

December 2008

Biofuels Position Paper

Biofuels have been presented as the solution to two of the biggest challenges facing governments today- climate change and energy security. Tearfund believes that the increased use of agricultural crops to produce biofuels is causing more harm than good, and although there is the need for urgent action to tackle climate change, biofuels are not a quick fix. Climate change hits the poorest communities hardest, as they are most vulnerable to changing weather patterns and extreme events, so urgent international action is needed to reduce carbon emissions.

However, the rapid expansion in the use of agricultural commodities to produce biofuels has had a significant impact on global food markets, contributing to rising food prices and increased levels of hunger amongst poor and vulnerable communities globally. Changing land use linked to the expansion of biofuels is also leading to environmental degradation, increased rates of deforestation and undermining the livelihoods of poor households.

Main conclusions and policy recommendations

- **Biofuels are not 'carbon neutral'. The whole life-cycle of their production should be included in calculations.** The production of biofuels includes significant carbon emissions. They should therefore not be seen as a 'magic bullet' solution to climate change, as in some cases they may have worse environmental impacts than fossil fuels. There can be a role for biofuels as one component of decarbonising strategies, but only if the environmental and social impacts have been fully addressed.
- **Indirect impacts of biofuels must be taken into account by policy makers.** Tearfund welcomes the recognition by policy makers of the indirect impacts of biofuels on both carbon emissions and poor communities, as evidenced by the UK Gallagher review into this subject. However, we are concerned that these statements may not lead to substantive changes in policy and practice.
- **All governments should review and revise downward their mandates for the amount of biofuels to be added to vehicle fuel.** To protect the vulnerable, a moratorium on targets for biofuels and greater co-ordination internationally, would dampen speculation on agricultural markets, and restore market prices to levels which reflect the true demand for food, making food more affordable for the world's poorest..
- **Future investment in biofuels should be focused around the most efficient technologies, and only those that use inputs that do not compete with food markets.** This means not using land not currently used for agriculture, and producing biofuels from crops that cannot be used for food.
- **Incentives should be created for research and investments in 'second-generation' biofuels.** These include 'closed loop' agricultural systems, which ensure that little energy is wasted in the production process. This should ensure that the most efficient technologies are used for producing biofuels, and carbon emissions are minimised. The use of waste products as biofuels should be encouraged.
- **Biofuels should meet comprehensive sustainability criteria, which are able to be independently monitored.** These should include both direct and indirect land-use change (so as not to compete with food production), water use, and workers' rights.
- **Policies to cut carbon emissions from transport require an integrated approach-** efficiency savings from transport would be far more effective than the use of biofuels.

Background and Definitions

Biofuels¹ are liquid fuels made from organic matter- typically crops- and can be used for many different purposes. This review focuses on the use of biofuels for transportation, since this is the sector that has seen a recent surge in production due to new government mandates promoting their use. Most current biofuels use food or arable crops as inputs, resulting in increased competition for land and water, and linking the markets for food and fuel, resulting in increased food prices. The most efficient biofuels are those that use by-products of other processes as a source of fuel, or where no energy from the production of biofuels is wasted. Biofuels that use waste products, such as cow dung, to provide low-cost sources of fuel for poor communities, could have significant carbon emission reduction and cost benefits, and should be encouraged.

There are two main types of biofuels used for transportation- **ethanol-based** fuels from carbohydrates such as sugarcane, corn and wheat, and **biodiesel** from oilseeds, such as rapeseed, oil palm and jatropha. It is possible to mix these fuels with petrol in blends of up to 5 per cent or 10 per cent in unmodified internal combustion engines. Many new cars and diesel engines are able to take much higher proportions. It is also possible to use these as fuel in power stations, and to produce biogas from maize and agricultural waste, which can be used for heating and cooking.

Food prices and food insecurity

Food prices have soared in the past year, with devastating impacts for the poor and vulnerable. There have been significant surges in food prices across the world, leading to unrest in many countries, such as riots in Haiti in which at least four people died². After 30 years of falling prices, the cost of food has recently increased exponentially, rising by 140% from January 2002 to February 2008³. Overall, wheat prices rose from \$105 in January 2000, to \$167 in January 2006 to \$481 in March 2008⁴. Since March, the price of food has stabilised, but the increased price has continued to undermine the food security of millions of people⁵.

The FAO (Food and Agriculture Organisation of the United Nations), estimates that the number of undernourished people has increased by 75 million to 923 million people⁶- the World Bank estimates that 100 million people are likely to be pushed into poverty by the increases in food prices⁷. Rising food prices are exacerbating food shortages caused by droughts, and regions recovering from natural disasters are particularly hard hit.

