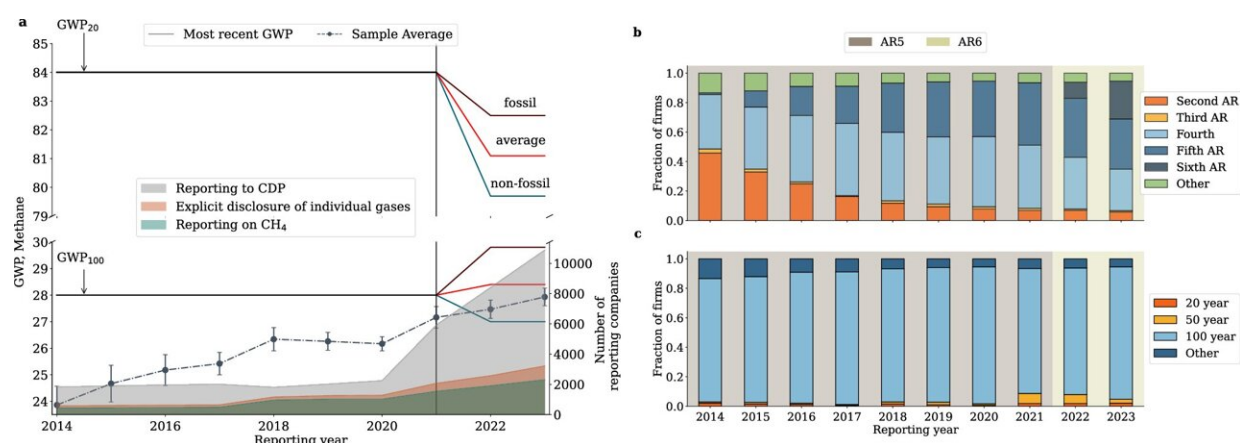


Inconsistent reporting by companies leads to underestimation of methane's climate impact, study finds

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Emission metrics. Credit: *Nature Communications* (2025). DOI: 10.1038/s41467-025-56845-3

Companies around the world are underestimating their total greenhouse gas footprints because of inconsistent accounting standards for methane emissions, finds a new study by researchers from UCL and Imperial College London.

The new study, [published](#) in *Nature Communications*, found that methane emissions are being underreported by at least the equivalent of between 170 million and 3.3 billion tons of carbon over a decade, depending on

the metric used in calculating the shortfall.

This means that each year, on average, companies around the world have potentially underestimated their [carbon footprint](#) by as much in total as the annual carbon emissions of the UK in 2022. This represents a significant methane emissions gap that could cost between \$1.6 billion (£1.3 billion) and \$40 billion (£32 billion) to fix.

Lead Author Dr. Simone Cenci (UCL Bartlett School of Environment, Energy & Resources) said, "The cumulative emission gap we have documented in this work shows how important it is to standardize the reporting of methane emissions. Methane is a potent greenhouse gas and the first step towards properly addressing its effect on climate is to make sure that it's accounted for properly.

"Adopting a global standard is in principle easy for companies as it essentially only requires the adjustment of a few conversion factors when calculating their greenhouse gas footprint. However, it requires global coordination as companies are currently often subject to fragmented regulations."

Methane is a [potent greenhouse gas](#) that contributes to global warming at levels comparable to carbon dioxide. Though methane is emitted in much smaller quantities than carbon dioxide, it's more efficient at trapping heat in the atmosphere. However, methane is also short-lived in the atmosphere, with a half-life of only about 10 years versus 120 years for carbon dioxide.

How much total heat a greenhouse gas traps is called its Global Warming Potential (GWP) and measured in CO₂ equivalent units, or the amount of carbon dioxide gas that would cause the same amount of warming. Because of methane's short lifespan, the conversion to CO₂ is not straightforward and debate persists about how best to represent it in

terms of carbon dioxide.

If methane's impact is calculated over 20 years (GWP-20), it's about 80 times more potent than carbon dioxide because that's the timeframe before most of it has dissipated. However, gauged over 100 years (GWP-100) more of the methane has broken down so it's only about 28 times as potent.

For companies estimating and reporting their greenhouse gas footprint, this lack of harmonization can cause confusion and inaccuracies, as there's no legally binding guidance or consensus for which standard to use.

In this study, the researchers compiled and analyzed methane emissions from a sample of 2,846 representative companies across a range of economic sectors and countries. They found the conversions used by the companies are largely inconsistent with the guidelines of most current carbon accounting standards that recommend the same GWP-100 metric as the latest Intergovernmental Panel on Climate Change (IPCC) Assessment Report.

To see how much methane emissions might be underreported, the team substituted the companies' various accounting conversions with the standard GWP-100 system suggested by the IPCC. Over the ten years from 2014 to 2023, methane emissions were underreported by the equivalent of about 170 million tons of carbon dioxide.

When they harmonized all reporting to the stricter GWP-20 standard, advocated by some [climate scientists](#) and used in some US jurisdictions, they found that over the same decade, methane emissions had been underestimated by the equivalent of about 3.3 billion tons of carbon dioxide.

The team also analyzed the [economic cost](#) of correcting the underrepresented carbon footprints. Based on carbon prices from emission trading schemes across the globe, the cumulative cost to companies over the study's ten years would total about \$1.6 billion (£1.3 billion) to align all global companies with the GWP-100 standard, and about \$40 billion (£32 billion) to align with the stricter GWP-20 standard. Companies in the energy, utilities and material sectors would face the biggest costs because they are the biggest industrial emitters of methane.

The authors note that even with their suggested corrections, total [methane emissions](#) are still being underestimated, as their calculations only focused on emissions directly produced by the companies they analyzed. Other downstream emissions, such as that which come from sold products, were not included, and are likely significant contributors as well, particularly in the energy sector.

More information: Simone Cenci et al, Lack of harmonisation of greenhouse gases reporting standards and the methane emissions gap, *Nature Communications* (2025). [DOI: 10.1038/s41467-025-56845-3](https://doi.org/10.1038/s41467-025-56845-3)

Provided by University College London

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