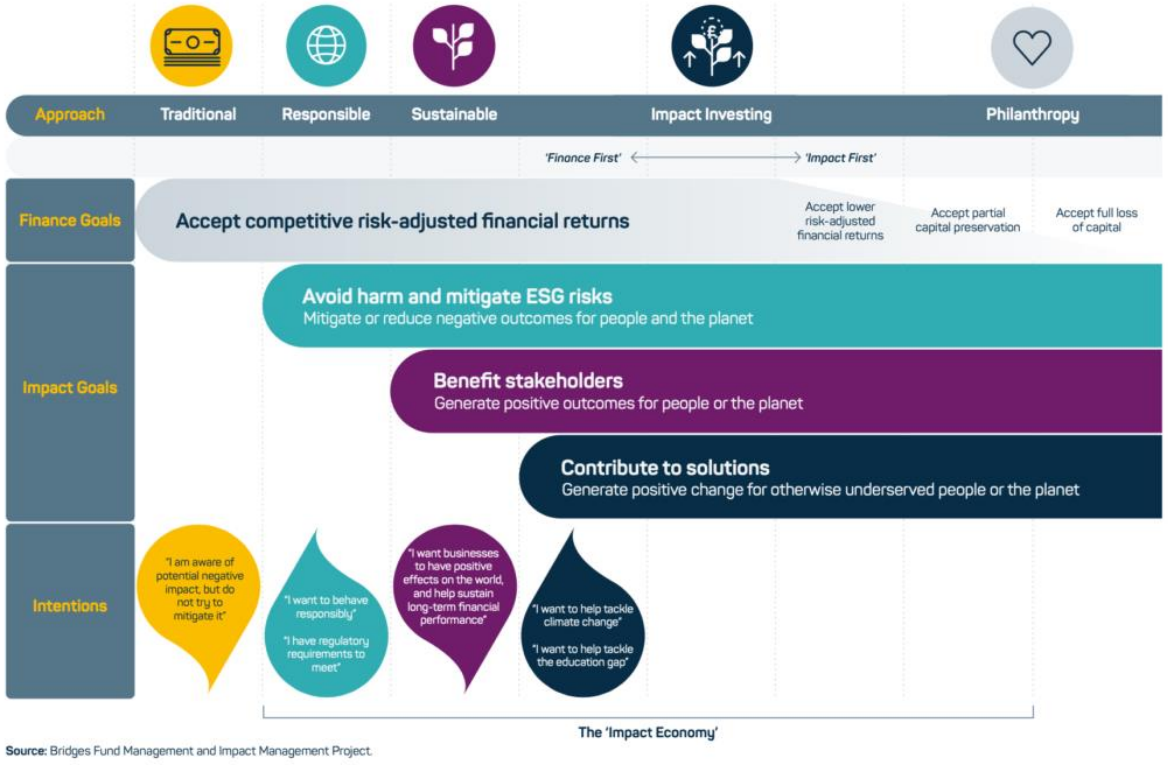
WHAT is Impact Investing?

Definition: “Impact investments are investments made with the intention to generate positive, measurable social and environmental impact alongside a financial return.” [GIIN]

The Spectrum of Capital:



Criteria:

- ✓ Intentionality
- ✓ Impact Measurement & Management
- ✓ Additionality and/ or contribution
- ✓ Materiality or significance

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HOW MUCH is happening?

Globally:

c.3,907 organisations currently manage

$1.571trn in impact investing AUM

[GIIN – Sizing the Impact Investing Market 2024]

In the UK:

8% global impact investing market

£76.8bn AUM (end 2023) (just under **1% investment market**)

[Impact Investing Institute – The UK Impact Investing Market: Size, scope, potential, 2024]

Figure: UK Growth Rate Compound Annual Growth Rate 2021-3 >10%

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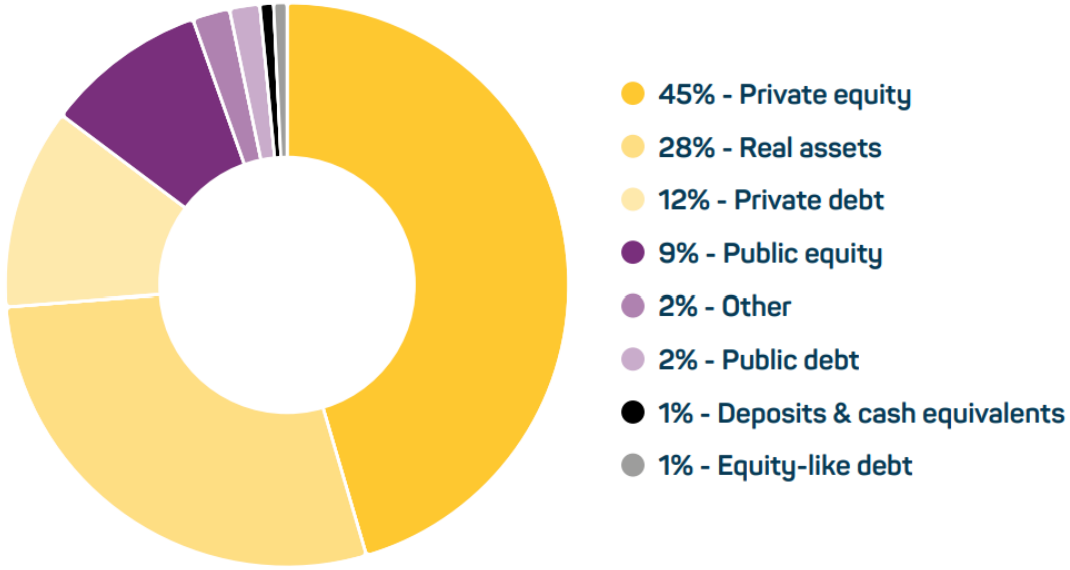
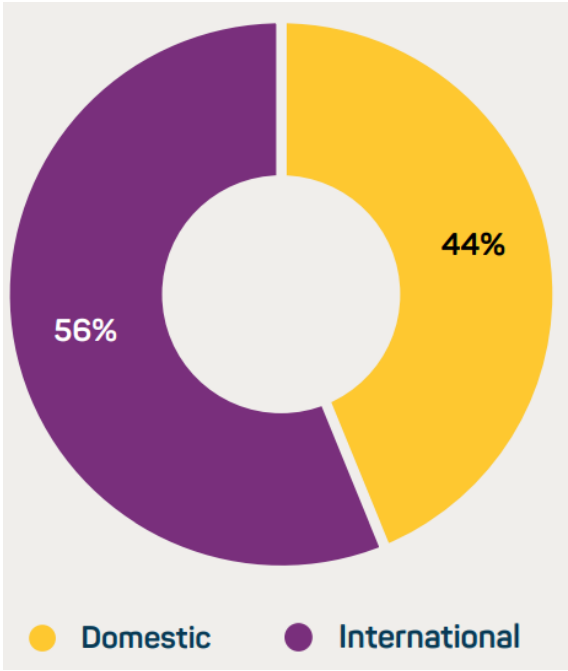
WHERE is impact capital allocated (% portfolios)

