elobio

Biofuel policies for dynamic markets

2nd ELOBIO stakeholder consultation

Report from the: " Stakeholder consultation concerning modelling of impacts of EU biofuels policies: *Early findings and call for stakeholder input to further analysis on Efficient and Low-disturbing Biofuels policies – ELOBIO*"

August 2009

Intelligent Energy Europe

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Table of contents

Executive summary

The ELOBIO research project aims to develop policies that will help achieve a higher share of biofuels in total transport fuel in a low-disturbing and sustainable way. The project strives to achieve:

- A clear vision on policy options with the least negative impacts on other markets in food, feed and ligno-cellulosic materials; a vision shared with and approved of by policy makers and by relevant market actors and other stakeholders.
- A reliable estimate of the potential and costs of biofuels, given the application of these low-disturbing policy measures.
- Improved models and tools to assess the relations between biofuels policies and the markets for food, feed and ligno-cellulosic materials.
- Improved models and tools to assess the impact of policy and market interactions on the allocation of biomass for the electricity, biofuels and heating/cooling sectors.

Stakeholder consultations play a central role in the project development, both to help the ELOBIO team formulate low-disturbing policies and get responses to the policies analysed, the findings obtained and the analytical methodologies applied. A workshop on 30 October 2008 was the first step, followed by a questionnaire survey undertaken June-August 2009, and finally a second workshop is scheduled for November 2009.

The issues raised in the questionnaire include eight subjects within 4 main categories:

Main categories	Subjects
1. Socio-economics	1. Impacts of first-generation biofuels on agricultural prices 2. Food security
2. Environment	3. Land use conversion
3. Technology	4. Agricultural technology – Growth in agricultural productivity 5. Second generation biofuels - Speed of introduction 6. Second generation biofuels and investment risks 7. Competition and synergies between the transport and stationary energy sectors and implications for the food and forest sector
4. Methodological policy issues	8. Overall methodological policy considerations

This report presents an overview of the opinions and arguments put forward by the stakeholders and the main conclusions as to the policy analyses that could be considered in the further work of the ELOBIO project. Appendices 1 to 3 present the list of stakeholders, the questionnaire and the full responses to the questionnaire.

Introduction

1.1. The ELOBIO project

As the debate of "food versus fuel" has intensified in the wake of rising food prices in the past few years, the relevance of achieving a clear understanding of the complexity of the relationships between biofuels, agricultural markets and food markets is of ever greater importance. Stress in commodity markets, allegedly induced by biofuels, can become a major barrier to political and public support for biofuels, thus seriously hindering their further development without achieving stability on agricultural markets.

The main objective of the ELOBIO research project[1] is to develop policies that will help achieve a higher share of biofuels in total transport fuel in a low-disturbing and sustainable way. The key ingredient for such a policy mix is that it is understood and accepted by all stakeholders involved and affected by the development of biofuels. Therefore, the project will strive to achieve:

- A clear vision on policy options with the least negative impacts on other markets in food, feed and ligno-cellulosic materials; a vision shared with and approved of by policy makers and by relevant market actors and other stakeholders.
- A reliable estimate of the potential and costs of biofuels, given the application of these low-disturbing policy measures.
- Improved models and tools to assess the relations between biofuels policies and the markets for food, feed and ligno-cellulosic materials.
- Improved models and tools to assess the impact of policy and market interactions on the allocation of biomass for the electricity, biofuels and heating/cooling sectors.

The ELOBIO project, which is running over 30 months, is using several analytical tools such as an agro-economic model, expertise in agricultural commodity markets, and a biofuels pathway model. However, the project has been conceptualised in a way where stakeholder consultations play a central role in the project development.

1.2. Stakeholder consultation a key component

The stakeholder consultation is an interactive process taking place throughout the project to obtain more in-depth and up-to-date insight and feedback from stakeholders directly affected by the development of biofuels. The purpose is to obtain a more broad-based, realistic, and legitimate modelling for policy recommendations. A continuous feedback has been planned through three major inputs:

- First stakeholder workshop, defining and setting criteria (30 October 2008)
- E-mail questionnaire, exchange of preliminary results (the focus of this report, June - Aug 2009)
- Second stakeholder workshop, identifying optimal policies (planned for November 2009).

The workshop on 30 October 2008 was the first step in the stakeholder consultation process aiming at having stakeholders reflect on existing policies and identifying key issues and mechanisms leading to market disturbance. The results of the first workshop were used as inputs to an economic model developed for the purpose (assessing potential and cost of proposed biofuels policies). The preliminary results of the model-runs (indicating the impacts on food & feed markets as well as on ligno-cellulosic

[1] The ELOBIO project is undertaken by seven European partners: ECN, VITO, IPIEO, CIEMAT, COWI, IIASA, and Chalmers University. For further details see www.elobio.eu

markets) have now been reflected upon by the stakeholders in a questionnaire survey, including both the methodologies applied as well as suggestions for further improvements. The purpose of this report is to summarise the findings of the questionnaire survey.

The Questionnaire survey

1.3. Objective

The ELOBIO project is meant to develop ideas and criteria for EU biofuels policy, aiming at minimising negative impacts on food, feed and ligno-cellulosic markets. The objective of the questionnaire survey was thus to gather inputs from key stakeholders in order to make the analysis better informed, more up-to-date, and thus more realistic. The consultation aims at having the stakeholders reflect on the preliminary results, assist in formulating other possible scenarios for analysis, and encouraging them to evaluate methodologies applied, and consequently providing an opportunity for them to influence the project by feeding their viewpoints into the process.

1.4. The Questionnaire as a tool

The use of e-mail questionnaires has both advantages and disadvantages as a methodological tool. A questionnaire is a research instrument consisting of a series of questions for the purpose of gathering information from respondents, often designed for statistical analysis of the responses, though this is not always the case, as in this study. The main objective of the questionnaire was to gather different viewpoints to be used as inspiration for the further model-runs and thus make it more comprehensive and realistic. Hence, the results of the questionnaire are by no means to be used as statistical data, but more as explorative input to the further process.

Questionnaires by e-mail are very cost effective and easy to use when the stakeholders are spread over large geographic areas. A common criticism of mail surveys is that they often have low response rates, which has also shown to be a limitation in this stakeholder consultation. However, some of the most powerful tools for increasing response rates are a user-friendly design of the questionnaire and follow-ups or reminders. In this case, a meticulous process of questionnaire design was conducted with the use of test people and redesigning - and both e-mail and telephone reminders were made to a wide range of selected priority stakeholders . In this way, a reasonable response rate was reached supplying a number of interesting viewpoints and useful input to show new ways for the project development.

A sample of the questionnaire and background information can be found in Appendix 2.

1.5. Target group and participants

The *target group of the questionnaire survey* represents the various players that are most affected by biofuels policies, and who have an interest in expressing their opinion on the issue. The questionnaire was distributed by mail to 63 relevant stakeholders, representing 50 organisations; 16 of the stakeholders having participated in the 1st consultation workshop in 2008 and 47 stakeholders being included in the stakeholder process for the first time.

The approached stakeholders covered the following sectors:

- Suppliers of raw material (agricultural crops and forestry)
- Biofuels/biomass industry
- Food and feed industry
- Energy Sector
- Pulp and paper industry
- Experts/researchers
- NGOs
- Relevant EU/DG officials

The outcome of this process was 13 answers, 6 of which came from workshop participants, and 7 from non-workshop participants.

The backgrounds of the stakeholders that responded to the questionnaire were mixed, including representatives from the margarine and plant oil industry, the farmer's and agricultural interests, biomass associations, the academic sector and NGOs. However, unfortunately and as in the 1st stakeholder consultation the stakeholders from the ligno-cellulosic industry such as forestry, pulp and paper, and stakeholders from the energy sector were absent.

A list of the stakeholders is found in Appendix 1.

Viewpoints from the questionnaire

The viewpoints stated in the questionnaire are presented according to the design of the questionnaire into eight subjects within four main categories as illustrated below:

Main categories	Subjects
1. Socio-economics	1. Impacts of first-generation biofuels on agricultural prices 2. Food security
2. Environment	3. Land use conversion
3. Technology	4. Agricultural technology – Growth in agricultural productivity 5. Second generation biofuels - Speed of introduction 6. Second generation biofuels and investment risks 7. Competition and synergies between the transport and stationary energy sectors and implications for the food and forest sector
4. Methodological policy issues	8. Overall methodological policy considerations

The viewpoints of the stakeholders have been summarised and synthesised within each subject, reflecting the opinions and arguments put forward. For an un-edited version of the responses to each subject, please refer to Appendix 3. Please note that the viewpoints presented are not necessarily consistent across stakeholders and that clear conclusions may not always be drawn.

1. Socio-economics - Prices and food security

The subjects concerning impacts of 1st generation biofuels on agricultural prices and food security are highly relevant to the stakeholders, and the answers clearly illustrate the different viewpoints. Within this theme, the following opinions were extracted:

- Higher agricultural prices are necessary for agricultural production to increase.
- Higher agricultural commodity prices could also increase price for crop residues.
- Price volatility is the most damaging price development to the sector.
- Steady annual increase of 2-3% in agricultural commodity prices is preferable.
- Higher prices may not be bad for developing countries.
- Decreases in protein feed prices could lead to increased meat production.
- Stop export food by dumping prices from the EU.
- Only rural producers who have surplus production and market access will benefit from higher prices.
- Highlight the effect of the use of co-products from 1st generation biofuels in the analyses.
- Aim for decentralized fuel production since potential negative socio-environmental costs are easier to control.
- Favour multipurpose crops which allow to switch between food and energy production.
- Do not allow competition between food and fuel.
- Multifunctionality of land and production is important and may increase flexibility and opportunities.

2. Environment

The category of environment was divided into four sub-groups structuring the variety of viewpoints regarding land use conversion:

Productivity increases in agriculture

- Historic yield increases caused severe environmental damage.
- Stop subsidies to EU/US farmers to produce excess food, which is dumped on world markets.
- Provide a good investment climate. Particularly in developing countries, local markets need to be developed, trade infrastructures established, investment in technology and knowledge undertaken, and export markets which can provide revenue and funds for investments be developed. Resource efficiency is crucial.
- Programmes have been developed for decades (for instance by Wageningen University). Prime focus should be on removing economic and political barriers that prevent implementation of these programmes.
- Agricultural productivity is primarily a product of stable market prices.
- R&D is needed.
- Sustainable long-term agricultural productivity requires a radical shift from the currently favoured and promoted large-scale intensive production.
- Some increases in livestock productivity expected due to climate mitigation measures, including new technology as well as increased costs for feed which could improve resource efficiency.
- For instance in Brazil, a more intensive livestock system is the key to implementing the sustainability criteria (2 cows per hectare instead of one).

Marginal land

- Use of marginal land needs to be tackled carefully because it may have other important values (ecological functions, grazing).
- No extension should take place on marginal land, focus on agricultural wastes.
- Use of marginal land is possible without endangering environment and biodiversity by the use of modern techniques.

Sustainability criteria

- Sustainability criteria are mostly perceived as very necessary, however, stakeholders find them impractical.
- Sustainability criteria should be applied at international level.
- Sustainability regimes should be co-ordinated between countries (US, EU, Brazil).
- Sustainability criteria is better than land use restrictions. Introduce sustainability criteria for food production as well.

How stop deforestation?

- Sustainable forest management.
- Individual countries/regions should implement proper policies to avoid deforestation. Key actors in the various supply chains should refrain from sourcing from heavily deforesting regions.
- Implement radical measures, like “polluter pays principle” for Western consumers.
- Stopping deforestation in the context of growing agricultural demand needs to happen first and foremost through reducing demand.
- More focus on making second-generation biofuels feasible.
- Deforestation is a governance issue. Has more to do with corruption than with the need for more land and political pressure to reduce deforestation at national level.

3. Technology

The technology category contains four sub-themes: 1) Agricultural technology – Growth in agricultural productivity, 2) 2nd generation biofuels - Speed of introduction, 3) 2nd generation biofuels and investment risks, and 4) Competition and synergies between the transport and stationary energy sectors and implications for the food and forest sector. The following main viewpoints were extracted from the responses in the questionnaire:

Productivity increases in the agricultural sector

- Estimate the magnitude of the linkages between prices and productivity.
- Any envisaged yield increases should avoid negative environmental externalities (e.g. in EU even a yield reduction may be desirable).
- Sustainable long term agricultural productivity requires a radical shift away from large scale intensive production.
- Productivity increases will occur when market prices are stable. At the same time, productivity increases can also lead to higher prices; then production in developing countries could double in four years.
- 1% productivity increase seems reasonable.
- Livestock efficiency increases are expected due to climate mitigation measures and increased feed costs.
- Growth rate needs to be higher than 1%.

