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COVID-19 lockdown causes unprecedented drop in global CO₂ emissions in 2020

The global COVID-19 lockdowns caused fossil carbon dioxide emissions to decline by an estimated 2.4 billion tonnes in 2020 – a record drop according to researchers at Future Earth's Global Carbon Project.

The fall is considerably larger than previous significant decreases – 0.5 (in 1981 and 2009), 0.7 (1992), and 0.9 (1945) billion tonnes of CO₂ (GtCO₂). It means that in 2020 fossil CO₂ emissions are predicted to be approximately 34 GtCO₂, 7% lower than in 2019.

Emissions from transport account for the largest share of the global decrease. Those from surface transport, such as car journeys, fell by approximately half at the peak of the COVID-19 lockdowns. By December 2020, emissions from road transport and aviation were still below their 2019 levels, by approximately 10% and 40%, respectively, due to continuing restrictions.

Total CO₂ emissions from human activities – from fossil CO₂ and land-use change – are set to be around 39 GtCO₂ in 2020.

The release of this year's Global Carbon Budget comes ahead of the fifth anniversary tomorrow of the adoption of the UN Paris climate Agreement, which aims to reduce the emission of greenhouse gases to limit global warming. Cuts of around 1 to 2 GtCO₂ are needed each year on average between 2020 and 2030 to limit climate change in line with its goals.

“Given that we need to reduce global emissions by more than 7% year over year through 2030, this analysis shows that social responses alone will not drive the sustained reductions needed to effectively combat climate change,” says Josh Tewksbury, Interim Executive Director at Future Earth. “Alongside energy transformations, smart policy in areas like emissions-free transportation and the future of work may help lock in these observed reductions.”

Five years on from the landmark agreement, the international team behind the annual carbon update say growth in global CO₂ emissions had begun to falter, with emissions increasing more slowly in recent years, which could be partly in response to the spread of climate policy. For the decade prior to 2020, fossil CO₂ emissions decreased significantly in 24 countries while their economy continued to grow.

However, the researchers warn that it is too early to say how much emissions will rebound by during 2021 and beyond, as the long-term trend in global fossil emissions will be largely influenced by actions to stimulate the global economy in response to the COVID-19 pandemic.

Prof Corinne Le Quéré, Royal Society Research Professor at UEA's School of Environmental Sciences, contributed to this year's analysis. She said: “All elements are not yet

in place for sustained decreases in global emission, and emissions are slowly edging back to 2019 levels. Government actions to stimulate the economy at the end of the COVID-19 pandemic can also help lower emissions and tackle climate change.

“Incentives that help accelerate the deployment of electric cars and renewable energy and support walking and cycling in cities are particularly timely given the extensive disturbance observed in the transport sector this year.”

The emissions decrease appears more pronounced in the **US** (–12%) and **EU27** countries (–11%), where COVID-19 restrictions accelerated previous reductions in emissions from coal use. It appears least pronounced in **China** (–1.7%), where the effect of COVID-19 restrictions on emissions occurred on top of rising emissions. In addition, restrictions in China occurred early in the year and were more limited in their duration, giving the economy more time to recover.

In the **UK**, which first introduced lockdown measures in March, emissions are projected to decrease about 13%. The large decrease in UK emissions is due to the extensive lockdown restrictions and the second wave of the pandemic.

In **India**, where fossil CO₂ emissions are projected to decrease about 9%, emissions were already lower than normal in late 2019 because of economic turmoil and strong hydropower generation, and the COVID-19 effect is potentially superimposed on this changing trend.

For the **rest of the world** the effect of COVID-19 restrictions occurred on top of rising emissions, with emissions this year projected to decrease by about 7%.

Globally, the peak of the decrease in emissions in 2020 occurred in the first half of April, when lockdown measures were at their maximum, particularly across Europe and the USA.

Emissions from industry, for example metal production, chemicals, and manufacturing, reduced by up to a third during the COVID-19 lockdown in spring. However, they could already be back up to near or even above 2019 levels by now.

Despite lower emissions in 2020, the level of CO₂ in the atmosphere continues to grow – by about 2.5 parts per million (ppm) in 2020 – and is projected to reach 412 ppm averaged over the year, 48% above pre-industrial levels.

Lead researcher Prof Pierre Friedlingstein, of the University of Exeter, said: “Although global emissions were not as high as last year, they still amounted to about 39 billion tonnes of CO₂, and inevitably led to a further increase in CO₂ in the atmosphere. The atmospheric CO₂ level, and consequently, the world’s climate, will only stabilize when global CO₂ emissions are near zero.”

Preliminary estimates based on fire emissions in deforestation areas indicate that emissions from deforestation and other land-use change for 2020 are similar to the previous decade, at around 6 GtCO₂. Approximately 16 GtCO₂ was released, primarily from deforestation, while the uptake of CO₂ from regrowth on managed land, mainly after

agricultural abandonment, was just under 11 GtCO₂. Measures to better manage land could both halt deforestation and help increase the CO₂ sink from regrowth.

Deforestation fires were lower this year compared to 2019 levels, which saw the highest rates of deforestation in the Amazon since 2008. In 2019 deforestation and degradation fires were about 30% above the previous decade, while other tropical emissions, mainly from Indonesia, were twice as large as the previous decade because unusually dry conditions promoted peat burning and deforestation.

Land and ocean carbon sinks continue to increase in line with emissions, absorbing about 54% of the total human-induced emissions.

Data for the Global Carbon Budget 2020 is published today in the journal *Earth System Science Data*.

Facts about the Global Carbon Project: The Global Carbon Project is an international research project within Future Earth, 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 2020 is the 15th edition of the annual update that started in 2006.

Press event: Future Earth, US, embargoed media webinar, **10 December, 11:00AM EST**

- Join using the following link: <https://zoom.us/j/95342455955>

Publications: This media release is part of the Global Carbon Budget 2020:

Friedlingstein et al. (2020) Global Carbon Budget 2020. *Earth System Science Data* (see below for access prior to the embargo)

Data access:

- Data and figures: <http://www.globalcarbonproject.org/carbonbudget>
 - Data interface for exploring data: <http://www.globalcarbonatlas.org>
 - Under embargo:
 - ESSD paper, animations, and infographics are available here: https://drive.google.com/drive/folders/1iJHSWpyKGMkodwEqJ_idvf2xB3venJg
 - Global Carbon Atlas with country data to year 2019 <http://emissions2020.globalcarbonatlas.org/>
- User name:** media
Password: fromLSCE2020
- Daily emissions from the CarbonMonitor <https://carbonmonitor.org/>
 - Daily estimates of the effect of COVID-19 restrictions on countries emissions are also available in the Google Drive above.

Social media: Twitter: #carbonbudget, @gcarbonproject