

# Understanding and Preventing Climate Breakdown

Fabian Dablander

University of Amsterdam

22<sup>nd</sup> February, 2023

# Outline

- Part I: The Bigger Picture
  - Part II: Climate Emergency
- 

} 30 min

- Part III: Why Have We Failed So Far?
  - Part IV: Why Current Policy is Insufficient
- 

} 30 min

- Part V: Climate Action
- Part VI: Discussion

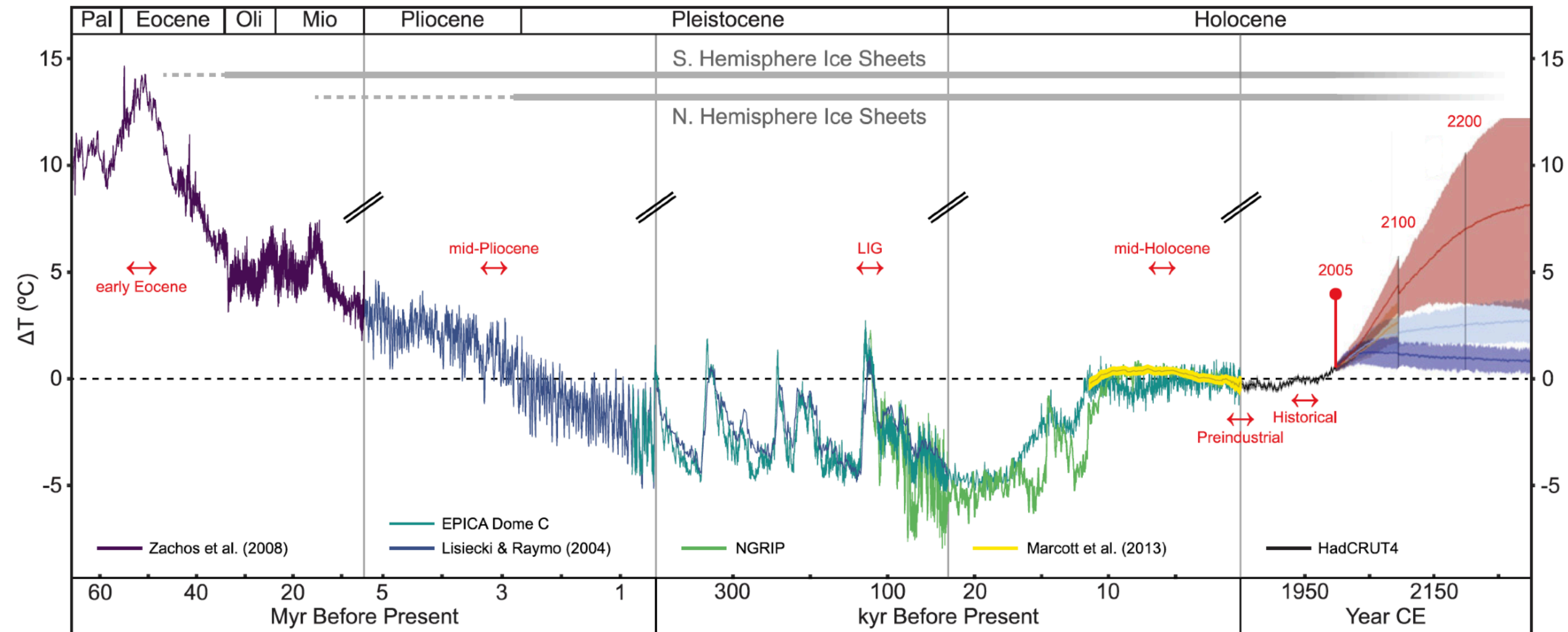
} 30 min



# **Part I:**

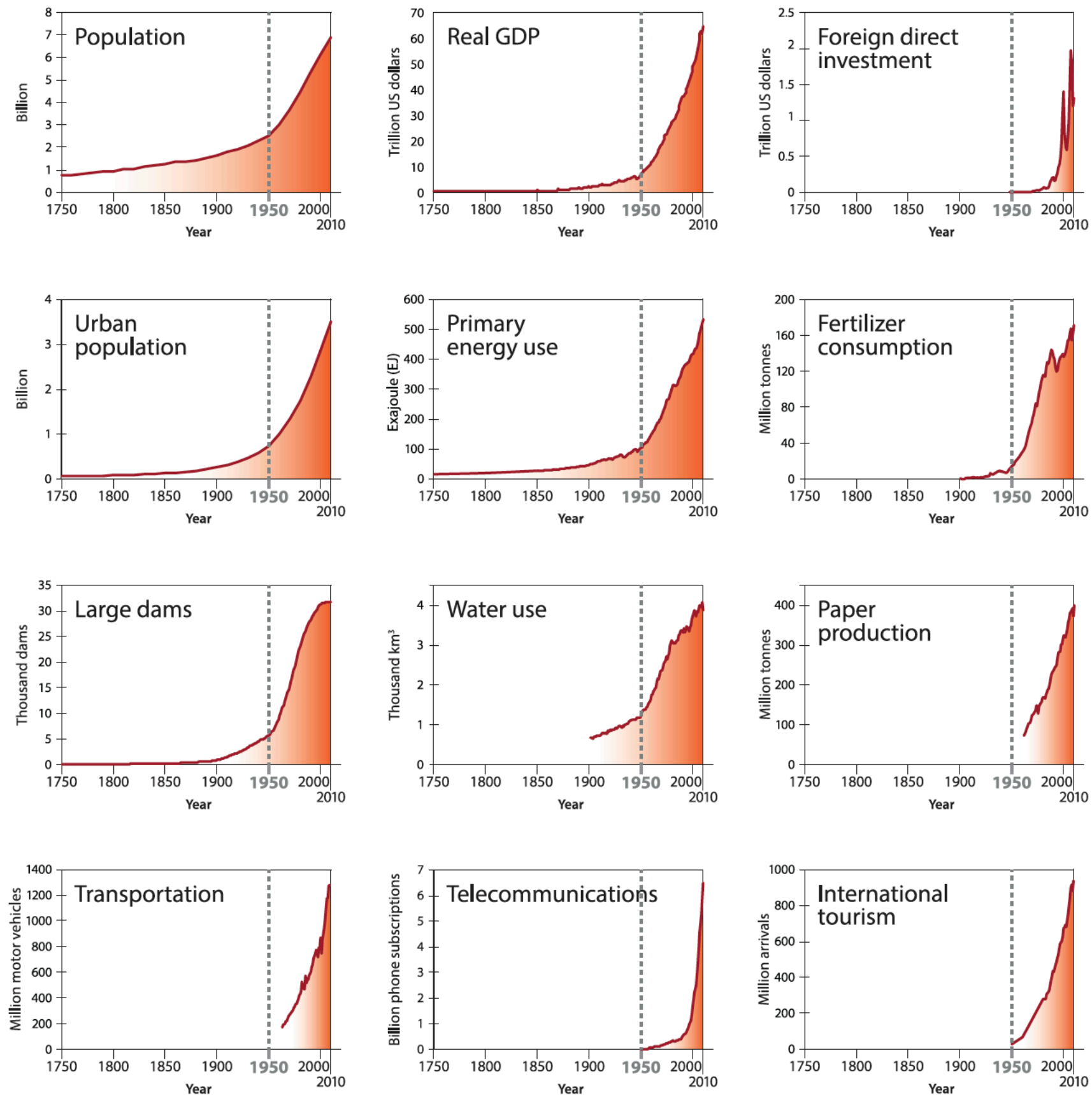
# **The Bigger Picture**





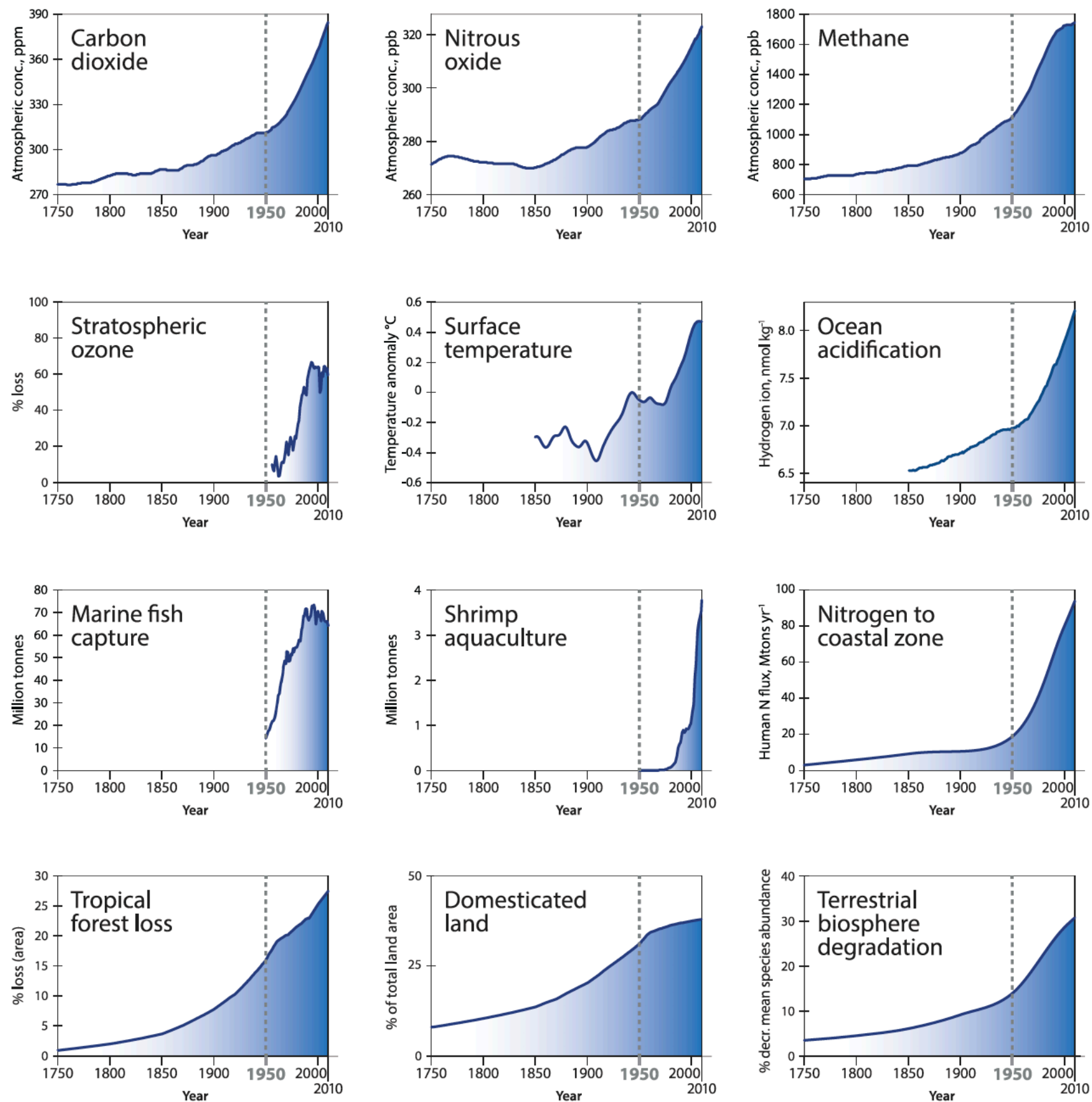
Burke et al. (2018); Brannen (2021); United Nations (2021)

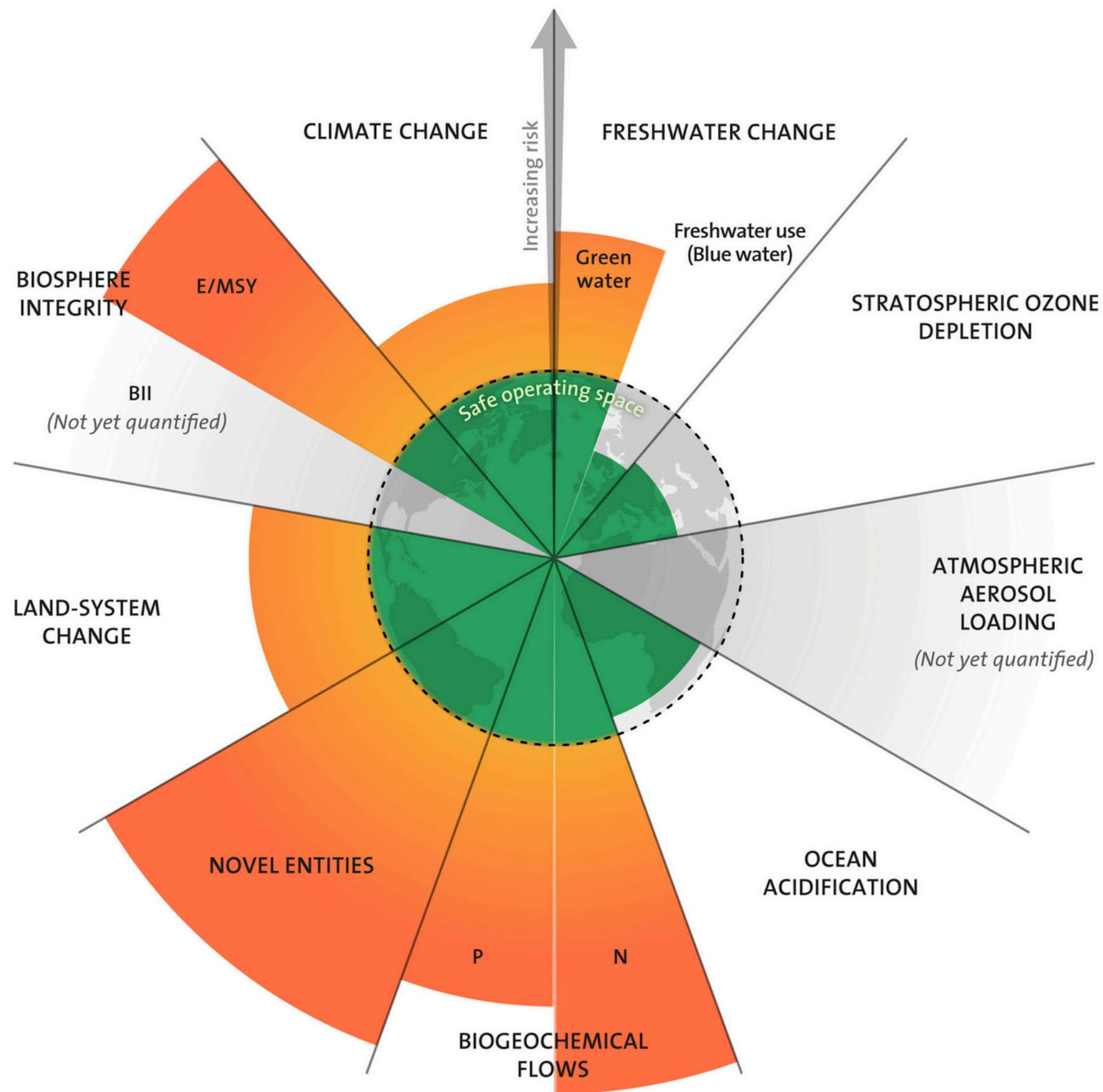
# Socio-economic trends

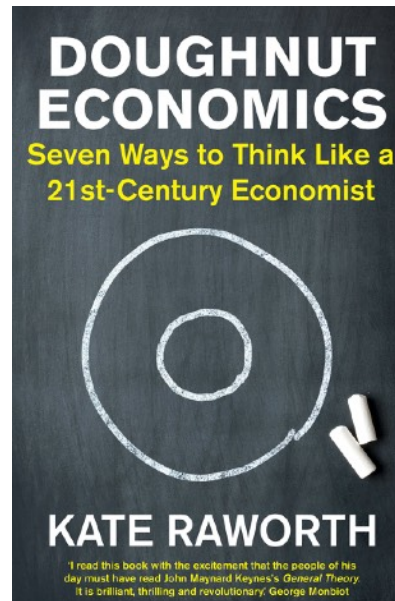
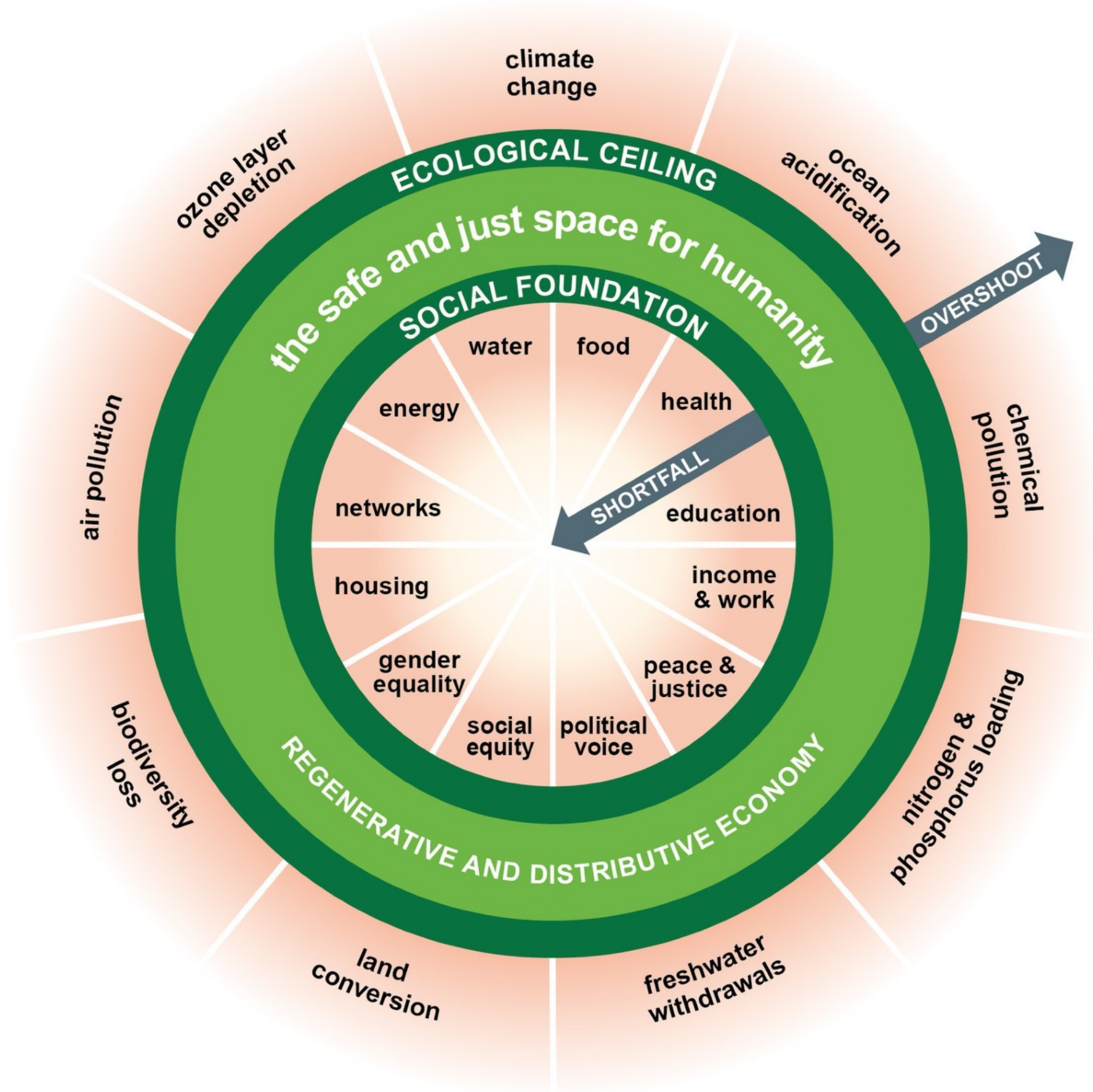




# Earth system trends







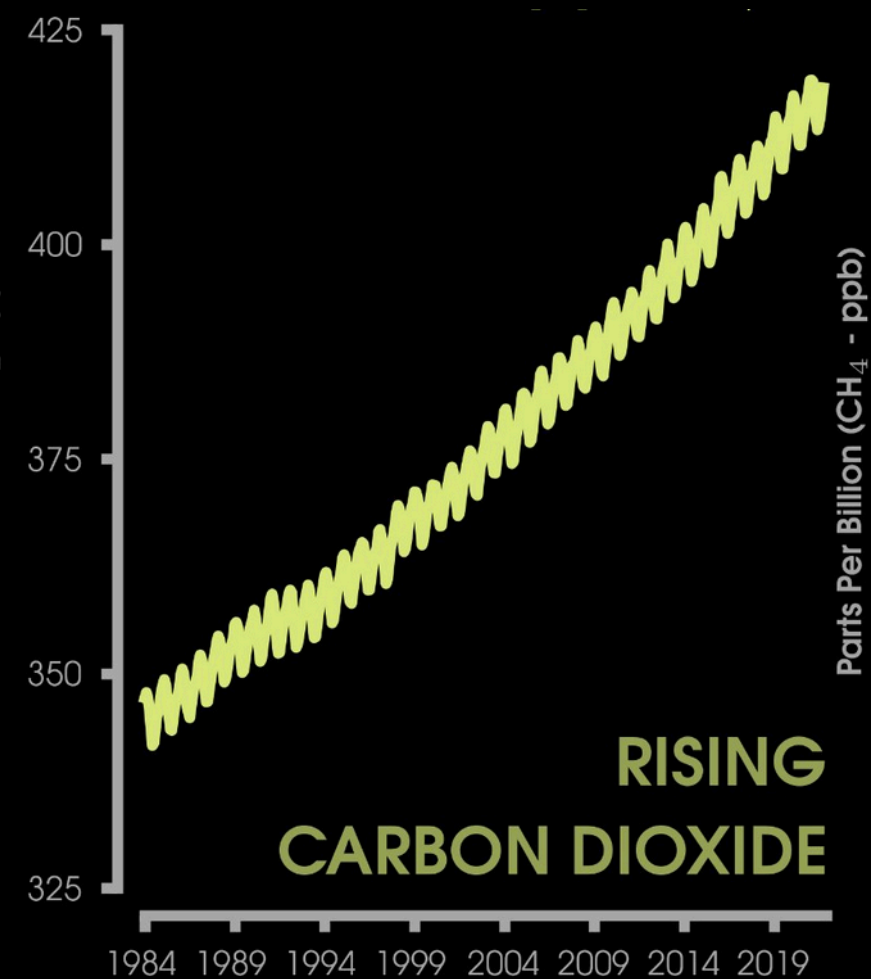






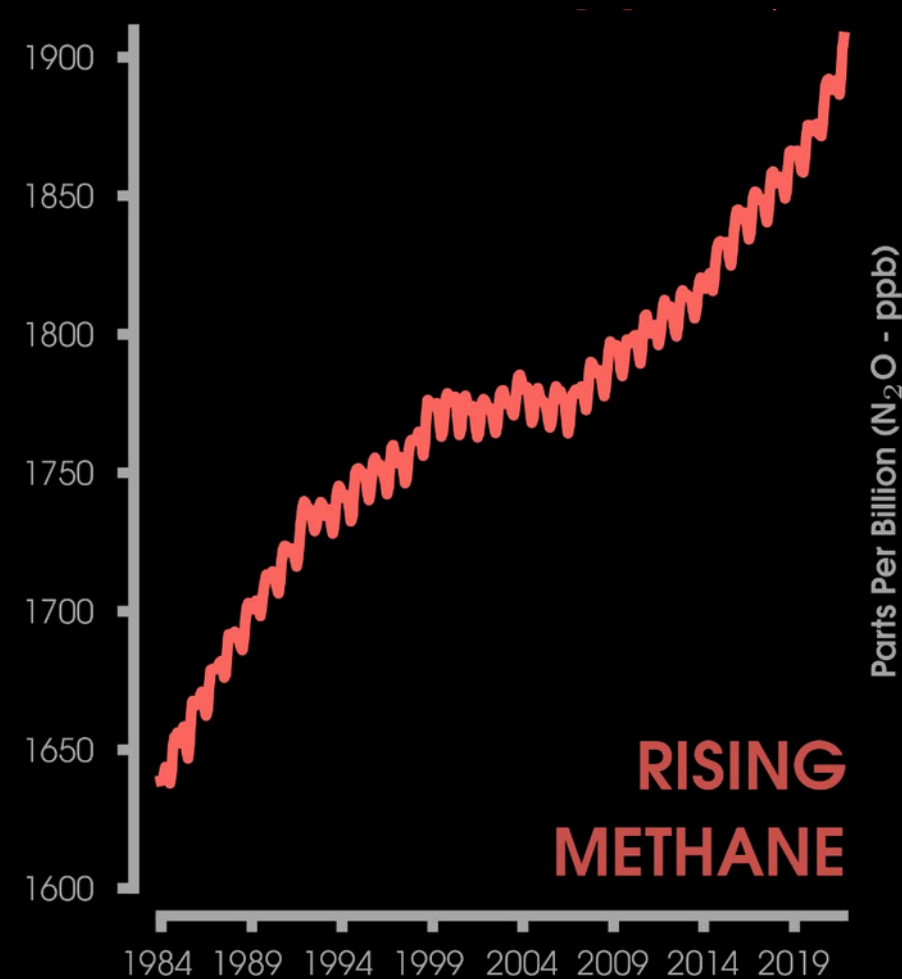
# **Part II:**

# **Climate Emergency**



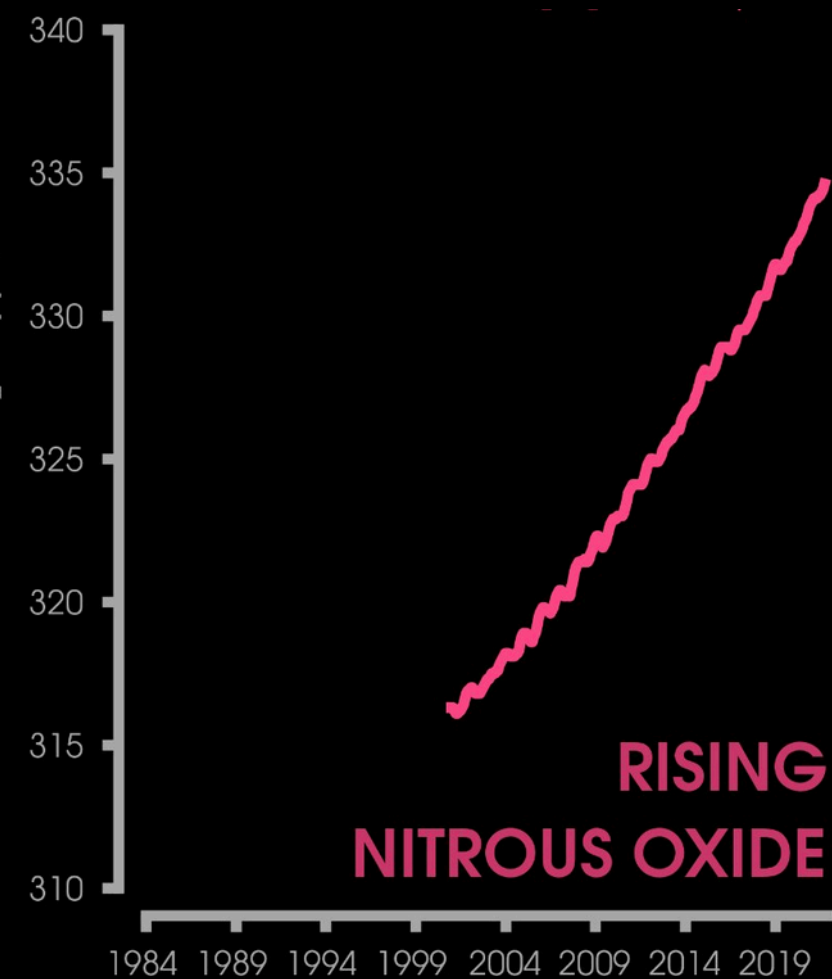
DATA: NOAA ESRL DATA (Keeling Curve) - Mauna Loa, HI  
SOURCE: <https://www.esrl.noaa.gov/gmd/ccgg/trends/data.html>

GRAPHIC: Zachary Labe (@ZLabe)  
UPDATE: January 2022



DATA: Ed Dlugokencky, NOAA/ESRL DATA  
SOURCE: <https://www.esrl.noaa.gov/gmd/ccgg/trends/ch4/global>

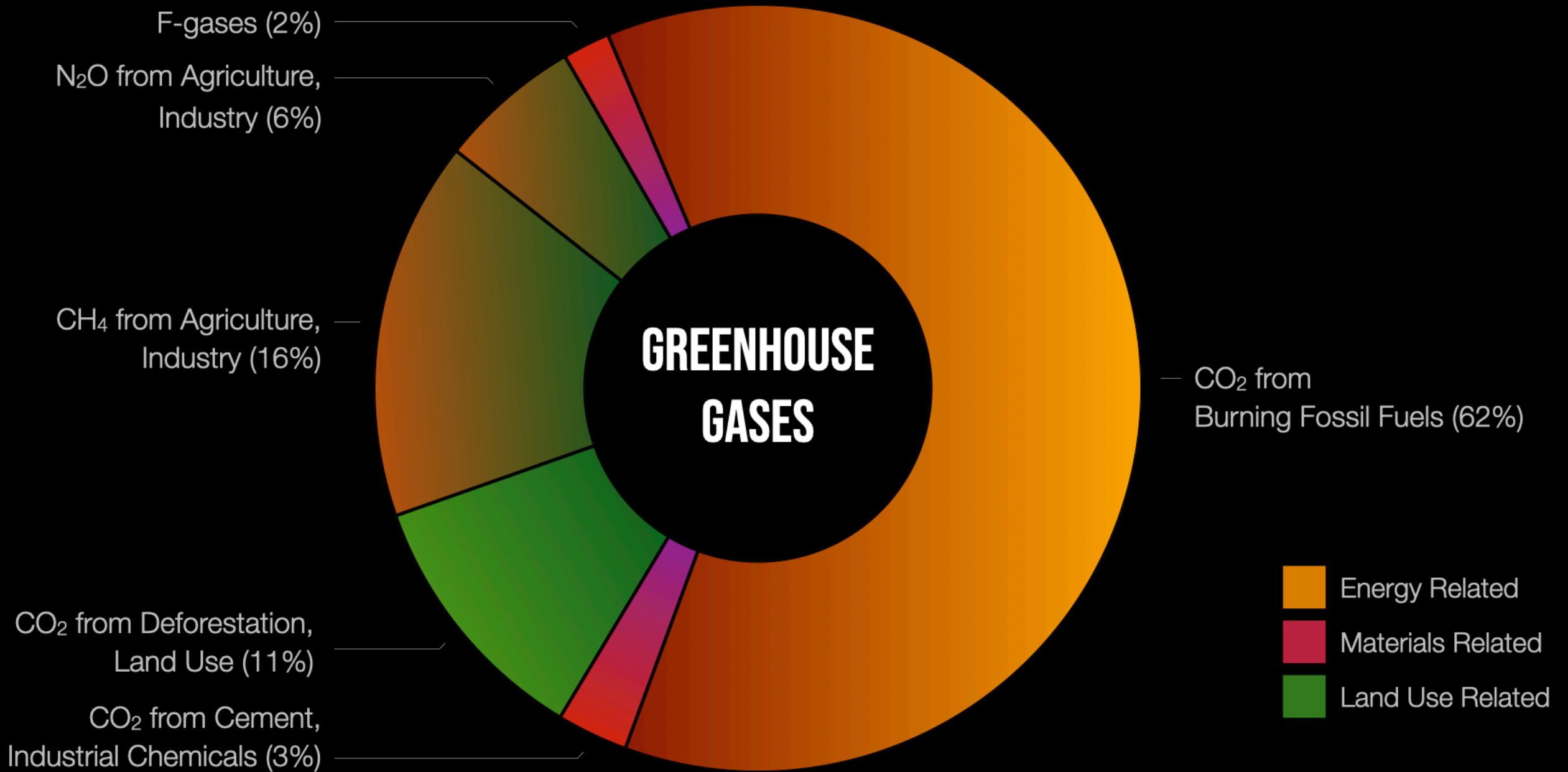
GRAPHIC: Zachary Labe (@ZLabe)  
UPDATE: October 2021



DATA: Ed Dlugokencky, NOAA/GML DATA  
SOURCE: <https://gml.noaa.gov/ccgg/trends/n2o/>

