

Press release: Embargoed until 00:01 GMT on Thursday 4 November 2021

Global carbon emissions rebound close to pre-Covid levels

Global carbon emissions in 2021 are set to rebound close to pre-Covid levels, according to the Global Carbon Project.

Fossil carbon emissions dropped by 5.4% in 2020 amid Covid lockdowns, but the new report projects an increase of 4.9% this year (4.1% to 5.7%) to 36.4 billion tonnes.

Emissions from coal and gas use are set to grow more in 2021 than they fell in 2020, but emissions from oil use remain below 2019 levels.

For major emitters, the 2021 emissions appear to return to pre-COVID trends of decreasing CO₂ emissions for the United States and European Union and increasing CO₂ emissions for India. For China, the response to the COVID-19 pandemic has sparked further growth in CO₂ emissions, pushed by the power and industry sectors.

The research team – including the University of Exeter, the University of East Anglia (UEA), CICERO and Stanford University – say a further rise in emissions in 2022 cannot be ruled out if road transport and aviation return to pre-pandemic levels and coal use is stable.

The findings come as world leaders meet at COP26 in Glasgow to address the climate crisis and try to agree on a plan of action going forward.

"The rapid rebound in emissions as economies recover from the pandemic reinforces the need for immediate global action on climate change," said [Professor Pierre Friedlingstein](#), of Exeter's [Global Systems Institute](#), who led the study.

"The rebound in global fossil CO₂ emissions in 2021 reflects a return towards the pre-Covid fossil-based economy. Investments in the green economy in post-Covid recovery plans of some countries have been insufficient so far, on their own, to avoid a substantial return close to pre-Covid emissions."

Prof Corinne Le Quéré, Royal Society Research Professor at UEA's School of Environmental Sciences, contributed to this year's analysis. She said: "It will take some time to see the full effect of the Covid-related disruptions on global CO₂ emissions. A lot of progress has been made in decarbonising global energy since the Paris Agreement was adopted in 2015, plus renewables is the only energy source that continued to grow during the pandemic. New investments and strong climate policy now need to support the green economy much more systematically and push fossil fuels out of the equation."

The report – the 16th annual Global Carbon Budget – produced the following analysis on major emitters (the figures below exclude international transport, particularly aviation):

- China: Emissions are projected to rise 4% compared to 2020, reaching 5.5% above 2019 – a total of 11.1 billion tonnes CO₂. China accounted for 31% of global emissions in 2020.
- USA: Emissions are projected to rise 7.6% compared to 2020, reaching 3.7% below 2019 – a total of 5.1 billion tonnes CO₂. USA accounted for 14% of global emissions in 2020.
- EU27: Emissions are projected to rise 7.6% compared to 2020, reaching 4.2% below 2019 – a total of 2.8 billion tonnes CO₂. EU27 accounted for 7% of global emissions in 2020.
- India: Emissions are projected to rise 12.6% compared to 2020, reaching 4.4% above 2019 – a total of 2.7 billion tonnes CO₂. India accounted for 7% of global emissions in 2020.

For the rest of the world taken as a whole, fossil CO₂ emissions remain below 2019 levels.

Over the past decade, global CO₂ net emissions from land-use change were 4.1 billion tonnes, with 14.1 billion tonnes CO₂ emitted by deforestation and other land-use changes, and 9.9 billion tonnes CO₂ removed by regrowth of forests and soil recovery.

Removals by forests and soils have grown in the last two decades while emissions by deforestation and other land-use changes remained relatively stable, suggesting a recent decline in net emissions from land-use change, although with a large attached uncertainty.

When combining CO₂ emissions from fossil sources and net land-use change, total emissions have remained relatively constant in the last decade, averaging 39.7 billion tonnes CO₂.

Based on the findings, atmospheric CO₂ concentration is projected to increase by 2.0 parts per million (ppm) in 2021 to reach 415 ppm averaged over the year, a lower growth compared to recent years due to La Niña conditions in 2021.

To have a 50% chance of limiting global warming to 1.5°C, 1.7°C and 2°C, the researchers estimate the remaining "carbon budget" has now shrunk to 420 billion tonnes, 770 billion tonnes and 1,270 billion tonnes respectively – equivalent to 11, 20 and 32 years at 2021 emissions levels.

