Indicators of Global Climate Change 2026: A Climate Science Briefing for Policymakers

June 2026, based on: [Forster et al. (2026), Indicators of Global Climate Change 2025](#)
Interactive data dashboard also available here: https://indicators.climate.copernicus.eu/

1. INTRODUCTION

Since the last IPCC Assessment Report (AR6) in 2021, a great deal has changed. The annual Indicators of Global Climate Change (IGCC) is a scientific "pulse check" on how the climate system is changing. Following the methodologies used in the 6-8 yearly IPCC assessment cycles, the report provides an up-to-date, independent scientific assessment of changes in the global climate system. It has been compiled by scientists working across climate and environment, drawing in the latest studies. These are synthesised into a set of key indicators, to give policymakers a clear overview of the trends in the climate system.

2. EXECUTIVE SUMMARY

Our planet's climate system is accumulating heat at an accelerating rate. The Earth's Energy Imbalance is the closest thing we have to a master gauge of climate change. It measures the difference between the energy that the planet takes in and the energy it releases.

The 2026 IGCC report sets out what a fast-warming climate looks like. The headline findings are:

- **Heat is building faster.** The Earth's Energy Imbalance – a decadal average – is up 40% since the last IPCC report and has more than doubled in two decades and is still rising.
- **Human-induced warming reached 1.37°C in 2025.** The planet was 1.39°C hotter than pre-industrial times last year, almost all of it (1.37°C) human-induced. Warming is on track to pass 1.5°C around 2030.
- **The regional temperatures we experience are even higher.** Land temperatures increased by 1.81°C and polar regions are experiencing temperature increases 3-4 times as high.
- **Emissions remain the dominant driver.** Greenhouse-gas emissions hit a record in 2024 and consequently the blanket of greenhouse gases trapping heat also reached an all-time high. Man-made emissions remain the dominant factor but natural feedbacks from a warmer world also contribute.
- **The planet is reflecting less sunlight.** Total aerosol cooling fell by 10% in 2025. As air pollution falls — a major win for public health — its cooling haze fades and fewer cooling clouds are seeded, adding to the imbalance and increasing warming.
- **The ocean is taking the strain.** Over 90% of the excess heat goes into the oceans; a new indicator shows marine-heatwave days have more than tripled since 1991.

- **Seas are rising and accelerating.** Global sea level is 23 cm above its 1901 level — a record — and now rising more than twice as fast as in the late 20th century.

The monitoring that underpins all of this is at risk. These findings rest on more than 40 long-term datasets, and the funding behind them is being cut just as they matter most. Policymakers should note that we are in a critical decade where the complex consequences of sustained high levels of greenhouse gas emissions over decades are already being felt.

We need to dramatically increase efforts to reduce emissions, be better prepared for hotter temperatures and their knock-on effects, and invest in increasing our resilience. This includes expanding our monitoring capabilities and providing better risk assessments and early warning systems.

igcc earth 2025

Key Indicators of Global Climate Change:
Since IPCC Sixth Assessment Report

	IPCC 6th assessment	⟶	2025		Change %
Greenhouse gas emissions	53.5	↗	54.6	$GtCO_2$ e/year	2.1%
CO_2 concentration	410.1	↗	425.6	ppm	3.8%
CH_4 concentration	1866.3	↗	1936.3	ppb	3.8%
N_2O concentration	332.1	↗	339.4	ppb	2.2%
Effective radiative forcing	2.72	↗	3.10	W/m²	14.0%
Earth's energy imbalance	0.79	↗	1.12	W/m²	41.8%
Global mean surface temperature change	1.09	↗	1.26	°C	15.6%
Human-induced warming (decade)	1.07	↗	1.24	°C	15.9%
Land average max temp change	1.55	↗	1.92	°C	23.9%
Remaining carbon budget (⤒1.5°C, 50% probability)	500	↘	130	$GtCO_2$	-74.0%
Sea level rise (GMSLR)	201.9	↗	229.6	mm	13.7%
Marine heatwaves	36	↗	58	days	61.1%

3. WHAT HAS CHANGED

3.1 The Master Gauge: Earth's Energy Imbalance

The Earth's Energy Imbalance (EEI) is the gap between the energy reaching us from the sun and the energy the planet manages to radiate back out to space. In a stable climate the two roughly match. Today, more comes in than goes out, so the surplus heat builds up.

