

(tiny, light-scattering pollution particles) — have led to an especially high rate of heating. PRODUCED MAINLY BY BURNING FOSSIL FUELS, AEROSOLS HAVE LONG ACTED AS AN INVISIBLE BRAKE ON HEATING BY REFLECTING SUNLIGHT AND ALTERING CLOUD FORMATION THE LEVEL AND RATE OF HEATING IS UNPRECEDENTED Human-induced heating has risen to an average of 1.22°C over the most recent decade (2015 - 2024). DECADAL AVERAGE ANNUAL AVERAGE **CHANGE IN GMST. 2024** CHANGE IN GLOBAL MEAN SURFACE TEMPERATURE (GMST) Human activity drove **1.36°C** of heating in 2024.

Including natural climate variability, total

temperature rise was 1.52°C.

1.36°C

**HUMAN-CAUSED** 

**HEATING** 

INCLUDING NATURAL CLIMATE

VARIABILITY

1.52°C

**AVERAGE SURFACE** 

**TEMPERATURE RISE** 

2051

2024

The ocean has absorbed about 90% of the excess heat caused by humans.

Oceans heat more slowly than land due to their higher 'heat capacity'

— it takes more energy to raise its temperature — and the slow mixing

PARTICULARY FOR MONITORING THE FUTURE EXTENT OF CLIMATE CHANGE

2012 - 2024

Now rising about 4mm (3.91mm) per year

STEEP EMISSION REDUCTIONS WOULD SLOW THE RATE OF SEA-LEVEL RISE, BUYING MORE TIME FOR ADAPTATION

**DEEP, STRONG** 

AND SUSTAINED

**REDUCTIONS** 

2050

LAND AND OCEAN DRAIN

2030

MORE CUMULATIVE EMISSIONS, MORE GLOBAL HEATING

Easier today but more climate impacts and much harder for future generations

THE BEST FORM OF CO<sub>2</sub> 'REMOVAL'?

Turning down the tap through emission reductions. Preventing a tonne

of CO<sub>2</sub> emissions today will almost always be easier and cheaper than

trying to remove CO<sub>2</sub> from the atmosphere later this century.

02

When only residual emissions remain (e.g. 5-10%),

'PROGRESSION' OVER TIME

IT TAKES LESS ENERGY AND LESS TIME TO HEAT UP LAND COMPARED WITH OCEAN

2023

2053

+1.5°C

+1.0°C

+0.5°C

When scientists talk about limiting global heating to 1.5°C or 'well below 2°C', they are referring to

the average global temperature increase over decades, rather than any single year's temperature.

**PARIS AGREEMENT** 

1.22°C

2015 - 2024

**TEMPERATURE GOALS** 

+2.0°C -

+1.5°C

+1.0°C

+0.5°C

2011 - 2020

2025

2027

2031

Several regions around the world have already heated by more than 2°C.

Climate change has adversely impacted food security

and terrestrial ecosystems — as well as contributing to an

increased frequency, intensity and duration of heat-related

events, including heatwaves in most land regions.

2006 - 2018

Sea-level rise is driven by three main factors:

2030

CO2 REMOVALS DRAIN

THE UNPROVEN OUTLET FOR COUNTERBALANCING UNAVOIDABLE 'RESIDUAL EMISSIONS' — WITH NO GUARANTEE IT WILL WORK AT THE SCALE REQUIRED

The number one priority is slashing CO<sub>2</sub> emissions.

That effectively means turning down the tap of fossil fuel

emissions, with a view to turning it off completely.

LESS CUMULATIVE EMISSIONS, LESS GLOBAL HEATING

Challenging today but less climate impacts and easier for future generations.

ii. Glacier melt — mountain glaciers are melting worldwide

i. Thermal expansion — warmer water takes up more space than colder water

iii. Ice sheet loss — Greenland and Antarctica are losing ice at accelerating rates.

Global mean sea level has risen by 22.8cm, 1901-2024

AR6: Global mean sea level had risen by 20.2cm, 1901-2018

2033

366666666666666

WHAT ARE NATIONALLY DETERMINED CONTRIBUTIONS (NDCs)?