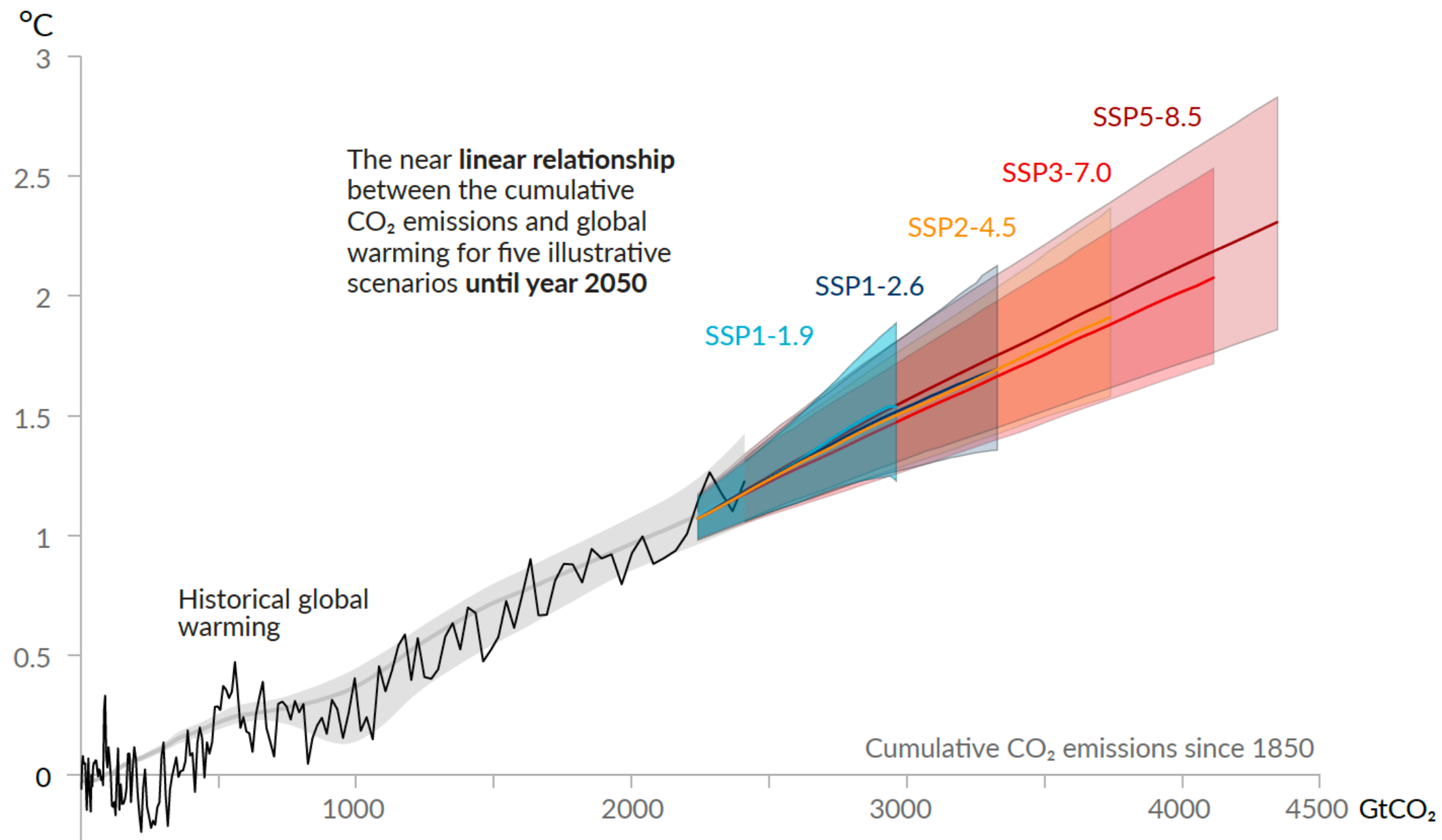
GRAPHIC: Zachary Labe (@ZLabe)  
UPDATE: October 2021

# GREENHOUSE GASES

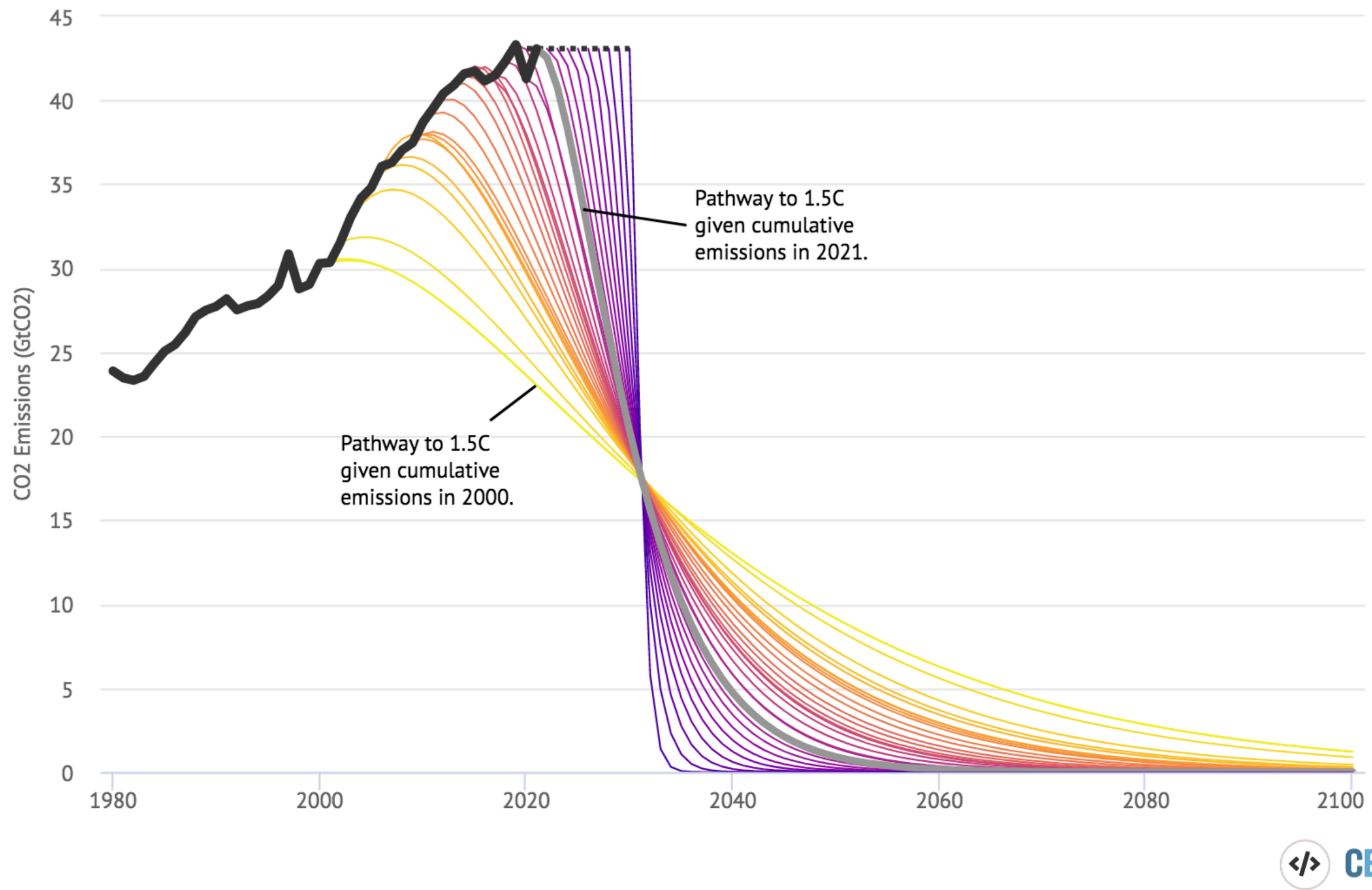


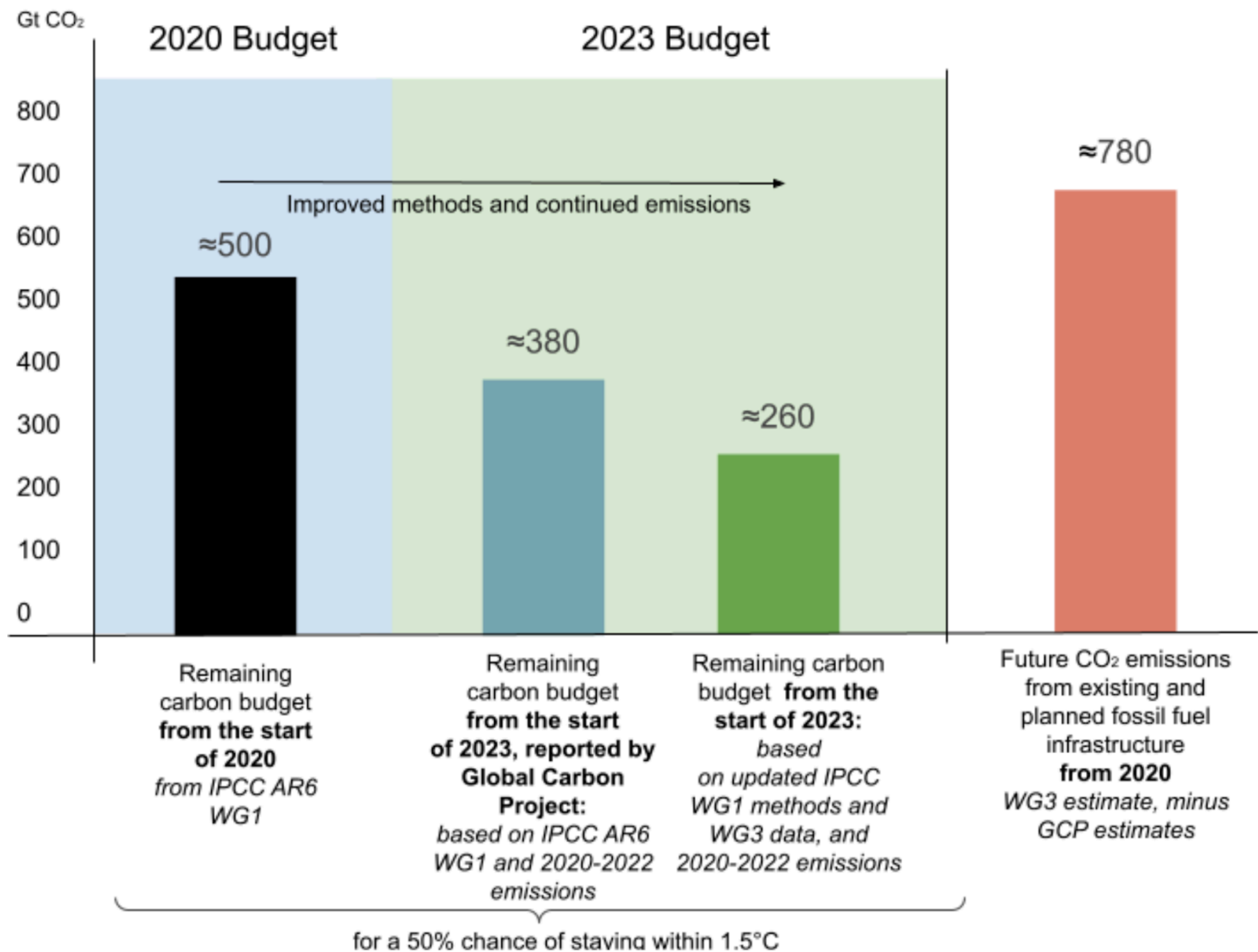
# Every tonne of CO<sub>2</sub> emissions adds to global warming

Global surface temperature increase since 1850-1900 (°C) as a function of cumulative CO<sub>2</sub> emissions (GtCO<sub>2</sub>)



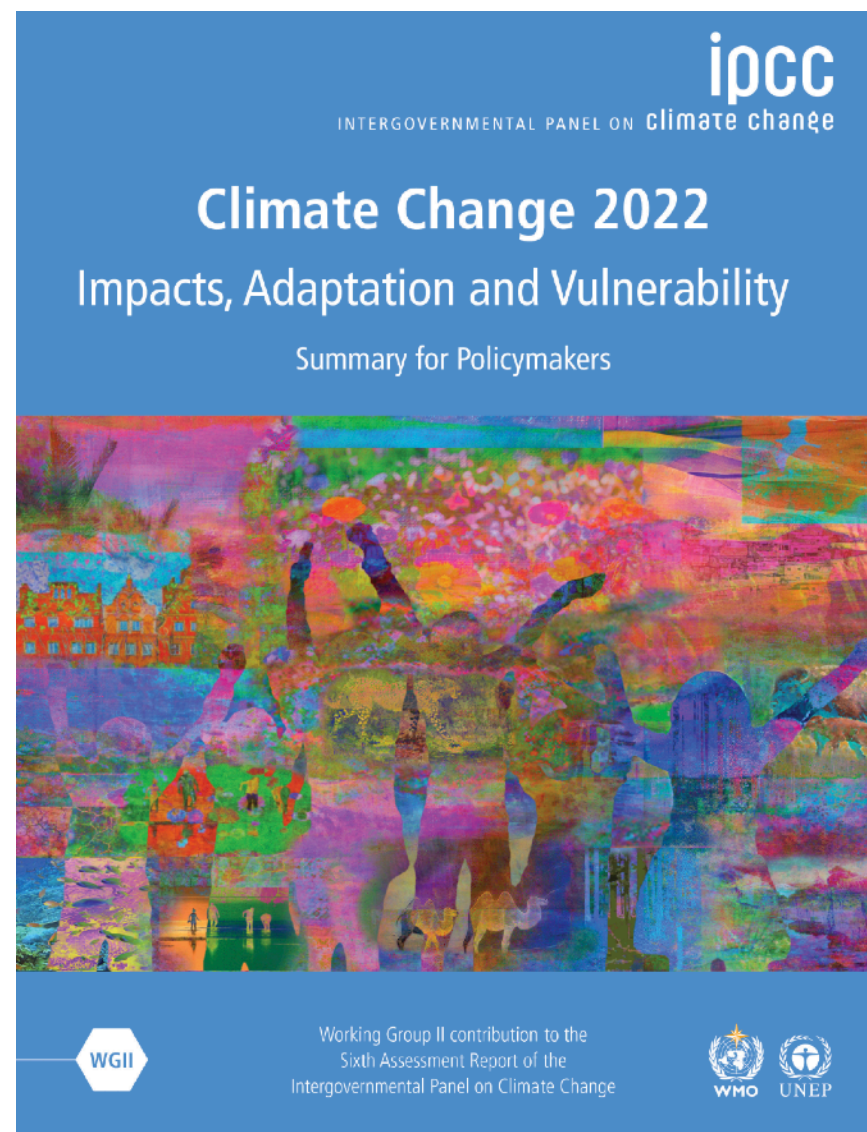
## Limiting warming to 1.5C is increasingly difficult without large-scale negative emissions

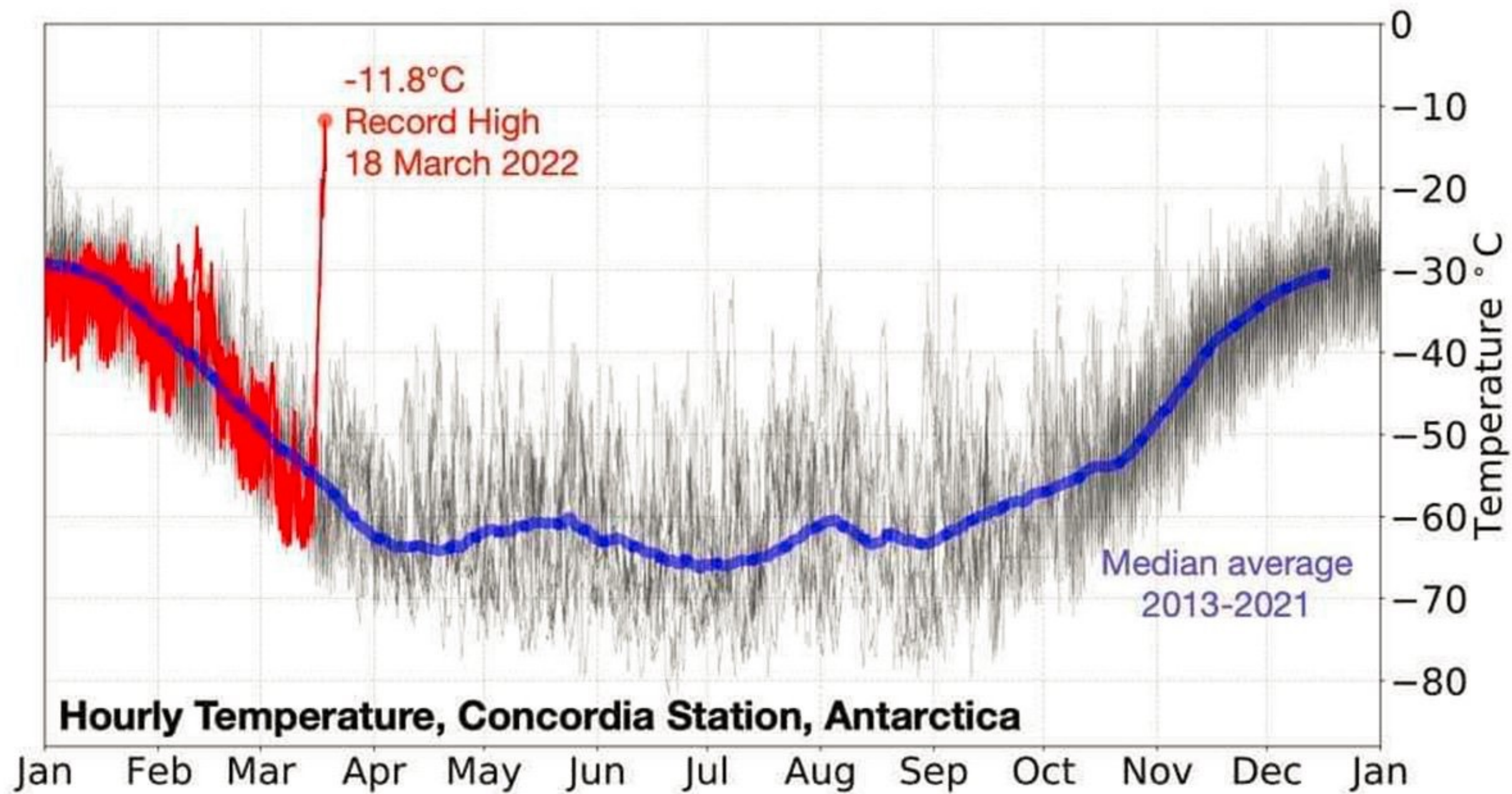






# Climate impacts emerge earlier and are worse than anticipated





**Hourly Temperature, Concordia Station, Antarctica**



# Canadian inferno: northern heat exceeds worst-case climate models

Source

Mann Podcast

Scientists fear heat domes in North America and Siberia indicate a new dimension to the global crisis

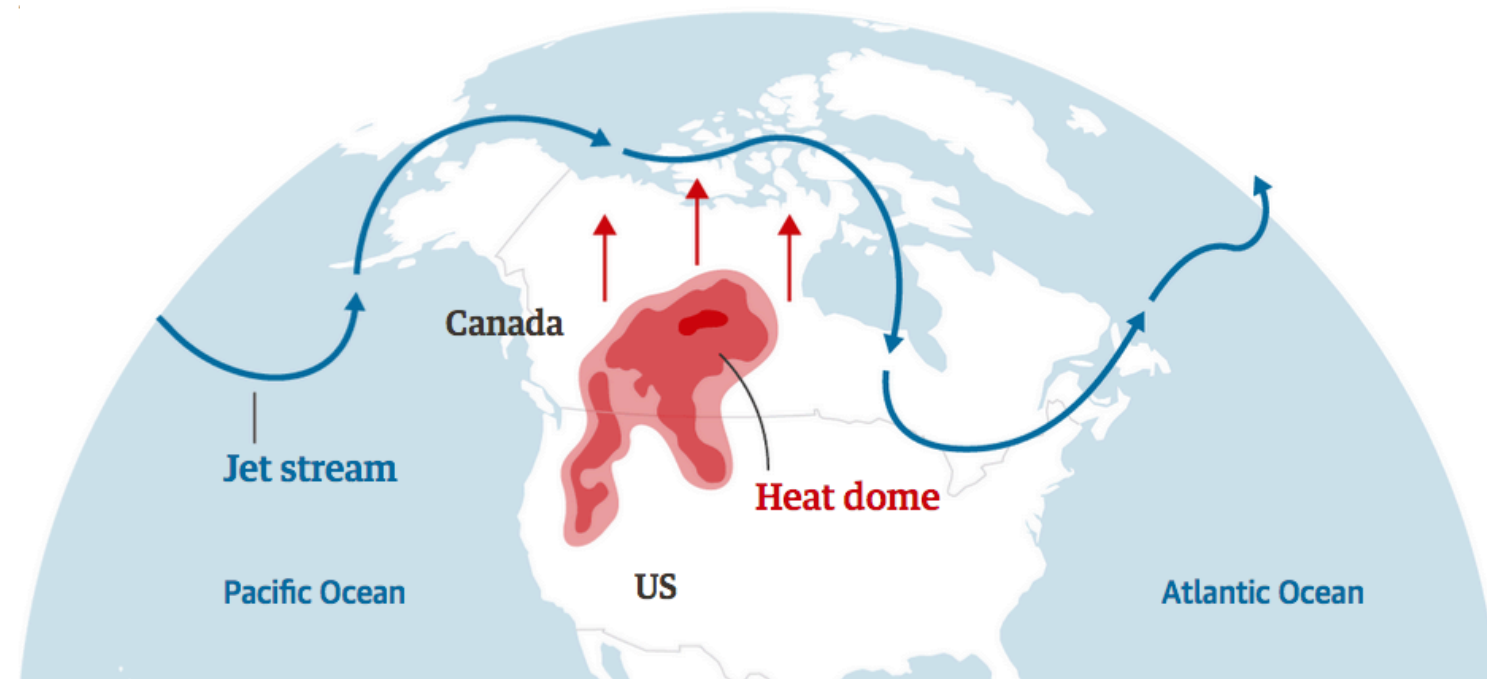
**Jonathan Watts**

🐦 @jonathanwatts

Fri 2 Jul 2021 16.28 BST

“[T]here is something else going on with this heatwave, and indeed, with many of the very persistent weather extremes we’ve seen in recent years in the US, Europe, Asia and elsewhere, where the models aren’t quite capturing the impact of climate change.”

- Michael Mann



“The recent extreme weather anomalies were not represented in global computer models that are used to project how the world might change with more emissions.”

- Johan Rockström

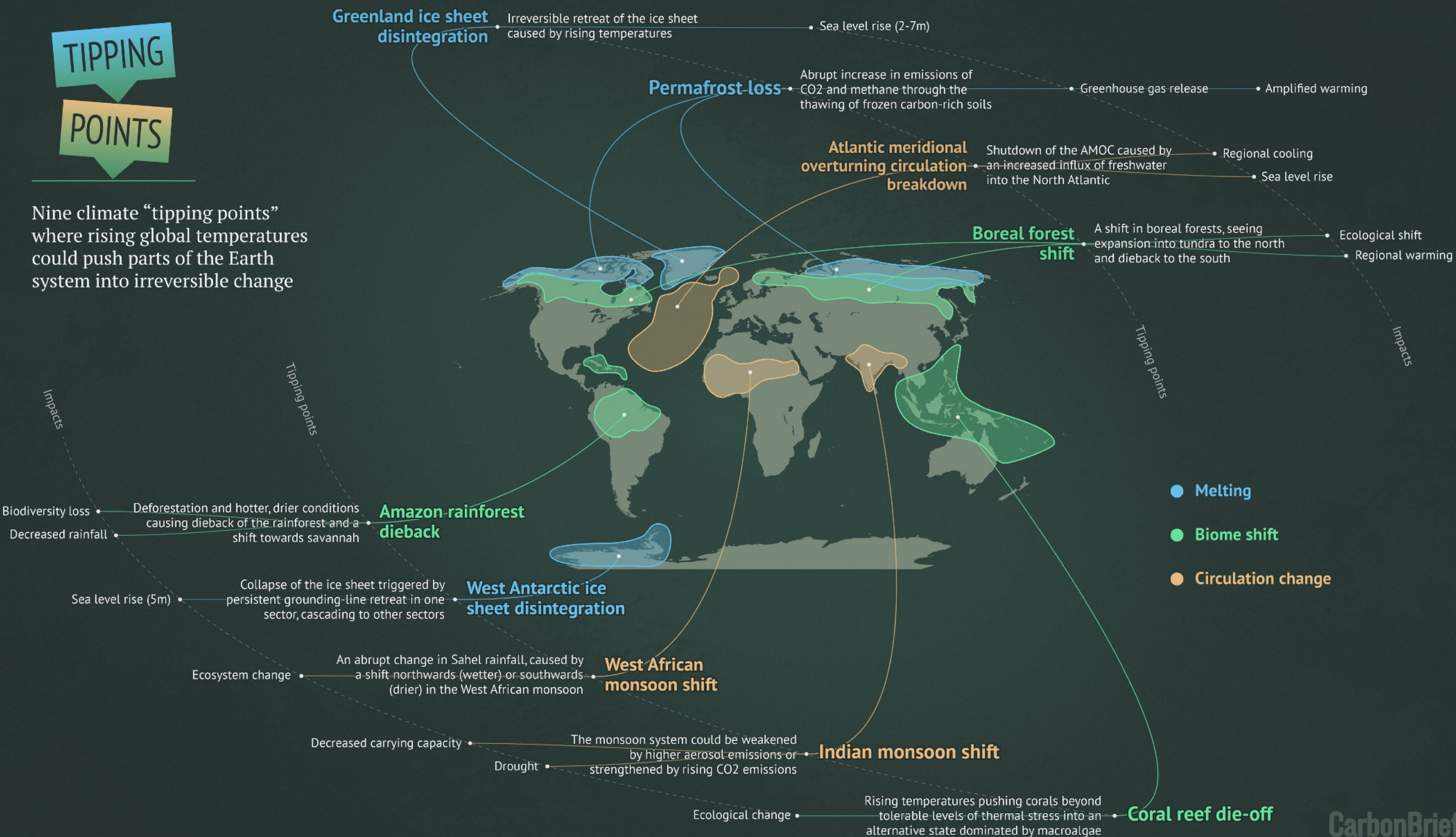
Fisher et al. (2021)

McSweeney (2019)



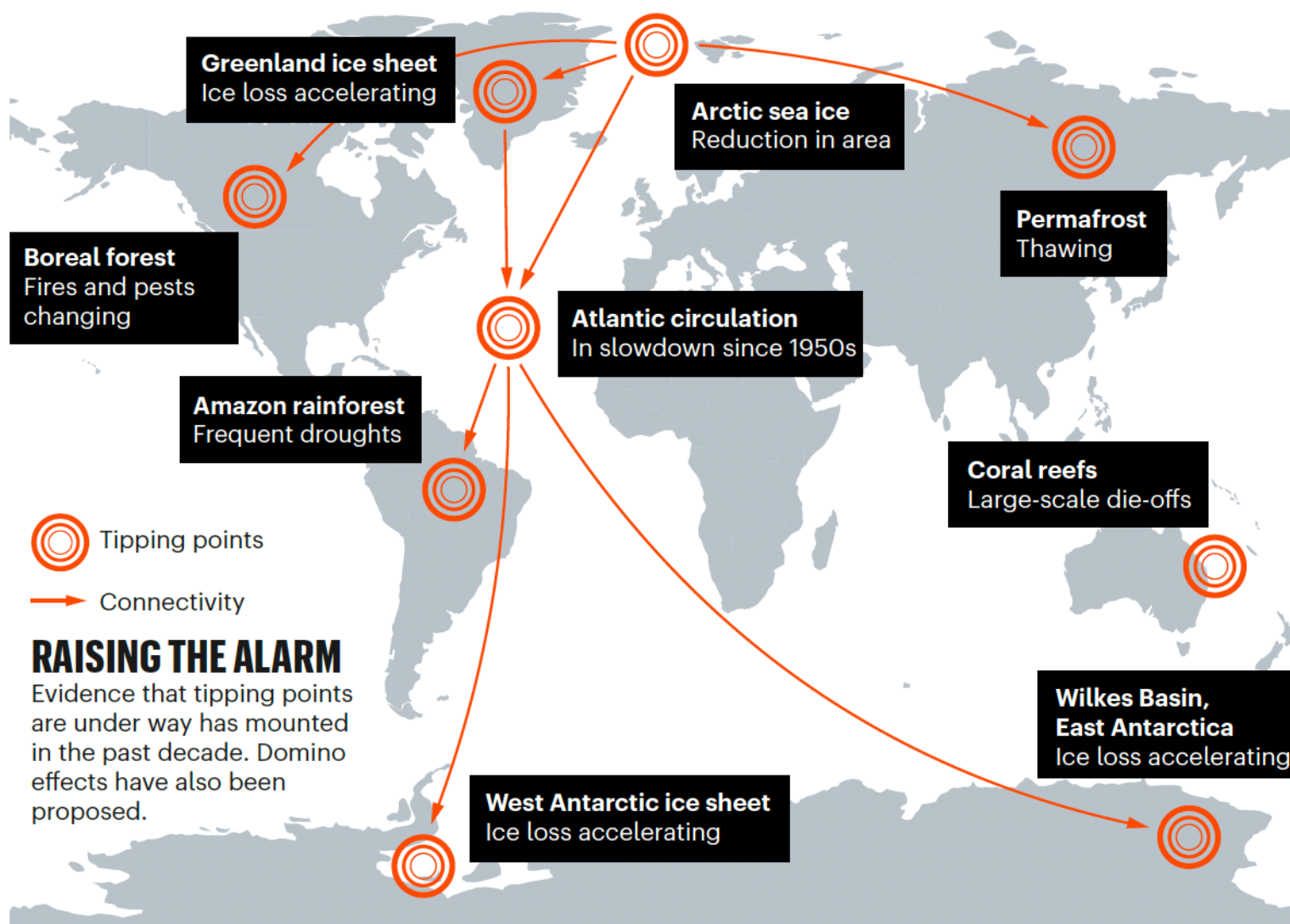
# TIPPING POINTS

Nine climate “tipping points” where rising global temperatures could push parts of the Earth system into irreversible change

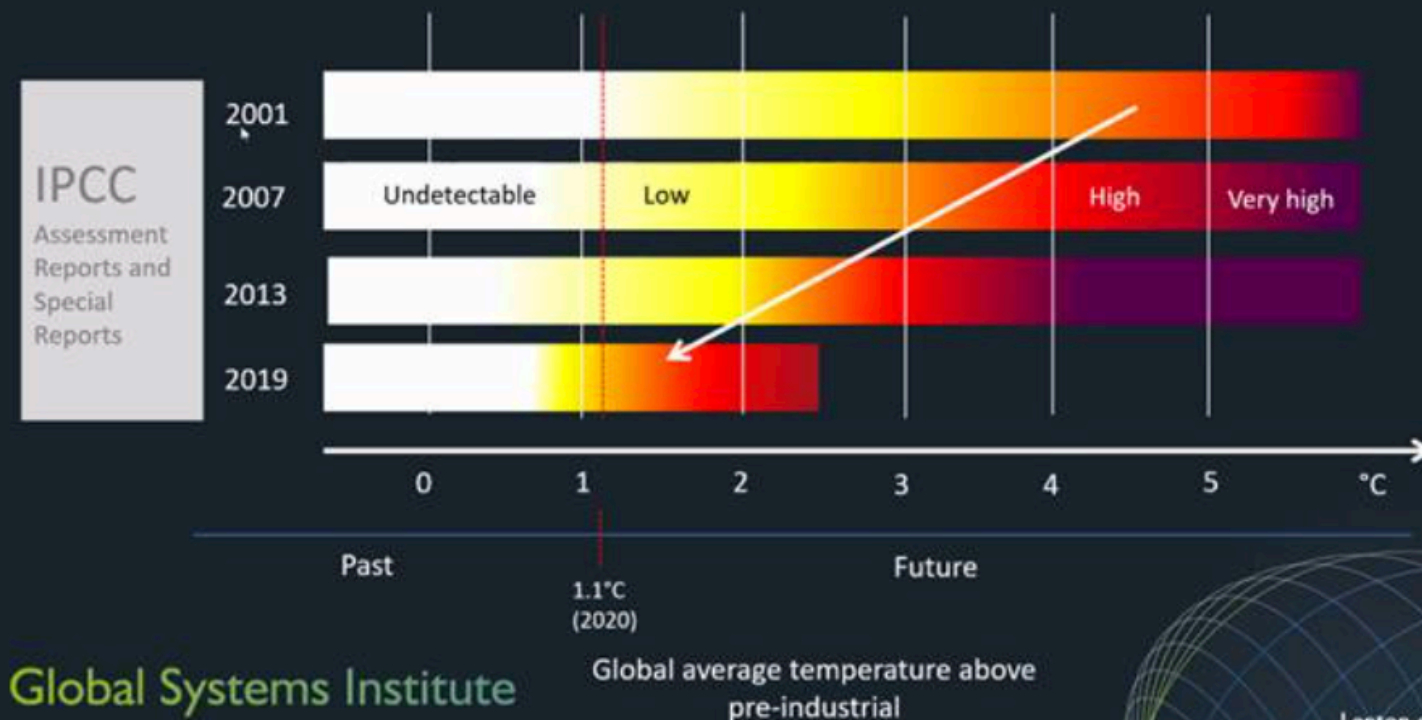


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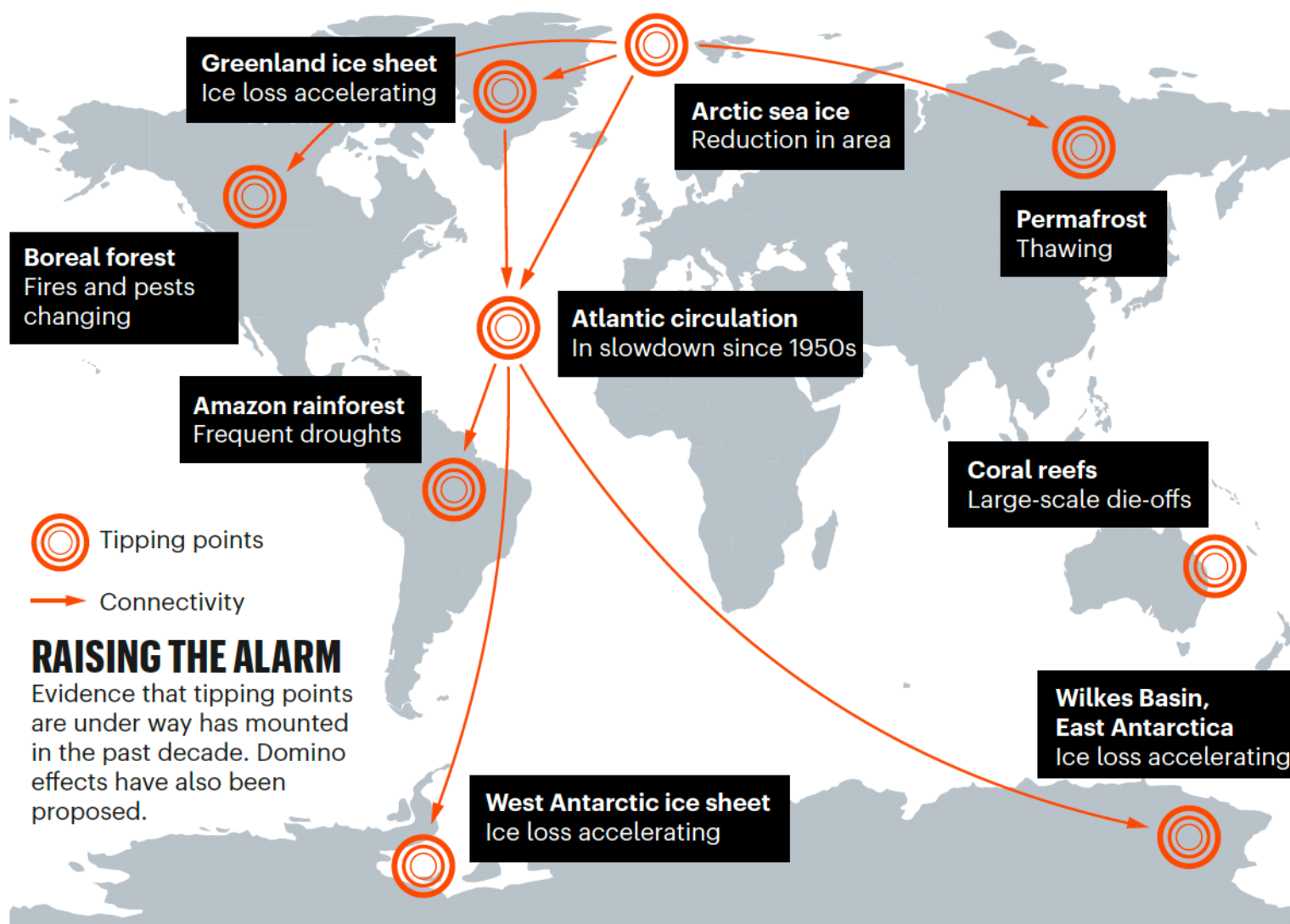




