Avoiding fossil fuel 'lock-in' could limit global temperature rise

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Credit: Michael Gaida

Research suggests there would be a 64 percent chance of limiting the increase in global average temperatures to 1.5°C above pre-industrial levels, if fossil fuel infrastructure was phased out immediately.

An international team of scientists led by the University of Leeds has used a new climate model to determine what would happen to global temperatures if the phase-out process for carbon-intensive infrastructure

had begun at the end of 2018.

In the study's scenario, fossil fuel power plants, cars, aircraft, ships, and industrial infrastructure are replaced with zero carbon alternatives at the end of their design lifetime – the point where large scale refurbishments or maintenance would be required.

The team found that if the process of replacing these systems with zero carbon alternatives – or not replacing them at all – began from the end of 2018, and their subsequent CO_2 emissions decreased at close to a linear rate as a result, the chance of keeping global temperature rise to below 1.5°C is 64 percent.

Study lead author Dr Chris Smith, from the School of Earth and Environment and Priestley International Centre for Climate at Leeds, said: "All fossil fuel infrastructure, such as coal power plants, carries a climate change commitment. A new coal plant will emit carbon dioxide for roughly 40 years across its lifecycle which in turn affects global warming.

"Investments into carbon-intensive infrastructure and their development and maintenance lock us in to the associated carbon emissions and make the transition to lower-carbon alternatives more difficult.

"Our research found that the current amount of fossil fuel infrastructure in the global economy does not yet commit us to exceeding the 1.5°C temperature rise limit put forward by the Paris Agreement. We may have missed starting the phase out by the end of 2018, but we are still within the margin of achieving the scenario the model put forward.

"Every year we delay in phasing out this infrastructure makes the fossil fuel 'lock-in' harder to get out of and the possibility of keeping global temperature rise below 1.5°C less likely."

In an article written for The Conversation, Dr Smith explains the details of the research findings and the necessity of phasing out fossil fuel infrastructure immediately.

The study, published today in *Nature Communications*, focused on energy generation, transport and industrial sectors, which have the best data available for the CO_2 emissions for their historical lifetimes and produce 85 percent of global emissions.

The study produced a scenario that reduces CO_2 emissions to net zero over 40 years. By contrast, the recent special report by the Intergovernmental Panel on Climate Change (IPCC) highlighted a requirement for CO_2 emissions to be reduced to net zero over the next 35 years. The authors explained that window of five years to get to net zero can be attributed to different modelling approaches with some of the difference is accounted for by the timing of emissions phase out.

The authors also acknowledged that their results rely on no large-scale climate tipping points being breached in the coming decades, such as large amounts of carbon dioxide that would be released from extensive permafrost melting.

More information: Christopher J. Smith et al. Current fossil fuel infrastructure does not yet commit us to 1.5 °C warming, *Nature Communications* (2019). DOI: 10.1038/s41467-018-07999-w

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