AGU25:

Where Science Connects Us.

Peter Carter, director

There Is Something More That Scientists Can Do To Help Secure A Livable Climate Future

IPCC quote

Any further delay in concerted global action will miss a brief and rapidly closing window to secure a liveable future.

AGU25 Town Hall
15 Dec. 2025

Climate Emergency Institute

Dr. Peter Carter

There Is Something More That Scientists Can Do To Help Secure A Livable Climate Future

What we are up against

- Global heating driven climate change is accelerating (being accelerated)
- Global emissions are still being increased
- Tipping point thresholds are being exceeded, certainly by unavoidable warming and fossil fuel policies
- Now with the most powerful climate emergency denial and mitigation opposition ever

The Future Needs Climate Scientists More Than Ever

The One Thing

There Is Something More That Scientists Can Do To Help Secure A Livable Climate Future

With record powerful denial, effective ongoing communication by scientists is now the priority

Climate Science Serious PR

2019 AGU Fall Meeting session on
"Communicating with Appropriate Urgency: How to Connect with Audiences in a Time of Accelerating Change."

1 Main Message
IMMEDIATE ACTION
IPCC AR6

The world is backing off from the climate emergency

We need planetary emergency intervention by scientists more than ever

United Nations Environment Assembly Seventh session High-level segment Nairobi,
11 December 2025 Draft ministerial declaration of the United Nations Environment Assembly at its seventh session

(h) We urge all Member States to pursue ambitious nationally determined contributions with a view to holding the increase in the global average temperature to well below 2 degrees Celsius above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5 degrees Celsius above pre-industrial levels.

BUT

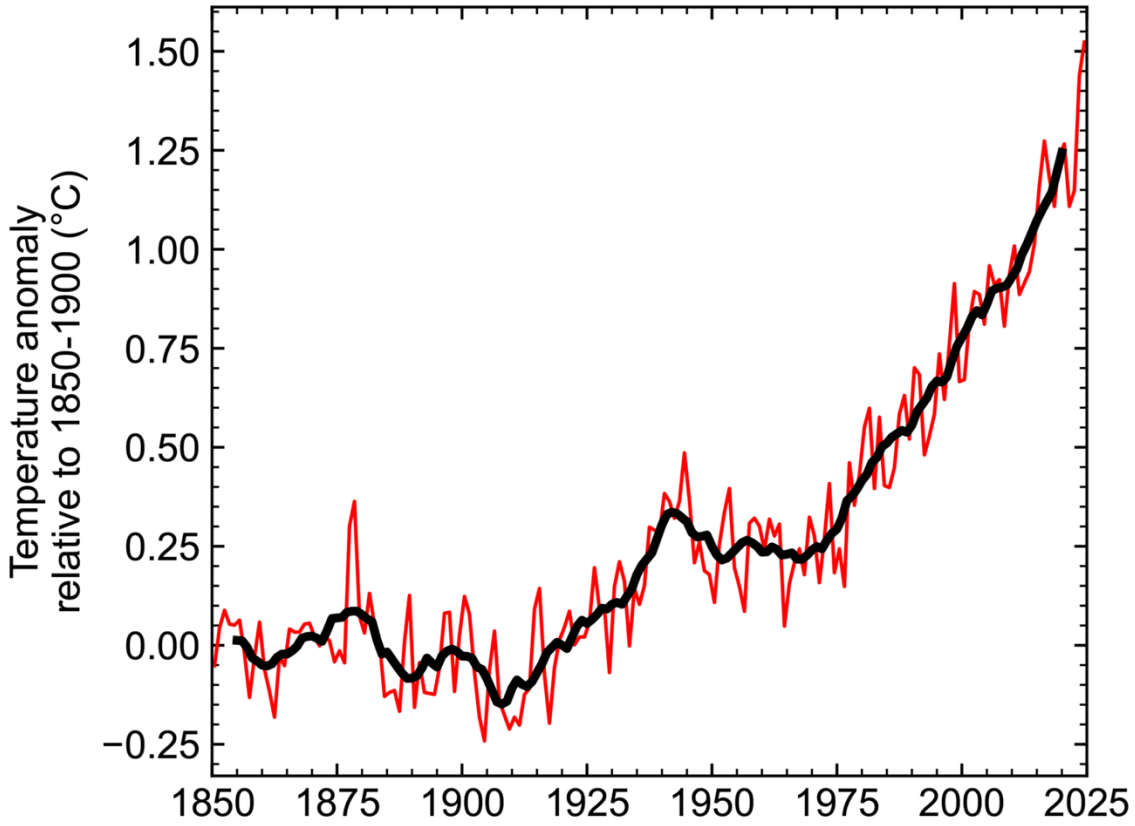
No mention of:

- Emergency
- Mitigation
- Fossil fuels (coal, oil or gas)
- Emissions (any greenhouse gases)
- Fossil fuel subsidies

Climate Change Indicators

Climate Change Indicators

Human-induced warming has been increasing at a rate that is **unprecedente**d in the instrumental record, reaching 0.27 °C per decade over 2015–2024

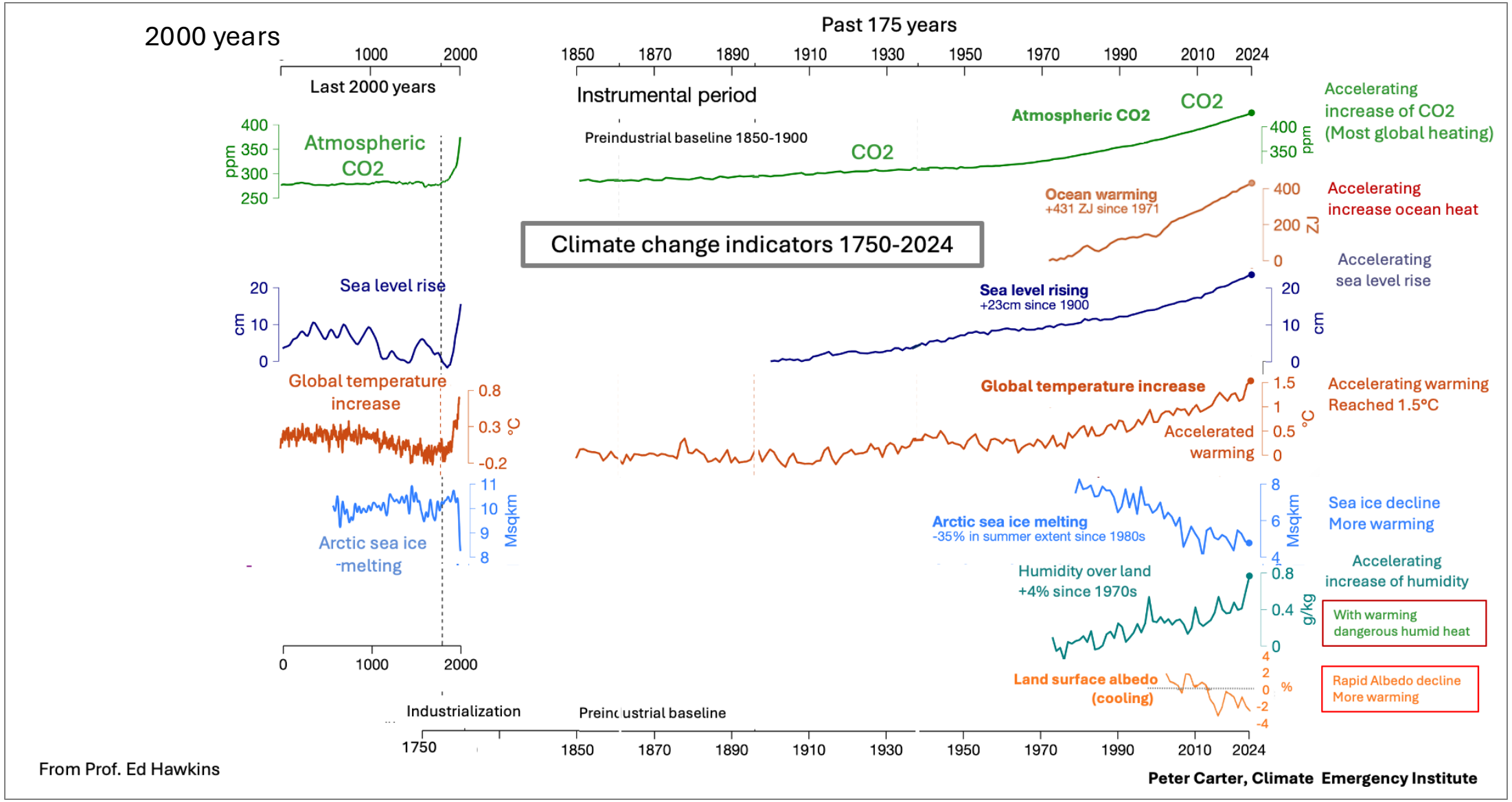


Indicators of Global Climate Change 2024:
Annual update of key indicators of the state of the climate system and human influence, Piers M. Forster e al