## Changing risk assessment of tipping points



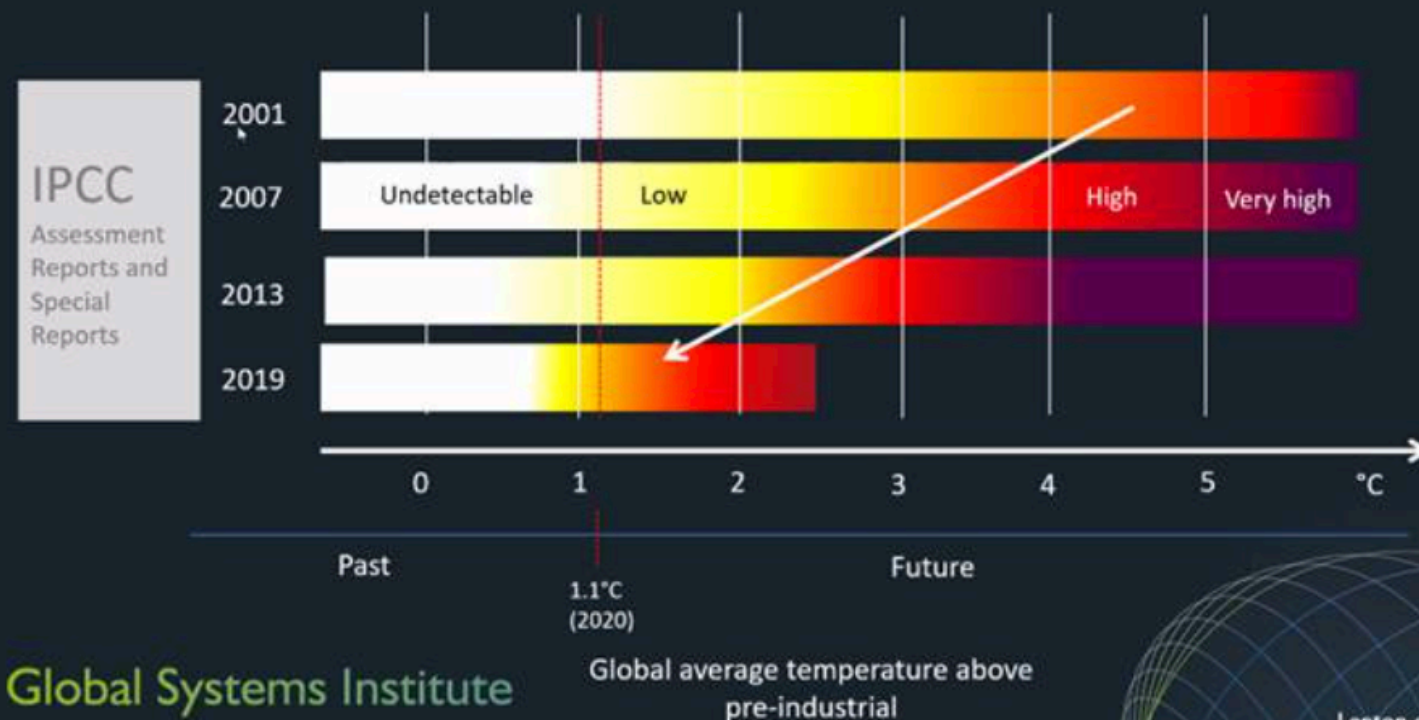
Ritchie et al. (2020)  
Lenton et al. (2019)  
Wunderling et al. (2021)  
McKay et al. (2022)



“The evidence from tipping points alone suggests that we are in a state of planetary emergency.”

- Lenton et al. (2019)

## Changing risk assessment of tipping points



Ritchie et al. (2020)  
Lenton et al. (2019)  
Wunderling et al. (2021)  
McKay et al. (2022)



# Exceeding 1.5°C global warming could trigger multiple climate tipping points

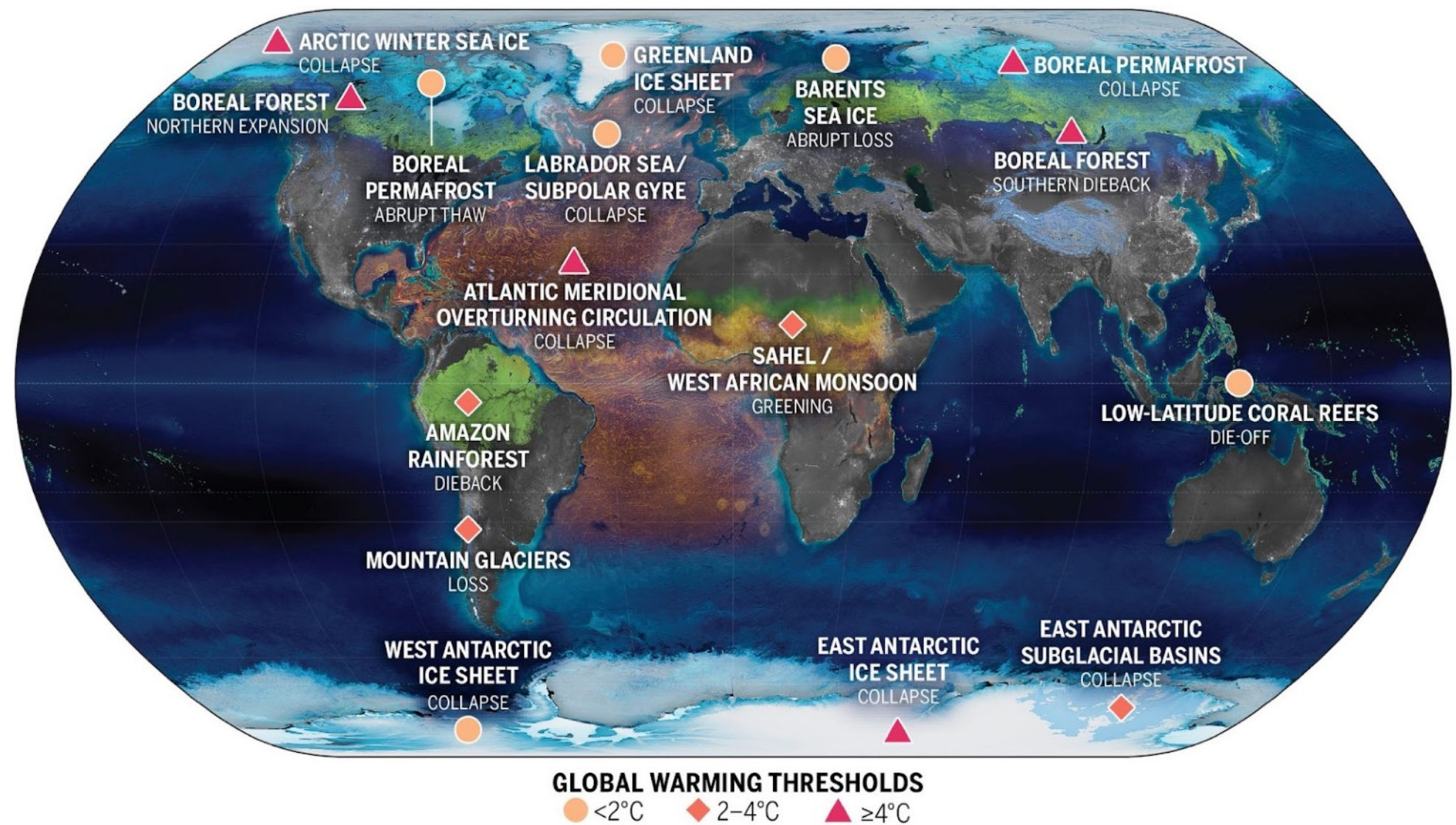
DAVID I. ARMSTRONG MCKAY , ARIE STAAL , JESSE F. ABRAMS , RICARDA WINKELMANN , BORIS SAKSCHEWSKI , SINA LORIANI , INGO FETZER ,

SARAH E. CORNELL , JOHAN ROCKSTRÖM, AND TIMOTHY M. LENTON 

[fewer](#)

[Authors Info & Affiliations](#)

SCIENCE • 9 Sep 2022 • Vol 377, Issue 6611 • DOI: [10.1126/science.abn7950](https://doi.org/10.1126/science.abn7950)

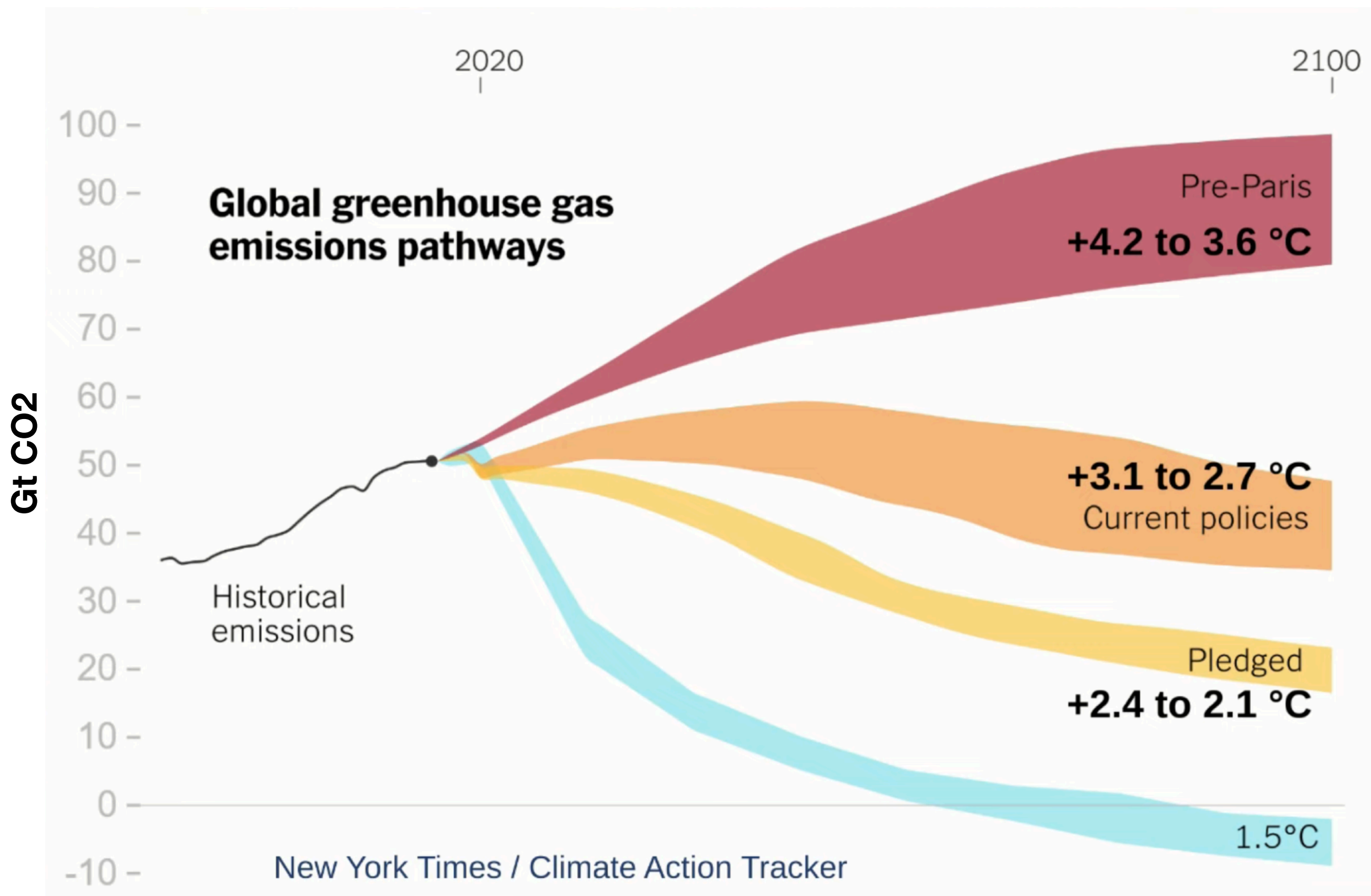


Ritchie et al. (2020)

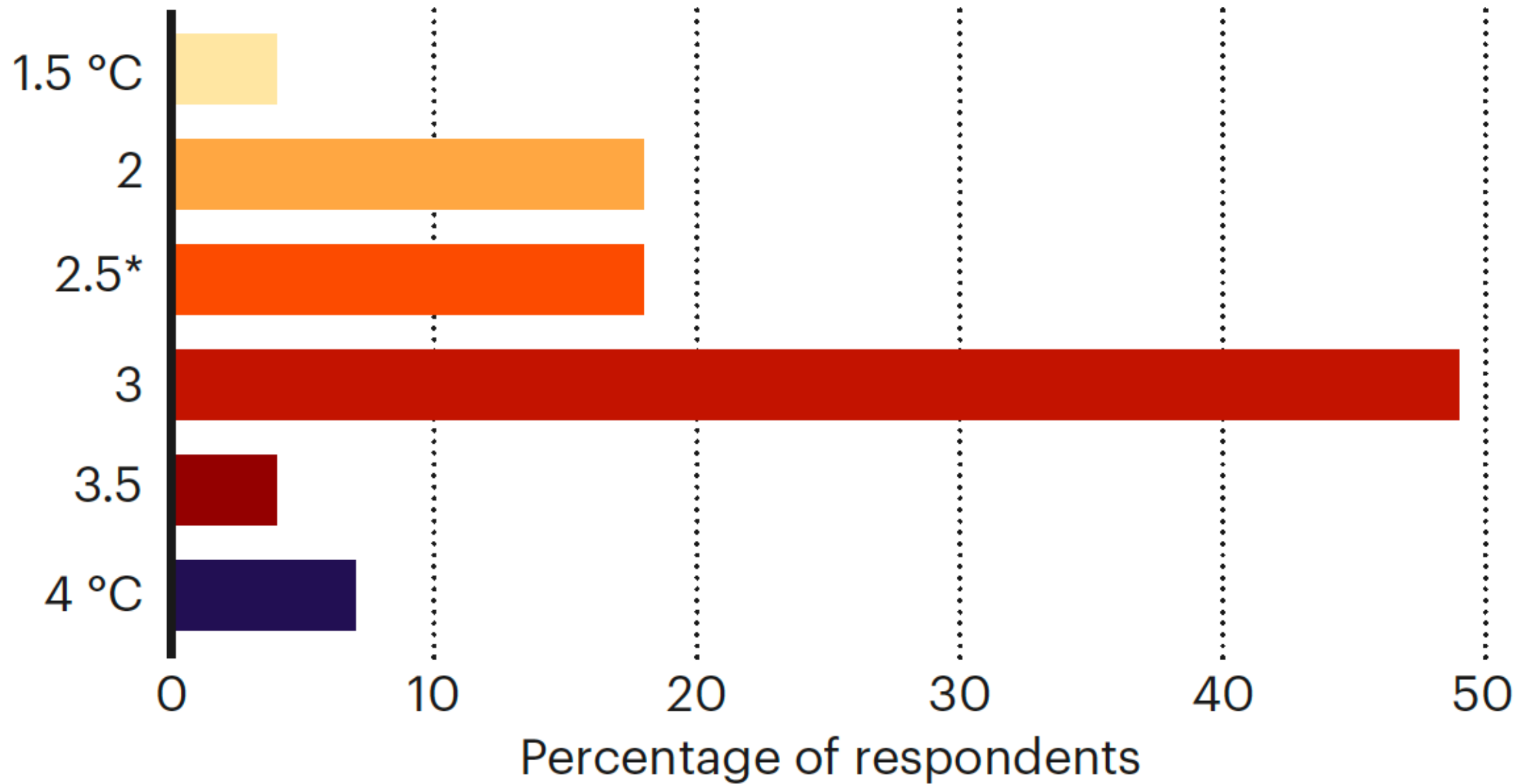
Lenton et al. (2019)

Wunderling et al. (2021)

McKay et al. (under review)



## How much warming above pre-industrial times do you think is likely by 2100?



\*Includes 2 responses between 2.7 °C and 2.75 °C;  
2.5 °C and 3.5 °C were write-in answers.



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# The Uninhabitable Earth

Famine, economic collapse, a sun that  
cooks us: What climate change could  
wreak — sooner than you think.

By David Wallace-Wells



## The Barely Inhabitable Earth: Climate Impacts under Business as Usual

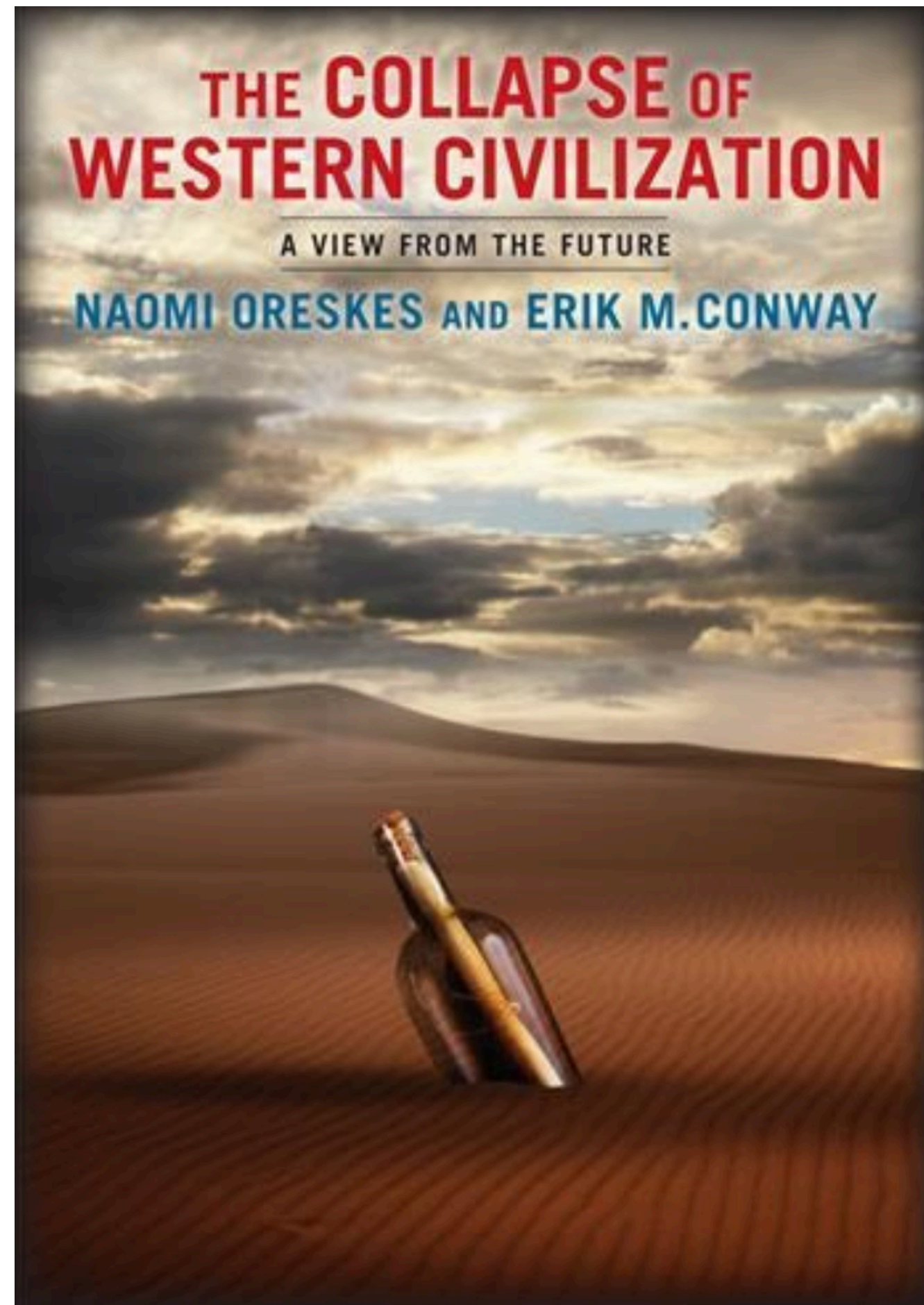


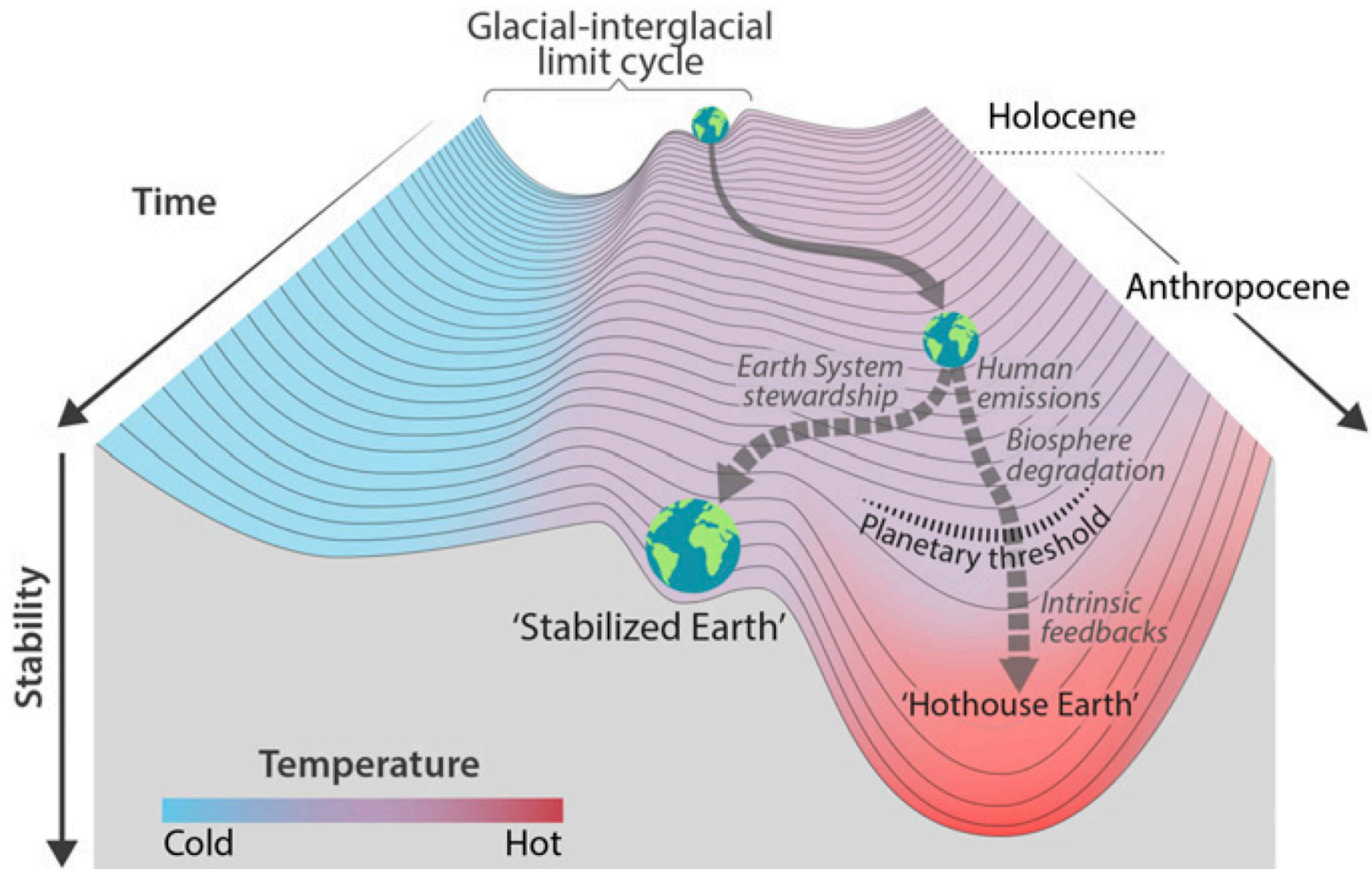


*“ I think we have more than a 5% chance of succeeding but it is definitely less than 50%, in my view. But what is the option? If we have a final chance to save our culture and our civilisation, I am just compelled to do it. ”*

**John Schellnhuber**

Founding Director  
Potsdam Institute for Climate Impact Research







# Climate Change 2022

## Impacts, Adaptation and Vulnerability

Summary for Policymakers



“Any further delay in concerted anticipatory global action on adaptation and mitigation will miss a brief and rapidly closing window of opportunity to secure a liveable and sustainable future for all.”

**Part III:**

**Why Have We Failed So  
Far?**

# Three Decades of Climate Mitigation: Why Haven't We Bent the Global Emissions Curve?

**Annual Review of Environment and Resources**

Vol. 46:653-689 (Volume publication date October 2021)

First published as a Review in Advance on June 29, 2021

<https://doi.org/10.1146/annurev-environ-012220-011104>

Isak Stoddard,<sup>1</sup> Kevin Anderson,<sup>1,2</sup> Stuart Capstick,<sup>3</sup> Wim Carton,<sup>4</sup> Joanna Depledge,<sup>5</sup> Keri Facer,<sup>1,6</sup> Clair Gough,<sup>2</sup> Frederic Hache,<sup>7</sup> Claire Hoolohan,<sup>2,3</sup> Martin Hultman,<sup>8</sup> Niclas Hällström,<sup>9</sup> Sivan Kartha,<sup>10</sup> Sonja Klinsky,<sup>11</sup> Magdalena Kuchler,<sup>1</sup> Eva Lövbrand,<sup>12</sup> Naghmeh Nasiritousi,<sup>13,14</sup> Peter Newell,<sup>15</sup> Glen P. Peters,<sup>16</sup> Youba Sokona,<sup>17</sup> Andy Stirling,<sup>18</sup> Matthew Stilwell,<sup>19</sup> Clive L. Spash,<sup>20</sup> and Mariama Williams<sup>17</sup>

## **Davos Cluster**

**International Climate  
Governance**

**Vested Interests of the  
Fossil Fuel Industry**

**Geopolitics &  
Militarism**

## **Enabler Cluster**

**Economics &  
Financialization**

**Mitigation Modelling**

**Energy Supply System**

## **Ostrich Cluster**

**Inequity**

**High-Carbon Lifestyles**

**Social Imaginaries**



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# Fossil Fuelled Lies

[Franta Talk](#)

[Franta Interview](#)

[The Corporation](#)

[The Power of Big Oil](#)

## Society's Understanding & Actions

## Big Oil's Understanding & Actions

Franta (2018a,b); Franta (2021a,b); Farrell (2016); Supran & Oreskes (2017,2021a,b); Rahmstorf (2009); McKibben (2015); Bonneuil et al. (2021); Franta & Supran (2017); Supran, Rahmstorf, & Oreskes (2023)



# Fossil Fuelled Lies

Franta Talk  
Franta Interview  
The Corporation  
The Power of Big Oil

## Society's Understanding & Actions

- 1960: Keeling shows increase in CO<sub>2</sub>
- 1965: Environmental Report Lyndon Johnson
- 1970s: Cooling or Warming? Warming!
- 1988: Hansen testifies before Congress
- 1988: IPCC forms
- 1992: UNFCCC
- 1997: Kyoto Protocol signed
- 2015: Paris Agreement

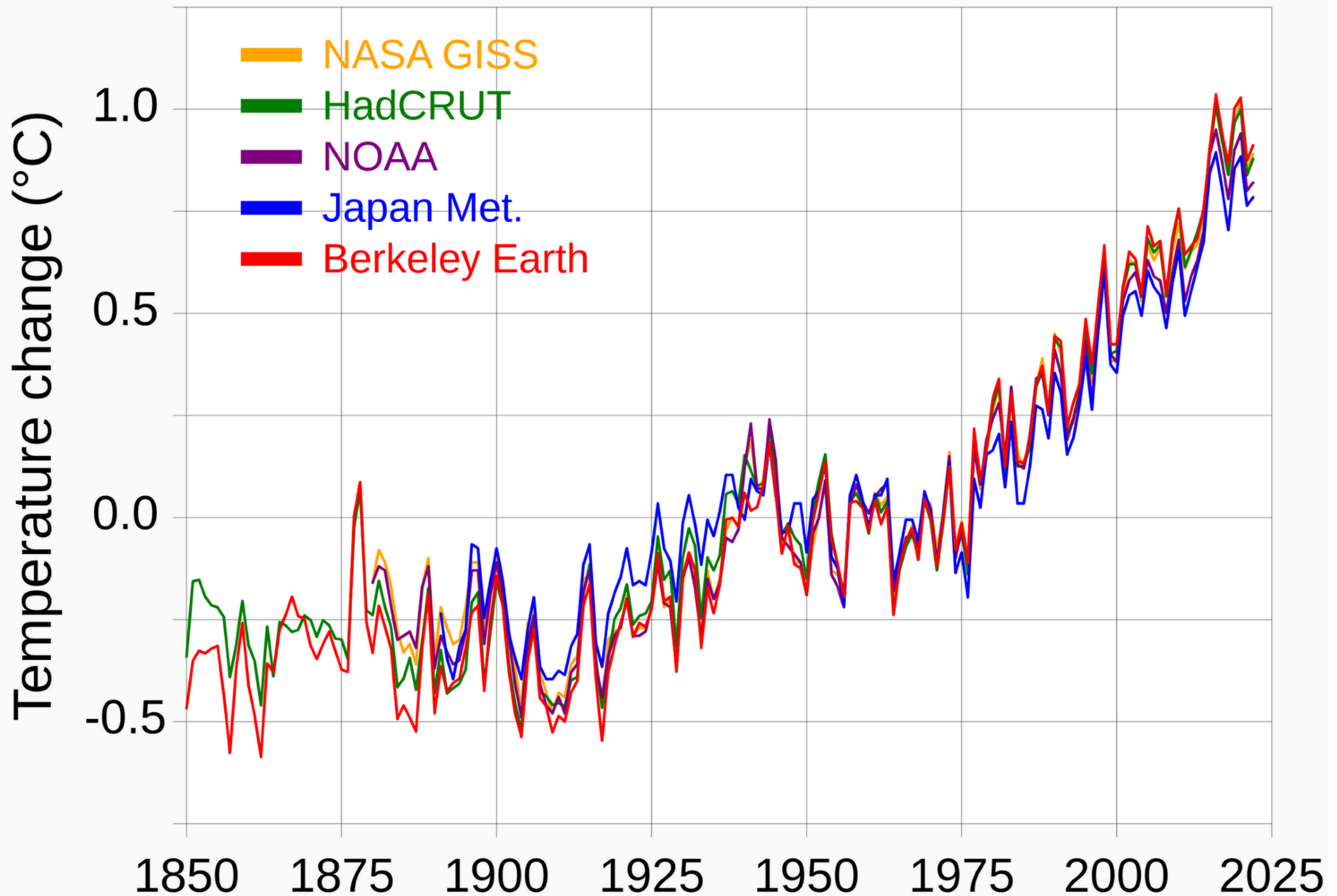
## Big Oil's Understanding & Actions



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# Global average temperature change



# Fossil Fuelled Lies

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## Society's Understanding & Actions

- 1960: Keeling shows increase in CO<sub>2</sub>
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- 1988: IPCC forms
- 1992: UNFCCC
- 1997: Kyoto Protocol signed
- 2015: Paris Agreement

## Big Oil's Understanding & Actions

- 1959: Edward Teller warns Big Oil
- 1965: President of API warns Big Oil
- 1979-83: Exxon internal research programme
- 1980: API argues for tripling coal
- 1987: IPIECA Strategy meeting  
Emphasise uncertainties  
Stress the cost of action  
Focus on policies that do not threaten fossil fuels  
Insist on 'detection before action'
- 1989-2002: Global Climate Coalition
- 2000-now: Greenwashing



Franta (2018a,b); Franta (2021a,b); Farrell (2016); Supran & Oreskes (2017,2021a,b); Rahmstorf (2009); McKibben (2015); Bonneuil et al. (2021); Franta & Supran (2017); Supran, Rahmstorf, & Oreskes (2023)

# Shell, BP, Exxon: Seized emails reveal 'deceptive' climate tactics and greenwashing

## Oil firms have internally dismissed swift climate action, House panel says

**Documents show the fossil fuel industry 'has no real plans to clean up its act' and took steps to continue business as usual**

GREEN NEWS

### **'Pure greenwashing': Shell reports highest ever profits while labelling fossil gas as 'renewable'**

DAILY BRIEFING | February 3, 2023. 🕒 10:11am

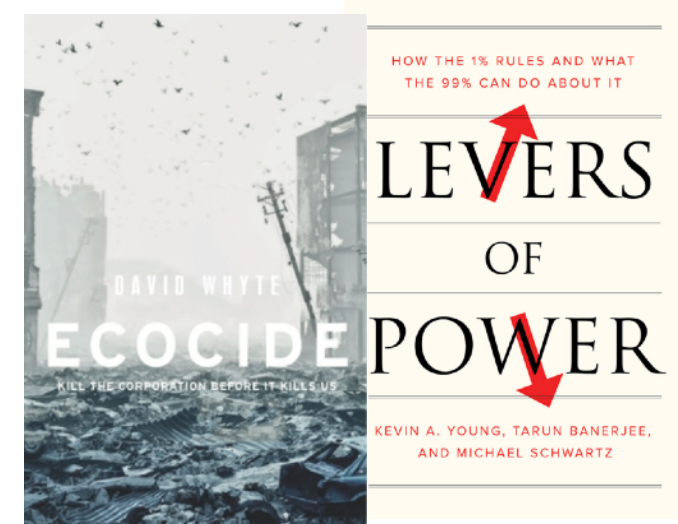
Shell hits the brakes on growing renewables unit after record 2022 profit

**Why are BP, Shell, and Exxon suddenly backing off their climate promises?**

"If we see value, we'll do it. If we don't, we won't."