Asset Classes



Geographies

(excl. Development Finance Institutions)



[Impact Investing Institute – The UK Impact Investing Market: Size, scope, potential, 2024]

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HOW is the sector evolving?

1. **Climate finance** remains the biggest driver **BUT**
2. **New themes are emerging** (e.g. place-based impact investing, just transition, others)
3. **< New financial structures and instruments**, options across spectrum of capital
4. **< Public sector capital** using impact investing mechanisms to catalyse private capital
5. **< Pension fund investment** (e.g. LGPS)
6. **Increasing regulation** driving emphasis on **rigour** and **transparency**
   - Higher bar for impact strategies and reporting
   - Spotlight on data and AI
   - Focus on reporting negative impacts and impact risk
   - Need for robust impact management and governance structures
7. **Focus on outcomes** for **end-beneficiaries** (meaningful engagement, feedback loops)
8. **Pullback concern** (geographies de-prioritising ESG / impact agendas)

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Lunch

12:20 – 13:20

17 October 2025

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Sustainable Finance in the Mid-Transition

13:20 – 14:05

William Hynes, World Bank
Etienne Espagne, World Bank
Carole Bernard
Robert Gilhooly, Aberdeen Investments

17 October 2025

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Steering Through Complexity: Stewardship in a Modern World

14:05 – 14:50

Dan Grandage, Aberdeen
Valeria Piani, Head of Stewardship at Phoenix Group
Georgia Stewart, CEO & Co-founder of Tumelo
Andrea Tweedie, Head of Stewardship, FRC

17 October 2025

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Break

14:50 – 15:00

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Turning Insight Into Action

15:00 – 15:45

Dr Christine Chow PhD, Tracker Group
Ethan McCormac, Planetrics

17 October 2025

Carbon Tracker Initiative

Planet Tracker

Part of Tracker Group

Dr Christine Chow

CEO Tracker Group

Research Themes

Energy Transition

- Oil Gas & Mining
- Industrial Emitters
- Power & Utilities
- Transition Plans

Land & Sea Use Change

- Food System
- Deforestation
- Aquaculture

Natural Resource Extraction

- Overfishing
- Deep Sea Mining
- Water Stress

Pollution

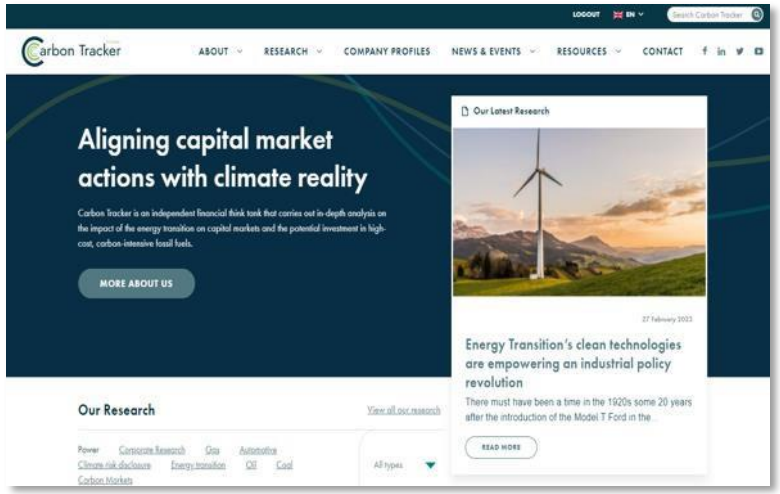
- Soil Degradation
- Plastics
- Textiles
- Petchem

Cross- Cutting

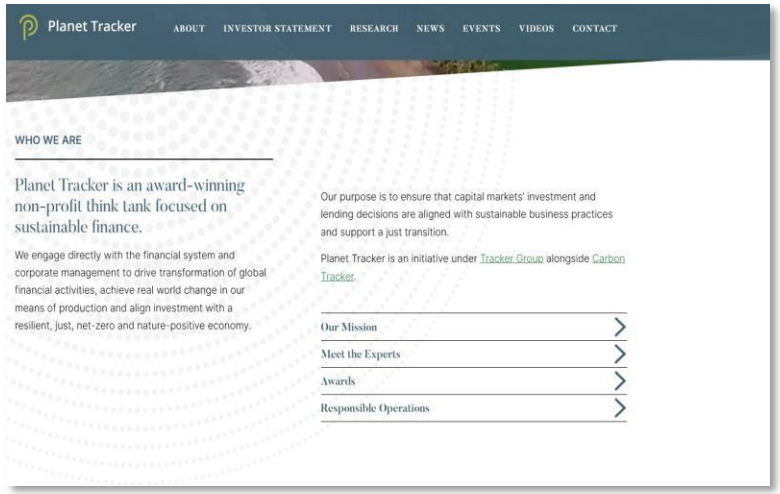
- Financial Risk & Reward
- Shareholder Engagement
- Transparency & Traceability
- Climate and Nature
- Accounting, audit & disclosure
- Regulation & Policy

