

A 'carbonizing dragon': Construction drives China's growing CO₂ emissions

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Constructing buildings, power-plants and roads has driven a substantial increase in China's CO₂ emission growth, according to a new study involving the University of East Anglia (UEA).

Fast growing capital investments in [infrastructure projects](#) led to the expansion of the construction industry and its energy and CO₂ intensive [supply chain](#), such as steel and cement production. As a result of this transformation of China's [economy](#), more and more CO₂ was released per unit of [gross domestic product](#) – a reversion of a long-term trend.

Recently China became the world's largest consumer of energy and emitter of CO₂, overtaking the US. Previously the country's greenhouse gas [emissions](#) growth was driven by rising consumption and exports. Today this growth is offset by emission savings from efficiency increases, but these savings are being hindered by the building of infrastructure – which is important as it dictates tomorrow's emissions, the international team of researchers concludes.

The study, entitled A 'Carbonizing Dragon': China's fast growing CO₂ emissions revisited', is published in the journal *Environmental Science & Technology*. It emphasizes that putting a low carbon infrastructure in place in China as well as other emerging and developing economies from the beginning is a key global challenge to avoid 'carbon lock-in' – where a country could be stuck on a path of high emissions - which would have a significant and persistent impact on future emissions.

"The carbon intensive nature of capital investment in heavy industry, large infrastructure building projects, and energy production, might be hard to avoid as China tries to instigate a virtuous cycle of high rates of investment and economic growth," explained Giovanni Baiocchi, from Norwich Business School at UEA and the lead UK author of the study.

"The high levels of CO₂ emissions from capital investment might only be temporary as, with economic development, investment moves into more high-tech and greener technologies," added Dr Baiocchi, a senior lecturer in business and climate change. "However, it is crucial that China now invests in the right kind of infrastructure to limit the growth of CO₂ emissions that causes global warming. The type of infrastructure put in place today will also largely determine future mitigation costs."

The study's lead author Jan Minx, from the Potsdam Institute for Climate Impact Research (PIK) and the Technical University of Berlin, said: "Up to 2002 there has been a race between consumption growth and efficiency gains. However, the recent rise in emissions is completely due to the massive structural change of China's economy. Emissions grow faster and faster, because CO₂ intensive sectors linked to the building of infrastructure have become more and more dominant. China has developed into a 'carbonizing dragon'."

The researchers conducted a 'structural decomposition' analysis of input-output data for 1992 to 2007 - the most recent official data available - which allowed them to assign changes in emission over time to a set of drivers such as consumption growth, efficiency gains or structural change.

They found that emissions almost tripled between 1992 and 2007, growing by about four billion tonnes, with 70% of this growth happening between 2002 and 2007. The average annual CO₂ emission growth alone in this period was similar in size to the total CO₂ emissions in the UK.

While exports showed the fastest CO₂ emission growth at one point, capital investments and the [construction industry](#) then overtook.

According to the study another important driver of emissions is urbanization – emissions from household consumption are more significant than the sheer growth of population or even the decreasing household size. When people move from the countryside to the city lifestyle changes take place. Urban dwellers, for example, tend to seek gas heating and electricity and also depend more upon a transport infrastructure to get to work, all of which implies a higher per capita carbon footprint.

Provided by University of East Anglia

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