

Study reveals inequalities in carbon footprints of Chinese households

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Inequalities in China's household carbon footprints and incomes risk undermining the country's attempts to reduce its greenhouse gas emissions, according to new research involving the University of East Anglia (UEA).

Researchers say new policies are needed to improve living standards and encourage [sustainable consumption](#) if Chinese lifestyles are to move away from the current trajectory of carbon-intensive consumption patterns.

The study, published today in *Nature Climate Change*, quantified the [carbon footprints](#) of urban and rural households across 13 income groups (5 rural and 8 urban) for services, goods, food, mobility and housing.

The researchers, including Prof Dabo Guan of UEA's School of International Development and Dr Jing Meng from UEA's School of Environmental Sciences, found they are unequally distributed among the rich and poor due to differences in the scale and patterns of consumption. It comes as more people in China move from rural to urban areas - approximately 20 million a year - and increasingly aspire to and adopt westernised carbon and resource-intensive consumer lifestyles.

Using data for the most recent available years (2007-2012), the study's authors found that due to income inequality the urban very rich income group, comprising 5% of the population, generated 19% of the total carbon footprint from household consumption in China, with 6.4 tons of

CO₂ per capita (tCO₂/cap), nearly four times the national average of 1.7 tCO₂/cap.

The rural population and urban poor, comprising 58% of population, produced 0.5-1.6 tCO₂/cap. Between 2007 and 2012 the total footprint from households increased by 19%, with 75% of the increase due to growing consumption of the urban middle class and the rich.

In terms of energy consumption, there is a clear urban-rural divide in China. Rural households often use traditional and locally polluting energy carriers, such as straw, wood or coal, while electricity and natural gas are slowly penetrating these areas. In urban areas, modern energy carriers such as electricity, natural gas and LPG are dominant, and mobility, for example travelling by private car, has become one of main drivers of direct household energy use.

Prof Guan, a professor in [climate change](#) economics and the study's lead UK author, said: "Our findings suggest that coming out of poverty is fairly carbon-intensive. This is because poorer households would tend to increase consumption of food, housing and general manufacturing products. Production of those goods are often emission intensive, strongly driven by China's coal dominated energy mix.

"However, much more problematic are the growing carbon footprints of the urban middle class and the rich, who together produce 69% of the total Chinese household footprint and are rapidly westernising their lifestyles, meaning more resources are required and larger carbon footprints are created.

"Decarbonising the energy system via production-focused efficiency measures and energy-pricing reforms is essential. But developing carbon-free lifestyles beyond the current trajectory of increasing carbon footprints while becoming wealthy will require more substantial debates

on the limits of green consumerism and the potential towards sustainable consumption."

The researchers recommend that the long-term transformations required to create a net zero carbon society should be included in national discussions about the currently dominant mode of ecological modernization, green growth and conspicuous consumer lifestyles.

Prof Guan said: "The carbon intensive lifestyles of the wealthy are being emulated, and serve as role models, while investments in infrastructure and cities are made. Therefore, social and redistributive policies need to be understood as interacting with climate and energy policy, as well as with efforts towards enabling sustainable lifestyles for all.

"In a globally carbon-constrained future, high levels of wellbeing and human development need to be achieved while rapidly reducing total emissions. Reducing inequalities but preventing emission-intensive lifestyle westernisation in populous developing countries can be a step forward in contributing to global climate change mitigation. Consumers in developed countries can be role models in advocating sustainable consumption as a desirable way of living."

The researchers conclude that cost-effectively using public and private funding for these societal goals will be crucial. They add that some countries, such as Costa Rica and Thailand, have already achieved a high level of human development with an average carbon footprint of 1 ton per capita, suggesting routes to habitable and potentially more sustainable societies exist.

They also suggest the methods used in the study could be useful for developing sustainable consumption programmes for those income groups which dominate the footprints of certain consumption areas, or for guiding policy design in achieving poverty alleviation while reducing

emissions and increasing energy efficiency.

More information: 'Unequal household carbon footprints in China', Dominik Wiedenhofer, Dabo Guan, Zhu Liu, Jing Meng, Ning Zhang and Yi-Ming Wei, is published in *Nature Climate Change*. [DOI: 10.1038/nclimate3165](https://doi.org/10.1038/nclimate3165)

Provided by University of East Anglia

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