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9 Charts Explain Per Capita Greenhouse Gas Emissions by Country

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Explainer

Topic **Climate**

When India surpassed the European Union in total annual greenhouse gas (GHG) emissions in 2019 becoming the [third largest emitting country](#) after China and the United States, that statistic only told part of the story. India's population is nearly three times larger than that of the EU, so based on emissions per person, India ranks much lower among the world's national emitters.

This is just one of many ways to compare country responsibilities for climate change; there are many other dimensions to [climate equity](#), such as a [country's vulnerability or capacity to act](#). When focusing on emissions, it's important to consider population differences and historical contributions, alongside total emissions. That's why examining a country's GHG emissions relative to its population — or per capita emissions — provides a helpful perspective.

Using data from [Climate Watch](#) — an online platform managed by WRI with open data, visualizations and analysis that provide insights on countries' climate progress — we analyzed how countries' per capita emissions compare historically and in the present day.

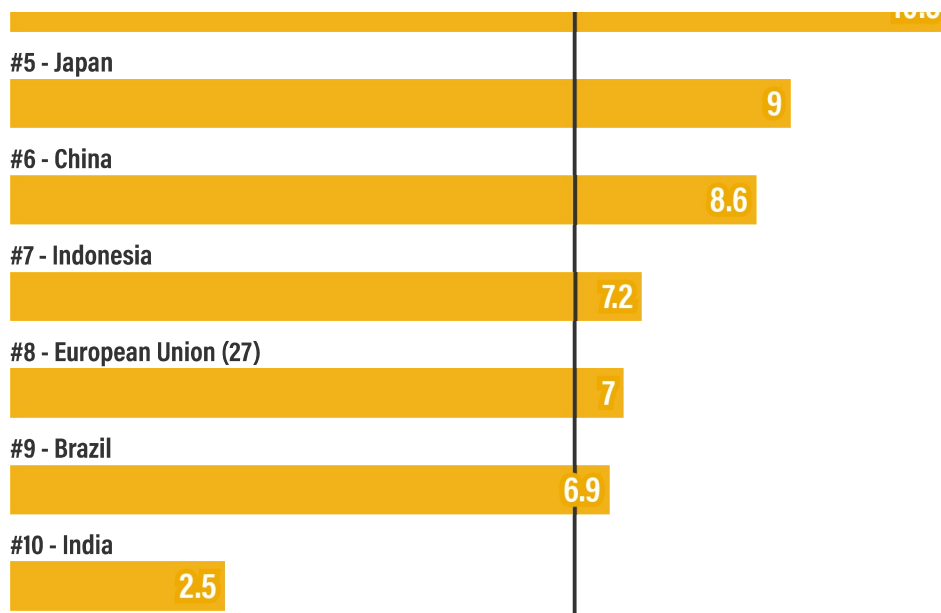
Among the 10 Highest Emitters, India has the Lowest Per Capita Emissions

China, the United States, India and the EU have the highest total emissions in the world.

Per capita emissions for the top 10 total emitters, 2019

tCO₂e/person





Source: [Climate Watch](#) - Values include emissions from LUCF sector.

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But among the top 10 highest emitters, the U.S. and Russia have the highest per capita emissions, at 17.6 tonnes of carbon dioxide equivalent (tCO₂e) per person and 13.3 tCO₂e per person respectively, while India's per capita emissions are the lowest at just 2.5 tCO₂e per person.