2nd generation

- There is some scepticism that 2nd generation will have no or little negative impact on food security (e.g. due to lack of by-products and due to indirect land use change, ILUC)

Speed of introduction

- Raw material availability and security (supply has to be secured for a time horizon of more than 10 years; developers often do not own land).
- Quick introduction possible (2013) if financial incentives are provided.
- Changes in harvesting machinery required.
- 5-10 years in industrialized countries; 10-15 years at small-scale community level.
- Available by 2015-2020; additional time for technology transfer and implementation in developing countries.
- Several infrastructure investments required: feedstock infrastructure; processing infrastructure; market infrastructure.
- 2nd generation infrastructure will require quite some time to be operational especially in rural underdeveloped regions.

Policy recommendations for support of 2nd generation

- No specific market support for 2nd generation.
- Support for targeting the problems (e.g. GHG emission savings), but not support for specific individual solutions (such as 2nd generation biofuels).
- General carbon tax should be implemented.
- Tradable carbon permits.
- R&D, but funds distributed based on objective criteria (e.g. GHG savings) and not on specific technologies.
- Differentiated tax and/or direct support to stimulate utilisation of biomass waste.
- Governmental loan-guarantees (as a form of direct non-refundable contribution towards investments in industry).
- Since consumers will not pay higher prices for 2nd generation biofuels, either an obligation or tax differentiation is necessary.
- Sharing of risk between early-moving businesses and the public.
- Phase out support for 1st generation.

- Higher subsidies or tax return for GHG saving.

Competition & Synergies between transport and stationary sector

- Priority for heat and CHP (because of higher CO_2 saved per hectare and ton wood compared to the transport sector).
- Second-generation biofuels will dampen the cost for stationary energy producers to replace coal with biomass.
- Use biomass for CHP and use the electricity in electric cars.
- Transport sector is more risky than stationary sector because interaction between production of fuel, distribution and vehicles is more complicated.
- Generally policy incentives for stimulating demand is the best policy.
- Coordination and harmonization of EU biomass policies is required, especially between Renewable Energy directive, the Waste directive and the draft IPPC (industrial pollution) directive.

4. Methodological issues

The biofuels scenarios used in the model simulations were designed to cover a wide and plausible range of possible future demand for biofuels. The results depend on the assumptions defined and in this last category the main viewpoints regarding the overall methodological policy considerations have been extracted:

- Do not a priori assume that 2nd generation technologies are always better than 1st generation technologies.
- Avoid blending mandates because they tend to exacerbate price volatility.
- Consider a countercyclical mandates, e.g. a blending target that is high when feedstock prices are low and vice versa.
- No sustainability criteria because monitoring and enforcement is impossible anyway.
- Measures to shield the hungry and poor should be included.
- A jatropha scenario should be analysed.
- Include solar energy in scenarios.
- Assess the EU sustainable biofuel potential.
- Only wastes and residues for biofuels.
- Improve yield by using best available practices.
- Apply precision farming.
- First guarantee sustainability, then set biofuel volume targets.

Conclusions

Some general observations from the survey
As mentioned, it is difficult to draw fully consistent conclusions from the stakeholder input. However, a few general observations on the responses can be made:

- There are a few issues which brought forth completely contrasting opinions (e.g. on land use restrictions; whether increasing prices for agricultural products are good or bad; whether promoting 1st generation biofuels will block the development of 2nd generation (technological lock-in) rather than "pave the path" for it; sustainability criteria)
- Several stakeholders are sceptical about liquid biofuels in general. They favour other options for fuelling cars and other uses for the biomass (electric cars, biomass for stationary sector).
- There is a focus on GHG emission savings and the environment while the ELOBIO objective is towards identifying impacts on other markets.

Apart from these general observations, a number of policy-related conclusions have been extracted:

Input for Policies within the category of Socio-economics

- Establish linkage between commodity prices and agricultural productivity.
- Assumptions and predictions about yield increases should first of all consider environmental limitations in terms of water, soil and biodiversity.
- Agricultural productivity primarily is a product of stable market prices.
- The negative consequences of climate change on yield increases (especially in developing countries) must be taken into account.
- More investment in agriculture in developing countries that benefits both farmers and productivity is needed.
- More funds for World Food Programme and other food initiatives are needed.
- No imports of agricultural commodities should be accepted from countries where food security is endangered.

Input for Policies within the category of Environment

- Introduce sustainability criteria for both food and energy feedstock production.
- Allow land conversions for biofuel feedstock production only when carbon payback time is 10 years or less.
- Only allow biofuels with GHG balance better than 30% emission reduction compared to fossil fuels.
- Implement "polluter pays principle" to stop deforestation
- Tax meat consumption because of high ecological footprint and use the revenue for reforestation and forest conservation.
- Key actors in the biofuel supply chains should refrain from sourcing from regions with high rates of deforestation.
- Create stable market prices.

Input for Policies within the category of Technology

- Some stakeholders want to see the implementation of specific restrictions, others are strongly against it because they argue that restrictions cannot be enforced.
- Quantification of indirect land use change.

Main input for Elobio modelling
As input for the further modelling, the following key issues have been extracted from the survey responses as:

- Price volatility of agricultural commodities – How to reduce? How big is the amplitude?
- What is the impact on vegetable oil prices.

- What is the value and impact of co-products of 1st generation biofuels.
- What effect would the following policy measures have:
  - a carbon tax (instead of dedicated biofuel policies);
  - tradable carbon permits;
  - aubsidy/tax credit to reflect carbon reductions compared to fossil fuels;
  - countercyclical blending mandates.
- Small-scale localized versus large scale industrial production.
- Stationary versus transport sector.
- Indirect land use change.
- Add jatropha as feedstock.
- Limit biofuel feedstock to wastes & residues.

Finally, it should be mentioned that the responses have not touched upon differential approaches, both regional and feedstock specific. Biofuel policies could be quite different for industrialized versus developing countries; or the risks that need to be addressed differ for the different biofuel production chains. This could also be an interesting issue for further modelling, but will not be focused on here, as the stakeholders did not mention it.

Appendix 1 - List of stakeholders

Workshop participants

#	Name	Company/organisation	E-mail	Questionnaire filled
1	Dominique Dejonckheere	COPA-COGECA (European farmers and agri-cooperatives)	dominique.dejonckheere@copa-cogeca.be	
2	Ruth Digby	National Farmers Union/UK	Ruth.Digby@nfu.org.uk	
3	Flavia Bernadini	Chocolate, confectionary and biscuits ass.	Flavia.Bernardini@caobisco.be	
4	Kenneth Baltzer	Copenhagen University (FOI)	kb@foi.dk	x
5	Sander Van Bennekom	Oxfam UK (Oxfam NL)	sander.van.bennekom@oxfamnovib.nl	x
6	Inneke Herreman	IMACE	imace.ifma@imace.org	x
7	Geert VANMARCKE	FEDIOL (EU Oil and Proteinmeal Industry)	fediol@fediol.be	
8	Alessandra Paccamiccio	ebio	paccamiccio@ebio.org	
9	Frank Bergmans	MVO	Bergmans@mvo.nl	x
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11	Ywe Jan Franken	Fact Foundation (Fuels from agriculture in	yj.franken@fact-fuels.org	x
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15	Mihai Tomescu	DG ENV	mihai.tomescu@ec.europa.eu	
16	Jana Polakova	DG ENV	Jana.POLAKOVA@ec.europa.eu	

Non-workshop participants

Name	Company/Organisation	E-mail	Questionnaire filled
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Appendix 2 - Sample of Questionnaire

Stakeholder consultation concerning modelling of impacts of EU biofuels policies:
Early findings and call for stakeholder input to further analysis on Efficient and Low-disturbing Biofuels policies – ELOBIO

Name of respondent	
Organisation/company	
E-mail	
Telephone	

Introduction
Increased demand for biofuels have impacts on several commodity markets. The ELOBIO project seeks to formulate efficient and low-disturbing policy options that can enhance biofuels while minimizing the impacts on food and feed markets and biomass for power and heat. Recognizing that ambitious climate and energy security targets will likely lead to high future demand for bioenergy in the transport and stationary energy sectors, the ELOBIO project proposes that low-disturbing policy options should aim for creating opportunities for developing visions and strategies within agriculture and forest sectors in response to this prospective future situation.

The project consists of a review of current experiences with biofuels and other RE policies and their impacts on other markets. The project is based on stakeholder-supported development of low-disturbing biofuels policies, model-supported assessment of these policies' impacts on food & feed and lignocellulosic markets, and finally an assessment of the selected optimal policies on biofuels costs and potentials.

The objective of this questionnaire is to gather inputs from key stakeholders in order to make the analysis better informed, and thus more realistic. The consultation aims at having you reflect on the preliminary results, assist us in formulating other possible scenarios for analysis.

Scenarios and assumptions used
The analysis is based on a set of assumptions which has been formulated as model scenarios. These scenarios have then been used to quantify impacts of expanding [2]biofuels use on agriculture and world food system outcomes. The five key scenarios used for the analysis are described below (Table 1.1). The key policy related assumptions are presented next. Concerning the scenarios, we would like you to consider if these scenarios are the most realistic ones, or if any alternative scenarios should be considered.

[2] Feedstocks for first-generation biofuels typically include sugar cane, wheat, maize, cassava, rapeseed, oil palm, soybean and jatropha. For second-generation biofuels different woody and herbaceous ligno-cellulosic feedstocks are used.

Table 1.1: Scenarios

Scenario acronym	Scenario description
REF-01	The reference-scenario against which alternative biofuels scenarios are compared for their impact • *biofuels feedstock demand is kept constant after 2008*; • Assumes historical biofuels development until 2008 (Less than 3% of global transportation fuel supply);
WEO-V1	Assumes transport energy demand and regional biofuels use as projected by International Energy Agency (IEA) in its WEO 2008 Reference Scenario. Further, it assumes: • Second-generation conversion technologies become commercially available after 2015; deployment is gradual. • By 2030 the share of biofuels consumption in total transport fuels is 4.2% globally (5.5% developed countries; 3.0% developing countries), of which 25% are second generation.
WEO-V2	Assumes transport energy demand and regional biofuels use as projected by IEA in its WEO 2008 Reference Scenario. Further, it assumes: • Second-generation conversion technologies become commercially available only after 2030; deployment is gradual. Until then all biofuels are first-generation. • The share of biofuels in total transport fuels is the same as in WEO-V1
TAR-V1	Assumes transport energy demand as projected by IEA in its WEO 2008 Reference Scenario. Further, it assumes: • Mandatory, voluntary or indicative targets for biofuels use announced by major developed and developing countries will be implemented by 2020, resulting in about twice the biofuels consumption compared to WEO 2008 (nearly 10% biofuels in global transport fuel use; 12% in developed countries; 8% in developing countries). • Second-generation conversion technologies become commercially available after 2015; deployment is gradual (25% share as in WEO-V1).
TAR-V3	Assumes transport energy demand as projected by IEA in its WEO 2008 Reference Scenario. Further, it assumes: • Mandatory, voluntary or indicative targets for biofuels use announced by major developed and developing countries will be implemented by 2020 (same biofuels share as in TAR-V1). • Accelerated development of second-generation conversion technologies permits rapid deployment; 33% and 50% of biofuels use in developed countries from second-generation in 2020 and 2030 respectively.

Concerning the assumptions used, the most important key policy related assumptions in the modelling relate to (i) the range of biofuel targets and the introduction rate of second-generation technology; (ii) anticipated growth rates in agricultural productivity; (iii) implementation of sustainability criteria, especially options concerning land use conversion.

These assumptions are fundamental to the scenario analysis, to the results produced from the modelling, and thus to the recommendation of the ELOBIO project. We would therefore encourage you to be particularly attentive to these assumptions, when answering the questions and providing your feedback to us.

Early findings

According to our first set of analyses, substantial consumption of biofuels (i.e. 10% of global transport fuel use) will not be achievable in the short term (2020 or 2025) without significant impacts on food and feed markets as within this time frame neither of the following is expected to be available:

- industrial scale 2nd generation technologies, and more efficient biobased processes for e.g. food, feed, chemicals and energy (biorefineries);
- radical increases in crop production through major yield improvements;
- fundamental changes in our food production and consumption patterns towards less resource intensive biomass use (i.e. less meat consumption in developed countries).

Preliminary results also indicate that greenhouse gas savings of first generation biofuels compared to fossil fuel can become relatively marginal when indirect land use change is considered (with the exception of sugar cane ethanol).

How to use the questionnaire
In the following, a number of results of the study are presented with a brief explanation to the most obvious impacts. You do not need to answer all the questions. Rather, we would appreciate if you focus on those results and impacts which are most relevant to you, and provide us with your reflections on these. Further background information on the modelling and the questions is found in the attached **background information document** for those stakeholders, who would like more in-depth information on the project - but this is optional.

