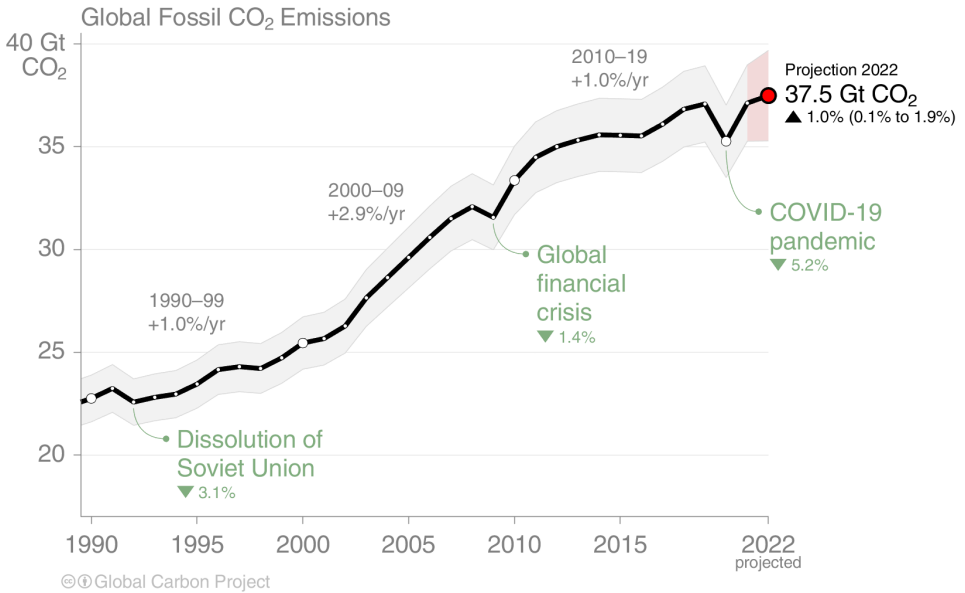
A net zero emissions future: How to make it a reality



Thursday 2 November 2023

LSE The London School of Economics and Political Science

Grantham Research Institute on Climate Change and the Environment

Grantham Foundation for the Protection of the Environment

Grantham Institute Climate Change and the Environment
An institute of Imperial College London