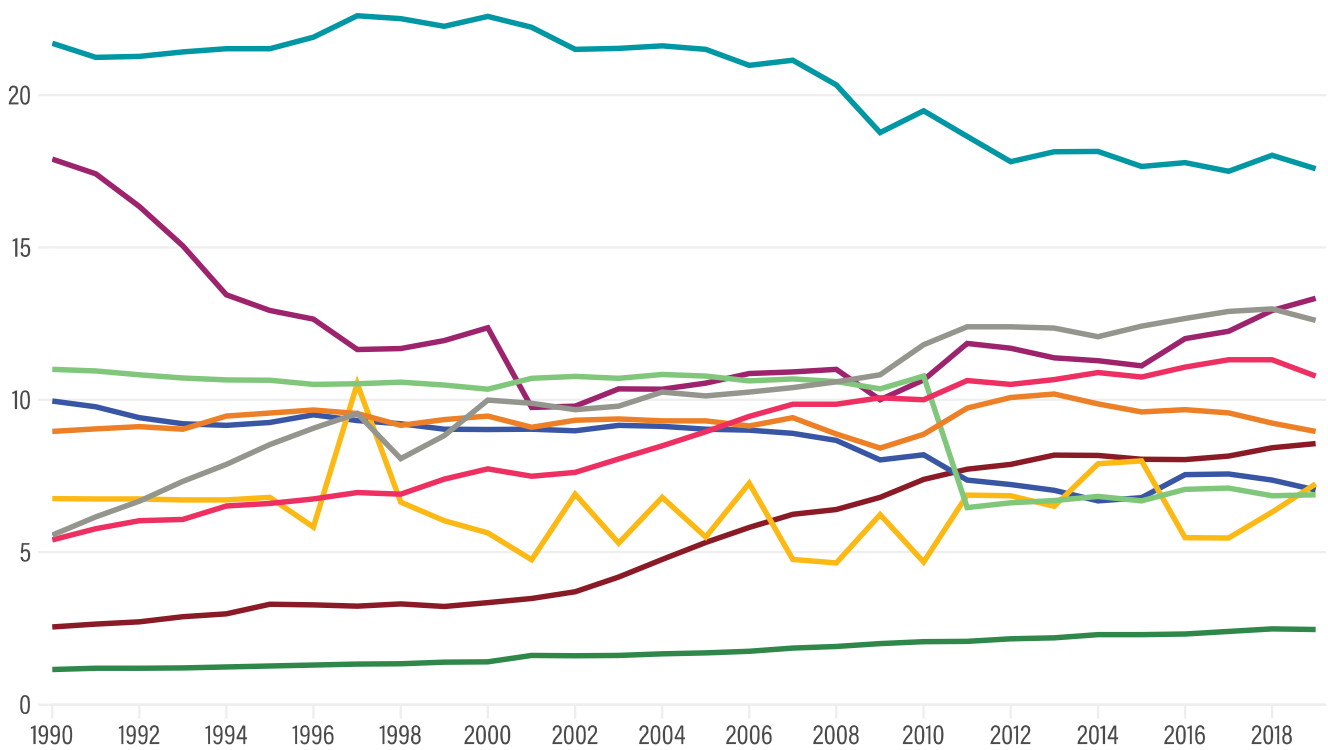
Of the Top 10 Emitters, the US, Russia, Japan and the EU Have Reduced Per Capita Emissions

When looking at the top 10 total GHG emitters, the EU has reduced its per capita GHG emissions by 29% since 1990 and is now ranked at number 8 (7.04 tCO₂e per person), below China (8.6 tCO₂e per person) and Indonesia (7.2 tCO₂e per person). The U.S. (17.6 tCO₂e per person) has reduced its per capita GHG emissions by 19% since 1990. However, this trend in reducing total and per capita GHG emissions for the EU and U.S. is a recent phenomenon.

Per capita emissions for the top 10 emitters, 1990-2019

tCO₂/person

25



Source: [Climate Watch](#) - Values include emissions from LUCF sector.

