

Biofuels and Indirect Land-Use Change The evidence keeps piling up

Briefing on latest science, September 2013



It's crunch time for biofuels

The vote in the European Parliament scheduled for the 11th of September will be a critical moment in limiting the harm from first generation biofuels and correcting the flaws in existing EU biofuels law. By taking into account the full impacts of indirect land use change (ILUC) from biofuels, MEPs will have the opportunity to help ensure that the biofuels industry does not drive production that harms wildlife, the climate or vulnerable people. This short briefing outlines the scale of the problem today and includes some of the latest research in the area.

Examining the evidence

In the midst of the politics about biofuels it can be forgotten that more and more evidence is accruing on their damaging impacts around the world. BirdLife Europe has been campaigning for years for policies that ensure only sustainable biofuels are produced. We believe it is critical that MEPs take into account the latest evidence ahead of the plenary debate and vote. In 2011, over 200 scientists wrote to the European Commission calling for policies to take account of indirect land use change:

"Without addressing land use change, the European Union's target for renewable energy in transport may fail to deliver genuine carbon savings in the real world. It could end up as merely an exercise on paper that promotes widespread deforestation and higher food prices."

Biofuels, food and indirect land use change (ILUC)

Professor David Powlson, Lawes Trust Senior Fellow and retired scientist from Rothamsted Research Centre writes (2013) that indirect land use change is contributing to significant greenhouse gas emissions: "The current world population of 7 billion people obviously has a huge demand for food. It is estimated that to meet projected demand by 2050 will require an increase of 60% compared to current annual production. In this situation, there is a strong likelihood that any loss of food production from diverting land from food to fuel will be replaced by increasing food production elsewhere in the world. Often this will involve clearing of land that is currently under natural or semi-natural vegetation, which will often have a high content of organic matter such as grasslands or peats in tropical regions. When these lands are cleared there is a large loss of carbon to the atmosphere as carbon dioxide. Thus growing biofuels at one location, with the aim of decreasing GHG emissions, can easily have the perverse effect of increasing emissions through land use change elsewhere in the world."

Beyond carbon: biofuels and NOX emissions

Professor Keith Smith, Senior Honorary Professorial Fellow at the School of Geosciences at the University of Edinburgh writes that, while the debate has been going on in Brussels for the last years "there have been new scientific publications that beef up the argument against crop-based (first-generation) biofuels because of the nitrous oxide (N₂O) emissions from nitrogenous fertiliser use."

In an earlier paper, back in 2008 by Paul Crutzen (winner of the Nobel Prize) and others including Keith Smith, it was suggested that N₂O emissions were high enough to negate any global warming benefits, compared with fossil fuels. That work is now supported by direct experimental evidence: a paper that came out only last month, from Griffis et. al. in Minnesota, which showed that the US corn belt – a huge agricultural region and the source of most of the corn-derived bioethanol – has

N₂O emissions even higher than the global average calculated by the Crutzen group, relative to nitrogen fertiliser applied.

Even a recent modelling paper which uses lower assumed emission values of N₂O by Pehnelt & Vietze argues that while some biodiesel emissions can meet the current EU requirement of a 35% reduction in greenhouse gases from biofuels compared with fossil fuels, even given "conservative assumptions on N₂O emissions", many others absolutely cannot do so. The real situation may be much worse even than this modelling suggests.

ILUC and biodiversity

Dr. Ben Phalan of the University of Cambridge highlights that a soon-to-published review of 53 studies by Immerzeel et al. (GCB Bioenergy in press) found that the biodiversity impacts of bioenergy crops depended on the initial land use and were mostly negative, especially in tropical regions. Very few studies have looked at ILUC impacts on biodiversity, but those that have indicate that **ILUC effects on biodiversity are likely to be larger than the effects of direct land use change.**

As a counterpoint to industry claims that new biofuel production will come from farmland that's currently sitting idle, a paper published earlier in 2013 by Phalan et al. shows that cropland expansion is continuing on a large scale, and threatens many of the planet's areas of highest biodiversity, including the Central African rainforests and the fringes of the Amazon basin. Cropland area in tropical countries is increasing by around 48,000 km² (more than twice the size of Wales) each year, and of the ten most rapidly expanding tropical crops, seven are used as biofuel feedstocks. At present, most of this expansion is not caused by biofuels, but increasing the demand for biofuel feedstocks keeps prices high and encourages further expansion into habitats of critical importance for wild species. We already know that tropical forests were the primary source of new agricultural land in tropical countries in recent decades, from a study by Gibbs et al. In fact 83% of new agricultural land (including both cropland and pasture) in tropical countries came from forested land.

What needs to be done

In 2011 it was already clear that tackling ILUC was crucial to experts at the Joint Research Centre of the European Commission (JRC). JRC experts unanimously agreed that "even when uncertainties are high, there is strong evidence that the ILUC effect is significant and that this effect is crop-specific. The sustainability criteria in the Renewable Energy Directive (RED) and Fuel Quality Directive (FQD) limit direct land use change (LUC) but they are ineffective to avoid ILUC, and therefore additional policy measures are necessary."

- ✓ **MEPs should introduce binding ILUC factors to ensure that all climate impacts of biofuels are included.**

The International Food Policy Research Institute (IFPRI) found that "simulations for EU biofuels consumption above 5.6% of road transport fuels show that ILUC emissions can rapidly increase and erode the environmental sustainability of biofuels."

- ✓ **MEPs should strengthen and tighten the 5% cap on land based biofuels**

It is important in the debate that mistakes made with first generation are not repeated with future biofuels.

- ✓ **MEPS should ensure that advanced biofuels are sustainable and reduce emissions**

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This briefing looks at the latest views from scientists but a comprehensive review of the science of can be found at <http://www.transportenvironment.org/what-we-do/what-science-says-0>