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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Answering the Nuffield Consultation

Question 1
What is your view on society moving towards greater use of biofuels?

There is an intense discussion about „Food or Fuel", about climate change mitigation and about energy security. The first „hype" has given way to a realistic assessment of the possibilities of biofuels. Ecological, social and economical aspects have to be considered.

If food security is guaranteed then biofuels give a lot of options to make the world a bit better.

Question 2
What are the most important ethical challenges raised by the prospect of future generation biofuels?

The challenges of future-generation biofuels are the same as of today's biofuels. Food security and a sustainable economy such as integration of local stakeholders are one side of ethical challenges. The other side is the ecological one. Preservation of nature has also an ethical aspect. Nature has a value itself, and it has a value for humanity, thus it has to be protected.

Question 3
Do you regard yourself as well informed about biofuels? Where do you get your information from?

There are two main possibilities for information: Internet mailing and working groups of various organizations.

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?

From our point of view the development of biofuels will be influenced by the sustainability of the ecological side of the biomass production and by the way they are politically supported.

The ecological sustainability excludes deforestation and destruction of grassland and peatland, i.e. land use change (LUC) is one of the main topics in production of biomass.
In our opinion the REDD (Reducing emissions from deforestation and degradation and enhancement of carbon stocks) in the scope of Kyoto-II framework is a very promising way to reduce LUC or ILUC (Indirect Land Use Change).
This methodology has to gain more influence on the whole biomass production.

The political support should rather be in form of incentives than by defining quotas for adding biofuels in fuel. In any case the support scheme must be clear, stable and long-lasting.

In addition very important factors are the GHG emission balance and the fuel quality.
The EU has defined limiting GHG emissions values to be reached by biofuels. With regard to fuel quality we request the compliance with existing or future CEN-standards.

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?

A new approach is the sustainability certification of biomass. It excludes the destruction of High Nature Value Areas and high carbon stock values. This is an essential part of generating GHG savings.

Another essential part is the choice of energetically optimized biomass/plants and the strengthened usage of waste and residues in due consideration of the ecological value of residues in agriculture.

The sustainability in agriculture (e.g. Cross Compliance in the European Agriculture Politics) will be another pillar in GHG emissions savings.
New approaches in biofuel production technologies are the BtL technology, the production of lignocellulosic ethanol and other new processes based on the direct utilisation of glucose derived from lignocellulose, i.e. hydrothermal processes. These processes seem to be efficient ways of producing biofuels by utilising non-food feedstocks.

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?

On condition of a balanced global feed biofuels can replace 10 – 20 % of the global fuel consumption in our point of view.

The more efficient the biofuel production will be the more fossil fuels can be replaced in fuel consumption.

These new approaches should NOT lead to nature consumption, e.g. destruction of the Amazonian rain forest.

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?

This cannot be answered presently, since all new processes need to reach a higher degree of maturity. First, they need to be demonstrated on a commercial scale. Generally speaking, one decisive parameter is the yield of biofuel per hectar acreage,. The higher this number of an approach is, the more likely is a final success. In principle, only approaches considering the participation of ALL stakeholders should be encouraged.
They should be encouraged by long-lasting stable political frame, i.e. by incentives/quotas based on sustainability criterias.

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?

From our point of view the technology of producing cellulosic ethanol and „Biomass to Liquid“ is promising. Since these technology lack still maturity, we expect considerable shares later than 2020 in EU.

Therefore existing production processes of ethanol are also a solution to fulfill current quotas.

The commercial risk of the new technologies results especially from high industrial plant costs implying high production costs.
Hence they need to be supported with biofuel quotas and/or with incentives/tax exemptions.

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

Genetic engineering offers the tremendous chance to develop new feedstocks.
E.g. lignocellulosic ethanol can only be produced with genetically modified yeast to digest the lignocellulose.
However, the handling of genetically modified organisms (GMOs) must be done with reasonable care.

There are many critical points about genetically modified organisms.
We are not sure if one can cope with the uncertainty of GMOs and the resulting danger for the ecosystem.

Advanced breeding systems must be analyzed via life cycle assessment and sustainability analyses in order to determine if the respective system offers a GHG reduction compared to conventional breeding systems.

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?

There are a lot of subjects concerning biofuels.
The main challenge with regard to intellectual property is to coordinate the different research and development properties and – in the second step – the producing properties.
In principle all stakeholders of the future chain of custody have to be involved and have to develop a sustainable new approach.
The best way to govern this is a multi-stakeholder process from the start of R&D.

Question 11

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

It became obvious that biofuels are not the world-saving solution as which they have been declared in the past.
There are ecological and social effects and consequences which have not been analysed in the history of R&D of biofuels.