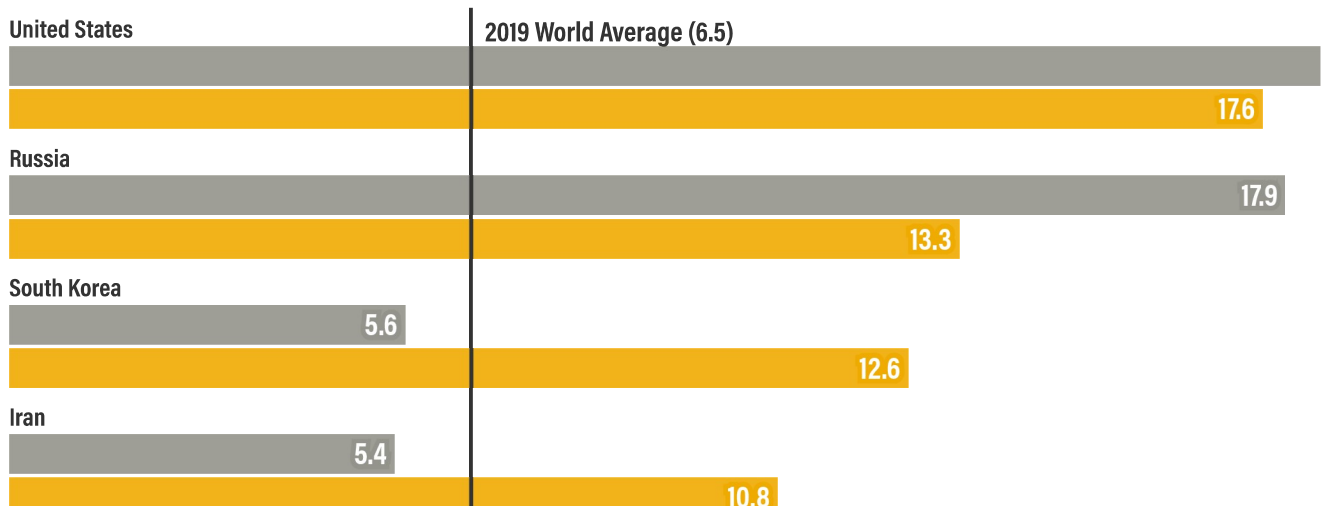


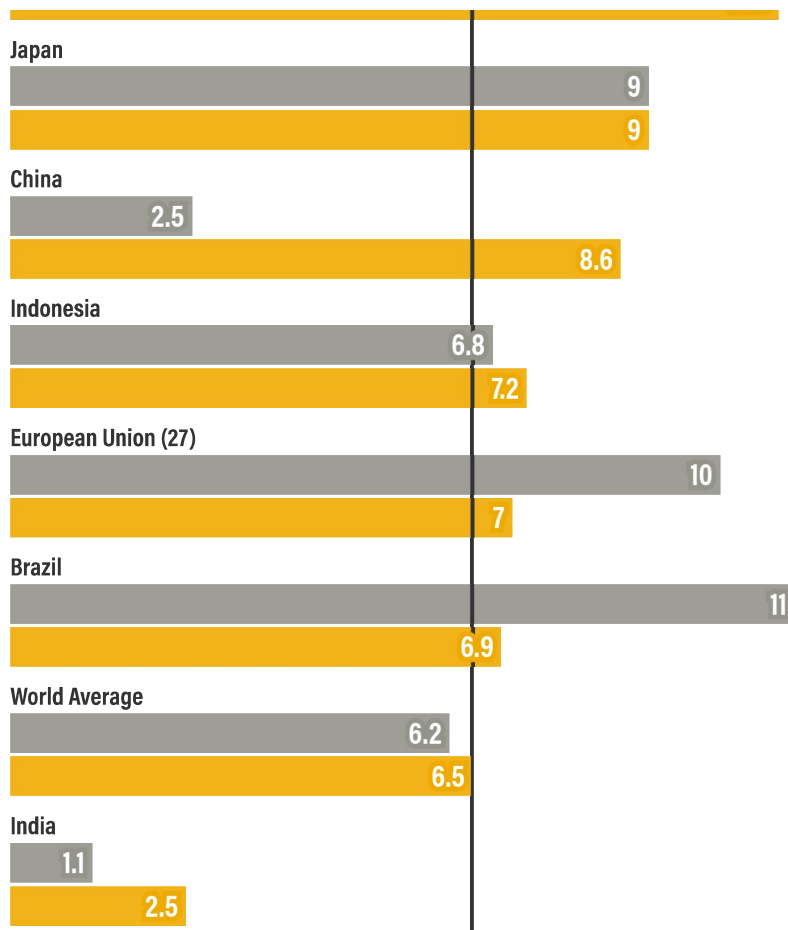
Russia and Brazil have also reduced their per capita GHG emissions, while Japan's per capita GHG emissions have barely changed — though they all remain higher than the world average.

Per capita emissions for the top 10 emitters, 1990 vs 2019

tCO₂e/person

1990 2019





Source: [Climate Watch](#) • Values include emissions from LUCF sector.

