

Global fossil CO₂ emissions increase amidst turmoil in energy markets

Global fossil CO₂ emissions are expected to grow 1.0% in 2022 as the COVID recovery continues amidst turmoil in energy markets. Growth in oil use, particularly aviation, and coal use are behind most of the increase in 2022.

Today, 11 November, the Global Carbon Project (GCP) publishes its annual analysis of trends in the global carbon cycle in the journal *Earth System Science Data*, including an updated full-year projection for 2022.

Global fossil CO₂ emissions¹ are expected to grow 1.0% in 2022 (with an uncertainty range of 0.1% to 1.9%). The decline in 2020 of -5.2% because of COVID19 restrictions, was quickly erased by a 5.6% increase in 2021. Global fossil CO₂ emissions have now grown 0.6% per year over the last 10 years.

“Many countries, cities, companies, and individuals have made pledges to reduce emissions, and it is stark reminder that despite all this rhetoric, global fossil CO₂ emissions are more than 5% higher than in 2015, the year of the Paris Agreement,” said Glen Peters, a Research Director at the CICERO Center for International Climate Research.

“During the Global Financial Crisis in 2008/9, the COVID19 pandemic, and now the Ukrainian War, economic stimulus packages were meant to put the world on a cleaner and greener path, but this is not at all evident in the CO₂ emissions data,” said Peters.

Turmoil in energy markets lead to different sources of emissions growth

The turmoil in the global energy markets is affecting the different fossil fuels in different ways.

CO₂ emissions from natural gas use have grown a sustained 2.2% per year over the last 10 years but are expected to decline slightly in 2022 by 0.2% [-1.2% to 0.6%], potentially only the third such decline since 1990 (the others in 2009 and 2020).

CO₂ emissions from coal use are expected to grow 1.0% [0.2% to 1.9%], potentially exceeding the previous peak in 2014 to reach a new high. While the data indicates that coal use has plateaued in the last 10 years, there remains considerable uncertainty on when it will start to decline.

CO₂ emissions from oil use are expected to grow 2.2% [0.9% to 3.2%], primarily due to an increase in international aviation, but oil use remains below 2019 levels and have not fully recovered from the COVID19 pandemic in 2020.

“Given that a further recovery in oil use is expected in 2023, if coal or gas use remain flat or increase, then it is likely that global fossil CO₂ emissions will continue to rise in 2023 without a concerted policy effort,” said Robbie Andrew, a Senior Researcher at CICERO preparing the fossil CO₂ emission estimates.

¹ The global fossil CO₂ emission estimates presented here do not include the small uptake from cement carbonation.

Large increases in emissions in India, USA, and international aviation

Our 2022 emission projection are based on the use of monthly energy data, with the latest data between August and October, and we then make judgements about how emissions may develop for the remainder of 2022.

India has the largest contribution to growth in fossil CO₂ emissions in 2022, with a projected increase of 6.0% (range 3.9% to 8.0%), driven by a 5% increase in coal emissions, a sharp projected rise in oil of 10% back to 2019 levels, but a decline in gas of 4%.

“Indian fossil CO₂ emissions have grown at over 3% per year in the last 10 years and now exceed emissions in the European Union, but India’s per capita are still only a third of those in the EU,” said Andrew.

Fossil CO₂ emissions in the USA are projected to increase by 1.5% (range -1.0% to +4.0%), with the global energy crisis effecting the US differently. Emissions from gas are projected to rise by 4.7% due to increased electricity demand and constraints on coal supply, with coal to decline by 4.6%. Emissions from consumption of oil products are projected to increase by 2%, largely because of the continued rebound of domestic aviation since the COVID-19 pandemic.

China is projected to have the first decline in fossil CO₂ emissions since the slowdown in 2015 and 2016, with a projected decrease of 0.9% (range -2.3% to 0.4%). Continued lockdowns have constrained activity and economic growth, with emissions projected to be essentially flat (0.1% growth) for coal, but decline by 2.3% for oil, 1.1% for natural gas, and 7.0% for cement.

“Fossil CO₂ emissions in China will almost certainly go down this year,” said Jan Ivar Korsbakken, a Senior Research at CICERO. “COVID lockdowns, a collapse in the construction sector and economic headwinds have constrained energy consumption growth this year, especially in the spring. Meanwhile, renewable energy continued to grow, with wind and solar power making up more than 10 percent of total electricity generation for the first time. A shortfall in hydropower after the massive drought this summer and stronger industrial growth in the past few months have pushed coal consumption up again a little in the autumn, but probably not enough to stop overall CO₂ emissions from falling.”

The European Union (EU27) is the most effected region to the energy crisis driven by Russia’s invasion of Ukraine, but even so, is projected to see fossil CO₂ emissions decline by only 0.8% (range -2.8% to +1.2%). The decline in the EU is driven largely by a 10% reduction in emissions from natural gas, with emissions from coal projected to increase 6.7%. Emissions from oil rise only 0.9%.