Poor households typically spend around half their income on food- the chronically poor may spend over eighty per cent. Increases in food prices are putting a heavy burden on

¹ Some organisations, such as Friends of the Earth refer to 'Agrofuels' rather than 'Biofuels' to emphasise the fact that these come from agricultural biomass and by-products at a farming level, or industrial processing of raw materials. Biofuels can technically refer to fuel produced from any living thing, or the waste they produce, including wood, and methane from animal excrement.

² BBC Website, 'Food riots turn deadly in Haiti' April 2008, <http://news.bbc.co.uk/1/hi/world/americas/7331921.stm>

³ Source World Bank;

<http://web.worldbank.org/WBSITE/EXTERNAL/NEWS/0,,contentMDK:21722688~pagePK:64257043~piPK:437376~theSitePK:4607,00.htm>

⁴ Overseas Development Institute, *Rising food prices: A global crisis*, Briefing Paper, April 2008,

<http://www.odi.org.uk/publications/briefing/bp37-april08-rising-food-prices.pdf>. For up-to-date information on the latest food prices, see the tables produced by FAO, http://www.fao.org/es/ESC/en/15/16/highlight_538.html, IFPRI and the IMF.

⁵ FAO, Food Outlook: Global Markets Analysis, <http://www.fao.org/docrep/011/ai474e/ai474e03.htm>

⁶ FAO, *Briefing Paper: Hunger on the rise*, 17 September 2008 – downloaded 22 September 2008, <http://www.fao.org/newsroom/common/ecg/1000923/en/hungerfigs.pdf>.

⁷ The World Bank, 'Food Price Crisis Imperils 100 Million in Poor Countries, Zoellick Says', April 2008 <http://go.worldbank.org/5W9U9WTJBO>

these households, increasing their costs, and forcing them to eat less and switch to eating cheaper, less nutritious foods leading to a risk of malnourishment.

The effects of food price increases are not felt evenly- households (typically in rural areas) who grow their own food crops may be cushioned from the impacts and could see their incomes rise, but the urban poor and those reliant on imported food are particularly vulnerable. Countries that have experienced chronic instability and conflict, and which are not self-sufficient in agriculture are reliant on buying food on the global markets. These countries are particularly badly affected because they do not have food reserves to absorb the impact of rising prices. The Head of the World Food Programme has described the increases in food prices as a 'silent tsunami'⁸ because of the disastrous humanitarian effects in these areas.

Many factors have contributed to the global food crisis but most analysts, including the World Bank and IMF agree that biofuels have played an important part in the rapid increase in food prices. Other reasons for price increases include: rising costs of agricultural inputs, such as fertiliser, due to high oil prices; increased demand from booming developing countries, such as India and China; speculation on commodity markets; agricultural subsidies and policies; trade liberalisation; and the impacts of climate change and bad weather, leading to poor harvests in countries such as Australia. However, these factors are normally absorbed by the market, without causing a sharp increase in the price of food, as has been experienced in the past year. Indeed a record cereal harvest is expected in 2008, with production up 2.6%⁹. The main 'shock' to the agricultural system which has contributed to food prices escalating is the use of food crops for biofuels- particularly because of subsidies and increased demand created by quotas for the amount of biofuels to be used in transport fuel¹⁰.

The World Bank reports that "Biofuel production has pushed up feedstock prices"¹¹. The food crisis has been exacerbated by speculation on agricultural markets, and protectionist policies by food producing countries, which have sought to cushion the impact of increasing world food prices on their domestic consumers by introducing export limits. This has reduced the supply of food on world markets and pushed these prices higher¹².

The exact impact of biofuels on food prices is controversial and politically sensitive. An unpublished paper by the World Bank, leaked to the Guardian newspaper, states that biofuels and the resulting land use shifts, speculation and shortages that they have led to, were responsible for three-quarters of the 140% increase in food prices. The Guardian reports that the World Bank sought to suppress analysis that blamed biofuels as the main cause of high food prices because it would be political damaging for governments that have set high biofuel targets, particularly the US. The leaked report states that "the most important (factor) was the large increase in biofuels production in the U.S. and EU. Without the increase in biofuels, global wheat and maize stocks would not have declined appreciably and price increases due to other factors would have been moderate"¹³. Biofuels are therefore significantly responsible for food price increases, alongside other factors such as failure of harvests and increasing demand for food.

