

Biofuels could increase global warming with laughing gas, says Nobel prize-winning chemist

Growing and burning many biofuel crops may actually raise, rather than lower, greenhouse gas emissions. That's the conclusion of a new study led by Nobel prize-winning chemist Paul Crutzen, best known for his work on the ozone layer.

He and his colleagues have calculated that growing some of the most commonly used biofuel crops releases around twice the amount of the potent greenhouse gas nitrous oxide (N₂O, also known as 'laughing gas') than previously thought – wiping out any benefits from not using fossil fuels and, worse, probably contributing to global warming.

'The significance of it is that the supposed benefits of biofuels are even more disputable than had been thought hitherto,' Keith Smith, a co-author on the paper and atmospheric scientist from the University of Edinburgh, told Chemistry World magazine. 'What we are saying is that [growing many biofuels] is probably of no benefit and in fact is actually making the climate issue worse.'

The work is currently subject to open review in the journal Atmospheric Chemistry and Physics, and Crutzen himself has declined to comment until that process is completed. But the paper suggests that microbes convert much more of the nitrogen in fertilizer to nitrous oxide than previously thought – 3 to 5 per cent, which is twice the widely accepted figure of 2 per cent used by the International Panel on Climate Change (IPCC) to calculate the impact of fertilizers on climate change.

For rapeseed biodiesel, which accounts for about 80 per cent of the biofuel production in Europe, the relative warming due to nitrous oxide emissions is estimated at 1 to 1.7 times larger than the relative cooling effect due to saved fossil CO₂ emissions. For corn bioethanol, dominant in the US, the figure is 0.9 to 1.5. Only cane sugar bioethanol – with a relative warming of 0.5 to 0.9 – looks like a better alternative to conventional fuels.

In the wake of the findings comes a recent report prepared by the OECD for a recent Round Table on Sustainable Development, which questioned the benefits of first generation biofuels and concluded that governments should scrap mandatory targets. Richard Doornbosch, the report's author, says both the report and Crutzen's work highlights the importance of establishing correct full life-cycle assessments for biofuels. 'Without them, government policies can't distinguish between one biofuel and another – risking making problems worse,' he said.

Read the full text of this Chemistry World exclusive at:

<http://www.rsc.org/chemistryworld/News/2007/September/21090701.asp>

The full research paper is available here:

<http://www.atmos-chem-phys-discuss.net/7/11191/2007/acpd-7-11191-2007.html>

Source: Royal Society of Chemistry

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