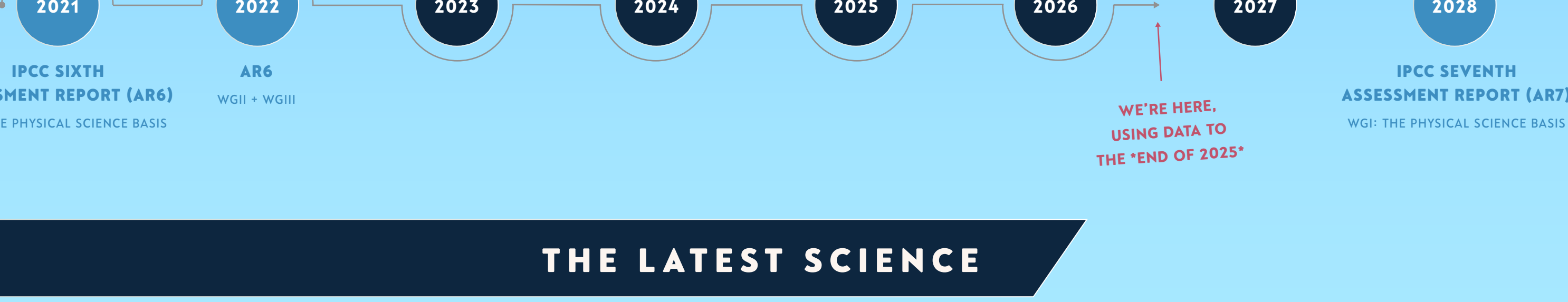


# INDICATORS OF GLOBAL CLIMATE CHANGE

IGCC | 2025

## WHY IS THIS UPDATE IMPORTANT?

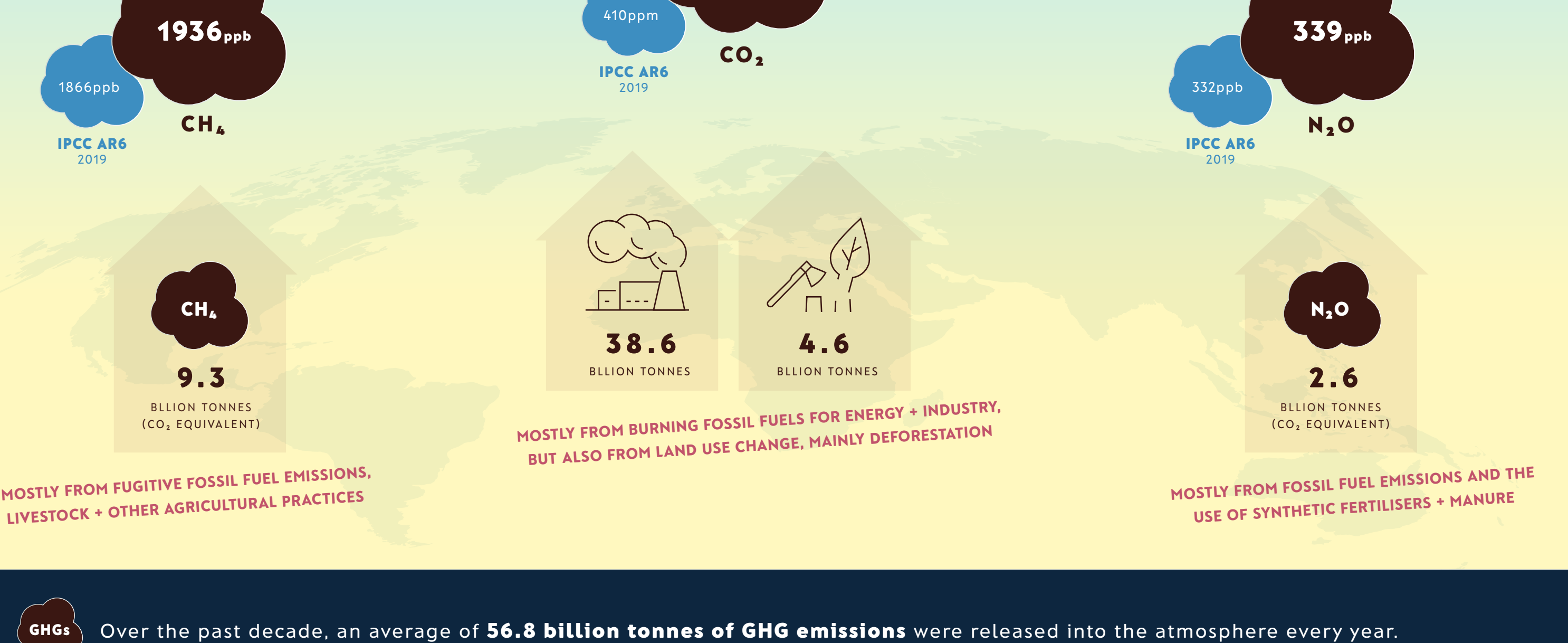
It bridges the gap between IPCC reports, bringing decision makers and the public the latest climate science each year. IGCC includes IPCC veterans and early-career scientists. They produce this to keep you informed.