⁸ BBC News, 'Assessing the global food crisis', April 2008, http://news.bbc.co.uk/1/hi/in_depth/7361945.stm

⁹ FAO, 'Poorest countries' cereal bill continues to soar, governments try to limit impact' April 2008 – downloaded September 2008, <http://www.fao.org/newsroom/en/news/2008/1000826/index.html>

¹⁰ Braun, Joachim von, *HIGH AND RISING FOOD PRICES Why Are They Rising, Who Is Affected, How Are They Affected, and What Should Be Done?*, IFPRI, April 2008, <http://www.ifpri.org/presentations/20080411jvbfodprices.pdf>

¹¹ The World Bank (2008), 'Biofuels: The Promise and the Risks', *World Development Report 2008*, <http://go.worldbank.org/UK40ECPQ20>

¹² IFPRI, *IFPRI Forum*, July 2008, <http://www.ifpri.org/PUBS/newsletters/IFPRIForum/if22.pdf>

¹³ Guardian website, 'Secret Report: biofuel caused food crisis', July 4th 2008, <http://www.guardian.co.uk/environment/2008/jul/03/biofuels.renewableenergy>

The current global economic crisis presents a significant risk for food security. Although in the short term this may lead to prices coming down, it may also lead to considerable instability in food markets. Fluctuations of supply could lead to increasing vulnerability for poor communities¹⁴.

Climate Change and Biofuels

Climate change is having a devastating effect on the poorest people in the poorest regions of the world. In order to address climate change, drastic cuts in emissions of greenhouse gases are required – around 50-85% globally by 2050¹⁵. Many countries see investment in biofuels as part of the solution to these problems, and have introduced obligatory targets for the proportion of road fuel that comes from renewable sources.

Biofuels targets

The production of biofuels has increased in response to new policies and incentives promoting their use, including subsidies. Governments have seen them as a solution to two major international challenges- energy security and climate change. Biofuels are often presented as a climate-friendly fuel because, in theory, they absorb as much CO₂ from the atmosphere when they grow as they produce when burnt. However, new evidence suggests that they may not be the solution to either of these problems, and are instead contributing to food insecurity.

The World Bank reports that the grain needed to fill one 4x4 or sport utility vehicle (SUV) with ethanol (240 kg of maize for 100 litres of ethanol¹⁶) could feed one person for a year. Policy makers have been heavily influenced by agricultural lobbyists who have stressed the benefits of creating new agricultural markets and rural development opportunities. There are many interests groups who stand to benefit from government regulations mandating the use of biofuels, so any attempt to remove these is likely to be met with significant opposition.

The production of biofuels has increased rapidly in the past five years, and is due to increase more in future. Global production of biofuels amounted to 62 billion litres or 36 million tonnes of oil equivalent in 2007. Global ethanol production tripled between 2000 and 2007. Global production of ethanol as fuel in 2006 was around 40 billion litres, and is expected to grow by a further 20% in 2008¹⁷. Nearly 90% of this was produced in Brazil and the United States, which has recently become the largest producer.

Many governments have now set targets for biofuel production or use. These include Australia, Brazil, the EU, India, Indonesia and the USA¹⁸. In many cases these are mandatory legal targets, which specify the proportion of biofuels to be mixed petrol.

Targets for biofuels production and use (selected OECD countries)

EU	5.75% by 2010 (indicative target set in 2003 biofuels directive), 10% by 2010 (binding target proposed in 2006 renewable energy roadmap)
France	7% (2010) 10% (2015)

¹⁴ FAO, 'Clinton at UN: food, energy, financial woes linked', October 2008,

<http://www.fao.org/newsroom/en/news/2008/1000945/index.html>

¹⁵ IPCC (2007), Summary for Policymakers In: *Climate Change 2007: Mitigation. Contribution of Working Group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*,

<http://www.ipcc.ch/pdf/assessment-report/ar4/wg3/ar4-wg3-spm.pdf>

¹⁶ The World Bank (2008), 'Biofuels: The Promise and the Risks', *World Development Report 2008*,

<http://go.worldbank.org/ZJIAOSUFU0>

¹⁷ Renewable Fuels Energy, *The Gallagher Review of the indirect effects of biofuels production*, July 2008, p17.

http://www.dft.gov.uk/rfa/db/documents/Report_of_the_Gallagher_review.pdf. Reference from F.O. Lichts 2008.

¹⁸ Biofuels: An economic assessment. OECD and IEA (2008) [OECD](http://www.oecd.org) publishing

UK	5% by 2010
Japan	50 million litres of biofuels produced domestically by 2011
New Zealand	Mandatory target of 3.4% of total transport fuel sales by 2012
US	36 billion gallons by 2022

Adapted from OECD (2008)

Biofuels target in the UK

In the UK, the Renewable Transport Fuel Obligation (RTFO) came into force in April 2008. This sets a target of 2.5% of fuel to come from renewable sources, rising to 5% by 2010. Because of concerns about the impact of biofuels the UK government launched the Gallagher review - to ensure that the full economic, environmental and social impact of biofuel production is taken into account. The review reported in July 2008 that the rush to develop biofuels had a 'significant' role in the dramatic increase in food prices, and recommended that the UK targets are revised to 5% by 2013/14, based on per annum increases of 0.5%. Policy changes will be incorporated into the UK Renewable Energy Strategy which will be published in spring 2009.