“Let me be, I think, categorical in this. We cannot justify going for a low return. Our shareholders deserve to see us going after strong returns. If we cannot achieve the double-digit returns in a business, we need to question very hard whether we should continue in that business. Absolutely, we want to continue to go for lower and lower and lower carbon, but it has to be profitable.”

- Wael Sawan, Shell's CEO, February 2<sup>nd</sup>, 2023



Source

Christophers (2022)





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Mitigation Modelling

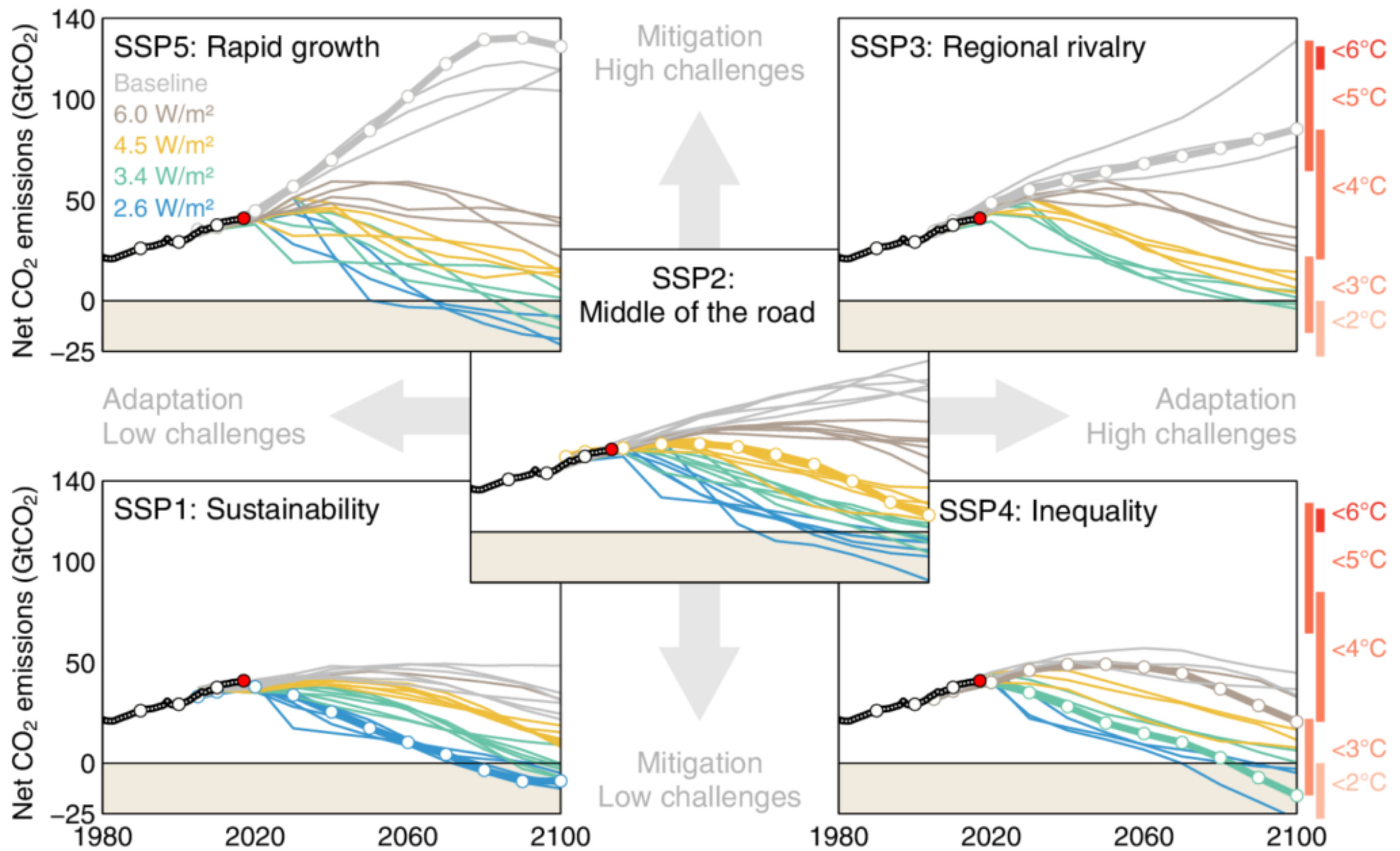
Energy Supply System

## Ostrich Cluster

Inequity

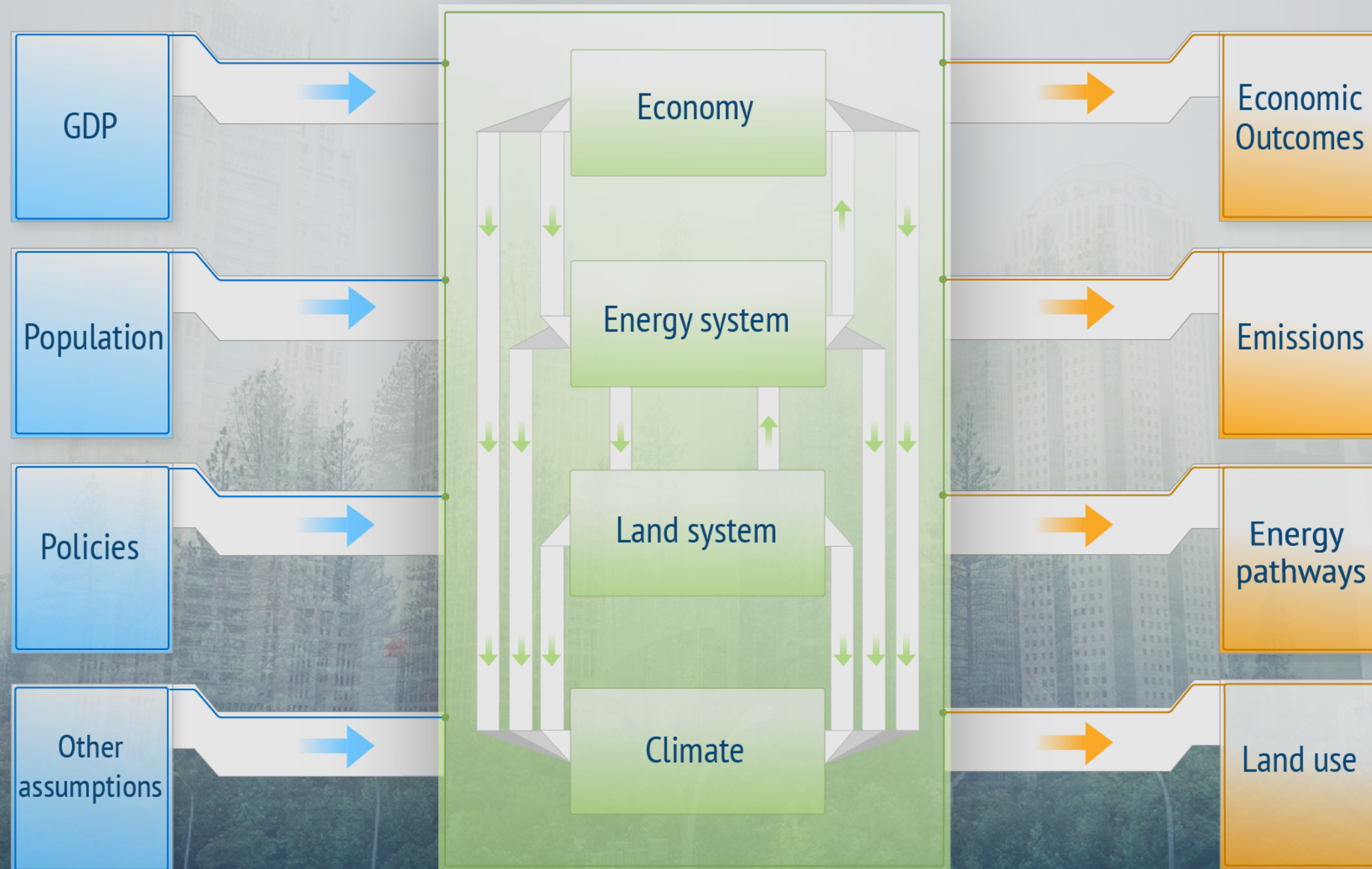
High-Carbon Lifestyles

Social Imaginaries





## How do Integrated Assessment Models work?



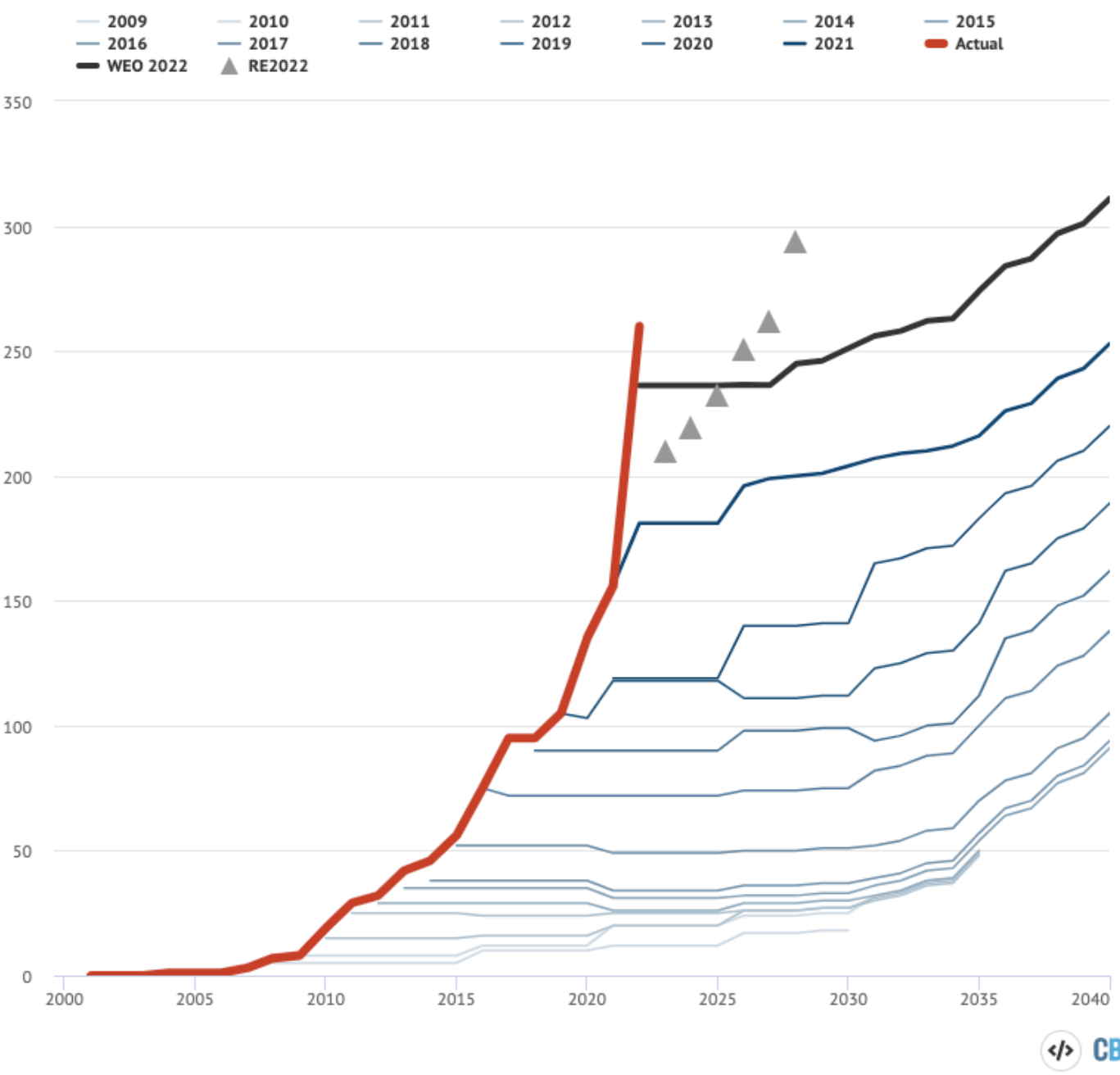


# Integrated Assessment Models

- Based on neoclassical economics
  - Rational agents, full information
  - Markets work, no wasted investments, no unemployment
  - Reduction in economic activity by definition a cost
  - Economic growth can be decoupled from emissions (“green growth”)
- Discount rate
  - Weigh near-time costs more heavily than those in the future
  - Action today is more costly than action tomorrow
- Under-predicted the fall in the cost of renewables
  - Overstated the cost of rapid decarbonisation
- Focus on market-based solutions (e.g., carbon price)
- Focus on technological innovation such as large-scale negative emissions technology

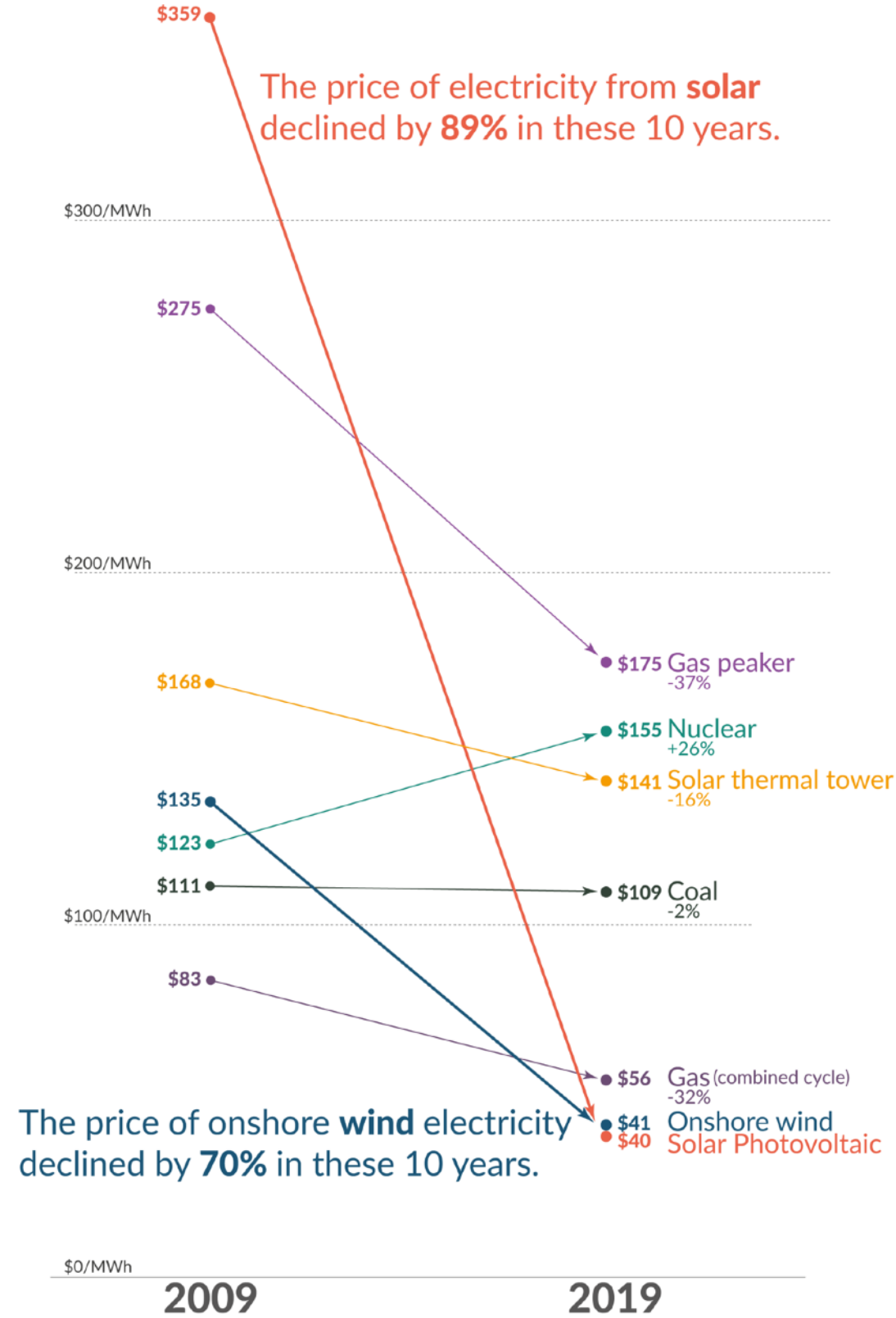
# The rapid **rise of solar** continues to **outpace IEA outlooks** – but remains short of what would be needed for 1.5C

Gigawatts added per year in IEA WEOs, before retirements; Triangles show IEA Renewables 2022 forecast



## The price of electricity from new power plants

Electricity prices are expressed in 'levelized costs of energy' (LCOE). LCOE captures the cost of building the power plant itself as well as the ongoing costs for fuel and operating the power plant over its lifetime.



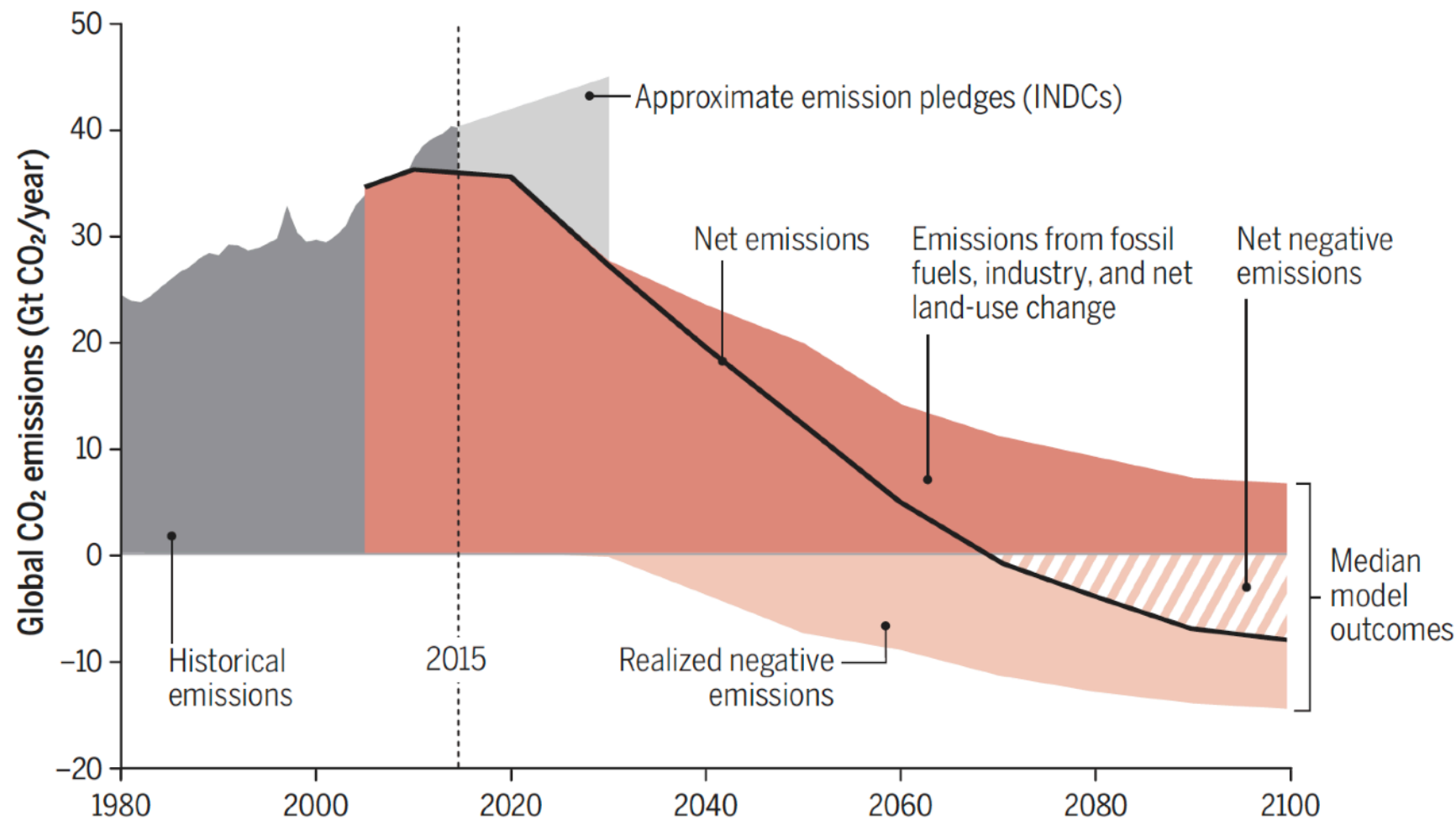
## No quick fixes

Modelers generally report net carbon emissions, unintentionally hiding the scale of negative emissions. Separating out the positive CO<sub>2</sub> emissions from fossil fuel combustion, industry, and land-use change reveals the scale of negative CO<sub>2</sub> emissions in the model scenarios (16). INDCs, Intended Nationally Determined Contributions.

Peters [Talk](#)

Anderson [Talk](#)

Anderson [Interview](#)



***“Negative-emission technologies are not an insurance policy, but rather an unjust and high-stakes gamble.”***

- Anderson & Peters (2016)

Hickman (2016)

Sen & Dabi (2021)

[Carbon Brief](#)

Land used exclusively for removal\* could compete with food production

LAND FOR  
CARBON  
REMOVAL



1.62bn ha

CROPLAND  
WORLDWIDE



1.5bn ha

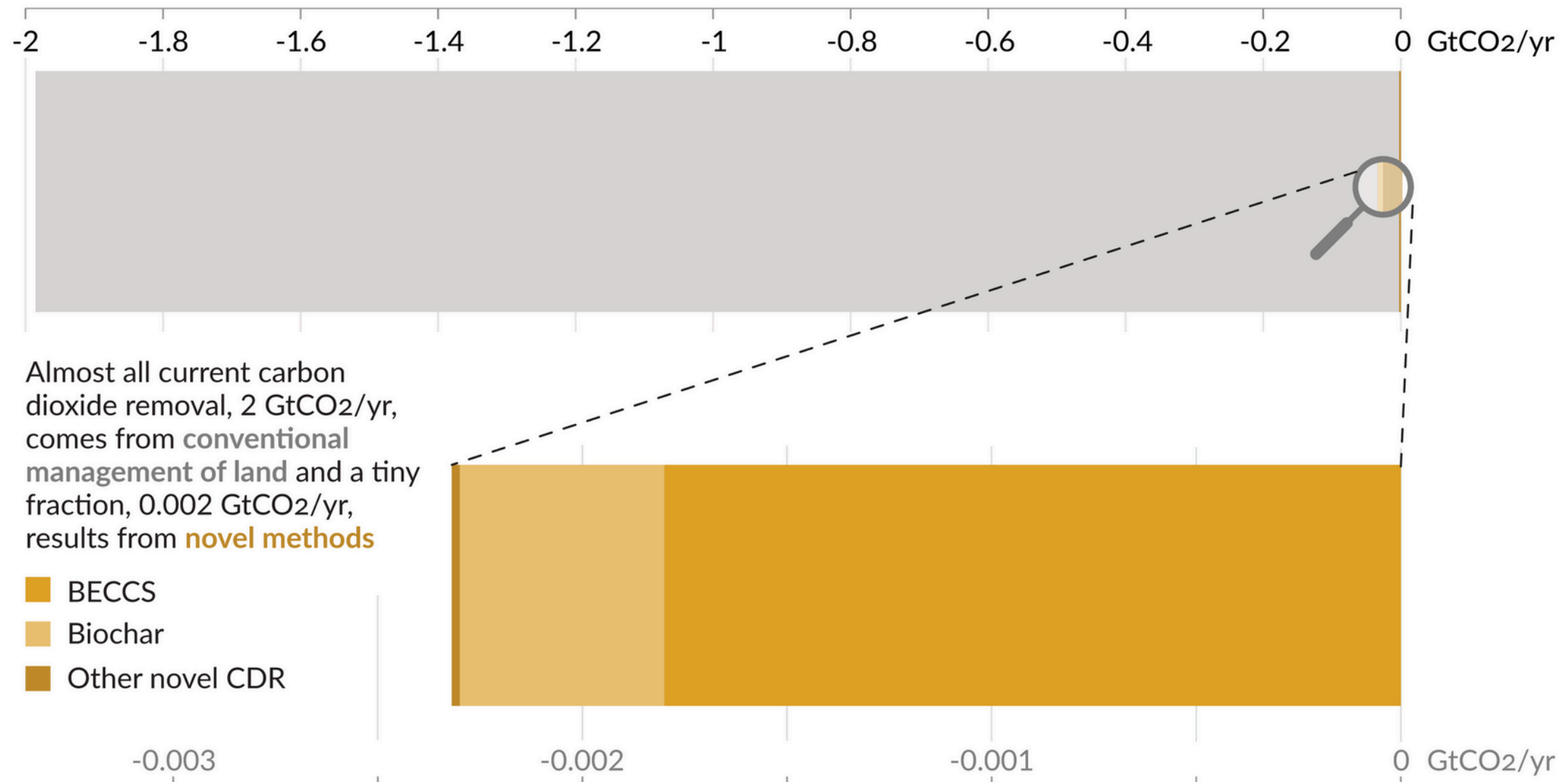
\*Afforestation, reforestation and BECCS

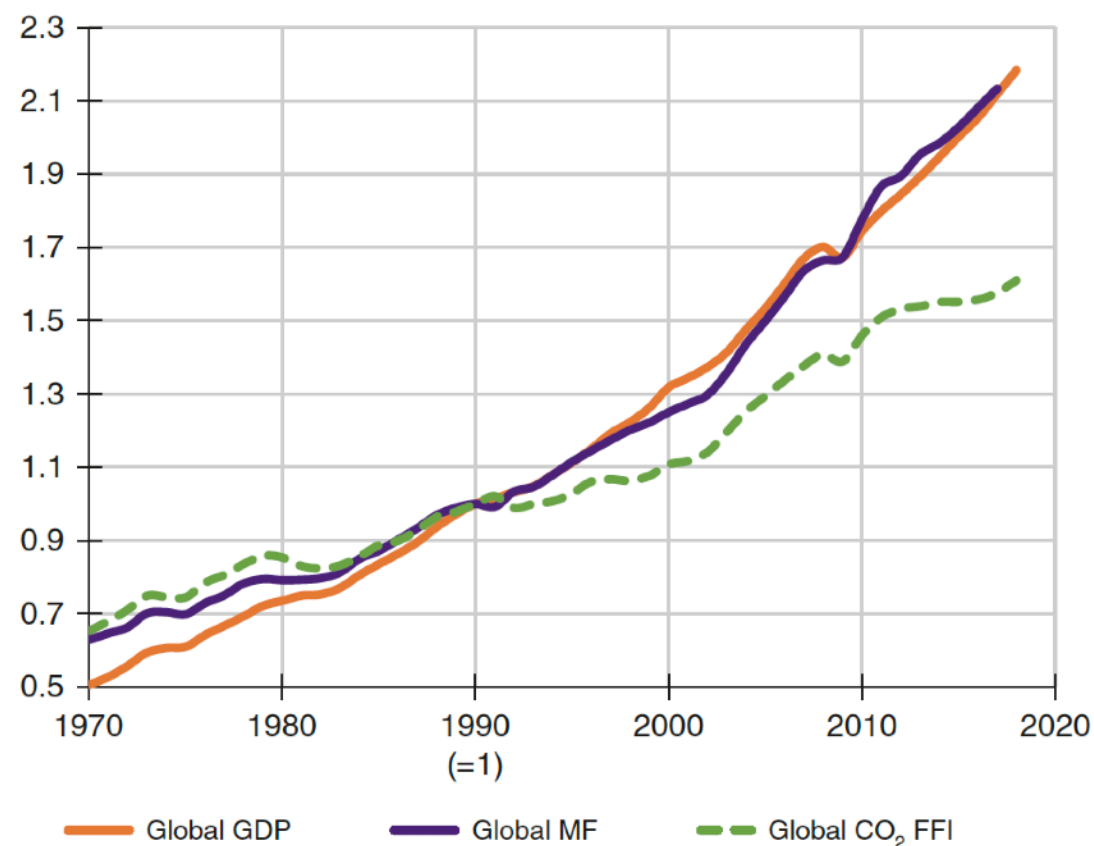


Number of scenarios	Type of scenario	Median total BECCS removal	Median removal per year
91 / 95	1.5° limited / no overshoot	334 Gt	4.1 Gt
	1.5° high overshoot	464 Gt	5.7 Gt
294 / 294	2°	291 Gt	3.6 Gt

## Only a tiny fraction of all current carbon dioxide removal results from **novel methods**

Total current amount of carbon dioxide removal, split into **conventional** and **novel** methods (GtCO<sub>2</sub>/yr)





## ECONOMICS


# Unraveling the claims for (and against) green growth

Can the global economy grow indefinitely, decoupled from Earth's limitations?

