

Cutting emissions gradually will avert sudden jump in warming

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Reducing fossil fuel emissions steadily over coming years will prevent millions of premature deaths and help avoid the worst of climate change without causing the large spike in short-term warming that some studies have predicted, new analysis by researchers at Duke University and the University of Leeds finds.

"We analyzed 42 scenarios presenting different timescales for a very rapid worldwide transition from fossil fuels to [clean energy](#)," said Drew Shindell, Nicholas Professor of Earth Science at Duke's Nicholas School of the Environment. "Under all of these scenarios there is no significant spike in warming, no climate penalty, and we actually see a decrease in warming rates within two decades of the start of the phase-out."

"The only scenarios that result in a significant warming spike are implausible ones in which worldwide emissions are halted instantaneously or over a very short timescale. But in the real world, that's not going to happen. It will take decades to transition to clean energy," Shindell said.

Climate negotiations have been clouded in recent years by the view that cleaning up fossil-fuel air pollution rapidly will unintentionally lead to a near-term rise in atmospheric warming of about a half-degree Celsius, which might take up to a century to reverse. The idea is that the sun-obscuring aerosols fossil fuel consumption puts into the atmosphere would clear relatively quickly, but long-lived greenhouse gases such as carbon dioxide would persist and create a net warming.

"Our finding shows these fears are unfounded," said Christopher J. Smith, research fellow at the School of Earth and Environment at Leeds.

"Under a realistic rate of fossil-fuel phase-out, we do clean up the air, unmasking historically suppressed cooling," Smith said. "But we would also reduce the rate of further [greenhouse gases](#) put into the atmosphere, slowing down future warming. These competing effects will approximately balance out, and any increase in the rate or level of near-term [warming](#) will be quite small compared to what we would see if we allowed emissions to remain at current levels," he said.

The new finding is good news on the public health front, too, Shindell

noted, because aerosol particulates are highly toxic when inhaled and cause millions of [premature deaths](#) each year, "so taking these steps to reduce emissions and slow [climate change](#) will also save lives," he said.

"We know there are enormous risks associated with continuing to burn fossil fuels," Shindell said. "What this work shows is that it's mistaken to think that the transition to clean energy also has large environmental risks. Instead, it provides huge public health benefits while also mitigating climate change."

Shindell and Smith published their peer-reviewed study Sept. 18 in *Nature*.

By showing an alignment between climate and public health policy goals, Shindell and Smith hope their finding will spur progress in climate negotiations and add momentum to the discussions and presentations taking place at the UN Climate Action Summit in New York City on Sept. 23.

"This research dispels the misconception that the air-quality and climate benefits of transitioning to clean energy play out at different timescales," Smith emphasized. "Climate change mitigation does not come at the expense of air pollution reductions."

"As the world moves to decarbonize and transition away from fossil fuels, we must ensure that our actions benefit both climate and human well-being," said Helena Molin Valdéz, head of the Climate and Clean Air Coalition Secretariat at the UN Environment office in Paris. This new study will help do just that, she noted.

"It is important to see clearly that transitioning away from [fossil fuels](#) does not lead to environmental trade-offs, but produces benefits for both combatting [climate](#) change and improving air quality," said Maria Neira,

director of the World Health Organization's Department of Public Health, Environmental and Social Determinants of Health.

More information: Drew Shindell et al, Climate and air-quality benefits of a realistic phase-out of fossil fuels, *Nature* (2019). [DOI: 10.1038/s41586-019-1554-z](https://doi.org/10.1038/s41586-019-1554-z)

Provided by Duke University

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