Welcome and introduction

Professor Elizabeth Robinson

Director

Grantham Research Institute on Climate Change and the Environment

London School of Economics and Political Science

Update on the science

Professor Sir Brian Hoskins

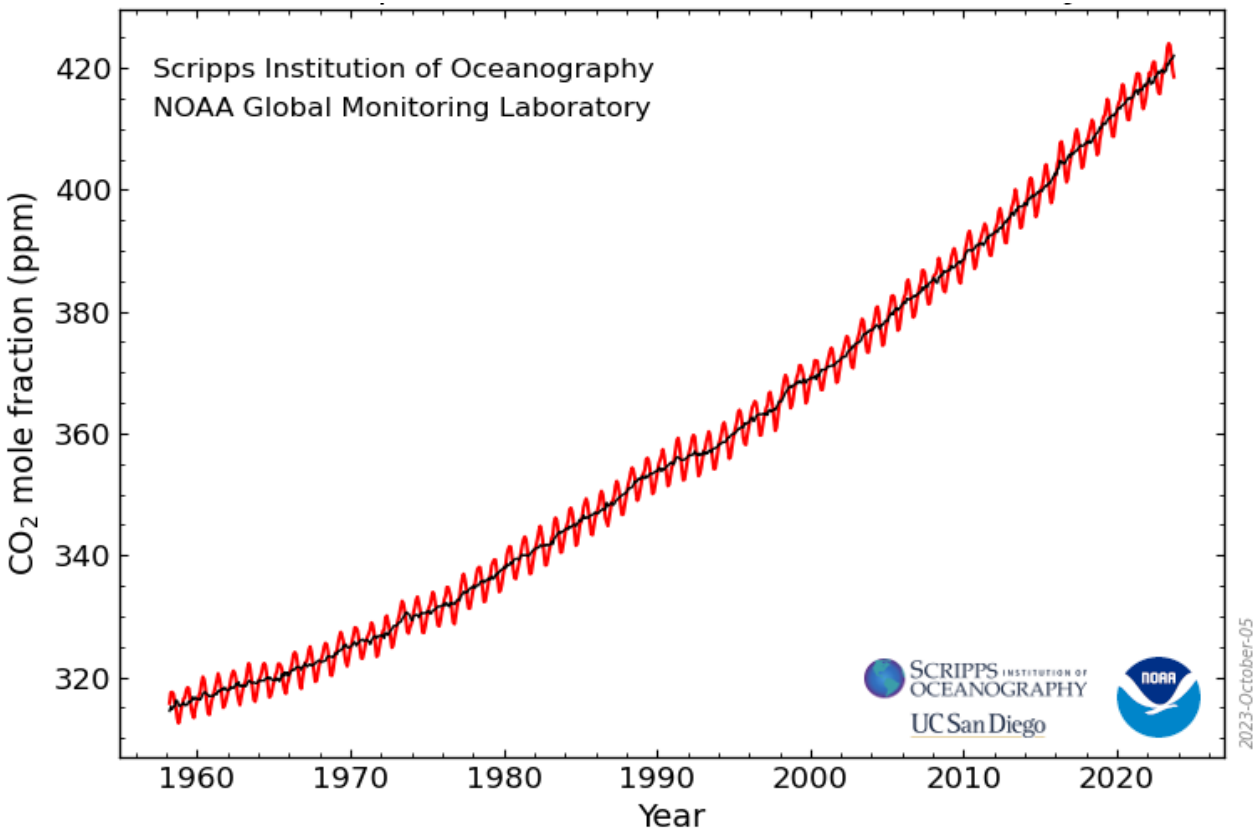
Chair

Grantham Institute – Climate Change and the Environment

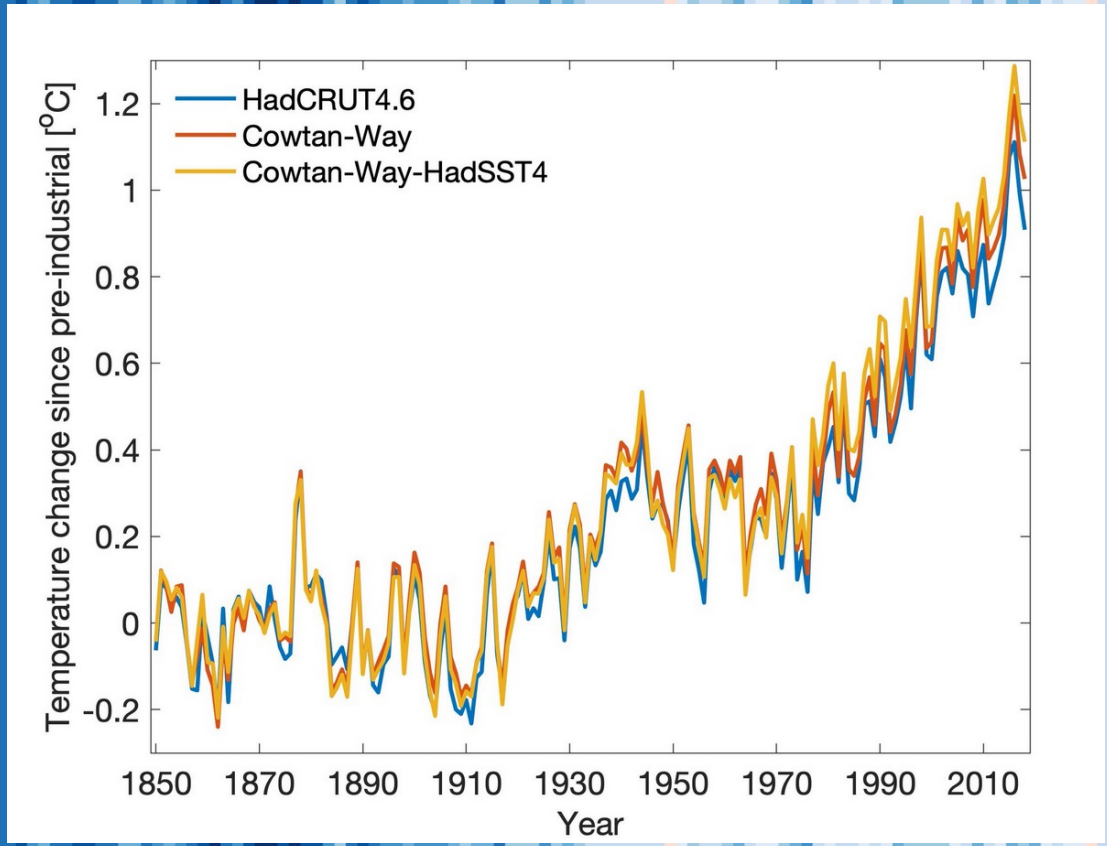
Imperial College London

Measured Atmospheric Carbon Dioxide

Mauna Loa, Hawaii

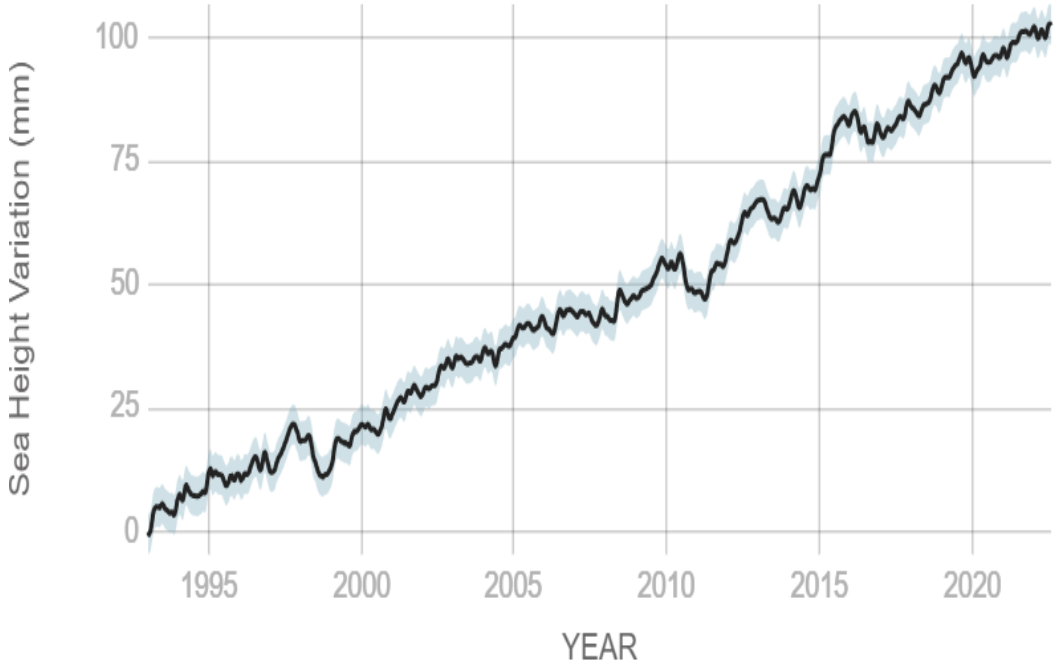


Other GHGs (methane, nitrous oxide, FCs..) give the equivalent of ~20% more CO_2

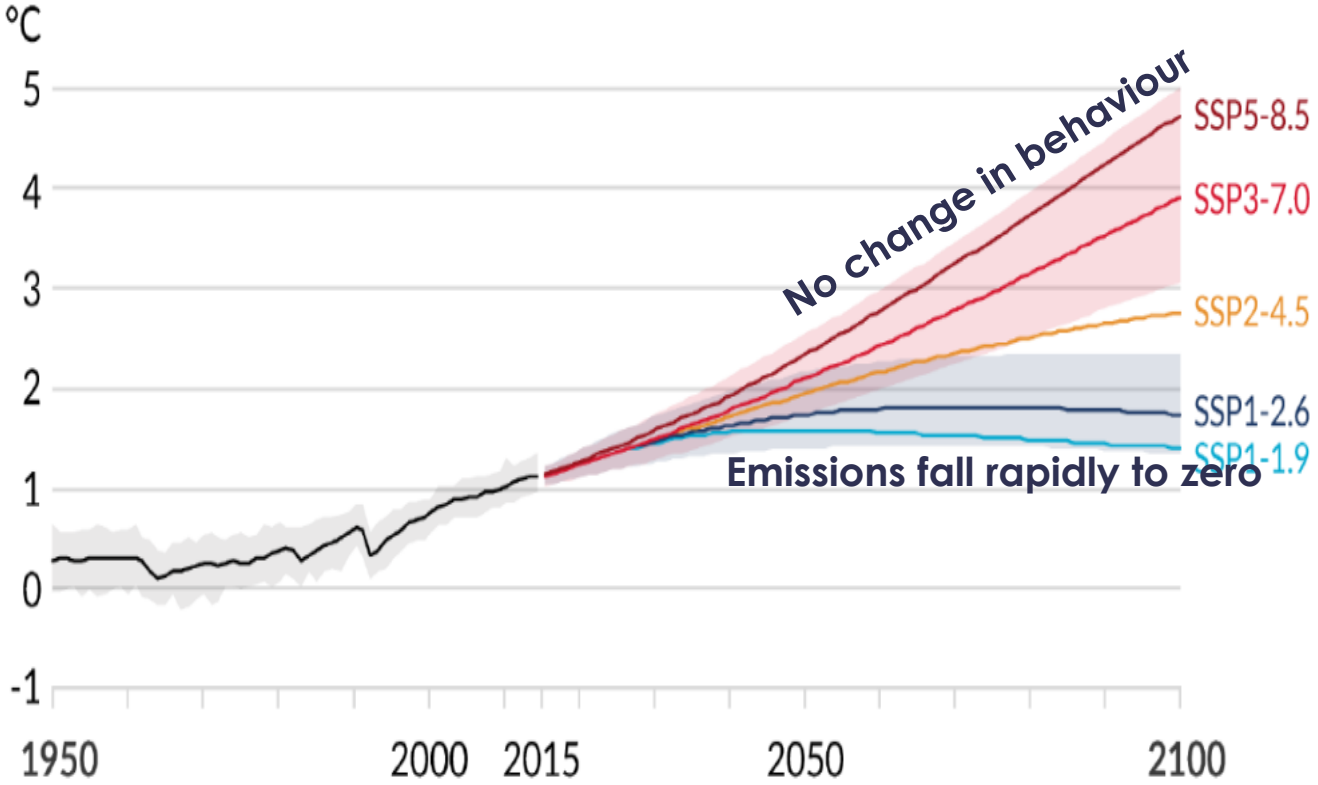


Ed Hawkins, U of Reading

Sea Level Rise 1993-2022



The Future? Projections of Temperature Rise

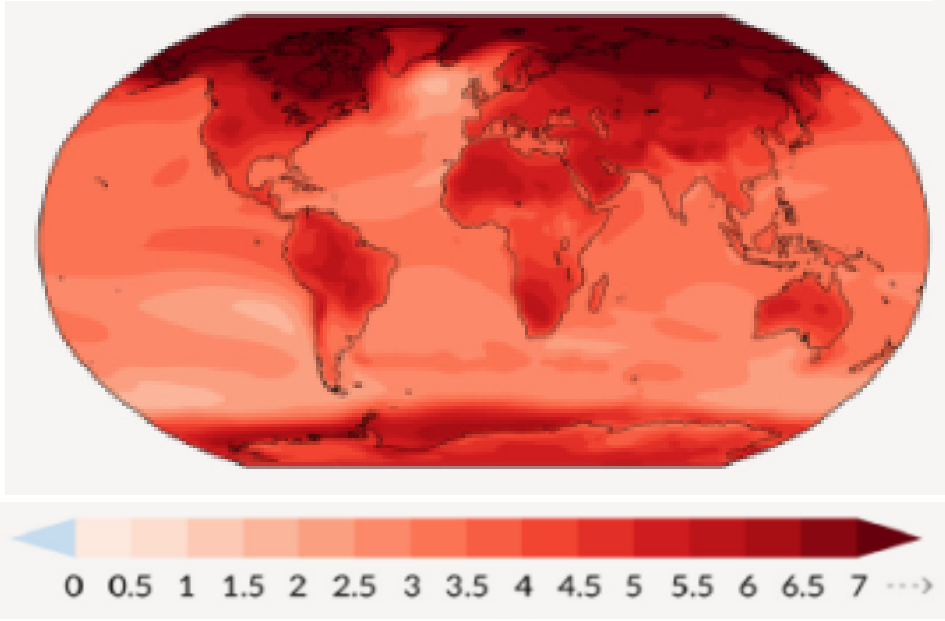


IPCC WGp1 AR6

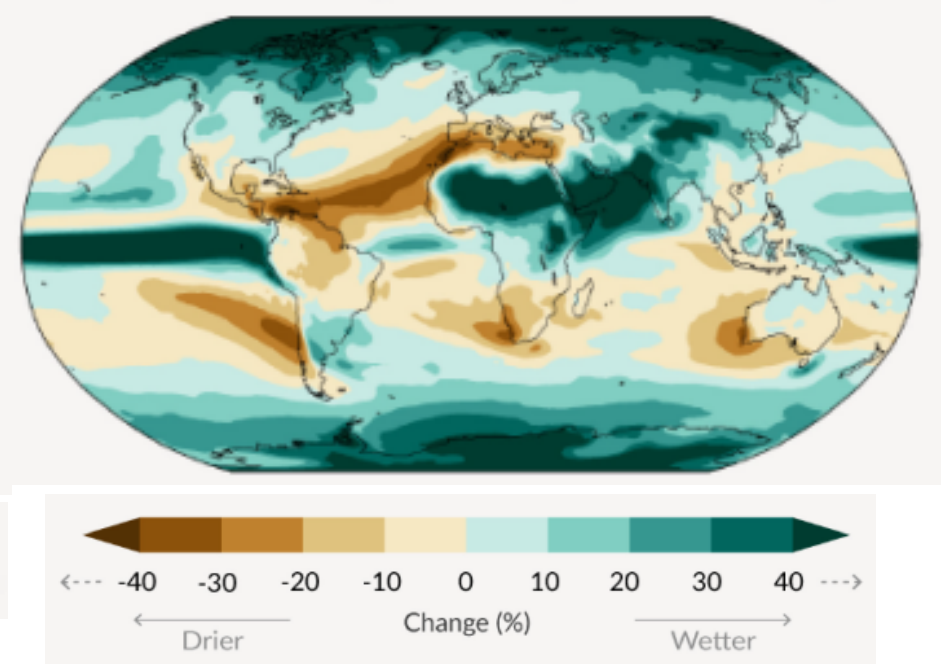
Projected Average Annual Changes at 4°C

IPCC WGp1 AR6

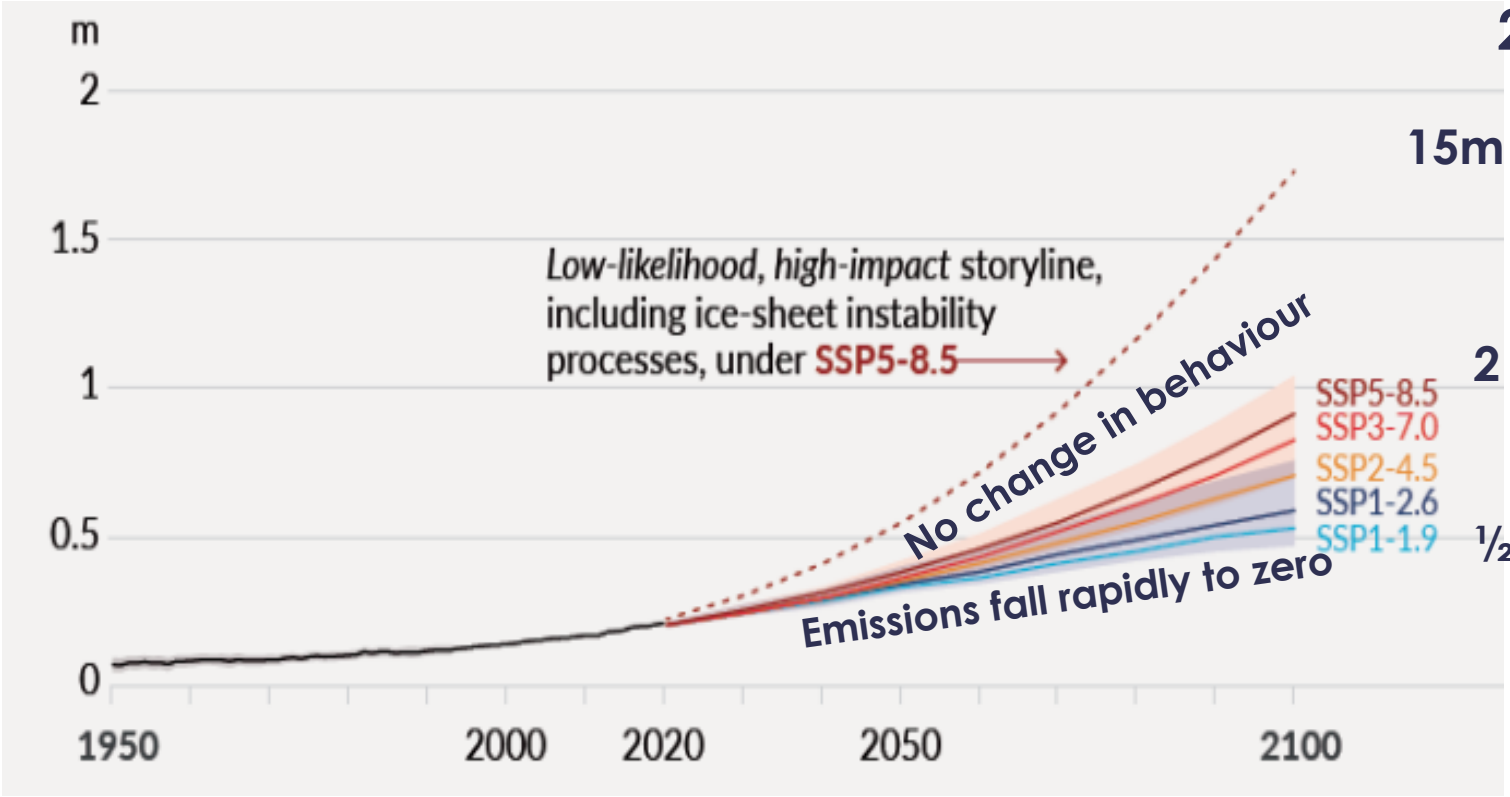
