

New estimates show China's carbon emissions were less than previously thought

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Credit: Alfred Palmer/Wikipedia

China's carbon emissions have been substantially over estimated by international agencies for more than 10 years, according to research co-led by the University of East Anglia.

From 2000-2013 China produced 2.9 gigatonnes less [carbon](#) than previous estimates of its cumulative emissions. The findings suggest that overestimates of China's emissions during this period may be larger than China's estimated total forest sink - a natural carbon store - in 1990-2007 (2.66 gigatonnes of carbon) or China's land carbon sink in 2000-2009 (2.6 gigatonnes of carbon).

Published tomorrow in the journal *Nature*, the revised estimates of China's [carbon emissions](#) were produced by an international team of researchers, led by Harvard University, UEA, the Chinese Academy of Sciences and Tsinghua University, in collaboration with 15 other international research institutions.

The team re-evaluated emissions from the burning of fossil fuels and [cement production](#) from 1950-2013. They used independently assessed activity data on the amounts of fuels burned and new measurements of emissions factors - the amount of carbon oxidised per unit of fuel consumed - for Chinese [coal](#).

Nearly three-quarters of the growth in [global carbon emissions](#) from the burning of fossil fuels and cement production between 2010-2012 occurred in China. Yet estimates of Chinese emissions remain subject to large uncertainty due to conflicting assessments of energy consumption and emission factors. Indeed, using different official sources of activity data and emissions factors can result in estimates that vary by up to 40 per cent in a given year.

Lead UK researcher Prof Dabo Guan, of UEA's School of International Development, said the key contributor to the new estimates was fuel quality, which for the first time was taken into consideration in establishing emission inventories - something the Intergovernmental Panel on Climate Change (IPCC) and most international data sources had not.

"China is the largest coal consumer in the world, but it burns much lower quality coal, such as brown coal, which has a lower heat value and carbon content compared to the coal burned in the US and Europe," said Prof Guan.

"China is one of the first countries to conduct a comprehensive survey for its coal qualities and a global effort is required to help other major coal users, such as India and Indonesia, understand their physical coal consumptions as well as the quality of their coal types.

"Our results suggest that Chinese CO₂ emissions have been substantially over estimated in recent years. Evaluating progress towards countries' commitments to reduce CO₂ emissions depends upon improving the accuracy of annual emissions estimates and reducing related uncertainties. These findings represent progress towards improving estimates of annual global carbon emissions."

The researchers found that total energy consumption in China was 10 per cent higher between 2000-2012 than the value reported by the country's national statistics. However, emission factors for Chinese coal were on average 40 per cent lower than the default levels recommended by the IPCC. Emissions from China's cement production were 45 per cent less than recent estimates.

The revised estimate of China's CO₂ from fossil fuel combustion and cement production in 2013 is 2.49 gigatonnes of carbon. This is up to 14 per cent lower than the emissions reported by previous assessments, including those by the Carbon Dioxide Information Analysis Centre (CDIAC) in the US and the Emissions Database for Global Atmospheric Research (EDGAR) in the EU, which are the official data sources for the IPCC Fifth Assessment Report (AR5) - providing scientific evidence for climate change policy negotiations in Paris later this year.

The figure is also about 10 per cent less than the estimate given for China in the most recent publication of the Global Carbon Project, which updates annually the [global carbon](#) emissions and their implications for future trends.

Prof Corinne Le Quéré, director of the Tyndall Centre for Climate Change Research at UEA, co-leads the publication of annual updates of emissions for the Global Carbon Project. She said there were a lot of uncertainties in Chinese data, especially given discrepancies between national and provincial figures.

"There is still a lot of work to do," said Prof Le Quéré. "The strong message here is that as we refine our estimates of carbon [emissions](#) we get closer to an accurate picture of what is going on and we can improve our climate projections and better inform policy on [climate change](#)."

More information: 'Reduced carbon emission estimates from fossil fuel combustion and cement production in China' is published in *Nature* on August 20, 2015. [DOI: 10.1038/nature14677](https://doi.org/10.1038/nature14677)

Provided by University of East Anglia

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