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Dwindling chances to stay below 2°C warming

Carbon dioxide emissions continue to track the high end of emission scenarios, eroding the chances to keep global warming below 2°C, and placing increased pressure on world leaders ahead of the United Nations Climate Summit on the 23rd September.

Global carbon dioxide emissions from fossil fuel combustion and cement production grew 2.3 per cent to a record high of 36.1 billion tonnes CO_2 in 2013. In 2014 emissions are set to increase a further 2.5%, 65 per cent above the level of 1990.

In its annual analysis of trends in global carbon dioxide emissions, the Global Carbon Project (GCP) published three peer-reviewed articles identifying the challenges for society to keep global average warming less than 2°C above pre-industrial levels.

Emissions keep growing

The top-four emitters of CO_2 have a critical role in global emissions growth:

- Chinese emissions grew at 4.2%, due to slower economic growth and faster improvements in carbon intensity of the economy compared to the previous decade
- USA emissions increased 2.9%, due to a rebound in coal consumption potentially reversing the downward trend since the start of the shale-gas boom in 2007
- Indian emissions grew at 5.1%, due to robust economic growth and a continued increase in the carbon intensity of the economy
- EU28 emissions decreased 1.8%, due to a weak economy and emission decreases in some countries offsetting a return to coal led by Poland, Germany, Finland

“China now emits more than the US and EU combined and has CO_2 emissions per person 45% higher than the global average, exceeding even the EU average”, said Robbie Andrew, a co-author of the studies based at the Center for International Climate and Environmental Research – Oslo (CICERO) in Norway.

“China continues to reshape the global distribution of emissions, and as politics impedes significant progress in the US and other key countries, observers increasingly look to China to provide a breakthrough in climate negotiations”, said Glen Peters, another CICERO-based co-author.

Remaining Carbon ‘Quota’ may be used up in one generation

For a likely chance to stay below 2°C above pre-industrial levels, the world can only emit another 1,200 billion tonnes of CO_2 from 2015, the year of the climate negotiations in Paris.

With current emission rates (2014), the remaining ‘quota’ to surpass 2°C of global warming will be used up in around 30 years (one generation).

“Globally emissions would need sustained and unprecedented reductions of around 7%/yr for a likely chance to stay within the quota”, said Peters.

“Furthermore,” added Peters, “because of differentiated capabilities some countries would need even higher rates of emissions reductions. These rates have not been seen in any individual country outside of severe economic crises”.

“Depending on technology, the remaining available ‘quota’ implies that two-thirds of proven fossil reserves might have to remain in the ground”, said Andrew.

Betting on Negative Emissions

The ability to keep temperatures below 2°C depends on three things: uncertainties in the climate system, when deep and sustained mitigation starts, and rapid development of new technologies.

“Most scenarios consistent with 2°C used in the IPCC Fifth Assessment Report largely depend on carbon capture and storage (CCS), both from fossil-fuel combustion and, particularly, bioenergy”, said Andrew.

But the development and deployment of CCS technologies has not lived up to expectations.

“Today’s emission-reduction targets need to incorporate the risk that society is unable to commercially develop and rapidly deploy a technology that is so far largely unproven at the required scale”, said Peters.

“If carbon capture and storage technologies are not realised, it may not be possible to keep the temperature increase below 2°C”, said Peters.

Sharing the Remaining ‘Quota’

Given a remaining emissions ‘quota’ it is inevitable that this quota will be shared between countries either by design or default.

“We found that given the very small remaining ‘quota’, population-based sharing is no longer feasible”, said Peters. “Yet, basing emission reduction on current emission distribution is unfair to many countries”.

“We found that with rapid growth in Chinese emissions and those ‘locked into’ fossil-fuel based infrastructure, China has already exceeded its ‘quota’ under population-based sharing,” said Andrew.

“The mitigation efforts put forward by individual countries should be both feasible and fair, where an equitable balance is struck that is acceptable to all countries”, said Andrew.

