

This response was submitted to the consultation held by the Nuffield Council on Bioethics on *New approaches to biofuels* between December 2009 and March 2010. The views expressed are solely those of the respondent(s) and not those of the Council.

Friends of the Earth England, Wales and Northern Ireland

Friends of the Earth's response to

"New approaches to biofuels"

Consultation paper by Nuffield Council on Bioethics

Question 1

What is your view on society moving towards greater use of biofuels?

The use of biofuels in transport and heat & power only makes sense if it can be guaranteed that their use actually helps to significantly reduce ghg emissions once all effects have been taken into account; including knock-on effects like indirect land use change. At the same time it must be guaranteed that negative social and environmental impacts as a result of biofuels (both directly and indirectly) e.g. on biodiversity, food prices & hunger, water availability, land right conflicts etc. are avoided. It has already become apparent that the large scale use of first generation biofuels has failed to meet the above criteria.

It is therefore paramount to scrap biofuel targets now to stop the demand for these destructive biofuels.

Second (third and forth) generation biofuels pose new risks which are poorly understood and little research has been done into these.

It is extremely important that the mistakes done with first generation biofuels are not repeated: the risks associated with second generation biofuels must be thoroughly investigated before any decisions about their use should be made. Until this has been done the precautionary principle must apply.

Question 2

What are the most important ethical challenges raised by the prospect of future generation biofuels?

The most important thing is that unlike with first generation biofuels the risks associated with second generation biofuels must be thoroughly investigated *before* their use is approved or encouraged.

Another key question that needs to be answered before targets and similar policy instruments are introduced is a critical analysis of the quantitative limits of the sustainable use of biofuels. Sustainability is in particular a function of quantity and it is misguided to extrapolate the sustainability of small schemes to the large and industrial scale. There are clear limits to how much biomass can sustainably be produced/used (using whatever technical process) and these limits need a lot more further research.

This research needs to take into account the competing demands on limited resources like land and water from other sectors (most notably food production).

The use of land remains a key issue for current as well as future biofuels. Even algae will not fundamentally change this (see below for more detail). What is particularly worrying is the trend that rich countries (particularly in Europe and N America) use up large amounts of land in poor countries to fulfil their needs. This is true for other commodities like food, but it is particularly prominent in biofuels where this is being done under the pretence of fighting climate change. This leads to a situation where European consumers are led to believe they are doing something good for the environment while the negative

impacts are primarily felt by affected communities in producer countries, largely unnoticed by the end-consumers.

Question 3

Do you regard yourself as well informed about biofuels? Where do you get your information from?

Personally yes. I get my information from a wide range of sources including research papers, email news servers, research carried out or commissioned by the Friends of the Earth International network and the media. However I believe there is a lack of information available to the public, particularly regarding the negative impacts of biofuels around the world and on the risks associated with new biofuels.

Question 4

Which factors are going to be the most important in driving the development of biofuels in the future? To what policy concerns should priority be given? What advantages not mentioned here could and should future biofuel production aim to deliver?

Biofuels are driven entirely by government targets. Which is why governments have a particularly high responsibility here.

A recognition of the limits of the use of biomass for energy purposes must be given priority. World-wide food security and food sovereignty should be given absolute priority over the drive for biofuels.

Where biomass is available for energy purposes it should be used in the way most effective at cutting ghg emissions, which is mostly in heat and power, not in transport.

Question 5

Which of the new approaches to biofuels will be most successful in generating GHG emission savings? How should these be encouraged? Are there any reasons why these new approaches should NOT be encouraged?

The assumption in the figures given in the intro for questions 5 that *lignocellulosic*

Biofuels do not lead to land use change is naïve. Lignocellulosic

Biofuels can be produced from any form of biomass and there is no reason to believe that they will primarily come from residues. In the same way first generation biodiesel *could* be made from used cooking oil, but in reality is mostly made from crops.

It remains to be proven that *any* biofuels will generate significant ghg emissions savings once all impacts (including indirect ones) are taken into account. Already there are studies that challenge the assumption that second generation biofuels necessarily have a better greenhouse gas balance than first generation biofuels. A recent study by the Environment Defence Fund showed that even for ligno-cellulosic biofuels the pressure on land means that they produce more GHG emission than petrol¹

Question 6

¹ Scientific American <http://www.scientificamerican.com/article.cfm?id=advanced-biofuels-will-st>

Which of the new approaches to biofuels will be most successful in improving energy security? How should these be encouraged? Are there any reasons why these new approaches should NOT be encouraged?

As mentioned above there are quite restricting limits to the sustainable use of biomass particularly in the UK which has little natural resources in terms of forests.

Reducing energy demand and increasing energy efficiency are far more effective at improving energy security.