By **Tim Jackson<sup>1</sup>** and **Peter A. Victor<sup>2</sup>**

Comment | Published: 04 August 2021

## Urgent need for post-growth climate mitigation scenarios

















Jason Hickel , Paul Brockway, Giorgos Kallis, Lorenz Keyßer, Manfred Lenzen, Aljoša Slameršak, Julia Steinberger & Diana Ürge-Vorsatz

*Nature Energy* 6, 766–768 (2021) | [Cite this article](#)

2218 Accesses | 1476 Altmetric | [Metrics](#)

## PAPER • OPEN ACCESS

## A systematic review of the evidence on decoupling of GDP, resource use and GHG emissions, part II: synthesizing the insights

Helmut Haberl<sup>1</sup> , Dominik Wiedenhofer<sup>1,9</sup> , Doris Virág<sup>1,9</sup> , Gerald Kalt<sup>1</sup> , Barbara Plank<sup>1</sup> , Paul Brockway<sup>2</sup> , Tomer Fishman<sup>3</sup> , Daniel Hausknost<sup>5</sup> , Fridolin Krausmann<sup>1</sup> , Bartholomäus Leon-Gruchalski<sup>4</sup> , Andreas Mayer<sup>1</sup> , Melanie Pichler<sup>1</sup> , Anke Schaffartzik<sup>1,6</sup> , Tânia Sousa<sup>7</sup> , Jan Streeck<sup>1</sup>  and Felix Creutzig<sup>8</sup>  — [Hide full author list](#)

Published 11 June 2020 • © 2020 The Author(s). Published by IOP Publishing Ltd

[Environmental Research Letters](#), Volume 15, Number 6

Citation Helmut Haberl *et al* 2020 *Environ. Res. Lett.* **15** 065003

## Is Green Growth Possible?

Jason Hickel<sup>a</sup> and Giorgos Kallis<sup>b</sup>

<sup>a</sup>Anthropology, Goldsmiths, University of London, London, UK; <sup>b</sup>ICREA and ICTA-UAB, Universitat Autònoma de Barcelona, Barcelona, Spain

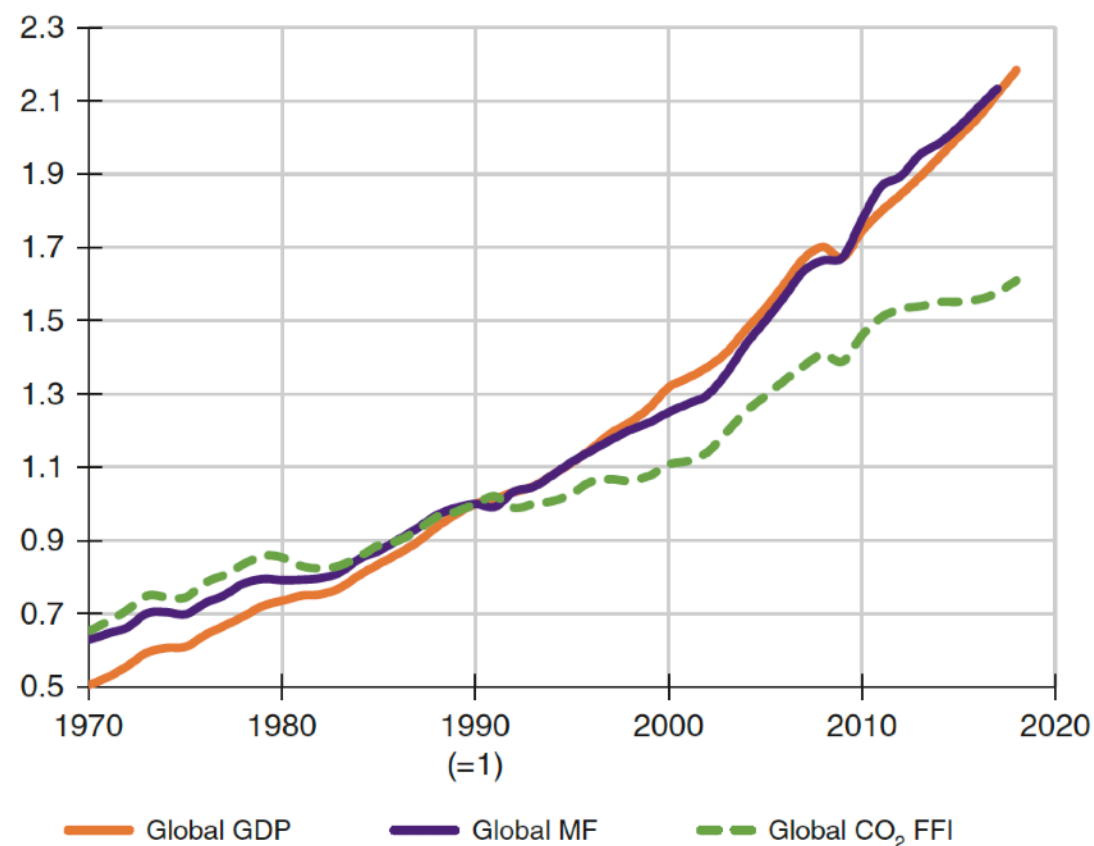
## ABSTRACT

The notion of green growth has emerged as a dominant policy response to climate change and ecological breakdown. Green growth theory asserts that continued economic expansion is compatible with our planet's ecology, as technological change and substitution will allow us to absolutely decouple GDP growth from resource use and carbon emissions. This claim is now assumed in national and international policy, including in the Sustainable Development Goals. But empirical evidence on resource use and carbon emissions does not support green growth theory. Examining relevant studies on historical trends and model-based projections, we find that: (1) there is no empirical evidence that absolute decoupling from resource use can be achieved on a global scale against a background of continued economic growth, and (2) absolute decoupling from carbon emissions is highly unlikely to be achieved at a rate rapid enough to prevent global warming over 1.5°C or 2°C, even under optimistic policy conditions. We conclude that green growth is likely to be a misguided objective, and that policymakers need to look toward alternative strategies.

## KEYWORDS

Sustainable development; ecological economics; green growth; degrowth; decoupling





“The analysis shows that the large majority of this literature does not question the GDP growth paradigm, even if the empirical evidence suggests that it contradicts officially committed climate policy goals. Policy recommendations point towards a standard repertoire (i.e. efficiency, technology, innovation) that is not further discussed or questioned.”

- Haberl et al. (2020, p. 30)

## ECONOMICS


# Unraveling the claims for (and against) green growth

Can the global economy grow indefinitely, decoupled from Earth's limitations?

By **Tim Jackson<sup>1</sup>** and **Peter A. Victor<sup>2</sup>**

Comment | Published: 04 August 2021

## Urgent need for post-growth climate mitigation scenarios

Jason Hickel , Paul Brockway, Giorgos Kallis, Lorenz Keyßer, Manfred Lenzen, Aljoša Slameršak, Julia Steinberger & Diana Ürge-Vorsatz

*Nature Energy* 6, 766–768 (2021) | [Cite this article](#)

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## Is Green Growth Possible?

Jason Hickel<sup>a</sup> and Giorgos Kallis<sup>b</sup>

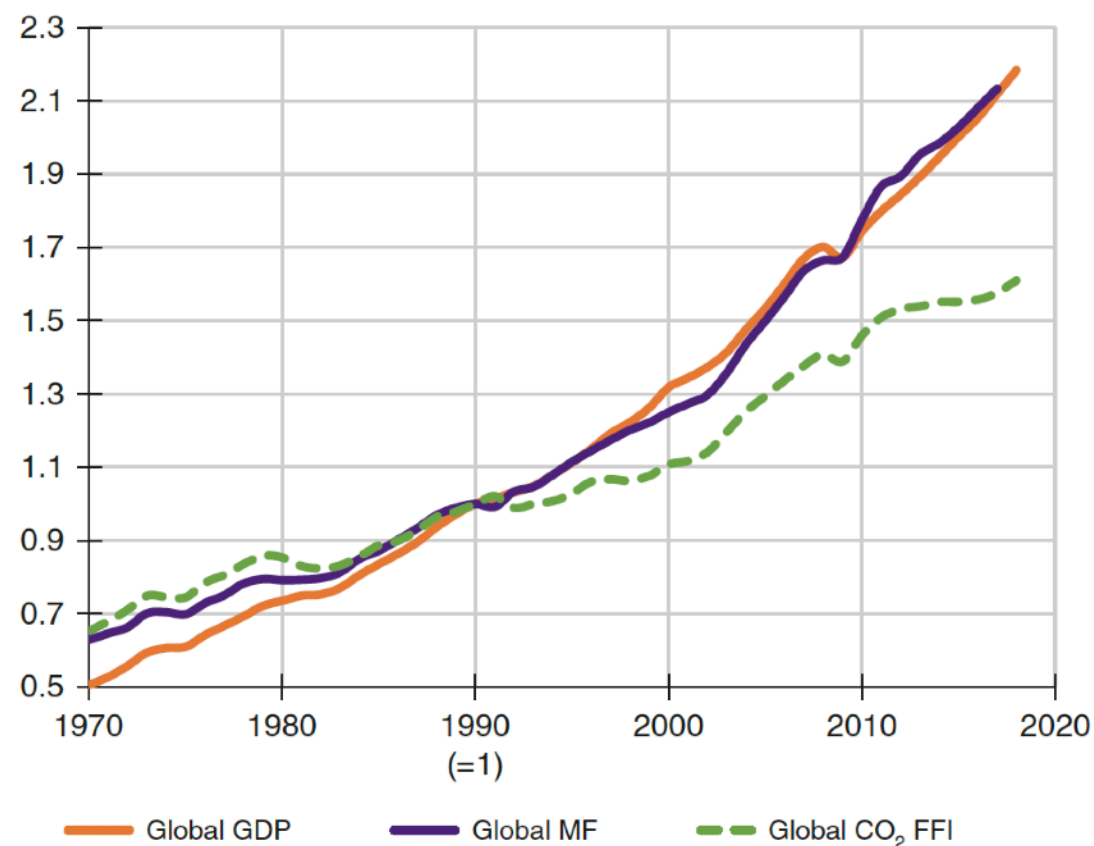
<sup>a</sup>Anthropology, Goldsmiths, University of London, London, UK; <sup>b</sup>ICREA and ICTA-UAB, Universitat Autònoma de Barcelona, Barcelona, Spain

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“We conclude that large rapid absolute reductions of resource use and GHG emissions cannot be achieved through observed decoupling rates, hence decoupling needs to be complemented by sufficiency-oriented strategies and strict enforcement of absolute reduction targets.”

- Haberl et al. (2020, abstract)

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Sustainable development; ecological economics; green growth; degrowth; decoupling



# Climate Change Policy: What Do the Models Tell Us?

Robert S. Pindyck


JOURNAL OF ECONOMIC LITERATURE  
VOL. 51, NO. 3, SEPTEMBER 2013  
(pp. 860-72)

Keen Podcast  
Nordhaus Lecture

## Abstract

Very little. A plethora of integrated assessment models (IAMs) have been constructed and used to estimate the social cost of carbon (SCC) and evaluate alternative abatement policies. These models have crucial flaws that make them close to useless as tools for policy analysis: certain inputs (e.g., the discount rate) are arbitrary, but have huge effects on the SCC estimates the models produce; the models' descriptions of the impact of climate change are completely ad hoc, with no theoretical or empirical foundation; and the models can tell us nothing about the most important driver of the SCC, the possibility of a catastrophic climate outcome. IAM-based analyses of climate policy create a perception of knowledge and precision, but that perception is illusory and misleading.

## The appallingly bad neoclassical economics of climate change

Steve Keen 

Institute for Strategy, Resilience and Security, University College London, London, UK

### ABSTRACT

Forecasts by economists of the economic damage from climate change have been notably sanguine, compared to warnings by scientists about damage to the biosphere. This is because economists made their own predictions of damages, using three spurious methods: assuming that about 90% of GDP will be unaffected by climate change, because it happens indoors; using the relationship between temperature and GDP today as a proxy for the impact of global warming over time; and using surveys that diluted extreme warnings from scientists with optimistic expectations from economists. Nordhaus has misrepresented the scientific literature to justify the using a smooth function to describe the damage to GDP from climate change. Correcting for these errors makes it feasible that the economic damages from climate change are at least an order of magnitude worse than forecast by economists, and may be so great as to threaten the survival of human civilization.

### KEYWORDS

Climate change; neoclassical economics; William Nordhaus

Keen (2020)

Pindyck (2013)

Evans, Pidcock, & Yeo (2017)



# Three Decades of Climate Mitigation: Why Haven't We Bent the Global Emissions Curve?

**Annual Review of Environment and Resources**

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## Davos Cluster

International Climate Governance

Vested Interests of the Fossil Fuel Industry

Geopolitics & Militarism



## Enabler Cluster

Economics & Financialization

Mitigation Modelling

Energy Supply System



## Ostrich Cluster

Inequity

High-Carbon Lifestyles

Social Imaginaries



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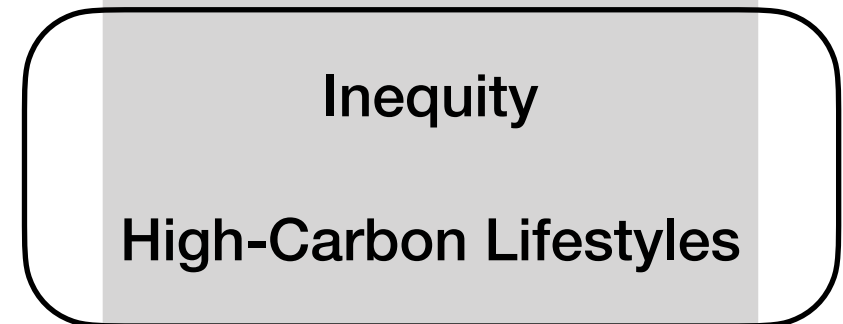


## Ostrich Cluster

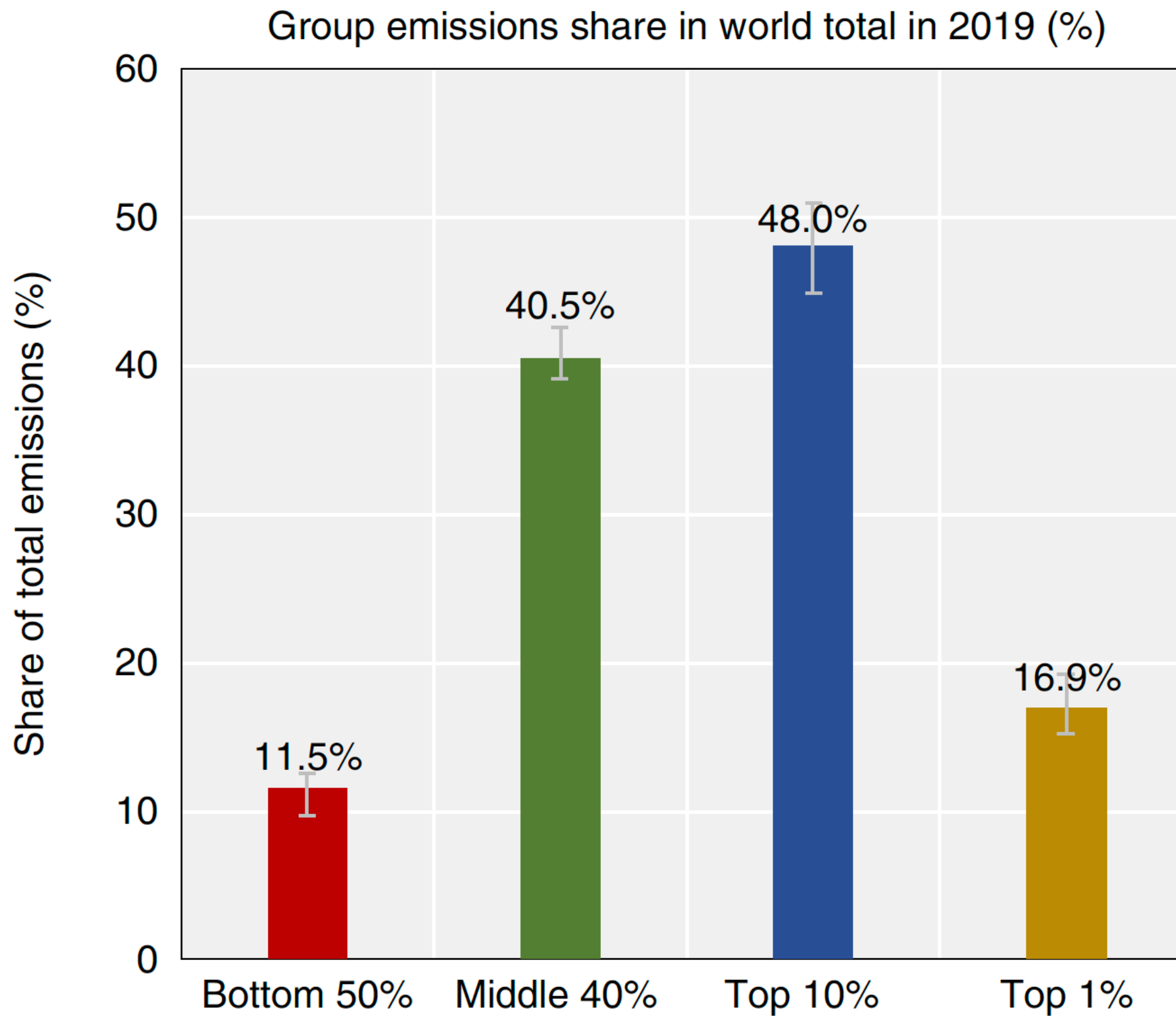
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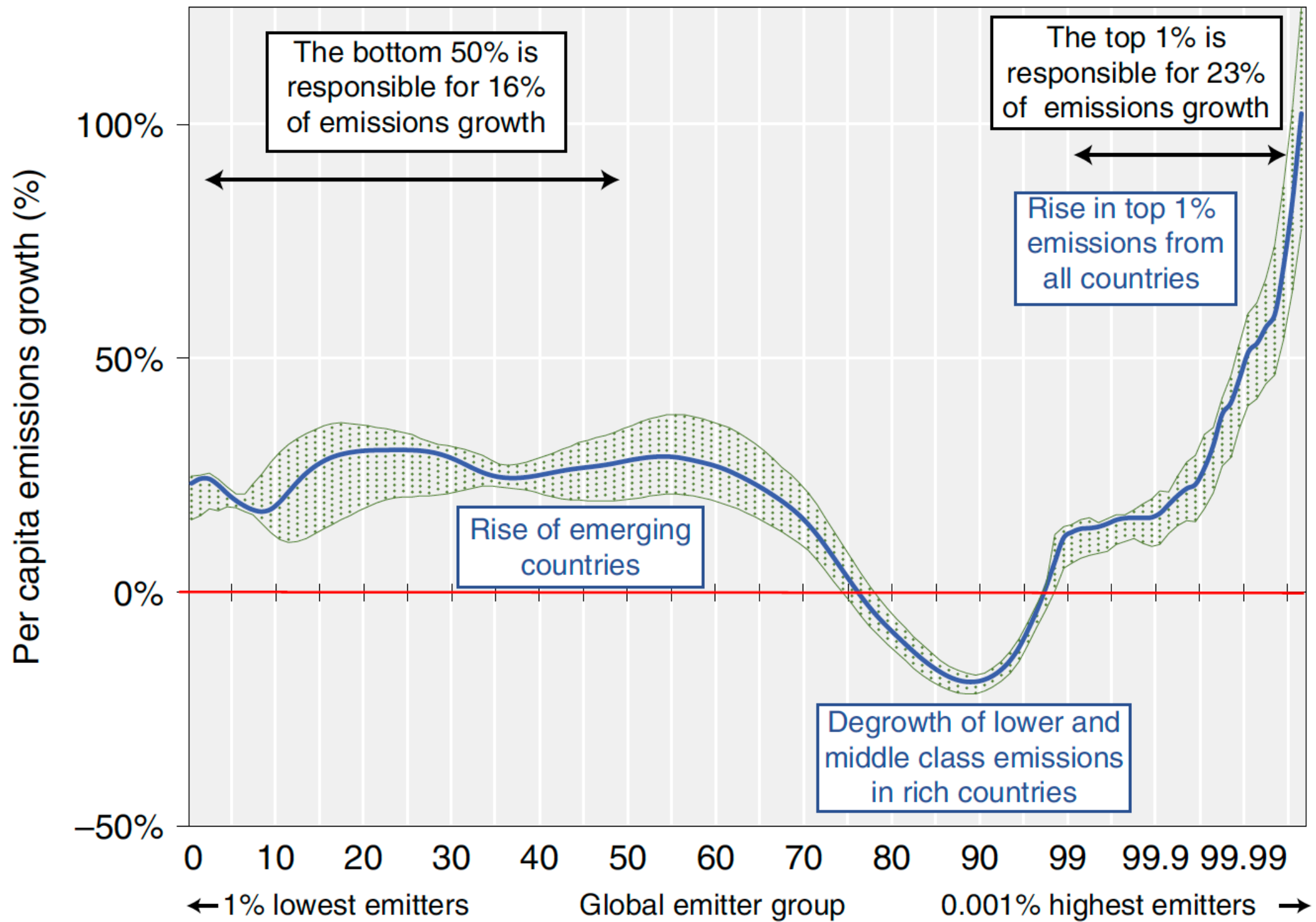






**a**

## Emissions growth by percentile over 1990–2019



Comment | [Published: 28 January 2019](#)

## Shift the focus from the super-poor to the super-rich

[Ilona M. Otto](#) , [Kyoung Mi Kim](#), [Nika Dubrovsky](#) & [Wolfgang Lucht](#)

[Nature Climate Change](#) **9**, 82–84 (2019) | [Cite this article](#)

**4864** Accesses | **28** Citations | **1921** Altmetric | [Metrics](#)

Perspective | [Open Access](#) | [Published: 19 June 2020](#)

## Scientists' warning on affluence

[Thomas Wiedmann](#) , [Manfred Lenzen](#), [Lorenz T. Keyßer](#) & [Julia K. Steinberger](#)

[Nature Communications](#) **11**, Article number: 3107 (2020) | [Cite this article](#)

**171k** Accesses | **107** Citations | **4550** Altmetric | [Metrics](#)

Perspective | [Published: 30 September 2021](#)

## The role of high-socioeconomic-status people in locking in or rapidly reducing energy-driven greenhouse gas emissions

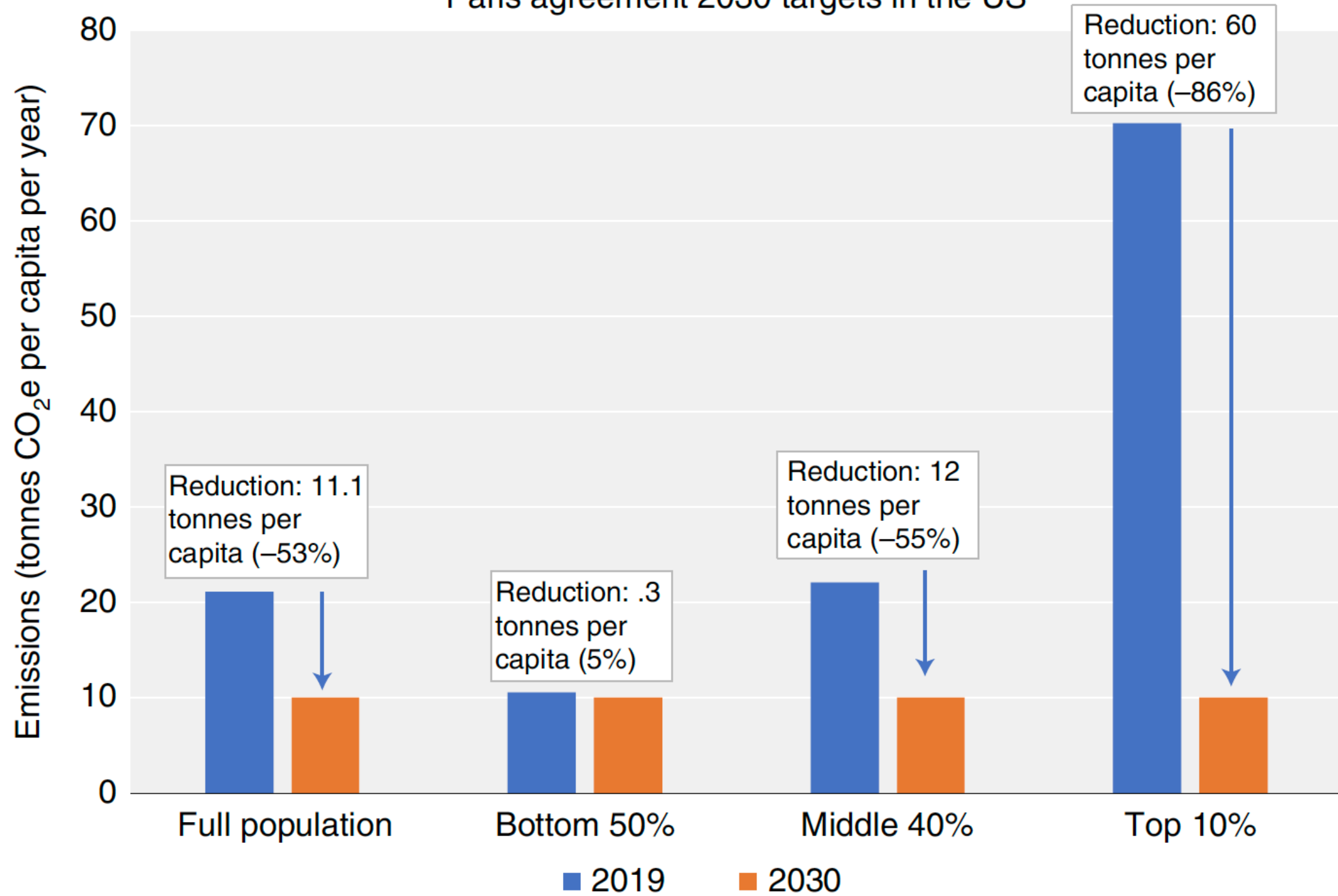
[Kristian S. Nielsen](#) , [Kimberly A. Nicholas](#), [Felix Creutzig](#), [Thomas Dietz](#) & [Paul C. Stern](#)

[Nature Energy](#) **6**, 1011–1016 (2021) | [Cite this article](#)

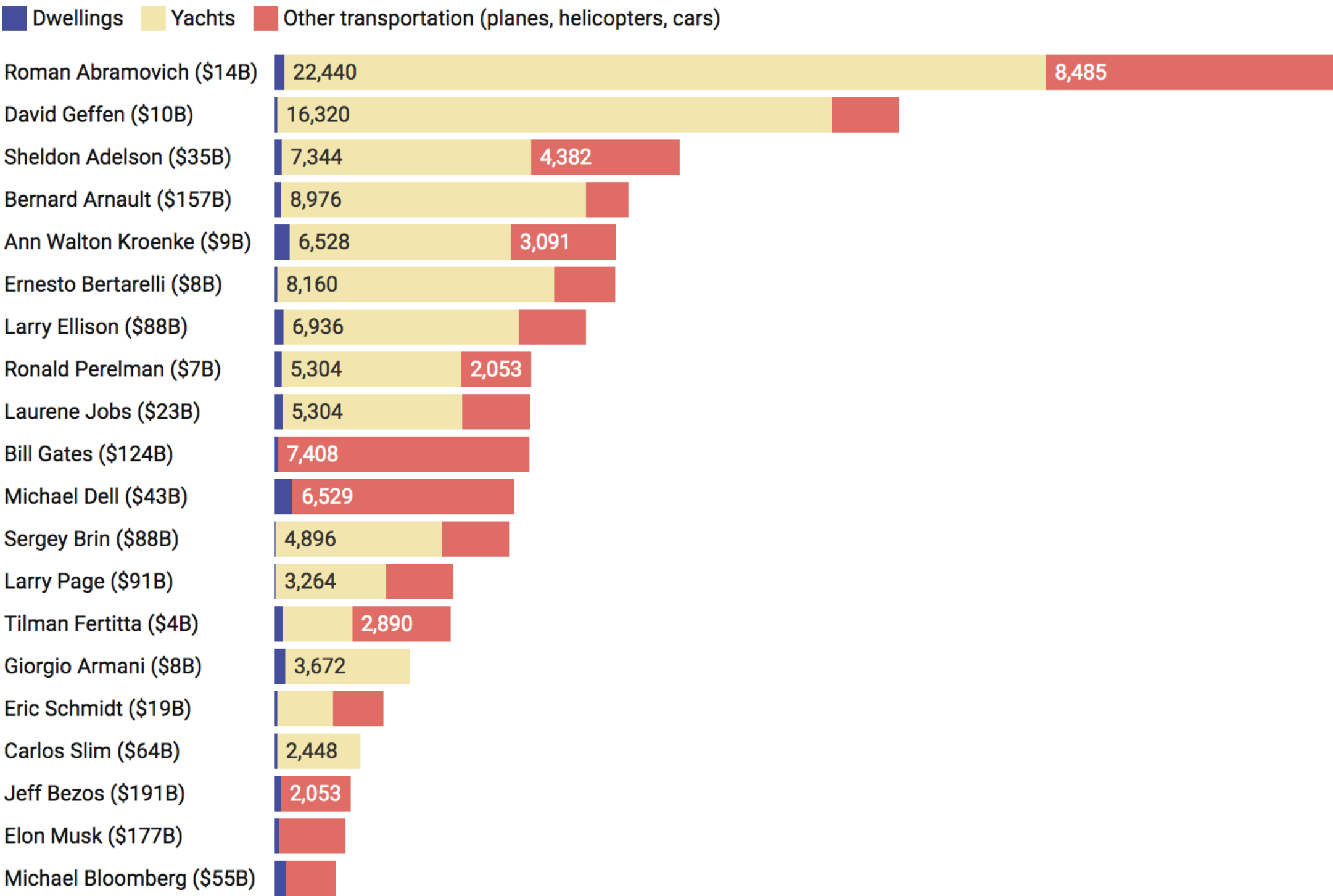
**12k** Accesses | **671** Altmetric | [Metrics](#)



# Emissions reduction requirement to meet Paris agreement 2030 targets in the US



# Billionaire Emissions



Estimates of wealth are based on Feb. 15 data, according to Forbes, except for Sheldon Adelson, who died in January.  
Chart: The Conversation, CC-BY-ND • Source: Forbes, Carbon Footprint, US US Energy Information Administration, Carbon Independent, "The Yacht of 2030"

# Three Decades of Climate Mitigation: Why Haven't We Bent the Global Emissions Curve?

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“I’ve been there all along, and it had taken me too long to figure out what was happening. I wrote the first book about [climate change] and I kept writing more books, articles, and having symposiums on the theory that if we kept piling up enough data and reason eventually the powers that be would get to work — why wouldn’t they?”

- Bill McKibben

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I thought that we were in an argument. And it took me too long to figure out that we won the argument, but that that didn’t mean anything. We won the argument — the science was entirely robust and clear. We were just losing the fight.