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Per capita emissions are a function of economic and technological factors, and typically decline as a result of deploying lower-carbon technologies or an economic decline that decreases fossil fuel consumption.

For the U.S., EU, Japan and other advanced economies, reduction of per capita emissions were made possible by deploying low-carbon technologies such as solar and wind power and transitioning from high-emitting fossil fuels like coal to less carbon-intensive sources such as natural gas.

Russia's reduction of its per capita emissions however [was driven by the dissolution of the Soviet Union](#) and the decrease of fossil fuel demand as part of a declining economy. Brazil's reduction, in contrast, was driven by an increased share of renewables in their energy mix (mostly from hydropower and wind) and a significant reduction in their deforestation rates, implementing policies to protect the Amazon

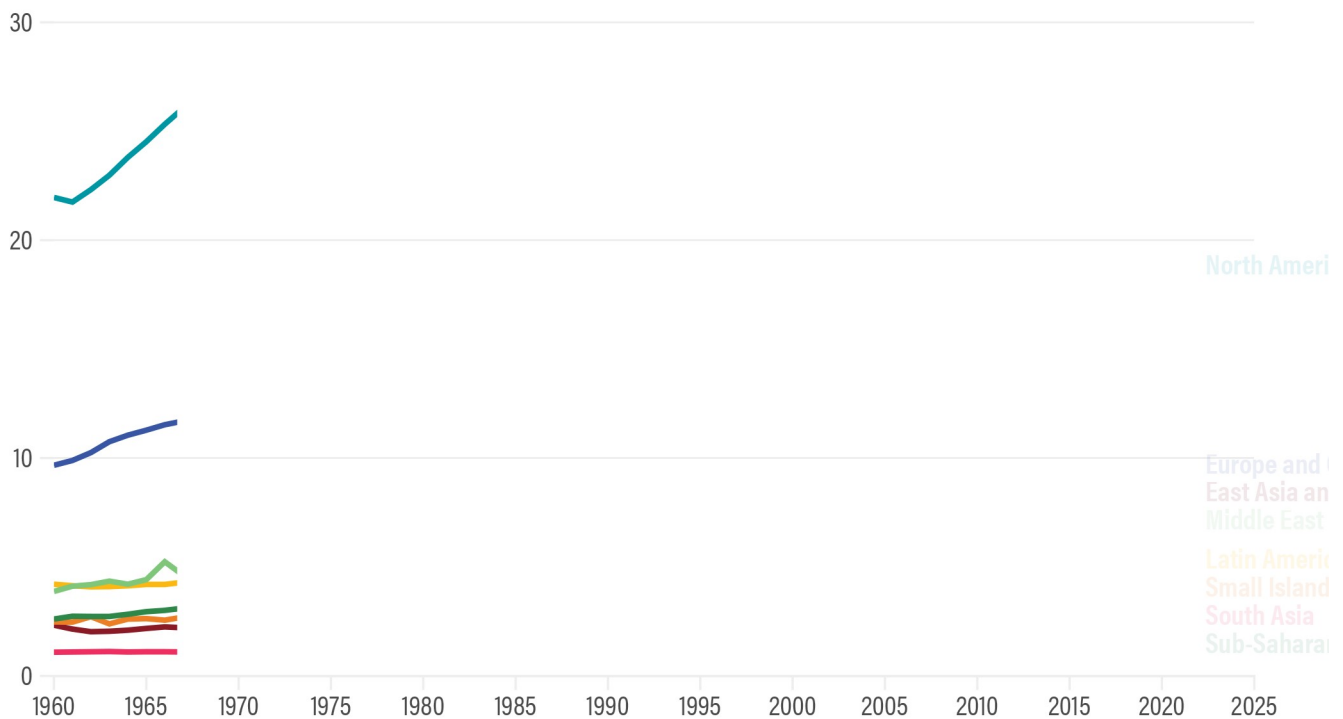
rainforest, a significant carbon sink.