Question 7

Which of the new approaches to biofuels will be most successful in supporting economic development? How should these be encouraged? Are there any reasons why these new approaches should NOT be encouraged?

It is a simplistic view to believe that the model of largely imported biofuels is benefiting “economic development” in producer countries. In reality it largely benefits only a small rich elite that controls plantations as well as international commodity traders and fuel companies. Local communities either serve as cheap labour force, sometimes suffering slave-like conditions, or they are forcibly evicted from their land.

Commenting on an advert promoting palm oil as a “sustainable” biofuel a spokesperson for the Malaysian Penan people said:

“How come the advert claimed that palm oil helps alleviate poverty, when from the very beginning oil palm plantations have destroyed our source of livelihood and made us much poorer? A lot of people are hungry every day because our forest has been destroyed.”

The fact that biofuels (including second generation) compete with food production over agricultural land and therefore push up food prices with catastrophic impacts for the world’s poorest people is well documented.

The Gallagher review confirmed that in fact the overall economic impact of biofuels on nearly all global regions was negative, with a particularly pronounced negative effect on Sub-Saharan Africa.

There is little reason to believe that second generation biofuels will change this picture fundamentally as the reliance on large biomass imports into the UK remains.

Question 8

Of all the new approaches to biofuel feedstock development, pre-treatment and processing (including any additional to those mentioned here), which is looking most promising for eventual commercial and sustainable use? Over what timescales might such developments be commercialised? Are there any risks associated with these developments?

Clearly the most sustainable and most commercially promising use are two totally different concepts that are often mutually exclusive. Neither of the main proposed second generation technologies currently appear to be a sustainable solution.

Lingo-cellulosic ethanol:

- Very little research has been done into the impacts of ligno cellulosic ethanol. There is particular concern that when the whole plant is used instead of just the crop soils will be depleted of nutrients quicker and more nitrate fertilizer use will be necessary. This could lead to nitrate overloading and with impacts on biodiversity, on land, in freshwater and in the oceans. Additionally it would lead to an increase of nitrous oxide emissions (a climate gas 300 times more potent than CO₂)
Without research into their impacts there is a danger that the same mistakes that were done with first generation biofuels could now be repeated with second generation biofuels.
- A recent report by the OECD raises serious doubt about the potential of second generation fuels and questions whether transporting biomass material on a large scale will be economically feasible.²
- Because the production of ligno-cellulosic ethanol can utilise non-food biomass it has been argued that it would avoid competition with food production. However - as has been pointed out above - the production of sufficient amounts of biomass for large scale ethanol production still requires agricultural land, therefore still competing with food production over globally available agricultural land.

Biofuels from algae:

Algae are seen by some as the biofuel panacea that will have none of the problems with land use and competition with food production as described above.

The algae's oil content is being harvested and converted into biodiesel; the algae's carbohydrate content can be fermented into bioethanol and biobutanol.

There are proposals for algae production in tubes, ponds and in the open oceans.

Currently biofuel from algae is still at a research stage. Production is extremely costly. There is no realistic prospect that biofuel from algae will be commercially viable and available in significant amounts in the next 10-15 years.

New research into biofuels from algae has shown that their productivities achieved in large-scale commercial microalgae production systems do not surpass those of other biofuel crops and suggests that the energy balance of algal biofuels is very poor³

But even looking at optimistic figures provided by Exxon illustrates why biofuels from algae don't necessarily solve the fundamental problem of land use:

Exxon claim that "Algae could yield more than 2000 gallons of fuel per acre of production per year." This is actually only three times more than palm oil.

According to DfT estimates the RED 10% road transport target will result in a demand from the UK alone for 6-8 billion litres of biofuels by 2020.

It is easy to calculate that to meet the UK target alone this would require a land mass twice the size of Greater London to be converted into individually managed ponds/tanks or be covered with plastic tubes. This obviously seems an unrealistic prospect for UK production.

² OECD, "Biofuels: Is the cure worse than the disease"

http://www.foeeurope.org/publications/2007/OECD_Biofuels_Cure_Worse_Than_Disease_Sept07.pdf

³ Why microalgal biofuels won't save the internal combustion machine, Jan B. van Beilen, University of Lausanne, Switzerland 2009

Proponents of algae biofuel would probably argue that this would be produced elsewhere. But even in that case it is hard to see where in the world the amount of land to supply global biofuel targets would be available, where it would not compete with food production and biodiversity, where water would not be an issue and where sufficient infrastructure would be available.

The proposals for growing algae in the open oceans have some very worrying implications in regards to fertilising oceans and risking uncontrollable algae blooms.

Biofuels from “waste”

There is a view that using anything that can be labelled “waste” or “residues” as a feedstock for biofuel is inevitably a good thing.