Combined- a rapid trend to biosphere collapse

***Transform or Collapse*, GEO-7, 8 Dec. 2025**

Example of best science communication



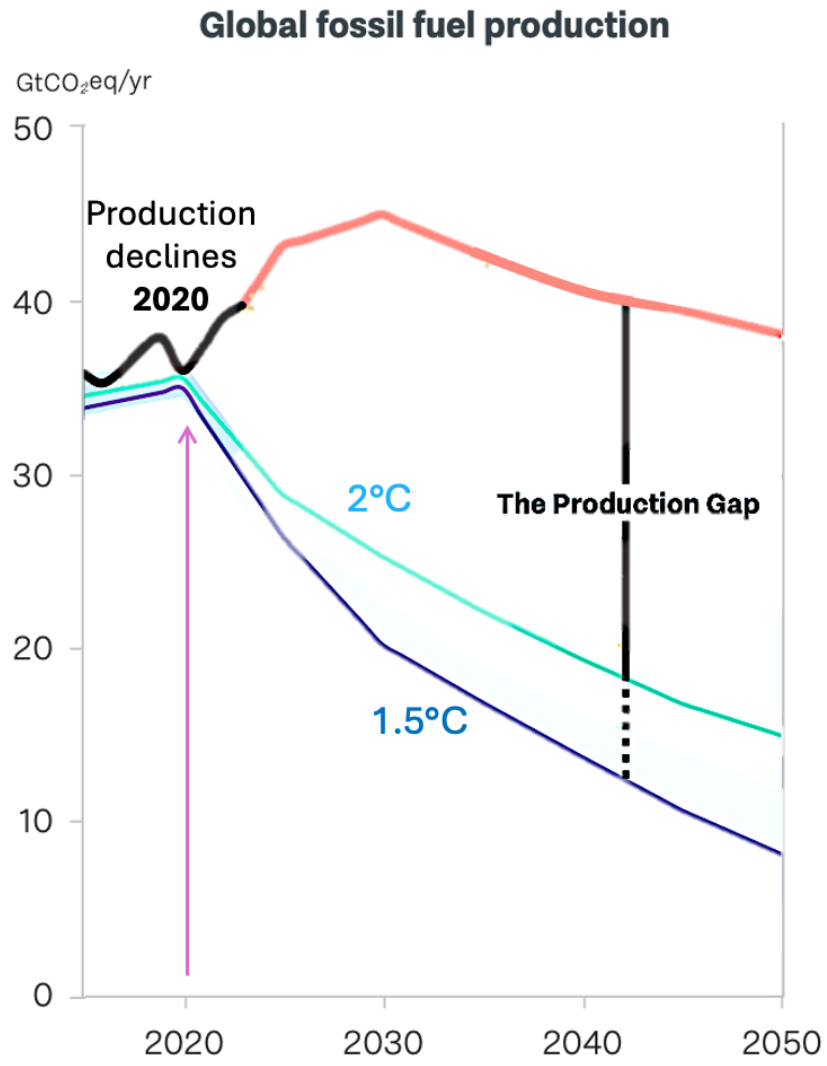
Planned Future Fossil Fuel Production

77% over 2°C

States' policies and plans are to produce more fossil fuels by 2030

120% above 1.5°C and 77% above 2°C

September 2025, The (Fossil Fuel) **Production Gap Report**



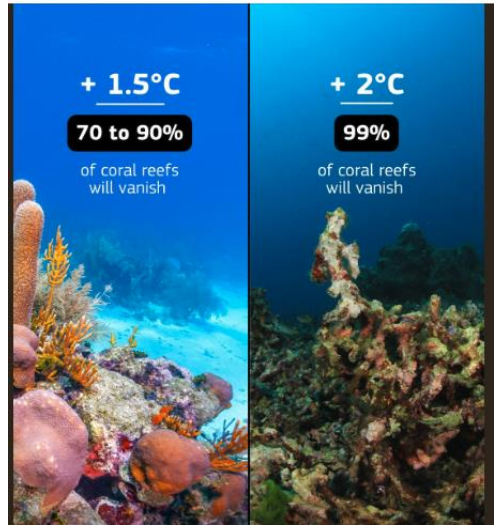
The 2030 fossil fuel production gap has increased:

- **120% above the median 1.5ºC** pathway and
- **77% above the median 2ºC** pathway

SEI, Climate Analytics, & IISD. . The Production Gap Report 2025. Stockholm Environment Institute, Climate Analytics, and International Institute for Sustainable Development.

2°C Climate Catastrophe (5 papers)

1) Warming of +1.5 °C is too high for polar ice sheets, 2025
2) 2°C Multiple cascading tipping points and Earth system, *Trajectories of the Earth System in the Anthropocene,* 2018
3) *The quiet crossing of ocean tipping points*, 2021 , heat stratification, acidification, deoxygenation, **coral reefs**
4) **AMOC** Warning of a forthcoming collapse of the Atlantic meridional overturning circulation
5) **Coral reefs tipped,** 2025 Tipping Points Report Coral reefs At 1.5°C: 70-90% At 2°C: 99%. (IPCC, 2018, 1.5°C Report)

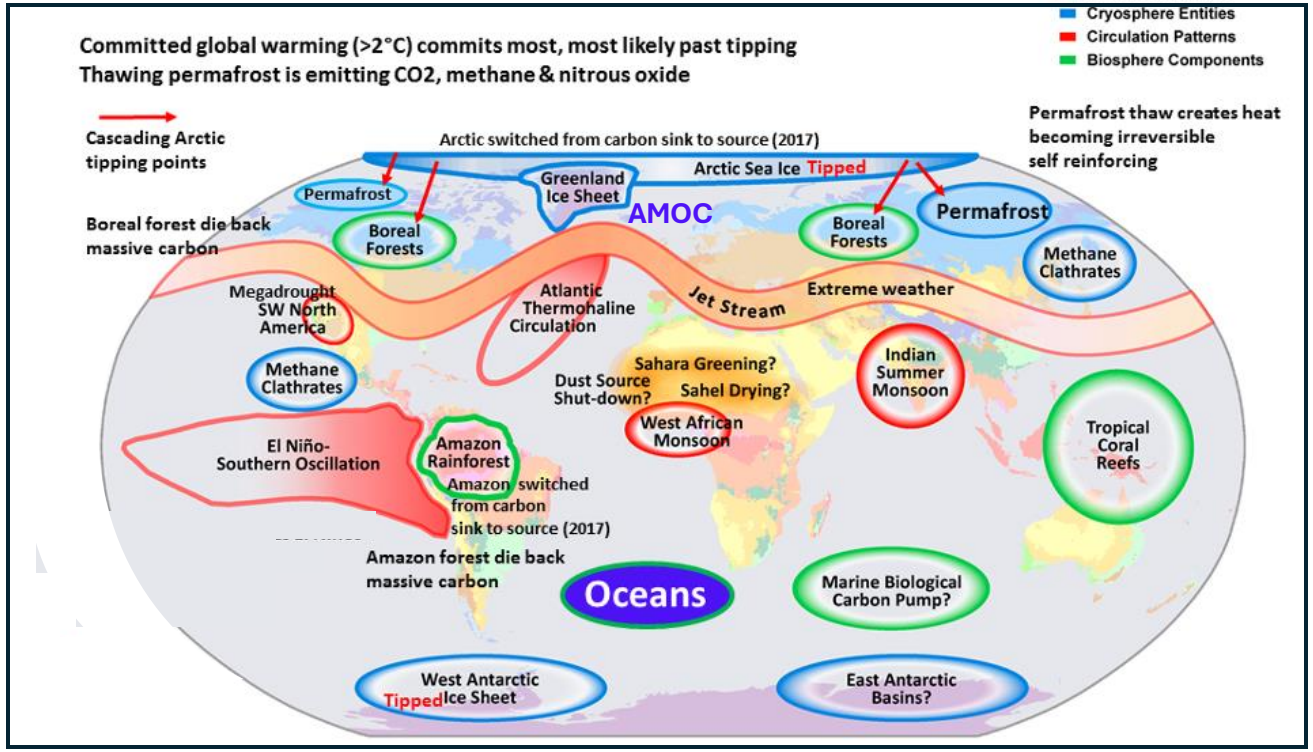


The 2°C paper *Trajectories of the Earth System in the Anthropocene,*

We argue a planetary threshold in the Earth System at a temperature rise of 2 °C above preindustrial.

6 August 208, Will Steffen et al

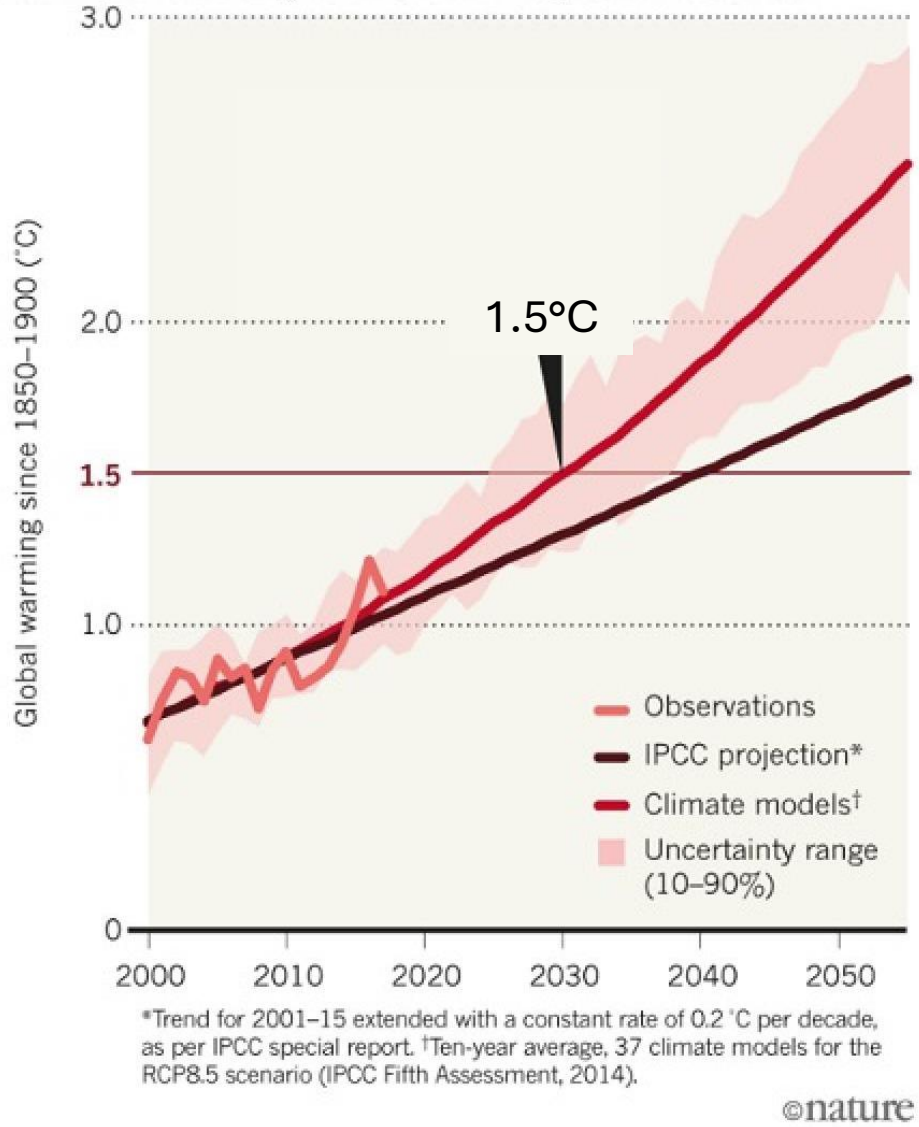
Global Warming Vulnerable Tipping Points



Accelerating Global Warming

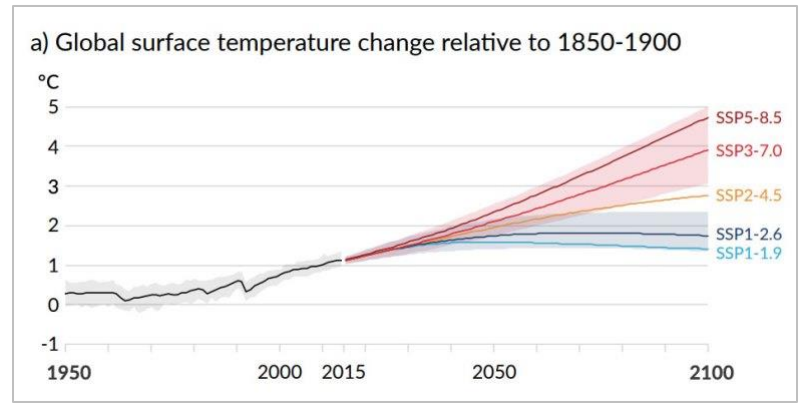
ACCELERATED WARMING

Climate simulations predict that global warming will rise exponentially if emissions go unchecked.



