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Global carbon emissions increase but rate has slowed

Global carbon emissions are set to grow more slowly in 2019, with a decline in coal burning offset by strong growth in natural gas and oil use worldwide – according to researchers at the University of East Anglia (UEA), University of Exeter and the Global Carbon Project.

Emissions from burning fossil fuels are projected to grow by 0.6 per cent (range: –0.2 to +1.5 per cent) this year to reach almost 37 billion tonnes of carbon dioxide (CO₂). This is down from 1.5 per cent in 2017 and 2.1 per cent in 2018.

This lower rate of growth is due to substantial declines in coal use in the EU and US, and slower growth in coal use in China and India compared to recent years. Weaker economic growth has also contributed to this trend.

Natural gas has seen the fastest fossil fuel emissions growth in 2019, with a projected increase of 2.6 per cent (+1.3 to +3.9 per cent). Oil used in transport is also driving emissions up, with a projected increase of 0.9 per cent (+0.3 to +1.6 per cent) this year, while emissions from coal burning are projected to decrease by 0.9 per cent (-2.0 to +0.2 per cent).

Emissions this year are likely to be 4 per cent higher than in 2015, the year of the UN Paris Agreement.

As international Governments gather at the UN Conference of the Parties (COP25) in Madrid this week, the team behind the annual update of the Global Carbon Project call for policies directed at phasing out the use of fossil fuels, in addition to more urgent and large-scale deployment of renewable energy and other low-carbon technologies.

Lead researcher Prof Pierre Friedlingstein, of the University of Exeter, said: “A failure to promptly tackle the driving factors behind continued emissions growth will limit the

world's ability to shift to a pathway consistent with 1.5°C or well below 2°C of global warming, the aim of the Paris Climate Agreement.

“The science is clear, CO₂ emissions need to decrease to net zero globally to stop further significant warming of the planet.”

What else is happening?

The slower growth in 2019 is aligned with trends of the past decade. Global fossil CO₂ emissions grew on average 0.9 per cent a year since 2010, slower than the 3 per cent a year of the 2000's.

Preliminary estimates of emissions from fire deforestation and other land-use change for 2019 reached 6 billion tonnes of CO₂, about 0.8 billion tonnes above 2018 levels. This increase stems partly from elevated fire activity in the Amazon, in line with data from the Brazilian Space Agency showing that deforestation in the Brazilian part of the Amazon has steadily increased since 2008, reaching its highest level in 2019. Fire activity was also unusually high in deforestation zones of Indonesia.

Total CO₂ emissions from human activities - including combustion of fossil fuels and land use change - are set to reach 43.1 billion tonnes (39.9 to 46.2 GtCO₂) in 2019.

Concentrations of CO₂ in the atmosphere continue to grow and are projected to reach 410 parts per million averaged over the year. Atmospheric CO₂ concentration in 2019 is 47 per cent above pre-industrial levels.

Prof Corinne Le Quéré, Royal Society Research Professor at UEA's School of Environmental Sciences, contributed to this year's analysis. She said: “Current climate and energy policies are too weak to reverse trends in global emissions.

“Policies have been successful to varying degrees in deploying low-carbon technologies, such as solar, wind and electric vehicles. But these often add to existing demand for energy rather than displacing technologies that emit CO₂, particularly in countries where energy demand is growing. We need stronger policies that are targeted at phasing out the use of fossil fuels.”

Globally, around 45 per cent of fossil CO₂ emissions come from the energy sector, mainly electricity and heat production. Industry, such as metal production, chemicals, and manufacturing, contribute 22 per cent. Land transport together with national shipping and aviation are responsible for 20 per cent, while international shipping and aviation add another 3.7 per cent. The remaining 10 per cent includes additional emissions from sectors such as buildings, agriculture, fishing, and the military.

Despite a projected decline in coal use in 2019 (-0.9 per cent), coal is still the main source (about 40 per cent) of fossil fuel CO₂ emissions. The last decade (2009-2018) saw emissions from coal grow at 0.6 per cent, with no significant growth since 2012.

Burning gas emits about 40 per cent less CO₂ than coal per unit energy, but it is not a low-carbon fuel. While CO₂ emissions are likely to decline when gas displaces coal in electricity production, Global Carbon Project researchers say it is only a short-term solution at best. All CO₂ emissions will need to decline rapidly towards zero.

How different countries compare

China's emissions continue to grow in 2019 and are projected to increase by 2.6 per cent (+0.7 to +4.4 per cent). The modest growth in coal use in China this year is due to low growth in electricity demand and no growth in coal-fired power generation, but pushed up somewhat by stronger growth in production of cement, steel and other energy-intensive products. China accounts for 50 per cent of global coal use. A global peak in coal use is highly dependent on the future use of coal in China, which will depend on structural changes and energy and climate policy in China.

In the **US** emissions are projected to fall by 1.7 per cent (-3.7 per cent to +0.3 per cent) in 2019, with a projected decrease of 10 per cent in coal-based emissions. Coal is being displaced by gas, and to a lesser extent by solar and wind power. Electricity demand was also low in 2019. Oil use is projected to decline slightly in 2019, but is still likely to be over 1 per cent higher than in 2017. Growth in 2018 was high because of above normal home-heating requirements with cold winters. Natural gas use continues to grow strongly (+ 3.5 per cent) due to low prices and its increased role in electricity generation.

