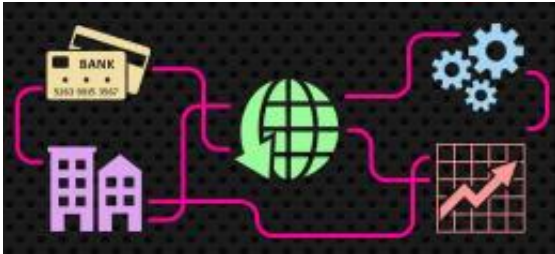


# Low carbon, moderate income and long life

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(PhysOrg.com) -- A new study shows that countries with high incomes and high carbon emissions do not achieve higher life expectancies than those with moderate incomes and lower carbon emissions.

This finding challenges the assumption that human wellbeing requires growth in both economic activity and carbon emissions.

The research, led by the University of Leeds and published in *Nature Climate Change*, highlights alternative development pathways that prioritize human well-being and climate protection over imperatives for economic growth.

Researchers from British, American, Austrian and Norwegian universities investigated links between [carbon dioxide emissions](#) from fossil-fuels, economic wealth, and life expectancy. Ideally, from a sustainable development perspective, countries would achieve both high

incomes and high life expectancies at low levels of carbon emissions. Historically, however, high incomes and high life expectancies have been dependent on increasing [emission levels](#). The apparent conflict between socio-economic development and reducing carbon emissions is at the core of international disagreements over addressing climate change.

A central finding of this study is that a moderate income, corresponding to a Gross Domestic Product of between US\$2000-US\$12,000 per capita, is currently a necessary, but not sufficient, requirement for sustainable development: 'necessary' because no high-income country has carbon emissions below 1 tonne of carbon per capita; 'not sufficient' because moderate incomes do not guarantee either high life expectancy or low carbon emissions.

Dr Julia Steinberger, a lecturer in [ecological economics](#) at the Sustainability Research Institute of the University of Leeds, said: "Some nations are clearly more carbon efficient than others when it comes to enhancing well-being. Understanding national differences in the relationship between human development and carbon footprints is the first step in bringing about more desirable outcomes through active policy interventions."

The evidence shows that the highest international life expectancies are attainable at a wide range of carbon emissions, from 0.5 tonnes per capita for Costa Rica to 6.2 tonnes per capita for the United States: more than a factor of 10 apart. However, the countries with the lowest carbon emissions also had the lowest incomes: low carbon emissions were always incompatible with higher incomes.

Dr Julia Steinberger said: "Most scenarios leading to stable and reduced carbon emissions rely on rapid technology shifts, from fossil-based energy to renewable sources, for example. The results of this study show

that technology shifts may not be required if economic activity is reduced in the richest countries. In this case, global long life expectancies would be compatible with a stabilised climate on planet Earth."

This study takes into account the fact that national carbon emissions are affected by international trade. Conventional territorial, or "production-based" emissions are thus corrected by adding imported, and subtracting exported, carbon embedded in imported goods and services. The study's analysis shows that such trade-adjusted "consumption-based" emissions are more reflective of national socio-economic benefits than territorial emissions. This is because the benefits of carbon-emitting activities go to the final consumers of the goods and services, rather than the producers.

According to Dr. Giovanni Baiocchi, senior lecturer in business and [climate change](#) at the Norwich Business School of the University of East Anglia: "The displacement of carbon emission through trade also has a fairness dimension, since most developed countries are net-importers of carbon from emerging or developing economies."

By examining the pathways of individual countries, the researchers conclude that there is no pre-determined development trend. The diversity of development trajectories indicates that countries may be able to alter their future course.

The findings have implications for emission scenarios based on human development targets rather than economic growth.

Dr. Steinberger said: "Since countries currently exist with the same [life expectancies](#) as the UK and the US, but with a small fraction of their [carbon emissions](#) (and incomes), prioritising economic growth at the expense of climate stability seems less and less defensible."

**More information:** The paper Pathways of human development and carbon emissions embodied in trade by Julia K. Steinberger, J. Timmons Roberts, Glen P. Peters and Giovanni Baiocchi is published in *Nature Climate Change* on 22 January, [doi:10.1038/NCLIMATE1371](https://doi.org/10.1038/NCLIMATE1371)

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