Anthropogenic perturbation of the global carbon cycle

Source: NOAA-ESRL; Friedlingstein et al 2022; Canadell et al 2021 (IPCC AR6 WG1 Chapter 5); Global Carbon Project 2022
Global fossil CO₂ emissions have risen steadily over the last decades. Emissions are set to grow again in 2022. The rate of increase: from 3% per year in the 2000s, down to 0.5% per year in the past decade.

The 2022 projection is based on preliminary monthly data and modelling. When including cement carbonation, projected 2022 fossil emissions reach 36.6 GtCO₂.

Source: Friedlingstein et al 2022; Global Carbon Project 2022
Largest share of global fossil emissions: China (31%), USA (14%), India (8%), EU27 (8%). In 2022 the largest increases are in India, Rest of World (primarily aviation), and the USA. Emissions are projected to decline in China and the EU27.

The 2022 projections are based on preliminary monthly data and modelling. Source: Friedlingstein et al 2022; Global Carbon Project 2022
Land-use change emissions are projected to be 3.9 GtCO₂ in 2022, ten times less than fossil emissions. There is a small but uncertain decline in the past two decades. Regrowth through re/afforestation counterbalance approximately half the deforestation emissions.

Estimates from three bookkeeping models
Source: Friedlingstein et al 2022; Global Carbon Project 2022
Indonesia, Brazil, the Democratic Republic of the Congo combined contribute 58% of the global land-use change CO₂ emissions.

The peak in Indonesia in 1997 was the Indonesian peat fires
Estimates from three bookkeeping models
Source: Friedlingstein et al 2022; Global Carbon Project 2022
Global total CO$_2$ emissions of 40.6 GtCO$_2$ are projected for 2022. Total CO$_2$ emissions remain high, approximately flat since 2015, but this trend is uncertain.

Source: Friedlingstein et al 2022; Global Carbon Project 2022
The global CO\textsubscript{2} concentration increased from \textasciitilde277 ppm in 1750 to \textbf{417.2} ppm in 2022 (up 51%)
Atmospheric CO\textsubscript{2} is the main driver of climate change

Source: NOAA-ESRL; Scripps Institution of Oceanography; Friedlingstein et al 2022; Global Carbon Project 2022
The remaining carbon budget for a 50% chance to limit global warming to 1.5°C, 1.7°C and 2°C has reduced to an equivalent of 9, 18 and 30 years from 2023 (at 2022 emissions levels).

Quantities are subject to additional uncertainties e.g., future mitigation choices of non-CO₂ emissions.

Source: IPCC AR6 WG1; Friedlingstein et al 2022; Global Carbon Budget 2022
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https://essd.copernicus.org/articles/14/4811/2022/

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