2035

## 1.09°C

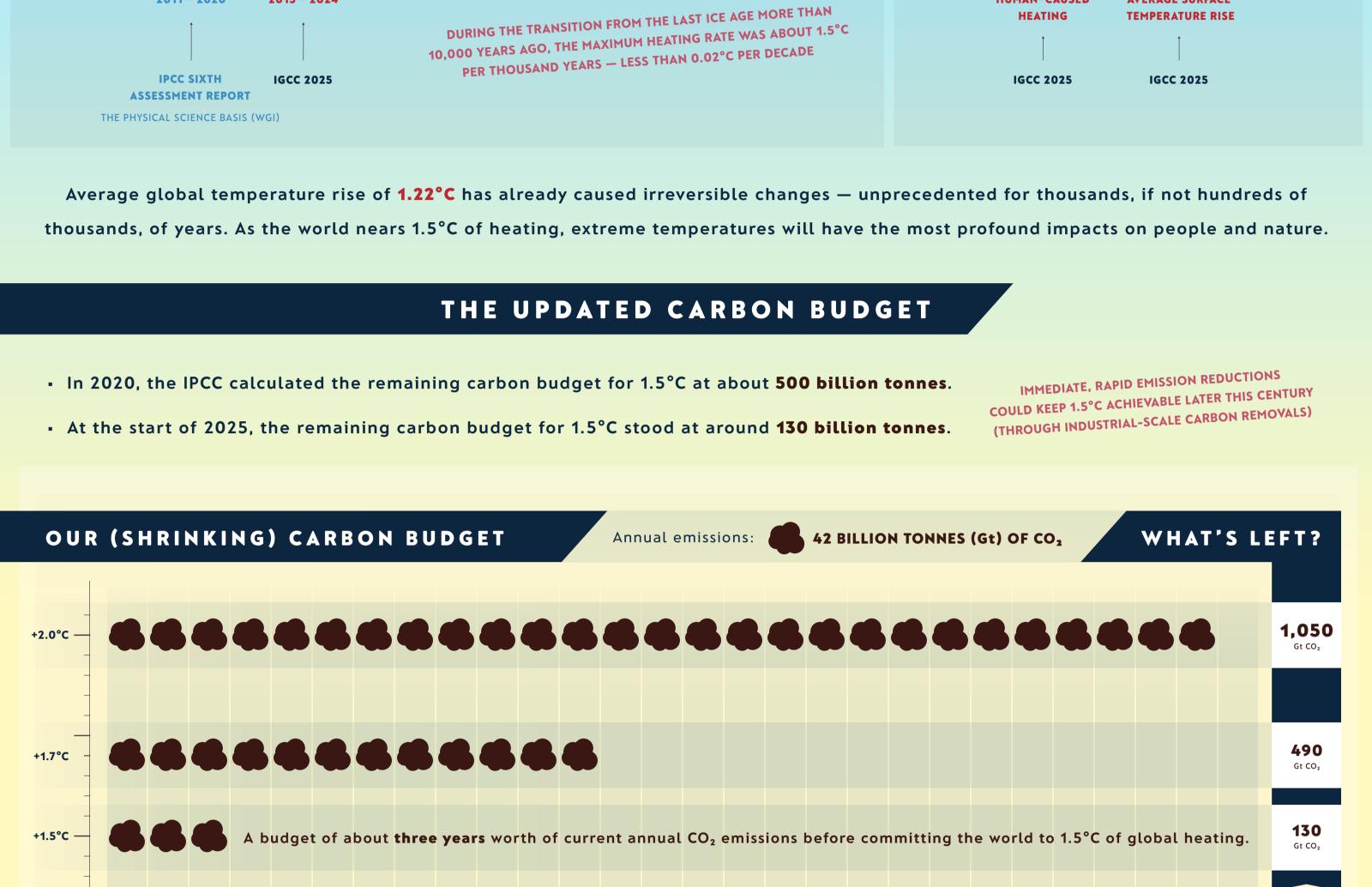
0.27°C

RATE OF HEATING PER DECADE

LIKELY TO BREACH 1.5°C IN ABOUT 2030

'Limit warming to well below 2°C'

'Pursue efforts to limit warming to 1.5°C'



**CARBON-CUTTING PLEDGES (NDC 3.0)** In 2025, countries must submit the third round of their climate pledges known as NDCs 3.0 — outlining carbon-cutting plans for 2025 to 2035. 'HIGHEST POSSIBLE AMBITION' Under the Paris Agreement, nations are required to update their NDCs every five years. Each new version must show 'PROGRESSION' from the last and reflect 2028 the 'HIGHEST POSSIBLE AMBITION' toward meeting global climate goals. While countries set their own targets, these pledges are expected to ratchet up over time to collectively meet the Paris Agreement's temperature limits.