Find our Research

www.carbontracker.org



www.planet-tracker.org



3rd Party Platforms

Bloomberg

FACTSET

S&P Global

REFINITIV

CLIMATE ENGAGEMENT CANADA

Climate Action 100+

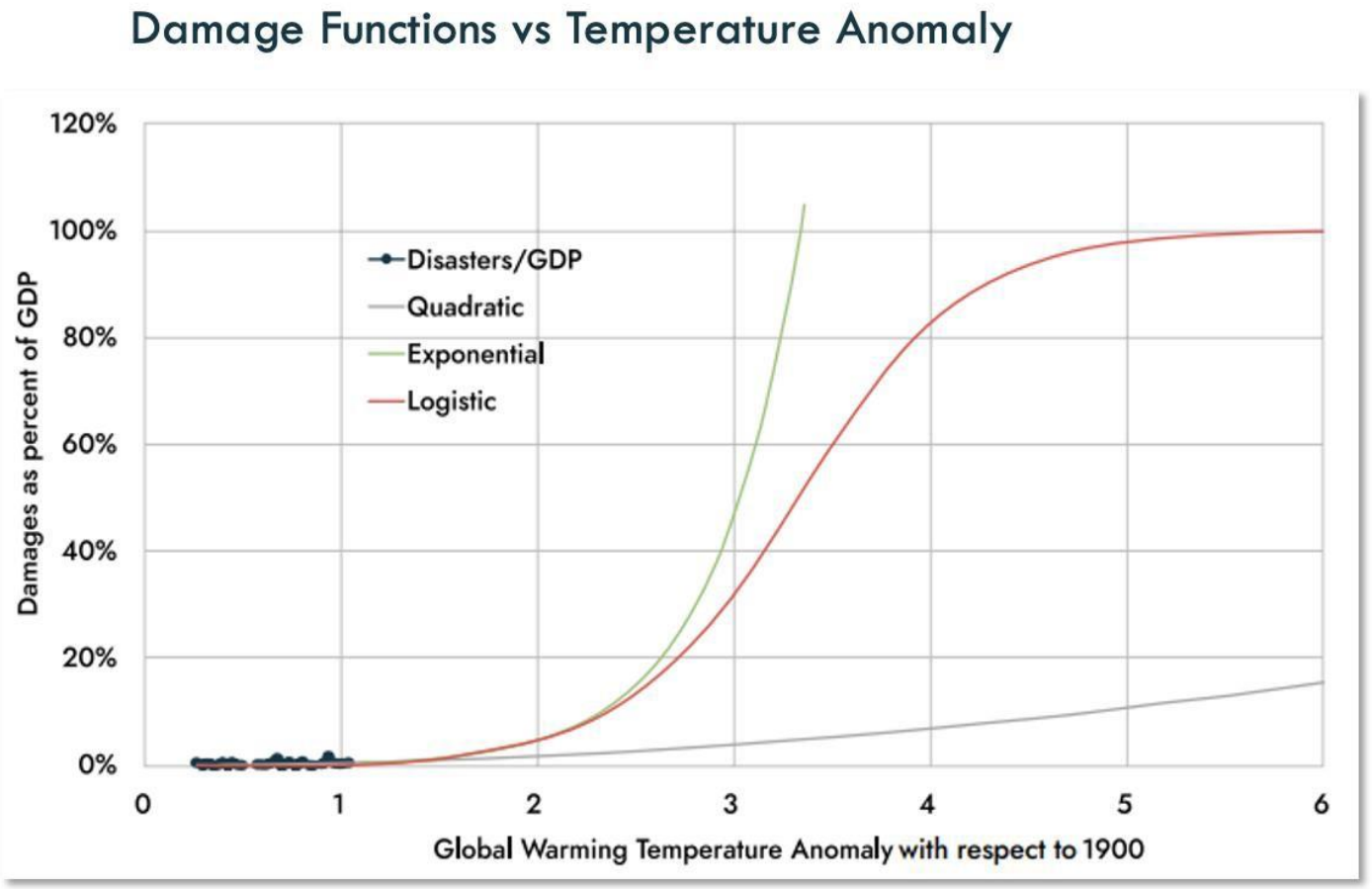
AlphaSense

smartkarma

climate arc TransitionArc

Key Takeaways

A New Science-Informed Damage Function for IAMs



Source: Loading the Dice against Pensions – Keen & Carbon Tracker

- Uni of Exeter with input from Carbon Tracker are currently polling ~1000 climate & social scientists future expectations of climate change. IAMs may be better served by use of a logistic function within climate risk models
- Current IAMs econometric models used widely in financial services use a quadratic (~linear) function to represent climate damages, informed by historical data recorded in a stable climate era

Oil & Gas Asset Retirement Obligation (ARO) Costs

Table 1. State orphan well liability risk — unplugged wells

State	# of Wells (000's)	Cost @ $30k/well ($B)	CTI Estimate ($B)
Texas	783	23	117
Oklahoma	288	9	31
Pennsylvania	174	5	15
Ohio	170	5	13
New Mexico	73	2	10
Louisiana	71	2	10
Wyoming	64	2	10
North Dakota	29	1	8
West Virginia	102	3	8
California	108	3	7
Colorado	60	2	7
Utah	27	1	5
Alaska	5	0	1
All Other	637	19	39
Total	**2,592**	**78**	**280**