## THE LATEST SCIENCE

Humans are heating Earth at a rate of **0.27°C** per decade — by far the fastest rate on record.

This heating is due to carbon dioxide (CO<sub>2</sub>) and other greenhouse gases (GHGs) accumulating in the atmosphere, blocking outgoing infrared radiation. As less heat escapes to space, an energy imbalance is created. Earth heats up.



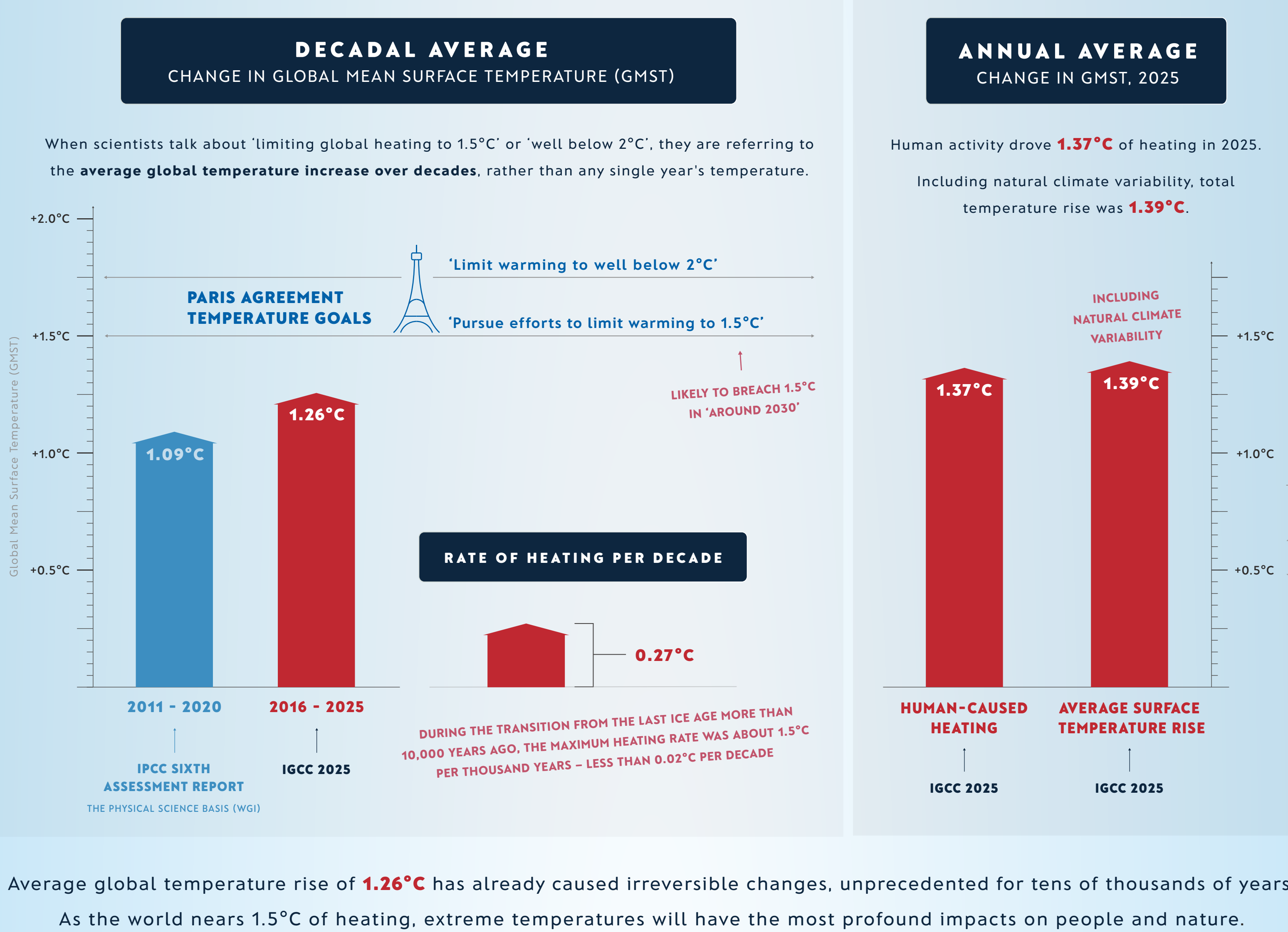
**GHGs** Over the past decade, an average of **56.8 billion tonnes** of GHG emissions were released into the atmosphere every year. **WEIGHT WISE, THAT'S 5.6 MILLION EIFFEL TOWERS**

