

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.

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**Question 1**

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

Biofuels are hugely problematic but in theory could raise the environmental and social performance of agriculture globally. At the moment it appears to me that the problems are much more likely to actualise than the positive potential, as regulatory efforts to date have been weak. Proponents say that this is because it is early days. Perhaps they are right, but there are many major obstacles to securing a large-scale sustainable supply of biofuel feedstocks. I don't personally think that it can be done, given all the weaknesses of environmental institutions in the supply-side countries.

We have written on related issues in the papers below, though the views that I express here are my own. The problems stem principally from (a) biofuel feedstocks' substantial use of environmental resources and (b) their close connection with existing inequities in production and trade.

It is not clear that adequate mandatory certification, agreements, monitoring and enforcement can be achieved. It is just as, if not more, likely that the large scale production of biofuel would add to global biodiversity losses and entrench inequities. This does not mean that they should not be pursued as a mitigation option, but it does mean that this should be done very cautiously and selectively.

Thornley, P., Upham, P. and Tomei, J. (2009) "Sustainability constraints on UK bioenergy development", *Energy Policy* 37 (12): 5623-5635.

Tomei, J. and Upham, P. (2009) "Argentinean soy based biodiesel: an introduction to production and impacts", *Energy Policy* 37 (10), pp. 3890-3898.

Upham, P., Thornley, P., Tomei, J. and Boucher, P. (2009) "Substitutable biodiesel feedstocks for the UK: a review of sustainability issues", *Journal of Cleaner Production*, vol. 17, supplement 1, pp. S37-S45, <http://dx.doi.org/10.1016/j.jclepro.2009.04.014>

**Question 2**

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

Lignocellulosic technologies still require feedstocks, which in turn still require land and water that would not then be available to others. Monocultures are also likely to be favoured. *Perhaps* terrestrially-based marine micro-algae in ponds/races in coastal/desert areas may reduce this problem. In general, highly capitalised production systems are likely to favour investors and consumers. Affluent consumers have an obligation to ensure that their consumption improves the lot of poorer producers. Appropriation of genetic resources is a further issue, as is use of GM material. Use of herbicide-tolerant species should be completely unacceptable; acceptable uses of GM technology include drought-and pest-tolerance etc.

**Question 3**

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

Reasonably well-informed – few people can see this topic from all sides, as it is multi-faceted. I have been researching biofuel sustainability academically p/t since Sept 2006. I use academic, government agency, EC agency and NGO sources.

**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?**

We need to find synergies between the objectives and not prioritise one at the expense of another. This will mean accepting a modest of biofuel production. Reduced energy consumption and energy efficiency should be the critical priorities in affluent nations. We have delayed on this for decades.

**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?**

This isn't really the right question; you should be asking: 'how can particular biofuels be produced so as to minimise adverse impacts and maximise benefits to local populations, ecological systems and climate mitigation?' Focussing on GHG savings alone may lead you in directions that should be rejected for social reasons.

Nonetheless, use of organic (carbon based) wastes should be the first priority. We do need to ensure that the environmental systems from which these are derived, though, are not mined of their nutrients.

#### **Question 6**

**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?**

Biofuels will not substantially improve UK energy security. Largely, they will change the locations on which we are dependent. I suppose that diversified dependence is preferable to the status quo, but it's hardly a huge advance and even optimistic projected contributions of biofuels are modest in terms of total primary energy demand. A combination of striving for a higher degree of self-sufficiency and reducing demand are preferable options, if the objective is to reduce the length of supply chains. Also note that electrification of transport is increasingly modelled as a more cost-effective carbon mitigation option.

#### **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?**

Again there is a slight assumption of technological determinism in the question, unless you mean by 'new approaches' not simply new technical systems but also new socio-technical systems? You need to consider 'whose' economic development. Small-scale biofuel production for local use might well help some regions. Beneficiaries will vary, depending on the pattern of ownership of land and capital. I doubt that large scale production, in aggregate, can be achieved by a large number of small producers, but perhaps the babassu co-operatives of Brazil are an example – I have not researched them myself, though. In general, the dynamics of capital accumulation make it difficult to avoid a drift towards large-scale, highly mechanised and capitalised agriculture – unless there is an explicit purchasing policy that encourages a counter-trend.

For example, GM soy and associated mechanisation in Argentina have been associated with increasing landlessness, rural unemployment and environmental degradation: it is this type of trend that may well be replicated and advanced by biofuel production unless deliberate steps are taken to avoid it. It is not clear to me how this could be achieved.