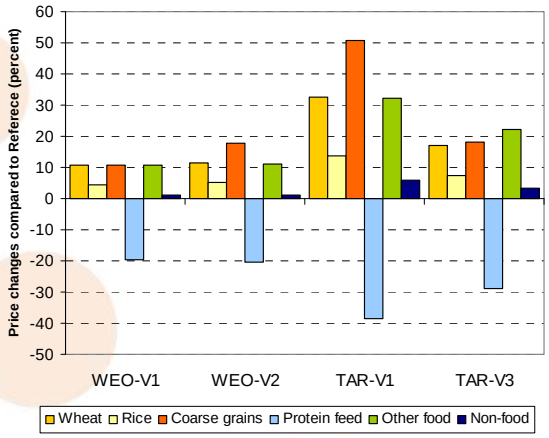
Questions or assistance concerning the questionnaire - contact the ELOBIO team
If you have any questions concerning the questionnaire or the ELOBIO project, you are welcome to contact the team directly: **Henrik Duer** (hdu@cowi.dk, ph. (+45) 4597 2215), **Jeppe Lundbæk** (jelk@cowi.dk, ph. (+45) 4597 2642) or **Lillah Lucie Emmik Sørensen** (lles@cowi.dk, ph. (+45) 4507 1207).

1 SOCIO-ECONOMICS

 # 1: Impacts of first-generation biofuels on agricultural prices

Context/results:
The impact of first-generation biofuels on agricultural prices in 2020 is shown in the figure below. Compared to the reference projection, commodity prices increase up to 50%. The exception is protein feed prices, which decrease due to large volumes of co-products from biofuels production entering the market.

Figure 1. **Impacts of first-generation biofuels on agricultural prices in 2020**



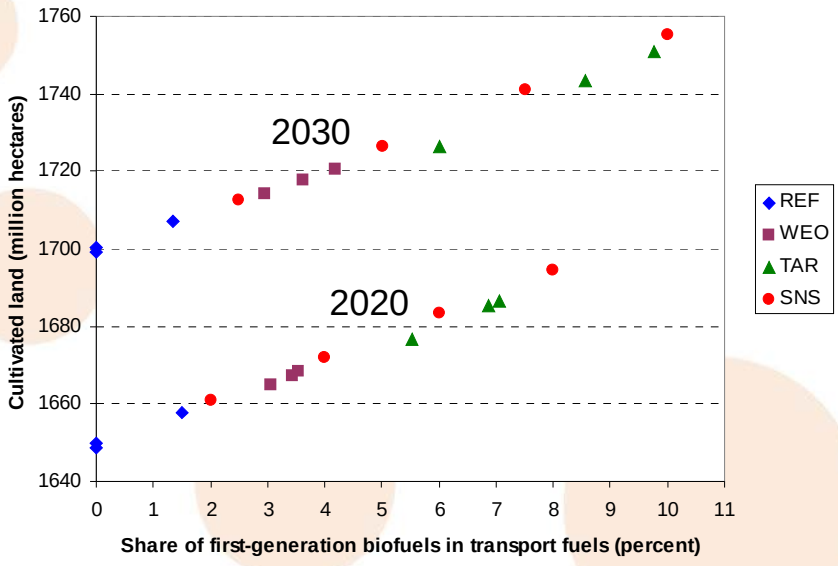
Please reflect on these results, e.g.:

1. What are the implications of these results for your business/organisation?
2. Could your business introduce any measures to respond to these effects?
3. While increasing commodity prices are essential for investments in agriculture, they are detrimental to the food industry and consumers (especially urban poor). Can you describe a level of price increase, which is acceptable (or desirable) for your business/company?

Answer:

 # 2: Food security
Context/results: In 1970 about 900 million people in the developing world, a third of the total population, was chronically undernourished. Almost four decades later the number of undernourished in the world totalled some 923 million in 2007. The food price crisis in 2008 added a further 100 million to the world's undernourished. Global biofuels scenario runs indicate an *additional* people at risk of hunger in 2020 for between 40 and 140 million people. Purchasing power in several countries was apparently not strong enough to respond to increases in food prices.
Please reflect on these results, e.g.: 1. What is your reaction to these results? 2. What are the implications of these results for your business/organisation? 3. Could your business introduce any measures to contribute to increasing food security in developing countries? 4. Should food security be a decisive element for designing biofuels policies? If yes, what measures do you propose?
Answer:

2. ENVIRONMENT

 # 3: Land use conversion
Context/results: Model results indicate that **greenhouse gas savings** of first generation biofuels compared to fossil fuel are small when land use change is considered (with the exception of sugar cane ethanol). Conversion of forests or grassland to cultivated land causes substantial emissions of carbon stocks in soils and vegetation. This defeats one of the primary goals of biofuels to contribute to climate change mitigation. Land conversion may endanger landscapes with significant value for **biodiversity**. **Figure. Cultivated land use versus share of first-generation biofuels in transport fuels in 2020 and 2030** 

Please reflect on these results, e.g.:

1. In current model runs no additional land use restrictions are applied for biofuels. What land use restrictions can you envisage? What policies are necessary to enforce proposed land use restrictions?
2. How could deforestation be stopped in the context of growing agricultural demand?
3. Should the focus of cultivated land expansion be on marginal land? If yes, would you accept potential higher costs due to higher management requirements and potentially lower yields?
4. One motivation for promoting biofuels even with low or negative climate benefit is that it paves the way for 2nd generation technologies in the longer term. Would you agree with this motivation? What time horizon for phasing in 2nd generation technologies would you require for accepting this motivation as valid? Do you accept no GHG reductions?
5. What measures should be taken to intensify agricultural production on existing land (thus reducing the need to expand agricultural land into forested and marginal areas)?
6. The impacts of biofuels on the environment and biodiversity depend on (i) the extent of land use change and conversion, (ii) the type of biofuels feedstocks used and (iii) the agronomic management applied. Do you consider compliance with sustainability criteria an important element for increased biofuels deployment? Would you accept additional costs, if they were necessary to achieve compliance with sustainability criteria?

Answer:

3 TECHNOLOGY

 # 4: Agricultural technology – Growth in agricultural productivity

Context/results:

Growth in agricultural productivity is critical for the calculation of land use requirements for food, feed and biofuels feedstock production. Agricultural productivity is a function of input use, multi cropping and a technology factor. Technology affects yield estimates, by modifying the efficiency of production per given units of inputs and land.

In many developing countries, crop yields for most commodities are lower than those attained in developed countries. During the period 1970 to 1990 world grain yields increased by an average of some two percent per annum but since then this remarkable yield growth has been reduced by half. In the first scenario runs, a commodity specific factor for technological progress of about 1% per year (in terms of yield increase) has been applied. No changes in livestock efficiency were applied.

Please reflect on the key assumptions, e.g.:

1. What rate of technological progress do you expect in agriculture? Higher, lower or similar growth rates than the historic 1% ?
2. What would be a reasonable alternative assumption for maximum productivity growth? If possible specify for different regions.
3. Assuming a strong movement for agricultural productivity growth in less developed countries could substantially influence their competitive position. How much productivity growth do you consider possible in the next two or three decades? Can you provide material for your assumption (e.g. for Eastern Europe or developed countries)?
4. What measures are necessary for achieving growth of agricultural productivity?
5. Do you expect increases in livestock efficiencies? If yes, where and at what rates?

Answer:

 # 5: Second generation biofuels - Speed of introduction

Context/results:

Feedstocks for second generation biofuels technology often require significant changes in land use and management. There is a need to carefully assess and respect the current uses and functions of potentially suitable land, to regulate land use in an integrated approach across sectors to achieve land use efficiency, avoid conflicts and to protect the rights of the weakest members of society when land ownership is uncertain. Another major

challenge is development of the massive infrastructure and logistical systems required for second-generation feedstock supply systems.

Please reflect on the key assumptions, e.g.:

1. When do you anticipate 2nd generation technologies to be available at industrial scale? Do you have any material to support your assumptions?
2. If 2nd generation technologies become available, how fast can one expect these to be implemented in developing countries? What measures would be necessary to support technological transfer?
3. What is necessary and how long will it take to establish infrastructure and logistical systems?

Answer:

 # 6: Second generation biofuels and investment risks

Context/results:

2nd generation biofuels appear to be a key factor in dampening impacts of biofuels on food markets. One of the determining factors for successful commercialization of 2nd generation biofuels is a conductive investment climate. This is, in turn is, to a large extent dependent on how finance providers (of both debt and equity) perceive the risks related to investment in biofuels projects.

Please reflect on:

1. What kind of policies could improve the investment climate for second generation biofuels?
2. Is paying higher biofuels prices from 2nd generation installations (compared to first generation) justifiable if this would help reducing resource competition with the food/feed sector? How could this be regulated for practical implementation (i.e. how to ensure 2nd generation being rather consumed than 1st generation)?
3. Who should carry the risk of the push for 2nd generation technologies?

Answer:

 # 7: Competition and synergies between the transport and stationary energy sectors and implications for the food and forest sector

Context/results:

Model-based analyses of interactions between the transport and stationary energy sectors indicate that ambitious climate policies in combination with high ambitions for biofuels for transport can lead to strong competition for biomass between the stationary energy sector and transport sector. Besides the overall policy regime, development of a range of other energy technology options than those related to bioenergy, are among critical determinants of stationary sector biomass demand. Preliminary calculations indicate that the paying capacity for biomass in the stationary sector can drive up future biomass and land prices substantially, and thus affect the food and forest sectors to the same extent as has been the case for 1st generation biofuels in relation to the food sector in recent years.

Please reflect on:

1. What is your view about the growing bioenergy sector – do you see new business opportunities for your company/sector?
2. Do you have any opinion on how biomass use for energy should be prioritized? If so, please motivate.
3. Do you see any differences between the transport and stationary energy sectors in relation to the risks of developing businesses strategies to exploit bioenergy opportunities?
4. Do you see differences between policy instruments with respect to how they influence the possibilities for your company to adapt to a changing situation (with or without orientation towards developing bioenergy related business opportunities)?

Answer:

4. METHODOLOGICAL POLICY ISSUES

8: Overall methodological policy considerations
Context/results: The biofuels scenarios used in the model simulations were designed to cover a wide and plausible range of possible future demand for biofuels. The results depend on the assumptions defined and we are looking for ways that could include more favourable, but still realistic results. The below questions concern the overall analysis, and here we would like to remind you of the following key parameters used: • The range of biofuels targets and speed of introduction • The introduction of 2nd generation biofuels technologies and the combination of use of 1st and 2nd generation biofuels technologies • The agricultural productivity growth rate • Options concerning land use • Implementation of sustainability criteria
Please reflect on the key assumptions applied, e.g.: 1. If you consider the five above-mentioned parameters from a policy perspective, do you then have any important messages you would like to provide us? (for example, what can be done to stimulate agricultural productivity growth or are there any land restrictions you think should be imposed in the model?) 2. ***What other scenarios which have not been analyzed would you like to be modelled?"*** 3. What additions/changes would you suggest/be interested in analyzing if you think your industry would be best served by intensifying agriculture on existing land? How much investment do you think that would require in agricultural production systems and how this be mobilized? 4. What level of future biofuels targets do you envision? If possible, please indicate expected biofuels targets for 2020 and 2030 for EU, US, Brazil, China, India and the World. 5. How important do you consider the inclusion of sustainability criteria?
Answer:

Background information to the questionnaire

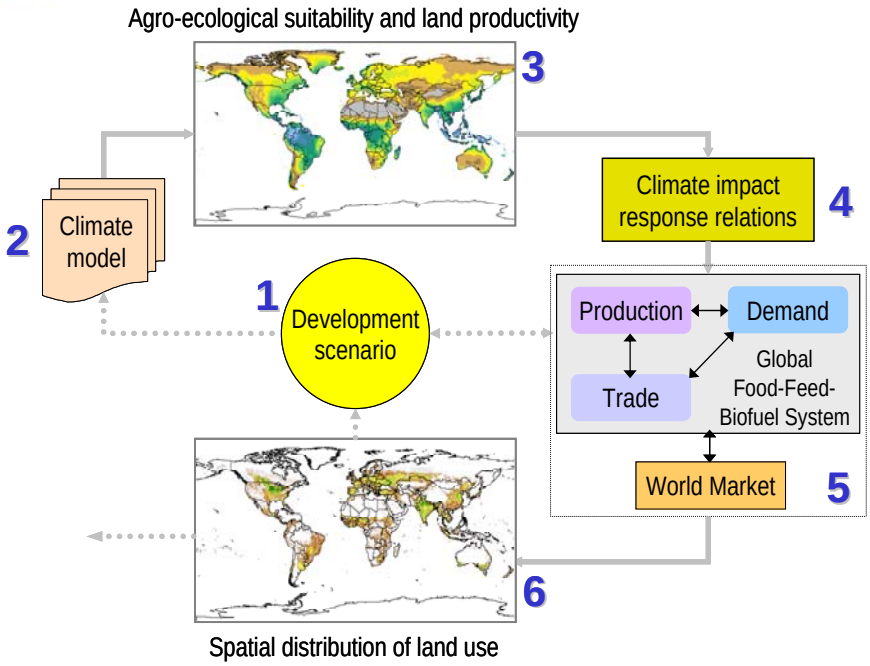
- The model used for the ELOBIO project

ELOBIO applies scenarios in a state-of-the-art ecological-economic modelling approach, which is presented below:

An ecological-economic world food system model

For the analysis of the global agricultural system a state-of-the-art ecological-economic modelling framework is applied. It includes as two major components, the FAO/IIASA Agro-ecological Zone (AEZ) model and the IIASA world food system (WFS) model. The two main model systems, AEZ and WFS, were adapted and expanded for resource use and by-product generation of biofuel production and form the basis of scenario evaluation and policy analysis of the impacts of increased biofuel deployment on food and agriculture at the national, regional and global levels. In addition, a rule-based downscaling methodology is applied to allocate the results of the world food system simulations to the spatial grid of the resource database for the analysis and quantification of environmental implications. This modelling framework comprises six main elements, as sketched in Figure 1 and described below:

Figure 1. Framework for ecological-economic world food system analysis



1. A storyline and quantified development scenario (usually chosen from the extensive integrated assessment literature) is selected to inform the world food system model of demographic changes in each region and of projected economic growth in the non-agricultural sectors. It also defines scenarios of demand for first- and second-generation biofuels in different regions/countries. The scenario also provides assumptions characterizing in broad terms the international setting (e.g. trade liberalization; international migration) and the priorities regarding technological progress. It quantifies

selected environmental variables, e.g. greenhouse gas emissions and atmospheric concentrations of CO_2.