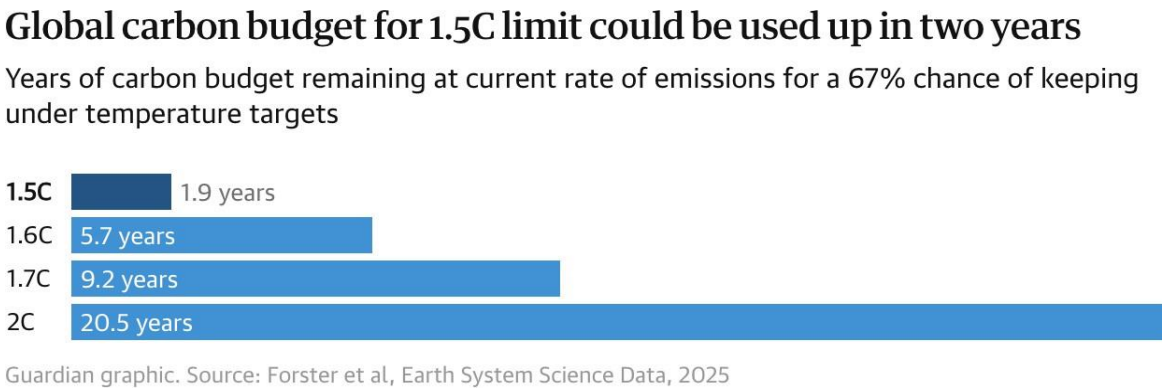
- No one knows the actual number of uncapped oil wells in the U.S
- Industry bond coverage a fraction of actual well capping costs (1%)
- O&G industry transfer liabilities to smaller firms as they exit, without financial resources to plug, leaving the bill to states/ taxpayers
- California recently passed legislation to tackle well liability transfer

Table 3. Bonding Coverage - Selected States

State	CTI Estimate ($B)	State Bonds ($B)	Federal Bonds ($B)	Total Bonds ($B)	Orphan Well Liability Risk ($B)	Bond Coverage Ratio
Colorado	7.09	0.16	0.02	0.18	6.92	2%
Montana	1.86	0.01	0.00	0.01	1.85	1%
New Mexico	10.31	0.10	0.07	0.17	10.14	2%
North Dakota	7.92	0.08	0.01	0.09	7.83	1%
Pennsylvania	14.58	0.05	0.00	0.05	14.53	0%
Utah	4.99	0.02	0.02	0.04	4.95	1%
West Virginia	7.66	0.03	0.00	0.03	7.63	0%
Wyoming	9.51	0.19	0.07	0.26	9.25	3%
TOTAL	**63.92**	**0.64**	**0.19**	**0.83**	**63.10**	**1%**

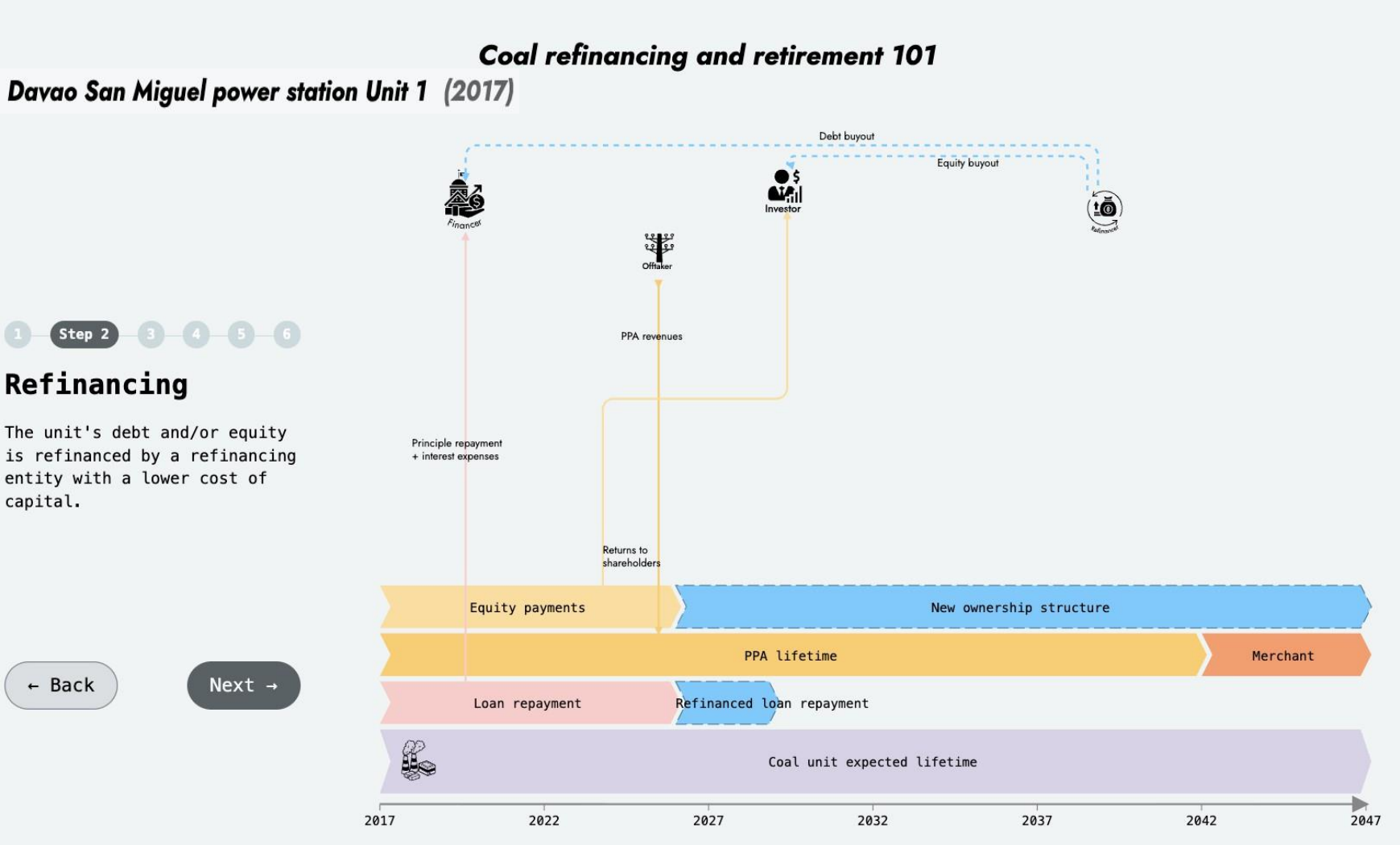
Atmospheric Viability Test (AVT) for Fossil Fuel IPOs

- **What? -** Proposed change to IPO listing rules. Firms wishing to develop new fossil fuel reserves required to disclose to investors how new production is consistent with remaining carbon budget.
- **Where? -** Fossil fuel reserve assessments are set by a handful of standard setters globally. Updating prospectus docs to include the AVT is best coordinated at EU to global level.



