Biofuels emissions may be 'worse than petrol'

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Biofuels, once seen as a useful way of combating climate change, could actually increase greenhouse gas emissions, say two major new studies.

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Biofuel production has accelerated over the last 5 years, spurred in part by a US drive to produce corn-derived ethanol as an alternative to petrol.

The idea makes intuitive environmental sense – plants take up carbon dioxide as they grow, so biofuels should help reduce greenhouse gas emissions – but the full environmental cost of biofuels is only now becoming clear.

Extra emissions are created from the production of fertiliser needed to grow corn, for example, leading some researchers to predict that the energy released by burning ethanol is only 25% greater than that used to grow and process the fuel.

Carbon debt

The new studies examine a different part of biofuel equation, and both suggest that the emissions associated with the crops may be even worse than that.

One analysis looks at land that is switched to biofuel crop production. Carbon will be released when forests are felled or bush cleared, and longer-term emissions created by dead roots decaying.

This creates what Joseph Fargione of The Nature Conservancy and colleagues call a "carbon debt". Emissions savings generated by the biofuels will help pay back this debt, but in some cases this can take centuries, suggests their analysis.

If 10,000 square metres of Brazilian rainforest is cleared to make way for soya beans – which are used to make biodiesel – over 700,000 kilograms of carbon dioxide is released.

The saving generated by the resulting biodiesel will not cancel that out for around 300 years, says Fargione. In the case of peat land rainforest in Indonesia, which is being cleared to grow palm oil, the debt will take over 400 years to repay, he says.

Missing corn

The carbon debts associated with US corn are measured in tens rather than hundreds of years. But the second study suggests that producing corn for fuel rather than food could have dramatic knock-on effects elsewhere.

Corn is used to feed cattle and demand for meat is high, so switching land to biofuel production is likely to prompt farmers in Brazil and elsewhere to clear forests and other lands to create new cropland to grow the missing corn.

When the carbon released by those clearances is taken into account, corn ethanol produces nearly twice as much carbon as petrol.

"The implications of these changes in land use have not been appreciated up until now," says Alex Farrell, at the University of California, Berkeley, US.

Farrell adds that biofuels could still prove useful in the fight against climate change, but using different approaches – such as focusing on crops for both food and fuel, or new technology for generating biofuels from food waste.

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