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Europe



## THE REAL IMPACT OF GROWING BIOFUELS

### Calculating Indirect Land-Use Change

Biofuels are being promoted as a climate-friendly alternative to conventional oil. However, for most biofuels, alleged greenhouse gas (GHG) savings do not represent the reality. As soon as crops or land that would have otherwise been used for producing food or animal feed are used for growing biofuels, indirect emissions occur through the displacement of agriculture to new areas. Research increasingly indicates that the emissions released through land-use change could be substantial and outweigh any savings from using biofuels. **It is therefore essential that a realistic correction factor is introduced when calculating all GHG emissions associated with biofuels.**

*"The balance of evidence shows a significant risk that current [biofuel] policies will lead to net greenhouse gas emissions..."* (Gallagher Review 2008)

#### **More biofuels = more annual emissions**

There are two types of indirect emissions caused by increasing the amount of land used for agriculture to meet biofuel demand: i) indirect annual emissions and ii) one-off indirect land-use change (ILUC) emissions. Indirect annual emissions are due to fuel and fertilizer use, as well as the change in nitrous oxide release from farm soils in the countries where the additional displaced production will take place. One-off land-use changes occur when new land is converted for agriculture, which can lead to the destruction of carbon stocks and the release of substantial GHG emissions.

#### **ILUC for real: soy expansion and deforestation**

*"...the largest increase in crop area resulting from either bioethanol or biodiesel expansion would seem to be for soybeans in Brazil. A detailed GIS study shows that soybean is encroaching directly and by displacement on rainforest and "refutes the claim that agricultural intensification does not lead to new deforestation [Morton 2006]." (Joint Research Centre 2008)*

#### **More biofuels = more land-use change**

Indirect land-use change can lead to extra GHG emissions if the area of arable land is increased so as to provide the extra crops needed to deliver on EU biofuels policy. This is because a large part of the carbon stored in undisturbed natural soils and forests is released as carbon dioxide when the land is cleared and the soil disturbed. Replacing 10% of EU diesel with biodiesel would account for around 19% of world vegetable oil production in 2020 which means more land will be planted with crops and more land somewhere in the world will be converted into farmland, thereby releasing GHG emissions. The EU's Joint Research

Centre estimates that around 44% of the additional vegetable oil demand created by biofuels will come from palm oil originating in Malaysia or Indonesia. They state that “12% of the extra vegetable oil for biodiesel would come indirectly from palm oil on peat land (more than enough to negate the GHG savings from all EU biofuels).” (JRC 2008)

### ILUC for real: Palm oil and deforestation

“According to the latest analysis [Rieley 2008], the CO<sub>2</sub> losses from oil palm plantations on drained peat-forest are about 170 tonnes/ha/y. An average palm oil yield of 4 t/ha/y would substitute enough rapeseed oil from the food market to make 2.5 toeq/y of biodiesel. This would save ~4 t CO<sub>2</sub> eq/ha/y (data from JEC 2007). So if roughly  $\sim 4/170 = 2.4\%$  of biodiesel comes directly or indirectly from palm oil grown on peatland, the GHG savings from EU biodiesel are cancelled out.” (JRC 2008)

### How ILUC works

Indirect land-use change can occur when the production of biofuel feedstock displaces certain activities to other areas where they may cause negative land-use changes such as deforestation. An example of this is where demand for palm oil for the biofuel market is met from existing plantations which previously supplied the food market (see figure below). As palm oil is now supplied to the energy sector, the food sector is confronted with a shortage in supply. In the short term, this will lead to higher prices given that supply is slow to adapt to new market circumstances. In time, the higher prices will attract new producers and supply will be increased. This additional supply will require additional plantations. The location of these additional plantations is uncertain, and more importantly, will be out of the control of the energy sector. (Ecofys 2007)