In reality there is much confusion regarding the term “waste”: Many products that are occur as “wastes” of one process are valuable resources for another process. Diverting them away from this process into biofuel production means demand increases for virgin materials are need to replace them. E.g. so called “black liquor” waste from the paper industry is most efficiently used for energy production within the paper production process. Removing “waste wood” from forests and straw from fields has negative impacts on soil nutrients and biodiversity.

Paper “waste” is better recycled to reduce demand for virgin wood.

Many forms of biomass, e.g. grass-cuttings and agricultural residues are most efficiently used in anaerobic digestion to produce biogas.

Question 9

Is the use of the following technologies to develop new approaches to biofuel production appropriate? Why?

Genetic engineering

The high lignin content in trees poses a particular problem for breaking down wood for cellulosic ethanol. In response GM trees are being developed with reduced lignin content. There is worldwide concern about the danger GM trees pose to biodiversity.

In order to facilitate the breakdown process for cellulosic ethanol GM enzymes are being developed. Again there is concern about the impact of these as it is unlikely they can be contained within a processing plant.

The concentration of “patents on life” in the hand of a few corporations is an additional concern.

Question 11

What are currently the main constraints to R&D in new approaches to biofuels?

There seems to be an obsession with pumping money into biofuels research rather than facilitating R&D into the reduction of energy demand.

Research money should be used in the efficiently way to produce solutions that reduce green house gas emissions. As it has become clear that that’s not simply replacing fossil fuels with biofuels than research priorities must be readjusted energy solutions should be investigated than sticking with dead end false solution.

Question 12

Where should R&D for new approaches to biofuel be targeted, and who should decide about future biofuel R&D strategies?

See above

Question 13

Are new approaches to biofuels likely to raise problems related to land use? If yes, how? If not, how do new approaches avoid these issues?

Second generation biofuels may, in some cases, be more efficient than first generation biofuels, however they do not solve the land use problem. They still require the large scale production of biomass (e.g. tree plantations) which requires large amounts of agricultural land. This leads to many of the same problems observed in first generation biofuels.

Question 14

What differences are there between the developed world and developing countries with regards to the potentially problematic effects of future generation biofuel production on land use?

As mentioned above the model that poor countries will produce the majority of the biofuels consumed by rich country is likely to remain with second generation biofuels.

Communities in poor countries will continue to suffer from the food price rises, land conflicts, water shortages, pesticide use etc. caused by biofuels (current and future). The increase in the use of technological processes in second generation biofuels is likely to increase the gap between the small number of (often Western) companies that profit from the development and the local communities that will suffer the consequences.

Question 15

Should indirect land use change (iLUC) be considered when evaluating the GHG emissions savings of new approaches to biofuels, and if so, how?

It is of course essential that the emissions from indirect land use change are taken into account when evaluating the green house gas balance of biofuels. An ILCU emission factor that is strong enough to account for the remaining uncertainties in the science and that can play a precautionary role is needed.

However it is important to remember that indirect land use change is not only a problem of ghg emissions. Knock on effects from using large amounts of land for biofuels and potentially displacing other land uses has impacts on communities, land rights conflicts, biodiversity, farming systems, economies, water availability and soil fertility.

These wider impacts must be taken into account when weighing up biofuels targets against other policies that are far more effective at reducing green house gas emissions.

Question 16

What advantages and disadvantages for environmental security could new approaches to biofuels have? How could harms for environmental security be dealt with?

I am not familiar with the term "environmental security".

I have already described the environmental risks posed by second generation biofuels elsewhere.

Question 17

Are new approaches to biofuels likely to raise problems related to food security? If yes, how? If not, how do new approaches avoid these issues?

As mentioned before second generation biofuels still require large amounts of land which inevitably competes with food production.

Question 18

What differences are there between the developed world and developing countries with regards to the potentially problematic effects of future generation biofuel production on food security?

The main difference is that while for Europe the impact is largely an increased reliance on food imports, for many poor countries the impacts are widespread malnourishment and hunger as well as increases in violent conflicts over food and land.

Question 19

Are new approaches to biofuels likely to raise problems related to rights of farmers and workers? If yes, how? If not, how do new approaches avoid or benefit these issues?

Due to the increased use of technological processes the concentration of ownership and profits from biofuels is likely to increase with second generation biofuels. There is no reason to believe that the rights of farmers and workers will be any more respected on e.g. eucalyptus plantations than on palm oil or sugar cane plantations. The same goes for land right issues.

Question 20

What differences are there between the developed world and developing countries with regard to the effects of the production of future generation biofuels on the rights of farmers and workers?

Question 21

Where do you think investment in new approaches to biofuels should be directed and where should it come from (public sector, private sector or public-private partnerships)?

See question 1:

Investment should be directed to where they are most effective at cutting ghg emissions, generally that is not through using biofuels.

Question 22

Which policy issues in relation to new approaches to biofuels would you like to bring to our attention?

See above