**CO<sub>2</sub>** In 2025, **43.2 billion tonnes** was CO<sub>2</sub>. The rest consisted of methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O) and F gases (HFCs, PFCs, SF<sub>6</sub>, NF<sub>3</sub>).

Record GHG emissions over the past decade combined with less cooling from aerosols have led to an especially high rate of heating. Aerosols (or air pollution) have long acted as an invisible brake on heating by reflecting sunlight and altering cloud formation.

## THE HEATING IS UNPRECEDENTED

Human-induced heating has risen to an average of **1.26°C** over the most recent decade (2016 – 2025).



Average global temperature rise of **1.26°C** has already caused irreversible changes, unprecedented for tens of thousands of years. As the world nears 1.5°C of heating, extreme temperatures will have the most profound impacts on people and nature.

## THE UPDATED CARBON BUDGET

In 2020, the IPCC calculated the remaining carbon budget for 1.5°C at about **500 billion tonnes**. **IMMEDIATE, RAPID EMISSION REDUCTIONS COULD KEEP 1.5°C ACHIEVABLE LATER THIS CENTURY (THROUGH INDUSTRIAL-SCALE CARBON REMOVALS)**

At the start of 2026, the remaining carbon budget for 1.5°C stood at around **130 billion tonnes**.



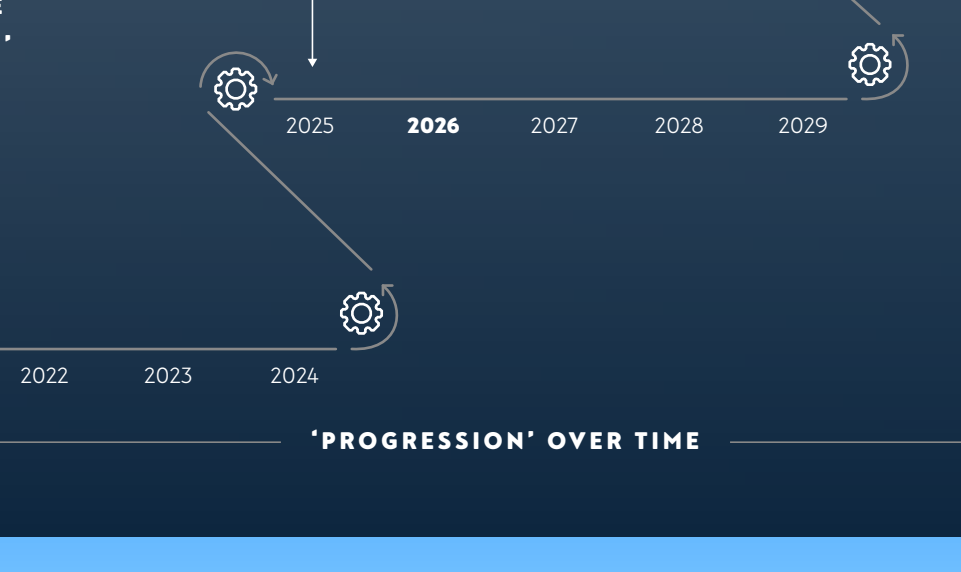
To meet the Paris Agreement temperature goals, governments must submit and deliver stronger carbon-cutting pledges.

## WHAT ARE NATIONALLY DETERMINED CONTRIBUTIONS (NDCs)?

In 2025, countries were supposed to submit the third round of their climate pledges — known as NDCs 3.0 — outlining carbon-cutting plans for 2025 to 2035.

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 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 limit.