2. The emission pathway associated with the chosen development scenario is used to select among available and matching published outputs of simulation experiments with general circulation models (GCMs). The climate change signals derived from the GCM results are combined with the observed reference climate to define future climate scenarios.
3. The agro-ecological zone (AEZ) method takes as input a climate scenario and other elements from a land resources inventory including soils, landform, and present land cover and estimates the likely agronomic impacts. The AEZ model uses detailed agronomic-based knowledge to simulate land resources availability, and assess for specified management conditions and levels of inputs, the suitability of crops in relation to both rain-fed and irrigated conditions. Relevant to specific agro-ecological contexts attainable crop production potentials are quantified for a spatial grid of 5′ by 5′ latitude/longitude.
4. Estimated spatial climate change impacts on yields for all crops are aggregated and incorporated into the parameterization of the national crop production modules of a regionalized world food system model.
5. The global general equilibrium world food system (WFS) model is used – informed by the development storyline (including biofuel demand) and estimated climate change yield impacts – to evaluate internally consistent world food system scenarios. It comprises a series of national and regional agricultural economic models and provides a framework for analyzing the world food system, viewing national food and agricultural components as embedded in national economies, which in turn interact with each other at the international trade level. The model consists of 34 national and regional geographical components covering the world. The individual national/regional models are linked together by means of a world market, where international clearing prices are computed to equalize global demand with supply.
6. In a final step, the results of the world food system simulations are ‘downscaled’ to the spatial grid of the resource database for quantification of land cover changes and a further analysis of environmental implications of biofuels feedstock production.

Further information on questions in questionnaire

1 SOCIO-ECONOMIC

1: Impacts of first-generation biofuels on agricultural prices
Context/results: In the world food system model, when simulating scenarios with increased demand for food staples caused by production of first–generation biofuels, the resulting market imbalances pushes international prices upwards. Real prices of agricultural crops declined by a factor of more than two during the period from the late 1970s to the early 1990s and then stagnated until about 2002 when food prices started to rise. The Reference projection (with no increased biofuel deployment) is characterized by modest increases of world market prices from 2000 to 2030. With population growth slowing after 2030, agricultural prices stabilize or even decline slightly.

2. ENVIRONMENT

3: Land use conversion
Context/results: Available scenario runs projecting world food system development (Fischer et al., 2007) indicate that global food and feed demand will require some additional land to be used for cultivation, notably in developing countries (between 100 and 150 million hectares by 2030 compared to a global total of 1.6 billion hectares currently used for crop production). Depending on required biofuel quantity, speed of introduction, and biofuel portfolio, additional cultivated land will be required for biofuel feedstock production. Model results for the above described biofuel scenarios indicate additional cultivated land use requirements between 20 to 40 million hectares. The Figure below highlights global cultivated land use in 2020 and 2030 for a reference scenario (REF) with no or limited biofuel use and three different biofuel scenarios. Spatial land conversion is determined in a series of multi-criteria problems for each country or region subject to various constraints, which include: (i) net land conversion as simulated in general equilibrium food system model; (ii) spatially detailed resource availability; (iii) suitability of land for cropping; (iv) legal land use limitations (i.e. protected areas); (v) ecosystem conversion suitability/propensity, and (vi) land accessibility, i.e. proximity to current agricultural activities.

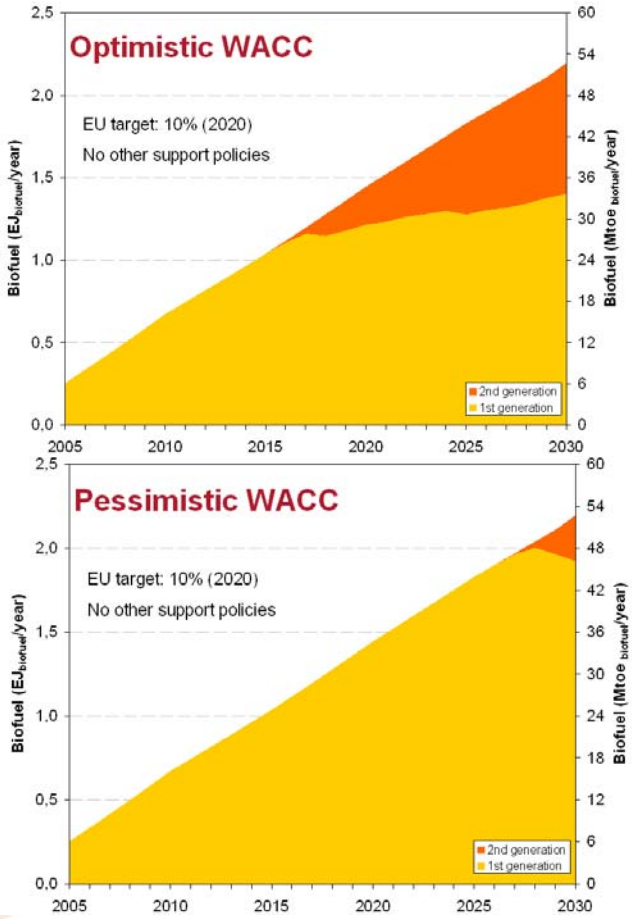
3 TECHNOLOGY

5: Second generation biofuels - Speed of introduction
Context/results: Second-generation biofuels, i.e. fuels produced from woody or herbaceous non-food plant materials as feedstocks, have attracted great attention because they are seen as superior to conventional feedstocks in terms of their greenhouse gas saving potential, but even more so because of their potential for production on 'non-food' land. Major technological breakthroughs will be required to improve feedstock materials and the efficiency of the conversion process before second-generation biofuels will be able to make a significant contribution. Global land balances based on a detailed assessment of land suitability and current land use indicate potential availability of substantial amounts of land for second generation feedstock production. Hence, at current use levels, the land potentially available for bioenergy production (assuming unbiased distribution between livestock feeding and bio-energy uses) was estimated in the order of 700 – 800 million hectares, characterized by a rather wide range of productivity levels.

6: 2nd generation biofuels and investment risks
Context/results: First and second generation technologies have very different risk profiles, which is due to a variety of factors, ranging from their cost-supply structure, feedstock availability, maturity of the conversion technology, government support, public perception etc. For example, for a given volume of biofuel production, capital costs make up between 5 and 25% of the overall cost price of first-generation biofuels, while this is in the order of

70% for second generation biofuels. This also means that first generation installations are more vulnerable to variability of feedstock prices, because those represent the biggest part of their production cost. They also face uncertain government support in the long run. On the other hand, second generation installations have a much higher technology risk, in terms of the technology being relatively unproven on a large scale.

Different risk profiles translate into different costs of capital for first or second generation technologies, the latter currently being significantly higher. Preliminary analysis have shown that second generation biofuel projects are in this regard penalized twice: because of the still high technology risk, the premium required by investors to provide finance to second generation ventures is very high compared to first generation, and because of their cost-supply structure (with very high fixed capital costs) this premium has a bigger effect on their cost of capital. The result is that installations using second generation technologies often cannot obtain financing at an acceptable cost, which hinders their large-scale deployment, which in turn slows their technological learning curve and further cost reductions (see figures below).



WACC - weighted average cost of capital

 # 7: Competition and synergies between the transport and stationary energy sectors and implications for the food and forest sector

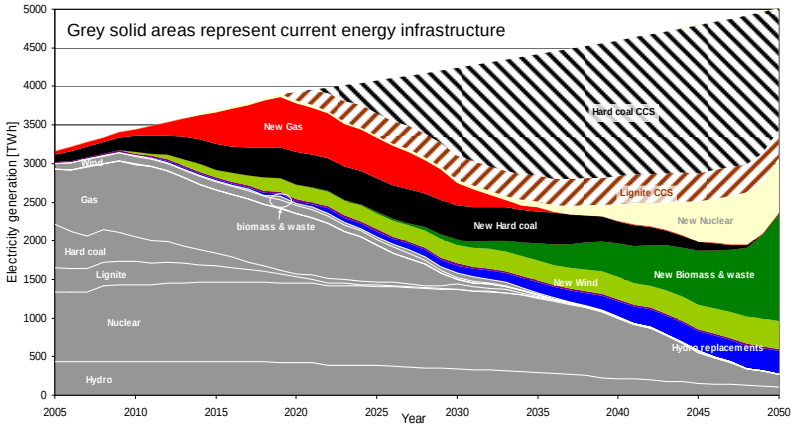
Context/results:

There are significant opportunities for synergies via integrated production of biofuels and heat/power and actors in the food and forest sectors may develop visions and coherent strategies with respect to bioenergy. Experience from countries with well established forest bioenergy sector shows that while the industry often has adopted reactive and defensive attitudes to policies stimulating bioenergy; proactive early movers have grasped new opportunities and market bioenergy products. Policies have opened up new markets for the forest industry and green electricity and forest by-products contribute substantially to the profitability.

Policies strongly influence the prospects for both biofuels for transport and for stationary energy purposes, but there are also many other influential factors, implying that policymakers may have limited possibilities to guide bioenergy development in a specific direction (e.g., regarding which end uses that dominate) unless policies are

shaped to strongly favour/disfavour specific bioenergy options. However, such policies have the disadvantage of not allowing market forces to find the best use of biomass for meeting the overall environmental and energy security objectives.

CCS – Pathway for EU-27 (plus Norway)
30% CO_2 emission reduction by 2020 and 85% by 2050



No CCS – Pathway for EU-27 (plus Norway)
30% CO_2 emission reduction by 2020 and 85% by 2050

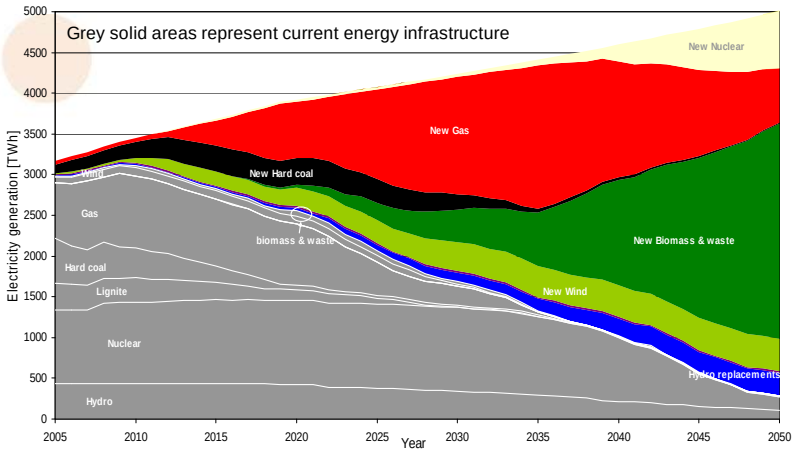


Figure: Contrasting bioenergy futures – the diagrams show the development of electricity generation in Europe under a carbon cap, given contrasting development pathways for carbon capture and storage (CCS). The grey area represents the existing power generation capacity, which is phased out over time due to age, and the coloured area represents the new generation capacity, which is added in response to increasing demand and the need to replace aged capacity. As can be seen, if CCS becomes established as an option and grows fast much less biomass will be required for heat and power production compared to a situation where CCS does not become established. The diagrams are illustrative of the fact that the prospects for other technologies than those directly related to bioenergy can strongly determine how the demand for biomass develops. Source: Elobio WP6.