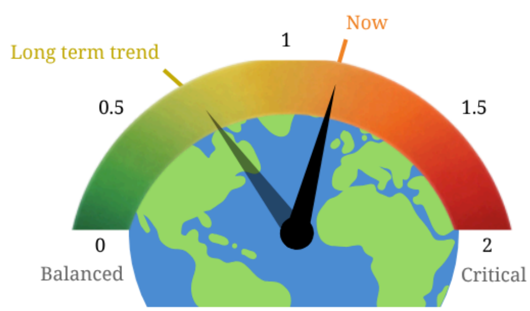
The Earth's Energy Imbalance is one of the most important indicators of the pace of climate change. It is the engine behind almost everything else in the report: rising temperatures, melting ice, fiercer extremes and hotter seas. The Earth's Energy Imbalance is measured as a decadal average and for 2013-2025 it reached 1.12 W m^{-2}.

That is 40% higher than in the last IPCC report. It is now more than double what it was two decades ago.

The Earth's Energy Imbalance is related to the rate of warming and its big jump over recent years helps explain the record warm years in 2023 and 2024. Three factors drive the imbalance. First, greenhouse gases thicken the atmosphere's insulating blanket and trap heat that would otherwise escape. Second, the planet is less reflective; as we clean up air pollution, the tiny reflective particles (aerosols) that masked some of the warming are fading, revealing more warming. Feedbacks, including shrinking reflective ice, changing clouds and rising water vapour, add to both of these factors. Finally, the planet's ability to shed heat is decreasing as certain man-made gases and more water vapour block the exit route for radiating heat.

Earth's Energy Imbalance

PLANETARY HEAT GAUGE



+1.12

Current 12 year avg. (2013-2025): +1.12 W/m²

Long-term trend (1978-2025): +0.72 W/m²

An EEI of **2.0 W/m²** sustained over a decade would add roughly **half a degree** of warming — a dangerous acceleration in the rate of change.

THREE FORCES PUSHING THE GAUGE HIGHER:

More heat trapped
GREENHOUSE GASES

Rising greenhouse gases from human activity, amplified by carbon cycle feedbacks (permafrost thaw, forest loss). GHGs trap outgoing infrared radiation that would otherwise escape to space.

→ **primary driver**

Less sunlight reflected
DECREASING REFLECTIVITY

Cleaner air = fewer cooling sulfate aerosols. Ice loss and darker surfaces absorb more solar radiation. Clouds reflectivity has declined. More sunlight is reaching us.

→ **accelerated**

Less heat escaping
OBSCURED EXIT WINDOW

Water vapour feedback, high-altitude cloud changes, and stratospheric cooling are making it harder for outgoing longwave radiation to reach space. The atmospheric window is clouded.

→ **reinforcing**

Source: IGCC 2026, Indicators of Global Climate Change

3.2 Temperatures

Observed

The global average observed temperature in 2025 was 1.39 (± 0.13)°C above pre-industrial levels. It was cooler than 2024's increase of 1.52°C, but warmer than any year before 2023. Little of 2025's warmth came from natural swings; 2024, by contrast, was lifted by a strong El Niño.