Temperature



Precipitation



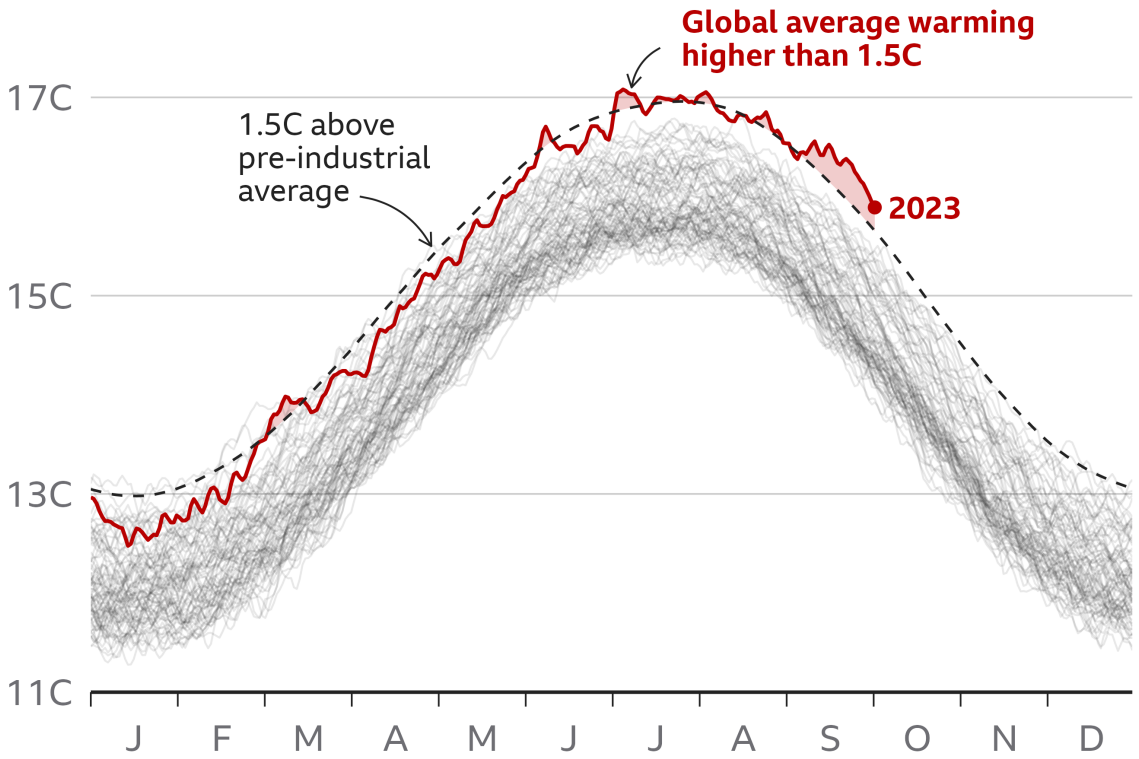
Global mean sea level relative to 1900



IPCC WGp1 AR6

Record number of days breaking 1.5C in 2023

Daily global average air temperature, 1940-2023

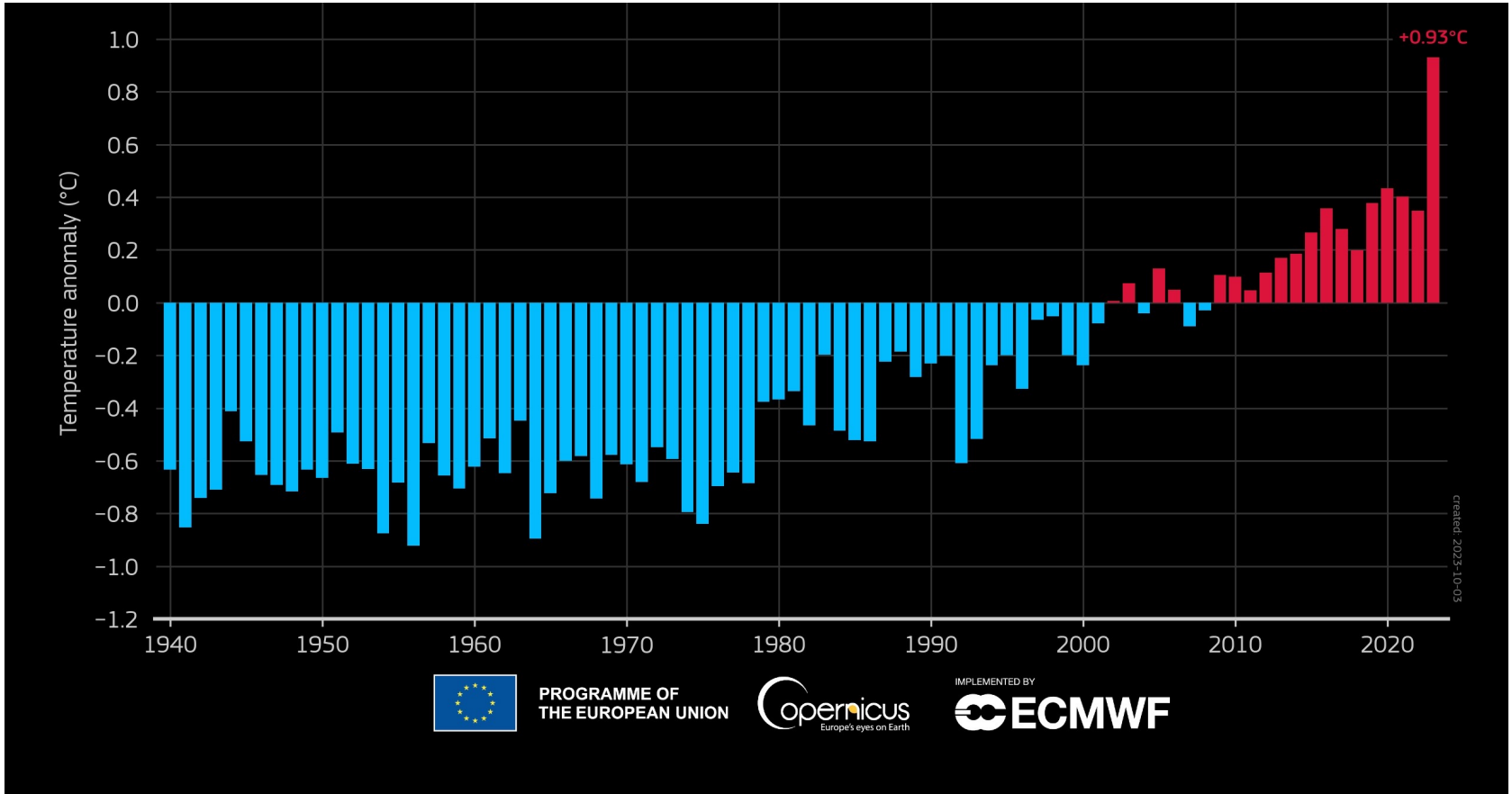


Note: Temperature data for 2 October 2023 is preliminary. Each line represents a year. Pre-industrial average calculated from 1850-1900 levels.

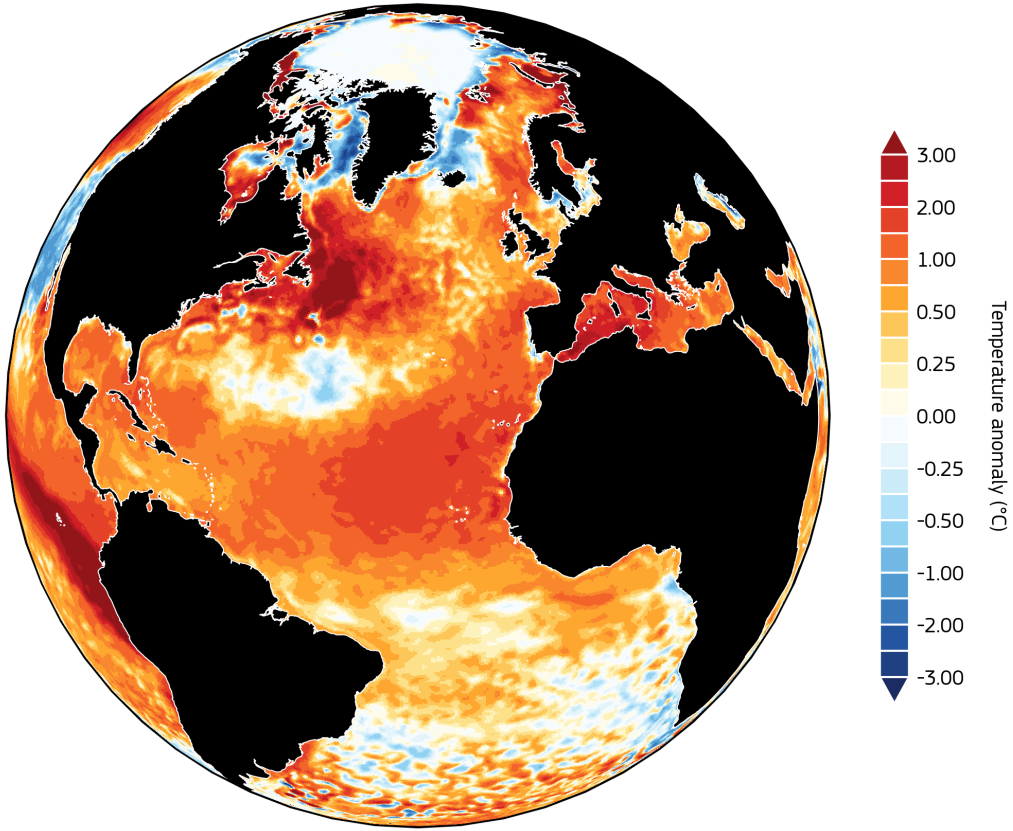
Source: ERA5, C3S/ECMWF

BBC

September 2023 Global Surface Temperature anomaly
relative to 1991-2020

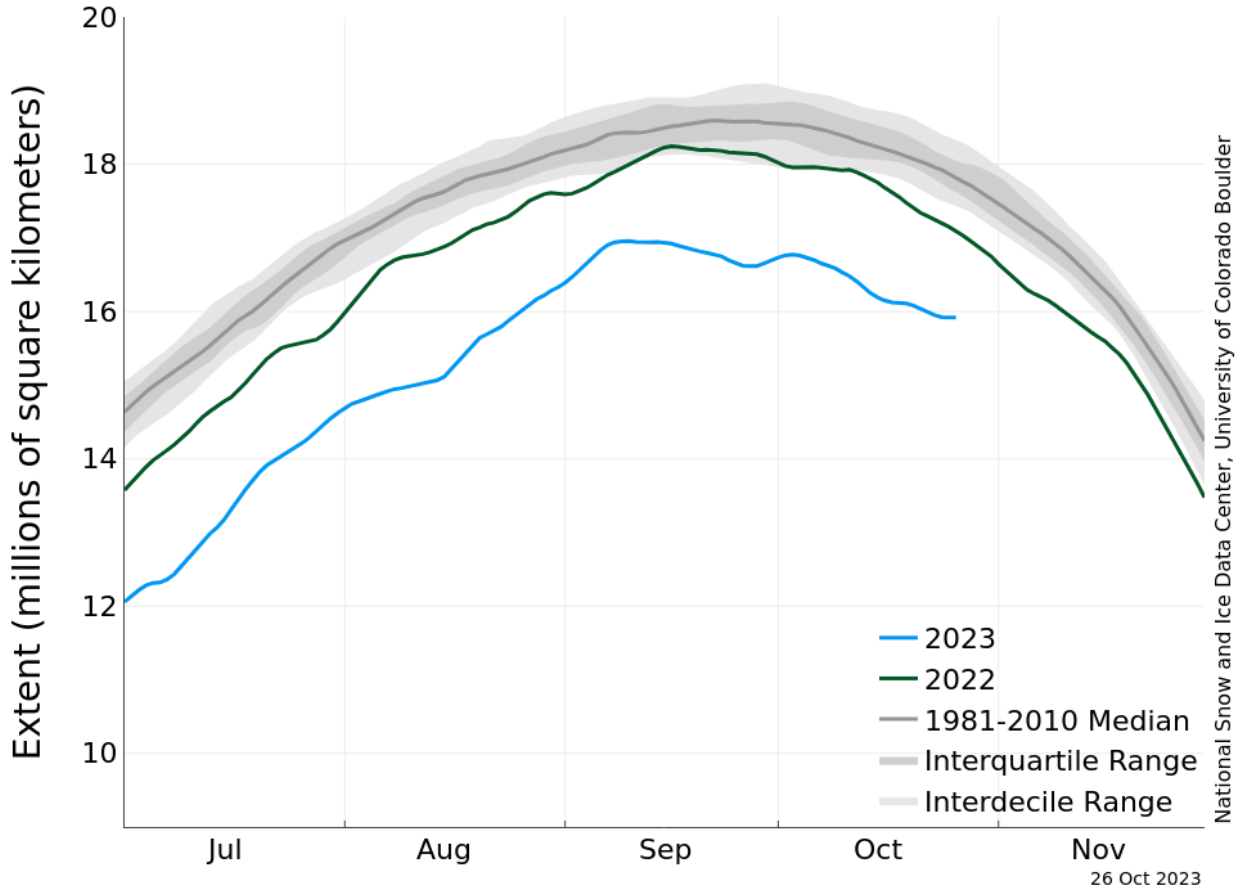


July 2023 Sea Surface Temperature anomaly
relative to 1991-2020



PROGRAMME OF THE EUROPEAN UNION
opernicus Europe's eyes on Earth
IMPLEMENTED BY ECMWF
Climate Change Service climate.copernicus.eu

Antarctic Sea Ice Extent



The IPCC 6th Assessment of the Science underlined the imperative for urgent action on climate change