Per Capita Emissions are Rising in Emerging Regions but Have Stabilized Globally

On a regional scale, there is a declining trend in per capita emissions from most industrialized economies, such as those in North America and Europe. This reduction in per capita emissions can be attributed to an uptake in renewables, the use of less carbon intensive fuels, improvements in energy efficiency, among others.

Per capita emissions by region, 1960-2021

tCO₂/person



Source: [PIK](#) - Values exclude emissions from LUCF sector.



While emerging economies have much lower per capita emissions, they have continuously increased their emissions — except for Sub-Saharan Africa, which

declined from 2.63 tCO₂e per person to 2.17 tCO₂e per person between 1960 and 2019. The main driver behind the increase in most emerging economies comes from their economic growth and reliance on carbon intensive fuels.

The good news is that globally, per capita emissions have not increased since 2010, indicating that the world is slowly diverging from its previous path of carbon intense development.

Global Historical Emissions



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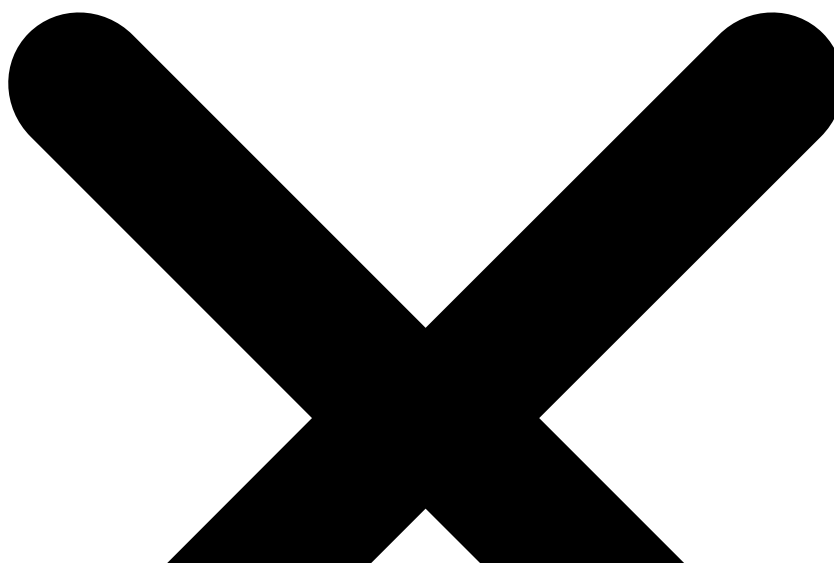
Data Source