As part of the RTFO, the UK introduced the world's first Carbon and Sustainability (C&S) scheme, which includes targets for the proportion of feedstock that meets acceptable levels of environmental performance and greenhouse gas savings. The Gallagher review recommends strengthening these criteria which currently encourage rather than require companies to source biofuels sustainably- through a process of naming, praising and shaming suppliers as appropriate.

The government has announced that by April 2010 the RTFO should reward biofuels in accordance with the greenhouse gas savings they offer, rather than by volume, and by April 2011, they would only be awarded if they meet 'appropriate sustainability criteria'. The UK has indicated that it will seek approval from the WTO and EU to introduce these criteria. However, there are big question marks as to how effective sustainability criteria will be, and therefore Tearfund believes that the expansion of biofuels should be restricted until these are shown to work in practice. Although this is a promising step, certification has many drawbacks, and could be a distraction from the key issues of reducing energy consumption and improving efficiency. Tearfund believes that this is too little too late, and that sustainability criteria should be in place before more damage is done.

The EU

The EU agreed to a proposal in the 2006 Renewable energy roadmap that mandated that biofuels should make up 10% of transport fuels by 2020. This is based on the condition that these are sustainably produced, and that 'second generation' biofuels are successfully developed¹⁹. However, in September 2008 members of the European Parliament voted to revise the target to specify 6% from biofuels and 4% from technologies that pose less of a threat to food security and the environment²⁰

The EU estimates that the impact on food prices based on its target of 10% of biofuels coming from feedstock by 2020 would be an increase in cereal prices by 3-6%, rapeseed by 8-10%, and sunseed by 15% as compared to 2006 levels²¹. The International Food Policy Research Institute (IFPRI) estimates that maize products will

¹⁹ Second generation biofuels currently under investigation, such as ethanol created from cellulosic sources - woody plants like switchgrass or poplar rather than corn or sugarcane, have the potential to cut greenhouse gas emissions by 90% or more when replacing gasoline. This is because the ethanol conversion process burns part of the plant, rather than fossil fuels, to provide the heat needed for fermentation. Such technologies are not yet in widespread commercial use.

²⁰ Oxfam, 'EU reduces 2020 biofuels target', September 2008, http://www.oxfam.org.uk/applications/blogs/policy/2008/09/members_of_the_european_parliament.html

²¹ European Commission, *Tackling the challenge of rising food prices: Directions for EU Action*, 20 May 2008, http://ec.europa.eu/commission_barroso/president/pdf/20080521_document_en.pdf

rise by 26% by 2020 under current plans for biofuels expansion, and by 72% with drastic expansion.²² Official forecasts predict increases in efficiency and yield to meet the increased demand for crops. However, these projections could pose significant risks if efficiency increases do not materialise, and food crops are displaced.

Unsustainable and inefficient targets

It is expected that, by 2016, corn acreage for bioethanol in the US will rise to 43% of the entire national corn land harvested for grain in 2004²³. The US corn-based biofuels industry is extremely inefficient. If the entire corn harvest of the US was diverted to ethanol, it would only be able to replace one sixth of the petrol sold in the US. If the entire world supply of corn were switched to ethanol, this would only be able to replace 40 per cent of global petrol consumption²⁴.

Meeting the challenges of energy security and climate change could be better met by introducing greater vehicle efficiency targets for cars and a more sustainable transport system. Improving vehicle efficiency and reducing consumption are central to reducing emissions of CO₂.

Massive subsidies

As David King, the UK government's former chief scientific adviser says, "All we are doing by supporting these is subsidising higher food prices, while doing nothing to tackle climate change"²⁵. By forcing up food prices, support for biofuels acts as a tax on food- in effect, the poor are subsidising the development of the biofuels industry, with the main beneficiaries being farmers, investors and large agribusinesses. In total, OECD countries provide subsidies totalling around \$13-15 billion²⁶. Meanwhile the poor and vulnerable face rising prices and greater food insecurity, a scandalous injustice.

To make biofuels competitive and to stimulate the investment needed to increase the supply of crops and processing plants required to meet the mandated targets for fuel, governments are providing massive subsidies to farmers and producers. The EU provided at least €3.6 billion in 2006 to support biofuels, a highly inefficient use of these funds.²⁷ In the US there are more than 200 support measures, which cost around US\$5.5 billion to US\$7.3 billion in the US, the equivalent to US\$0.38 to US\$0.49 per litre of petroleum equivalent of ethanol²⁸. Domestic US producers also receive additional support through high import tariffs on ethanol.

