# Pandemic brings record fall in global carbon emissions

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According to the latest figures published by the Global Carbon Project (GCP), the current coronavirus pandemic has led to a significant reduction in global $CO_2$ emissions. The GCP is an international collaboration of climate researchers, which includes LMU geographers Julia Pongratz, Selma Bultan and Kerstin Hartung as contributors. The

group monitors both the amounts of greenhouse gases released into Earth's atmosphere and the quantities absorbed by the world's oceans and sequestered in vegetation on land.

The latest report issued by the GCP shows that five years after the conclusion of the Paris Agreement, the rate of increase in global $CO_2$ emissions has slowed. In the decade from 2010 to 2019, $CO_2$ emissions from fossil sources decreased significantly in 24 countries whose economies had grown over the same period. This result suggests that policies intended to mitigate climate change may be having an effect. Over the course of this year—in part owing to the measures introduced in response to the coronavirus pandemic—global emissions of fossil carbon are estimated to have fallen to 34 billion tons (34 Gt $CO_2$). This figure represents a decrease of some 2.4 Gt from the previous year. This is a considerably larger drop than previous dips in the emission record for the years 1981 and 2009 (0.5 Gt), 1992 (0.7 Gt) and 1945 (0.9 Gt). In order to achieve the goals set out in the Paris Agreement, $CO_2$ emissions must fall by between 1 and 2 Gt annually between now and 2030.

The decrease was particularly notable in the U.S. (-12%) and in member states of the EU (-11%). "In both cases, reductions in the use of coal were complemented by the effects of the restrictions imposed in response to the coronavirus pandemic," says Pongratz. "In 2019, the rate of increase in $CO_2$ emissions was slower than in previous years. As a consequence of the pandemic, emissions have now fallen significantly. This makes 2020 a crucial year, but whether it marks the start of a trend strongly depends on how the measures taken to stimulate the economy unfold around the world. We are already seeing signs that the emission rate is climbing back toward the level observed for 2019."

## The transport sector accounts for most of the fall

Most of the decrease recorded for 2020 can be attributed to a drop in the carbon footprint of the transport sector. In December 2020, emissions due to road and air traffic still were lower by about 10% and 40%, respectively, relative to 2019 values. The authors of the report emphasize that it is not yet possible to assess whether the rate of global emissions will continue to fall in the coming years. Following the decrease in emissions in the aftermath of the global financial crisis in 2008, emissions rebounded a massive 5% in 2010, as the global economy recovered. The fear is that this could happen also in 2021.

Overall, total emissions of $CO_2$—from fossil sources and land use—for 2020 are estimated to be on the order of 39 Gt, which approximately corresponds to the value recorded for the year 2012. This caused the $CO_2$ concentration of the atmosphere to continue rising, and the average concentration for the current year is expected to set a new record of 412 ppm (parts per million). This corresponds to a rise of 48% relative to the pre-industrial level. The authors of the new report point out that the atmospheric $CO_2$ level, and consequently the world's climate, will only stabilize when global $CO_2$ emissions are near zero. The overall amount of $CO_2$ absorbed by carbon sinks on land and in the oceans continues to rise, and in 2020, they sequestered some 54% of all anthropogenic $CO_2$ emissions.

**No significant decrease in emissions from land use change**

Julia Pongratz is particularly interested in the impact of changes in land use on the global carbon balance. While unusually high level of emissions from these sources were estimated for 2019—which were exacerbated by extraordinarily dry conditions in Indonesia and the highest rate of deforestation in the Amazon Basin since 2008—the value for 2020 is lower again and equivalent to the mean level for the decade as a whole.

"For the first time, we were able to estimate the gross $CO_2$ emissions and removals through land use changes on the global carbon budget in 2020," Pongratz says. She and her colleagues come to the conclusion that this factor—largely attributable to deforestation—accounts for the release of around 16 Gt of $CO_2$ per year during the past decade. On the other hand, removals of $CO_2$ such as through the abandonment of agricultural lands, over the same period resulted in an estimated increase of nearly 11 Gt in $CO_2$ sequestration capacity. The net balance of +6 Gt for 2020 is similar to the values for previous years. "We have not found a reduction in carbon emissions in this sector yet. Deforestation continues at a rapid pace, especially in tropical regions, and public awareness of the impact of agricultural emissions has been muted owing to the influence of COVID," Pongratz says. "Effective measures to improve land management could not only curb deforestation, they could also contribute to an increase in $CO_2$ uptake from the atmosphere by allowing for the regrowth of natural vegetation."

The team of 86 climate researchers from all parts of the world has published its study in the peer-reviewed journal *Earth System Science Data*.

**More information:** Data: www.globalcarbonproject.org/carbonbudget

Data atlas: www.globalcarbonatlas.org/

Estimated daily emission rates: carbonmonitor.org/

Provided by Ludwig Maximilian University of Munich