

Climate TRACE Data Reveal High-Impact Opportunities for Cutting Greenhouse Gas Emissions

BAKU, AZERBAIJAN | November 15, 2024 – Today, Climate TRACE released its latest inventory which, for the first time, provides monthly emissions data for every country and every major individual source of emissions in the world. In addition, Climate TRACE has now compiled monthly emissions inventories for every state and province, every county, and more than 9,000 major urban areas around the world, providing subnational governments with critical information to accelerate climate action.

Prior to today, 80% of the world's cities did not have access to a comprehensive inventory of their greenhouse gas (GHG) emissions and those of their surrounding urban areas. With Climate TRACE, now they do. These urban areas account for 17 billion tonnes of carbon dioxide equivalent (CO₂e), or more than 25% of global emissions.

In another new breakthrough, Climate TRACE now also tracks key non-GHG air pollutants for the world's largest single point sources of emissions, including pollutants that are implicated in millions of deaths around the world every year.

“Despite pledges and promises, global greenhouse gas emissions continue their steady rise, bringing with them the toxic air pollution that disproportionately impacts communities with fewer resources,” said former U.S. Vice President and Climate TRACE co-founder Al Gore. “But when climate leadership at the global and national levels has faltered, it is state and local leaders who have stepped in to fill the void. Now, with the help of breakthroughs in AI, Climate TRACE is filling an information void that has previously hindered local leaders from taking effective action to combat the global climate crisis and environmental injustice.”

Initial analysis of Climate TRACE's GHG and non-GHG data in key environmental justice hotspots reveals consistent patterns of unequal pollution exposure. Additionally, analysis of Climate TRACE data suggests that decarbonization efforts focused on overburdened communities can often reduce more GHG and non-GHG emissions with the same resources.

“We see a stark pattern that often many resources have already been invested in measuring and reducing emissions in some communities, while others have been all but ignored,” said Gavin McCormick, executive director of WattTime and a Climate TRACE co-founder. “The newest Climate TRACE inventory finds enormous untapped potential for emissions reductions by investing in these overburdened communities. Intriguingly, we find this often both reduces pollution inequality and reduces more emissions in total – without requiring any more resources.”

BEYOND NATIONAL TOTALS: THE VALUE OF STATE AND LOCAL INVENTORIES

Greenhouse gas emissions are still on the rise globally, despite some positive progress. Climate TRACE data confirm the trend that emissions are rising fastest in developing countries. According to the latest inventory, in Annex 1 countries, annual GHG emissions fell by 3% (0.6

billion tonnes CO₂e) from 2019 to 2023, and in non-Annex 1 countries, they rose by 7% (5.5 billion tonnes) during that same time.

But subnational data enables deeper understanding of variation and key trends in the growth and decline of global emissions. In many countries with the highest GHG totals, emissions are still on the rise. But in every one of those countries, there is at least one state or province where emissions have declined between 2021 and 2024. In total, 378 states in the top 30 most emitting countries have seen their GHG totals fall since 2021.

Many state and local inventories rely on national averages to estimate emissions at the regional level. But Climate TRACE data show that actual emissions within the world's cities and states can differ significantly from national averages. Across all countries worldwide, the average state or province is a remarkable 47% higher or lower emissions per capita than their national average.

Climate TRACE data also find that, in many cases, inequality in emissions continues to increase at the city level. A Climate TRACE analysis of 500 urban areas – many of the largest worldwide – found that the half with lower GDP saw emissions rise 50% faster, resulting in nearly three times more absolute emissions than cities with higher GDP, increasing 113.9 million tonnes (2.3%) vs. 38.5 million tonnes (1.5%).