*Trend for 2001–15 extended with a constant rate of 0.2 °C per decade, as per IPCC special report. †Ten-year average, 37 climate models for the RCP8.5 scenario (IPCC Fifth Assessment, 2014).

©nature

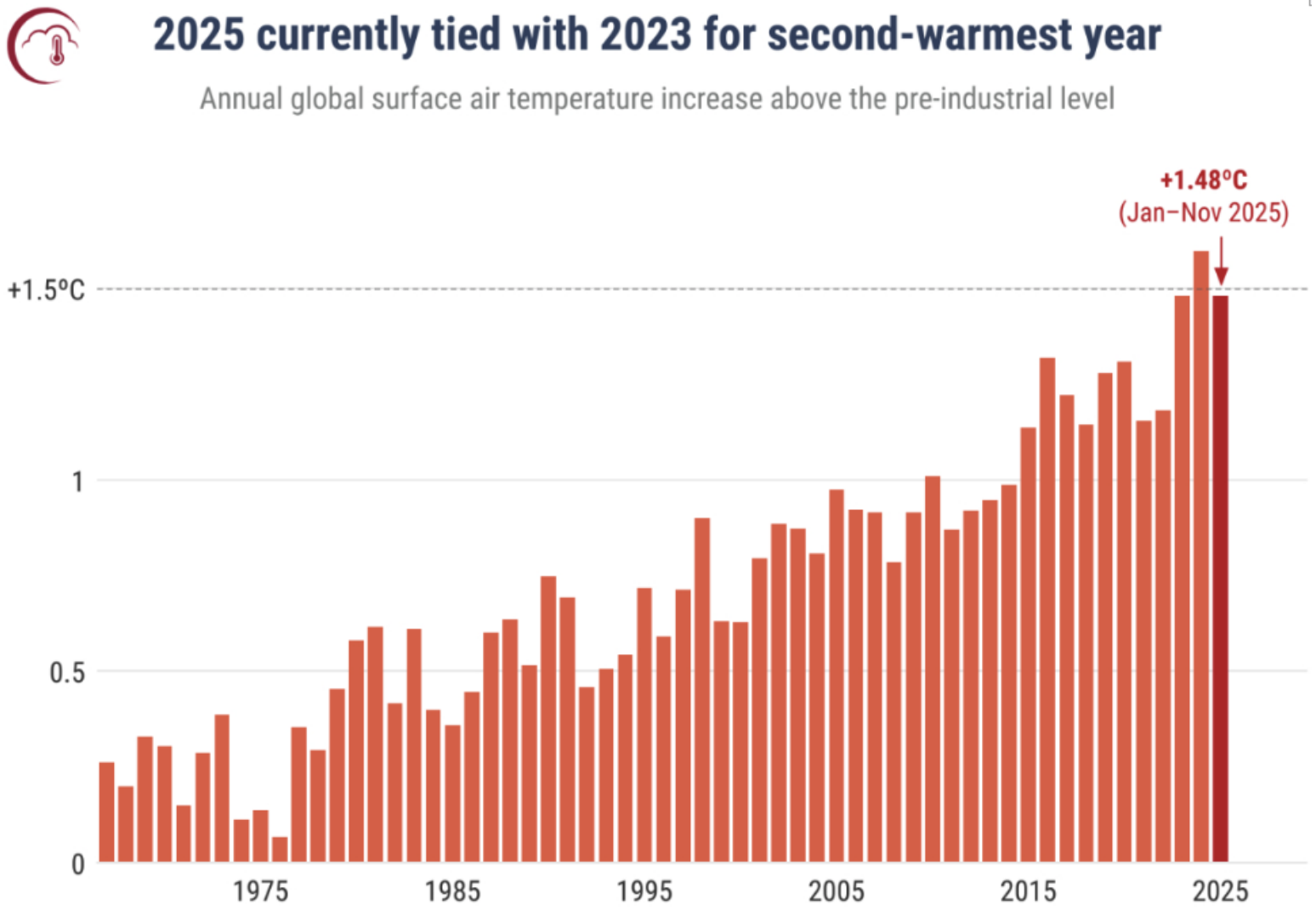


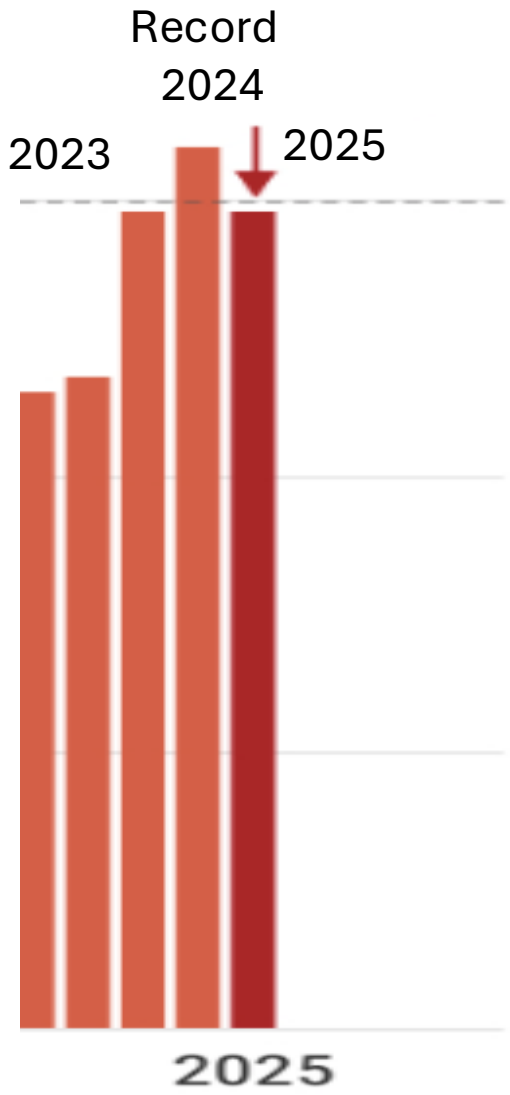
IPCC AR6, WG1, FIG. SPM. 8

Copernicus, 9 November 2025

2025: 2nd Warmest Year

Copernicus: 2025 on course to be joint-second warmest year, with November third-warmest on record





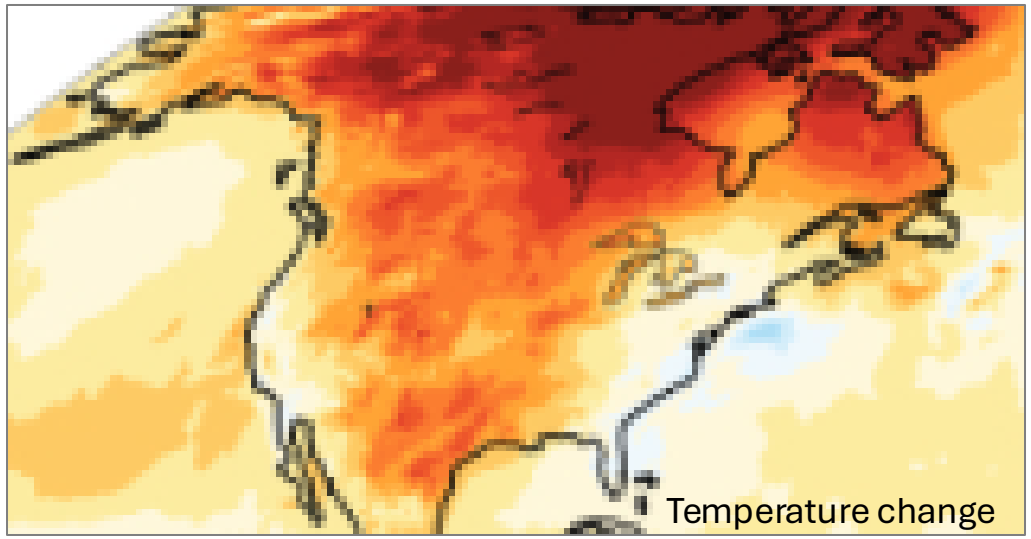
Fall of 2025: North America Heated the Most