Appendix 3 - Un-edited version of questionnaire responses

The viewpoints stated in the questionnaire are presented according to the design of the questionnaire into eight subjects within four main categories as illustrated below:

Main categories	Subjects
5. Socio-economics	1. Impacts of first-generation biofuels on agricultural prices 2. Food security
6. Environment	3. Land use conversion
7. Technology	4. Agricultural technology – Growth in agricultural productivity 5. Second generation biofuels - Speed of introduction 6. Second generation biofuels and investment risks 7. Competition and synergies between the transport and stationary energy sectors and implications for the food and forest sector
8. Methodological policy issues	8. Overall methodological policy considerations

SOCIO-ECONOMICS

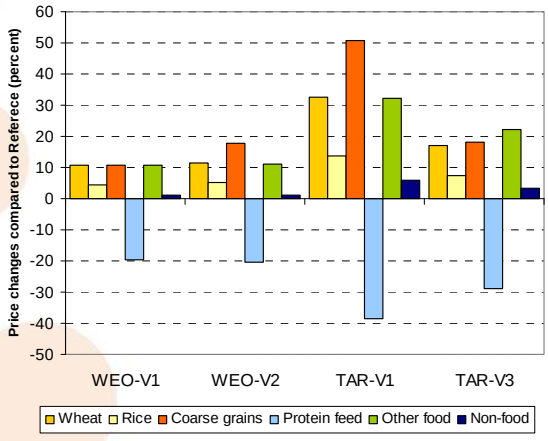
Subject 1: Impacts of first-generation biofuels on agricultural prices

 # 1: Impacts of first-generation biofuels on agricultural prices

Context/results:

The impact of first-generation biofuels on agricultural prices in 2020 is shown in the figure below. Compared to the reference projection, commodity prices increase up to 50%. The exception is protein feed prices, which decrease due to large volumes of co-products from biofuels production entering the market.

Figure 1. **Impacts of first-generation biofuels on agricultural prices in 2020**



Please reflect on these results, e.g.:

4. What are the implications of these results for your business/organisation?
5. Could your business introduce any measures to respond to these effects?
6. While increasing commodity prices are essential for investments in agriculture, they are detrimental to the food industry and consumers (especially urban poor). Can you describe a level of price increase, which is acceptable (or desirable) for your business/company?

#	Stakeholder	Answer
1	AEBIOM	1. No impact for the activities of our non profit organisation 2. - 3. The experience of the last 30 years does not show any significant impact of the increased commodity consumption (through higher meat consumption for example) on the price. Only at the end 2007 and early 2008, the price increased to a moderate level (still much lower than in the 80's) due to simultaneous reasons (bad harvest, oil price, speculations). Therefore, it is misleading to accuse biofuels of being responsible for food price increase as this is not a reality. Prize of cereals is extremely low. We need higher prize in agriculture to strengthen production.
2	Copenhagen University	We have no direct interest in food prices (from a private perspective). However, see comments from a societal perspective in #2 below
3	DanChurchAid	-
4	DONG Energy A/S	1. A general price increase may also cause wheat straw prices to increase which would be detrimental to our co-firing of straw with coal. Conversely, if feed prices decrease it may increase animal production in agriculture thus providing more manure for biogas production. 2. We would probably increasingly try to source woody biomass types. Also, our company owns a technology company that offers solutions for enzymatic conversion of biomass waste into bioethanol, i.e. second-generation biofuel with feed and solid biofuel as by-products. 3. This would be a little to speculative as government subsidies to use biomass could be revised to take into account of higher wheat straw prices.
5	EEB	What also should be considered is the potentially perverse effect a decrease of protein feed prices could have by making meat cheaper thereby creating an inventive to increase the production capacity of the meat industry. It seems to be a bit futile to try and establish a maximum acceptable price increase by asking respondents through this consultation. The people for whom this is really relevant are unlikely to have any say on this matter and for them every increase will be problematic. What's also important is that it is not simply assumed that because someone lives in the countryside and grows a few crops that this person will benefit from high prices. Many rural poor are just as dependent on the purchase of food as the urban poor. In fact a more realistic assumption would be that only those producers who produce significant surpluses and have market access will benefit from higher prices.
6	EPPOA (1)	-
7	EPPOA (2)	The international commodity markets are complex – They can, and often are hugely influenced by speculative buying and selling as well as supply and demand pressure. There is also huge unprecedented turmoil in the markets which still has to play out. Personally I feel this makes market long term predictions somewhat redundant.
8	Fact Foundation	1. Higher agricultural prices will give farmers an incentive to invest in yield improving technologies. Yields will increase, rural areas will developed, urbanisation will be less. Example is Bolivia where villages legally growing coca show a good development and villagers are better off than urban citizans. 2. Produce and use biofuels locally and not involve in large scale exports for the needs in developed countries. 3. The assumption is we all have come to accept urbanisation as such. Remigration to rural areas and rural development are key in my opinion.

9	IMACE	We miss the impact on vegetable oil prices. Most of the biofuel in the EU is biodiesel based on vegetable oils. Considering the fact that about 2/3 of the EU rapeseed oil crop is used for biodiesel we expect a strong price impact. - Impact: increasing costs of raw material will have an impact on consumer prices. This should have an impact on the biofuel policies: we need to phase out support for the use of food-grade raw material for biofuels. Alternatives like 2nd generation biofuels and electricity for transport, based on renewable inputs like sun, wind etc. offer much better alternatives.
10	LRF	1. The impacts of increased agricultural prices for our members who are farmers and forest owners will be varied. Generally, farmers will benefit from increased agricultural prices. However, for the livestock, dairy and poultry sectors increased feed prices can also lead to increased costs. Increased prices will probably also stimulate greater investments in agricultural and forest production which could help increasing production of both food and energy. 2. Our organisation could help its members by supporting them in their wish to expand and diversify their business. 3. Very rapid changes, increases as well as declines, are negative to all sectors of the food and energy sector. As for the whole economy. Therefore a slow yearly increase of about 2-3 %, is generally to be preferred.
11	MVO	In the first place I would like to question the results, especially **"**The exception is protein feed prices, which decrease due to large volumes of co-products from biofuels production entering the market." Due to increase of the world population and an increasing wealth the demand for dairy and meat will rapidly increase. This demand will increase the demand for protein. With the same ease the above statement is made one could also say that in the future protein demand will set the price of the oilseeds and beans. Since protein content varies between 20 and 40% one could state that vegetable oil is a by-product. If the price of the protein grows, prices of oil might be able to decrease. Another important factor which might influence the prices of feed ingredients is the GM-debate. If EU farmers cannot import US-soybean protein to feed their cattle demand for other protein sources like rapeseed meal will increase. This might lead to and imbalance of prices.
12	Oxfam	1. Such increase of food prices will lead to a growing number of people that spend more than 50% of their income on food. The 2007 rise in food prices put approx. 100 mln people below the poverty line. In principle, farmers can also benefit from rising food prices, but we fear that it will be mostly the agri-business corporations who will reap these benefits. 2. More investment in agriculture in developing countries that benefits both farmers and productivity. More funds for World Food Programme and other food initiatives. 3. Difficult to say, but a 50% increase, without compensating support is too much

Subject 2: Food security

 # 2: Food security
Context/results: In 1970 about 900 million people in the developing world, a third of the total population, was chronically

undernourished. Almost four decades later the number of undernourished in the world totalled some 923 million in 2007. The food price crisis in 2008 added a further 100 million to the world's undernourished.
Global biofuels scenario runs indicate an *additional* people at risk of hunger in 2020 between 40 and 140 million people. Purchasing power in several countries was apparently not strong enough to respond to increases in food prices.

Please reflect on these results, e.g.:

5. What is your reaction to these results?
6. What are the implications of these results for your business/organisation?
7. Could your business introduce any measures to contribute to increasing food security in developing countries?
8. Should food security be a decisive element for designing biofuels policies? If yes, what measures do you propose?

#	Stakeholder	Answers
1	AEBIOM	1. Yes too many people are undernourished. BUT this is not due to the lack of food. FAO states that we have enough food now for the world population and we could produce food for 12 billions people! The problem is access to food and bad agriculture development in less developed countries. We should stop exporting food at low prize. This dumping kills agriculture in developing countries. Accusing biofuels and taking them as a scapegoat for world's starvation is misleading and will not solve the problem. 2. Bad image of biofuels favours oil. 3. - 4. Yes. No import in EU of agricultural commodities from countries in which food security is in danger.
2	Copenhagen University	Price increases on agricultural commodities of up to 50% by 2020 seem very dramatic, particularly for the urban poor in developing countries. However, it needs to be put into perspective: - The real prices of agricultural commodities have been declining dramatically for the past century, particularly in the post-war period, without reducing the number of undernourished people notably. Obviously, we cannot say what would have happened if prices had not declined, undernourishment may well have been worse, but we must also consider the possibility that the link between food prices and undernourishment are not as clear as the text suggests. - The poorest people in developing countries often reside in the country-side and are in some way dependent upon agriculture – for employment or subsistence farming. To some extent, subsistence farmers may be shielded from world market price increases, because high costs of transportation and marketing creates a barrier between the local and world markets (hence the subsistence nature of farming). If world market prices increase beyond these barriers (or if barriers are lowered), farmers may actually benefit from higher prices if they are capable of producing an agricultural surplus. - A relatively high price level for agricultural products may not be as bad as large price fluctuations. Unstable prices create a lot of uncertainty and reduce incentives for agricultural investments. Even if prices are high today, it is risky to invest in higher output for next year's harvest, if prices could then be much lower. Higher investment risk particularly hurts the poor, who live close to subsistence level and cannot cope with failed investment.

		In summary, higher prices for agricultural commodities due to biofuel production may not be all bad for developing countries. However, if increased biofuel also raises price variability it will be more difficult for poor farmers to benefit from higher prices. A biofuel blending mandate may increase price variations, as it reduces the price responsiveness of demand (demand for biofuel will be high even when prices are high). On the other hand, a countercyclical blending target (i.e. more when prices are low, less when prices are high) could reduce price variations and lower the risk of agricultural investment.
3	DanChurchAid	-
4	DONG Energy A/S	1. This is a serious social issue. Our contribution is to offer the world technology for the use of non-food biomass (second-generation biofuel) thereby reducing pressures on biomass suitable for human consumption. Our business thus can make a big contribution towards enhancing sustainability and food security, of course depending on government incentive schemes to make it commercially viable to go for second-generation biofuels.
5	EEB	Ensuring lasting food security for all, which we understand as increasing productivity while at the same time significantly improving the environmental performance of farming, is a massive challenge. Its far from obvious that this challenge will be met, even without considering the impacts of our biofuel policies, irrespective of whether they support first or second generation. The only sensible and responsible course of action would be to review existing biofuels policies, identify if and if so, which types of feedstocks are unlikely to increase competition for land and only provide those with support after there's been clear and convincing evidence that they do deliver significant benefits.
6	EPPOA (1)	-
7	EPPOA (2)	EPPOA promotes decentralised localised fuel production. Decentralising fuel production, keeping fuel production small scale and producing fuel for local markets means that the fuel producers and users are directly linked to an socio-enviromental costs. These costs can not be so easily externalised and forgotten as is the case with current large production paths.
8	Fact Foundation	1) Enough food is produced for the world population, war and distribution problems are the reason for this problem. 2) Non-differentiated criticism on biofuels, stating biofuels harm food security might make sense in a global context but in many rural villages with plenty unused production potential the argument doesn't hold. 3) Grow multipurpose crops (instead of 100% biofuel crops) for energy and be able to produce food or biofuel according to demand. In case of food shortages enough food will be available. Production of bioenergy from agricultural and organic domestic wastes gets extra focus. 4) Yes, be careful growing non-food crops for energy. Food insecurity is a problem in many contexts in developing countries, make sure they can use their resources first to meet national demand (food and energy) before producing biofuels for export (e.g. to EU).
9	IMACE	These results are worrying. In the coming decade(s) we need to fight against hunger and malnutrition. We are prepared to contribute to this urgency. We have introduced a number of private sector initiatives (including partnership with World Food Programme). Food security should be a decisive element for designing biofuel policies. This has been included in the so-called

		Cramer criteria in The Netherlands and is briefly referred to in the EU Renewable Energy Directive. The food dollar of the poor should not compete with the fuel dollar of the rich!
10	LRF	1. Eradicating hunger and poverty in the world should be a top priority for the world leaders. However, since population is expected to increase further and at the same time climate change will influence agricultures ability to deliver food there is a great challenge to solving this problem. Agricultural productivity needs to increase. Biofuel production could help stimulate this. Depending on commodity, biofuel production could also compete with land and influence prices. It is however important to not judge it solely black and white but see opportunities and develop production in the most efficient way. Multifunctionality of land and production as well as resource efficiency could contribute to a sustainable development. Production of bi-products to biofuel is for example one important factor to take into account, or to produce biofuels on marginal lands not suitable for agricultural production. 2. Increased volatility in world market prices could have negative effects on agricultural prices. However, increased demand for food, energy and fibre should provide a general positive investment climate for agriculture for the future. In Sweden climate change is also expected to partially have positive effects for production. 3. One example is to produce more domestic protein for animal feed, thus lowering our dependence on import of soy meal from tropical countries. This we do by producing ethanol and DDGS from grain and FAME and rape seed meal from oil seeds. 4. Relations between food security and biofuels policies needs to be adequately analysed before making any conclusions on this. Biofuels production can influence food production in different ways, both positively and negatively.
11	MVO	Undernourishment is a sad issue but not necessarily fully caused by high prices. Prices of food commodities have been stable over the past 20 years. In real terms this means that the part of the money going to food from the average budget has decreased. The recent prices hikes in 2007/2008 are caused by a complex of factors like increasing demand (due to growing population, growing wealth, biofuel use), decreasing supply (low stocks, bad harvests), higher oil prices, and last but not least speculation, Meanwhile prices have come down. In the first place undernourishment has to do with problems in the distribution system. Not the least due to political reasons. Agricultural production is linked to nature (land and weather) and therefore needs a stable (political) environment as well as a financial framework to cope with fluctuations in crop yield from year to year. Food security as well as biofuel security both depend on availability of feedstock. Farmers can produce if they have the means to invest and have an outlook to sell their produce to get a return on their investment. Moreover, production of feedstock for biofuels from crops from which certain parts can be used as food will increase supply. In case of food scarcity, the part that is used for fuel which can be used as food can be redirected to the food chain. When developing a policy weather aimed at creating food or energy security one should always bear in mind that in real life there will be imbalances between supply and demand. Even in the mineral oil business this is the case. In markets depending on crops this will be even more the case.