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**Because the fight wasn’t about data and reason, the fight was about money and power, which is what fights are always about.”**

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# **Part IV:**

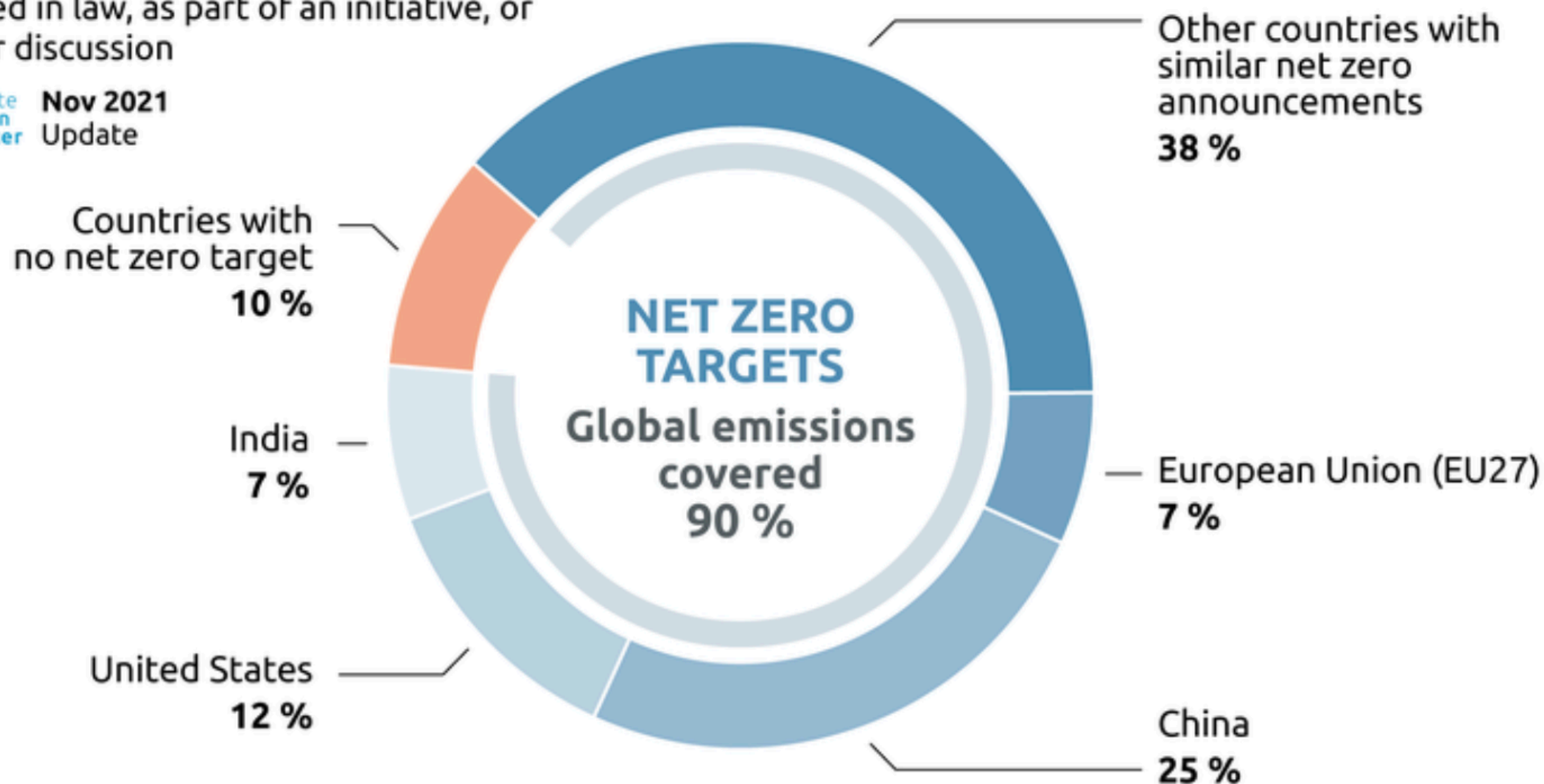
## **Why Current Climate Policy is Insufficient**



## Net zero emissions target announcements

Agreed in law, as part of an initiative, or under discussion

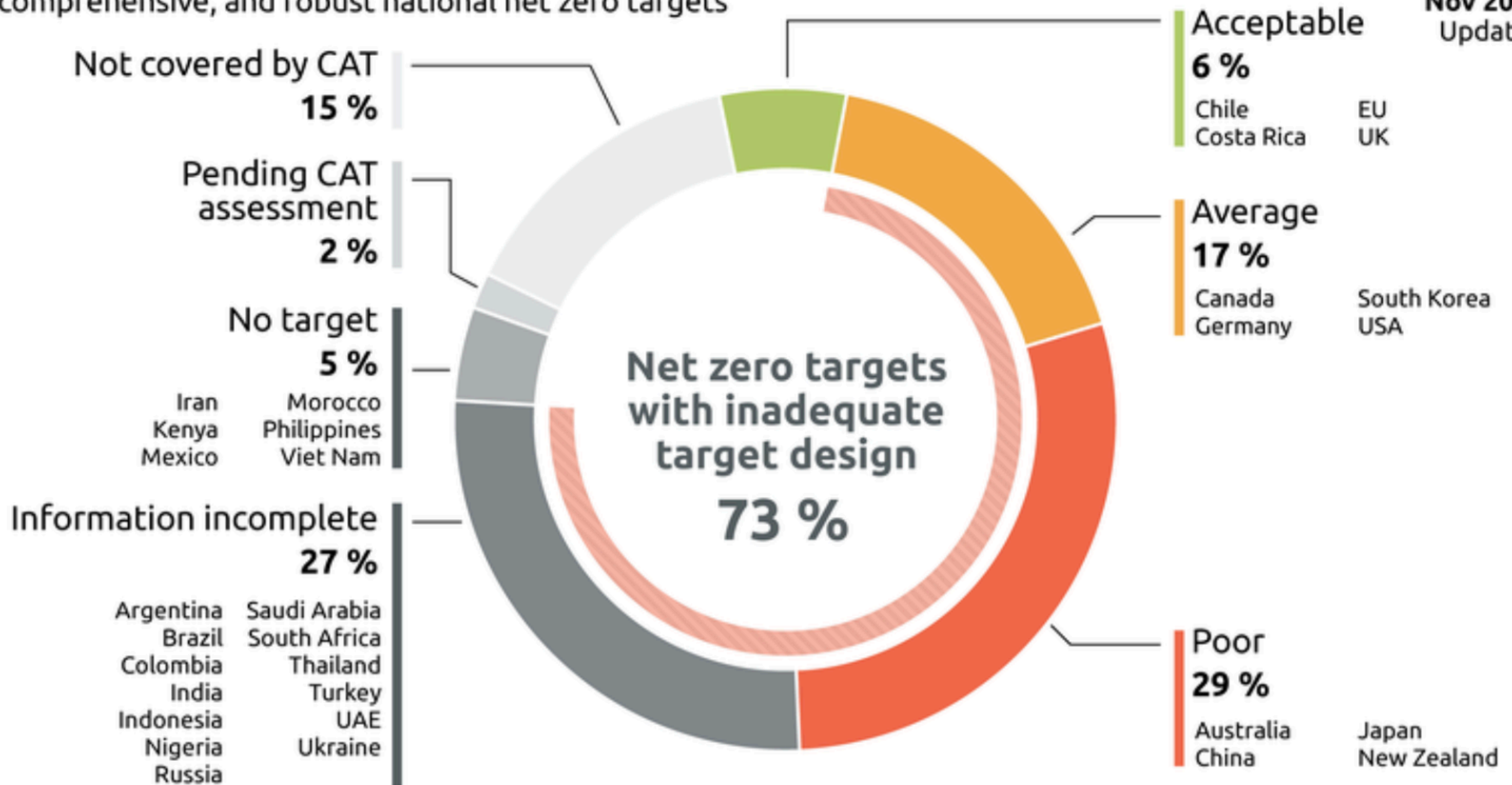
 **Nov 2021**  
Update



## Net zero target design - mostly inadequate to date

Evaluation of the quality of net zero targets using the CAT's design blueprint for transparent, comprehensive, and robust national net zero targets

Climate  
Action  
Tracker  
Nov 2021  
Update



# NET ZERO STOCKTAKE 2022

Assessing the status and trends of net zero target setting across countries, sub-national governments and companies.

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June 2022

**Six reasons why  
current climate policy  
is woefully inadequate**

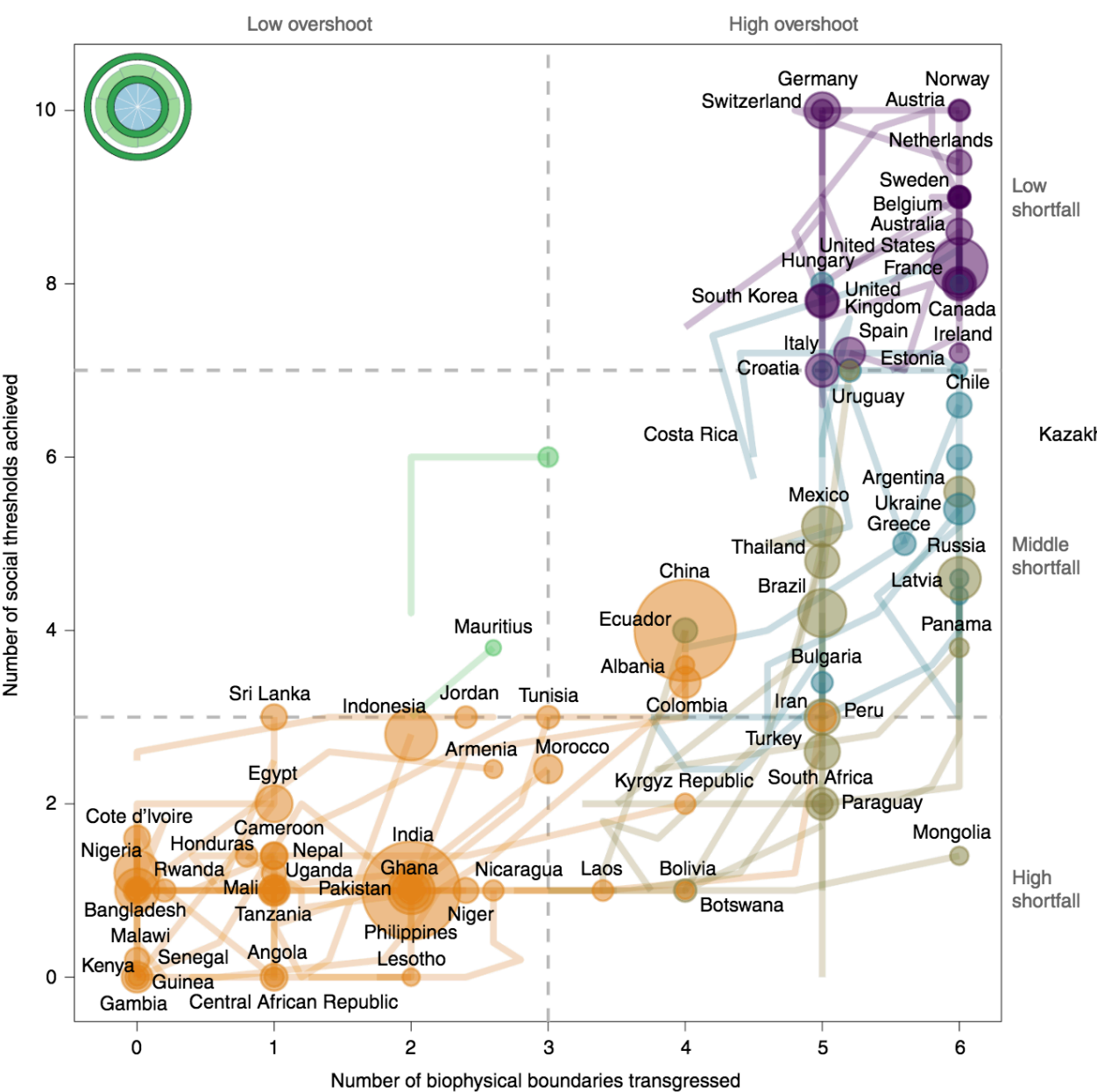
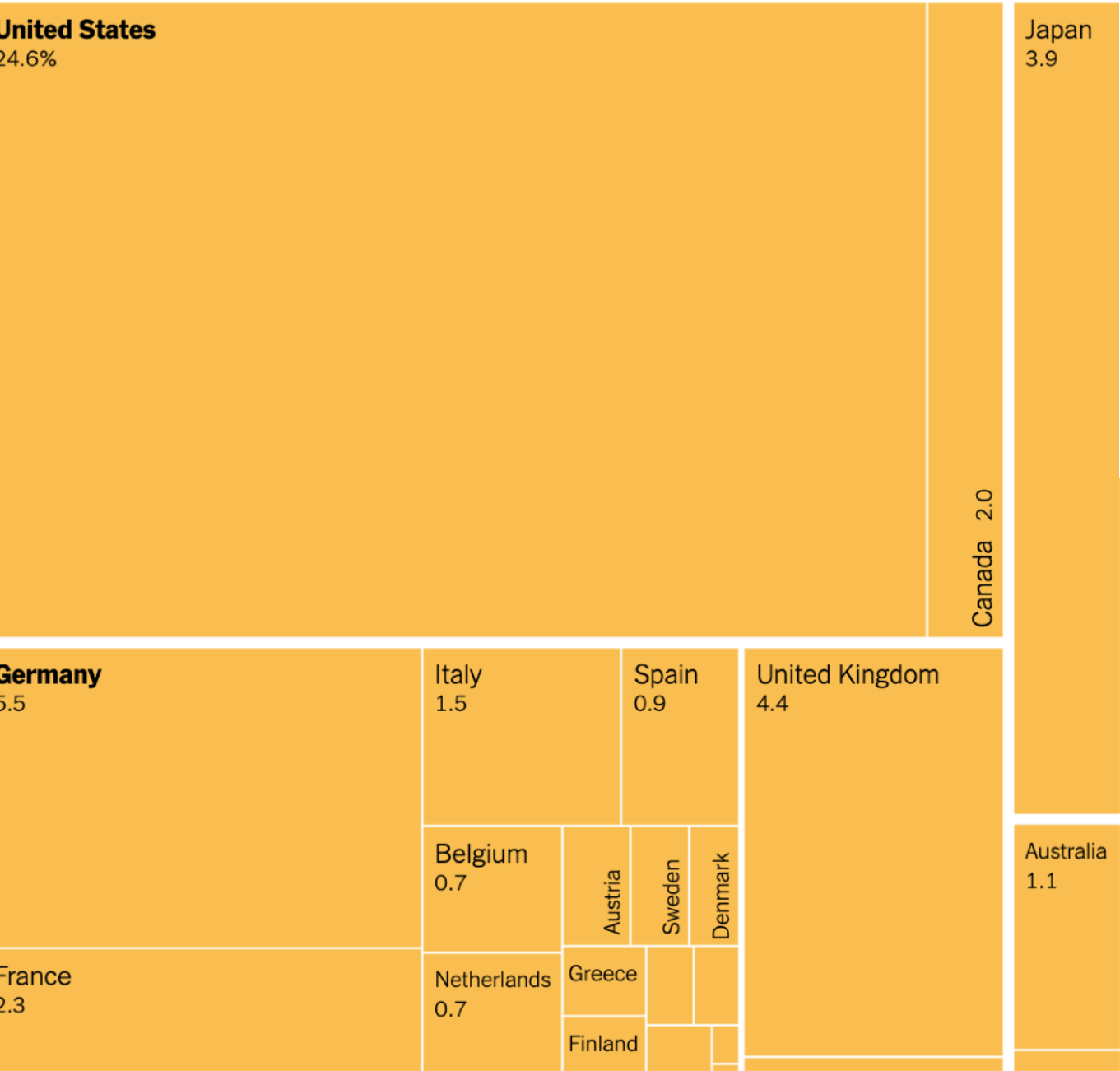


# Why net zero by 2050 is woefully inadequate

1. Equity considerations  
imply much faster  
decarbonisation rates

Anderson et al. (2020)  
Calverley & Anderson (2022)

**23 rich, developed countries** are responsible for half of all historical CO<sub>2</sub> emissions.

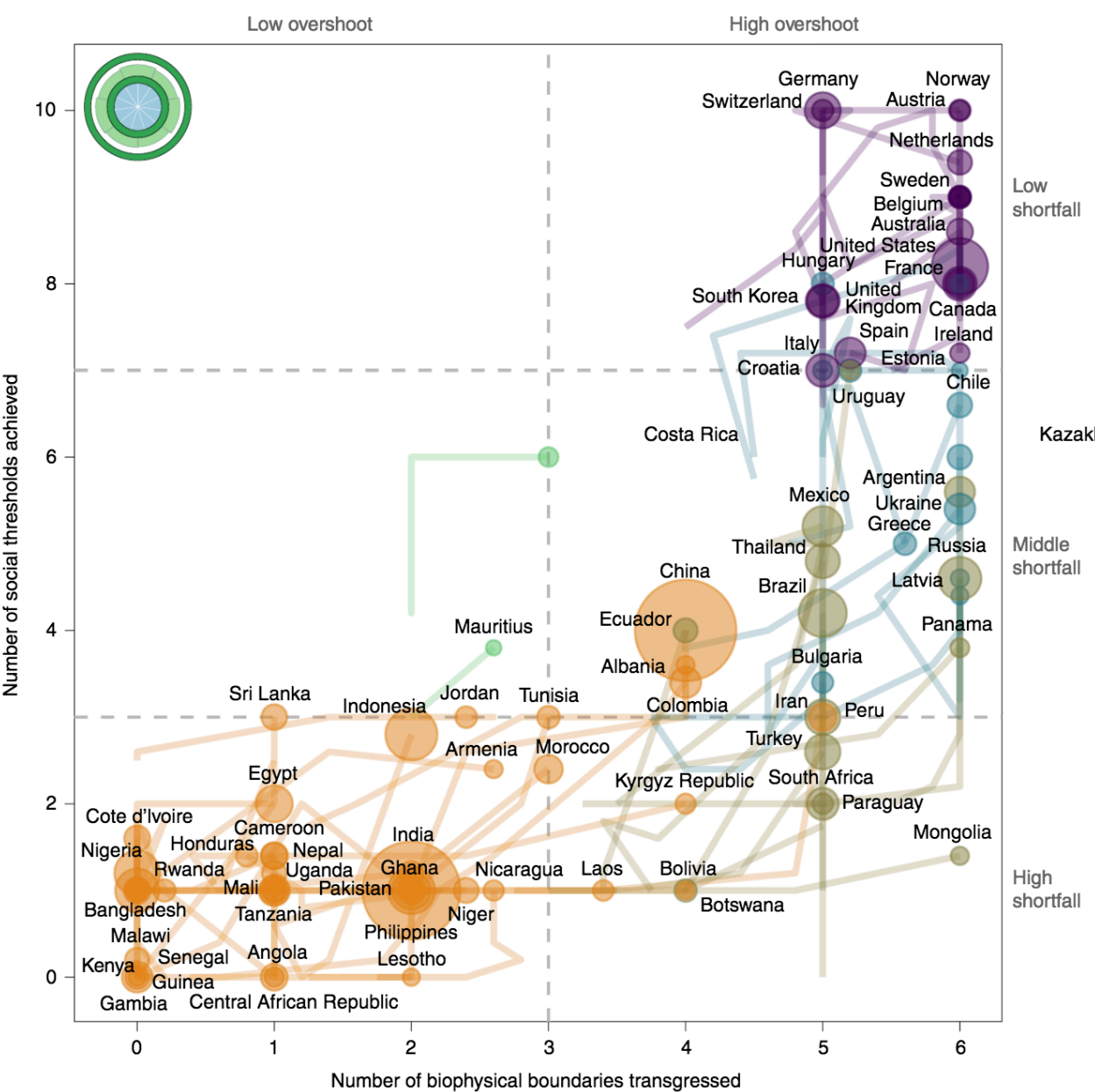
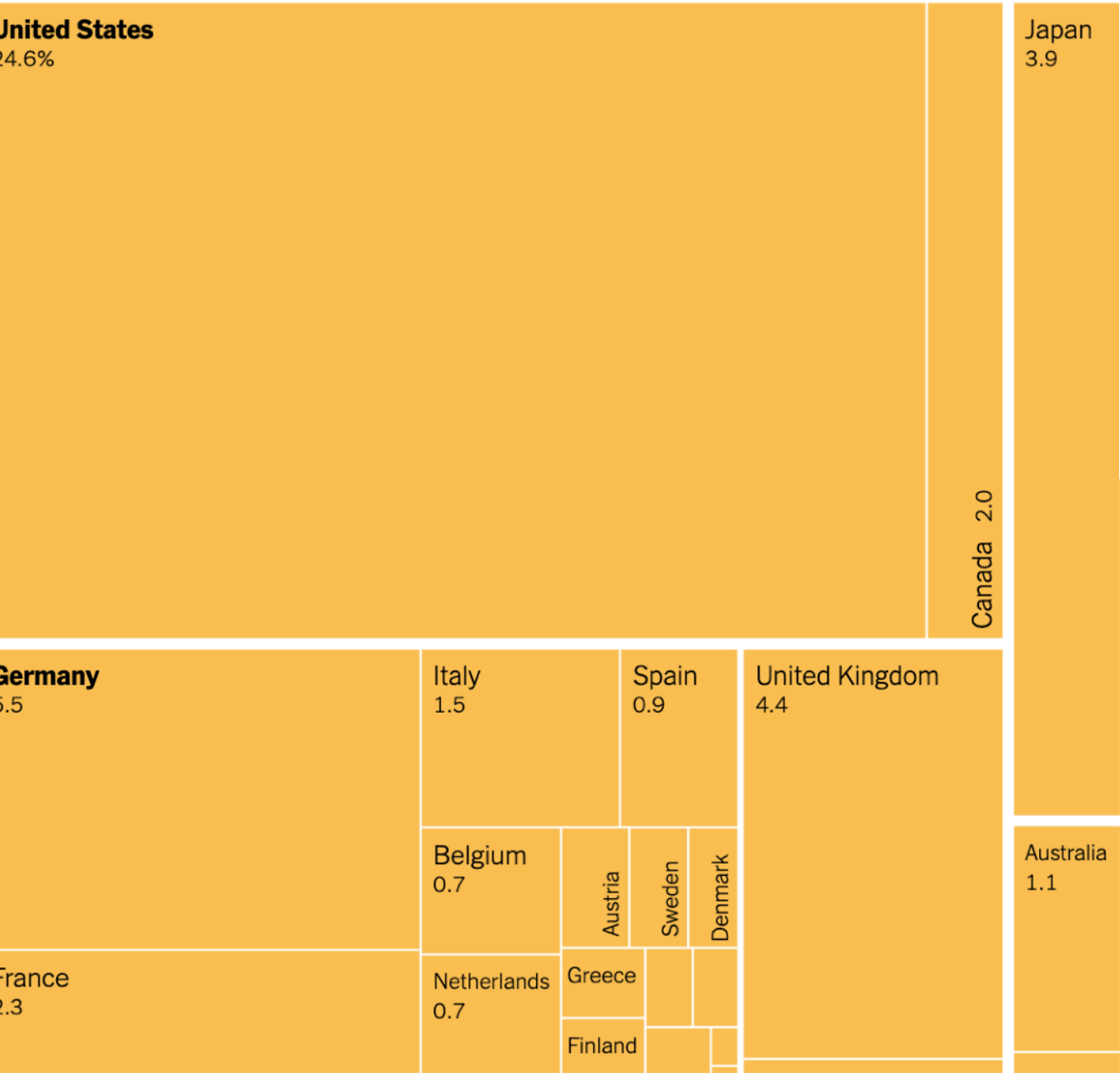


Tyndall<sup>o</sup>Centre  
for Climate Change Research

**Phaseout Pathways  
for Fossil Fuel Production  
within Paris-compliant carbon budgets**

Anderson et al. (2020)  
Calverley & Anderson (2022)

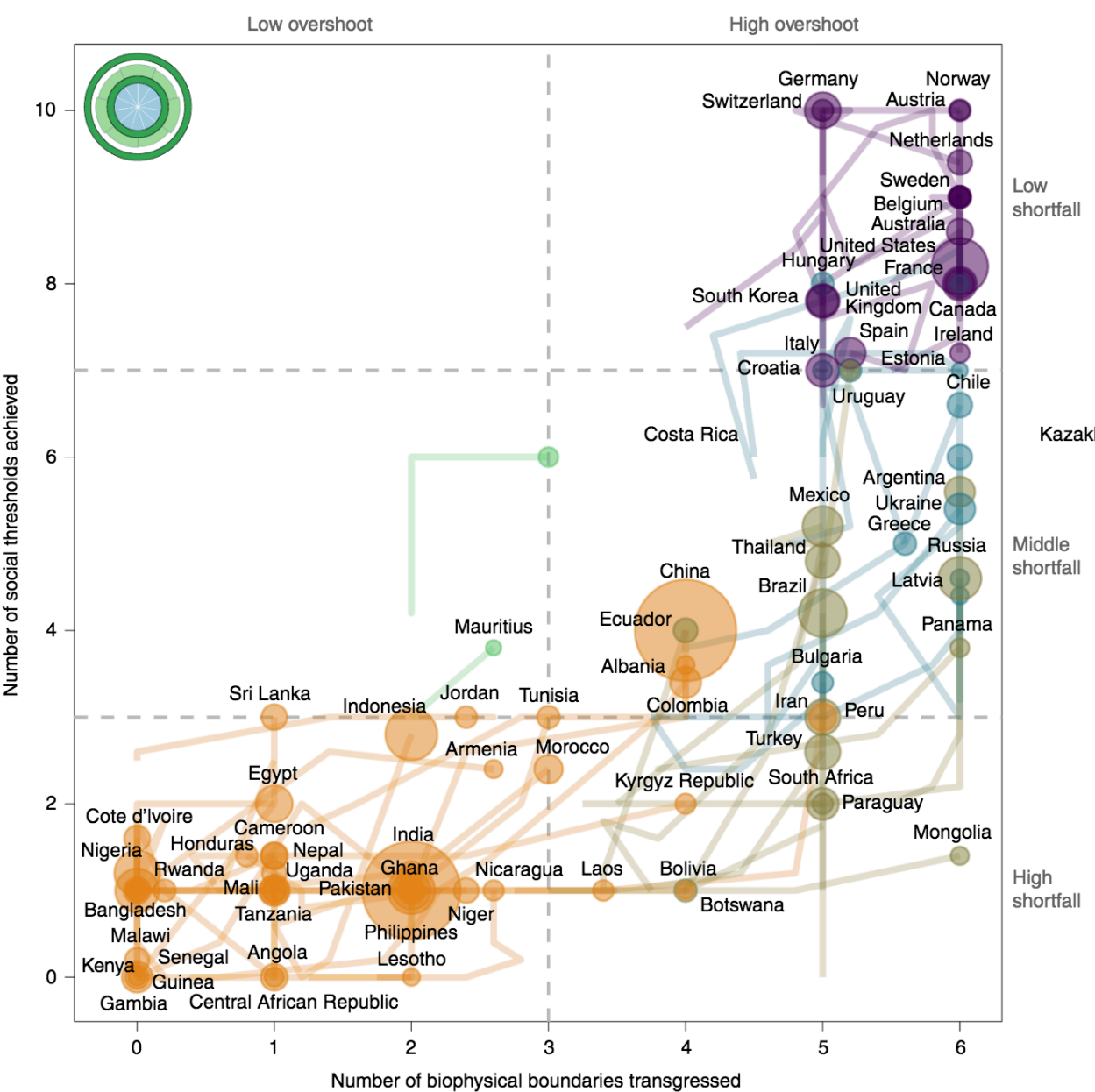
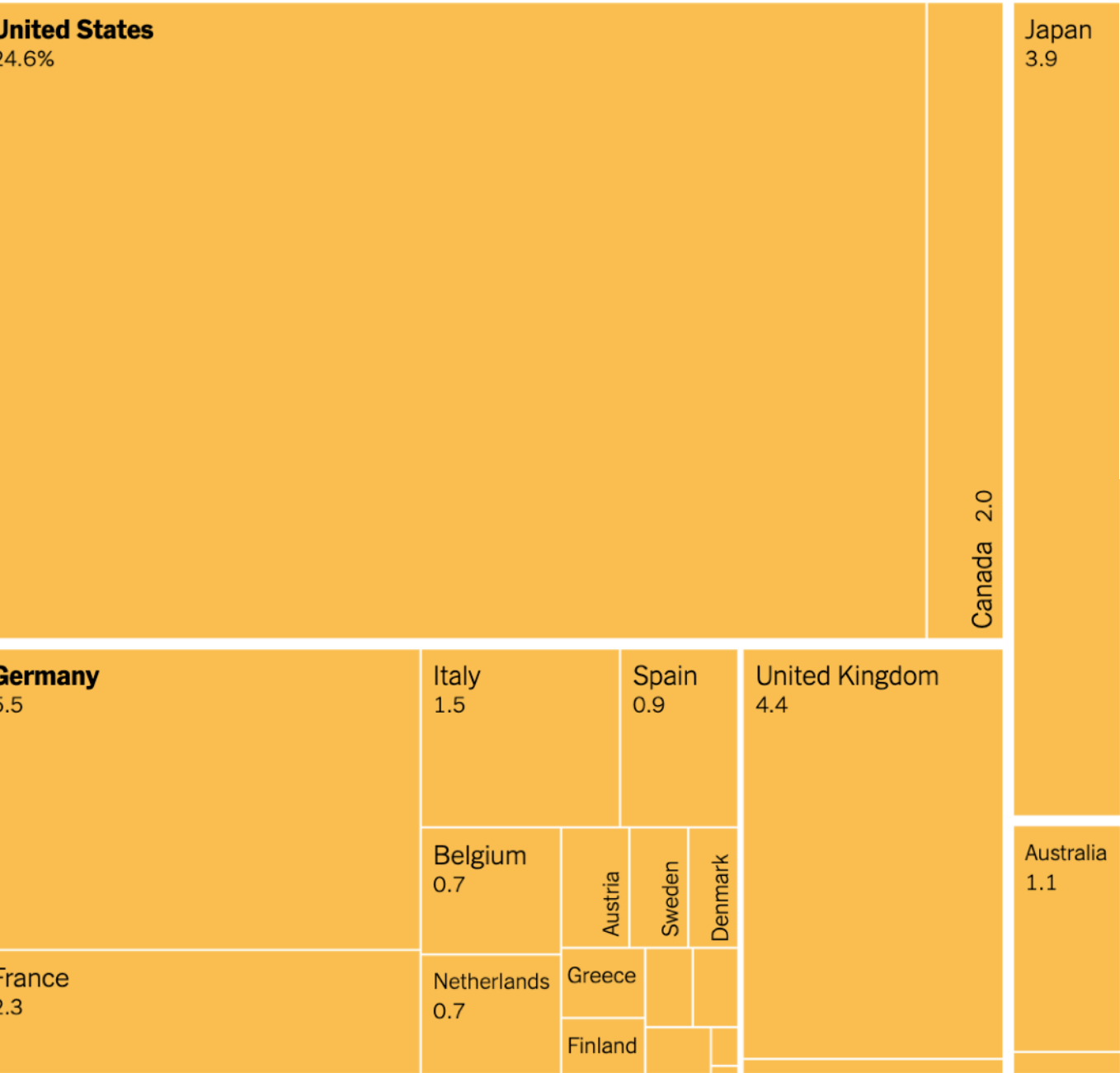
23 rich, developed countries are responsible for half of all historical CO<sub>2</sub> emissions.



“For developed nations, coal production needs to fall by 50% within five years and be effectively eliminated by 2030.”

Anderson et al. (2020)  
Calverley & Anderson (2022)

23 rich, developed countries are responsible for half of all historical CO<sub>2</sub> emissions.



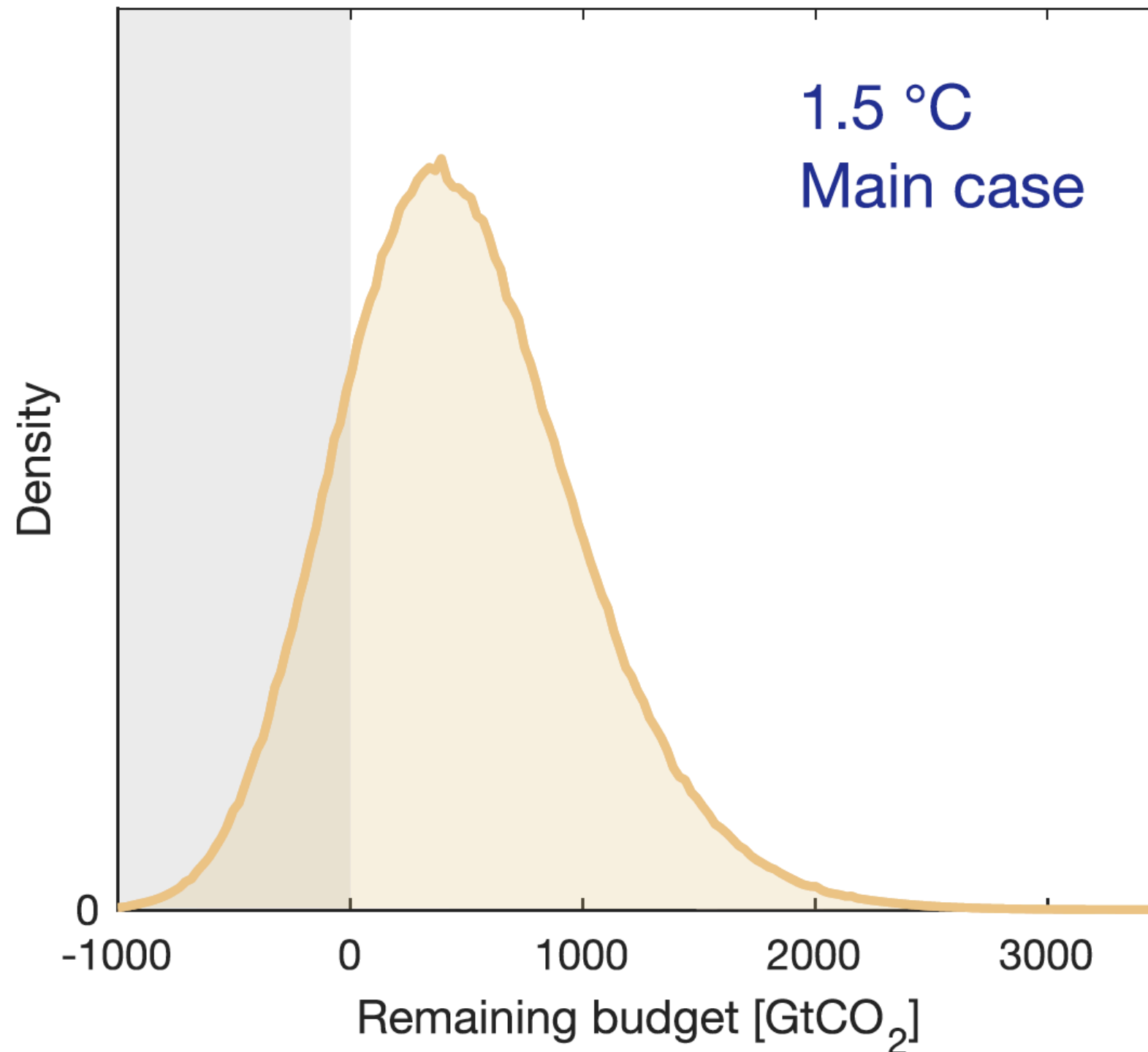
“For the wealthiest group of ‘producer nations’ [...] output of oil and gas needs to be cut by 74% by 2030, with a complete phase out by 2034.”

