

Study finds reducing carbon emissions won't hurt economic growth

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A new paper in *Oxford Open Energy* indicates that countries can get to net-zero carbon emissions by 2050 while maintaining economic growth.

Net-zero emissions by 2050 is the target for [climate policy](#) now pursued by many countries, in line with the 2015 Paris Agreement objective of "holding the increase in the [global average temperature](#) to well below 2 °C above pre-industrial levels and pursuing efforts to limit the [temperature increase](#) to 1.5 °C above pre-industrial levels." This paper reports on a study that used [energy system](#) and macroeconomic models to explore how these objectives could be reached and whether achieving them is possible with continuing economic growth through to 2100.

While some scholars argue that resolving the climate crisis is not consistent with continued economic growth in [rich countries](#), between 1990 and 2016 the European Union's economy grew by more than 50%, while CO₂ emissions fell by 25%. In the United Kingdom and Finland, for example, consumption-based emissions fell from 2007 to 2016 while their economies grew from 2010 to 2016.

Researchers here modeled various scenarios to slow the growth of global primary energy demand so that in 2100 primary energy demand was only 30% above its 2020 level. Researchers also modeled the deployment of renewable technologies needed to decarbonize [electricity generation](#) almost completely by 2100 and produce seven times as much power as the world used in 2010, to replace fossil fuels in transport, heating and in some industrial processes. Finally, they modeled the phasing down of coal globally as fast as the United States has reduced its use in recent years.

The results of the study were consistent with the many 1.5° C scenarios in the researchers' database, all of which showed continuing growth in the world economy, while meeting the 1.5° C climate target. In general, the reduction in economic growth by 2100 from a baseline without decarbonization, and which ignores climate damages, was small. None of the scenarios came anywhere near declines in economic output from the 2020 level.

Under the central scenario economic growth after 2020 declines from 3.5% to just over 1% in 2100. This decline is mainly due to the stabilization of the human population over this period. Per capita growth just about halves over these 80 years as the growth of investment (which is essential for decarbonization) slows, largely after 2040. The average annual growth rate over the period 2020-2100 consistent with an energy system that achieves 1.5°C in 2100 (after peaking at 1.87 °C between 2050 and 2060) is 1.76%. By 2100 the [global economy](#) is five times the size it was in 2015.

With a slower coal phase-down, it would still possible to reach the 1.5 °C target by 2100, but only by making significantly greater use of carbon capture and storage and negative emission technologies. The peak temperature under this scenario rises from 1.87 °C to 1.89 °C. If carbon capture is not available, even with the fast coal phase-down, cumulative CO₂ emissions double over the central scenario, and it would no longer be possible, to keep the temperature rise to 1.5 °C by 2100—it rises to 1.74 °C.

The modeling results of this study suggest that, with stringent public policy, the Paris target limiting warming to 1.5 °C in 2100 is feasible, and that this can be achieved with robust economic growth. In order to achieve this, countries' policies would need to stimulate significant increases in [energy](#) and resource efficiency and the rapid deployment of low-carbon technologies, with global cooperation, strong environmental policy, and low population growth.

"Continuing global [economic growth](#) is clearly compatible with achieving the temperature target in the Paris Agreement," said Paul Ekins, who led the study. "Governments now need to step up to put in place the policies to stimulate the investments that are required to turn these projections into reality."

The paper is titled "1.5° C Climate and Energy Scenarios: Impacts on Economic Growth."

More information: 1.5° C Climate and Energy Scenarios: Impacts on Economic Growth, *Oxford Open Energy* (2022). [DOI: 10.1093/ooenergy/oiac005](https://doi.org/10.1093/ooenergy/oiac005)

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