KEY INSIGHTS IN GREENHOUSE GAS EMISSIONS

Climate TRACE's annual data release provides important updates and insights on global climate progress:

- **Greenhouse gas emissions break a new record, have yet to peak.** Global greenhouse gas emissions rose 0.7% in 2023, and we will likely see another slight increase – 0.48% – in 2024.
 - Between 2015 (the year of the Paris Agreement) and 2023, global emissions have increased 9.2% or 5.2 billion tonnes CO₂e. That increase is more than the combined annual 2023 emissions of every COP host country between France and Brazil (France, Morocco, Fiji, Poland, Chile, UK, Egypt, UAE, Azerbaijan, Brazil).
- **Persistent underreporting of oil and gas emissions continues, largely due to methane.** For the fourth year in a row, Climate TRACE data show that oil and gas emissions from production and transport are three times higher than reported and not yet updated in official inventories, despite pledges for increased transparency and mitigation. Missing reporting on methane emissions drives much of this gap, in part because many countries do not yet include methane in their Nationally Determined Contributions (NDCs).
- **“Low-hanging fruit” opportunities for decarbonization are among those with the greatest potential impact near-term.** Climate TRACE asset-level data includes emissions intensity metrics for individual facilities, allowing easy identification of the facilities that have not yet implemented “low-hanging fruit” emissions-reducing measures

such as energy efficiency or covering leaks. These facilities offer the most significant near-term opportunities to reduce emissions and address injustice.

- For example, investing in cleaning up the most-emitting wastewater treatment facilities would reduce 114% more emissions per tonne of waste than cleaning up the cleanest 10% of the wastewater treatment facilities.
- According to Jonathan Foley, Executive Director of Project Drawdown: “Climate TRACE is the best game in town with data to tell us exactly where pollution is happening and the biggest opportunities to address inequalities and injustice.”
- **High-impact opportunities for emissions reductions are disproportionately concentrated in developing countries.** More than 80% of the assets with the highest emissions intensity in the world are located in developing countries. But these countries do not receive a large enough share of global climate finance flows - for example, only 29% of global green bonds are issued in developing countries. Climate TRACE data can be used to quantify the potential impact of a policy or climate finance initiative.
 - For example, the COP29 Declaration on Reducing Methane from Organic Waste calls on nations to establish a program to reduce emissions from landfills worldwide. Such a policy would reduce 2.9 times more emissions (4.7 million tonnes of methane) if funding and policy were directed toward reducing emissions from the highest-impact landfills worldwide (over 85% of which are in non-Annex 1 countries), instead of only those in Annex 1 countries (1.6 million tonnes of methane).
 - Here, the highest-impact landfills are defined as those where the same size mitigation project would reduce the most emissions, such as those that are not covered, resulting in methane leaks.
- **Methane emissions steadily rise, despite global pledge.** At COP26, the Global Methane Pledge set a global goal to reduce methane emissions at least 30% by 2030. However, Climate TRACE data shows that global methane emissions are now 5.17% higher than the 2020 baseline.
- **“Dark fleet” maritime vessels account for at least 7% of global maritime emissions.** New Climate TRACE contributor Global Fishing Watch has, for the first time, utilized satellite radar to detect fishing and other vessels that fail to broadcast their positions via the Automatic Identification System (AIS) and has calculated their emissions. In 2023, GHG emissions from dark vessels accounted for more than 80 million tonnes of CO₂e – roughly 7% of all shipping industry emissions and more than the entire annual emissions of countries like Ireland, Ecuador, or Cambodia.
- **Tropical deforestation emissions fall in Amazon and Congo, rise sharply in Indonesia.** In 2023, emissions from deforestation and forest degradation saw a substantial decline across tropical regions, thanks to strengthened policies aimed at curbing deforestation.
 - Notably, the Amazon and Congo Basins experienced significant progress, with emissions reductions surpassing 20% in both regions.
 - Colombia and Brazil achieved particularly impressive results, cutting deforestation rates by over 30% compared to 2022 levels.

- However, Indonesia saw a sharp reversal in its recent progress. Emissions from deforestation and degradation surged by over 40%, halting the country's downward trend that had been steady since 2015. This spike was exacerbated by emissions from fires, which quadrupled in Indonesia's lowland forests and peatlands, driven by climate-induced wildfires.
- **Record-breaking temperatures and prolonged drought weaken forests' carbon sink capacity.** Record-breaking temperatures and prolonged drought across the tropics and beyond weakened the carbon sink capacity of global forests in 2023, signaling an urgent message to policymakers worldwide: the resilience of natural carbon sinks cannot be taken for granted. Climate TRACE data demonstrate the threat to global ecosystems in the absence of adaptive and proactive measures to sustain them amid mounting climate pressures.