Copernicus, 9 Nov. 2025

Surface air temperature anomaly • Sep–Nov 2025

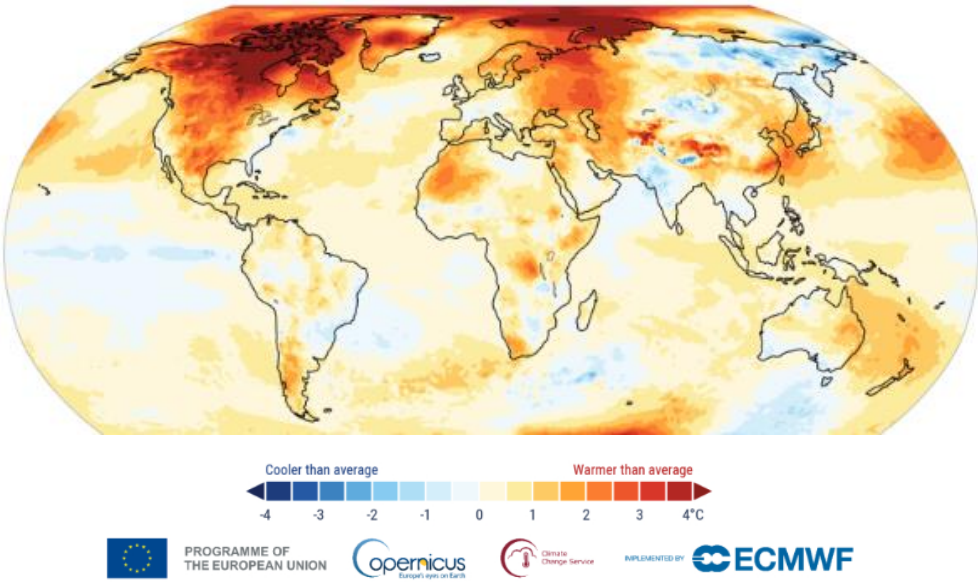
Boreal autumn – September to November 2025

North America Fall Heating



Sept.-Nov. 2025

Temperature change



Peter Carter, Climate Emergency Institute

Greenhouse Gas Emissions

Energy Production
Food Production

Record high Increasing fast

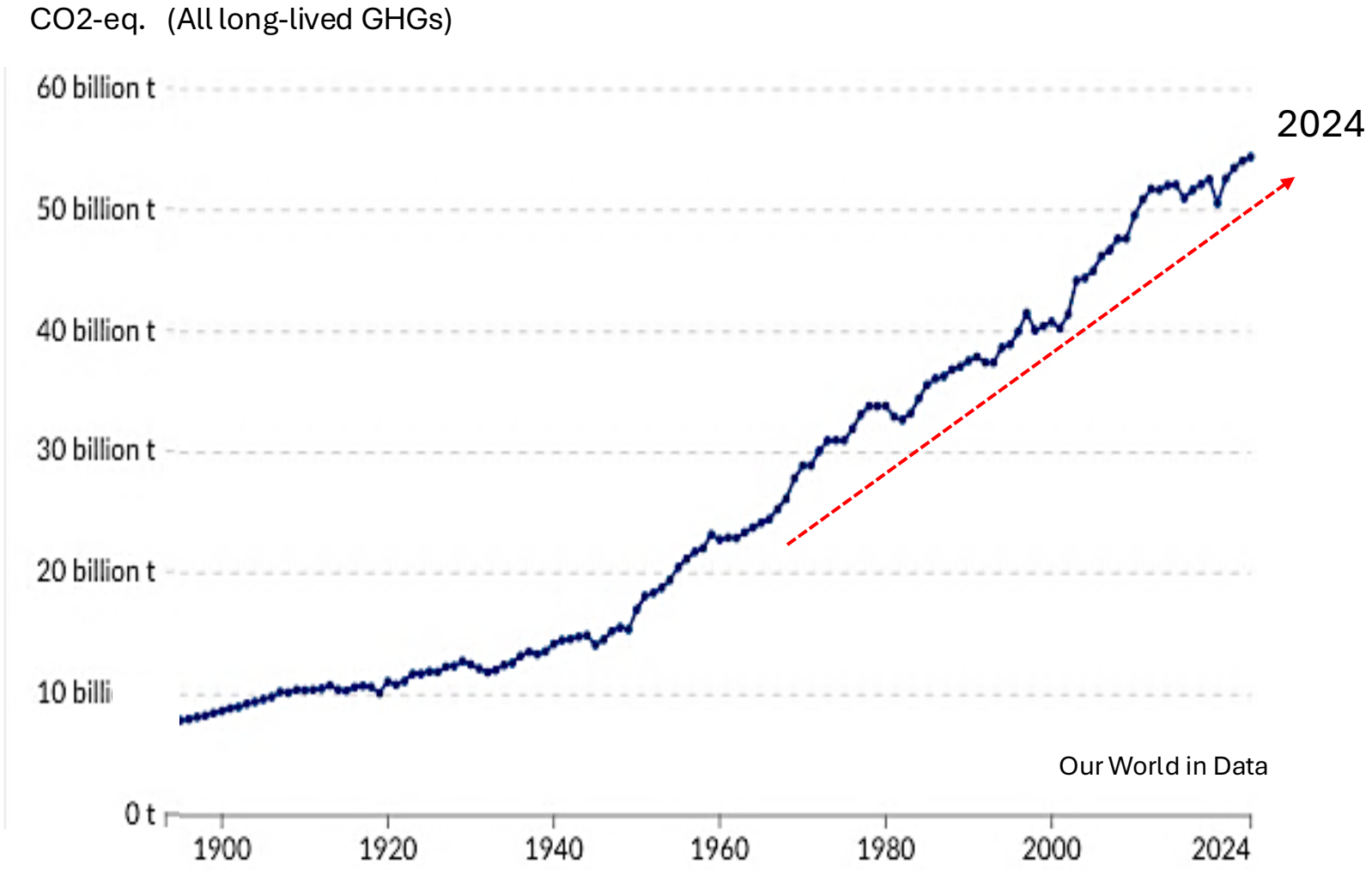
Emissions Database for Global Atmospheric Research (EDGAR)

2024 Global Greenhouse Gas Emissions Are Record High
Increasing rapidly since 1970

Global Greenhouse Gas Emissions

Our World in Data

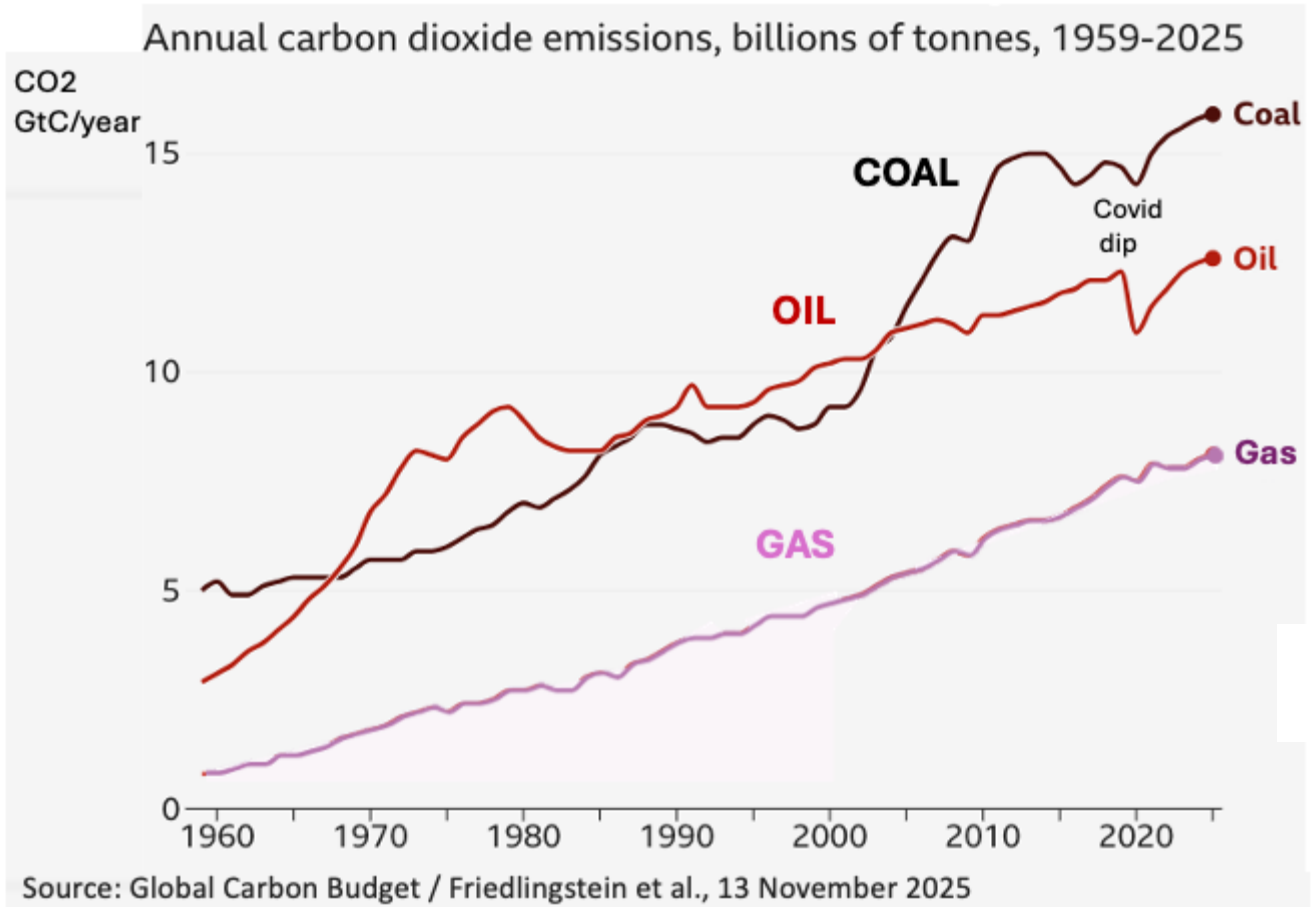
Greenhouse gas emissions include carbon dioxide, methane and nitrous oxide from all sources, including land-use change.
They are measured in tonnes of carbon dioxide-equivalents