²² Overseas Development Institute, *Rising food prices: A global crisis*, Briefing Paper, April 2008, p3.

²³ European Commission, *Tackling the challenge of rising food prices: Directions for EU Action*, 20 May 2008, http://ec.europa.eu/commission_barroso/president/pdf/20080521_document_en.pdf

²⁴ Oxfam, *Another Inconvenient Truth*, June 2008, p2. <http://www.oxfam.org/files/bp114-inconvenient-truth-biofuels-0806.pdf>

²⁵ The Guardian, 'Secret Report: Biofuel caused food crisis', July 4th 2008, <http://www.guardian.co.uk/environment/2008/jul/03/biofuels.renewableenergy>

²⁶ OECD Observer, <http://www.oecdobserver.org/news/fullstory.php/aid/2594/Biofuels.html>

²⁷ IISD (2007), *Biofuels – At What Cost?*, October 2007, http://www.gem.sciences-po.fr/content/research_topics/trade/ebp_pdf/GSI-European_Report_on_support_to_Biofuels-oct07.pdf

²⁸ The World Bank (2008), 'Biofuels: The Promise and the Risks', *World Development Report 2008*, <http://go.worldbank.org/UK40ECPQ20>

Analysis of the impact of biofuels on greenhouse gas emissions

Biofuels have been promoted as carbon-neutral, in that theoretically they absorb the same amount of CO₂ from the atmosphere when they grow as they release when burned. This simple logic has made biofuels an attractive option for policy makers.

However, the impression that biofuels are carbon neutral is misleading, since new evidence suggests that expanding demand for biofuels is having damaging indirect effects on the environment and poor communities. Further, when the whole life-cycle of the production of biofuels is considered, they appear far less efficient. This is because the crops may be grown intensively using nitrogen-based fertilisers, machinery, and the refining process requires large amounts of fossil energy.

Research by Nobel Laureate Paul Crutzen suggests that biofuels may not be an effective way of mitigating global climate change. This is because of the emissions of nitrous oxide, a greenhouse gas 296 times more potent than carbon dioxide, which is released through the decomposition of nitrogen-based fertilisers, which are commonly used in the production of corn-based ethanol in the USA and rapeseed oil in the EU²⁹.

Each crop used for biofuels has different opportunities and threats related to them. Some may have benefits for rural communities by providing increased incomes, but others may be harmful, with negative social or environmental impacts. Government policies on biofuels should recognise these differences, and include regulations on the types of crops that are grown, and criteria to ensure that the conditions in which they are grown are sustainable environmentally and socially. The outcomes for poor rural communities depend on the specific context of the country and the policies adopted, according the FAO director General, who said that "Current policies tend to favour producers in some developed countries over producers in most developing countries."³⁰

The Gallagher review states that lifecycle analyses demonstrate that most current (1st generation) and advanced (2nd generation) biofuel technologies deliver greenhouse gas savings from road transport only if land-use change (direct or indirect) that cause significant losses of carbon stocks is avoided. Current biodiesel technologies generally achieve a 40-50% saving compared to that of conventional diesel³¹, excluding land use change. Bioethanol technologies have a wider range of savings- from 20% to 80%.

There are considerable differences in the lifecycle greenhouse gas savings between different biofuels. Sugar cane ethanol, such as produced in Brazil, is the most efficient, with around a 90% saving in life-cycle greenhouse gas emissions compared to fossil fuels. The best savings are associated with high yields and use of bagasse for heat and power. Other forms of biofuels, such as corn ethanol, favoured by the US, Sugar beet ethanol, wheat ethanol and rapeseed ethanol have savings only in the region of 20 to 50 per cent³².

Land use change

Calculating the greenhouse balance of biofuels is difficult, but best estimates suggest that when all factors are taken into account, most biofuels currently in production provide only marginal benefits and at worst may lead to increased emissions and valuable carbon sinks being destroyed as a result of land use change. The increase in

²⁹ This report suggests that the emissions are typically far higher (3 to 5 times) than had been assumed in previous studies, and suggests that biofuels from these crops may actually be increasing emissions and making global warming worse. The Gallagher review critiques the assumptions made in this research, and concludes that although the nitrous oxide released by the global cultivation of soils is an important issue, the reliability of Crutzen's findings are uncertain.