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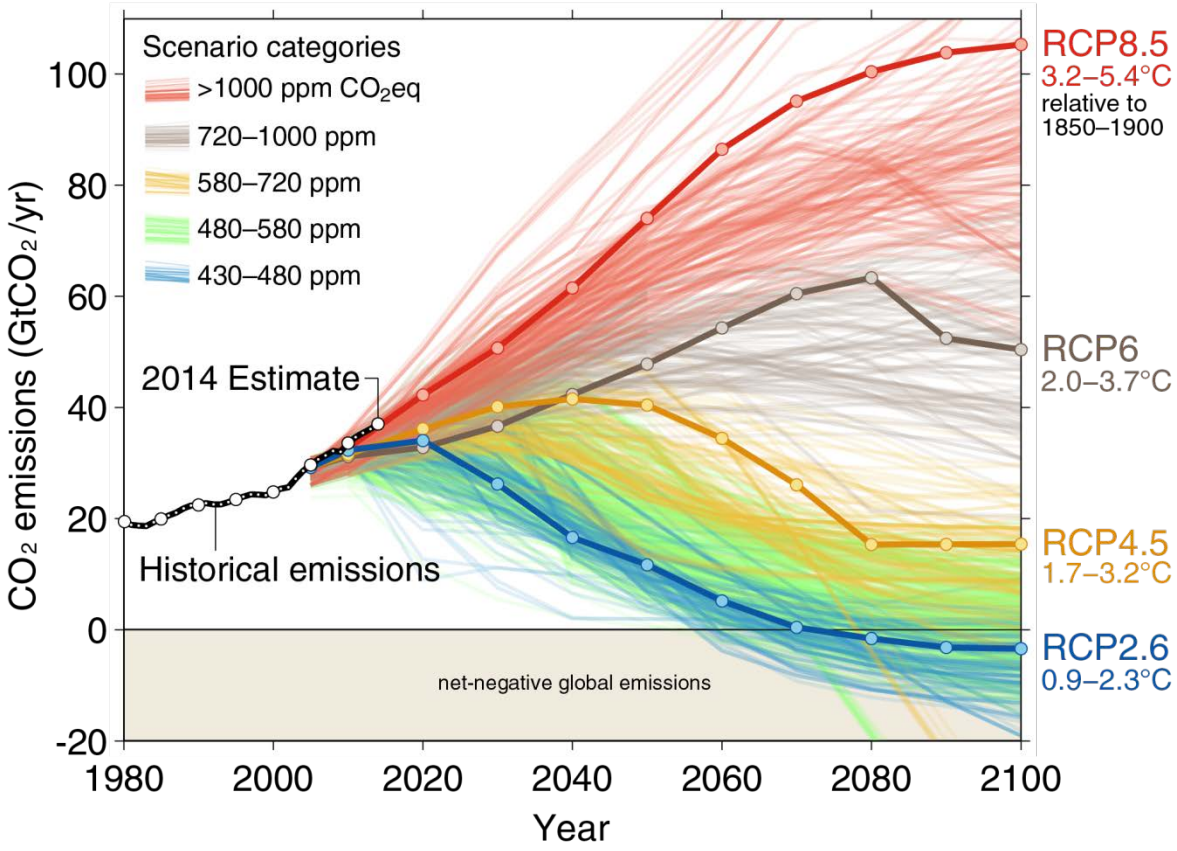
Global Carbon Budget: *for print-quality figures and additional information:* http://www.globalcarbonproject.org/carbonbudget/



The IPCC's Fifth Assessment Report collated from the peer-reviewed literature almost 1200 scenarios of future emissions, each scenario having a different 'story' of how the future might unfold. The scenarios can be grouped according to which of the four Representative Concentration Pathways (RCPs) they are most similar to, based on peak concentration of greenhouse gases.

This figure demonstrates that in many cases the scenarios that are consistent with keeping global temperatures below a 2-degree increase require 'net-negative' global emissions, that is, any remaining emissions of greenhouse gases are outweighed by removals of gases from the atmosphere.

This media release is part of the Global Carbon Budget 2014 of the Global Carbon Project, based on four analyses published on 21 September 2014, 6:00 pm UK time.

- Le Quéré et al. (2014) Global Carbon Budget 2014. *Earth System Science Data Discussions* (manuscript in discussions), http://dx.doi.org/10.5194/essdd-7-521-2014
- Friedlingstein et al. (2014) Persistent growth of CO_2 emissions and implications for reaching climate targets. *Nature Geoscience*, http://dx.doi.org/10.1038/ngeo2248
- Raupach et al. (2014) Sharing a quota on cumulative carbon emissions. *Nature Climate Change*, http://www.nature.com/doifinder/10.1038/nclimate2384
- Fuss et al. (2014) Betting on Negative Emissions. Nature Climate Change (commentary) http://www.nature.com/doifinder/10.1038/nclimate2392

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