Climate Watch



Location

World



Larger view

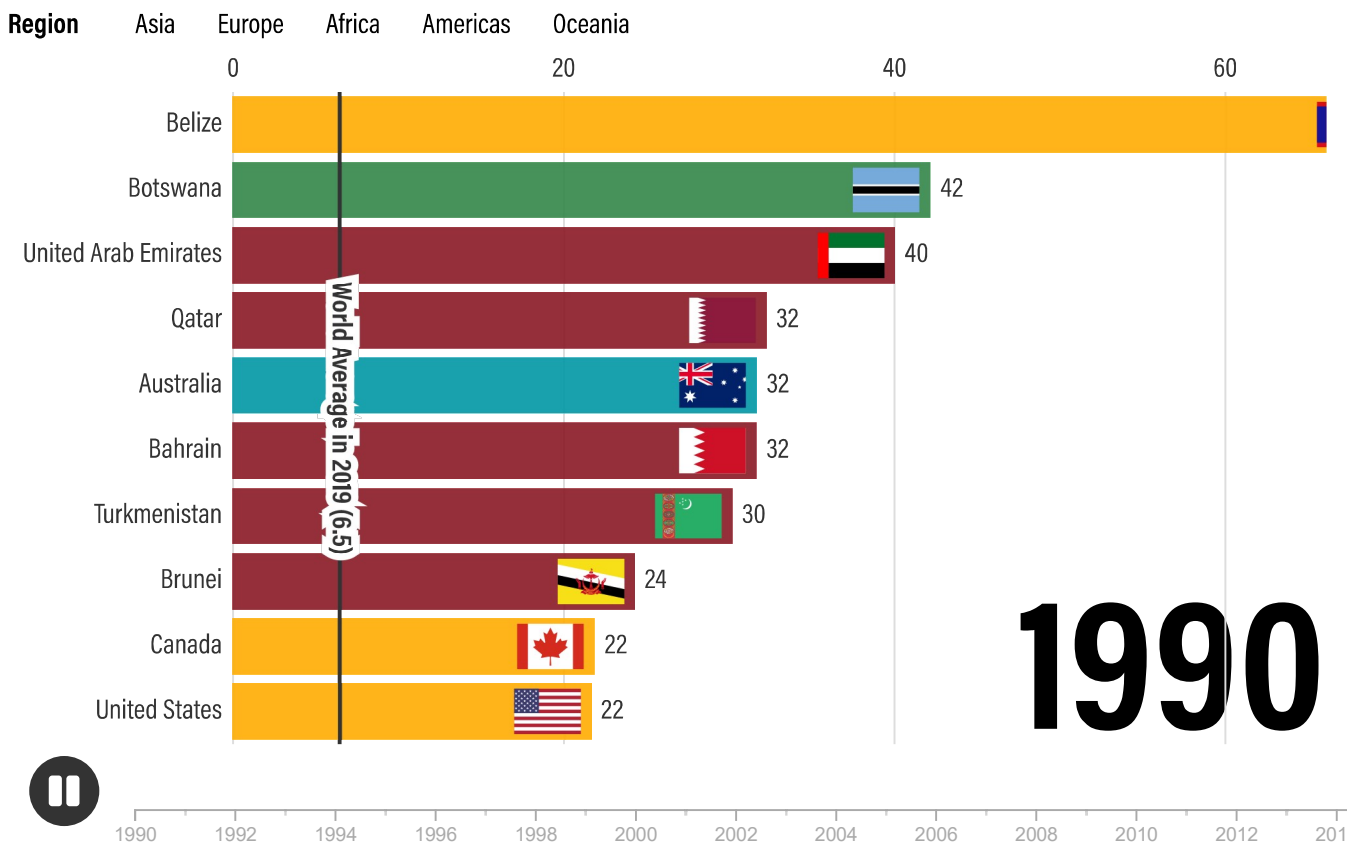
Top Per Capita Emitters are Countries with Emissions-Intensive Energy Sectors or High Land-Use Emissions

Between 1990 and 2019, most countries with the highest per capita emissions were countries with small populations but large emission-intense sectors, except for the U.S., Canada and Australia.

Countries per capita emissions, 1990-2019

tCO2e/person

Highest Lowest



1990

Source: [Climate Watch](#) • Values include emissions from LUCF sector.

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When looking beyond their total per capita emissions and exploring where those

emissions are coming from, we can see significant differences between the countries leading the chart. Taking the latest available year as a reference (2019), we have broken down the top per capita emitters by their respective sectoral emissions to identify what sector or activity is driving the bulk of their emissions.

Top per capita emitters by country and sector, 2019

tCO₂e/person

Energy Industrial Processes Agriculture Waste Land-Use Change and Forestry

Source: [Climate Watch](#)

The bars depict the per-capita emissions for each country, with each bar further divided to show the proportion of sectoral emissions contributed by that country as a whole



In 2019, the top per capita emitters were mostly countries with a combination of relatively smaller populations and emissions-intense industries or GHG emissions from land-use changes, such as converting land for agriculture.

For example, Qatar, Bahrain, Kuwait, Turkmenistan and the UAE have populations below 10 million people and emissions-intense industries, such as oil and gas production, refined petroleum products, petrochemicals and fertilizers. The Solomon Islands, Guyana, Suriname and Botswana, on the other hand, also have populations below 10 million but have [large emissions](#) from the land-use change and forestry

sectors, which include activities such as deforestation and forest fires.