- **Why?** AVT assesses new fossil fuel reserves viability under various climate scenarios, inc carbon budgets associated with varied warming levels. Test would protect market integrity & investors, promote joined-up policy & avoid fossil IPOs continuing to list without reference to climate limits - then being automatically bought by UK linked tracker funds.
- **How?** FCA repatriating UK listings rules from EU & can introduce AVT stress test within additional requirements outlined in Primary Market Technical Notes.

CTI – PALEM COAL RETIREMENT MODEL



- CTI-Palem - a cost-optimised, coal unit level refinancing model for coal retirement in the Philippines
- Model can be replicated for use in other countries with large coal footprints to deploy transition finance for early coal shut down
- Carbon Tracker's power team presented to Philippines Govt officials. Exploring options to replicate the model as coal phase out work accelerates to meet 2040-2050 Paris targets

Thank you for listening and look forward to the discussion.

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McKinsey & Company

planetrics

Insight Into Action

IFoA Sustainable Investment Symposium 2025

9th October 2025

Climate is impacting the economy, bringing new risks and opportunities…

Tech, policy, and physical shifts are reshaping economies

Compared to 10 years ago:

4x *Global renewable capacity additions[1]*

3x *Frequency of US bn-dollar climate events[2]*

40% *Increase in climate policies globally[3]*

2x *Companies committed to climate targets each year[4]*

Investors are channelling capital to the transition

8.5x *Increase in global investment in the low-carbon energy transition,[5] reaching:* **$1.8tn**

80% *Of investors globally expected AUM in sustainable funds to increase through 2026[6]*

… but also new challenges as headwinds slow the pace of the transition

Investors face regional variations in climate transition

THE WALL STREET JOURNAL.
Clean Energy Is Under Attack Even Where It's Booming
Federal tax credits for wind and solar power are on the chopping block, and states are weighing tougher rules

Britain eyes 2026 start for tougher company climate disclosures — Reuters

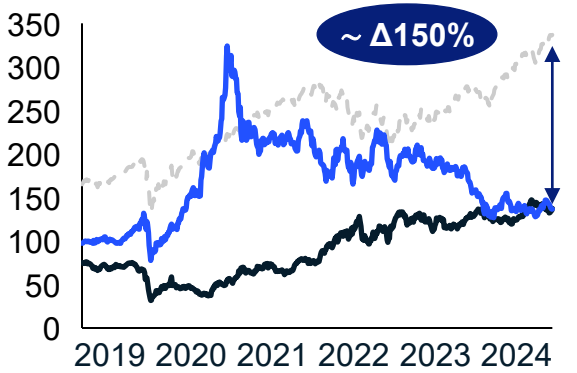
FINANCIAL TIMES
State Street loses £28bn of assets to Amundi and Invesco over ESG goals
US asset manager previously managed all of The People's Pension's £33bn in assets

the japan times
Japan adopts bill obliging firms' participation in emissions trading
Federal tax credits for wind and solar power are on the chopping block, and states are weighing tougher rules

euronews.
EU on track to meet 2030 emissions goal thanks to strong progress on renewables

Climate funds trail behind benchmarks

Total shareholder returns, %[8]



Unlocking climate opportunities and mitigating climate-driven risks to returns raises expectations for modelling financial impacts

Sources: 1. IRENA (2023), 2.NOAA (2025), 3. OECD (2023), 4. Science Based Target Initiative, 5. BNEF (2023), 6. Morgan Stanley (2024), 7. S&P 500 (2023), 8. McKinsey Value Intelligence
9. Reuters, 10. The Wall Street Journal, 11. The Japan Times, 12. euronews, 13. Financial Times

Leaders overcome challenges by showing the impact of their actions, identifying and managing risks and acting on emerging opportunities

	Impact	Risk	Opportunity
Challenges	**Investors struggle to show the impact of their actions** driven by challenges estimating their financing impact, which risks them achieving climate targets and their reputation • **Showing the impact** of their actions • **Inconsistent data,** regional variations • **Limited forecasting** capabilities • **Under-identified** decarb. opportunities	**Investors grapple with modelling real risks and investment insights,** impeding decision-making and engagement • **Sector average** missing firm level views • **Current firm position** without targets • **Less realistic** scenario pathways[1] • **Lack of probabilistic and priced-in** considerations	**Investors overlook emerging and undervalued opportunities,** by prioritizing known and priced-in ones • **Narrow focus** on conventional transition technologies, e.g., solar and wind • **Overlooked wider** opportunities, e.g., supply chain and services • **Investability challenges** for emerging solutions, e.g., adaptation
Leaders	**Demonstrate their impact, develop reliable measurement, project portfolio momentum and pull decarb. levers**	**Design scenarios incorporating own perspectives, assess firm-specific risks, and integrate the impact of firm targets**	**Identify sector-region relevant transition and adaptation opportunities, introduce new products, and attract AUM**
	Malaysian asset owner *The AO developed a net zero strategy, creating a financed emissions baseline and pathways for ~90% of AUM with a leading PCAF score*	**UK asset manager** *The AM developed ~20 probabilistic scenarios aligned with current pricing and in-house views, and translated scenarios into security-level insights*	**US asset manager** *The AM created a climate solutions fund focused on 7 themes, leveraging company level insights on CAPEX spend and EBITDA derived from emissions reduction*

1. Off-the-shelf scenarios lack real-world policy and technology variation across sectors and regions

Risk: Leaders identify high risk sectors, assess company risks and develop tailored scenario analysis to enhance decision making

