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Global fossil CO₂ emissions dropped by 17% amid coronavirus lockdowns

Daily global fossil CO₂ emissions fell by 17% in early April 2020 compared to 2019 amid coronavirus lockdowns in most countries, with full-year 2020 emissions set to decrease by up to 7% depending on future social distancing.

A new article released today, Tuesday 19 May 2020, in the journal *Nature Climate Change* has analysed daily CO₂ emissions across 69 countries, 50 U.S. states, 30 Chinese provinces, six economic sectors, and three levels of confinement.

This is the first peer-reviewed study into the effects of the coronavirus lockdowns on CO₂ emissions, and it has been led by Professor Corinne Le Quéré of the University of East Anglia in the United Kingdom.

“We are only one-third of the way through the year, with a lot of uncertainty ahead, so instead of only making an estimate for emissions reductions for 2020 as a whole, we have now also made the first dataset of daily CO₂ emissions,” said Glen Peters, a research director at the CICERO Center for International Climate Research in Oslo, Norway.

“By mapping daily emissions with scenarios for future confinement policies, we made various estimates for 2020 emissions,” Peters said.

Daily drop of 17 million tonnes

In 2019, the world emitted around 100 million tonnes of carbon dioxide per day by burning fossil fuels and cement production. In early April 2020, this number fell to 83 million tonnes per day, a drop of 17% (range: –11% to –25%).

Some countries saw emissions drop by as much as 26% on average during the peak of the confinement.

“There are no real-time estimates of CO₂ emissions, so we had to make estimates by using heterogeneous data sources such as daily electricity use and mobility tracking services,” said Robbie Andrew, a senior researcher at CICERO.

There is high uncertainty surrounding how confinement policies in different countries may change as the COVID-19 pandemic develops through 2020. But by making assumptions on different levels of confinement, several estimates have been made for 2020 emissions.

If pre-pandemic conditions return by mid-June, then 2020 emissions may decline by 4% compared to 2019 (range: –2% to –7%). On the other hand, if restrictions remain worldwide throughout 2020, then emissions may drop by 7% (range: –3% to –13%).

Aviation and transport saw the largest drops

The researchers behind the study had to make a new dataset of daily CO₂ emissions, with considerable sector and country detail.

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In the countries with the strictest lockdown restrictions, emissions from aviation plunged 75% in early April, while emissions from land transport fell by 50% and from power generation by 15%. Emissions from industry declined by around 35%, although this figure is highly uncertain due to a lack of data. Emissions from residential buildings, however, increased by 5%.

Each sector has a different share of CO₂ emissions in each country, and the reductions in activity in each country needs to be weighted with the size of the sector to estimate emissions. Surface transport, electricity, and industry dominated the emissions reductions seen in early April.

The highest drop was seen on 7 April, when daily emissions fell by 17% compared to the 2019 daily average. Emissions from land transport accounted for almost half (43%) of the decrease, while power generation accounted for 19%, industry for 25%, and aviation for 10%.

In the first four months of the year (January-April), emissions fell by a total of 1,048 million tonnes (range: –543 to –1,638 MtCO₂), and the biggest countries experienced the largest reductions:

- China with a decrease of –242 MtCO₂ (range: –108 to –394)
- US with –207 MtCO₂ (range: –112 to –314)
- Europe with –123 MtCO₂ (range: –78 to –177)
- India with –98 MtCO₂ (range: –47 to –154)

“Forced us to look at the climate problem with new eyes”

“Data on CO₂ emissions are often released with a year or two delay, and the rapid unfolding of the coronavirus crisis has exposed challenges in estimating real-time emissions,” said Andrew.

“Using methods developed here, we may be able to move to more regular and real-time updates of CO₂ emissions, such as currently occurs for GDP and important commodities like oil,” he added.

“While COVID-19 is a human tragedy, it has forced us to look at the climate problem with new eyes”, said Peters.

“Coronavirus-style confinement policies are not intended to solve the climate crisis, but the real-time data we collect now may help us design more effect climate policies in the future,” Peters said.

Moreover, fine-grained detail on daily CO₂ emissions may help researchers understand the role of behavioural change compared to technology change, according to Peters.

Future emissions highly uncertain amid coronavirus restrictions

There is considerable uncertainty on how the coronavirus pandemic may develop and what type of restrictions may be necessary for the remainder of 2020 and beyond.

“Population confinement has led to drastic changes in energy use and CO₂ emissions,” said Le Quéré.

“These extreme decreases are likely to be temporary, however, as they do not reflect structural changes in the economic, transport, or energy systems,” she said.

“The emissions reductions occurring because of COVID-19 will clearly be unprecedented. What is less certain is how the economy will rebound in late 2020 and 2021,” said Peters.

“As different countries and sectors recover, it is unclear if activity levels will return to normal levels or if we may see permanent shifts in behaviour,” Peters added.

“The world has already begun a climate transition, and the world may re-emerge from the coronavirus pandemic further along that transition, with peak emissions passed and CO₂ emissions finally beginning a downward trajectory”, he said.

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Interviews:

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- Robbie Andrew ([@robbie_andrew](https://www.instagram.com/robbie_andrew))

Data, results, videos, press releases, etc

- Dropbox: https://www.dropbox.com/sh/k5ezfx5ubu5rhzv/AADhtNJX_RHfQ2OkKcFRISmWa

Publication:

- ‘Temporary reduction in daily global CO₂ emissions during the COVID-19 forced confinement’, Corinne Le Quéré, Robert B. Jackson, Matthew W. Jones, Adam J. P. Smith, Sam Abernethy, Robbie M. Andrew, Anthony J. De-Gol, David R. Willis, Yuli Shan, Josep G. Canadell, Pierre Friedlingstein, Felix Creutzig, Glen P. Peters, is published in Nature Climate Change
 - Article available 19 May at 17:00 CET: <https://dx.doi.org/10.1038/s41558-020-0797-x>