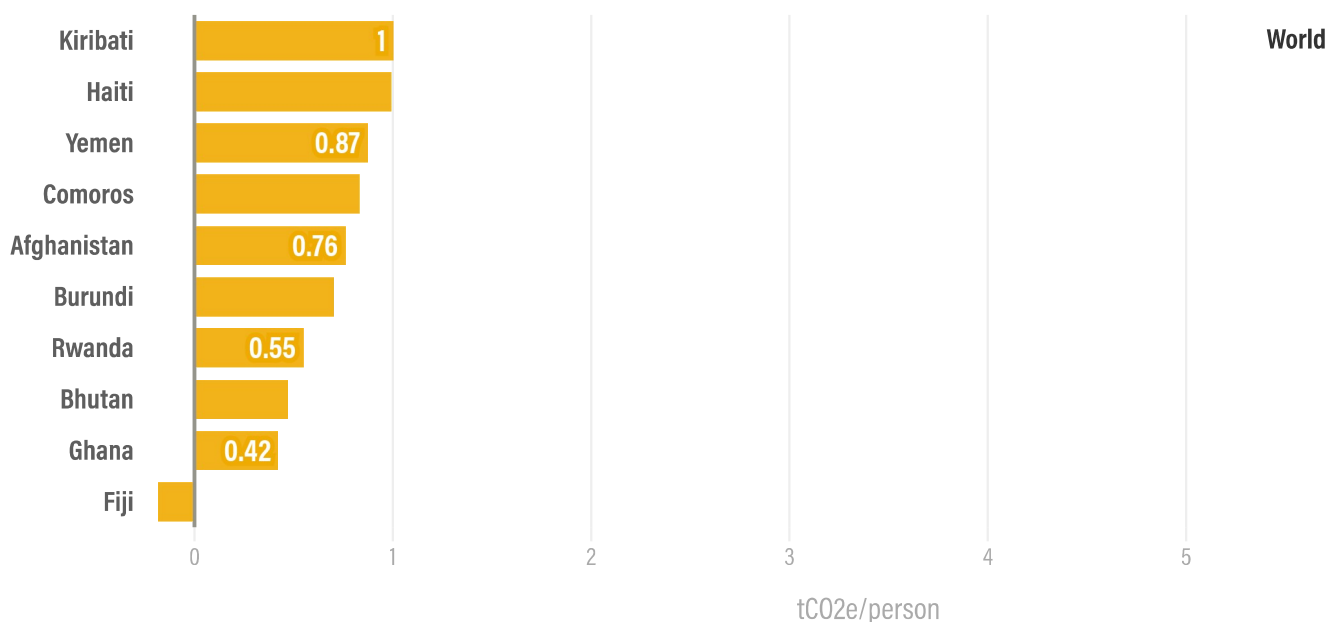
Australia is the eighth highest per capita emitter in 2019 and stands out as a large country that has high per capita emissions. This is primarily driven by a heavy dependence on coal and fossil fuels (which represented a [90% share of total energy consumption in 2020](#)), in addition to high transport emissions and energy consumption (powering the country’s large homes incurs higher demands for cooling, heating and lighting).

The Lowest Per Capita Emissions are in Developing Countries

Countries with the lowest per capita emissions are developing nations with smaller economies and less consumption.

Lowest per capita emitters, 2019

tCO2e/person



Source: [Climate Watch](#) - Values include emissions from LUCF sector.



Forty-five out of the 50 lowest per capita emitters are lower-income countries with an average per capita emissions value of a fourth of the world average. To put this into perspective, if the 10 top and 10 bottom per capita emitters were two different