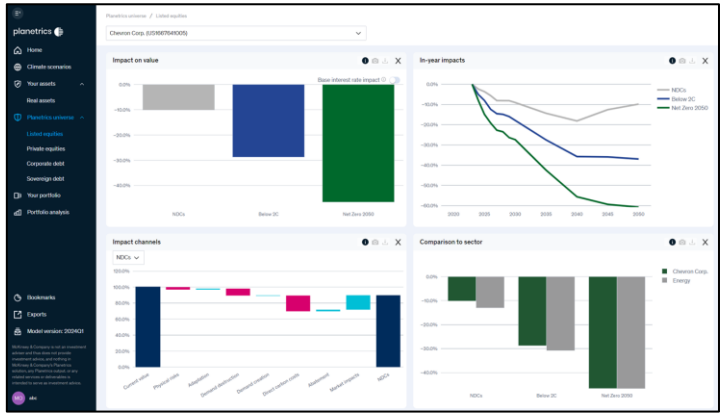
Increasing climate ambition

Granularity | Insights | Example uses cases

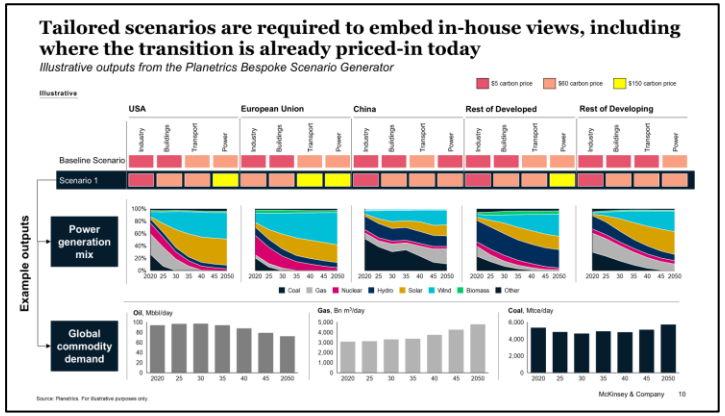
Sector risk assessment

Scenario	Divergent Net Zero	Net Zero 2050	Delayed transition	Below 2C	NDCs	Hot house world	1.5C Required Policy Scenario	Forecast Policy Scenario	Portfolio weight
Energy	-53%	-46%	-30%	-30%	-13%	-1%	-59%	-49%	5%
Non-Energy Materials	-12%	-16%	-14%	-8%	-6%	-1%	13%	9%	5%
Consumer Services	-5%	-5%	-5%	-4%	-4%	-3%	-4%	-4%	3%
Business Services	-5%	-4%	-5%	-2%	-2%	-1%	-1%	-1%	2%
Industrials	-3%	-3%	-3%	-2%	-1%	-1%	13%	13%	9%
Consumer Non-Cyclicals	-2%	-2%	-2%	-1%	-1%	-1%	-1%	-1%	11%
Finance	-1%	-1%	-1%	-1%	-1%	-1%	-1%	-1%	17%
Telecommunications	-1%	-1%	-1%	-1%	-1%	-1%	-1%	-1%	2%
Consumer Cyclicals	-1%	-1%	-3%	-1%	-1%	-1%	20%	16%	6%
Technology	0%	-1%	-1%	0%	0%	-1%	1%	1%	27%
Healthcare	0%	0%	0%	0%	0%	-1%	0%	0%	12%
Utilities	14%	8%	-3%	-5%	0%	-1%	18%	14%	3%
Total portfolio impact	-4%	-4%	-4%	-3%	-2%	-1%	0%	0%	100%

Company-level insights



Tailored scenario analysis

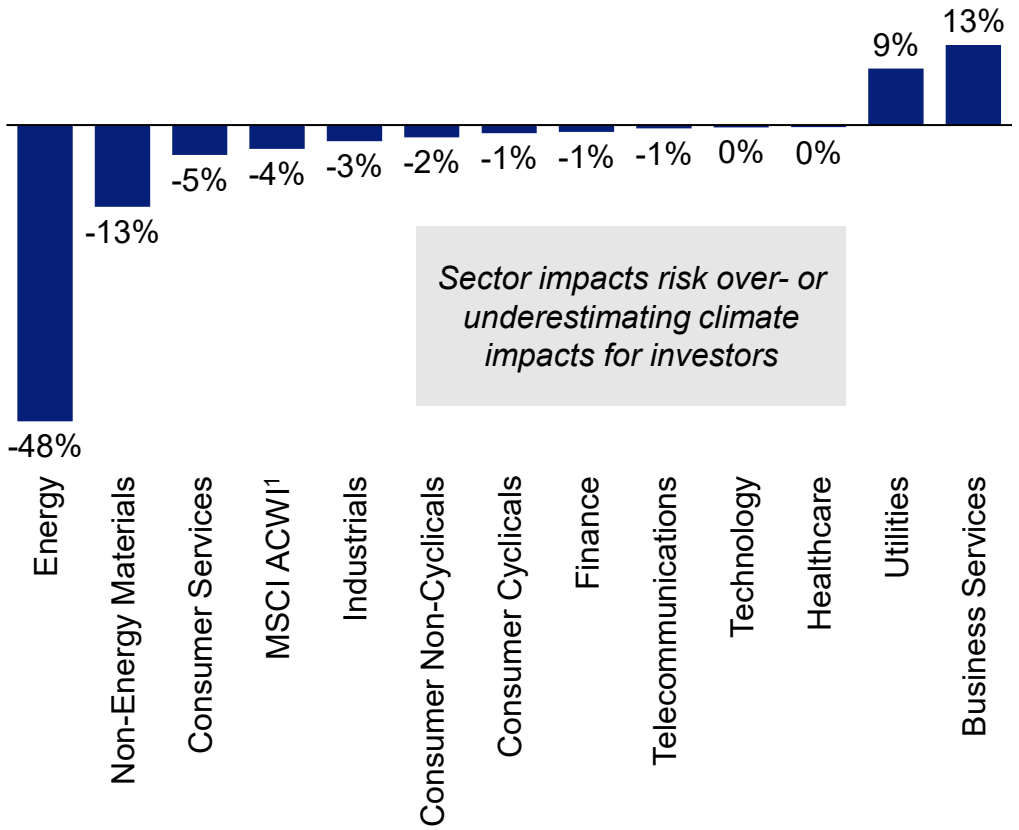


- High-level sector classification
  - + Company actions today
  - + Publicly announced target
  - + Bespoke scenarios, including incorporating in-house views and event scenarios
  - + Bespoke company characteristics
- Risk across sectors
  - + Company-specific risk within sectors
  - + Tailored views of the path and pace of climate policy and investees
- Disclosure
  - + Risk management
  - + Engagement
  - + Integration into BAU investment processes (e.g., selection, product creation)