2025 Fossil Fuel CO2 Emissions Record High and Increasing

Coal emissions have increased the most from 1960 and from 2000

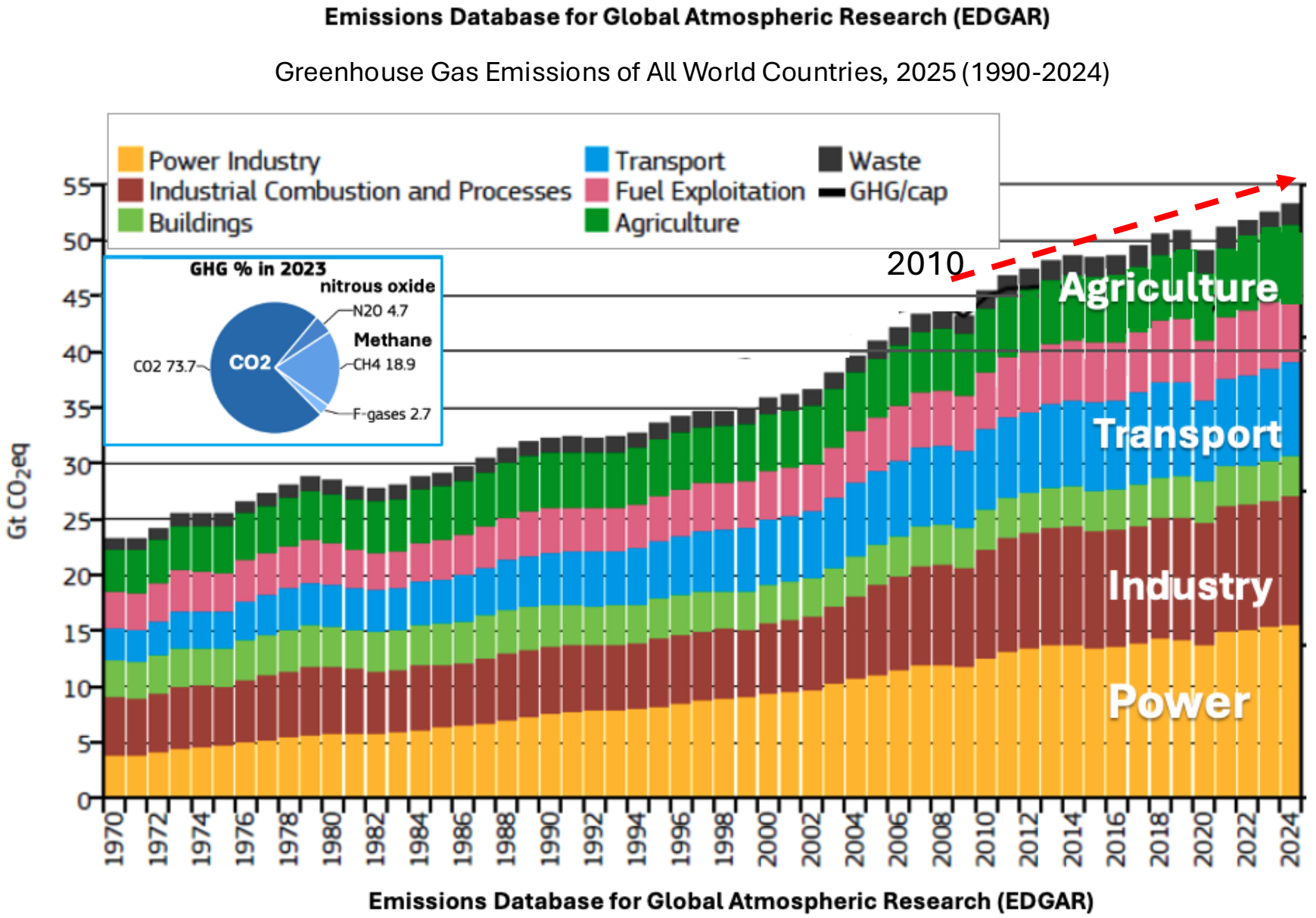
CO2 emissions from all three fossil fuels are record high and still increasing as fast as ever (from 1960 average).
In 2000, coal overtook oil and gas, increasing the fastest of all to 2010.
Coal emissions are by far the highest and have increased the most since 1960 and since 2000.



Increasing Global Greenhouse Gas Emissions (1970-2024)

EDGAR

EDGAR, Sept.2025



Crippa, M. et al, GHG emissions of all world countries - 2025 Report, 2025

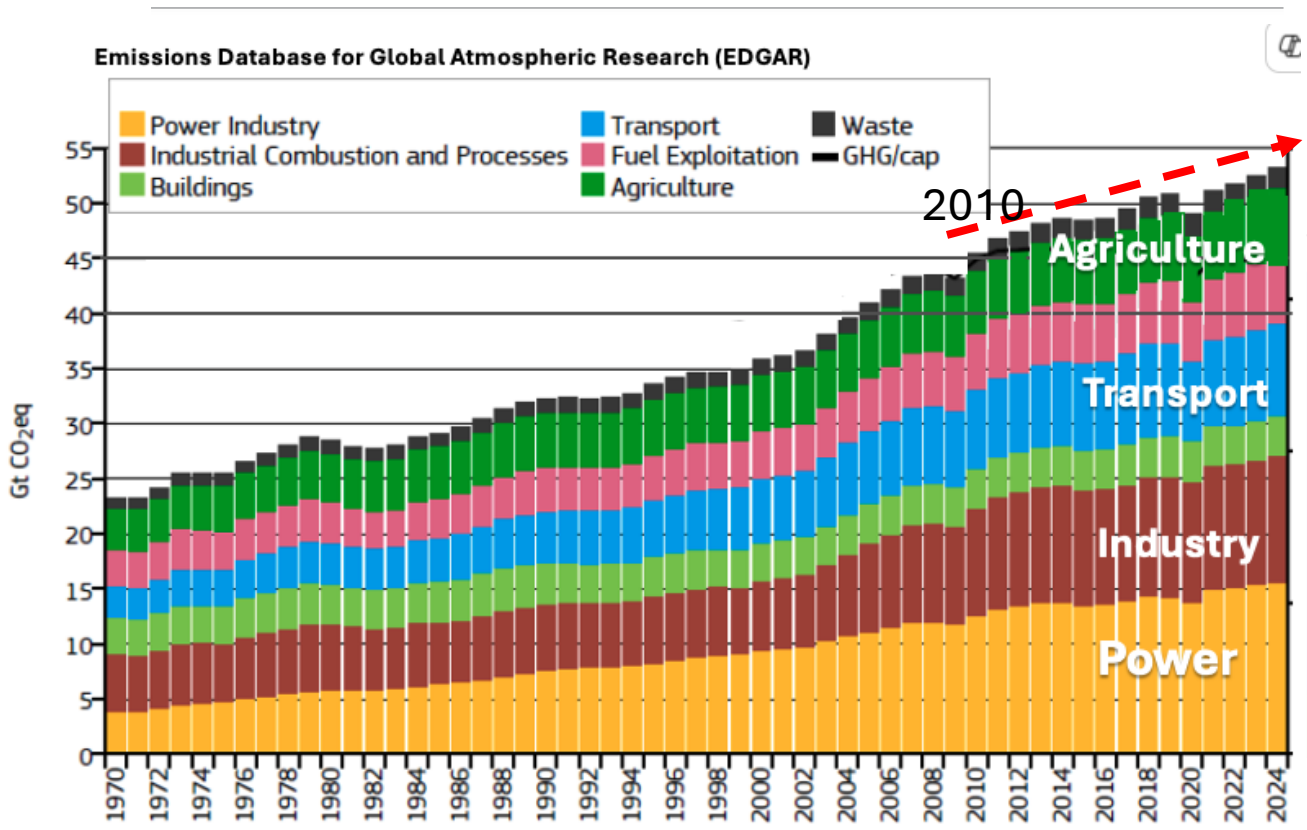
Increasing Sectoral Global Greenhouse Gas Emissions (1970-2024)

EDGAR

Emissions Database for Global Atmospheric Research (EDGAR)

Sectoral Greenhouse Gas Emissions, 2025 (1990-2024)

All increasing, Fasted Power & Industry



Year	GHG emissions Mt CO_2eq/yr	GHG emissions per capita t CO_2eq/cap/yr
2023	52962.901	6.594
2015	48808.767	6.613
2005	41296.885	6.314
1990	32726.228	6.140

	All increase +62%		All increase +28%		All increase +2% but agriculture	
	2023 vs 1990		2023 vs 2005		2023 vs 2022	
Power Industry	↗	+96%	↗	+36%	→	+2%
Industrial Combustion and Processes	↗	+91%	↗	+41%	→	+2%
Buildings	→	+1%	→	+3%	→	+1%
Transport	↗	+78%	↗	+26%	→	+4%
Fuel Exploitation	↗	+48%	↗	+23%	→	+2%
Agriculture	↗	+20%	↗	+15%	→	0%
Waste	↗	+56%	↗	+37%	→	+2%
All sectors	↗	+62%	↗	+28%	→	+2%

Small % increases now are large amounts

Peter Carter, Climate Emergency Institute

Latest EDGAR, Sept 2025

Crippa, M. et al, GHG emissions of all world countries - 2025 Report, 2025

EDGAR, Greenhouse Gas Emissions of All World Countries, 2025 (1990-2024)

“Global GHG emissions in 2024 reached 53.2 Gt.

“The pace of global GHG emissions **continues to rise** following the drop in 2020 (Covid)

“**2024 represents the highest level recorded**, increased by 1.3% compared to 2023

“Global fossil CO2 emissions have increased by nearly 75% since 1990.

All sectoral sources are increasing

Atmospheric greenhouse gases

Record high accelerating

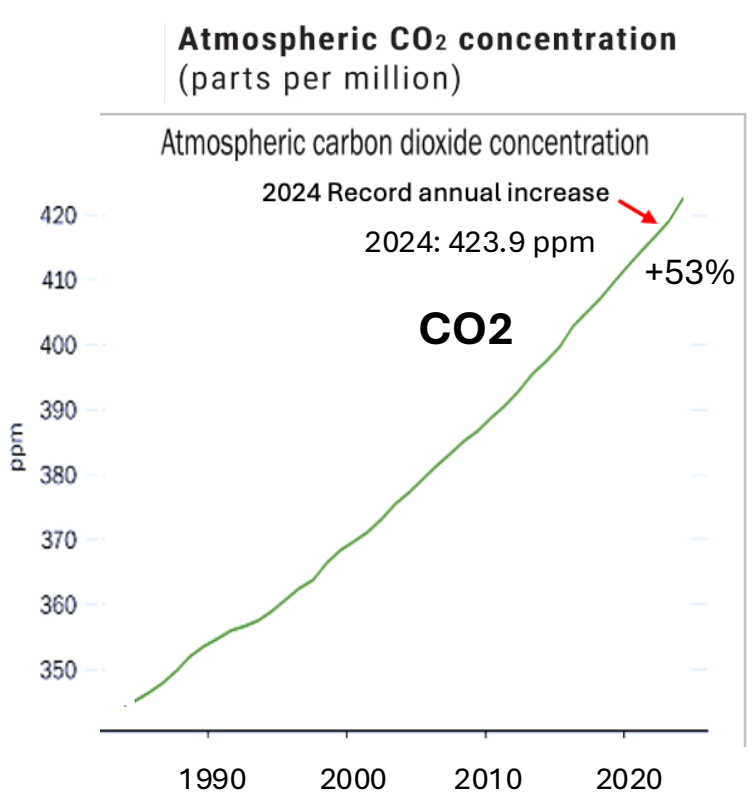
Record High Rapidly Increasing Atmospheric Greenhouse Gas Concentrations