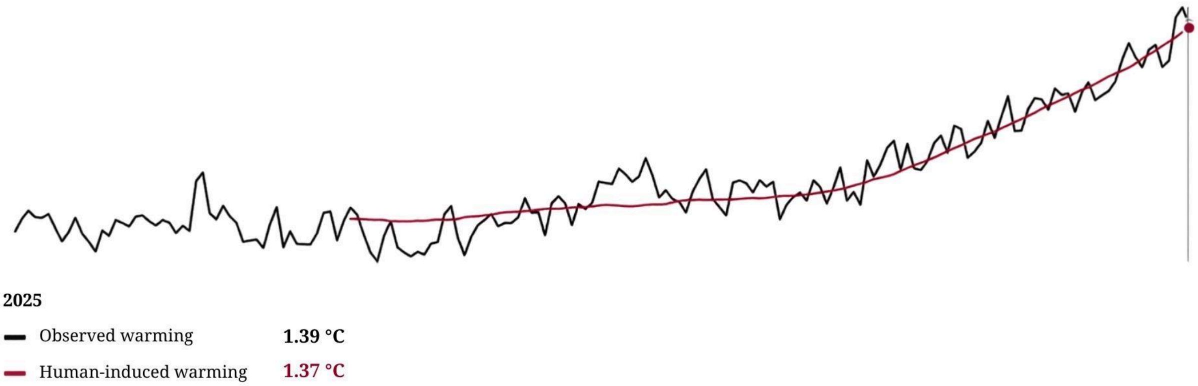
For the last decade (2016-2025), the observed temperature was 1.26°C higher than in pre-industrial times, an increase of 0.17°C from the last IPCC report (2011–2020). The land has warmed faster than the ocean. Relative to pre-industrial times, land temperatures have increased by 1.81°C, and ocean temperatures by 1.03°C over the decade.

The last decade was also 0.32°C warmer than the previous decade (2006–2015), amplified by the exceptionally warm years in 2023 and 2024.

Human-Induced

Removing any natural variability, human-induced warming reached 1.37°C in 2025 relative to pre-industrial times. The total observed warming over the last decade (2016-2025) was 1.26°C, relative to the pre-industrial average. Almost all of that warming (1.24°C) was human-induced.

The pace of human-induced warming (0.27°C per decade) matched last year's all-time high. Greenhouse gases remain the dominant driver, but the fading of cooling aerosols is the main reason that pace has accelerated since the early 2000s.



4. WHY IS THIS HAPPENING?

Effective Radiative Forcing – better known as human-induced warming – is now changing the planet's energy balance by about 3.10 W m^{-2} in 2025, up 14% from 2019. There are many reasons for the increase.

4.1 Total GHG Concentrations

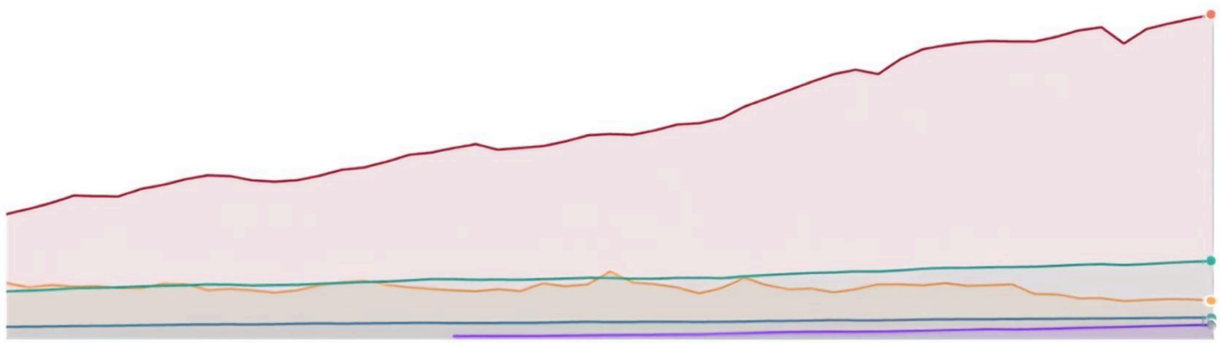
We are thickening the blanket of heat trapping gases through our burning of fossil fuels, other industrial sources of greenhouse gases (GHGs), and changes in land use and agricultural practices. Since 2019, concentrations of all three major greenhouse gases have risen: CO_2 by 15.6 ppm (+3.8%), CH_4 by 70 ppb (+3.7%), and N_2O by 7.2 ppb (+2.2%).