The recent behaviour of the climate system suggests even more urgency

Net zero: world's undelivered necessity

Professor Joeri Rogelj

Professor of Climate Science and Policy

Grantham Institute – Climate Change and the Environment

Imperial College London

LSE The London School of Economics and Political Science

Grantham Research Institute on Climate Change and the Environment

Grantham Foundation for the Protection of the Environment

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Three reflections

Physical necessity

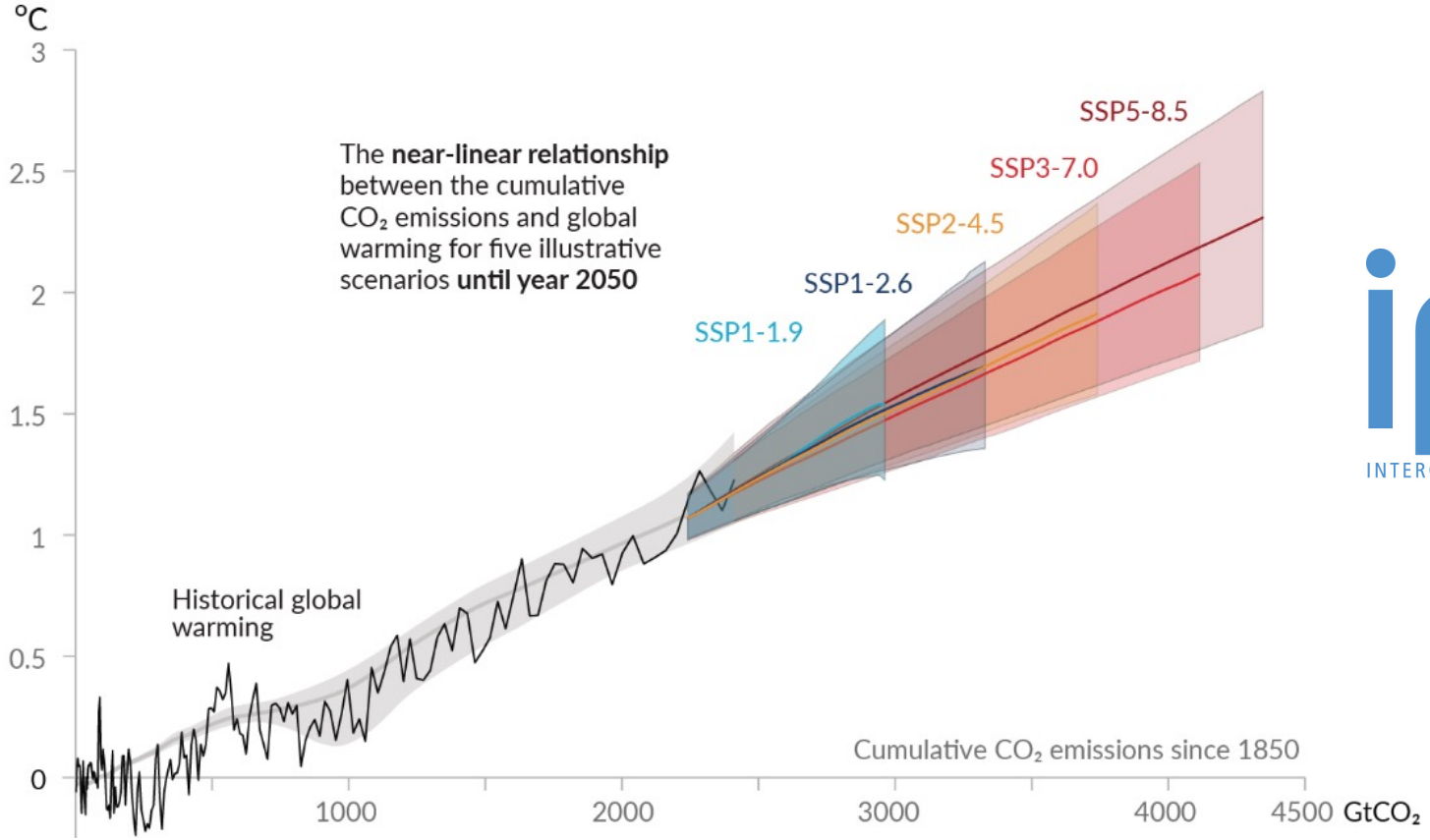
Undelivered pledges

High risk climate outcomes

Source: ENB, Ken Sklute, R. Butler

Every tonne of CO_2 emissions adds to global warming

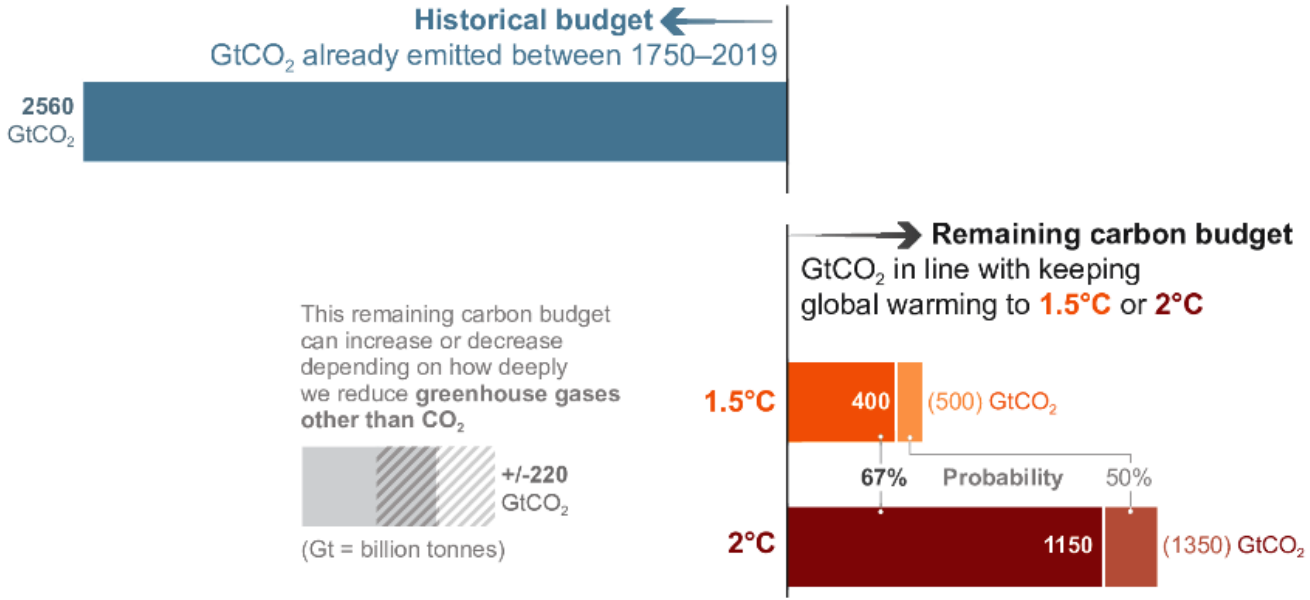
Global surface temperature increase since 1850–1900 (°C) as a function of cumulative CO_2 emissions ($GtCO_2$)



ipcc
INTERGOVERNMENTAL PANEL ON climate change

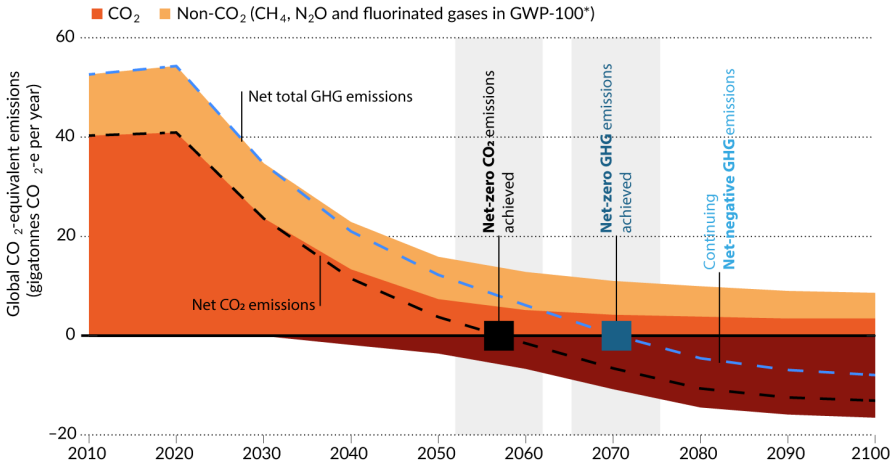
Source: IPCC AR6 WG1 (2021); Summary for Policymakers

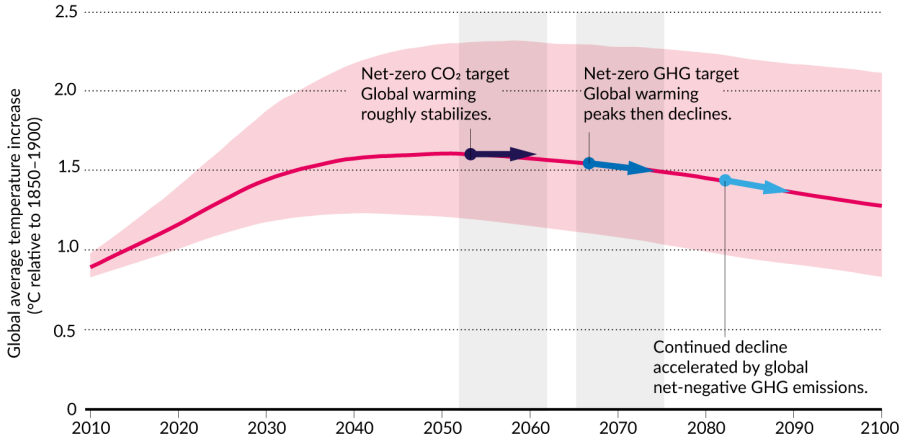
Rapid depletion of our limited carbon budget



Source: IPCC AR6 WG1 (2021); Chapter 5 (Canadell et al, 2021)

Net zero CO_2 as a milestone – not an endpoint

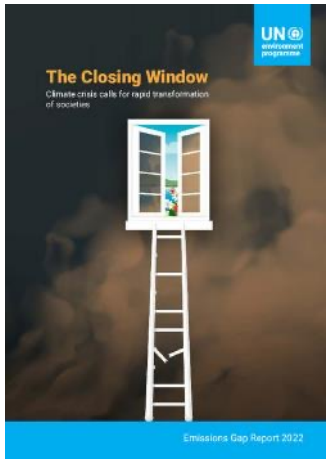




Source: Rogelj et al (2021) 'Net-zero emissions targets are vague: three ways to fix', Nature, doi: 10.1038/d41586-021-00662-3

The contrast of pledges versus policies

We are way off track



4. Despite the call for countries to "revisit and strengthen" their 2030 targets, progress since COP 26 is highly inadequate

7. Without additional action, current policies lead to global warming of 2.8°C over this century. Implementation of unconditional and conditional NDC scenarios reduce this to 2.6°C and 2.4°C respectively

We are almost there

Article

Realization of Paris Agreement pledges may limit warming just below 2 °C

https://doi.org/10.1038/s41586-022-04553-z
Received: 26 November 2021
Accepted: 16 February 2022
Published online: 13 April 2022
Check for updates

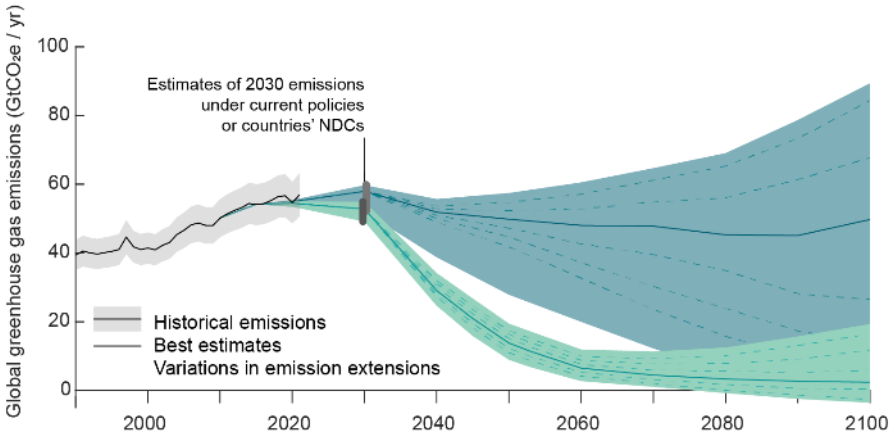
Malte Meinshausen[1,2,*], Jared Lewis[2,3], Christophe McGlade[4], Johannes Gütschow[2,1], Zebedee Nicholls[1,2,5], Rebecca Burdon[2,3], Laura Cozzi[4] & Bernd Hackmann[1]

Over the last five years prior to the Glasgow Climate Pact[1], 154 Parties have submitted new or updated 2030 mitigation goals in their nationally determined contributions and 76 have put forward longer-term pledges. Quantifications of the pledges before

iea Countries Fuels & technologies Analysis Data Policies About

COP26 climate pledges could help limit global warming to 1.8 °C, but implementing them will be the key

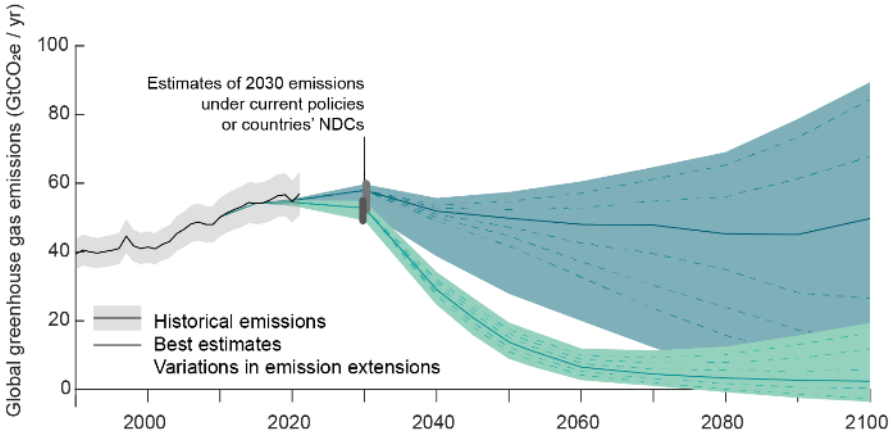
Pledges and promises remain largely undelivered

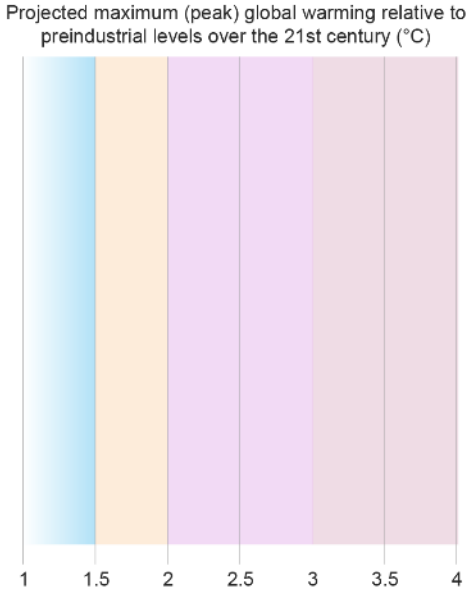


A wide implementation gap looms between policies and pledges

Source: Rogelj et al (2023) 'Credibility gap in net-zero climate targets leaves world at high risk', Science, doi: 10.1126/science.adg6248