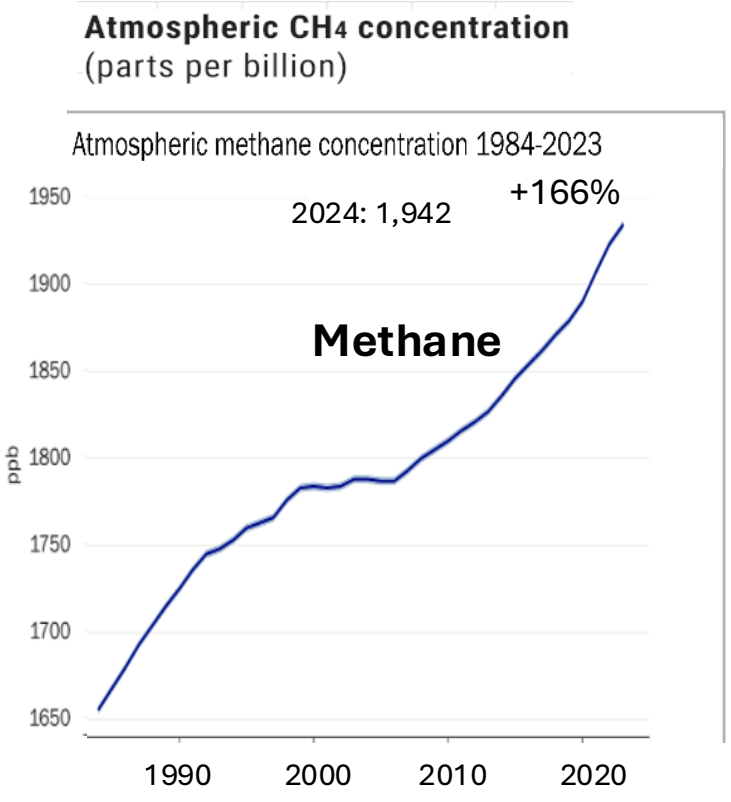
1850-2024

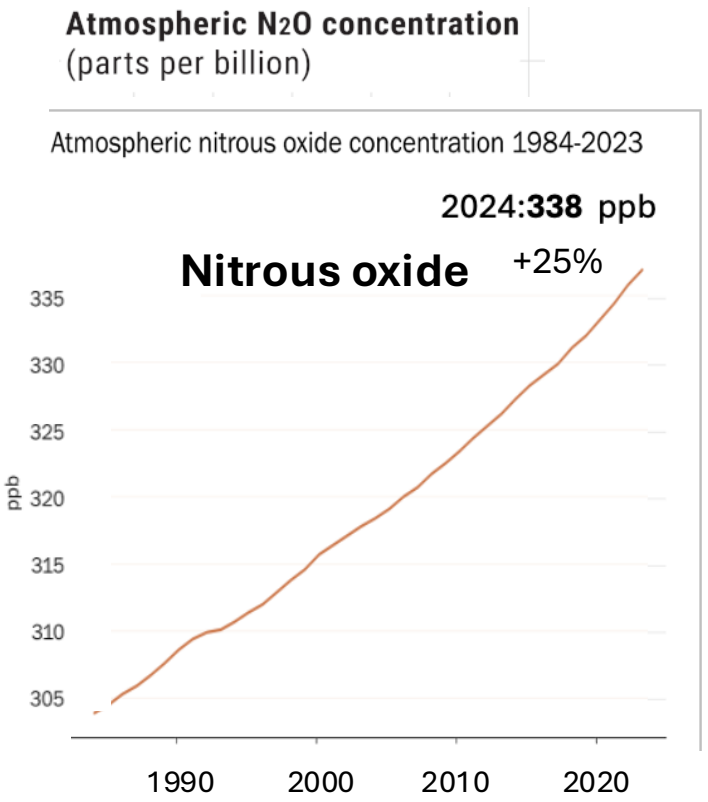
The increase in concentration from 2023 to 2024 was 3.5 ppm, a record increase (WMO, Nov. 2025)

Faster and faster

Atmospheric greenhouse gas concentrations (C2ES)



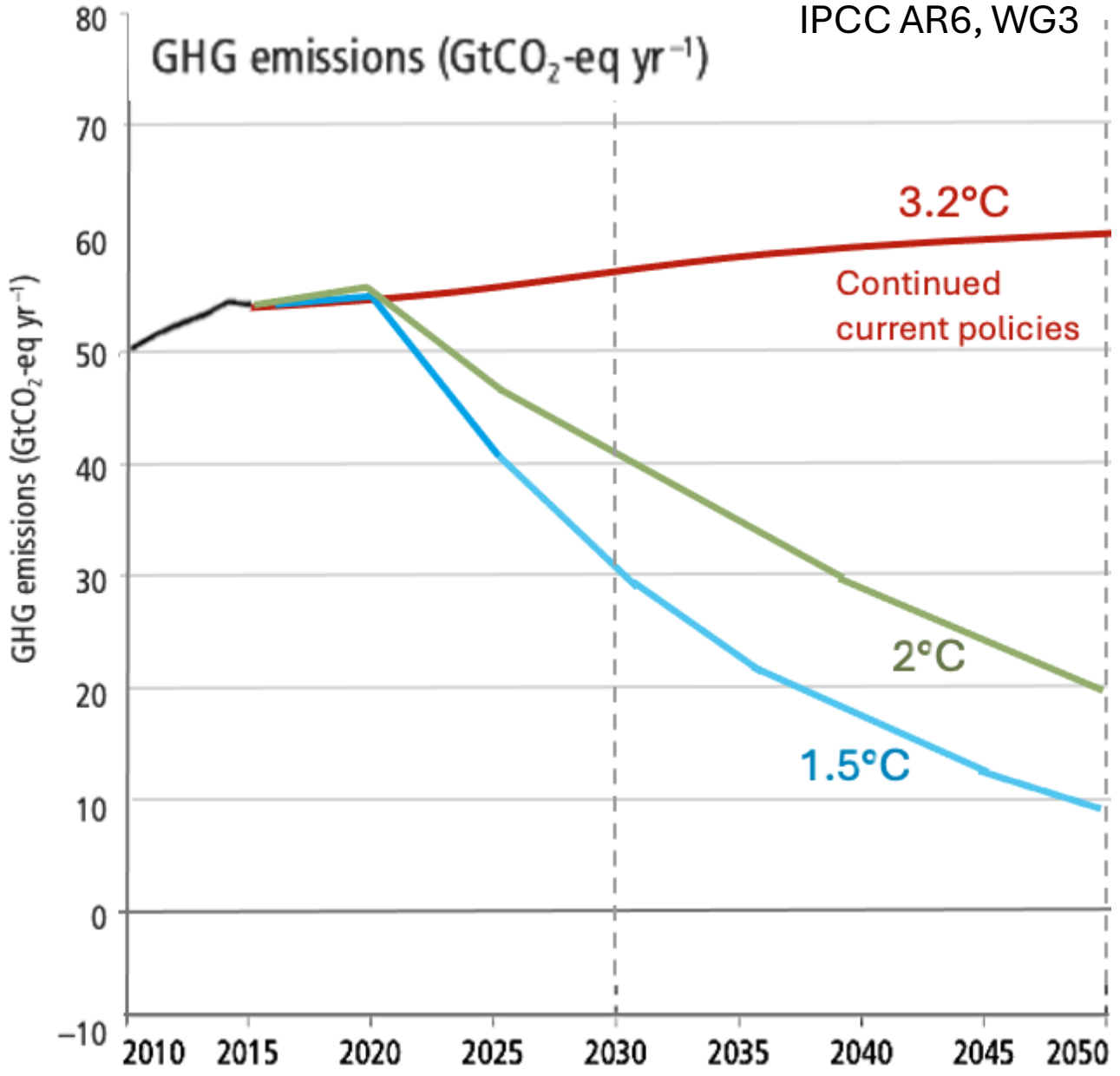




IPCC AR6

MITIGATION

Mitigation means **greenhouse gases**, not only CO2

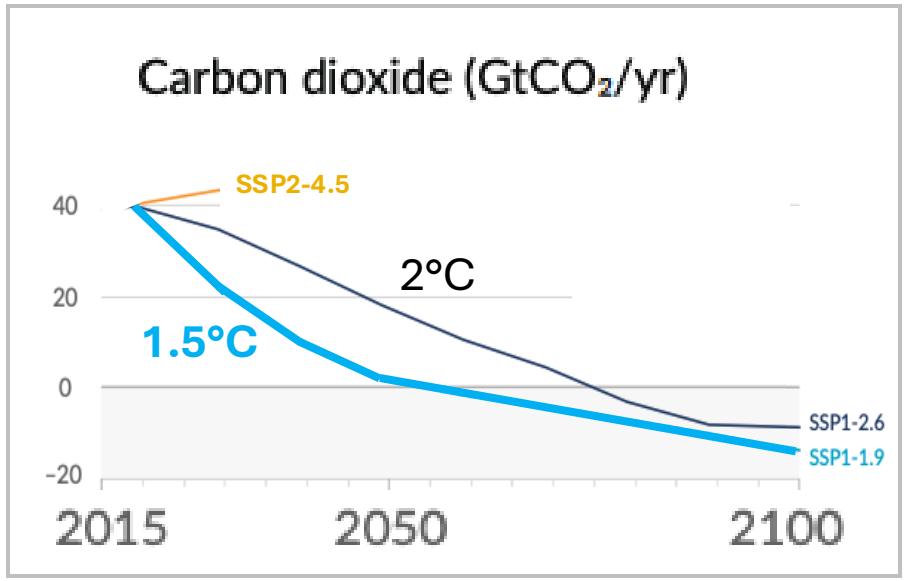


For 1.5°C and for 2°C-

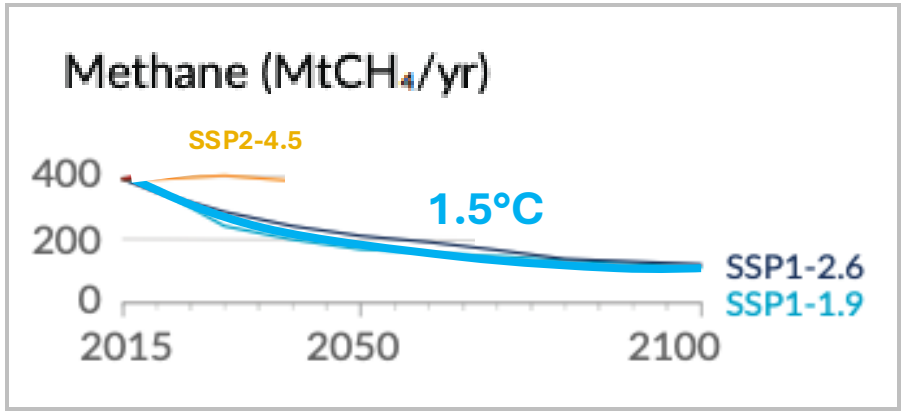
IPCC, AR6 **Emissions of CO2, Methane and Nitrous Oxide, Decline from 2020. (so Greenhouse Gases)**