EU28 emissions are projected to decline by 1.7 per cent (-3.4 to +0.1 per cent) in 2019, with a projected decrease of 10 per cent in coal-based emissions, accelerating a trend of -5.1 per cent per year since 2013. Electricity generation from coal has dropped by 22 per cent through October compared with 2018, due to a sharp rise in the price of carbon in the EU Emissions Trading Scheme combined with additional policy factors. Consumption of both diesel and jet kerosene continue to increase, leading to a projected increase in emissions from oil products of 0.5 per cent in 2019. Natural gas consumption continues to grow (+3 per cent), although at a highly variable rate across EU member states.

Emissions in **India** are projected to rise by 1.8 per cent (+0.7 to +3.7 per cent) in 2019, considerably lower than in 2018. India's economy has slowed significantly through 2019, affecting consumption of coal and oil, and production of cement.

A strong monsoon also affected coal production and consumption, with heavy rainfall leading to both flooded coal mines and high hydropower generation.

For the **rest of the world**, emissions are projected to rise by 0.5 per cent (–0.8 to +1.8 per cent) in 2019, based on projections of weaker economic growth of the International Monetary Fund (IMF).

In a separate analysis published earlier this year, members of the Global Carbon Budget team showed that the 18 countries that decarbonised the fastest in the past decade generally shared three characteristics:

- They had stable or declining energy use, from both energy efficiency and energy use;
- They deployed lots of renewable energy that replaced fossil energy;
- They had lots of climate and energy policies.

Data for the Global Carbon Budget 2019 is published today simultaneously in the journals *Nature Climate Change*, *Earth System Science Data* and *Environmental Research Letters*.

ENDS

NOTES TO EDITORS

1. PRESS CONFERENCE

United Nations Conference of the Parties (COP25) Madrid

A press conference about the Global Carbon Budget 2019 takes place at the United Nations Conference of the Parties (COP 25) Madrid, on Wednesday December 4, 10:30-11:00, room MOCHA.

A Side-event also takes place on December 4, 16:45-1815, Room 5.

Associated papers, infographics and country figures can be downloaded from the following google drive link: https://drive.google.com/drive/folders/1I9u4Hrm-SWeL3JyRmra_Uz1XY9jAIY5F?usp=sharing

2. For more information or to request an interview with Prof Corinne Le Quéré, please contact the UEA Communications Office on +44 (0)1603 593496 or email communications@uea.ac.uk. To request an interview with Prof Pierre Friedlingstein contact the University of Exeter Press Office on +44 (0)1392 724828 or email pressoffice@exeter.ac.uk.
3. The University of East Anglia (UEA) is a UK Top 25 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

4. The University of Exeter is a Russell Group university that combines world-class research with very high levels of student satisfaction. Exeter has over 21,000 students and is in the top one per cent of universities worldwide. Exeter is also ranked 10th in the *Guardian University Guide 2020* and 14th in *The Times and The Sunday Times Good University Guide 2018*. 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.
5. The Global Carbon Project is an international research project within the Future Earth research initiative on global sustainability. 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 2019 is the 14th edition of the annual update that started in 2006. Data and methods are detailed in the publications cited at the end of this document.
6. This media release is part of the Global Carbon Budget 2019, the annual update by the Global Carbon Project. It is based on the analyses published here:

Friedlingstein et al. (2019) Global Carbon Budget 2019. *Earth System Science Data*
<https://doi.org/10.5194/essd-11-1783-2019>

Peters G.P., R.M. Andrew, J.G. Canadell, P. Friedlingstein, R.B. Jackson, J.I. Korsbakken, C. Le Quéré, and A. Peregón (2019). Carbon dioxide emissions continue to grow despite emerging climate policies. *Nature Climate Change*.
<https://doi.org/10.1038/s41558-019-0659-6>

Jackson, R.B., P. Friedlingstein, R. M. Andrew, J.G. Canadell, C. Le Quéré, G.P. Peters (2019). Persistent Fossil Fuel Emissions Threaten the Paris Agreement and Planetary Health, *Environmental Research Letters*. <https://doi.org/10.1088/1748-9326/ab57b3>

See also: C. Le Quéré, C. J.I. Korsbakken, C. Wilson, J. Tosun, R. Andrew, R.J. Andres, J.G. Canadell, A. Jordan, G.P. Peters and D.P. van Vuuren (2019). Drivers of declining C_o2 emissions in 18 developed economies. *Nature Climate Change*.
<https://doi.org/10.1038/s41558-019-0419-78>.

Data Access:

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

Global Carbon Atlas with country data can be accessed since 28/11/2019 via
<http://emissions2019.globalcarbonatlas.org/>

User name: media
Password: fromLSCE2019

- After embargo: ESSD paper is open access available at <https://doi.org/10.5194/essd-11-1783-2019>

Social media:

- Facebook <https://www.facebook.com/globalcarbonproject>
- Twitter: #carbonbudget, @gcarbonproject @Peters_Glen