Central estimates hide important climate risks





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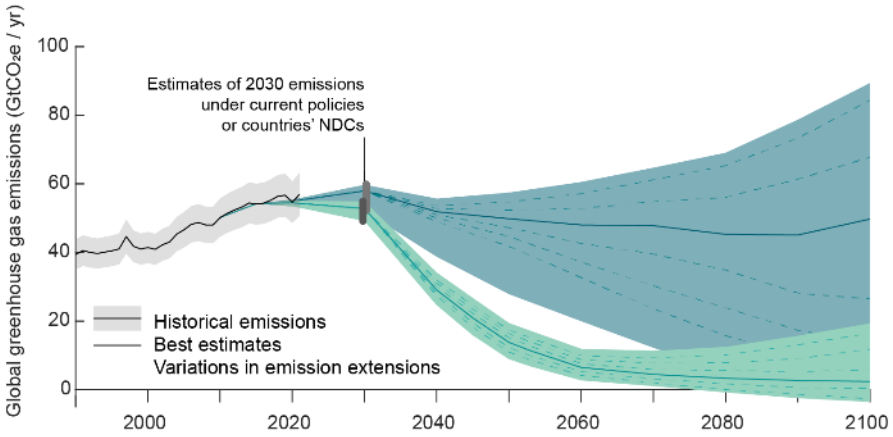
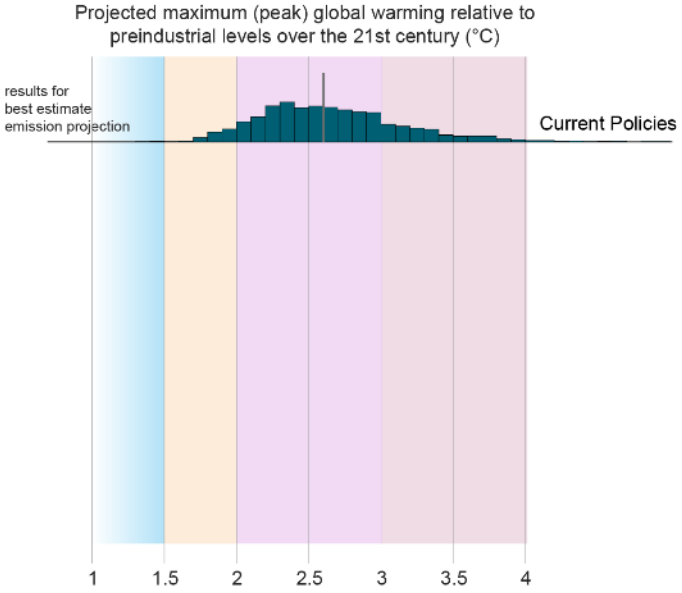
Central estimates hide important climate risks





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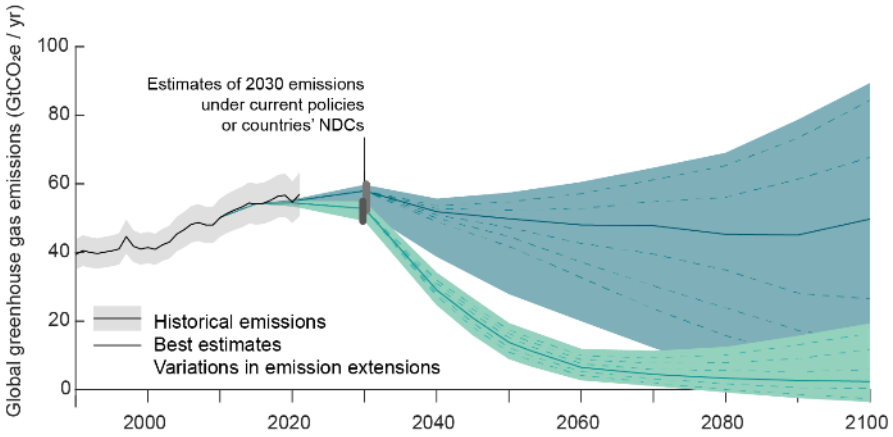
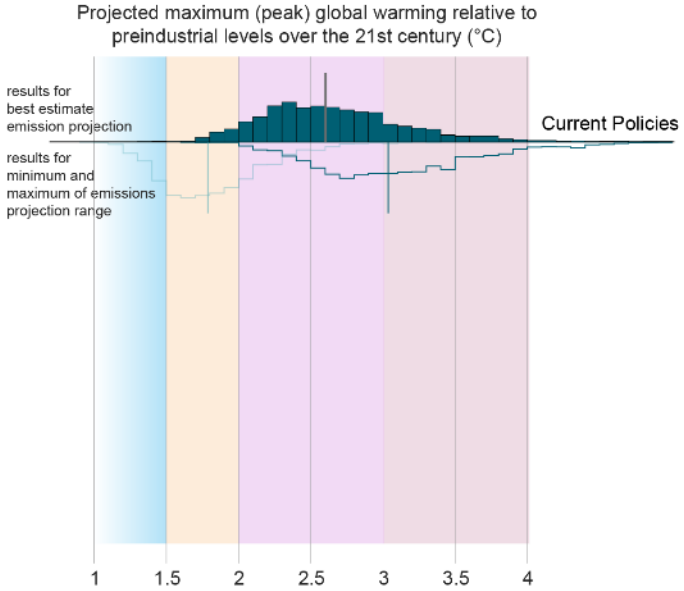
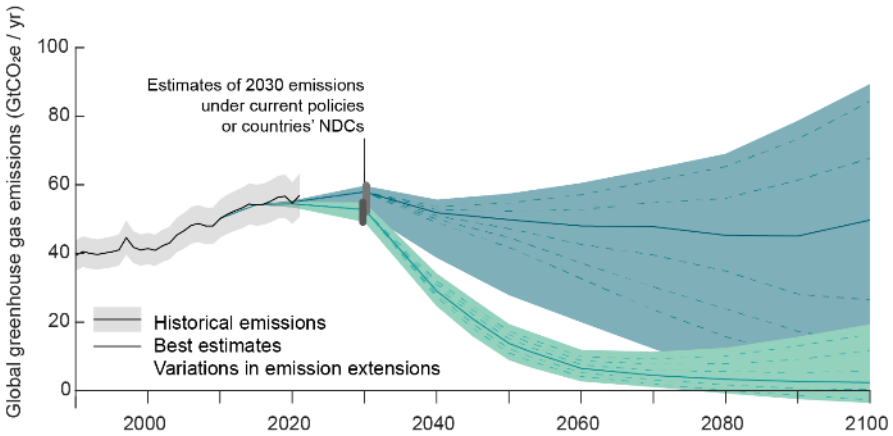
Central estimates hide important climate risks

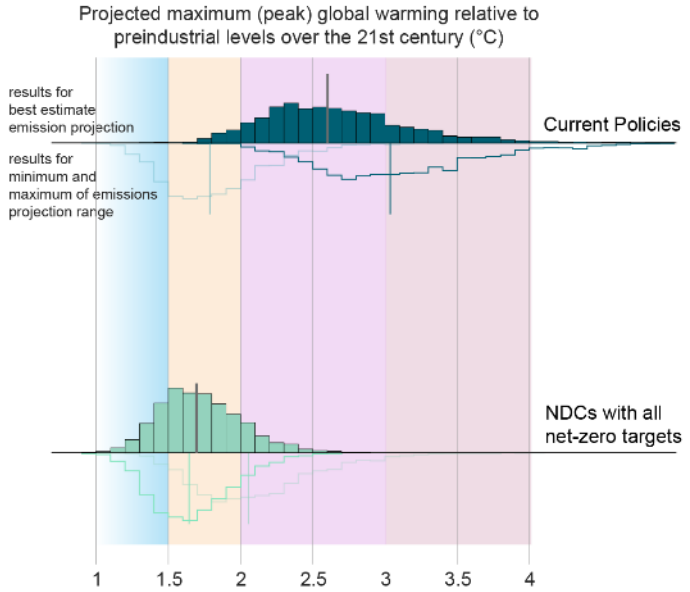




Source: Rogelj et al (2023) 'Credibility gap in net-zero climate targets leaves world at high risk', Science, doi: 10.1126/science.adg6248

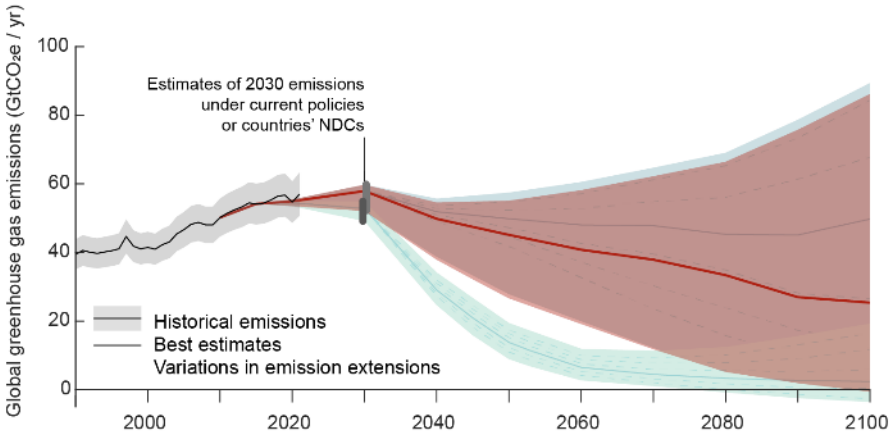
Climate risks can be reduced but not eliminated

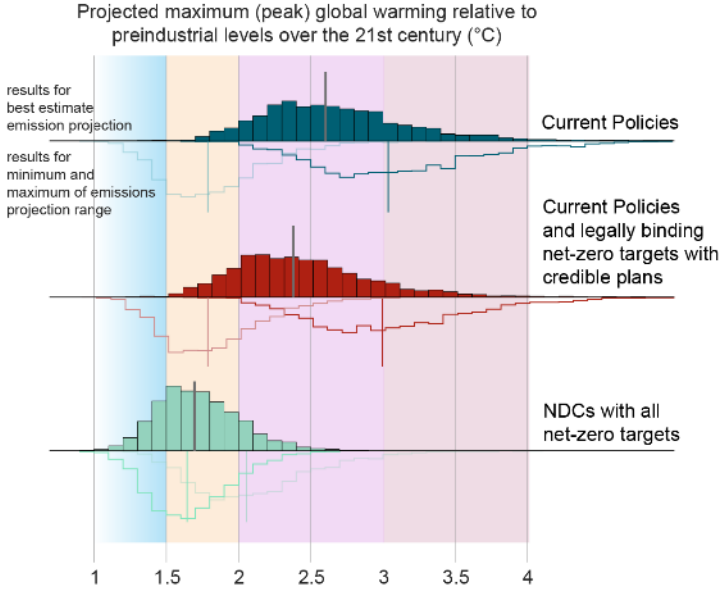




Source: Rogelj et al (2023) 'Credibility gap in net-zero climate targets leaves world at high risk', Science, doi: 10.1126/science.adg6248

Net zero plans lack credibility leaving high-warming risk





Source: Rogelj et al (2023) 'Credibility gap in net-zero climate targets leaves world at high risk', Science, doi: 10.1126/science.adg6248

Thank you

Contact: j.rogelj@imperial.ac.uk

Towards Net Zero Emissions: How to foster the transition and create a new path of sustainable growth

Professor Lord Nicholas Stern

Chair

Grantham Research Institute on Climate Change and the Environment

London School of Economics and Political Science

LSE The London School of Economics and Political Science

Grantham Research Institute on Climate Change and the Environment

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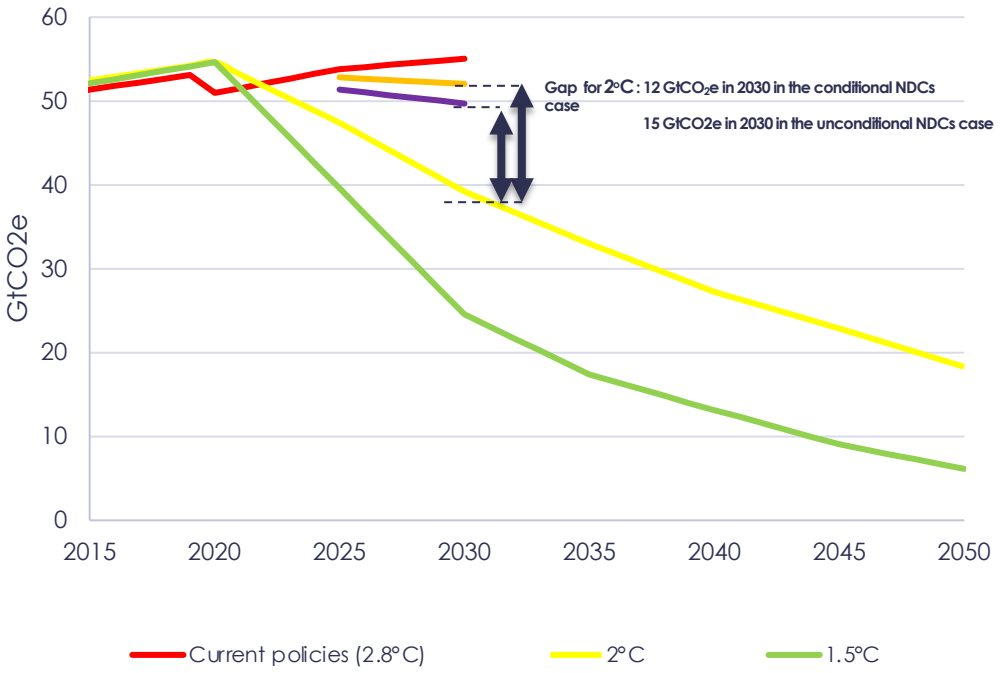
A Critical Moment in Time

- The **urgency of tackling climate change** is becoming ever clearer. The next decade is decisive.
- To act on climate and nature is not to be understood as a cost but rather to invest and to take an **opportunity to unlock new and better forms of growth.**
- **A growth story for the 21st century**; sustainable, resilient, inclusive, and much more attractive than the dirty, destructive models of the past.
- The transition from the old will require major investment across the world, particularly in emerging market and developing countries. **This major push on investment and innovation** can drive a sustainable recovery from a depressed world economy and make a breakthrough on both development goals and climate.
- Seizing the opportunity will **require clear strategic direction, strong and purposive policies, a massive scaling up and shift in investment, and the mobilisation of the right kinds of finance at the right scale.**

Immense Consequences of Unmanaged Climate Change, Urgency and Scale of Action: Dangers of delay

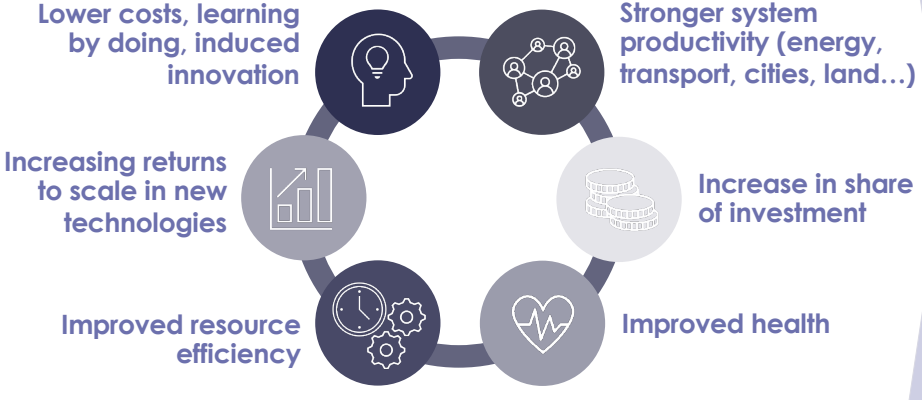
- Global GHG emissions **are on the wrong track**, in part associated with the **misconception** that climate action requires a **trade-off with economic development and growth**.
- "There's fairly compelling evidence from the past, combined with the information from climate models, that if we can keep warming below 1.5°C then we can preserve this fragile moment. But if we go beyond 3°C, it's likely we can't. **In between is where we're rolling the dice**. So it's a question of how bad we're willing to let it get. 1.5°C is already really bad but **3°C is potentially civilisation-ending bad**." (Michael Mann, 2023).
- Challenges of adaptation, loss and damage and natural capital also intensely urgent. Must integrate **adaptation, mitigation, development and natural capital**.
- Suggesting that can or should **delay** is usually implicitly downplaying or **distorting the science**.