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

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

The number of days experiencing **marine heatwaves** has more than **TRIPLED** globally between 1991 and 2025, compared with a doubling between 1982 and 2016.

Marine heatwaves averaged **58 DAYS** for the 2016-2025 period. Marine heatwaves can negatively affect both marine ecosystems and human society.

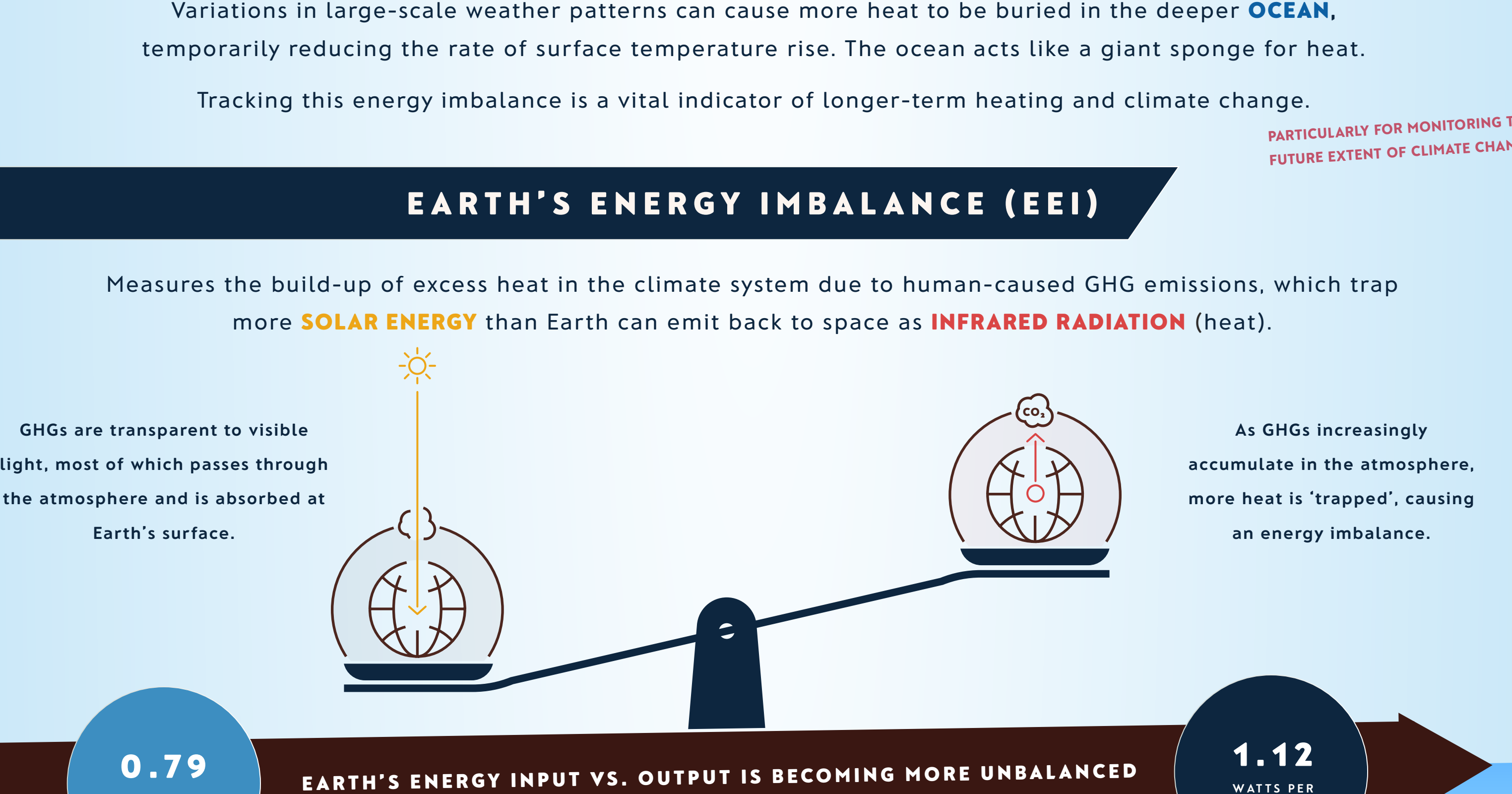
Variations in large-scale weather patterns can cause more heat to be buried in the deeper **OCEAN**, temporarily reducing the rate of surface temperature rise. The ocean acts like a giant sponge for heat.