Without company-level insights, investors often overlook the risk and opportunities concentrated within sectors

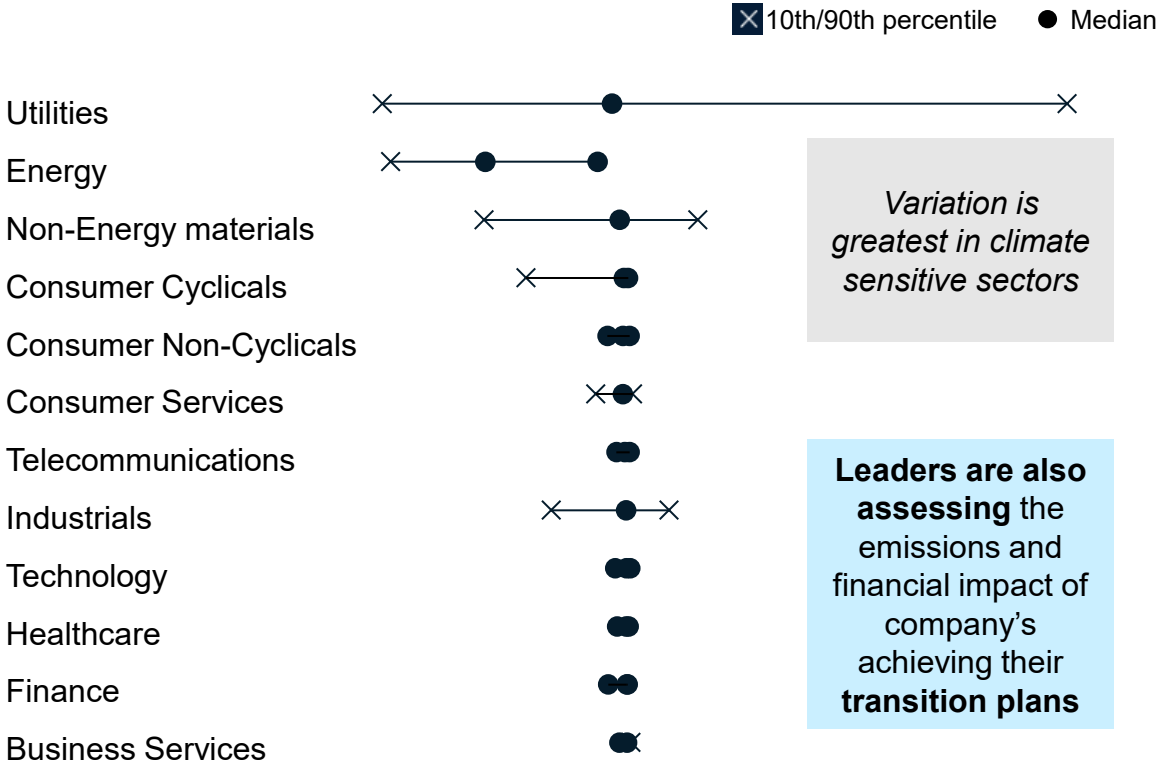
Insufficient differentiation within sectors can obscure concentrations of risk and opportunity…

NPV impact by sector, NGFS Net Zero 2050, MSCI ACWI[1]



… company-level insights are required to identify climate leaders and laggards

NPV impact – within sector variance, NGFS Net Zero 2050, %, MSCI ACWI[1]