“The EU has seen major disruptions to energy supply, with large parts of French nuclear down in 2022, a severe drought in the summer, and not least, a war on its doorstep severely curtailing natural gas supply,” said Andrew.

This year, there is a large increase in emissions in the Rest of the World, up 1.7% (range 0.1% to 3.3%), which is primarily driven by an increase in oil due to a continued rebound in international aviation. Projections are for a 3.5% rise in oil use in the Rest of the World and a 1.6% increase in coal, but a slight decline of 0.1% in emissions from natural gas because of higher global prices.

Continued growth in emissions drives increases in atmospheric concentrations

CO₂ emissions from land-use change (LUC) are projected to be 3.6GtCO₂ in 2022, slightly lower than 2021, and showing a slight decline over the past two decades, although with large uncertainties.

When combining CO₂ emissions from fossil sources and land-use change, total CO₂ emissions have grown slightly at 0.2% per year in the last 10 years, averaging 40.6 GtCO₂, and are projected to be 41.1 GtCO₂ in 2022.

Atmospheric CO₂ concentrations have increased on average 2.4 parts per million (ppm) per year in the last five years, and are projected to increase 2.5ppm in 2022 and reach 417.2 parts per million, 51% above its pre-industrial level.

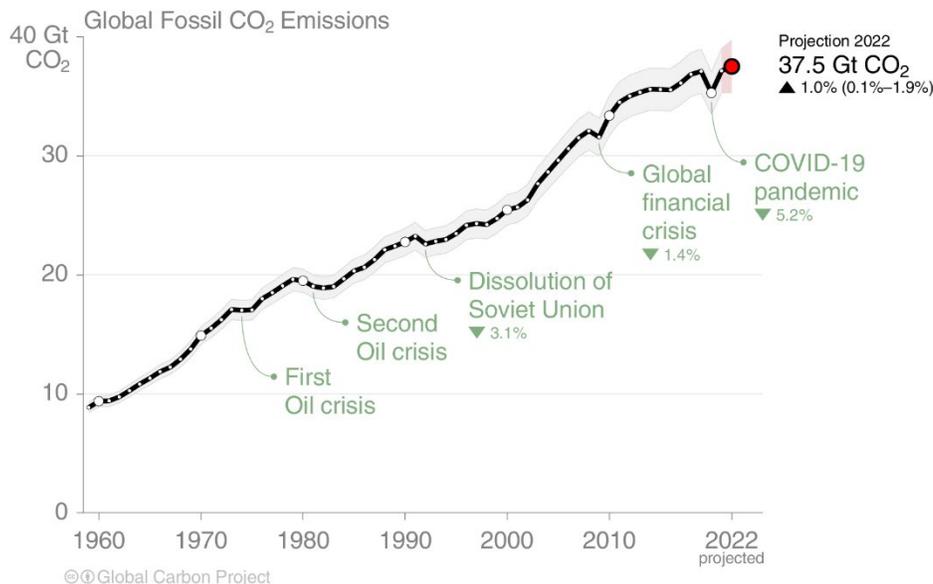
Where is the world heading?