#### **Question 8**

**Of all the new approaches to biofuel feedstock development, pretreatment 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?**

I don't know, but note that sustainability is not just a function of efficient conversion – the feedstock production method is as or more important. You need to think in terms of whole systems and value chains. Focussing on one part of the process is likely to mislead.

#### **Question 9**

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

Advanced plant breeding strategies Genetic engineering Synthetic biology

GE and SB carry potential environmental risks, principally in terms of unexpected and uncontrolled diffusion/mutation. They also tend to be associated with on-going retention of benefits and control with biotech firms. So their benefits clearly depend upon the uses to which the techniques are put. Personally I

am wary of the release of GE species and SB organisms, but if these techniques can be used 'safely', then this may be appropriate.

#### **Question 10**

**What are the most important intellectual property and access issues raised in new approaches to biofuels? What is the best way of governing these?**

Better to see the FAO-organised online mini-conference on this – I'm not familiar enough with the details of IP: at <http://www.fao.org/biotech/logs/C15/allmessages.htm>

#### **Question 11**

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

These will be various and with technicalities unknown to me. For example on the lingo enzymatic side, woody plants have evolved over millennia to be resistant to attack, and people are now trying to reverse this in a few years. There's no reason why this should be easy!

#### **Question 12**

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

Must think in terms of whole systems and not just technology – therefore we need informed social science too. In the UK it is extremely difficult to obtain this.

#### **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?**

Yes, simply through scale. Deep-water marine macro-algae? Expensive to make this work!

#### **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?**

The differences presumably lie in (a) proportion of income spent on food and (b) proportion of population employed in agriculture. Again, the consequences will be a function not just of the technologies, but whether any steps are taken to improve prevailing social and economic conditions, or whether capital-accumulating rules dominate.

#### **Question 15**

**Should iLUC be considered when evaluating the GHG emissions savings of new approaches to biofuels, and if so, how?**

Yes, but I have yet to see an approach to reliably indicating iLUC – this is an under-researched area. I'm doubtful that it can be done convincingly on a feedstock basis and monitoring will always be post-hoc. Measuring/anticipating iLUC would seem more plausible on a geographical basis, using integrated assessment techniques relating to a particular plan for a particular region.

#### **Question 16**

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

The impacts described in your introduction to this question in relation to first generation biofuels also relate to lignocellulosic technologies. Monoculture and associated loss of biodiversity is a key issue. Avoiding this would require harvest of biodiverse landscapes. Perhaps ideas about using US prairie grass, mimicking annual grazing, might combine large scale production and high biodiversity – I don't know.

**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?**

Depends whether arable land is used or not, directly or indirectly. Trees can be grown on harsher, steeper land – this is the principle way in which food security impacts might be reduced. Similarly algae can use sea-water (on land or in the sea).

**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 impacts are likely to be less direct, via income, unless people are directly dependent upon forestland for food. This question needs to be answered by forest community specialists.

**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?**

As articulated above, it is not the technologies that are key per se, but the way in which they interface with existing inequities, patterns of development etc. Which new institutions, norms, rights and regulations are brought to bear.

**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?**

As in parallel question above

**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)?**

Private sector should fund the tech R&D. Public sector should fund regulatory, EIA/SEA and related research.

**Question 22**

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

I think I've already done this.

**Question 23**

**What would be the most effective policies a) to promote and incentivise; and b) to regulate the development of new approaches to biofuels?**

Stringent, mandatory thresholds for sustainability performance, coupled with location-based agreements between feedstock producers and fuel suppliers. The involvement of environmental and development NGOs as partners in standards-setting and verification.

**Question 22**

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

The NGOs have been sidelined in European policy biofuel development – their concerns have not been taken seriously, and as a result we have no idea whether biofuels are helping or hindering even on a narrow GHG basis.

**Question 24**

**Are there any other issues not mentioned in this consultation that we should consider in the ethical evaluation of new approaches to biofuels?**

You have captured most of them but to my mind the text is a little anthropocentric: one of my main concerns is that population growth and development needs will already place huge pressure on natural environments, and large scale production of biofuels will add to this. In affluent countries, we must implement ways of reducing energy demand, not just reduce GHG emissions while maintaining a high level of calorific (energy) consumption.

Large scale expansion of biofuels would reduce our GHG intensity (CO<sub>2</sub>e emissions/joules consumed), but an ecocentric route envisages absolute reductions in both GHG and energy consumption, by those who over-consume (us!). The second route aims to leave room for increased consumption by those who don't have enough, while also leaving something for other species. Perhaps that route may include increased production of biofuels, but this would not be for us – those who are already affluent.

There is also a strong theme of capital accumulation and resource appropriation (from South to North) that others are exploring and which should be considered.