Atmospheric CO_2 is now accumulating 30% faster than it was in the 2000s — from ~2.0 ppm/yr to ~2.6 ppm/yr across 2020-25. The land and ocean still soak up just over half of our CO_2, but those natural sinks may be weakening. This is an active area of research, but anthropogenic emissions remain the dominant and unambiguous driver of rising GHG concentrations.

4.2 Man-made GHG Emissions

Man-made GHG emissions reached a record 56.8 (±5.5) Gt CO_2e in 2024, about three-quarters of it from fossil fuels. In 2019 global GHG emissions were ~55 Gt CO_2e — a ~3.3% increase over five years — a slower increase than in previous decades, but still headed in the wrong direction against a record-high baseline.

The bulk of current GHG emissions (over 70%) are from the use of fossil fuels, which have risen steadily in the past few decades, but emissions from deforestation, agriculture and industrial processes also play an important role.



2024	
CO2 – Fossil fuels & industry	38.6
CO2 – Land use, land-use change & forestry	4.6
CH4	9.3
N2O	2.6
F-gases	1.7
	56.8 [Gt CO2e/yr]

4.3 Unmasked Warming

In addition to GHG emissions, there are a number of polluting emissions, including sulphur dioxide (SO_2), black carbon, organic carbon, nitrogen oxides (NOx), and carbon monoxide (CO) that impact the climate, as well as air quality.

To improve air quality and combat acid rain, the international community has fitted scrubbing equipment and switched to alternative sources of fuel. As a result, these emissions have fallen considerably since 2019 – SO_2 by 15%, NOx by −10%, black carbon by −8%, and CO by 15%.

While aerosol pollutants are harmful, they also reflect sunlight, partially masking the warming effects of GHGs. As these emissions fall, their cooling haze fades and warming increases. Total aerosol cooling weakened 10% from -1.07 to -0.96 W m^{-2} between 2024 and 2025. Declining sulphur emissions since 2019, including the 2020 switch to cleaner shipping fuel, added an estimated +0.1 W/m^2 over 2020–2025.

This “unmasking effect” is now a measurable component of accelerating warming.

4.4 Persistent Contrails

The report also tracks the warming effect of aviation contrails and contrail-induced cirrus — the line-shaped clouds that form behind aircraft and trap outgoing heat. While small relative to CO_2 forcing (~2.37 W/m^2), contrails (0.07 W/m^2) are a warming contribution that respond immediately to changes in air traffic — making them one of the few climate warming effects that could be reduced on short timescales.

4.5 Other Factors

Additional factors captured in Earth’s Energy Imbalance but not in the ERF include: the ocean's absorption of ~90% of excess heat, amplifying feedbacks from water vapour and cloud changes, and loss of reflective ice cover. These feedbacks are contributing to warming and may become more significant over time.

5. CLIMATE IMPACT INDICATORS

The IGCC 2026 report tracks twelve key sets of indicators, following IPCC AR6 methods, and three indicators show the physical changes we are seeing in the climate system.

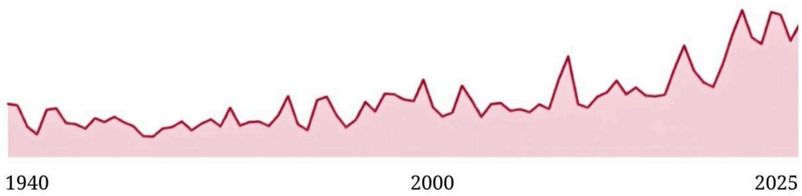
5.1 Ocean Heat

Oceans are central to our climate system absorbing over 90% of excess heat. This fuels sea level rise, disrupts ocean currents, accelerates sea ice loss, and intensifies marine heatwaves – all of which have multiple effects on marine life and the natural carbon cycle. Ocean warming also has high inertia, committing the planet to continued sea level rise and marine ecosystem disruption for centuries.