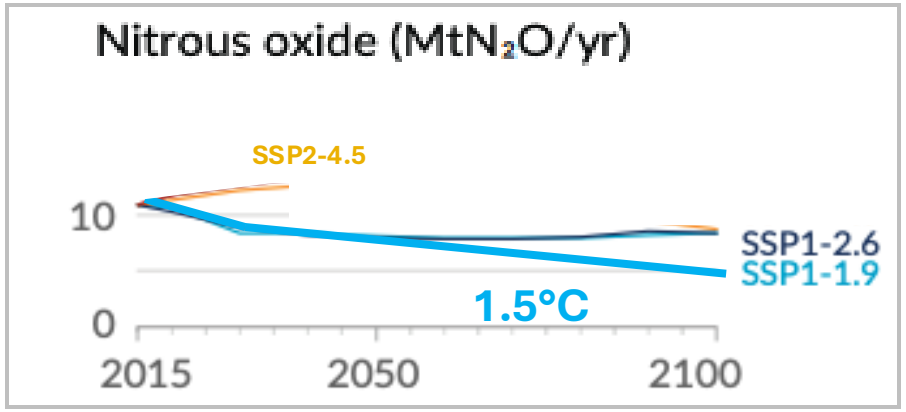
Sulphur dioxide (SO2) emissions (cooling) also decline, which incurs **additional warming**

CO2 emissions



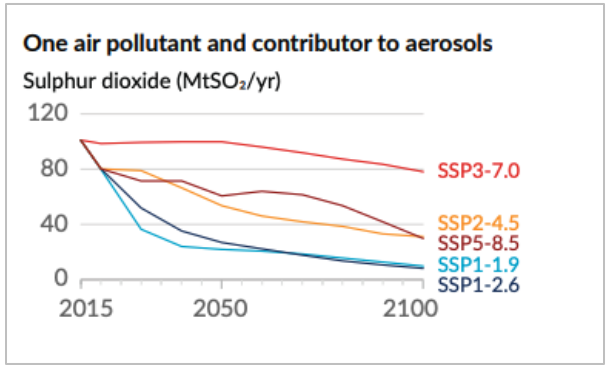
Methane & Nitrous oxide emissions





Sulfate aerosols

Fossil fuel air pollution
Global Cooling



IPCC AR6, WG1, Figure SPM.4 |

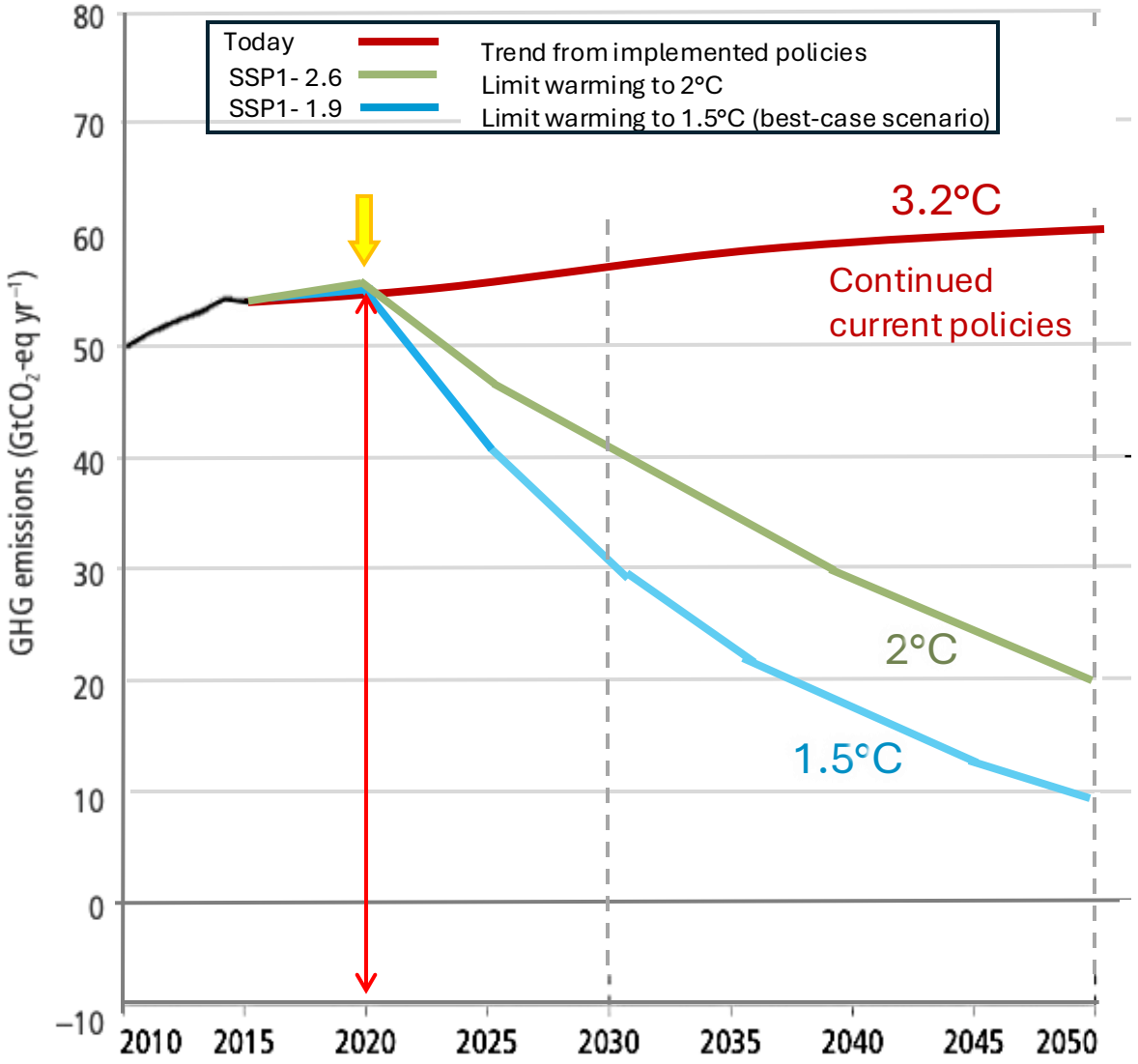
IPCC, 2022, AR6, WG3,
Global GHG emissions
and mitigation pathways

For Both 1.5°C and 2°C, Global Greenhouse Gas Emissions Decline **from 2020,** Assuming **Immediate Action**

IPCC AR6, Global Greenhouse Gas Emissions and Projected Warming

”Global GHG emissions are projected to peak between 2020 and at the **latest before 2025** in global pathways that limit warming to 1.5°C and in those **that limit warming to 2°C**, and assume **immediate action**.’

“Without a strengthening of policies beyond those that are implemented by the end of 2020, GHG emissions lead to global warming of **3.2°C.**



Sources
Fossil fuel combustion
Food production
“Transform or Collapse”

(UNEP GEO-7 2025)