NEW AND IMPROVED FEATURES IN THIS YEAR'S DATA RELEASE

With this data release, Climate TRACE's global inventory now includes:

- More than **660 million assets**, with increased coverage of the smaller and harder to spot sources of emissions.
- Inventories for **every state and province** as well as **more than 9,000 urban areas**.
 - Because there is no global database of political boundaries for the world's largest cities, the Climate TRACE website uses Functional Urban Areas as defined by the European Commission's Joint Research Centre. However, Climate TRACE can produce city-specific inventories for any location when provided with those boundaries.
- **2023 and 2024 emissions** data for all these locations and assets.
- Moving beyond annual to **monthly data releases**. Climate TRACE will begin releasing monthly data at a regular cadence beginning in Q1 2025.
 - Monthly data for all sectors and assets from January 2021 through present including projections of November and December 2024.
- **Non-GHG air pollutant** data at the asset level, representing more than 75% of global emissions of:
 - Sulfur dioxide (SO₂) (82.8 million tonnes/year)
 - Nitrogen oxides (NO_x) (95.2 million tonnes/year)
 - Organic carbon (12.8 million tonnes/year)
 - Black carbon (5.6 million tonnes/year)
 - Carbon monoxide (527.8 million tonnes)

As well as:

- 28.3 million tonnes of ammonia
- 111.2 million tonnes of volatile organic compounds
- 25.2 million tonnes of directly emitted particulate matter 2.5

...and will continue to expand in 2025.

- **Granular buildings data** that shows emissions for all 1km x 1km areas with buildings globally.
 - This is about 100x more detailed resolution than is typically available today.

- **Highly detailed datasets**, including uncertainty and temporal disaggregation, for climate modelers and other experts available upon request.

CONTINUOUSLY IMPROVING DATA AND METHODS

Climate TRACE harnesses artificial intelligence and machine learning methods to pinpoint the activities that cause GHG emissions and trace those emissions back to their source. As we continuously gather more information from 300 satellites, more than 11,100 sensors, and both public and commercially available datasets, our methods improve and the uncertainty inherent in estimating emissions decreases.

In addition to the methods Climate TRACE coalition members use to calculate emissions based on assets we can directly observe, this year, Climate TRACE also incorporated methods to estimate the most likely source of all other emissions we know are in the atmosphere. While no dataset is ever perfect, these methods have also allowed Climate TRACE to cross-validate with ground truth data from individual facilities, cities, countries, flux measurements, and sensors all around the world.

All methodologies for Climate TRACE data estimates are available to view and download [here](#). In addition, for a comprehensive list of the more than two dozen independently peer-reviewed scientific publications that underpin our work, click [here](#).

Climate TRACE always welcomes potential new members and contributors to help fill gaps and find hard-to-track emissions and assets. If you want to join or contribute to Climate TRACE, reach out to coalition@ClimateTRACE.org.

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About Climate TRACE

The Climate TRACE coalition was formed by a group of AI specialists, data scientists, researchers, and nongovernmental organizations. Current members include Carbon Yield; CTrees; Duke University's Nicholas Institute for Energy, Environment & Sustainability; Earth Genome; Former Vice President Al Gore; Global Energy Monitor; Hypervine.io; Johns Hopkins University Applied Physics Lab; OceanMind; RMI; TransitionZero; and WattTime. Climate TRACE is also supported by more than 100 other contributing organizations and researchers, including key data and analysis contributors: Arboretica, Carnegie Mellon University's CREATE Lab, Global Fishing Watch/emLab, Michigan State University, Open Supply Hub, and University of Malaysia Terengganu. For more information about the coalition and a list of contributors, click [here](#).

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Additional resources for media contacts can be found [here](#).