³⁰ The World Bank (2008), 'Biofuels: The Promise and the Risks', *World Development Report 2008*, <http://go.worldbank.org/UK40ECPQ20>

³¹ Renewable Fuels Energy, *The Gallagher Review of the indirect effects of biofuels production*, July 2008, p23.

http://www.dft.gov.uk/rfa/db/documents/Report_of_the_Gallagher_review.pdf

³² Oxfam, *Another Inconvenient Truth*, June 2008, p7. Data from Worldwatch Institute (2007)

<http://www.oxfam.org/files/bp114-inconvenient-truth-biofuels-0806.pdf>

aggregate demand for agricultural land associated with biofuels has led to both direct and indirect impacts on levels of carbon dioxide in the atmosphere, higher food prices, environmental degradation and the destruction of ecological habitats.

Governments, particularly in developing countries, are looking to increase the amount of land available for growing biofuel crops, as the financial returns appear very attractive, both now and in the future. However, the conversion of rainforests or other fragile ecosystems such as savannahs into plantations to grow crops or trees for biofuels can negate the climate benefits of growing biomass. Destruction of ecosystems also has a significant impact on communities who rely on these natural resources to meet their basic needs. The removal of natural vegetation, the draining of peatlands, or soil erosion caused by monoculture plantations leads to the release of soil carbon as CO₂ and other greenhouse gases. This is particularly true in the destruction of rainforests, or the draining of peatlands- two natural carbon sinks.

When the greenhouse gas emissions from land use change are included in life-cycle analyses of biofuels, the results are far less impressive. The authors of an article in the journal *Science*³³ estimated the 'carbon debt' associated with the emissions caused by direct land use change, and compared it with the annual emissions savings from the resultant biofuel. The authors then estimated the number of years of biofuel production needed to pay back the initial carbon debt. The carbon emitted in the destruction of rainforest would take over 300 years to payback in saved emissions from biofuels- and 93 years for grassland. The Gallagher review uses slightly different figures, and suggests that biofuels support mechanisms should exclude feedstock grown on land where carbon losses arising from its cultivation lead to a payback of longer than 10 years by the biofuel produced³⁴.

Environmental degradation

The impacts of biofuels are complex- the impacts of farmers switching production to grow feedstocks for biofuels are felt throughout the global market. Increased demand for corn for US ethanol production is causing American farmers to switch from soy to corn. This in turn is creating incentives for South American soy farmers to increase production by expanding their cultivated areas into the rainforest- a critical carbon sink.

The use of rapeseed oil for the production of biodiesel in the EU is diverting large quantities of edible oils into the production of biofuels. This gap will be met by imports, largely palm oil, which is linked to the destruction of tropical peatland forests in Indonesia and Malaysia. Friends of the Earth report that an area the size of England, Holland and Switzerland combined is due to be converted to palm plantation in Indonesia, planned to meet the expected increase in demand from the European market³⁵. Oxfam estimates that 3.1 billion tonnes of carbon dioxide will be released as a result of unmanageable indirect land-use change in the palm-oil sector³⁶.

³³ Fargione et al (2008) 'Land Clearing and the Biocarbon Debt', *Science* 29, February 2008

³⁴ Renewable Fuels Energy, *The Gallagher Review of the indirect effects of biofuels production*, July 2008, p12. http://www.dft.gov.uk/rfa/db/documents/Report_of_the_Gallagher_review.pdf

³⁵ Friends of the Earth, *Biofuels. Cool Fuel?* Leaflet, May 2008, http://www.foe.co.uk/resource/marketing_material/biofuels_soa_leaflet.pdf

³⁶ Oxfam, *Another Inconvenient Truth*, June 2008, p.10. <http://www.oxfam.org/files/bp114-inconvenient-truth-biofuels-0806.pdf>

The rush for biofuels is being felt all around the world, with potentially devastating environmental impacts. In 2006 the Ugandan government announced that it was planning to allow an Indian-owned sugar cane company, the Mehta group, to cut down one quarter of the Mabira forest nature reserve, one of the last remaining areas of virgin forest in the country. The company already owns a sugar cane plantation which borders the forest, and was seeking to expand it. Initially the President and his Cabinet approved the scheme, as it was estimated to create 3,500 jobs and contribute 11.5 billion Ugandan shillings to the treasury. However, because of widespread protests, and evidence of the unique biodiversity of the forest, in 2007 the environment minister announced that the deforestation plans were suspended and that the government would look into finding alternative land. The expansion of the plantation was linked to the increased returns from sugar and as an input to biofuels rise³⁷. While this scheme was defeated the risk of similar projects taking place in the future still exists.