THE 'LAND-OCEAN HEATING CONTRAST'

LAND TEMPERATURES, where people actually live, have risen nearly twice as fast as OCEAN TEMPERATURES.

2039

1 If annual emissions fall, budgets last longer. Deep, rapid and sustained reductions will limit the maximum heating we experience.

1 To meet the Paris Agreement temperature goals, governments must submit stronger carbon-cutting pledges — and deliver on them.

2043

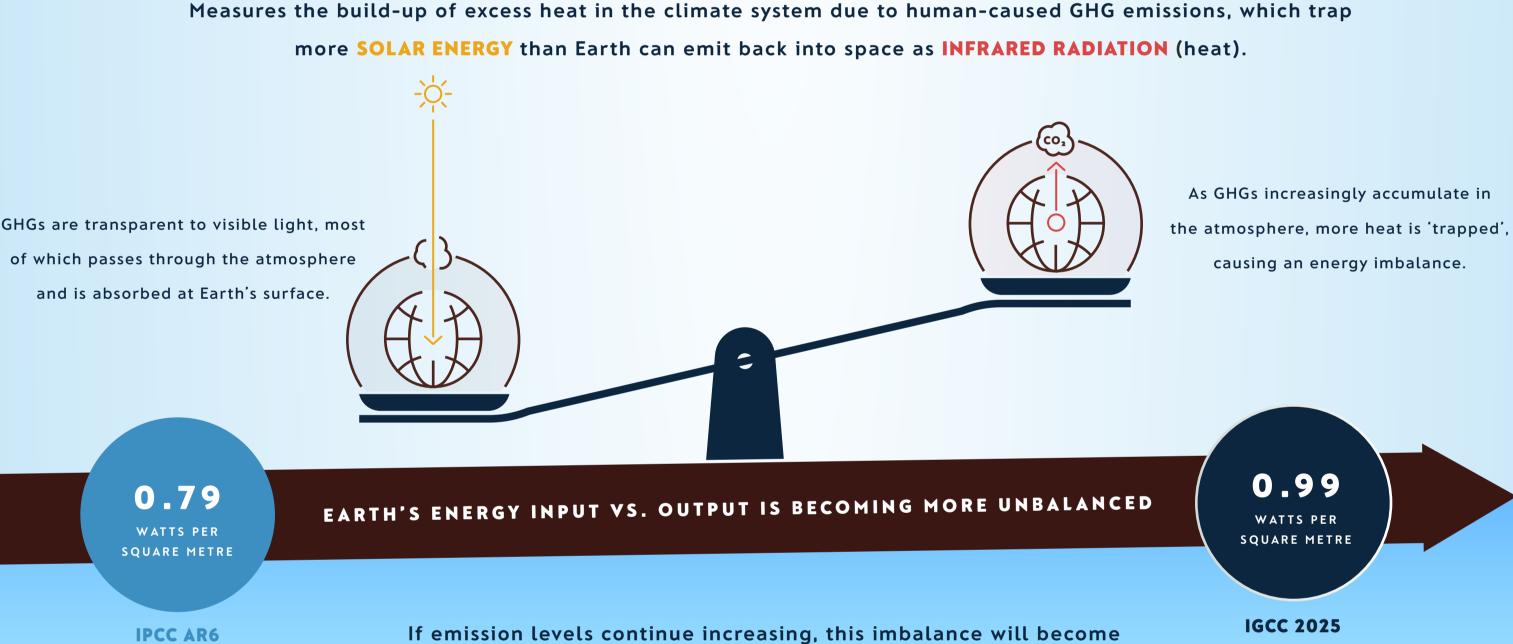
REFLECTS THE AVERAGE RISE IN MAXIMUM LAND TEMPERATURES OVER THE PAST DECADE — A KEY INDICATOR OF CLIMATE EXTREMES AND ONE OF THE MOST VISIBLE EFFECTS +1.90°C OF HUMAN-CAUSED HEATING +1.02°C REFLECTS THE INCREASE IN GLOBAL OCEAN TEMPERATURE REGISTERED OVER THE SAME PERIOD

Variations in large-scale weather patterns can cause more heat to be buried in the deeper OCEAN,

temporarily reducing the rate of surface temperature rise. The OCEAN acts like a giant sponge for heat.

Tracking this energy imbalance is a vital indicator of longer-term heating and climate change.

EARTH'S ENERGY IMBALANCE (EEI)



even more lopsided - and average temperatures will continue rising.

