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Stopping black carbon will not buy time for global warming, new study shows

Climate action efforts that focus on so-called “short-lived climate forcers” (SLCF) such as black carbon will do little to keep global warming below 2°C in the long term, says a new study published today in the Proceedings of the National Academy of Sciences.

The study, authored, amongst others, by three Climate Analytics scientists - Joeri Rogelj (lead author), Michiel Schaeffer and Bill Hare - shows that efforts to focus on cutting black carbon must go hand in hand with wider efforts to cut carbon dioxide emissions, or they will have little effect on global warming.

Some governments have seized upon reducing black carbon as a way to fight climate change in the short term. The new study now puts important question marks next to the effectiveness of such action for limiting climate change in the long term.

The new study has done what previous studies have not: it focused on the link between short-lived climate forcers like black carbon and long-lived forcer CO₂. They are often released from common sources and are therefore intricately linked, for example black carbon is emitted alongside CO₂ from a coal-fired power station, just as it is emitted from a diesel vehicle. For reasons of simplification, this linkage was often ignored by studies that carried out long-term projections of the climate effects of SLCF's. But this turns out to be the crucial missing link in the understanding of what black carbon can contribute in the long term.

“Reducing black carbon will clean up our air and reduce our impact on the climate in the next couple of decades, but we find that it cannot be a substitute for action to stop carbon dioxide emissions,” said Dr Joeri Rogelj, lead author of the paper. “It turns out that reducing black carbon cannot buy us time for putting in place stringent carbon dioxide emission reductions.”

The authors found that while deep cuts in methane in the short term do hedge against exceeding important temperature thresholds, they only do this if linked with deep cuts in carbon dioxide emissions. The effects of methane and hydrofluorocarbons (HFC's) are fairly robust across all scenarios, but in the long term, black carbon's effects become vanishingly small. Consequently lumping these together would obscure many of these important differences. From a climate perspective, governments would be better to focus on comprehensive CO₂ mitigation policies, which will lead to reductions in co-emitted pollutants like black carbon along the way. At the same time, the local health benefits of black carbon can still be a valid, yet entirely different, motivation for reducing black carbon in the near term.

“A rapid phase out of carbon dioxide emissions, including eliminating unmitigated coal from our energy mix, remains the single biggest measure for early action on global warming, which would also reduce a large of air pollutants including black

carbon. This confirms – from a very different perspective – the key finding of a limited carbon budget in the just-published Synthesis Report by the Intergovernmental Panel on Climate Change,” said Dr Michiel Schaeffer.

Reducing black carbon and sulfur dioxide from the atmosphere can be done in ways that do not address carbon dioxide, such as cleaning up car exhausts, diesel engines, and changing fuel in cookstoves, but this would contribute little to the fight against global warming in the long term.

“Efforts to clean up black carbon and other pollutants are all very well and good for their human health benefits, but if we don’t tackle the key gas, carbon dioxide, then we’re not going to solve the problem,” said another of the authors, Dr Bill Hare.

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The full paper is available from the PNAS secure media website until the embargo lifts.

Climate Analytics Climate Analytics is a non-profit organization based in Potsdam, Germany. It has been established to synthesize climate science and policy research that is relevant for international climate policy negotiations. It aims to provide scientific, policy and analytical support for Small Island States (SIDS) and the least developed country group (LDCs) negotiators, as well as non-governmental organisations and other stakeholders in the ‘post-2012’ negotiations. Furthermore, it assists in building in-house capacity within SIDS and LDCs.
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