The Gallagher review recommends the use of feedstocks for biofuels that do not cause a net additional pressure on current agricultural land. This means using idle agricultural land, marginal lands, waste products, and intensification of current production. Care needs to be taken that these do not cause environmental degradation or result in additional water stress. One such crop is jatropha, which can grow on marginal lands and does not compete with food stocks. However, studies have shown that its returns are quite low, and yields have been lower than expected in some field tests³⁸. Although jatropha can survive in semi-arid climates, its yield is closely linked to the amount of rainfall it receives.

Impacts on poor communities

Governments are increasingly looking to utilise marginal or idle land for biofuels- in the EU, this has led to changes to the policies on set-aside land, and developing country governments are looking to find new land to cultivate.

The Indian government has identified 400,000 hectares of land for jatropha, but this land is largely classified as Common Property Resources (CPRs), and is integral to the livelihood strategies of people who use them for food, fuel and building materials. Oxfam reports that these lands can contribute up to a quarter of poor households' incomes, with the poorest households particularly dependent on them³⁹.

People who do not own their own land are particularly vulnerable to negative impacts of the establishment of large scale plantations on the land that they use, and it is important that before these schemes are approved there is the opportunity for full, informed and prior consent of all communities affected. The right to food must be upheld, and working conditions in plantations must meet the International Labour Organisation's (ILO) Core Labour Standards.

'Marginal' lands are likely to be worth far more to poor communities than their market values suggest, and may be essential for sustainable livelihoods. It is important that sustainability criteria take into account human rights of workers and local populations, particularly in large agricultural plantations, and that water and other environmental resources are well managed. At present, such criteria are a long way off – even the most advanced proposals only cover land-related environmental impacts.

³⁷ BBC Website, 'Ugandan plan for forest suspended', 22 May 2007, <http://news.bbc.co.uk/1/hi/world/africa/6680637.stm>; Guardian, 'Uganda 'averts tragedy' with reversal of decision to clear virgin forest for biofuel', 29 October 2007, <http://www.guardian.co.uk/world/2007/oct/29/uganda.international>

³⁸ Renewable Fuels Energy, *The Gallagher Review of the indirect effects of biofuels production*, July 2008, p62. http://www.dft.gov.uk/rfa/db/documents/Report_of_the_Gallagher_review.pdf

³⁹ Oxfam, *Another Inconvenient Truth*, June 2008, p.21. <http://www.oxfam.org/files/bp114-inconvenient-truth-biofuels-0806.pdf>

Sustainability Criteria

Current proposals by the European Commission for sustainability criteria are weak and will be ineffective in preventing other environmental and social impacts. The US has recently included in the Energy Act that domestic biofuels plants must meet greenhouse gas targets, including indirect land use change effects, but in practice, this is likely to be hard to enforce.

The UK's environmental and social principles for the Renewable Transport Fuel Obligation (RTFO) draw on seven principles:

Environmental Principles:

- Biomass production will not damage large carbon stocks
- Biomass production will not lead to the destruction of high biodiversity areas
- Biomass production does not lead to soil degradation
- Biomass production does not lead to the contamination or depletion of water supplies
- Biomass production does not lead to air pollution

Social principles:

- Biomass production does not adversely affect worker's rights and working relationships
- Biomass production does not adversely affect existing land rights and community relations

Tearfund welcomes these principles, but is concerned that these are able to be adequately implemented. The UK Parliament's Environmental Audit committee has concluded that the environmental standards currently associated with the RTFO 'are unlikely to prevent environmental damage from biofuels'. Companies are currently allowed to report zero emissions from land use change if data on previous land use is 'unavailable', making this extremely ineffective⁴⁰.

It is very hard for certification schemes to monitor the indirect impacts of displacement of crops into more environmentally sensitive areas. This problem of leakage undermines the credibility of these sustainability schemes at present. Certification schemes are also extremely difficult to implement and monitor, and are therefore more likely to benefit large businesses and monoculture agriculture, rather than poor farmers or small scale producers. Tearfund recognises that certification schemes may have a role to play in encouraging greater sustainability, but that these need to be developed further to be effective. Therefore no further expansion should take place until these are in place, and the issues are comprehensively addressed.

Future technologies

'Second generation' biofuels, such as those which use 'forestry residues' are estimated to have greenhouse gas savings of around 80-90% compared with fossil fuels, and could overcome many of the current problems with biofuels. Another technology - 'syndiesel production via gasification with Fischer-Tropsch processing'⁴¹, which creates surplus renewable energy, leads to greenhouse gas savings equivalent to 100% of the diesel equivalent. There is also research into using algae to produce biofuels, and increasingly genetic engineering and biotechnology are being applied to attempt to increase yields and make production processes easier.