WHAT ABOUT SEA-LEVEL RISE?

Sea-level rise from global heating will continue for centuries to millennia, due to deep ocean warming and ice sheet mass loss.

THE GOOD NEWS? WE KNOW HOW TO FIX IT

Halving CO<sub>2</sub> emissions as quickly as possible, then achieving net zero CO<sub>2</sub> in the early 2050s — along

with rapid, deep and sustained cuts in other GHG emissions — would hold heating close to 1.5°C.

All GHG emissions should reach net zero roughly two decades later.

The path to net zero by mid-century will determine the total amount

of CO<sub>2</sub> that accumulates in the atmosphere, and how much damage we cause.

Think of the 'area under the curve' — that's what really matters.

WHAT DOES 'ACHIEVING NET ZERO' MEAN?

Stabilising global temperatures requires reaching net zero CO<sub>2</sub> — where

HUMAN-CAUSED CO<sub>2</sub> EMISSIONS are reduced enough to be counterbalanced by durable CO<sub>2</sub> REMOVAL.

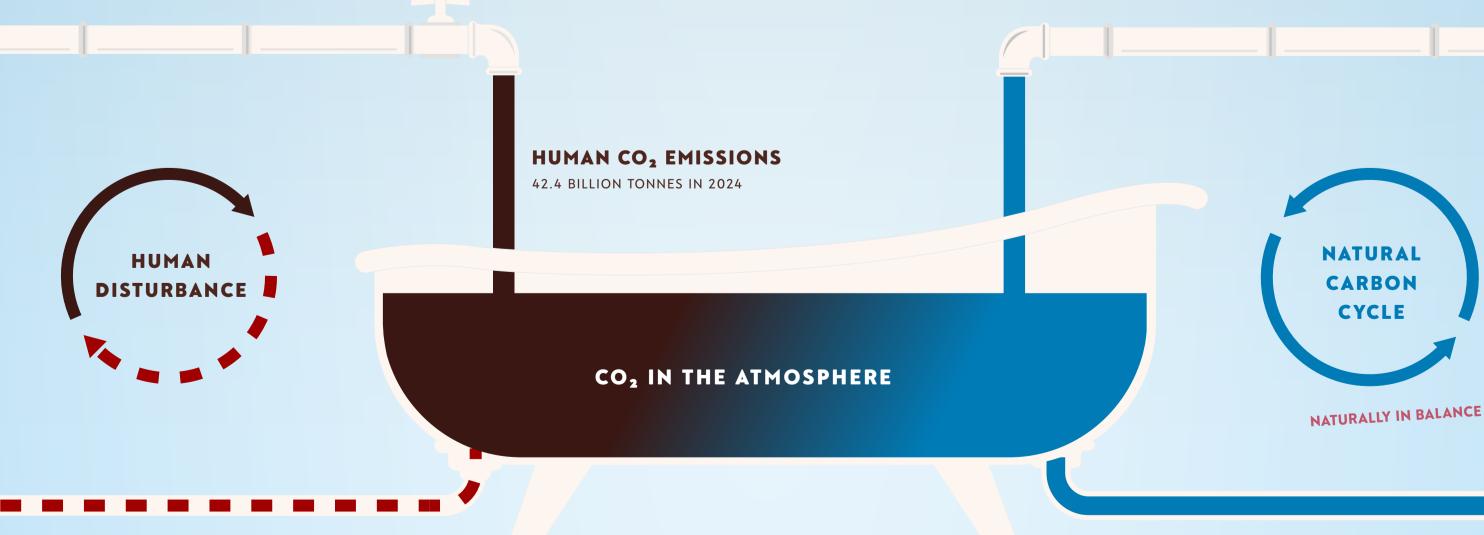
Achieving net zero CO<sub>2</sub> is the only scientifically established path to stabilise global warming.

Human-caused heating is accelerating the pace of sea-level rise. This has profound consequences for coastal ecosystems,

safety, and planning — because it raises the baseline for extremes caused by storm surges, waves and tides.

HALVE EMISSIONS **EARLY 2050s** BY 2030

2050





**EVERY CHOICE MATTERS** 

**EVERY YEAR MATTERS** 

continued emissions will lead to higher temperatures and more severe impacts on people and natural ecosystems.

Next year the data will be different, but the message will be the same. To prevent the worst impacts of

climate change, it's the same formula: deep, strong and sustained reductions in GHG emissions.

**EVERY TONNE MATTERS** 

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