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

PARTICULARLY FOR MONITORING THE FUTURE EXTENT OF CLIMATE CHANGE

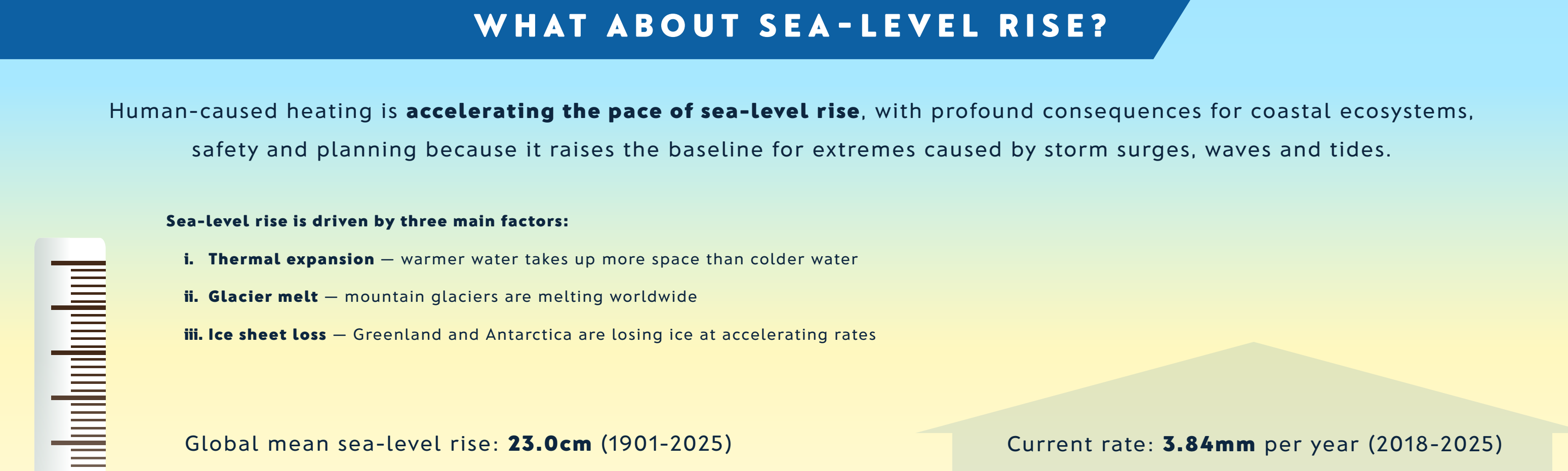
## EARTH'S ENERGY IMBALANCE (EEI)

Measures the **build-up** of excess heat in the climate system due to human-caused GHG emissions, which trap more **SOLAR ENERGY** than Earth can emit back to space as **INFRARED RADIATION** (heat).