Source: Trajectories based on UNEP (2022)
NB: The 1.5°C scenario used by the UNEP report relies on the widespread use of negative emissions technologies (NETs) later in the century.

The 21st Century Growth Story

Six mutually reinforcing drivers



A short, medium and long-run story

5 - 10 years		Investment in sustainable infrastructure and other assets can boost shorter-run demand and growth, sharpen supply and efficiency, reduce waste and pollution, promote sustainable development, improve health and reduce poverty.
~ 10 years		Spur innovation, creativity and growth in the medium term, unleash new waves of innovation and discovery.
~ 20 years		Low-carbon is the only feasible longer-run growth on offer; **high carbon growth self-destructs.**

Investment is at the core of the new growth story; no horse race between climate action and growth.

Most of the processes embodied in these drivers are excluded from standard macro modelling.

Investment Must Increase by Several Points of GDP

Investment/spending needs per year for sustainable development and climate action for EMDCs (other than China):

Estimate	2019 US$ billion	2019 % GDP	2030 US$ billion	2030 % GDP	Increase (2030 minus 2019)[1] US$ billion	Increase (2030 minus 2019)[1] % GDP
SDG-related investment[2]	2,385	11.3%	5,400	18,2%	3,000	6.9%
Of which climate and related investments[3]	550	2.4%	2,400	7.2%	1,800	4.8%

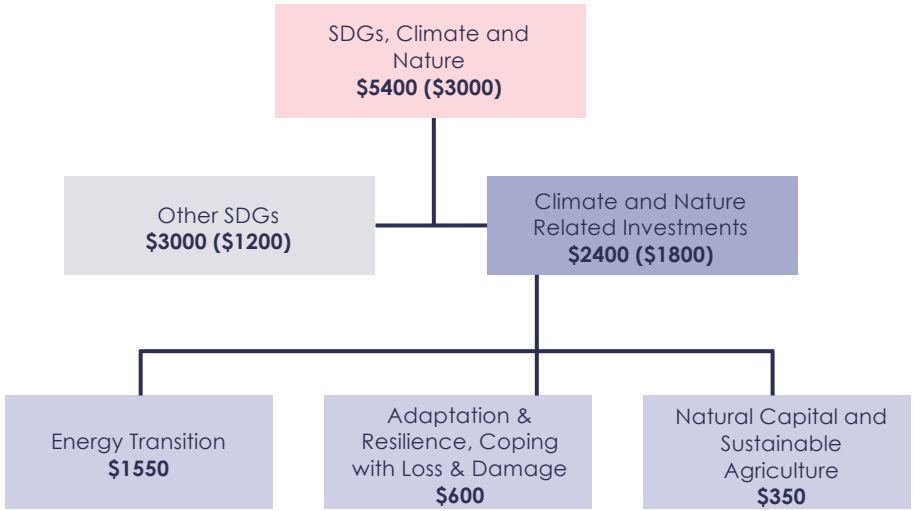
Notes:
1. Increase is defined as difference between estimated investment needs in 2030 and current baseline of investment in 2019.
2. Human capital, sustainable infrastructure (including on the energy transition), adaptation and resilience, AFOLU.
3. Energy transition, adaptation and resilience, AFOLU.

Source: Bhattacharya et al. (2022)

The scale of the increased investments needed in EMDCs over the next five years and beyond will require a debt, macroeconomic, and financing strategy that tackles festering debt difficulties, especially those of poor and vulnerable countries, and leads to a major expansion and revamp of both domestic and international finance, public and private. Criticality of conditions for investment.

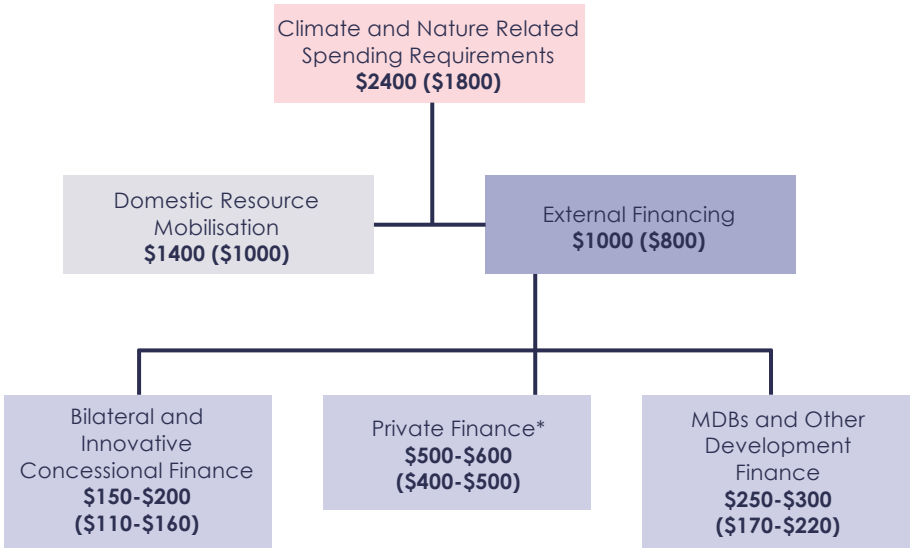
Creating Finance for Investments: DRM $1.4 trillion; External $1 trillion

Investment / Spending Requirements for Climate and Sustainable Development ($ billion per year by 2030, increment from current in parentheses)



Source: Bhattacharya et al., 2023

Financing the Green Transition ($ billion per year by 2030, increment from current in parentheses)



*More than half of this private finance would be directly and indirectly catalysed by MDBs, other development finance institutions, and bilateral finance.

Key Pillars of the New Approach to Deliver the New Growth Story and Inclusive, Timely and Effective Climate Finance

- Translating investment opportunities into reality**: unlocking ambitious investment programmes.** Country platforms and the investment; climate-country led, multilateral support.
- Tackling **debt and fiscal constraints.**
- **Domestic resource mobilization**: foundational to expansion and sustainability.
- Creating a **new highway for private finance.**
- A MDB System that delivers on climate action: **"The Triple Agenda" on MDB Reform** (see G20 MDB reports, July and October 2023, and Bhattacharya-Songwe-Stern, November 2022 and November 2023, forthcoming).
- Delivering on and expanding options on **concessional and debt-free finance.**
- **Quality of climate finance**: access, affordability and transparency.
- **Aligning all finance** with climate and sustainable development (Article 2.1c).
- None of this transition is easy. But it is feasible. The new path can be very attractive. The consequences of failure would be immense.

References

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- Strengthening Multilateral Development Banks: the Triple Agenda. Report of the Independent Experts Group (Volume 1, July 2023). Strengthening-MDBs-The-Triple-Agenda_G20-IEG-Report-Volume.pdf

- Strengthening Multilateral Development Banks: the Triple Agenda. A Roadmap for Better, Bolder, and Bigger MDBs. Report of the Independent Experts Group (Volume 2, October 2023). triple-agenda-roadmap-better-bolder-and-bigger-mdbs.pdf (cgdev.org)

Just Zero: How the just transition can speed net zero progress

Professor Nick Robins

Professor in Practice, Sustainable Finance

Grantham Research Institute on Climate Change and the Environment

London School of Economics and Political Science

LSE THE LONDON SCHOOL OF ECONOMICS AND POLITICAL SCIENCE

Grantham Research Institute on Climate Change and the Environment

Grantham Foundation for the Protection of the Environment

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The Imperative

The just transition puts people at the heart of achieving net zero - workers, communities, citizens, particularly in the Global South.

ILO: "*A just transition involves maximizing the social and economic* ***opportunities*** *of climate action, while minimizing and carefully managing any* ***challenges****, including through effective social* ***dialogue*** *among all groups impacted and respect for fundamental labour principles and* ***rights.***"

Global Stocktake: "*Just transitions can support more* ***robust*** *mitigation outcomes… with an upward spiral of* ***ambition****.*"

The Just Transition is becoming a Global Leadership Priority

President Biden
US Inflation Reduction Act
"Good-paying union jobs that will help reduce emissions across every sector in the country."

President Ramaphosa
Just Energy Transition Investment Plan
"Meet the challenges of climate change & achieve a just transition that benefits all our people."

The Potential: how can Just Transitions Help achieve Net Zero?

- ✓ **Delivers social progress:** shaping net zero for more & better jobs, community benefit (USA)
- ✓ **Overcomes distributional shocks:** ensuring that fossil fuel phase out leaves no one behind (EU)
- ✓ **Develops new capabilities:** building skills and human capital for communities (India)
- ✓ **Brings active involvement:** making participation core, particularly for excluded groups (Scotland)

Taken together, just transitions can bring about real world outcomes and generate public trust in net-zero

Reality Check: what are the Obstacles to Just Transitions?

The Commitment Gap

- Government: still insufficient government policies 8 years after Paris
- Business: only a small minority of carbon polluting firms have a just transition plan

The Implementation Gap

- International Public Finance: new Just Energy Transition Partnerships still to deliver
- Private Finance: just transition principles yet to be embedded in net zero plans

The Integrity Gap

- Risk of 'justice-washing' to mask inaction
- Fairness agenda can be misused to slow down climate action

What's Needed Next for a Just Transition to Net Zero?

- **Policy:** Make just transition core to net zero policy (energy, nature)
- **Place:** Focus on context-specific solutions to bring transformation
- **Business:** Agree just transition plans with workers and stakeholders
- **Finance:** Change mechanisms and metrics to drive system transformation
- **International:** Negotiate a strong Just Transition work programme at COP28, backed by public finance to deliver.

