

MCC Press Release

## Dumping greenhouse gases in the atmosphere: the past decade beats many records

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Showing highs for all climate killers and all sectors, an MCC-led project provides policymakers with the most comprehensive overview of global greenhouse gas emissions to date.

**Berlin, 10.11.2021.** The pledge to cut methane, by almost 100 countries at the start of the world climate conference in Glasgow, indicates that in the fight against global heating, greenhouse gases other than carbon dioxide are now coming into focus. But what is the weight of the individual climate killers, how much is being emitted, and by which countries and sectors? A research project led by the Berlin-based climate research institute MCC (Mercator Research Institute on Global Commons and Climate Change) has now compiled the most comprehensive overview to date. The study has been published in the renowned journal *Earth System Science Data*.

"Moving confidently towards net-zero emissions requires certainty about the starting point" says [Jan Minx](#), head of the MCC working group Applied Sustainability Science and a lead author of the study. "Otherwise, pledges by countries to reduce emissions by a certain percentage are without clear reference and international cooperation is correspondingly hampered. We present here a global inventory for virtually all greenhouse gases for 1970 to 2018, based on the most recent data available for this aggregate, with a flash estimate for 2019. In addition, we characterise the uncertainties." The dataset is publicly available on the online storage service Zenodo.

Listed, in addition to carbon dioxide (CO<sub>2</sub>) and methane (CH<sub>4</sub>), are nitrous oxide (N<sub>2</sub>O) and fluorinated greenhouse gases, namely hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulphur hexafluoride (SF<sub>6</sub>) and nitrogen trifluoride (NF<sub>3</sub>). Primary data sources are the global database EDGAR maintained under the umbrella of the EU Commission, well-established models which estimate the impact of land use and forestry, and other research. Each gas is converted into CO<sub>2</sub> equivalents using global warming potentials with a 100-year horizon, as is customary in climate science.

As a central statement, the research team notes: greenhouse gas emissions, which are being dumped into the atmosphere on an extraordinary scale, have increased in every decade in the period covered by the study. This is the case for every single group of greenhouse gas, and in every single sector. The absolute increase in average decadal emissions was greatest between the 2000s and the 2010s, although the annual percentage increase has slowed considerably recently. Carbon dioxide, the most important and most discussed greenhouse gas, accounted for only 76 percent of the 58 billion tonnes of CO<sub>2</sub> equivalents emitted in 2018 (66 percentage points from fossil fuels and industry, 10 percentage points from land use,

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land use change, and forestry). Methane accounted for 17 percent, nitrous oxide 5 percent, and fluorinated gases 2 percent of the overall greenhouse gas effect.

The study also shows detailed results for countries and sectors. For example, in the period from 2009 to 2018, Turkey and the global metals industry each demonstrated the largest percentage increases in emissions, while the largest absolute increases occurred in China and in the global electricity and heat generation sectors. In addition, the calculated increase in emissions for individual greenhouse gases and sectors is set in the context of future scenarios. This illustrates what policymakers would have to do in regard to limiting global heating to well below 2 degrees Celsius, as agreed in the Paris global climate agreement.

"The inventory of greenhouse gas emissions is also significant in view of scientific assessments, such as the reports of the Intergovernmental Panel on Climate Change and the UN Emissions Gap Report," says [William Lamb](#), researcher at MCC and also lead author of the study. "It demonstrates that climate transition has yet to come. It is high time that we start to make progress. Our study can help measure it."

### **About MCC**

The MCC explores sustainable management as well as the use of common goods such as global environmental systems and social infrastructures against the background of climate change. Our seven working groups are active in the fields of economic growth and development, resources and international trade, cities and infrastructure, governance and scientific policy advice. The MCC was co-founded by the Mercator Foundation and the Potsdam Institute for Climate Impact Research (PIK).

### **Reference of the cited article:**

- The study: Minx, J., Lamb, W., Andrew, R., Canadell, J., Crippa, M., Döbbling, N., Forster, P., Guizzardi, D., Olivier, J., Peters, G., Pongratz, J., Reisinger, A., Rigby, M., Saunio, M., Smith, S., Solazzo, E., Tian, H., 2021, A comprehensive and synthetic dataset for global, regional and national greenhouse gas emissions by sector 1970-2018 with an extension to 2019, *Earth System Science Data* <https://essd.copernicus.org/articles/13/5213/2021/>
- The full dataset: <https://zenodo.org/record/5566761>

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