

# Expansion of wind and solar power too slow to stop climate change

October 18 2021

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The production of renewable energy is increasing every year. But after analyzing the growth rates of wind and solar power in 60 countries, researchers at Chalmers University of Technology and Lund University in Sweden and Central European University in Vienna, Austria, conclude that virtually no country is moving sufficiently fast enough to avoid global warming of 1.5°C or even 2°C.

"This is the first time that the maximum growth rate in [individual](#)

[countries](#) has been accurately measured, and it shows the enormous scale of the challenge of replacing traditional energy sources with renewables, as well as the need to explore diverse technologies and scenarios," says Jessica Jewell, Associate Professor of Energy Transitions at Chalmers University of Technology.

The Intergovernmental Panel on Climate Change (IPCC) has identified energy scenarios compatible with keeping [global warming](#) under 1.5°C or 2°C. Most of these scenarios envision very rapid growth of renewable electricity: on average about 1.4 percent of total global electricity supply per year for both wind and solar [power](#), and more than 3 percent in more ambitious solar power scenarios. But the researchers' new findings show that achieving such rapid growth has so far only been possible for a few countries.

Measuring and predicting the growth of new technologies like renewable [energy](#) is difficult, as they do not grow linearly. Instead, the growth usually follows a so-called S-curve—at first it accelerates exponentially, then stabilizes to linear growth for a while, and in the end slows down as the market becomes saturated.

"We came up with a new method—to use mathematical models to measure the slope of the S-curve, that is, the maximum growth rate achieved at its steepest point. It is an entirely novel way to look at the growth of new technologies," says Jessica Jewell.

When analyzing the 60 largest countries, the researchers found that the maximum growth rate for onshore wind power is on average 0.8 percent of the total electricity supply per year, and 0.6 percent on average for solar—much lower than in the IPCC recommended scenarios. Sustained growth faster than 2 percent per year for wind and 1.5 percent for solar has only occurred in smaller countries such as Portugal, Ireland and Chile.

"It is likely that faster growth is easier to achieve in smaller more homogenous countries, rather than in large diverse systems," says Jessica Jewell.

"Among larger countries, only Germany has so far been able to sustain growth of onshore wind power comparable with median climate stabilization scenarios. In other words, to stay on track for climate targets, the whole world should build wind power as fast as Germany built recently. There may be limits to how fast wind and solar can be expanded and thus we should systematically analyze the feasibility of other climate solutions, especially for fast growing Asian economies such as India and China," says Aleh Cherp, professor of Environmental Sciences and Policy at Central European University and Lund University.

The article "National growth dynamics of [wind](#) and [solar power](#) compared to the growth required for global climate targets" was published in the journal *Nature Energy*, written by Aleh Cherp, Vadim Vinichenko, Jale Tosun, Joel A. Gordon and Jessica Jewell.

**More information:** Aleh Cherp et al, National growth dynamics of wind and solar power compared to the growth required for global climate targets, *Nature Energy* (2021). [DOI: 10.1038/s41560-021-00863-0](#)

Provided by Chalmers University of Technology

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