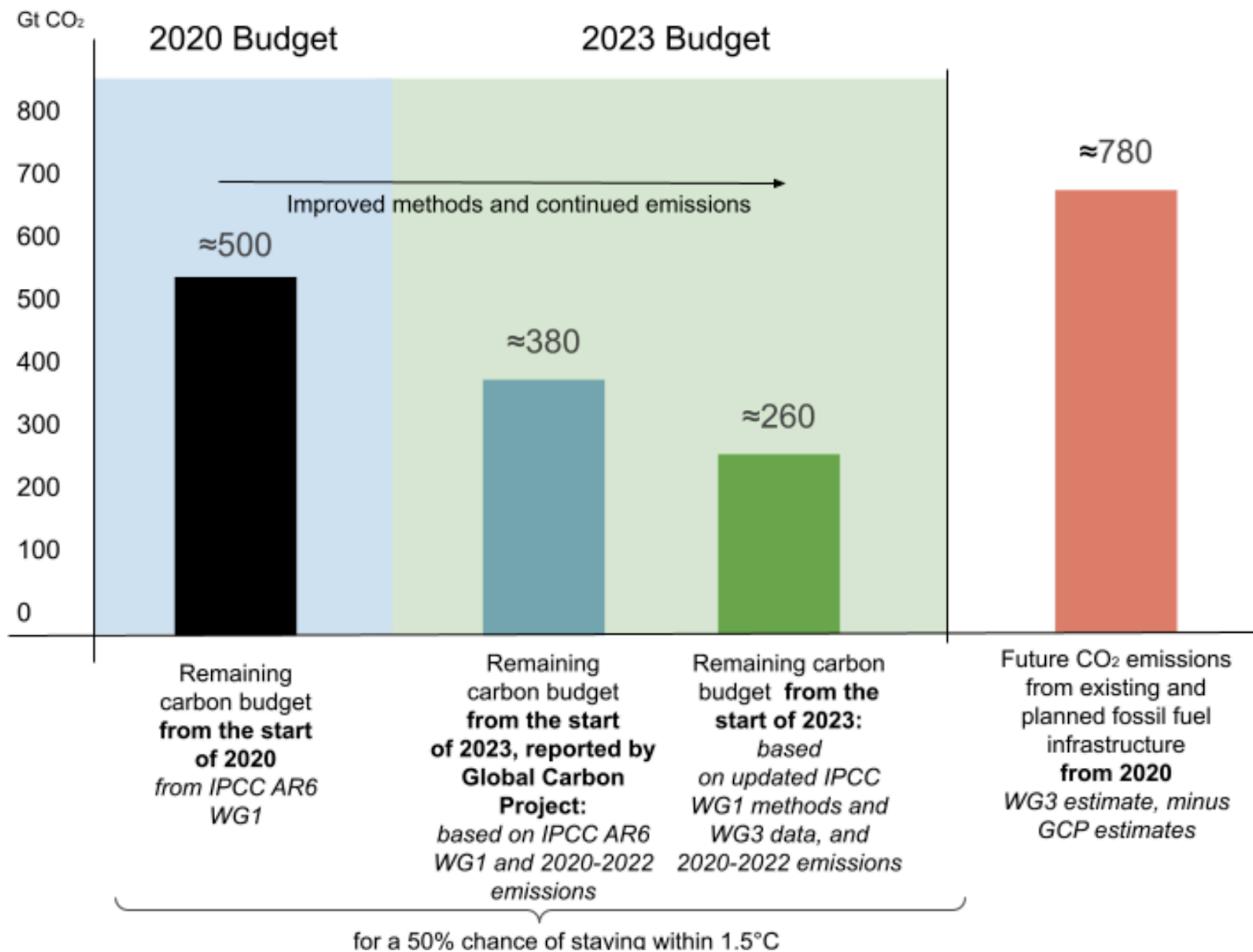


Why net zero by 2050 is woefully inadequate

2. Gives us a mere 50%  
chance of staying within  
1.5°C

# Why net zero by 2050 is woefully inadequate





Why net zero by 2050 is woefully inadequate

3. Relies on negative emissions technology that is unproven at scale



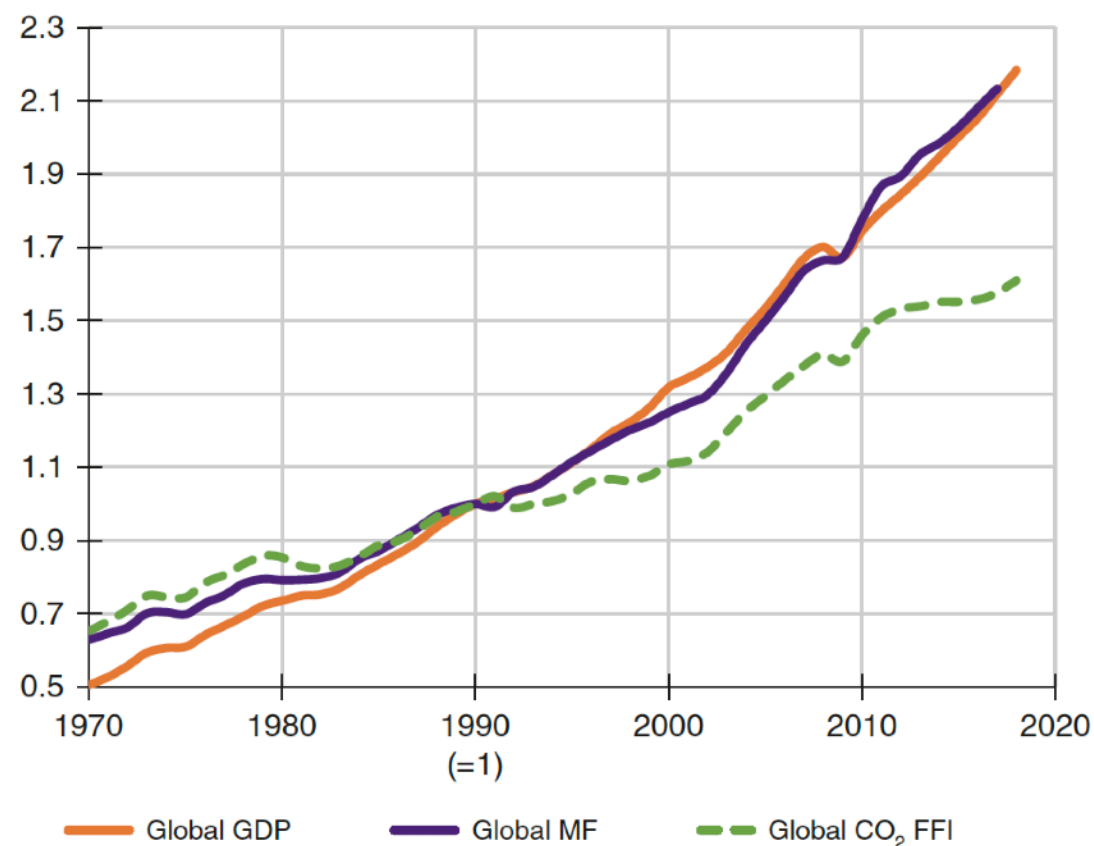
Number of scenarios	Type of scenario	Total BECCS removal	Removal per year
91 / 95	1.5° limited / no overshoot	334	4.1
122 / 123	1.5° high overshoot	464	5.7
294 / 294	2°	291	3.6

***“Negative-emission technologies are not an insurance policy, but rather an unjust and high-stakes gamble.”***

- Anderson & Peters (2016)

Why net zero by 2050 is woefully inadequate

4. Relies on unprecedented  
decoupling of emissions  
from economic growth



“We conclude that large rapid absolute reductions of resource use and GHG emissions cannot be achieved through observed decoupling rates, hence decoupling needs to be complemented by sufficiency-oriented strategies and strict enforcement of absolute reduction targets.”

- Haberl et al. (2020, abstract)

## ECONOMICS


# Unraveling the claims for (and against) green growth

Can the global economy grow indefinitely, decoupled from Earth's limitations?

By **Tim Jackson<sup>1</sup>** and **Peter A. Victor<sup>2</sup>**

Comment | Published: 04 August 2021

## Urgent need for post-growth climate mitigation scenarios

Jason Hickel , Paul Brockway, Giorgos Kallis, Lorenz Keyßer, Manfred Lenzen, Aljoša Slameršak, Julia Steinberger & Diana Ürge-Vorsatz

*Nature Energy* 6, 766–768 (2021) | [Cite this article](#)

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## Is Green Growth Possible?

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### ABSTRACT

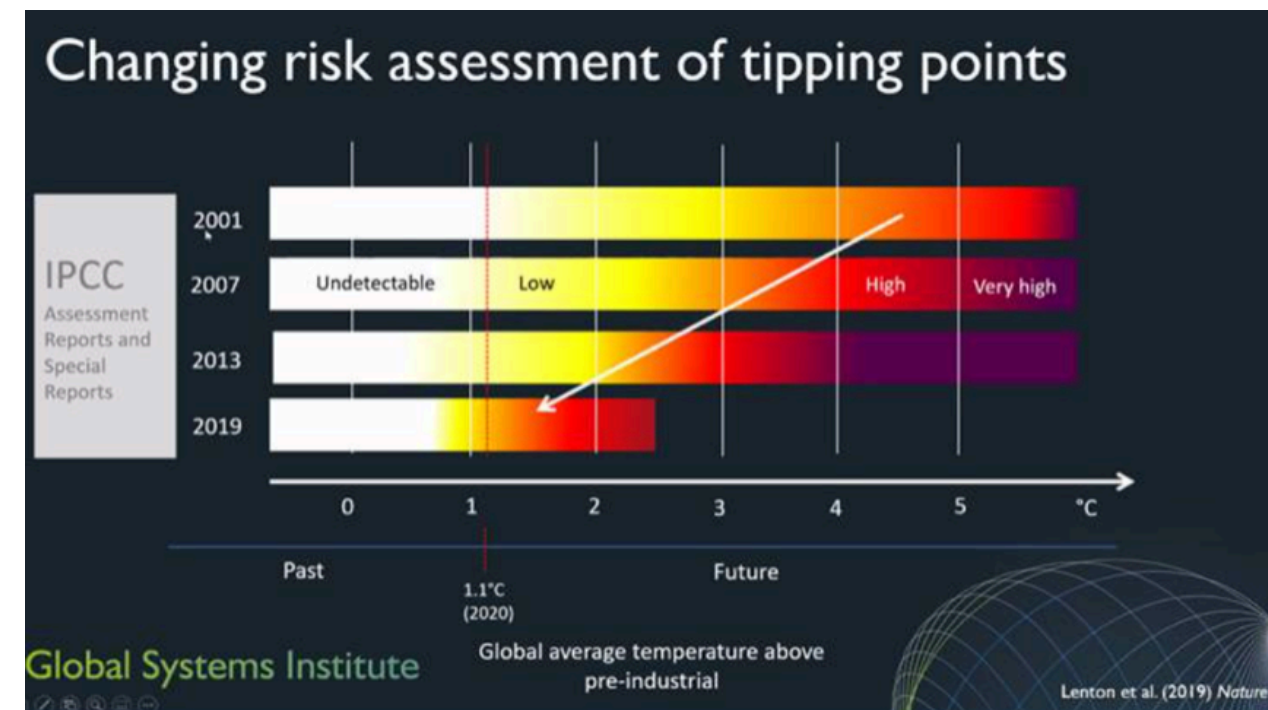
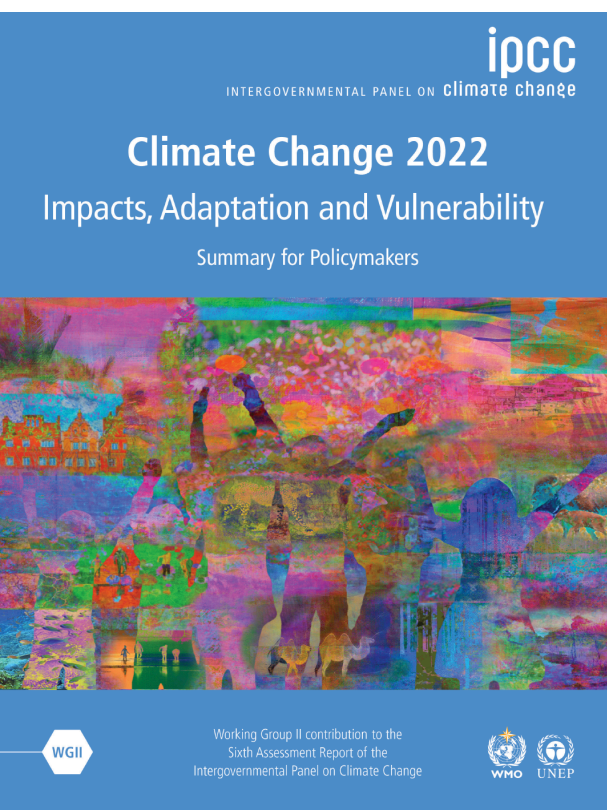
The notion of green growth has emerged as a dominant policy response to climate change and ecological breakdown. Green growth theory asserts that continued economic expansion is compatible with our planet's ecology, as technological change and substitution will allow us to absolutely decouple GDP growth from resource use and carbon emissions. This claim is now assumed in national and international policy, including in the Sustainable Development Goals. But empirical evidence on resource use and carbon emissions does not support green growth theory. Examining relevant studies on historical trends and model-based projections, we find that: (1) there is no empirical evidence that absolute decoupling from resource use can be achieved on a global scale against a background of continued economic growth, and (2) absolute decoupling from carbon emissions is highly unlikely to be achieved at a rate rapid enough to prevent global warming over 1.5°C or 2°C, even under optimistic policy conditions. We conclude that green growth is likely to be a misguided objective, and that policymakers need to look toward alternative strategies.

### KEYWORDS

Sustainable development; ecological economics; green growth; degrowth; decoupling

# Why net zero by 2050 is woefully inadequate

## 5. Climate impacts are worse than predicted and accelerating





**Why net zero by 2050 is woefully inadequate**

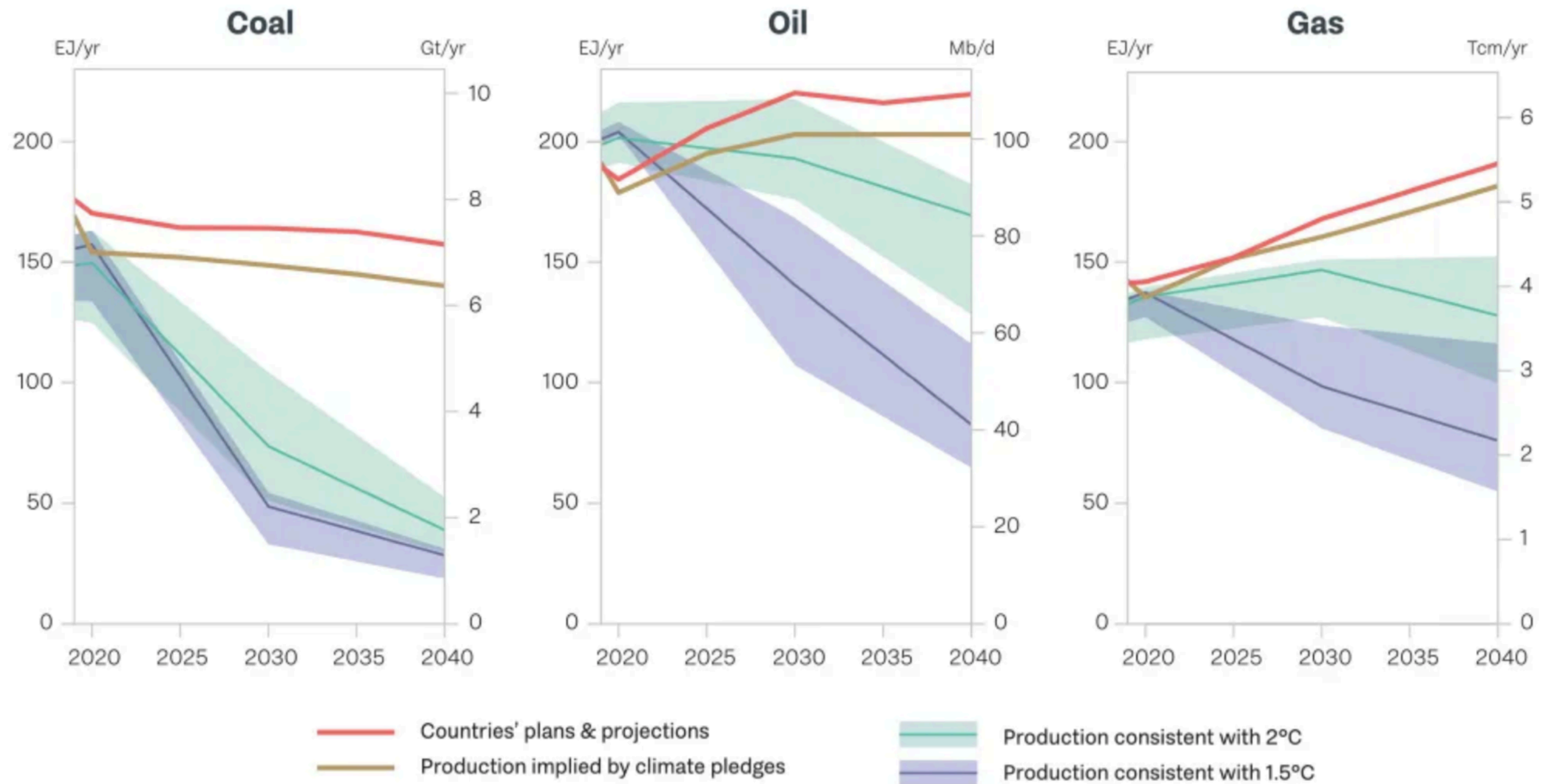
**6. Saying one thing, doing  
another**

“If governments are serious about the climate crisis,  
there can be no new investments in oil, gas and coal,  
from now – from this year.”

Fatih Birol (2021)



“Governments plan to produce more than twice the amount of fossil fuels in 2030 than would be consistent with limiting warming to 1.5°C.”





Extinction Rebellion  
@ExtinctionR

...

"The truly dangerous radicals are the countries that are increasing the supply of fossil fuels."

Which countries is the Secretary General of the UN referring to here?

Brace yourselves. 🧵

[Tweet übersetzen](#)



António Guterres  
@antonioguterres

...

Climate activists are sometimes depicted as dangerous radicals.

But the truly dangerous radicals are the countries that are increasing the production of fossil fuels.

Investing in new fossil fuels infrastructure is moral and economic madness.

11:46 AM · Apr 5, 2022 · Twitter Web App

6:54 nachm. · 13. Apr. 2022 · Twitter Web App

1.448 Retweets 104 Zitierte Tweets 3.524 „Gefällt mir“-Angaben

United States  
United Kingdom  
Germany  
The Netherlands  
Norway  
Turkey  
Cyprus  
Canada  
Australia  
New Zealand  
Russia  
Brazil  
Mexico  
Japan  
China  
India  
Nigeria  
Uganda  
Egypt  
Morocco

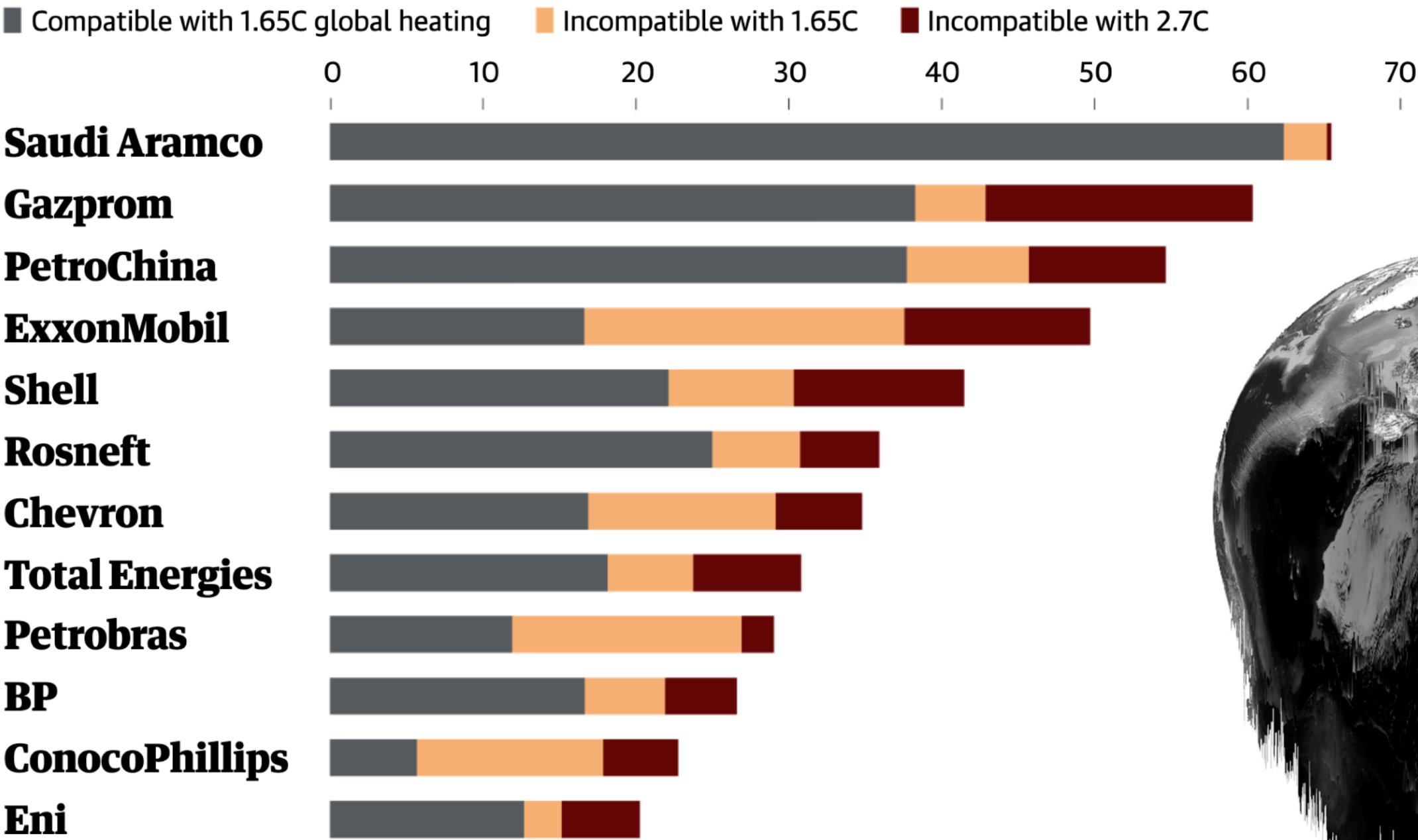
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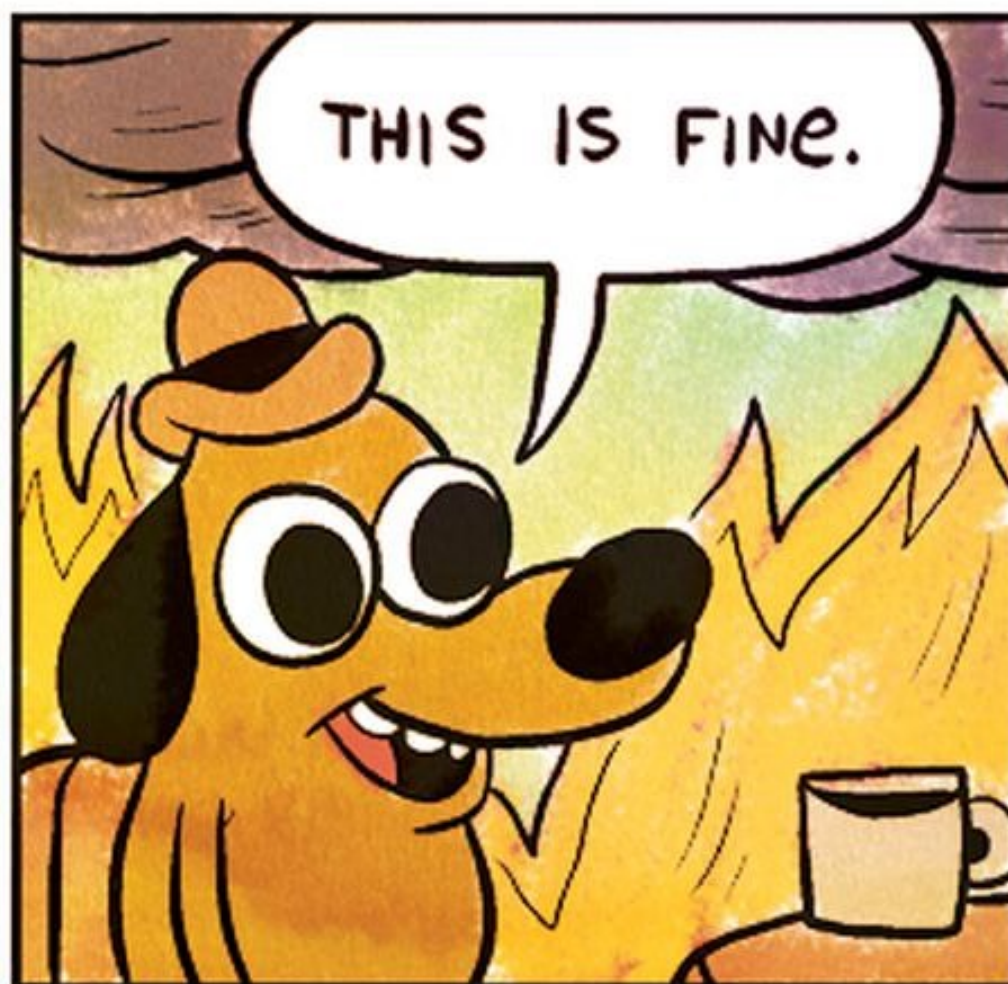
Source



# Major companies plan to spend many millions a day to 2030 on exploiting new oil and gas

Capital expenditure per day 2021-2030, \$m



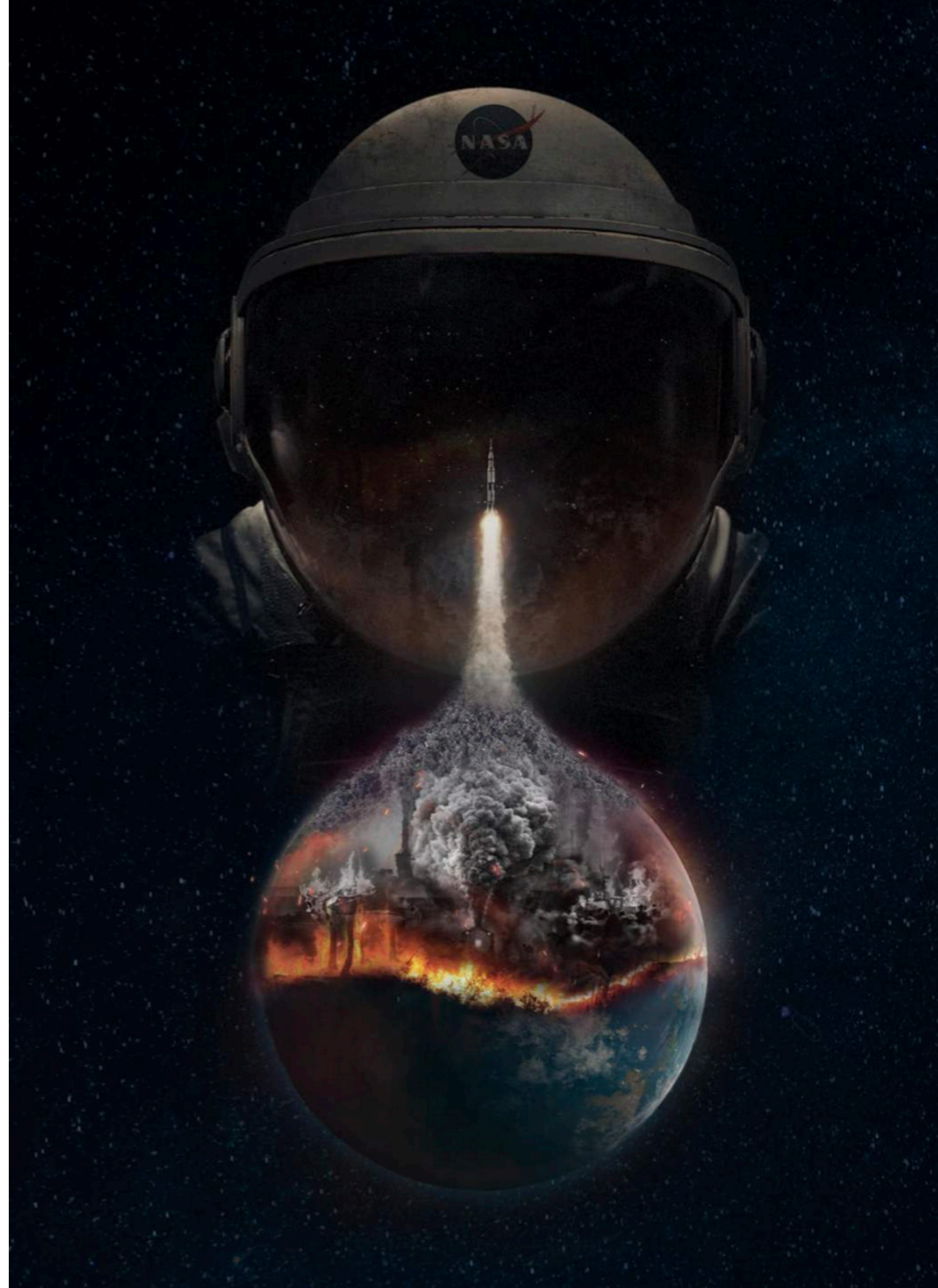




# UN Warns of 'Total Societal Collapse' Due to Breaching of Planetary Boundaries

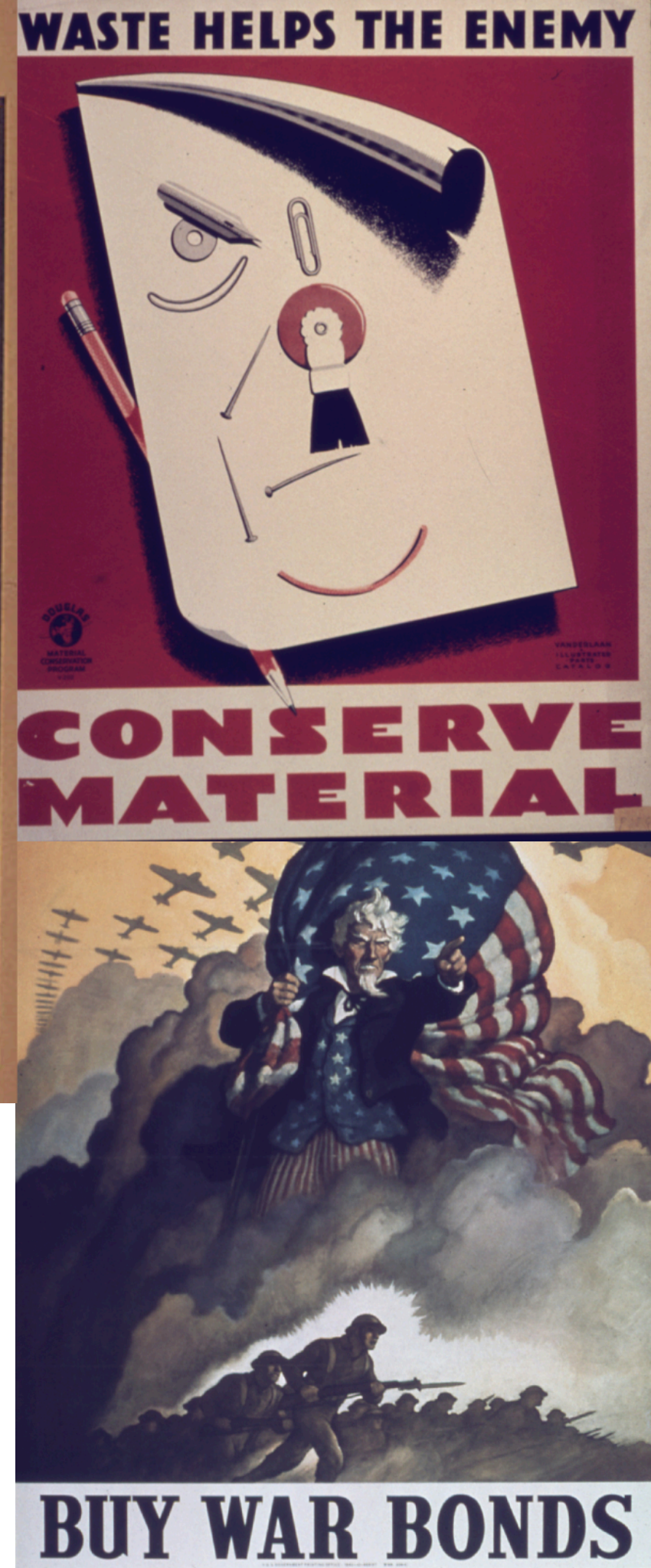
**Nafeez Ahmed**

26 May 2022



We need to shift  
into emergency  
mode





Source

Government spending rose 10 fold from 1940 to 1945  
 National speed limit of 35 mph to conserve fuel, car sharing  
 Manufacturing of cars, construction of new homes banned  
 Rationing of gasoline, meat, butter, sugar etc.  
 Income taxes of up to 94%