## WHAT ABOUT SEA-LEVEL RISE?

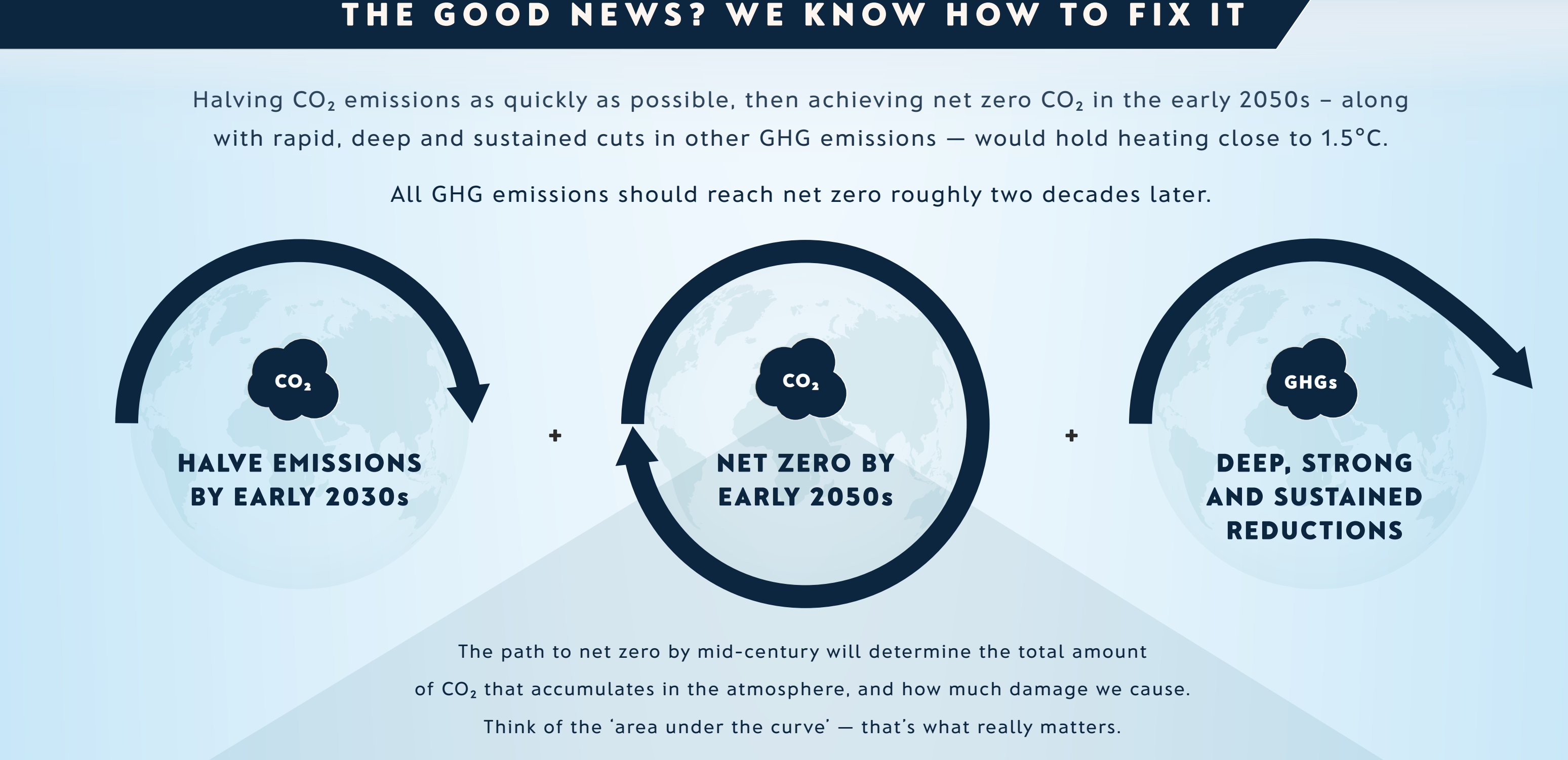
Human-caused heating is **accelerating the pace of sea-level rise**, with profound consequences for coastal ecosystems, safety and planning because it raises the baseline for extremes caused by storm surges, waves and tides.



## 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.

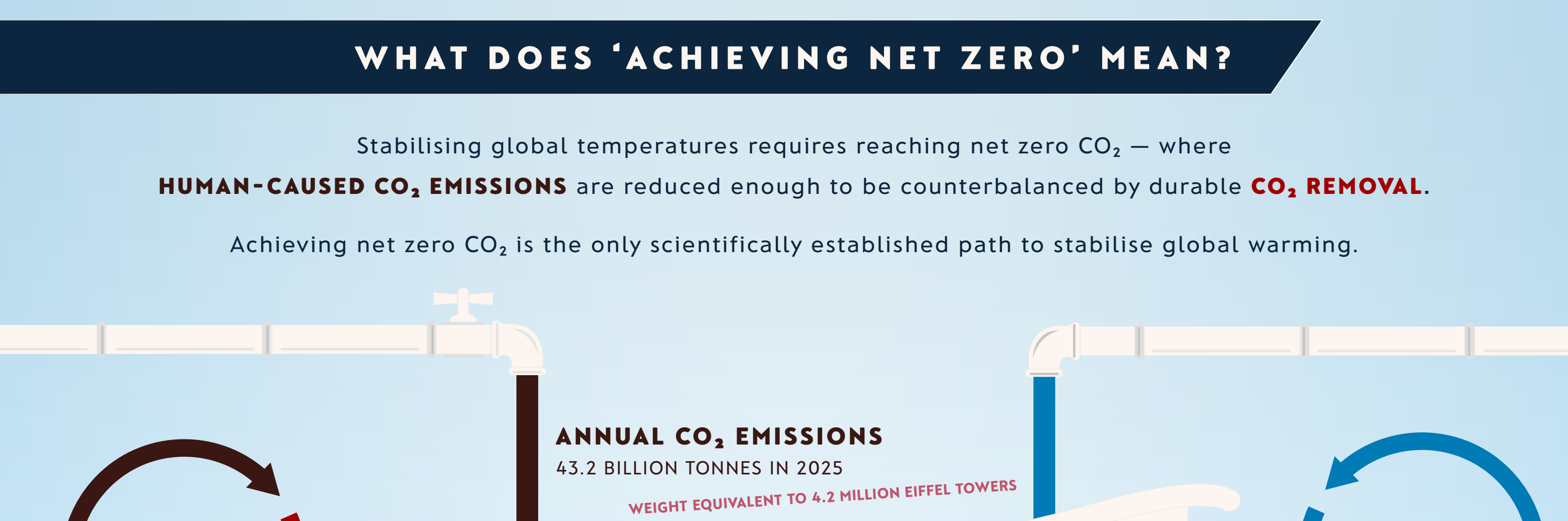
All GHG emissions should reach net zero roughly two decades later.