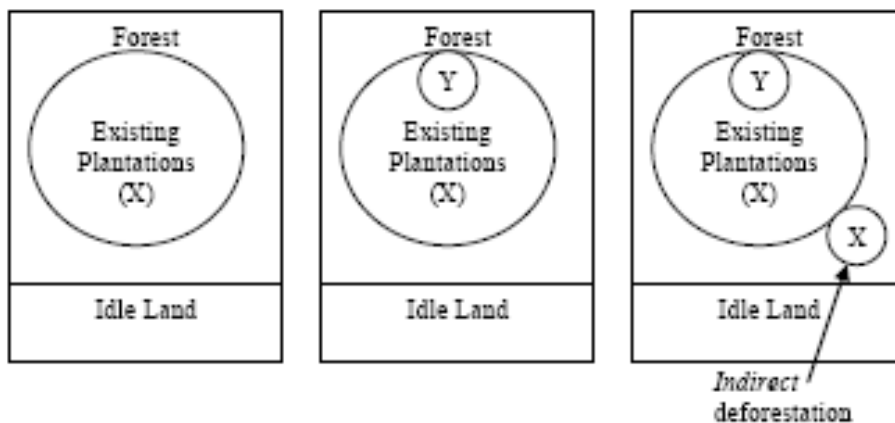


Figure 2-3 Example of displacement mechanism causing indirect deforestation. Y is new demand from biofuel sector from existing plantations. X is expansion of existing plantations as a result of displacement effects. (Dehue 2006)

### More land-use change = more greenhouse gas emissions

Ongoing research is attempting to estimate the GHG emissions caused by the potential indirect land-use change impacts of biofuels. Some modelling carried out to date provides

indications that the likely ILUC emissions are between 25 and 110g CO<sub>2</sub>eq/MJ (European Commission 2008) whereas other modelling suggests even higher impacts in worst case scenarios and recommends a correction factor of 120g CO<sub>2</sub>eq/MJ (Searchinger 2008).

The industry committee of the European Parliament voted that the Commission should develop a methodology to calculate indirect impacts of different biofuel crops and production pathways by the end of 2011. If the Commission fails to perform this task, a modest correction factor of 40g CO<sub>2</sub>eq/MJ should then apply to all biofuels grown on agricultural land from that date on, according to the Parliament.

The United States is more advanced in this debate and has already introduced legislation (Energy Independence and Security Act 2007) that calls for direct and indirect emissions from land-use change to be taken into account when calculating the climate performance of biofuels.

#### **ILUC for real: US corn**

*“By using a worldwide agricultural model to estimate emissions from land-use change, we found that corn-based ethanol, instead of producing a 20% savings, nearly doubles greenhouse emissions over 30 years and increases greenhouse gases for 167 years. Biofuels from switchgrass, if grown on U.S. corn lands, increase emissions by 50%.”*  
(Searchinger et al. 2008)

#### ***Taking a climate lead***

The EU is portraying itself as a global leader in the fight against climate change. If biofuels are to play a role in climate policy, the EU needs to take measures to ensure that they do not do more harm than good. Firstly, precautionary action has to be taken to prevent an increase of GHG emissions due to the promotion of biofuels. Secondly, the EU needs to use the best scientific analysis to ensure that only biofuels that lead to significant decreases in GHG emissions are subsidised or encouraged with public policies.

**It is therefore imperative to put in place a realistic correction factor that is sufficiently high so as to adequately reflect the full range of scientific estimates (i.e. up to 110g CO<sub>2</sub>eq/MJ). This will take into account the concrete risks linked to biofuel-related indirect GHG emissions.**

Until specific GHG emission data for different biofuel crops and production pathways are available, the correction factor must be applied for all biofuels, unless a producer can prove that a particular fuel does not lead to indirect impacts.

**The inclusion of indirect impacts is one of the biggest challenges facing biofuel policy and cannot be ignored by the EU.**

## **LIST OF REFERENCES:**

De Santi, Giovanni et al (2008): Biofuels in the European Context: Facts and Uncertainties. Joint Research Centre, European Commission.

Ecofys (2008): Sustainability reporting within the RTFO: framework report, published on RFA website [www.renewablefuelsagency.org](http://www.renewablefuelsagency.org), Renewable Fuels Agency.

Fehrenbach, H., Fritsche, U., Giegrich, J. (2008): Greenhouse Gas Balances for Biomass: Issues for further discussion Issue paper for the informal workshop, January 25, 2008 in Brussels [www.oeko.de/service/bio/dateien/en/ghg\\_balance\\_bioenergy.pdf](http://www.oeko.de/service/bio/dateien/en/ghg_balance_bioenergy.pdf).

Gallagher, Ed et al (2008): The Gallagher Review of the indirect effects of biofuels production. Renewable Fuels Agency, July.

Searchinger, T. et al (2008): Use of U.S. Croplands for Biofuels Increases Greenhouse Gasses through Emissions from Land Use Change. Science, Feb 8, 2008.