"Reaching net zero CO₂ emissions by 2050 entails cutting global CO₂ emissions by about 1.4 billion tonnes each year on average," said Friedlingstein.

"Emissions fell by 1.9 billion tonnes in 2020 – so, to achieve net zero by 2050, we must cut emissions every year by an amount comparable to that seen during Covid.

"This highlights the scale of the action that is now required, and hence the importance of the COP26 discussions."

The Global Carbon Budget annual update builds on established methodologies in a fully transparent manner. The 2021 edition is published as a preprint and is undergoing an open review in the journal *Earth System Science Data*.

Ends

NOTES TO EDITORS

1. PRESS BRIEFING:

A Science Media Centre online news briefing on the Global Carbon Budget 2021 will take place at 10:30am Wednesday November 3. For further information please contact: Tom Sheldon tom@sciencemediacentre.org or Garth Davies in the University of Exeter press office G.Davies2@exeter.ac.uk

The Global Carbon Budget will be launched at the COP26, Glasgow, 9:30am November 4, at the UN-IPCC Science Pavilion "2021 Global Carbon Budget".

2. To request an interview with Prof Corinne Le Quéré, please contact the UEA Communications Office via communications@uea.ac.uk. To request an interview with Prof Pierre Friedlingstein contact the University of Exeter Press Office via pressoffice@exeter.ac.uk

3. The results and implications of the latest Global Carbon Budget will be discussed as part of a UN side event at COP26 entitled: "1.5°C: Where are we now, where are we headed, what are the risks?" A panel of experts speak about issues including climate projections and resilience, with an opening talk from Prof Friedlingstein. It will take place on 10 November from 11:30-

12:45 GMT in Multimedia studio 3. Guest attendance will be online only, via the COP26 Platform, with Blue Zone pass-holders able to ask questions. The event will also be webcast live on the public UNFCCC website.

4. The University of East Anglia (UEA) is a UK Top 30 university and is ranked in the top 50 globally for research citations. Known for its world-leading research and good student experience, it was awarded Gold in the Teaching Excellence Framework and is a leading member of Norwich Research Park, one of Europe's biggest concentrations of researchers in the fields of environment, health and plant science. www.uea.ac.uk

5. The University of Exeter is a Russell Group university that combines world-class research with high levels of student satisfaction. Exeter has over 27,000 students and is 15th in The Guardian University Guide 2022, and in the top 150 globally in both the QS World Rankings 2022 and the THE World University Rankings 2022. In the 2014 Research Excellence Framework (REF), the University ranked 16th nationally, with 98% of its research rated as being of international quality, while in 2017, Exeter was awarded a Gold rating in the Teaching Excellence Framework (TEF) assessment. The University of Exeter has launched a 'Green Futures' campaign and website to drive action on the environment and climate emergency. To find out more visit <https://greenfutures.exeter.ac.uk>

6. The Global Carbon Project is an international research project within the Future Earth research initiative on global sustainability, and a research partner of the World Climate Research Programme. It aims to develop a complete picture of the global carbon cycle, including both its biophysical and human dimensions together with the interactions and feedbacks between them. The Global Carbon Budget 2021 is the 16th edition of the annual update that started in 2006.

Data access:

This media release is part of the Global Carbon Budget 2021, the annual update by the Global Carbon Project. It is based on the analyses published here:

Friedlingstein et al. (2021) Global Carbon Budget 2021. *Earth System Science Data*, <https://essd.copernicus.org/preprints/essd-2021-386/>

All material (publications, data, figures, key messages,...) are available, under embargo, on the following google drive:

https://drive.google.com/drive/folders/10ugYJ5V_rXoroLQpAs-ZbINklWITIBJ4

- Data and figures also available at <http://www.globalcarbonproject.org/carbonbudget>
- Data interface for exploring data: <http://emissions2021.globalcarbonatlas.org>

User name: media

Password: fromxLSCEx2021

- Growth rate in emissions can be explored for all countries and different periods using the embeddable visualisation at <https://enactivescience.com/gcp2021/>

Social media: Twitter: #carbonbudget, @gcarbonproject