12	Oxfam	This is our core business, see previous answers. 1. - 2. - 3. Agricultural productivity can be increased, while at the same time protecting farmers. We can raise international awareness to invest more in such agricultural improvements, finance a few good projects ourselves (and show good examples). At the same time, appropriate consultation mechanisms with local stakeholders should be established. They can also prevent that land for food is changed into land for fuel. Finally, we can ask for `emergency clauses' in, e.g. the EU biofuel policy (i.e. reduce the volume of imported biomass for energy because of its effect on food prices. The current review clause could be seen as such a clause) 4. Yes, a key condition for our `support.' See previous answer.

ENVIRONMENT

Subject 3: Land use conversion

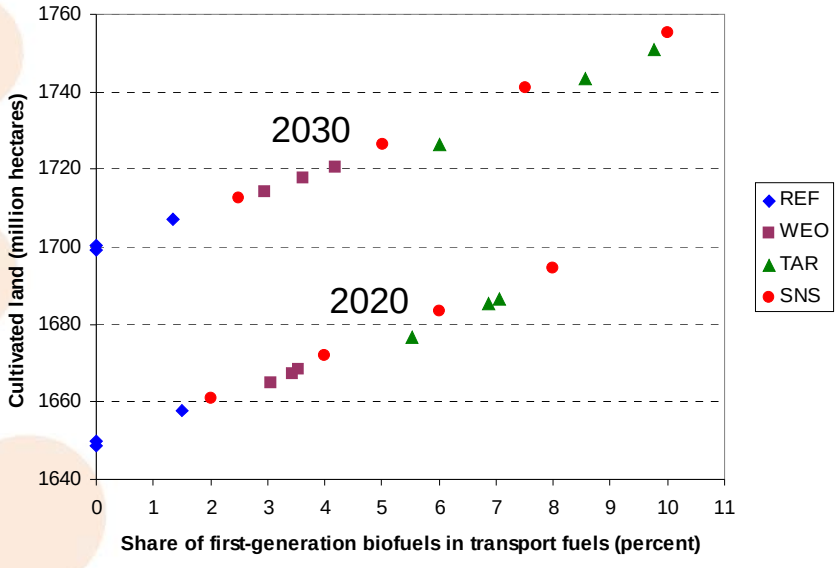
 # 3: Land use conversion

Context/results:

Model results indicate that **greenhouse gas savings** of first generation biofuels compared to fossil fuel are small when land use change is considered (with the exception of sugar cane ethanol). Conversion of forests or grassland to cultivated land causes substantial emissions of carbon stocks in soils and vegetation. This defeats one of the primary goals of biofuels to contribute to climate change mitigation.

Land conversion may endanger landscapes with significant value for **biodiversity**.

Figure. Cultivated land use versus share of first-generation biofuels in transport fuels in 2020 and 2030



Please reflect on these results, e.g.:

7. In current model runs no additional land use restrictions are applied for biofuels. What land use restrictions can you envisage? What policies are necessary to enforce proposed land use restrictions?
8. How could deforestation be stopped in the context of growing agricultural demand?
9. Should the focus of cultivated land expansion be on marginal land? If yes, would you accept potential higher costs due to higher management requirements and potentially lower yields?
10. One motivation for promoting biofuels even with low or negative climate benefit is that it paves the way for 2nd generation technologies in the longer term. Would you agree with this motivation? What

time horizon for phasing in 2nd generation technologies would you require for accepting this motivation as valid? Do you accept no GHG reductions?

11. What measures should be taken to intensify agricultural production on existing land (thus reducing the need to expand agricultural land into forested and marginal areas)?
12. The impacts of biofuels on the environment and biodiversity depend on (i) the extent of land use change and conversion, (ii) the type of biofuels feedstocks used and (iii) the agronomic management applied. Do you consider compliance with sustainability criteria an important element for increased biofuels deployment? Would you accept additional costs, if they were necessary to achieve compliance with sustainability criteria?

#	Stakeholder	Answers
1	AEBIOM	1. Agriculture should not be exposed to land restriction. The production of rape of cereals should be high enough for food and non food applications. 2. Political pressure at country level. 3. Marginal land should be used and incentives should be given for that. No industry will pay more. For the time being all crops in Europe are produced under cross compliance rules but the prize in similar compared to imports from the rest of the world where similar environmental regulations do not exist. This is not normal. 4. Yes there will be improvements. But what is second generation ? First generation can be good and some second generation can be bad. No GHG reduction is unacceptable. 5. This should not be regulated by energy policies. 6. Cross compliance is already a very high standard for EU agriculture production.
2	Copenhagen University	I am a bit sceptical about imposing sustainability criteria, e.g. in the form of certifications, on biofuel production. Even if such certification is successful in limiting the direct adverse impacts on biodiversity, forests, etc., it will be impossible to eliminate the indirect effects. For instance, suppose a certification requirement precludes imports of biofuels produced by (more efficient) Brazilian sugar and instead forces blenders to buy European biofuels based on wheat (or maize or sugar beets). This would lower export/increase import of the European feedstock (to replace the crops used in biofuel production) and increase its world market price. Higher world market prices would induce Brazil to export more grains, which could have the same impacts (or more, or less) than the biofuel production that was precluded in the first place. The outcome is uncertain, but the point is that the global agricultural markets are so well integrated, that the production of one small corner of it cannot be controlled in isolation. On the contrary, imposing a certification requirement may be worse than no criteria at all. It distorts markets and leads demand in the direction of more inefficient alternatives and opens up for the possibility of capture by European actors (e.g. farmers) who would benefit from regulation (in the form of greater demand for grains).
3	DanChurchAid	-
4	DONG Energy A/S	1) It is hardly possible to attribute land use change to a single factor such. Clearly, vulnerable states should apply tools to prevent that their domestic industries destroy valuable forest land for whatever reason. In reality, the US and Brazil can probably deliver a lot more biofuel without causing any land use change in sensitive natural regions. In Europe we already have very considerable regulation to protect the environment including forests. The world's population is growing rapidly and this may be much more significant factor in driving future commodity prices than biofuel production. Second generation biofuel technologies are not a theoretical

		possibility, they are very close to reality. For example, the first large demonstration plant is coming online in Kalundborg, Denmark ultimo 2009. The US has a "mandate" for a certain amount of cellulosic biofuel whereas the EU has adopted (inadequate) legislation to promote second-generation biofuels by allowing the latter to count twice the contribution made by first-generation biofuels. Much more could be done to make second-generation technologies commercially viable. 2) More focus on making second-generation biofuels feasible. 3) Second-generation biofuels can be implemented at a commercial scale as early as 2013, but it is currently not possible to compete with first-generation biofuel because costs for enzymes to break down the cellulosic material is too high and because government policies provide insufficient support via tax exemption or direct support whereby insufficient "credit" is given to the better socio-environmental profile of second-generation biofuels. It is a matter of technology, but only for a few years – the really big issue is government support policies. As an energy generator using biomass in production of coal-fired power plants we would only be able to pay a higher price is government direct support would cover the difference between using that biomass and using coal (which our competitors would be using). 6) It is very important that biomass compliance regimes are not deployed for the energy sector alone, but across all industries in order to avoid distortion of competition. Failure to do this will delay the greening of energy generation in Europe. Also, sustainability regimes should be co-ordinated between the EU and the US and also e.g. Brazil in order to ensure a level playing field.
5	EEB	Land use restrictions are necessary on all levels of governance in all places the world if we are to protect biodiversity and ecosystems from processes of agricultural expansion and intensification. There are however very few places where this has actually happened effectively. The chances of such restrictions being successful only become worse when the incentive to expand and intensify is greater. This means that at the moment biofuels policy are actually a liability to ongoing efforts to deal with deforestation. Stopping deforestation in the context of growing agricultural demand needs to happen first and foremost through reducing demand, certainly not by boosting it through biofuel support policies. Complementary to this, financing mechanisms will need to be developed to create the right incentives but this will only work when there are no other policies at work that increase the incentive to deforest. As regards marginal land, this needs to be tackled very carefully. First of all, most marginal land is only marginal from a crop growing perspective. Its however likely to be in use as grazing land or has other ecological functions. Moreover, it probably has such a use because it is not suitable for crop growing, either because the soil is too poor, water is lacking or other reasons. Bringing in water through irrigation means the water is no longer available for other functions. The argument that we should accept first generation biofuels as they pave the way for second generation has no validity whatsoever for a number of reasons. First of all, for second generation biofuels a different set of infrastructure and technologies is needed so if there's any effect between the two it will be technological lock-in in the first. Secondly, second generation

		biofuels are just as likely to lead to massive land use change impacts as first generation. This means that accepting this argument would imply accepting that we need to promote a technology with unlikely GHG benefits because only then we can get to a technology which also is also unlikely to have GHG benefits except that the one technology in fact does not prepare the way for the other. When it comes to measures to increase yields on existing land, the critical point is that existing yields in for example the EU have come at a very high environmental price in terms of soil degradation, biodiversity loss and water pollution. This price still continues to be paid as these problems have not been solved. In places where there are still possibilities for yield increases without degrading the environment by for example increasing market access, improving soil management, irrigation techniques etc this will need to happen in any case to bring food security to the worlds poor. As regards the final question about accepting additional costs, this is turning the world upside down: the whole reason why biofuel policies have been developed and they benefit from tax breaks and other benefits is that they are supposed to reduce GHG emissions. Existing and additional sustainability criteria are necessary to ensure that biofuels actually deliver any of these promised benefits. Without these, the whole policy does not make any sense.
6	EPPOA (1)	-
7	EPPOA (2)	Localisation of all agriculture combined with extensive education would help inform communities what impacts their consumption patterns were creating. Current intensive agricultural production and long supply chains have been shown to be highly damaging. Legislation is likely to necessary to create sustainable land use patterns. Current market led solutions |(i.e. carbon trading) may prove to be somewhat ineffective given the susceptibility of current market models to large scale manipulation.
8	Fact Foundation	1. Carbon payback time of 10 years or less, in case of land conversion for biofuels. Only biofuels with a positive carbon balance, of over 30%. 2. More radical measures, like "polluter pays principle" for western consumers. Eating 200 grams of beef daily is fine, but should be taxed, which can be used for reforestation and forest conservation. Same for other behaviour with a large ecological footprint. We can only stop deforestation if we offer people in developed countries an attractive alternative to deforestation. 3. No, Focus should mainly be on agricultural wastes. Only on marginal land when it offers the rural poor opportunities for increasing their income/well being. 4. No, second generation technologies require quite some time to be operational, especially in rural underdeveloped regions FACT focuses on. In case biofuels are of great benefit to a local community, this might be excepted, not awaiting second generation technologies, but cheap solar systems. 5. Liberalize world markets. Stop subsidizing EU – US farmers to produce excess agricultural product that are dumped on third world markets. This will increase market prices that farmers get for their products and increase investments and production. Production of biofuels can help, because farmers can sell to the energy market in case of unacceptable low prices on the food market. 6. Yes, this is very important. It is totally unacceptable that the western

		countries would allow unsustainable production in developing countries to supply their energy.
9	IMACE	1. We need strict land use restrictions to protect forests, peat lands, eco-systems, grasslands etc. Biofuels produced with feedstocks from these restricted areas should not receive government incentives (tax exemptions, subsidies) and/or should be excluded from biofuel mandates. 2. Individual countries/regions should implement proper policies to avoid deforestation. Key actors in the various supply chains should refrain from sourcing from these regions. 3. Marginal land could be used for agricultural production. We need to accept lower yields on these marginal lands and can only include realistic production yields, taking into account the high costs of inputs, including water. 4. I do not agree with the motivation indicated. It is quite well possible to develop 2nd generation without going through the 1st generation cycle. I would even argue the contrary. The development of 2nd generation biofuels is blocked by the existence of poor performing, 1st generation biofuels, which is available at lower cost. 5. In certain regions, the yields could increase. This, however, is needed for the increasing population (and chances in diets). Yield increases often go hand in hand with the use of more inputs. This will often imply more GHG-emissions. 6. We would accept additional costs, if necessary.
10	LRF	1. Sustainability criteria is better than land use restrictions. Introduce sustainability criteria for food production as well.? 2. Sustainable forest production could be one way. 3. There is marginal land in many countries that can and will be utilized for food as well as energy production and this can in many cases be done with modern techniques without endangering environment and biodiversity. However most of the increased volumes of food ,feed and energy will be a result of improved yields from land already in production. 4. Yes, we agree that production of 1st generation biofuels is necessary for paving the way for second. Development of infrastructure, investment climate etc. 1st generation biofuels must provide GHG savings. Preferrably over 50%. 5. Providing a good investment climate. Particular in developing countries local markets need to be developed, trade infrastructures, investment in technology and knowledge as well as developing export markets which could provide some necessary investments. Resource efficiency. 6. Compliance with sustainability criteria is a very important element for increased biofuels deployment if environmental and climate benefits are to be gained. In the EU, agriculture is already complying with sustainability criteria, namely cross compliance. These requirements which include environmental care, food safety and animal welfare is already creating additional costs for farmers in the EU in comparison with products produces outside of the EU.
11	MVO	Agriculture as well as forestry (for lignocellulose biofuels for instance) depends on land. If society does not want deforestation of valuable nature than this land should be protected in the first place. Sustainability criteria on end product level are a good development, but will not fully be able to save the nature. In general most agricultural crops are grown for more than one purpose anyway. Food is for sure an important, but not the only application.