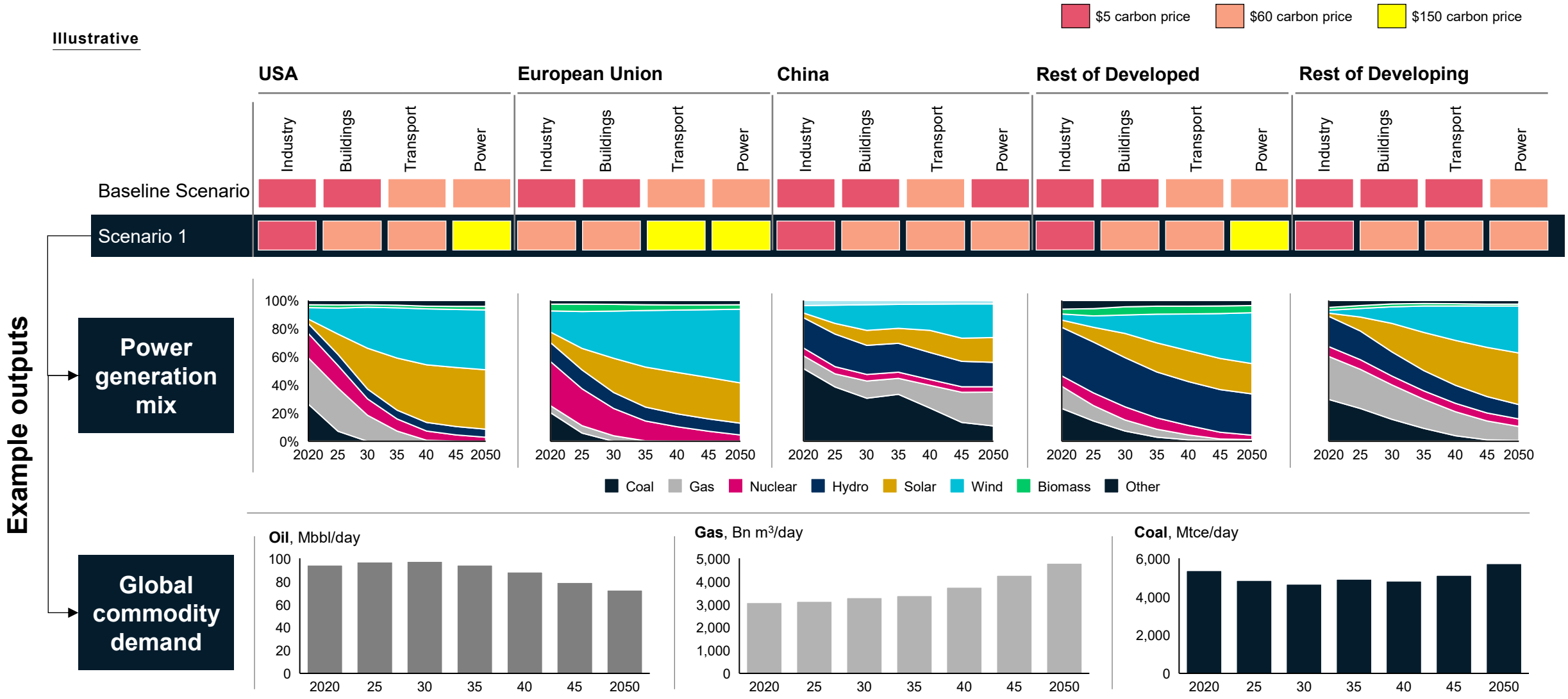


1. iShares MSCI ACWI ETF

Source: Planetrics Climate Scenario Analysis (2024Q2 model version)

Tailored scenarios are required to embed in-house views, including where the transition is already priced-in today

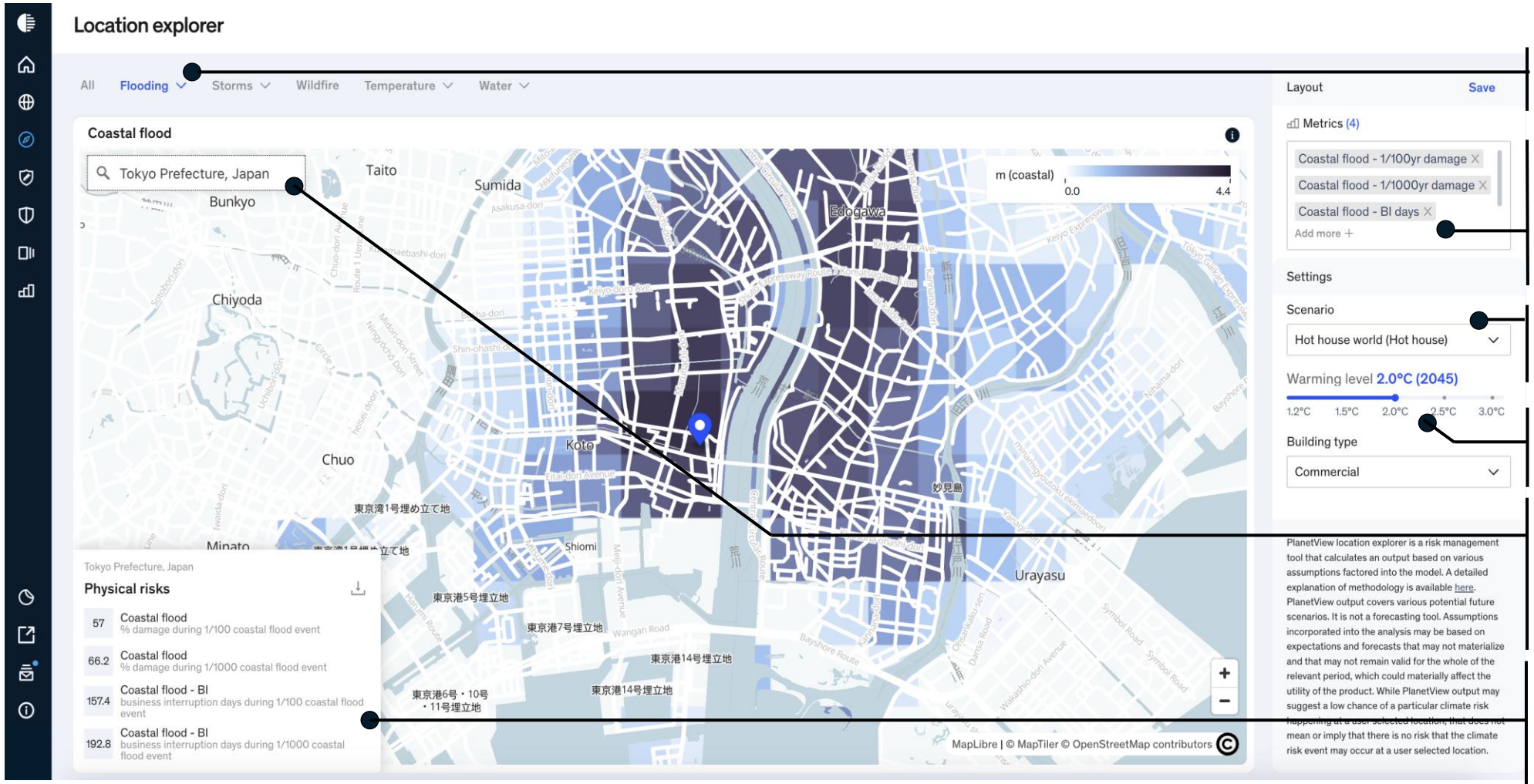
Illustrative outputs from the Planetrics Bespoke Scenario Generator



Note: For illustrative purposes only

Leaders are complementing long-term climate scenarios with event scenarios to test resilience to tail events in the short-term

1-in-100 year coastal flood at 2°C warming example



Hazards: Assess risks from 9 physical hazards

Physical risk metric: Assess expected impact by physical risk metric (e.g., wind speed, flood depths)

Scenario: Assess risks across 9 NGFS/IPR climate scenarios

Warming level/year: Assess risk from today to 3.0°C / 2080

Location specific: Assess risk for specific address or coordinates or select specific points on the map

Economic damage: Assess potential damage impacts from tail risk events at different return periods

Source: Planetrics Location Explorer

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Institute and Faculty of Actuaries

Closing Remarks

15:45 – 16:00

17 October 2025