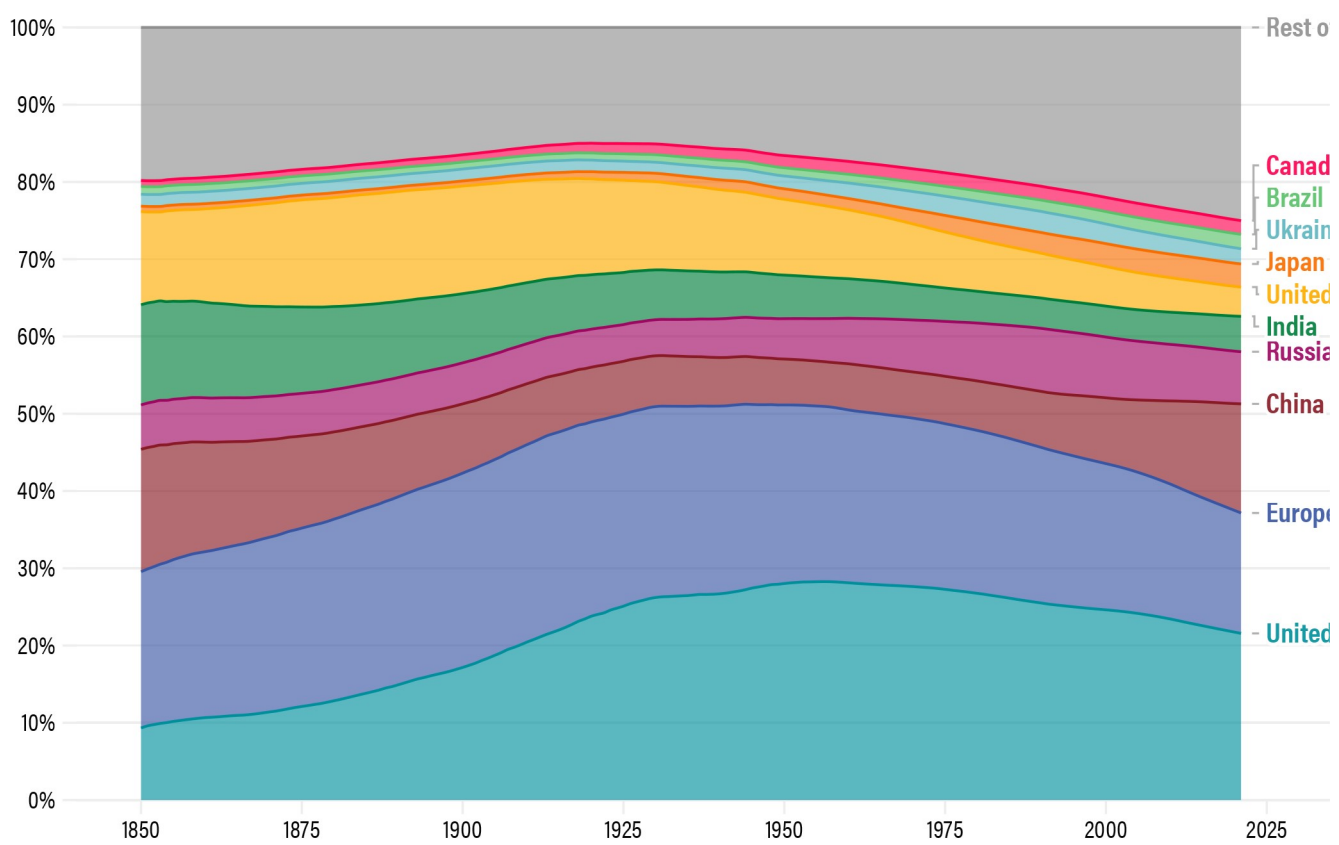
... proportion, if the top 10 and bottom 10 countries were the same countries, the per capita emissions from the top 10 would be 39 times higher than those of the bottom 10. Notably, Fiji's per capita emissions are negative because their land use change and forestry sector absorbs more emissions than all the other sectors combined.

Historically, the EU and US Have the Highest Cumulative Emissions

Historically, the U.S. and EU have caused the most GHG emissions, with a combined total of 37% cumulative emissions globally. If you consider historical emissions per capita, the responsibility from the U.S. and EU would be even greater: The U.S. and EU would have 20 and 11 times the historical emissions per capita compared to India, respectively.

Countries' cumulative emissions, 1850-2021

Percentage of total cumulative emissions



Source: [PIK Data \(2023\)](#) - Values exclude emissions from LUCF sector.



Emissions Trends and the Path Forward

Historically, there was a strong relationship between emissions and income. In general, as wealth and industrialization grow, so do consumption and energy-intensive lifestyles, and thus, the higher the emissions per person. This pattern is however changing with many countries growing their economy while not increasing their emissions and we see paradigm shifts like [90% of new electricity generation deployed in 2022 being renewable](#).

It is fundamental to accelerate this [decoupling of emissions from economic development](#). Developed countries should accelerate the pace at which they are reducing their emissions and assist developing countries in leapfrogging an emissions-intensive trajectory, providing the financial and technological support they need to transition towards a low-emissions economy.