		In that respect, typical food crops or typical energy crops do not exist. In agriculture there is hardly any waste. The stalks can be used as fertilizer or fuel. An important part is used for feed and there are a lot of technical uses. For an overview of the technical use of vegetable oils and animal fats in consumer care products and industrial applications look at http://www.croda.com/home.aspx?s=1&r=70 Sugar, potato, maize have similar and other technical applications. With perennial crops land use changes every year. To improve availability there is the following potential: Improve application of agricultural best practices all around the world Improve yield by using higher yielding varieties or varieties that a draught resistant or can stand long periods of rain Apply precision farming which uses only the most necessary amount of fertilizer, water, herbicides and pesticides directly at or near the plant. Application of sustainability criteria should be applied at international level, especially for agriculture as a whole rather than for separate end product, in order to avoid negative effects. Different sets of criteria for each member state will not work for this typically commodity based world market. If additional cost occurs due to sustainability the consumer will need to pay.
12	Oxfam	1. Not sure if I understand the question. I think an indirect land use factor is the best short term solution (based on indirect CO2 emissions which are now not included). 2. Deforestation is a governance issue. Has more to do with corruption than with the need for more land.. 3. Marginal lands will not likely produce volumes you can export. So not very relevant. 4. No, I do not. Second generation biofuels require different processing and storing (and end use) techniques. So most investment in first generation is wasted, because not relevant for 2nd generation. 5. There programmes have been developed for decades (for instance by Wageningen University). Prime focus should on removing the economic and political barriers that prevent implementation of these programmes. 6. Yes and I even believe that the public will be prepared to pay this higher price. It is essential for the credibility of these criteria.

TECHNOLOGY

Subject 4: Agricultural technology – Growth in agricultural productivity

 # 4: Agricultural technology – Growth in agricultural productivity
Context/results: Growth in agricultural productivity is critical for the calculation of land use requirements for food, feed and biofuels feedstock production. Agricultural productivity is a function of input use, multi cropping and a technology factor. Technology affects yield estimates, by modifying the efficiency of production per given units of inputs and land. In many developing countries crop yields for most commodities are lower than those attained in developed countries. During the period 1970 to 1990 world grain yields increased by an average of some two percent per annum but since then this remarkable yield growth has been reduced by half. In the first scenario runs a commodity specific factor for technological progress of about 1% per year (in terms of yield increase) has been applied. No changes in livestock efficiency were applied.

Please reflect on the key assumptions, e.g.:

6. What rate of technological progress do you expect in agriculture? Higher, lower or similar growth rates than the historic 1% ?
7. What would be a reasonable alternative assumption for maximum productivity growth? If possible specify for different regions.
8. Assuming a strong movement for agricultural productivity growth in less developed countries could substantially influence their competitive position. How much productivity growth do you consider possible in the next two or three decades? Can you provide material for your assumption (e.g. for Eastern Europe or developed countries)?
9. What measures are necessary for achieving growth of agricultural productivity?
10. Do you expect increases in livestock efficiencies? If yes, where and at what rates?

#	Stakeholder	Answers
1	AEBIOM	-
2	Copenhagen University	It is common to assume a fixed rate of agricultural productivity increase in these types of simulation. However, in my view it may be a little simplistic. Agricultural productivity is affected by investments in agriculture, and the incentives for investing in agriculture are determined by the expected development in prices. In the past, real prices of agricultural commodities have declined significantly, so it is not surprising that global yield growth rates have also declined. If prices increase in the future, as suggested by these simulations, so will incentives for investing in agriculture and productivity growth may well pick up again to reduce the pressure on land. The difficulty is, of course, to estimate the magnitude of the linkages between prices and productivity (which is why the growth rates are often assumed fixed).
3	DanChurchAid	-
4	DONG Energy A/S	-
5	EEB	See also answers to questions on the environment. Assumptions and predictions about yield increases should first of all consider environmental limitations in terms of water, soil and biodiversity (e.g pollinator services). At the moment within the EU for example, a stagnation and even reduction in yields is the more likely scenario if environmental pressures are to be reduced and long term sustainability guaranteed. Moreover, where yield increases are to be realised through increased fertiliser input, the resulting nitrous oxide emissions will need to be considered in the GHG impacts.
6	EPPOA (1)	
7	EPPOA (2)	Sustainable long-term agricultural productivity requires a radically shift from the currently favoured and promoted large-scale intensive production methods which have been shown to rely on huge inputs from fossil fuels (fertilisers, herbicides, pesticides, machinery, transport). These systems also degrade land and biodiversity and exploit local populations.
8	Fact Foundation	1. Agricultural primarily is a product of stable market prices! Farmers do always no how to increase production but this might not always lead to a higher income when prices are low. If this last problem is tackled growth can be faster than 1% especially in DC's. Though policy with this regard is not likely to change. 2. - 3. In many cases, production can be doubled in 4 years, depending on market prices. 4. Stable market prices! 5. -

9	IMACE	1. I expect that the 1% progress in terms of yield increase is reasonable. On the one hand we have to include the negative consequences of climate change on yield increases (especially in developing countries). On the other hand we may see productivity increase due to higher prices. 2. N.A. 3. N.A. 4. Investments in agriculture, R&D, etc. 5. No specific expectation.
10	LRF	1. no answer 2. no answer 3. no answer 4. More investments, secure political climate, trade agreements, development of local markets particularly in developing countries 5. Some increases due to climate mitigation measures, including new technology as well as increased costs for feed which could effect resource efficiency.
11	MVO	-
12	Oxfam	Growth rate has to be higher than 1%. 2. This will take investment, (Development banks, private sector and countries). If politicians can be convinced, it will happen. 3. I always understood that a doubling of output is easily possible. 4. Apart from finance, training programmes, more cooperation with networks of farmers. 5. for instance in Brazil, a more intensive livestock system is the key to implementing the sustainability criteria (2 cows per hectare instead of one). That would be enough to create more land for agriculture without cutting Amazon or at the expense of land for food)

Subject 5: Second generation biofuels - Speed of introduction

 # 5: Second generation biofuels - Speed of introduction
Context/results: Feedstocks for second generation biofuels technology often require significant changes in land use and management. There is a need to carefully assess and respect the current uses and functions of potentially suitable land, to regulate land use in an integrated approach across sectors to achieve land use efficiency, avoid conflicts and to protect the rights of the weakest members of society when land ownership is uncertain. Another major challenge is development of the massive infrastructure and logistical systems required for second-generation feedstock supply systems.
Please reflect on the key assumptions, e.g.: 4. When do you anticipate 2nd generation technologies to be available at industrial scale? Do you have any material to support your assumptions? 5. If 2nd generation technologies become available, how fast can one expect these to be implemented in developing countries? What measures would be necessary to support technological transfer? 6. What is necessary and how long will it take to establish infrastructure and logistical systems?

#	Stakeholder	Answers
1	AEBIOM	1. One issue for 2nd generation is the raw material availability. Project developers (generally oil companies) have to secure supply for more than 10 years and they don't own the land (agriculture of forest). Are they going to

		buy this land?
2	Copenhagen University	I have no deep insights into this.
3	DanChurchAid	-
4	DONG Energy A/S	General: There are a number of normative assertions offered in the introduction to item #5 which seem implicitly to suggest that using biomass waste for the purposes of second-generation biofuel is more problematic than alternative uses. No evidence is offered in support of this somewhat flaky line of argument. Ad 1) Industrial scale deployment of second-generation biofuel is now feasible. You can find this evidenced by the Kalundborg (Denmark) facility of Inbicon A/S which will commence operation ultimo 2009 in time for the COP-15 meeting. After six month of continuous operation the next step could be to offer this technology at a full industrial scale. Provided the financials are present, it is highly likely that a new industrial second-generation facility can be taken into operation 2013. Ad 2) The US has an obligatory amount of gallons of cellulosic and advance biofuels that must be used. Ad 3) Logistical systems for cellulosic ethanol production can to a large extent utilise existing infrastructure. However, some changes will need to take place in harvesting machinery.
5	EEB	Answer: See answer to question 6
6	EPPOA (1)	-
7	EPPOA (2)	2nd generation biofuels tend to favour large scale intensive production methods which have questionable consequences.
8	Fact Foundation	1. 5-10 years in western countries, producing biogas from organic domestic wastes already happens and is considered second generation techn. when considering production of lignocellulosic crops its probably 5-10 years, research shows its possible. 2. at least 10-15 years on small scale community level we work on. it requires high tech inputs and skilled labour. on industrial scale it can be faster when big multinationals introduce it on large scale.
9	IMACE	We agree with the analysis in the heading! 1. We expect 2nd generation technologies to be available at industrial/commercial scale in the period 2015-2020. Following OECD reports we have noted that 2nd generation bio-ethanol could be competitive towards this period. 2. The technology transfer and implementation could take an additional period before it will be available at industrial scale. 3. In fact you need a number of infrastructures: feedstock-infrastructure, processing infrastructure and a market infrastructure. It may be more economical to develop alternatives like the use of sun energy directly for electricity without going through the cycle of plant production with photosynthesis.
10	LRF	-
11	MVO	-
12	Oxfam	1. From what I hear certainly not before 2015, maybe before 2020.

		2. Much later. 2nd generation is more capital intensive and less labour intensive. Therefore, it is very unlikely that Africa will become engaged in 2nd generation biofuel.

Subject 6: Second generation biofuels and investment risks

 # 6: Second generation biofuels and investment risks
Context/results: 2nd generation biofuels appear to be a key factor in dampening impacts of biofuels on food markets. One of the determining factors for successful commercialization of 2nd generation biofuels is a conductive investment climate. This is, in turn, to a large extent dependent on how finance providers (of both debt and equity) perceive the risks related to investment in biofuels projects.
Please reflect on: 4. What kind of policies could improve the investment climate for second generation biofuels? 5. Is paying higher biofuels prices from second generation installations (compared to first generation) justifiable if this would help reducing resource competition with the food/feed sector? How could this be regulated for practical implementation (i.e. how to ensure 2nd generation being rather consumed than 1st generation)? 6. Who should carry the risk of the push for second generation technologies?

#	Stakeholder	Answers
1	AEBIOM	It is not obvious for me that 2nd generation will lower the food prizes. It might increase prize because agricultural land will be devoted to lignocellulosic crops, what means less food commodities on the market, and higher prizes! Also, feed production represent more or less 50% of the production per ha for 1st generation, compared with 0% for second generation. As second generation is producing less biofuels par ha it is not an obvious answer for me. Example for 1 ha : Sugarbeet : 7000 l ethanol per ha → 3,5 toe per ha + by-products for feed (pulp) Cereals : 3000 l bioethanol → 1,5 toe + 2,5 tons by-products for feed. Willow, miscanthus : 10 tons dry matter = 4,3 toe, efficiency of process of 40% → 1,7 toe/ha (BTL of ethanol) and NO by products for feed So where is the advantage ? 2. There should be no specific market support for second generation. They should compete on normal market conditions.
2	Copenhagen University	While I cannot contribute with any specific input, I make a general observation. Generally, policy makers are not ideally suited for choosing the optimal technology for solving an environmental problem. They lack detailed information and they may be influenced by other agendas (e.g. picking domestic technologies over more efficient foreign technologies to create jobs).