LSE's Just Transition Finance Publications

1. **Climate Change and the Just Transition: A guide for investor Action** report with the Principles for Responsible Investment (PRI), the International Trade Union Confederation (ITUC) & Harvard Kennedy School (2018).
2. **Financing Inclusive Climate Action in the UK -** an investor roadmap, with Leeds University, PRI, the TUC and Friends Provident Foundation (2019)
3. **Financing Climate Action with Positive Social Impact** focused on the role of banking in the UK with Leeds University, HSBC and UK Finance (2020)
4. **The Green + Gilt** how the UK launch a green sovereign bond with social co-benefits, with GFI and III (2020)
5. **From the Grand to the Granular:** translating ambition into investor action in the utilities sector (2021)
6. **Just Zero** first report of the UK Financing the Just Transition Alliance launched at COP26 (2021)
7. **Financing the Just Transition Beyond Coal** with the Powering Past Coal Alliance (2021)
8. **The Just Transition: Shaping the Inevitable Policy Response** with the PRI (2022)
9. **Financing People-centred Climate Action** a just transition bond proposal for the Northern Ireland Housing Executive (2022).
10. **Just Nature** how finance can support a just transition at the interface of climate and biodiversity (2022)
11. **Making Transition Plans Just** how to embed the just transition into financial sector net zero plans (2022).
12. **ILO/LSE Just Transition Finance Tool** for bankers & investors launched at COP27 (2022) jointly produced with the International Labour Organisation
13. **Supporting the Just Transition: A Roadmap for Central Banks** with the Council on Economic Priorities and INSPIRE (2022).
14. **Just Finance India** mobilizing private investment for the just transition, with BII, EMC and Suranjali Tandon (2023).
15. **Rethinking Finance to Make Climate Action Fair** Looking ahead to the new UNFCCC just transition programme (2023)

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Contact

Nick Robins
n.v.robins@lse.ac.uk

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Grantham Research Institute on Climate Change and the Environment

Grantham Foundation for the Protection of the Environment

Grantham Institute Climate Change and the Environment
An institute of Imperial College London

The era of loss and damage

Dr Friederike Otto

Senior Lecturer in Climate Science

Grantham Institute – Climate Change and the Environment

Imperial College London

LSE The London School of Economics and Political Science

Grantham Research Institute on Climate Change and the Environment

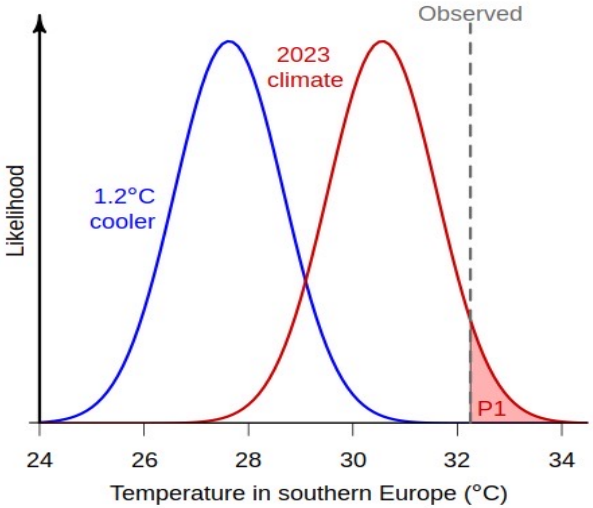
Grantham Foundation for the Protection of the Environment

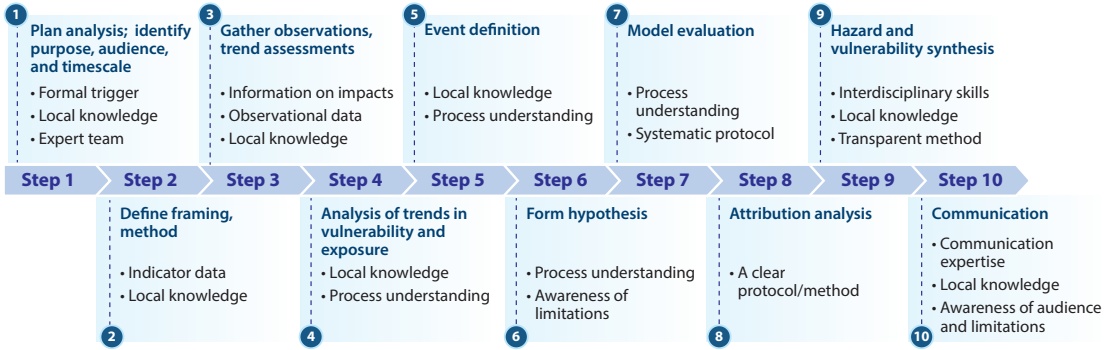
Grantham Institute Climate Change and the Environment
An institute of Imperial College London

Human-caused warming made the heavy rainfall up to 50 times more likely, with building in flood plains, poor dam maintenance and other local factors turning the extreme weather into a humanitarian disaster

world weather attribution

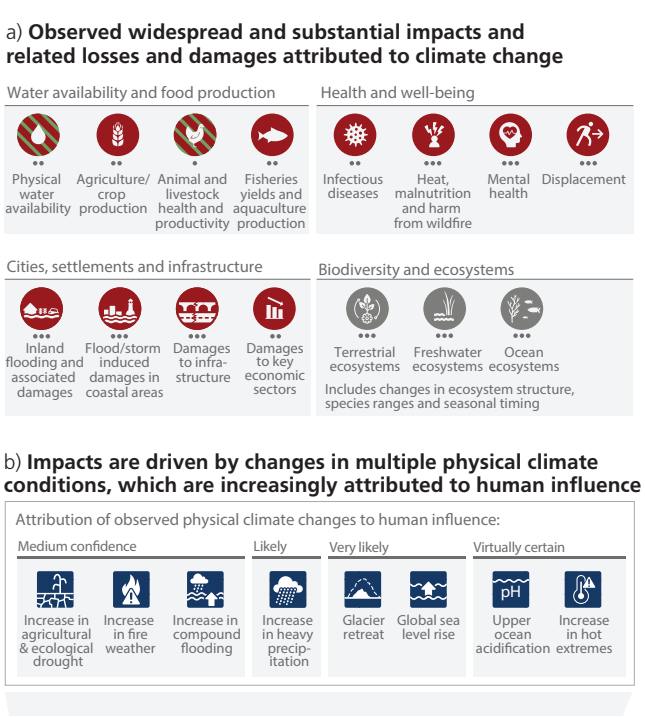
How do we know?

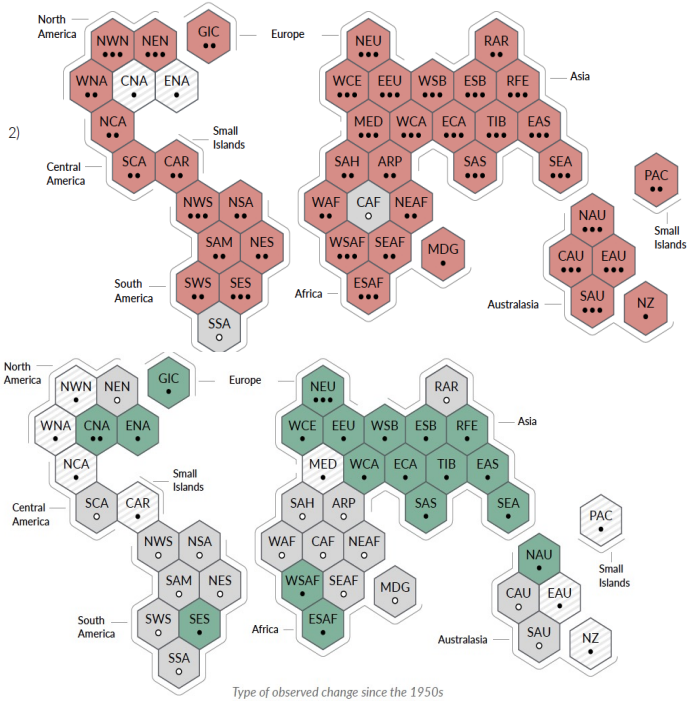




https://www.annualreviews.org/doi/abs/10.1146/annurev-environ-112621-083538

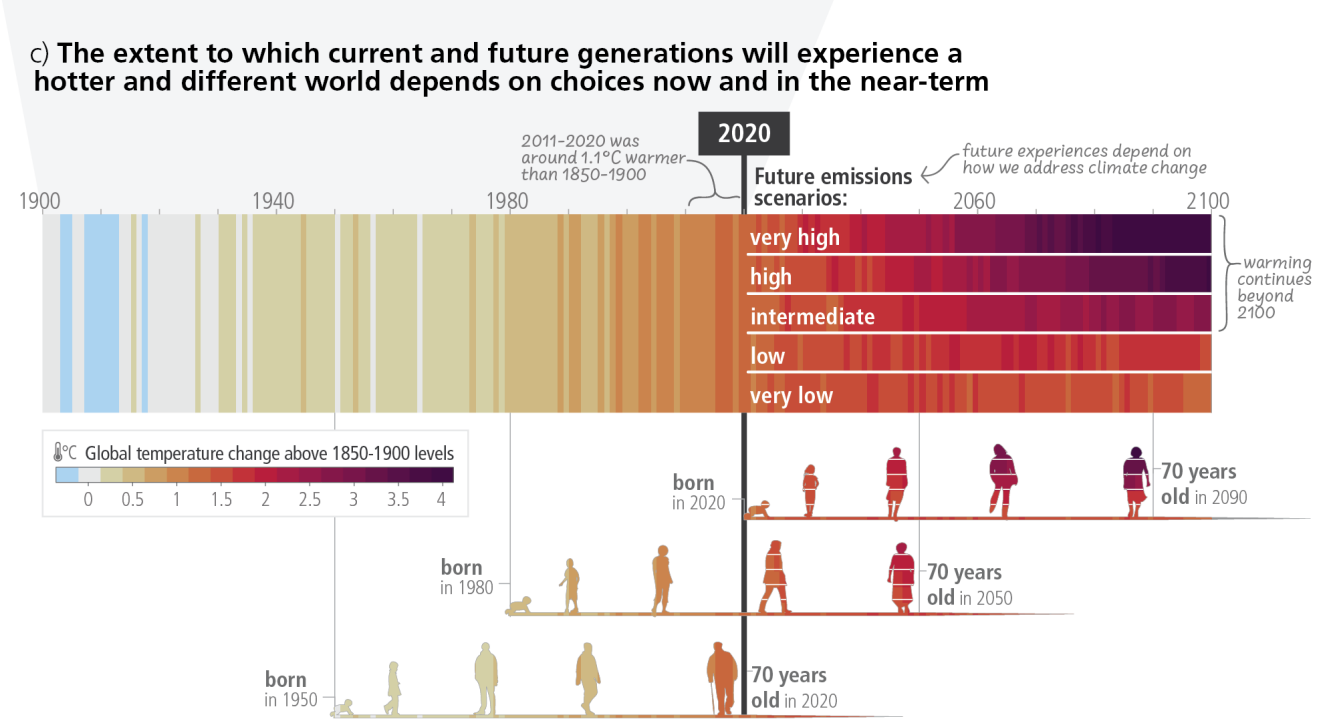
Human-caused climate change is already affecting weather and climate extremes in every region. This has led to widespread adverse impacts and related losses and damages to nature and people (*high confidence*).





IPCC, AR6 SYR SPM

With every increment of global warming, regional changes in mean climate and extremes become more widespread and pronounced



IPCC, AR6 SYR SPM

Getting to net zero: the role of the law

Catherine Higham

Policy Fellow

Grantham Research Institute on Climate Change and the Environment

London School of Economics and Political Science

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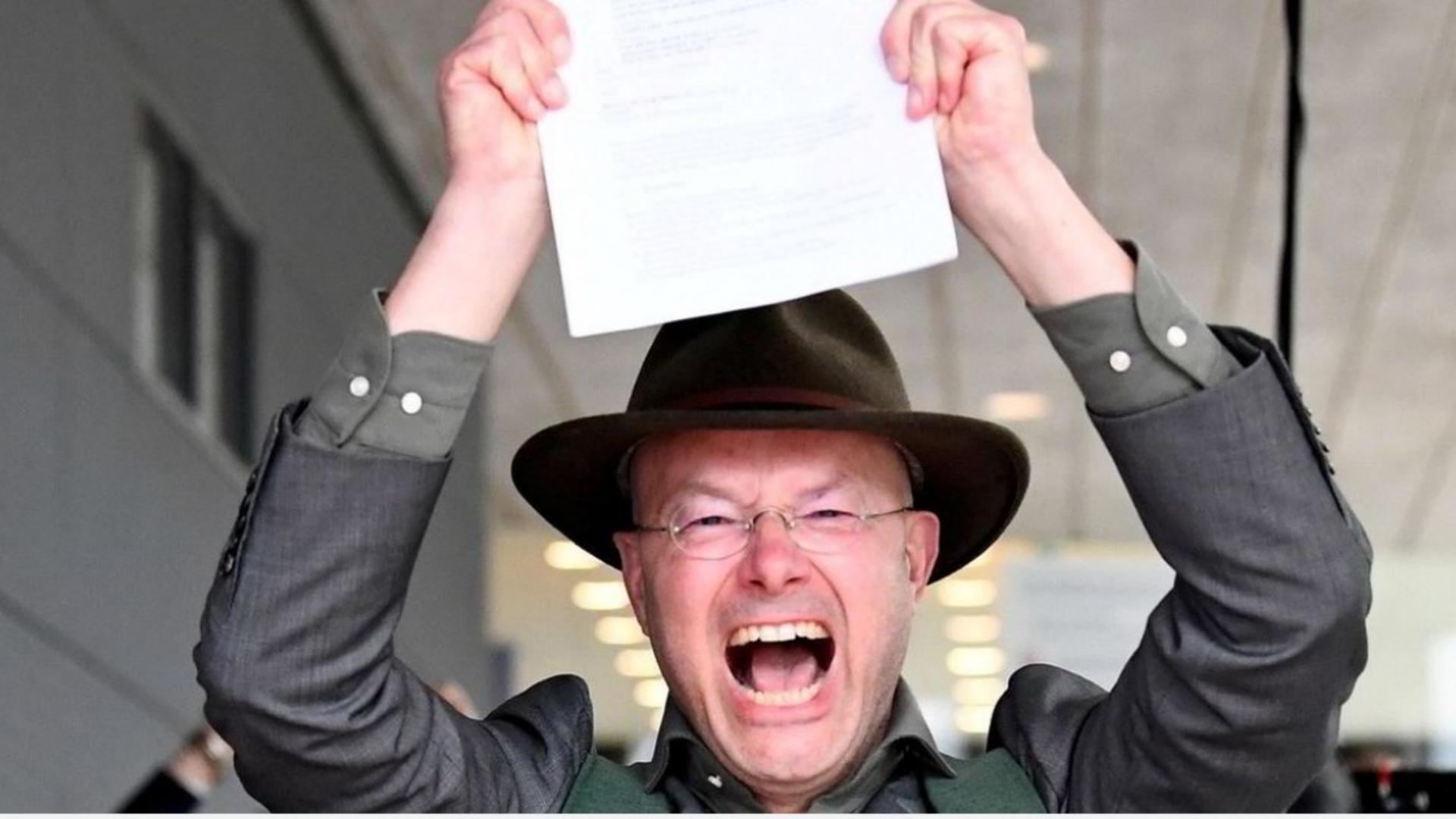
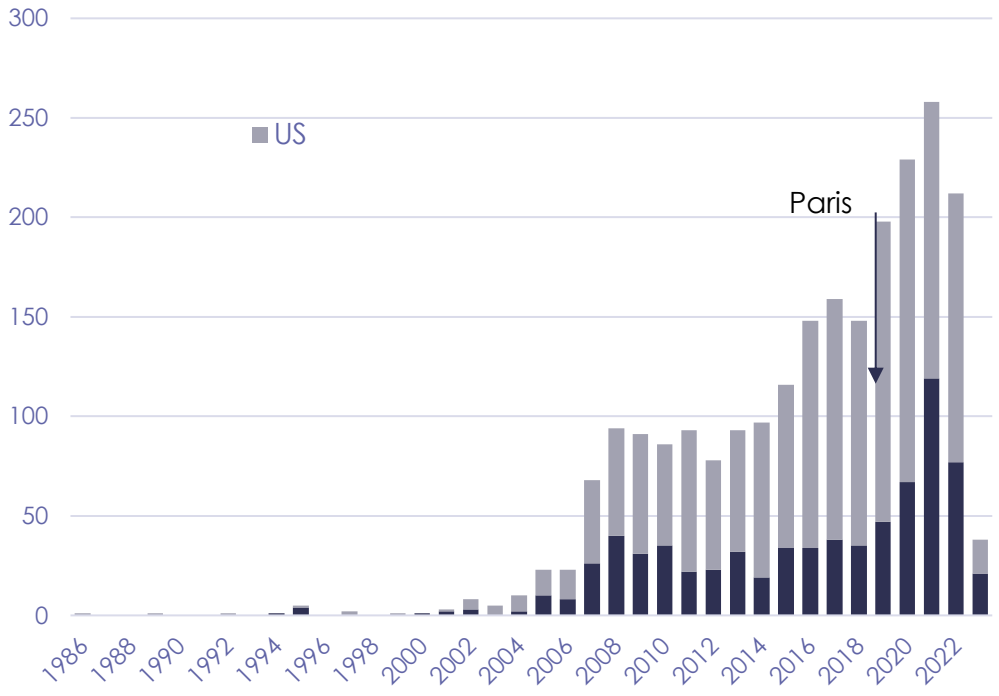
SUPERIOR COURT OF THE STATE OF CALIFORNIA