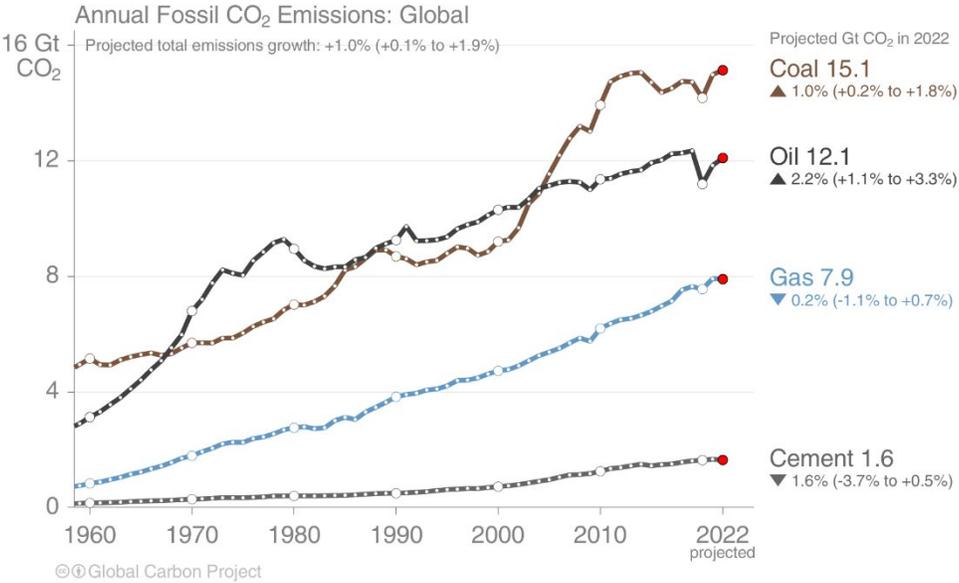
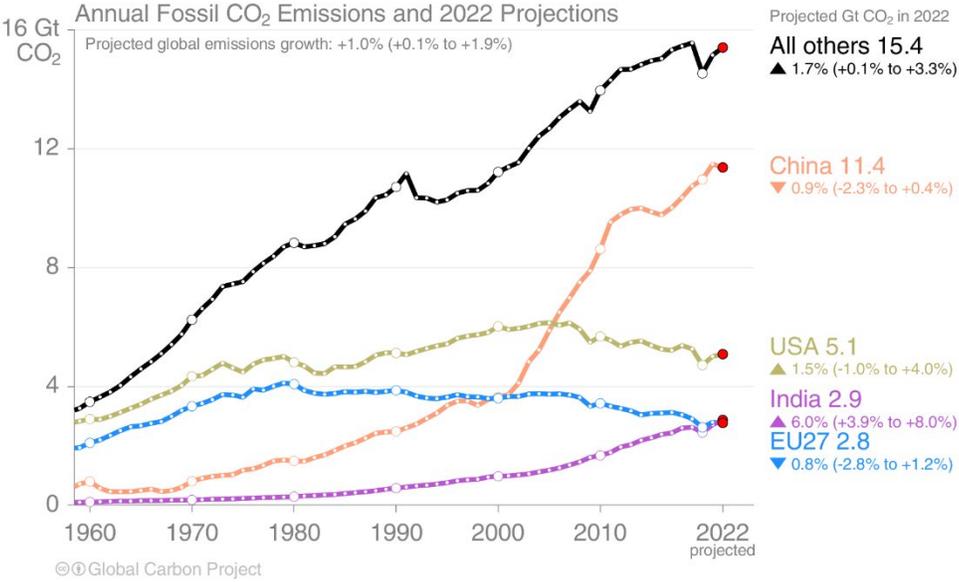
In the lead up to the Conference of the Parties (COP27) at Sharm El Sheikh in November 2022, there have been many projections of 2100 temperature outcomes for assumed pathways based on current policies, Nationally Determined Contributions, and long-term pledges (e.g., year of net-zero).

The Global Carbon Project focuses on historical emissions but does find that if total CO₂ emissions continue at the 2022 level for nine years, the remaining carbon budget for 1.5°C will be fully exhausted, with temperatures continuing to rise until total CO₂ emissions are zero.

“Despite an impressive array of policies, pledges, and promises on display at COP27, the historical emission data reveals a contrasting story where emissions continue to grow,” said Ida Sognnæs, a Senior Researcher at CICERO.

“A renewed focus on implementation and delivery is needed to ensure countries are kept to their promises, and the world starts to see a sustained reduction in CO₂ emissions in the coming years,” said Sognnæs.





Facts about the Global Carbon Project: The Global Carbon Project is an international research project within the Future Earth research initiative on global sustainability, 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 2022 is the 17th edition of the annual update that started in 2006.

Interviews

- Glen Peters (glen.peters@cicero.oslo.no, [@Peters Glen](#), +47 9289 1638 – email preferred)
- Robbie Andrew (robbie.andrew@cicero.oslo.no, [@robbie_andrew](#), +47 2200 4769)
- Jan Ivar Korsbakken (China) (jan.ivar.korsbakken@cicero.oslo.no, [@jikorsbakken](#), +47 2200 4718)
- Ida Sognnæs (future projections) (ida.soggnas@cicero.oslo.no, [@idasogn](#), +47 9590 0647)

Publications: This media release is part of the Global Carbon Budget 2022

- Friedlingstein et al. (2022) Global Carbon Budget 2022. *Earth System Science Data*, <https://doi.org/10.5194/essd-14-4811-2022> (after embargo)

Press events

- UK Science Media Centre (*under embargo*), Tuesday 8th November 11am (UK time)
 - Contact: tom@sciencemediacentre.org
- UN Press Conference & launch of Global Carbon Budget 2022. Friday 11 November, 09:00 Egypt time (07:00 GMT) Press Conference Room, Luxor Taba Area, COP27

Access to material:

- *Prior to embargo:*
<https://drive.google.com/drive/u/0/folders/1JLOukEVVYQsiuCma5hRN7L0iXiZ5vW0F>
- Data and figures (*after embargo*): <http://www.globalcarbonproject.org/carbonbudget>
- Fossil CO₂ data by country and fuel, 1750-2021: <https://zenodo.org/record/7215364>