As well as increasing efficiency, the amount of 'co-products' produced (by-products from the manufacture of biofuels that have other uses), may also result in land use savings. At the moment, very little is known about the potential of co-products, and as

⁴⁰ AEA Technology plc. *Review of work on the environmental sustainability of international biofuels production and use*, DEFRA, April 2008, <http://www.defra.gov.uk/environment/climatechange/uk/energy/renewablefuel/pdf/biofuels-080414-1.pdf>

⁴¹ For more information see *Biofuels Review: Advanced Technologies Overview*, May 2008. Input into Renewable Fuels Energy, *The Gallagher Review of the indirect effects of biofuels production*, July 2008, http://www.dft.gov.uk/rfa/db/documents/E4tech_Advanced_technologies.pdf

such it is not possible to fully analyse the impacts that they will have. These technologies are frequently presented as '5-10 years' away from commercial deployment, and thus there are concerns whether they will ever be developed and introduced. This is a particular problem if 1st generation biofuels become established, and investors want to prolong the return on these investments, as they could block the up-take of second generation biofuels⁴².

Tearfund is concerned the promises about second generation biofuels are based on assumptions about a technology that is not yet commercially available, especially as the OECD questions whether second generation fuels will be economically viable⁴³.

Overall, the development of biofuels has neither been pro-poor nor inclusive. The main people to benefit have been investors and agribusinesses taking advantage of large subsidies. These subsidies are highly inefficient, particularly US subsidies for corn-based bio ethanol, and have indirectly caused massive hunger in poor and vulnerable communities. Taxes, subsidies and import tariffs for biofuels should be ended to eliminate these distortions. There is the potential for developing countries to benefit from biofuels, but only if environmental and social standards are maintained, and they are given access to developed country markets.

⁴² Friends of the Earth Europe, *Agrofuels: Fueling or Fooling Europe?*, p7
http://www.foe.co.uk/resource/briefings/agrofuels_fuelling_or_fool.pdf

⁴³ OECD, *Biofuels Support Policies: An Economic Assessment*,
http://www.oecd.org/document/30/0,3343,en_2649_33785_41211998_1_1_1_1,00.html

Conclusions and recommendations

- **Recent evidence suggests that biofuels are not 'carbon neutral', as the whole life-cycle of their production, including land use change, should be included in calculations.** They should not automatically be seen as a solution to climate change, as in some cases they may actually be worse than fossil fuels. Each biofuel crop should be treated differently as the environmental impacts differ markedly.
- **All governments should review and revise downward their mandates for the amount of biofuels to be added to vehicle fuel.** To protect the vulnerable, a moratorium on targets for biofuels and greater co-ordination internationally, would dampen speculation on agricultural markets, and restore market prices to levels which reflect the true demand for food, making food more affordable for the world's poorest.
- **Future investment in biofuels should be focused around the most efficient technologies, and only those that use inputs that do not compete with food markets.** This means not using land not currently used for agriculture, and producing biofuels from crops that cannot be used for food.
- **Biofuels have the potential to contribute to greenhouse gas savings and energy security, but there is a significant risk that the environmental and social costs could far outweigh the benefits.** Policies to expand the use of biofuels, particularly in transport fuel, have been pushed through too quickly and must be revised urgently. Tearfund welcomes the UK government's Gallagher review, and its findings that a slowdown in the growth of biofuels is needed. As a minimum, these recommendations, including lower targets and stronger controls, should be introduced.
- **Biofuels policy has advanced more quickly than the technology needed to achieve the desired outcomes.** Investment in biofuels should be focused around the most efficient technologies, and only those that contribute of emissions savings of at least 60% across the life-cycle. Incentives should be created for investments in 'second-generation' biofuels, which include 'closed loop' agricultural systems, which ensure that little energy is wasted in the production process.
- **Biofuels should meet mandatory comprehensive sustainability criteria, which are able to be independently monitored, and include both direct and indirect land-use change (so as not to compete with food production).** These should also cover wider social and environmental issues, such as working conditions (meeting ILO standards) and sustainable water resource management. We welcome the UK government's criteria for the RFTO, but these need to be tightened further, and introduced as mandatory across the whole EU.
- **Policies to cut carbon emissions from transport require an integrated approach- efficiency savings in transport would be far more effective than using biofuels.** This can be done through tighter vehicle efficiency standards and the promotion of public transport and cycling.

Written by Richard Clarke, Researcher, Public Policy Team, Tearfund

Tearfund is an evangelical Christian relief and development agency working with a global network of local churches to help eradicate poverty.

www.tearfund.org 100 Church Road, Teddington, Middlesex TW11 8QE, UK
0845 355 8355 (ROI: 00 44 845 355 8355) enquiry@tearfund.org

Registered Charity No. 265464