## WHAT DOES 'ACHIEVING NET ZERO' MEAN?

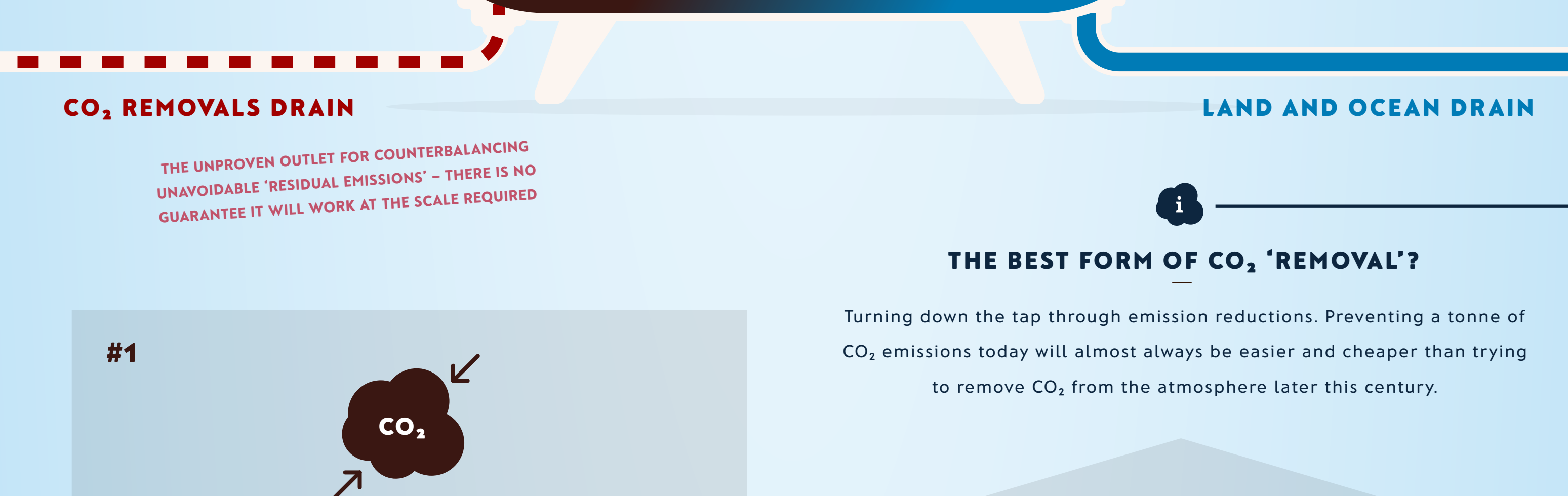
Stabilising global temperatures requires reaching net zero CO<sub>2</sub> — where **HUMAN-CAUSED CO<sub>2</sub> EMISSIONS** are reduced enough to be counterbalanced by durable **CO<sub>2</sub> REMOVAL**.

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



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

Turning down the tap through emission reductions will almost always be easier and cheaper than trying to remove CO<sub>2</sub> from the atmosphere later this century.



## THE NUMBERS WILL CHANGE, THE TAKEAWAYS WON'T

The team behind the **Indicators of Global Climate Change** will update these indicators next year, but we already know 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 CHOICE MATTERS

## EVERY TONNE MATTERS

## EVERY YEAR MATTERS

BASED ON THE PAPER

'Indicators of Global Climate Change 2025: annual update of key indicators of the state of the climate system and human influence'

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BY JOHN LANG | CREATIVE COMMONS





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