The main constraints are the ecological (including GHG reduction) and social balance regarding the production of biomass and of biofuel as well as the equal participation of all stakeholders. Moreover the EU support schemes seem to be restricted to rather conventional routes with regard to production processes, whereas new approaches like e.g. hydrothermal processes at low temperatures and pressures based on glucose seem to be promising.

Question 12
Where should R&D for new approaches to biofuel be targeted, and who should decide about future biofuel R&D strategies?

The scope of R&D support should be broadened to new approaches based mainly on glucose and aiming at fuels others than ethanol and butanol. In addition the preprocessing of lignocellulose to become accessible for these processes is essential.

It is not helpful to define ONE responsible body. As mentioned before biofuels have a lot of stakeholders, which need to be involved. Therefore the existing research associations on EU-level, like concawe or EUCAR should be clearly enabled to give there input to the discussion. In the end R&D targets should be defined by political bodies with a clear roadmap to commercialisation (including public support).

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?

Every biomass production is related to land use change.

There are some approaches (especially the new ones) with a smaller concern because they are based on waste or residues. However, every use of biomass or even bio-waste with an economic value generates a competition with the optional consequence of land use change.
In our opinion LUC and ILUC can only be avoided by the instrument of „REDD“ (Reducing emissions from deforestation and degradation) in the framework of Kyoto process.
It will hopefully be funded when Kyoto II will be ratified in December 2012.

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 are complex and multi-layered.

a) economic and political structures
b) effectivity in agriculture
c) different awareness in terms of environmental consciousness and preservation of biodiversity

Question 15
Should iLUC be considered when evaluating the GHG emissions savings of new approaches to biofuels, and if so, how?

It seems to be impossible to consider ILUC when evaluating GHG reduction.

Direct Land Use Change can be calculated because the influences on GHG balances are well known.

The interdependence of Indirect Land Use Change can hardly be made, because the referring of the ILUC to a certain biomass produced on a certain piece of land after a certain period of time will present juristic and ecological problems.

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 sensibility of the public eye with regards to the destruction of rain forests, nature habitats and biodiversity in connection with biofuels may help in general to implement a sustainability scheme for the biomass production.

If there is a chance to improve the agriculture it will be very helpful in developing advantages in environmental security.

The same could happen regarding social consequences of the biofuel production.

The management of environmental destruction depends on the modality.
Irretrievable losts should be avoided, others should be minimized.

The implementation of sustainable criteria is a promising instrument to avoid negative consequences of the forced biomass production for biofuels.

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?

Food security is strongly linked with the availability of agricultural land resp. land use change. The more effective a process, the more biofuel can be produced from biomass.

Therefore new approaches to biofuels with a high efficiency in the process will minimize the competition between food and fuel.

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?

See answer of question 14.

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?

Rights of farmers and workers do not depend on the kind of biofuel.
There is no difference between a new approach or an established biofuel.

The only way to avoid violation of worker and farmer rights ist the implementation of sustainability criteria and the establishment of political and legal rights (including the ILO convention)

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?

In general the developed world has a labour legislation according to the ILO rules.

Rights of farmers and workers in the developing countries depend on the political and economic situation. There are a lot of examples for the violation of labour rights.

However, this is not a question of the production of future-generation biofuels. It depends on the political and legal frameworks of the respective country.

BUT: The implementation of sustainable criteria may lead to an improvement of the labour situation; see question 19.

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)?

Investments by the private sector or public-private partnerships should be preferred. They should be directed to approaches being able to produce fuels in compliance with existing standards based on rather waste streams and/or lignocellulosic material, i.e. non-food feedstock.

Question 22
Which policy issues in relation to new approaches to biofuels would you like to bring to our attention?

The issue of biofuels is related to the biomass production. The question of biomass for food or fuel was discussed in relation to the problematic of land use change.
However, agriculture is not only a question of feeding the world. It also has a lot to do with the management of nature and the preservation of biodiversity.

The second issue was mentioned already: The sustainability along the chain of custody of biofuels. If certification based on sustainability criteria is established and gains influence it will bring more prosperity to developing countries.

The third issue to bring up is the fuel quality. Biofuels are obliged to fulfill the existing standards for gasoline and diesel.

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?

The definition of incentives and/or quotas based on CO_2-reduction targets are very effective for promoting the development of new approaches. Market support mechanisms must contain sustainability criterias. All these kinds of regulations have to be consistnt for other renewable forms of energy in the EU as well. Quotas are a form of regulatory policy. There should be legal regulations to make sure that biofuels which are produced in a non-sustainable way are not taken into consideration.

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? Please expand below.

The important issues have been described along the answers of all questions.