COUNTY OF SAN FRANCISCO

THE PEOPLE OF THE STATE OF CALIFORNIA, ex rel. ROB BONTA, ATTORNEY GENERAL OF CALIFORNIA, Plaintiff, **v.** **EXXON MOBIL CORPORATION; EXXONMOBIL OIL CORPORATION; SHELL PLC; SHELL USA, INC.; SHELL OIL PRODUCTS COMPANY LLC; CHEVRON CORPORATION; CHEVRON U.S.A. INC.; CONOCOPHILLIPS; CONOCOPHILLIPS COMPANY; PHILLIPS 66; PHILLIPS 66 COMPANY; BP P.L.C.; BP AMERICA INC.; AMERICAN PETROLEUM INSTITUTE; AND DOES 1 THROUGH 100, INCLUSIVE,** Defendants.	Case No. **COMPLAINT FOR ABATEMENT, EQUITABLE RELIEF, PENALTIES, AND DAMAGES** **JURY TRIAL DEMANDED** **(1) PUBLIC NUISANCE;** **(2) GOVERNMENT CODE SECTION 12607;** **(3) UNTRUE OR MISLEADING ADVERTISING;** **(4) MISLEADING ENVIRONMENTAL MARKETING;** **(5) UNLAWFUL, UNFAIR, OR FRAUDULENT BUSINESS PRACTICES;** **(6) STRICT PRODUCTS LIABILITY – FAILURE TO WARN; AND** **(7) NEGLIGENT PRODUCTS LIABILITY – FAILURE TO WARN**



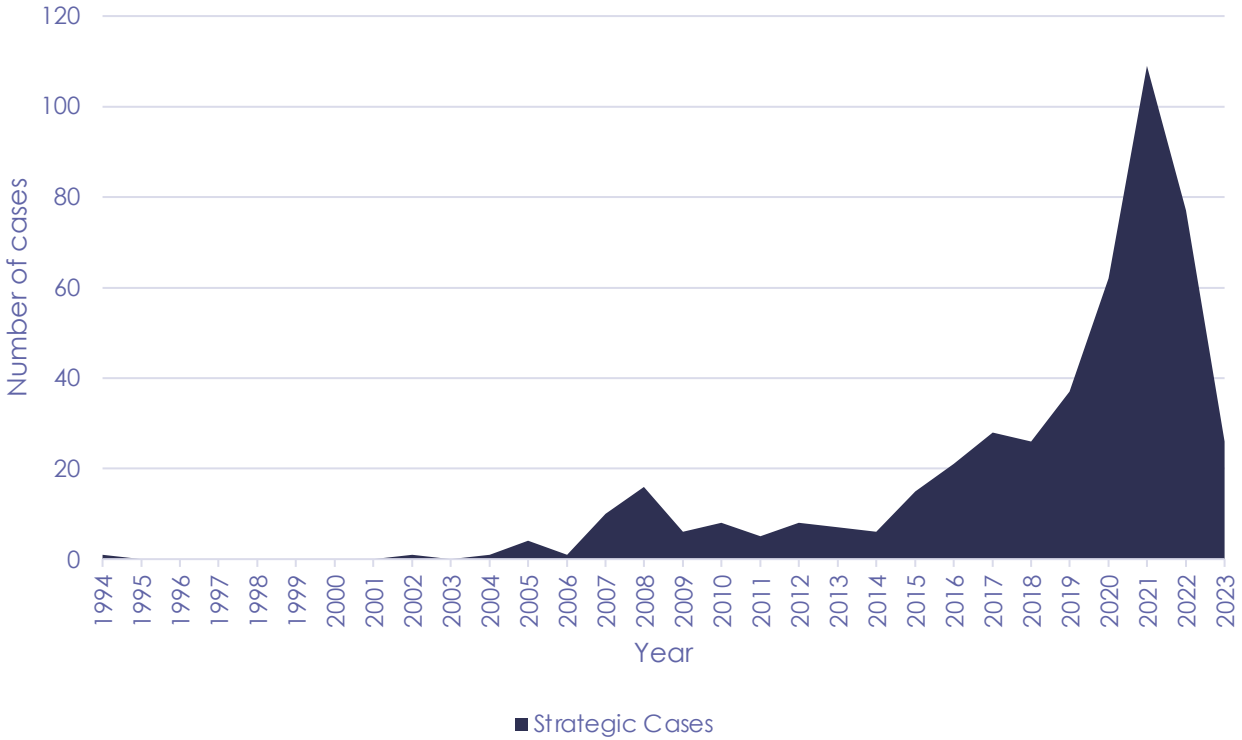
Climate case numbers rising year on year



- Over 2,340 cases
  - 1,590 in the US but now in more than 50 countries
- 2/3 since the Paris Agreement
- 190 cases in the last 12 months
- 2021 highest annual number of cases

Note: Up to end of May 2023, based on Sabin Center databases

The number of strategic cases continues to grow

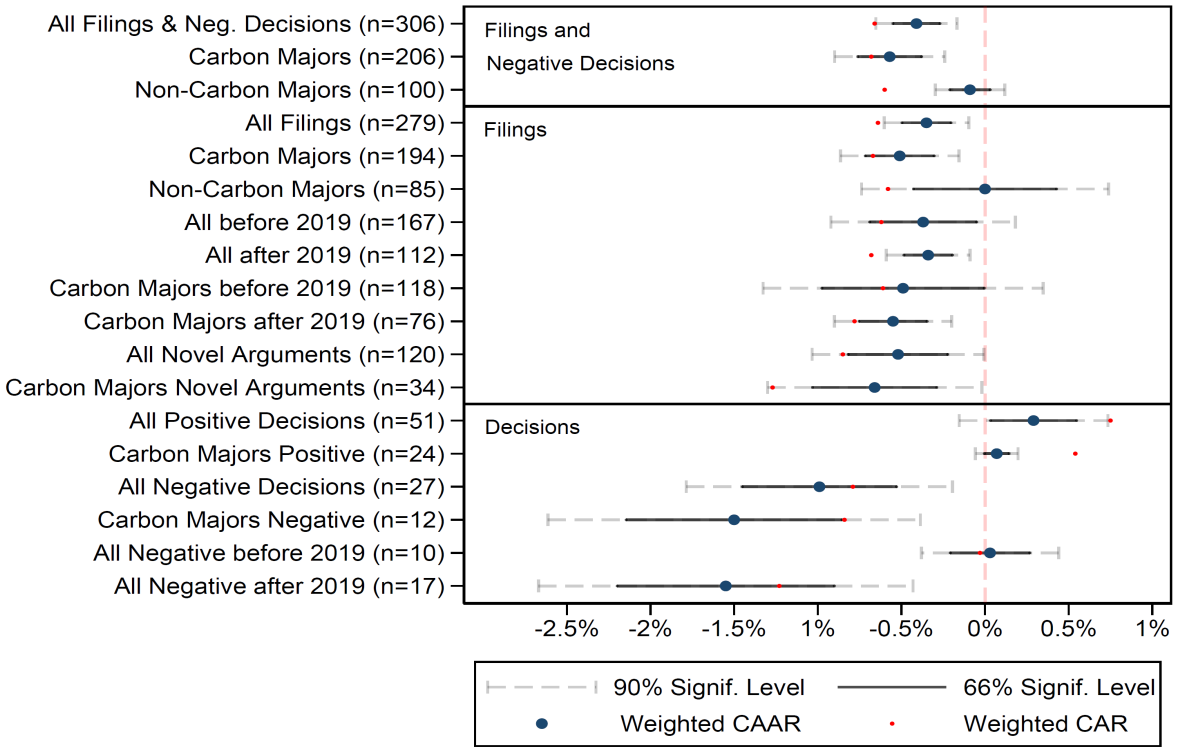


Not all strategic litigation is aligned with climate goals – e.g. 'ESG backlash' litigation

Growth in strategic cases over time (%), outside the US, to 31 May 2023

Event study to measure impacts of events on firm value

Sato, M., Gostlow, G., Higham, C., Setzer, J., and Venmans, F. (2023). ***Impacts of climate litigation on firm value.*** Grantham Research Institute on Climate Change and the Environment Working Paper No 397.



Impacts on firm value:
- Higher for **carbon majors**
- Not significant for **non-majors**
- No effect **before 2019**
- Higher for **"novel"** cases
- Effect largest for **negative decisions** against Carbon Majors after 2019

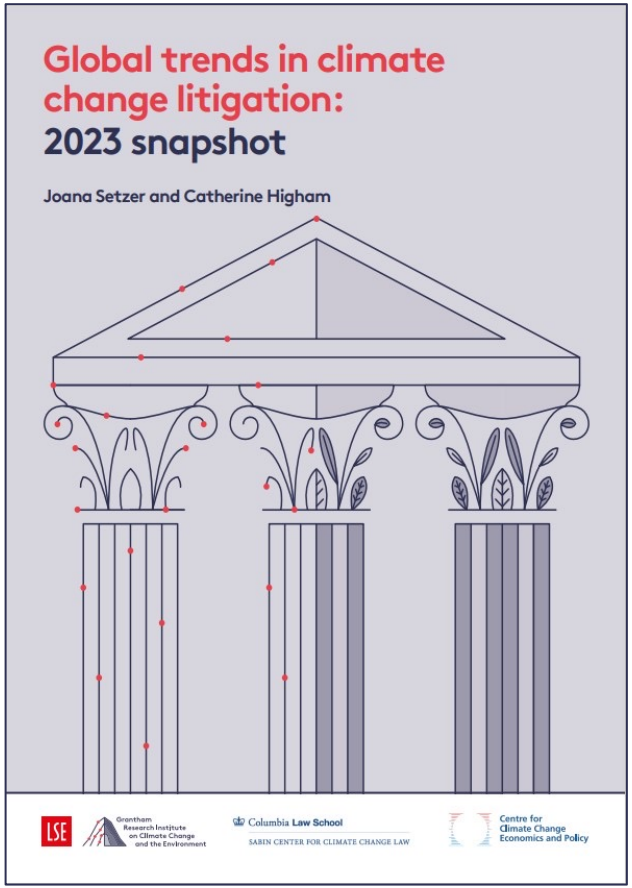
Thank you!

- **Access the 2023 report:**
https://www.lse.ac.uk/granthaminstitute/publication/global-trends-in-climate-litigation-2023-snapshot

- **Access the database:**
https://climate-laws.org

- **Contact us:**

Joana Setzer - j.setzer@lse.ac.uk
Kate Higham – c.m.higham@lse.ac.uk



Panel discussion and Q&A

Professor Ralf Toumi

Director

Grantham Institute – Climate Change and the Environment

Imperial College London

Closing remarks

Professor Ralf Toumi

Director

Grantham Institute – Climate Change and the Environment

Imperial College London