# Tipping positive change

Timothy M. Lenton

## *Sensitive intervention points in the post-carbon transition*

We must exploit socioeconomic tipping points and amplifiers

By J. D. Farmer<sup>1,2,3</sup>, C. Hepburn<sup>1,4</sup>, M. C. Ives<sup>1,4</sup>, T. Hale<sup>5</sup>, T. Wetzer<sup>1,6,7</sup>, P. Mealy<sup>1,4,8</sup>, R. Rafaty<sup>1</sup>, S. Srivastav<sup>1,4</sup>, R. Way<sup>1,4</sup>

points”) (3), such that a relatively small change can trigger a larger change that becomes irreversible (4), where nonlinear

## Social tipping dynamics for stabilizing Earth's climate by 2050

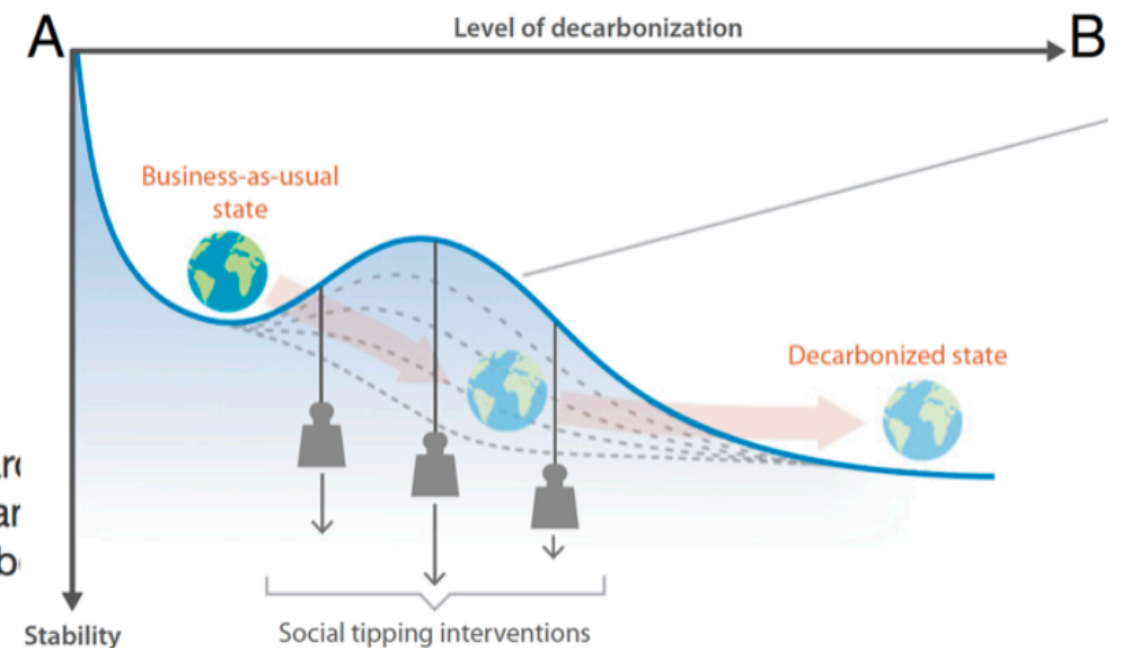
 Ilona M. Otto, Jonathan F. Donges,  Roger Cremades, Avit Bhowmik, Richard Wolfgang Lucht, Johan Rockström, Franziska Allerberger, Mark McCaffrey, Sylvar Alex Lenferna, Nerea Morán, Detlef P. van Vuuren, and Hans Joachim Schellnhuber

## Sensitive intervention points to achieve net-zero emissions

Report of the Policy Advisory Group\* of the Committee on Climate Change

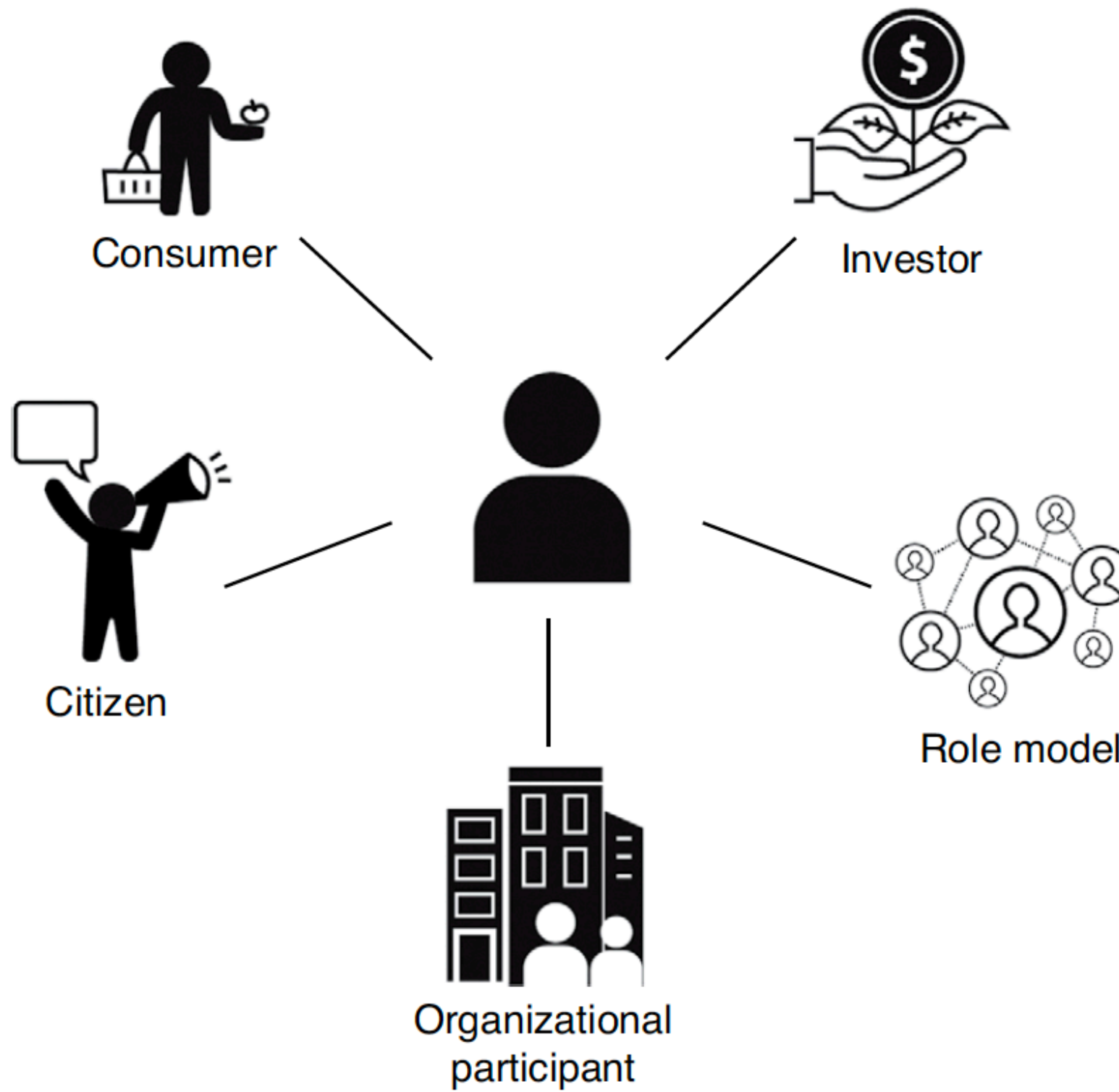
9 December 2020

Cameron Hepburn, Tera Allas, Laura Cozzi, Michael Liebreich, Jim Skea, Lorraine Whitmarsh, Giles Wilkes and Bryony Worthington



# **Part V:**

# **Climate Action**







# Carbon Footprint Reduction



- Stop or lower air travel
- Stop driving petrol cars
- Reduce your meat consumption, especially beef
- Talk about it!

## An Audacious Toolkit: Actions Against Climate Breakdown (Part 3: I is for Individual)



Julia Steinberger Nov 26, 2018 · 15 min read



## Your Personal Action Guide for the Environment

Solving our biggest environmental problems will require huge changes in policy and business practice. But it turns out that our personal actions can help too, if we focus on the right things. Here are some places to start.



Dr. Jonathan Foley

Follow



Apr 22, 2020 · 14 min read ★





Investor



Organizational  
participant

- Divestment (Personal & Organizational)
- Donations to environmental organizations
- Influence through position / status



Organize lectures / workshops  
High-level interventions

(Reduce meat in cafeteria, at parties,  
disincentivize flights, etc.)

....

Comment | [Published: 15 March 2021](#)

## Changing scientific meetings for the better

[Sarvenaz Sarabipour](#) , [Aziz Khan](#), [Yu Fen Samantha Seah](#), [Aneth D. Mwakilili](#), [Fiona N. Mumoki](#), [Pablo J. Sáez](#), [Benjamin Schwessinger](#), [Humberto J. Debat](#) & [Tomislav Mestrovic](#)

[Nature Human Behaviour](#) **5**, 296–300 (2021) | [Cite this article](#)

**7822** Accesses | **4** Citations | **249** Altmetric | [Metrics](#)

## Sustainability at the UvA

We integrate sustainability into study programmes and conduct research on sustainability issues. We have also adopted a sustainable approach to our operations.



Citizen



Role model

- Vote
- Talk about the climate crisis (urgency **and** agency)
- Contagion of low-carbon lifestyle (social norm shift)

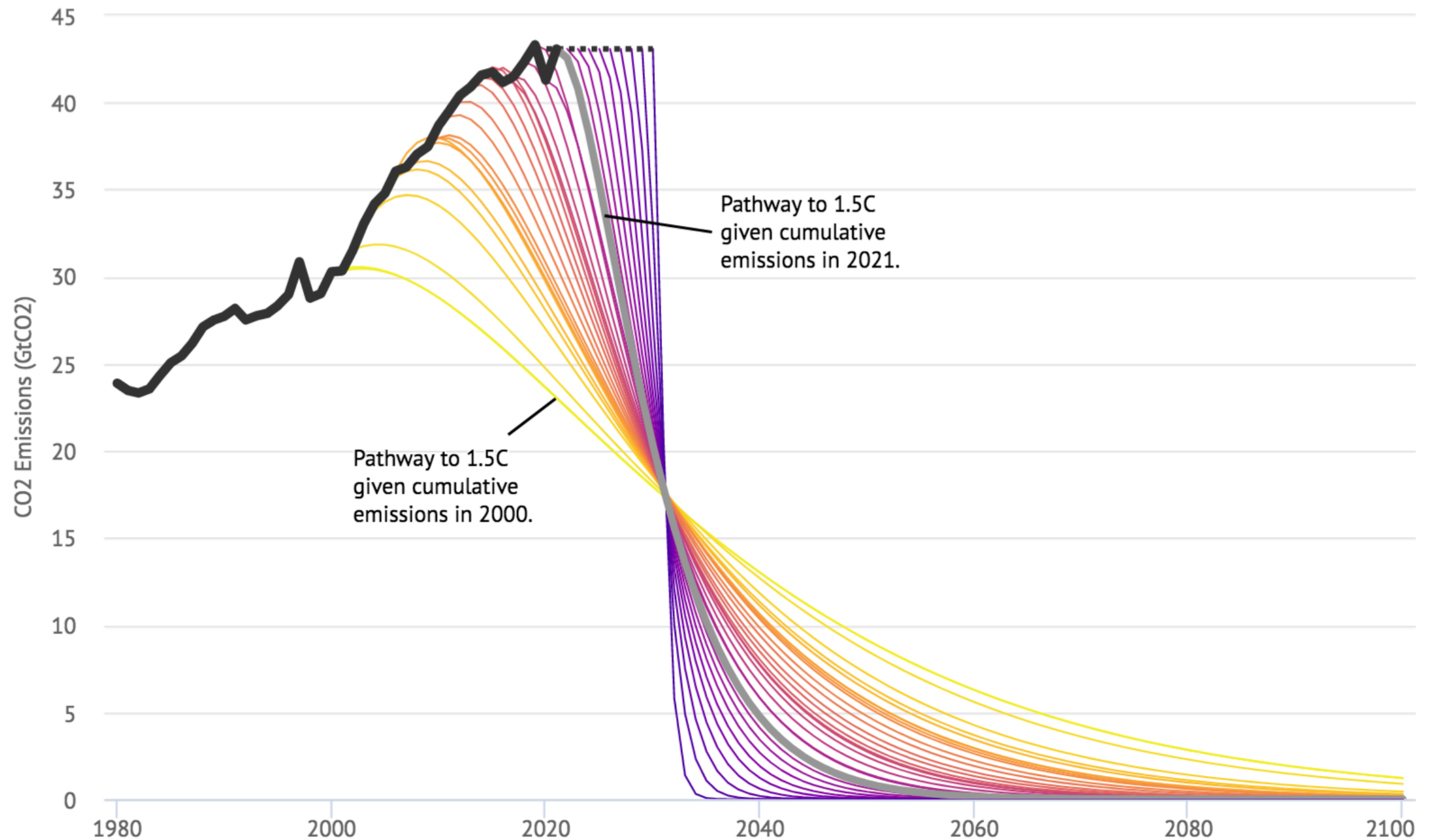


Citizen



Role model

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Citizen



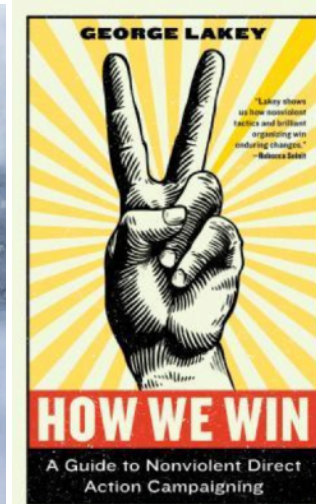
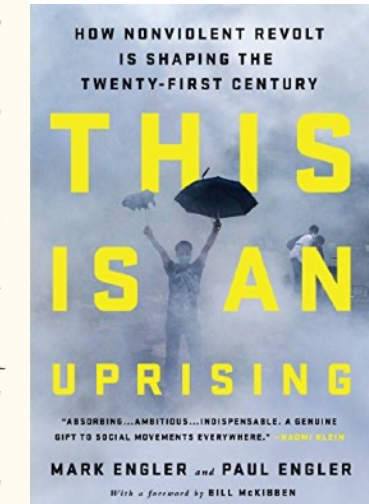
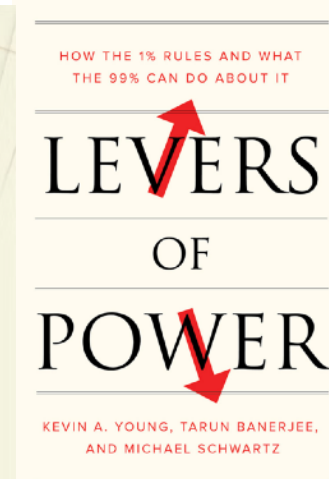
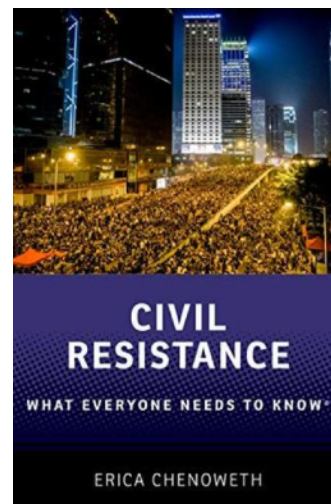
Role model

- Vote
- Talk about the climate crisis (urgency **and** agency)
- Contagion of low-carbon lifestyle (social norm shift)

# Civil Resistance

# Civil Resistance

Method to change the status quo using a diverse set of nonviolent, noninstitutional actions (strikes, protests, occupations, boycotts, etc.)



# Civil Resistance

Method to change the status quo using a diverse set of nonviolent, noninstitutional actions (strikes, protests, occupations, boycotts, etc.)

## On the Duty of Civil Disobedience

by Henry David Thoreau

1849, original title: Resistance to Civil Government

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# Civil Disobedience

Public, conscientious and nonviolent breach of law with the aim to bring about a change in laws or government policies

## On the Duty of Civil Disobedience

by Henry David Thoreau

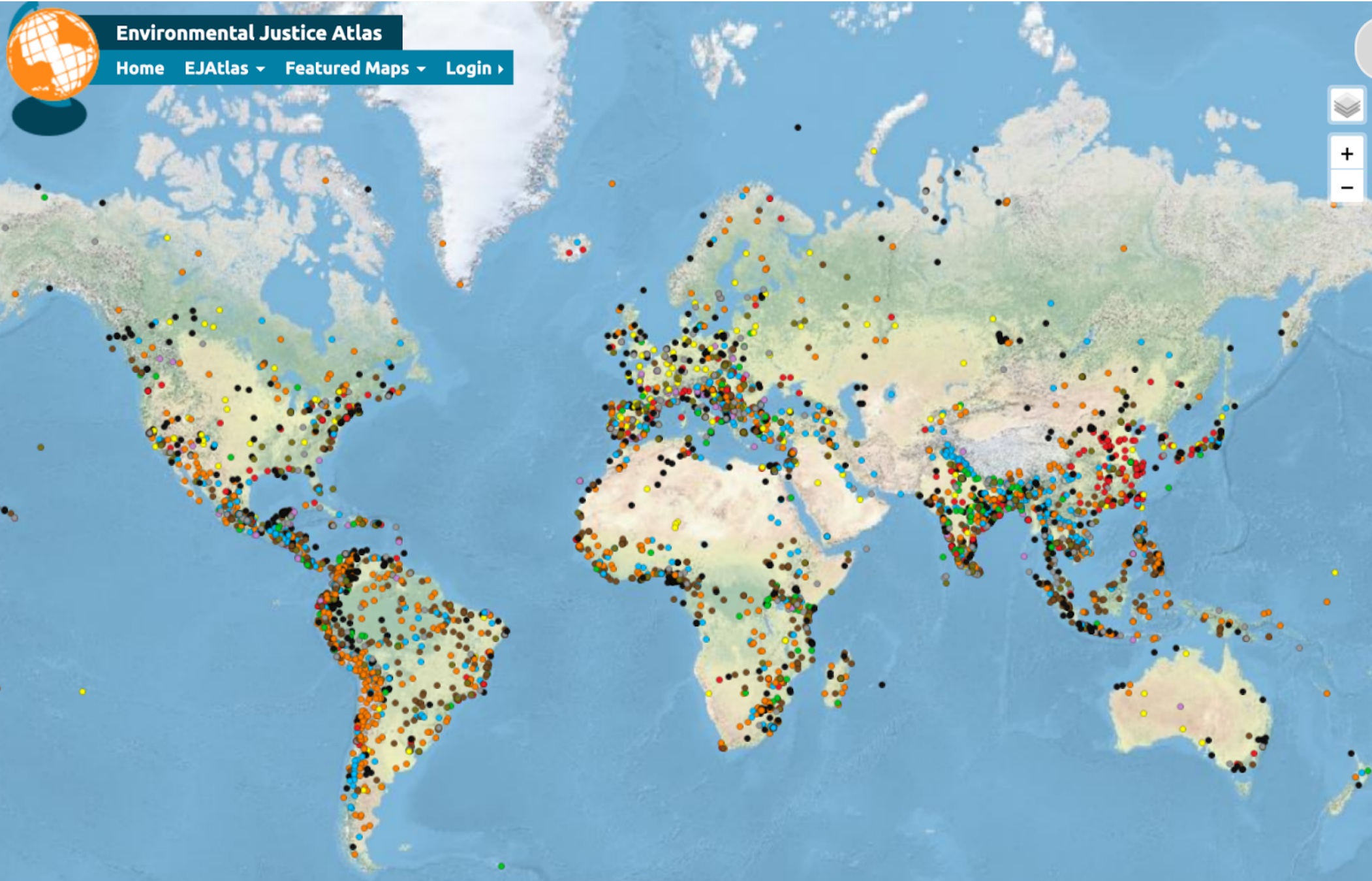
1849, original title: Resistance to Civil Government

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## Geographical Mapping of Campaigns

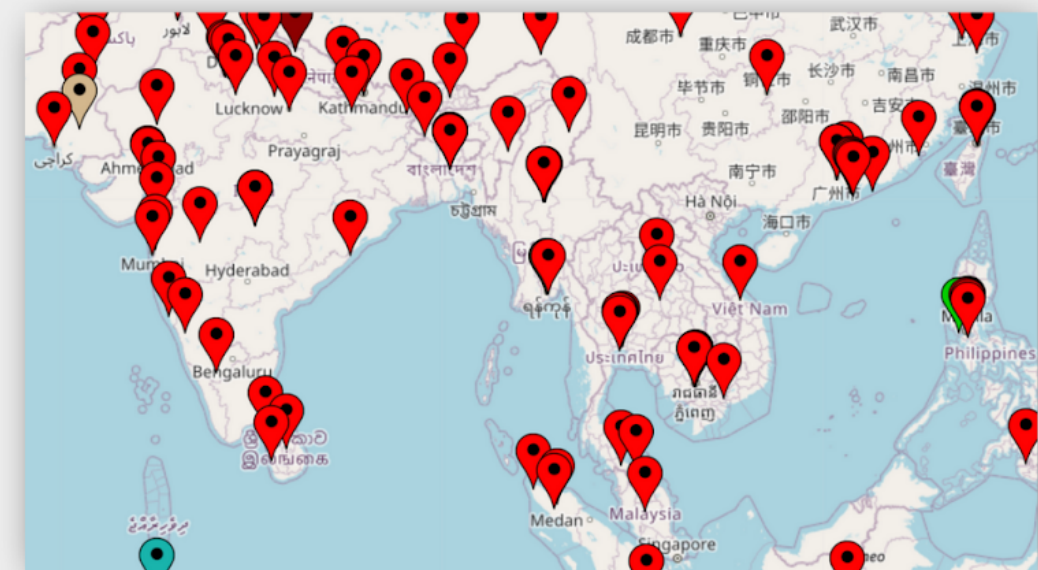
Nonviolent action campaigns are waged all over the world. See a distribution of the campaigns across the globe in our interactive map.

1,200+  
cases

100+  
countries

400+  
years covered

[View Campaigns on the Map](#)





# Fridays for Future

2018

SKOLSTREJK  
FÖR  
KLIMATET

2019

STRIKE FOR THE CLIMA



# Extinction Rebellion

The Troublemaker  
Rebellion





# 1992 World Scientists' Warning to Humanity

Published Jul 16, 1992 | Updated Feb 4, 2022

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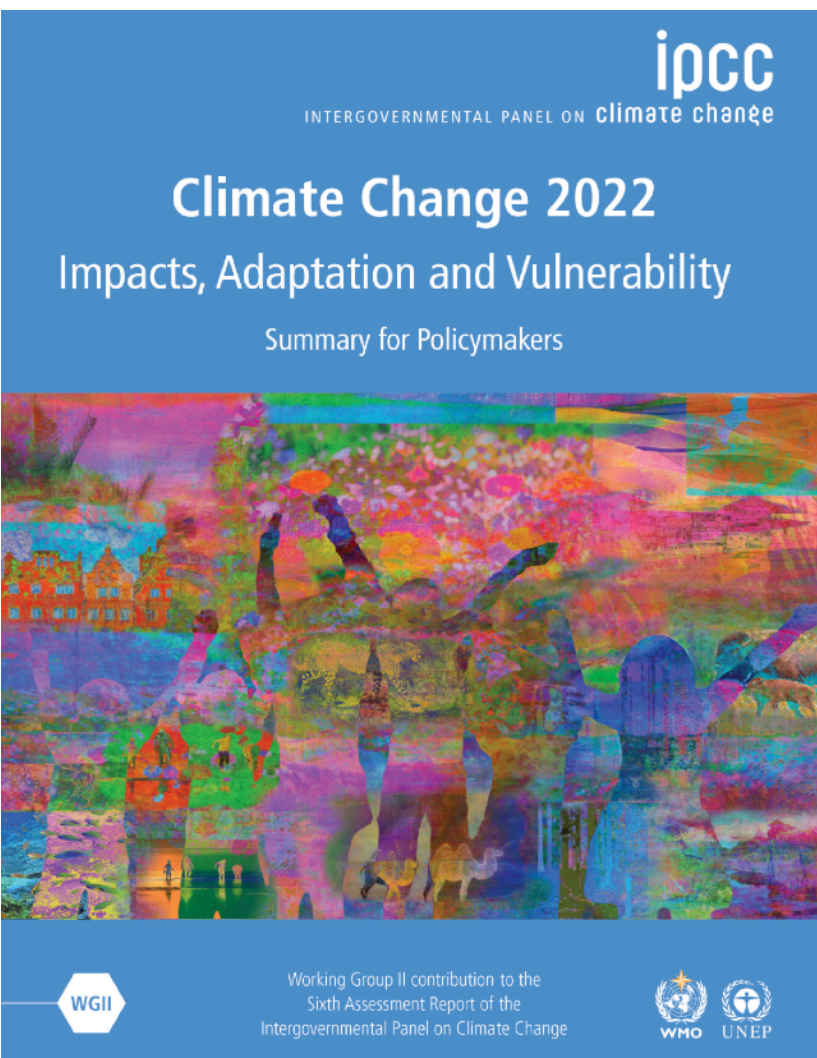
## JOURNAL ARTICLE

### World Scientists' Warning to Humanity: A Second Notice 🔒

William J. Ripple, Christopher Wolf, Thomas M. Newsome, Mauro Galetti, Mohammed Alamgir, Eileen Crist, Mahmoud I. Mahmoud, William F. Laurance, 15,364 scientist signatories from 184 countries

*BioScience*, Volume 67, Issue 12, December 2017, Pages 1026–1028, <https://doi.org/10.1093/biosci/bix125>

**Published:** 13 November 2017



Source

Ripple et al. (2017)

🔒 | LETTER

# Concerns of young protesters are justified

GREGOR HAGEDORN, PETER KALMUS, MICHAEL MANN, SARA VICCA, JOKE VAN DEN BERGE, JEAN-PASCAL VAN YPERSELE, DOMINIQUE BOURG, JAN ROTMANS, ROOPE KAARONEN, STEFAN RAHMSTORF, HELGA KROMP-KOLB, GOTTFRIED KIRCHENGAST, RETO KNUTTI, SONIA I. SENEVIRATNE, PHILIPPE THALMANN, RAVEN CRETNEY, ALISON GREEN, KEVIN ANDERSON, MARTIN HEDBERG, DOUGLAS NILSSON, AMITA KUTTNER, AND KATHARINE HAYHOE [fewer](#) [Authors Info & Affiliations](#)

SCIENCE • 12 Apr 2019 • Vol 364, Issue 6436 • pp. 139-140 • DOI: 10.1126/science.aax3807

ENVIRONMENT OCTOBER 13, 2019 / 4:12 AM / UPDATED 2 YEARS AGO

## Scientists endorse mass civil disobedience to force climate action

By Matthew Green

5 MIN READ



LONDON (Reuters) - Almost 400 scientists have endorsed a civil disobedience campaign aimed at forcing governments to take rapid action to tackle climate change, warning that failure could inflict “incalculable human suffering.”

[Source](#)







“Einstein said to think and not act is a crime. If we understand the situation, we must try to make it clear. I decided six or seven years ago that I did not want my grandchildren to look back in the future and say ‘Opa understood what was happening, but he didn’t make it clear’.”





“There is a very widespread feeling that the individual is impotent against governments, and that, however bad their policies may be, there is nothing effective that private people can do about it. This is a complete mistake. If all those who disapprove of government policy were to join in massive demonstrations of civil disobedience, they could render governmental folly impossible and compel the so-called statesmen to acquiesce in measures that would make human survival possible.”

# Civil disobedience by scientists helps press for urgent climate action

Time is short to secure a liveable and sustainable future; yet, inaction from governments, industry and civil society is setting the course for 3.2 °C of warming, with all the cascading and catastrophic consequences that this implies. In this context, when does civil disobedience by scientists become justified?

Stuart Capstick, Aaron Thierry, Emily Cox, Oscar Berglund, Steve Westlake and Julia K. Steinberger



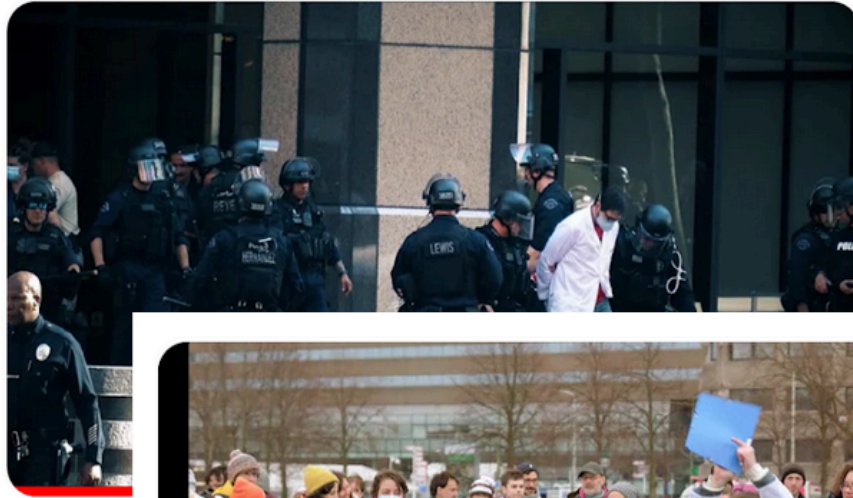


# Over 1000 academics in 26 countries took to the streets during 4 - 9 April



- Blocking government ministries / corporations, paper pastings
- Academic strikes, occupations, teach-ins, street theatre
- Mass arrests in multiple countries
- Global press coverage





## Scientist Rebellion at Chase Bank Los Angeles

8.6K views • 9 months ago



Climate Ad Project

When *\*scientists\** around the world are putting their bodies on the line to warn



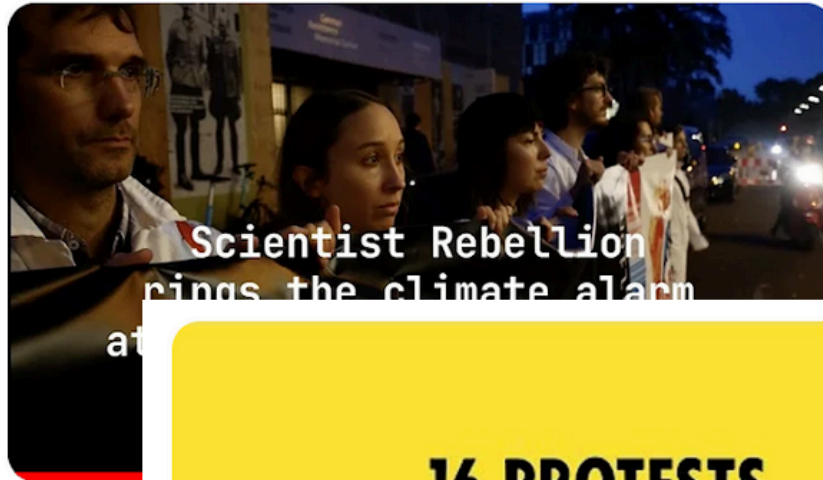
## Scientist Rebellion takes action in the Netherlands

4.5K views • 9 months ago



Scientist Rebellion

To secure a liveable future, we need emergency action! 🚨 The scientific community has been



## Scientist Rebellion rings the alarm at the World Health Summit

747 views • 3 months ago



Scientist Rebellion

60 scientists from Scientist Rebellion disrupt opening of World Health Summit in Berlin, Germany, :

**16 PROTESTS  
AGAINST PRIVATE AVIATION  
IN 11 COUNTRIES**

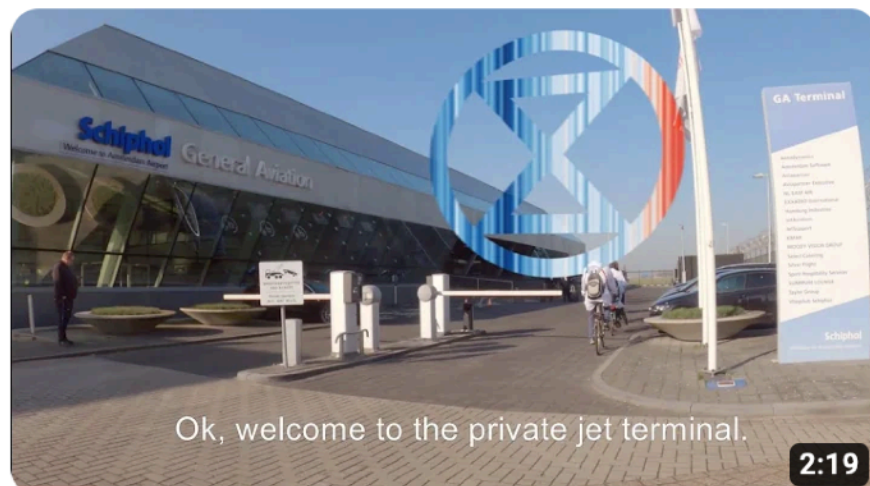
## Scientists and activists block private airports in eleven countries

406 views • 2 months ago



Scientist Rebellion

Scientists and climate campaigners from Scientist Rebellion and Extinction Rebellion barricaded n



Ok, welcome to the private jet terminal.

2:19

## Scientist Rebellion Netherlands blocks private jet terminal using bikes

4 views • 18 minutes ago



Scientist Rebellion

As part of the global Make Them Pay (<https://makethempay.info/>), Dutch scientists and academics blocked the private jet terminal ...

New



















Thank you!