A new ocean heatwave indicator included in this year's report shows that marine heatwave days have more than tripled since 1991. The past decade averaged 58 such days per year, about 60% more than the decade before, and peaked at 82 days in 2024. In 2025, the mean across all four datasets was 65 days. Marine heatwaves damage coral reefs, disrupt fisheries, alter carbon uptake, exacerbate acidification, and influence weather patterns over land.

Marine Heatwaves, 2025

64.90 days



5.2 Rainfall

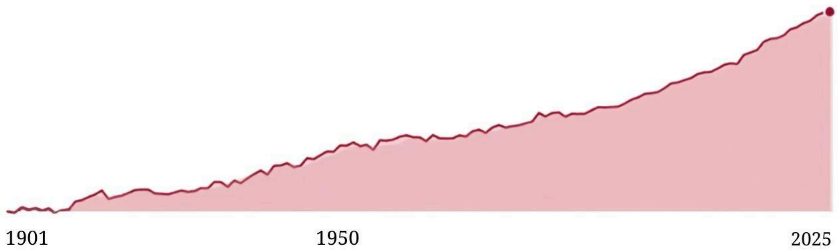
As the atmosphere warms it holds more moisture, making downpours heavier in some places and rainfall more erratic overall. Land rainfall globally increased in 2025 across all datasets. There was enhanced rainfall over Asia, the Maritime Continent, Siberia, and southern Africa. The severe rainfall deficit over central South America during 2023–2024 markedly reduced, while wet conditions persisted over the Arctic and Siberia for a third consecutive year.

5.3 Sea Level Rise

Warming water and melting land ice linked to rising Earth Energy Imbalanc==e are driving the global sea level rise, and the pace is accelerating. Global sea level is 23 cm above 1901 levels — a new record — and rising more than twice as fast as in the late 20th century: from 1.69 mm/year (1976–1995) to 3.67 mm/year (2006–2025).

Sea-Level Rise, 2025

22.96 cm



6. THE CARBON BUDGET AND 1.5°C

In 2025, human-induced warming rose slightly to 1.37°C. Under current trends, human-induced warming will likely pass 1.5°C around 2030. Individual years are already crossing it – as we saw in 2024 – and we will likely cross the 1.5°C threshold again in the next four years.

To keep an even (roughly 50%) chance of holding human-induced warming below 1.5°C this century, the world can add only about 130 Gt CO_2 more from the start of 2026 — roughly three years at today's CO_2 emissions of about 42 Gt a year. Budgets for higher thresholds are also tight: 1.7°C could be used up within about 12 years.

7. POLICY CONSIDERATIONS

7.1 Plan For Faster Near-Term Warming

Cleaning up air pollution is essential for public health, but it carries a climate twist: as sulphur and other reflective aerosols fade, the warming they were masking comes through. The report shows this "unmasking" is now a measurable part of the accelerating pace of warming and more research is needed to better understand the implications for the sensitivity of our climate systems and to improve models. Policymakers should expect the rest of this decade to warm faster than a simple emissions trajectory implies.

Getting in front of rapid changes requires more regular risk assessments, better early warning systems and near term adaptation plans. Concerted action to reduce methane emissions (a short-lived greenhouse gas) and carbon dioxide together could halve the rate of warming within two decades. Additional measures which can provide short-term cooling effects, such as reducing persistent contrails from aviation, should also be pursued.

7.2 Monitoring Matters

The IGCC draws on over 40 global datasets. Many of the monitoring systems behind them are now under threat: NASA climate satellites face proposed termination, weather balloon networks are already shrinking, and foundational ocean observing programmes rely on insecure, project-based funding.

Factors contributing to Earth's Energy Imbalance, including natural feedback, will require additional monitoring capabilities. Policymakers should protect the monitoring we have and invest in expanding it; without it, future assessments will be slower and less certain.

8. SHARING THE SCIENCE

The science doesn't stop here. Our animation *Reading the Climate Pulse* — narrated by Lucy Siegle environmental journalist and writer — translates these findings for a wider audience.

The more this evidence reaches decision-makers, media, and the public, the greater its impact.

Scan to watch and share.