IPCC AR6, WG3, Figure SPM.4
Global GHG emissions of modelled pathways

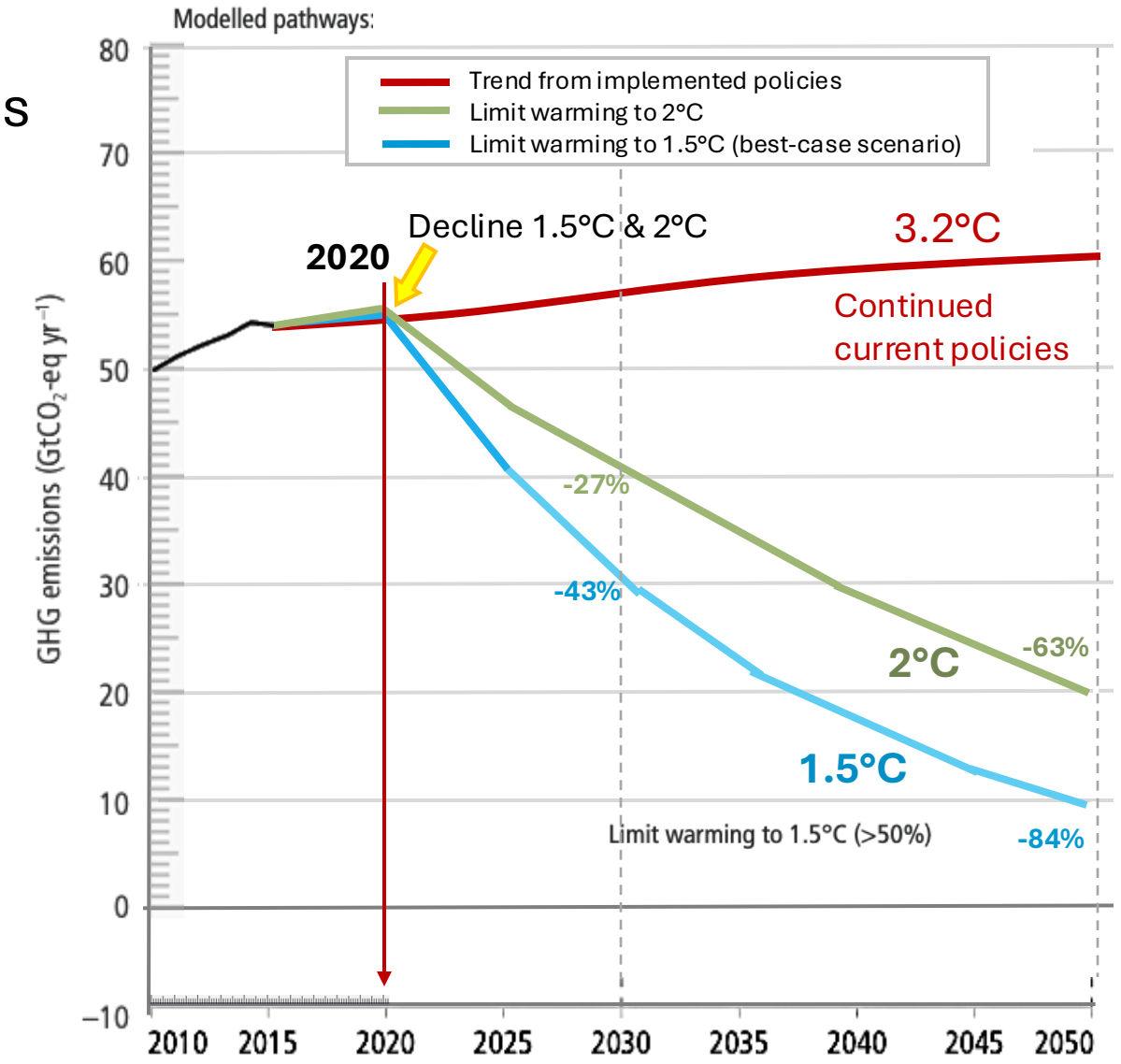
Adapted for median projections

For both 1.5°C and 2°C, Global Greenhouse Gas Emissions Decline from 2020 "Assuming Immediate Action"

IPCC, 2022, AR6, WG3, Mitigation

Reductions in emissions for mitigation

Science ignores feasibility



IPCC AR6, WG3, Figure SPM.4
Global GHG emissions of modelled pathways

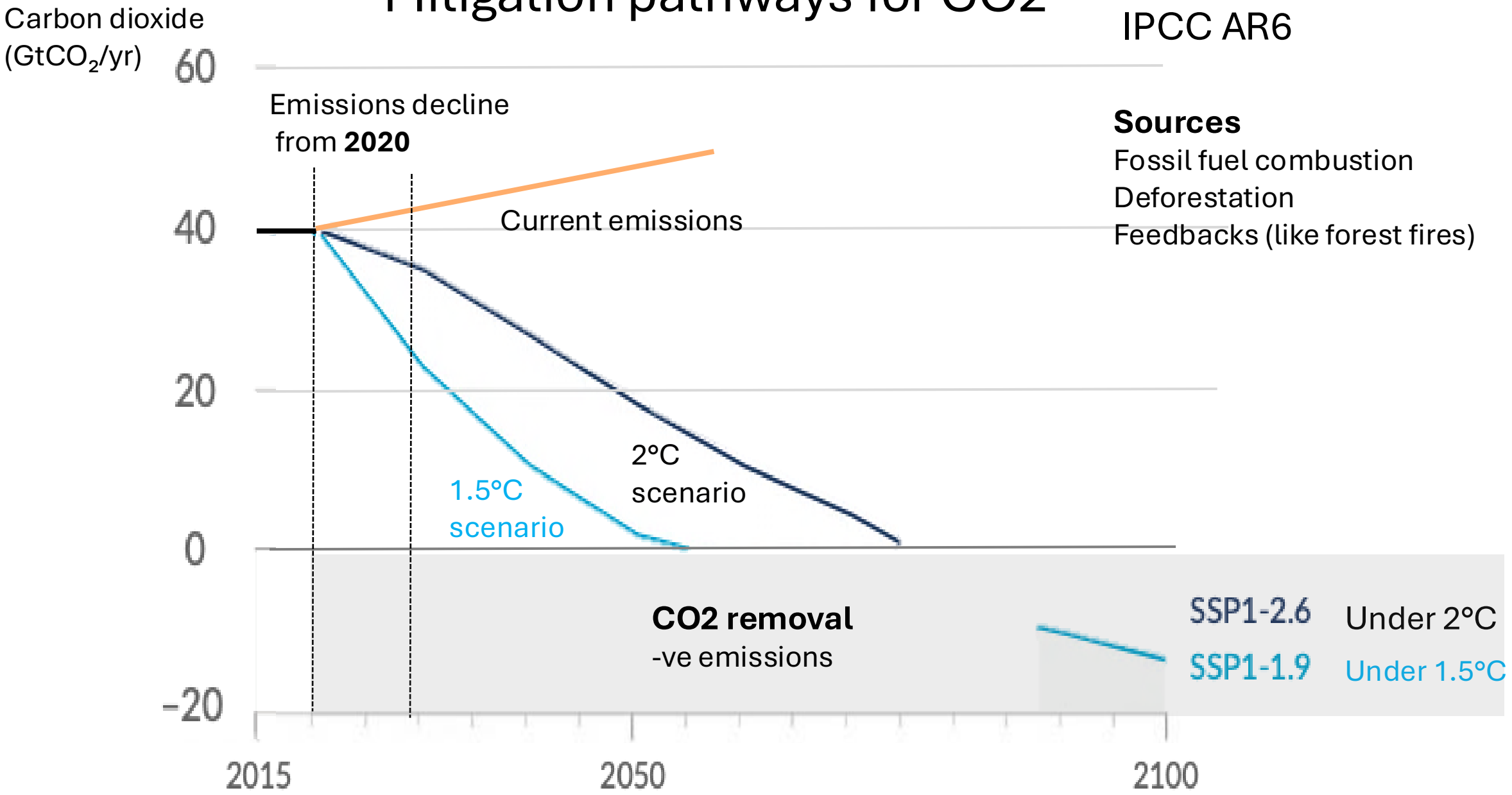
Adapted for median projections

Sources

Fossil fuel energy production
Food production
Transform or Collapse
(UNEP GEO-7 2025)

Peter Carter, Climate Emergency Institute

Mitigation pathways for CO2



IPCC, 2022, AR6, Figure SPM.4

IPCC AR6, Reductions of emissions (CO2, CH4) and fossil fuel energy so

All Immediate Action by 2030 and 2050

2030 and 2050

Emissions cuts % CO2 and CH4

Energy reductions % Coal, oil and gas

Global indicators	1.5°C (>50%)	2°C (>67%)		
	Immediate action, with no or limited overshoot	Immediate action	NDCs until 2030	All
Cumulative net negative CO_2 emissions until 2100 ($GtCO_2$)	220 (70,430)	30 (0,130)	60 (20,210)	40 (10,180)
Change in GHG emissions in 2030 (% rel to 2019)	–45 (–50,–40)	–25 (–35,–20)	–5 (–10,0)	–20 (–30,–10)
in 2050 (% rel to 2019)	–85 (–90,–80)	–65 (–70,–60)	–70 (–70,–60)	–65 (–70,–60)
Change in CO_2 emissions in 2030 (% rel to 2019)	–50 (–60,–40)	–25 (–35,–20)	–5 (–5,0)	–20 (–30,–5)
in 2050 (% rel to 2019)	–100 (–105,–95)	–70 (–80,–65)	–75 (–80,–65)	–75 (–80,–65)
Change in net land use CO_2 emissions in 2030 (% rel to 2019)	–100 (–105,–95)	–90 (–105,–75)	–20 (–80,–20)	–80 (–100,–30)
in 2050 (% rel to 2019)	–150 (–200,–100)	–135 (–185,–100)	–130 (–145,–115)	–135 (–180,–100)
Change in CH_4 emissions in 2030 (% rel to 2019)	–35 (–40,–30)	–25 (–35,–20)	–10 (–15,–5)	–20 (–25,–10)
in 2050 (% rel to 2019)	–50 (–60,–45)	–45 (–50,–40)	–50 (–65,–45)	–45 (–55,–40)
Change in primary energy from coal in 2030 (% rel to 2019)	–75 (–80,–65)	–50 (–65,–35)	–15 (–20,–10)	–35 (–55,–20)
in 2050 (% rel to 2019)	–95 (–100,–80)	–85 (–100,–65)	–80 (–90,–70)	–85 (–95,–65)
Change in primary energy from oil in 2030 (% rel to 2019)	–10 (–25,0)	0 (–10,10)	10 (5,10)	5 (0,10)

IPCC AR6 Energy, Changes of all fossil fuels
and all energy sources for 1.5°C
2030 and 20250

2050

Coal reduced 95%,
Oil 60% and
Gas 45%

Percent Change to fuels for 1.5°C limit by IPCC AR6 (re: 2019)

WITH IMMEDIATE ACTION INCLUDING ALL FOSSIL FUEL EMISSIONS

This is the minimum for mitigation and is only to 2100.

1.5°C >50%

	% change compared 2019	
	1.5°C	
	2030	2050
COAL	-75	-95
OIL	-10	-60
GAS	-10	-45
BIOMASS	75	290
NUCLEAR	40	90
RENEWABLE	225	725

IPCC AR6, WG3, Table TS.2 | mitigation towards limiting warming to 1.5°C

Fast and Fair Fossil Fuel Phase Out

Zero fossil fuels is required for net zero emissions

Supported by Science

- 10 Dec. 2025 From net-zero to zero-fossil in transforming the EU energy system, Felix Schreyer et al
- 31 March 2025, Scientists' warning on fossil fuels, Shaye Wolf et al
- 19 Sept. 2023, Global fossil fuel reduction pathways under different climate mitigation strategies and ambitions, Ploy Achakulwisut et al
- November 2023 UN COP 28 statement by over 100 scientists
- 5 December 2023, Future Earth

  For all intents and purposes, moving towards the phase-out of fossil fuel combustion is necessary to keep the 1.5°C goal of the Paris Agreement within reach.

Climate Science PR Priorities

- We are being pushed far beyond 1.5°C
- For net-zero Fossil fuel phase-out
- Immediate termination huge fossil fuel subsidies
- Food production and diet reform (GHG emissions)

The idea that science can keep us to the 1.5°C limit
and that over 1°5°C is only temporary
is not supported by the science
and is a disincentive to immediate action

Thank you for your interest