		Ideally, policy makers would only employ targeted economic policy instruments to attack the problem directly, and let the markets decide the appropriate technology. In this case, the problem is how to reduce carbon emissions. One possible technology is to replace fossil fuels with biofuels, but who says this is the most appropriate solution? Instead, policy makers should impose a general carbon tax (preferably – alternatively tradable permits). If biofuels are the cheapest way of reducing emissions, they will quickly replace more expensive fossil fuels. If 2nd generation biofuels is more efficient in reducing carbon emissions than 1st generation, private actors will make sure to develop the technology. Public support for research and development could be given (e.g. financed by carbon taxes), but again it should be distributed based on objective criteria (e.g. potential emission savings) and not focused on one particular technology. This is the ideal scenario, which may not be politically (or technically) feasible. However, it is worthwhile to keep the general recommendation in mind when evaluating policy instruments: Target the problem – not any potential solution!
3	DanChurchAid	-
4	DONG Energy A/S	1. Differential tax and/or direct support to render utilisation of biomass waste (second-generation) commercially competitive with food-based ethanol (first-generation). Direct non-refundable contribution towards establishing facilities and/or operating support. Finally, governmental loan-guarantees can be applied. 2. Consumers are unlikely to choose more expensive second-generation biofuel, so it would be necessary to issue an obligation or to use tax differentiation. It would be justifiable as it increases security of supply, dampens impact on food prices and offers – depending on the choice of second-generation technology – high-value byproducts (animal feed and solid biomass that can replace fossil fuels in the energy sector). 3. There should be a sharing of risk between early-moving businesses and the public. Government involvement is key to success for the deployment of second-generation biofuels production capacity.
5	EEB	The assumption that so called second generation biofuels will dampen the impacts of biofuels on food markets has been extraordinarily persistent during discussions about biofuels in the last couple of years. It is however deeply flawed and misses the central point about biofuel impacts: impacts on food markets and other impacts are not primarily caused by the fact that the crops are diverted but that the land needed to grow crops is diverted from other land uses. This land use change can have significant carbon costs. Second generation crops are likely to be as much in competition with other land uses including food production as first generation biofuels, depending on how they are grown and what type of land use they replace. The most important issue with all biofuels, whether first or second generation, is to tackle land use change impacts, both direct and indirect.
6	EPPOA (1)	-
7	EPPOA (2)	-
8	Fact Foundation	-
9	IMACE	1. Specific incentives for 2nd generation biofuels like: tax exemptions, subsidies and specific mandates. 2. Difficult to implement. We need measures to reduce the price of 2nd generation biofuels and phase out support for 1st generation biofuels.

		3. Governments and the biofuel industry.
10	LRF	-
11	MVO	-
12	Oxfam	1. A choice against 1st generation! 2. Yes it would be justifiable. For instance more subsidy/tax return for more GHG saving. Than you make 2nd generation fuel more competitive. 3. Society at large (taxpayers) + corporate investors (pension funds, insurance companies)

Subject 7: Competition and synergies between the transport and stationary energy sectors and implications for the food and forest sector

 # 7: Competition and synergies between the transport and stationary energy sectors and implications for the food and forest sector
Context/results: Model based analyses of interactions between the transport and stationary energy sectors indicate that ambitious climate policies in combination with high ambitions for biofuels for transport can lead to strong competition for biomass between the stationary energy sector and transport sector. Besides the overall policy regime, development of a range of other energy technology options than those related to bioenergy, are among critical determinants of stationary sector biomass demand. Preliminary calculations indicate that the paying capacity for biomass in the stationary sector can drive up future biomass and land prices substantially, and thus affect the food and forest sectors to the same extent as has been the case for 1st generation biofuels in relation to the food sector in recent years.
Please reflect on: 5. What is your view about the growing bioenergy sector – do you see new business opportunities for your company/sector? 6. Do you have any opinion on how biomass use for energy should be prioritized? If so, please motivate. 7. Do you see any differences between the transport and stationary energy sectors in relation to the risks of developing businesses strategies to exploit bioenergy opportunities? 8. Do you see differences between policy instruments with respect to how they influence the possibilities for your company to adapt to a changing situation (with or without orientation towards developing bioenergy related business opportunities)?

#	Stakeholder	Answers
1	AEBIOM	1. Yes plenty of opportunities 2. Yes priority for heat, CHP because much higher efficiency in conversion, higher dependency from oil, higher economic advantage for consumers, lower cost per ton CO2 saved, lower public spending per MWh produced, etc. Important criteria : CO2 saved per hectare and ton wood (limiting factors). Such calculation shows that using wood for heat and cogen is much more efficient that for transport.
2	Copenhagen University	If biofuels face hard competition from the stationary energy sector for biomass, then perhaps this is an indication that the stationary energy sector is more efficient in using biomass to reduce carbon emissions. This well illustrates the problems of policy makers choosing the technology. If enough support is given to the less efficient technology, it risks driving out the more efficient alternative. Use of biomass should be prioritised according to how cheaply it solves the problem – reducing carbon emissions.

3	DanChurchAid	-
4	DONG Energy A/S	A 1) Second-generation biofuels will dampen the stationary energy producers cost of replacing coal with biomass. We see several business opportunities in handling, refining and sourcing biomass. Ad 4) The EU's own policies are not sufficiently co-ordinated. The definition of biomass in the Renewable Energy directive is very good but is partially contradicted by the Waste Directive and the draft IPPC (industrial pollution) directive whose biomass definitions are much more narrow. Ideally, the EU should apply a consistent definition of biomass across its own legislation. As it is now, there are self-inflicted restrictions which lead to higher costs of achieving ambitious CO2 and renewable energy targets.
5	EEB	-
6	EPPOA (1)	-
7	EPPOA (2)	The peaking of oil will bring a demand for other energy sources which is likely to include pure plant oil fuels. A radical shift in the fabric of society is required to adjust to the coming changes. Biomass energy use policy should be decided locally.
8	Fact Foundation	-
9	IMACE	1. No 2. If biomass for stationary energy sectors provide better results in terms of GHG emission reduction, they should have more priority. We could use the electricity produced for electric cars! 3. No answer. 4. No answer.
10	LRF	1. Agriculture and forestry have a big potential to provide bio energy, and is already doing so. Therefore, we see big opportunities for our sector. Not only in providing biofuels but mostly bio mass, biogas, wind power as well as economic development in rural areas and environmental benefits to society. 2. There is an urgent need to replace fossil fuel in all sectors. The priorities depend on what other renewable energy sources that is available in the country or region, ie, wind, hydro, thermo etc. It also depends on the consumption. The transport sector is more risky since the interaction between production of fuel, distribution and vehicles is more complicated. 4. Generally policy incentives for stimulating demand is the best policy.
11	MVO	-
12	Oxfam	1. - 2. - 3. - 4. Of course, more factors play a role in the food prices. In the end, land use programmes (zoning) with appropriate consultation mechanisms and enforcement are key. Biofuels is only one element.

METHODOLOGICAL POLICY ISSUES

Subject 8: Overall methodological policy considerations

8: Overall methodological policy considerations
Context/results: The biofuels scenarios used in the model simulations were designed to cover a wide and plausible range of possible future demand for biofuels. The results depend on the assumptions defined and we are looking for ways that could include more favourable, but still realistic results. The below questions concern the overall analysis, and here we would like to remind you of the following key parameters used: • The range of biofuels targets and speed of introduction • The introduction of 2nd generation biofuels technologies and the combination of use of 1st and 2nd generation biofuels technologies • The agricultural productivity growth rate • Options concerning land use • Implementation of sustainability criteria
Please reflect on the key assumptions applied, e.g.: 6. If you consider the five above-mentioned parameters from a policy perspective, do you then have any important messages you would like to provide us? (for example, what can be done to stimulate agricultural productivity growth or are there any land restrictions you think should be imposed in the model?) 7. ***What other scenarios which have not been analyzed would you like to be modelled?"*** 8. What additions/changes would you suggest/be interested in analyzing if you think your industry would be best served by intensifying agriculture on existing land? How much investment do you think that would require in agricultural production systems and how this be mobilized? 9. What level of future biofuels targets do you envision? If possible please indicate expected biofuels targets for 2020 and 2030 for EU, US, Brazil, China, India and the World. 10. How important do you consider the inclusion of sustainability criteria?

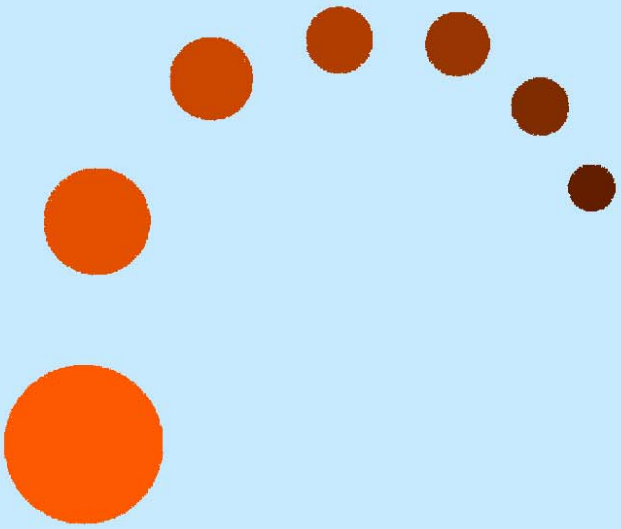
#	Stakeholder	Answers
1	AEBIOM	Do not start from à priori saying that 2nd generation are better. Should be based on transparent criteria for all biofuels.
2	Copenhagen University	Many of the questions have been addressed in the comments above. To summarise: - The price level of agricultural commodities may not be a large problem – on the contrary, increasing prices is probably necessary for increasing the growth rate of productivity. - However, increasing price variability could become a problem, for poverty as well as for agricultural productivity. If future climate change brings more extreme weather patterns, this could exacerbate the variations in agricultural commodity prices. - I am not a big fan of biofuels policies, and they should be replaced by a carbon tax. However, given that biofuels policies are here to stay, great care should be taken to designing them. For instance, blending mandates should be avoided altogether, as they are very inflexible and tend to exacerbate price variability of agricultural commodities (feedstock demand is more or less unaffected by prices). Alternatively, a subsidy/tax credit could be extended to reflect the carbon reductions compared to fossil fuels. If such a subsidy could be directly proportional to the degree of carbon savings, such that Brazilian ethanol received a larger subsidy than European wheat-based ethanol, then it could more closely resemble the ideal of a carbon tax. - An interesting alternative could be to make a biofuel mandate countercyclical, i.e. a blending target that is high when feedstock prices are low and vice versa. This could make total agricultural demand more responsive to price changes and thus help increase price stability. I have not analysed the implications in detail, but it could be an interesting case to

		consider. - Sustainability criteria should probably be avoided altogether, as they may have adverse unintended consequences and are almost impossible to control anyway. The adverse impacts of agriculture on biodiversity and forest cover are tremendous problems, but they cannot be solved (or even mitigated) for biofuel-induced expansions in agricultural demand in isolation. -
3	DanChurchAid	We fear significant increases in food prices will have devastating effects on the worlds poorest people and on hunger and malnutrition. This can have dramatic consequences for our relief and development work. We do recognise that higher prices will have beneficial effects in the longer term on agricultural development and growth and that this is critical for growth, poverty reduction and food production, but it is highly necessary with measures to shield the poor and hungry and to heavily invest in agricultural development. Food security and the eradication of poverty and hunger should indeed be a decisive parameter in designing biofuel policies and strategies. In general, we do not belive biofuels will be a very useful strategy for combating climate change. We do believe biomass is important but not the conversion to biofuels.
4	DONG Energy A/S	-
5	EEB	An increasingly realistic scenario which has not been part of this exercise is that electric cars will pick up at an accelerated pace, reducing significantly the need for liquid transport fuels. At the moment, biofuels targets in a number of EU states have been actually reduced in the last year. As the negative macro impacts of biofuel policies are becoming increasingly clear, it is in fact also becoming more likely that biofuel targets are actually going to be scaled down, with the possible exception of Brasil where biofuels have become firmly established. And at the same time that biofuel targets are being scaled down, the economic crisis and the uncertainty about EU sustainability standards are further undermining investor confidence making a scenario of high biofuels volumes even more unlikely. A final point on sustainability criteria: these are of vital importance as mentioned earlier but when it comes to developing scenario's they can't be taken for granted. If the assumption would be that effective sustainability criteria would be in place then by definition all biofuel scenarios would be sustainable. At the moment the sustainability criteria that are in place in the EU are unlikely to secure a sustainable production and changing these for the better is still going to be a long and difficult discussion with uncertain outcome. It should therefore never be used as an assumption in scenarios.
6	EPPOA (1)	The following answer is especially based upon the use of PPO, pure plant oil, from oilseed plants, whether edible or not, and thus first generation biofuels. To a certain extent, the same applies to other first generation biofuels whenever/wherever mentioned in the sources. 1) There are some crucial aspects which are not included in the analysis and its assumptions, see also 2) and 5):

		A) The assumptions concerning greenhouse gas savings rest, at least partially, on an erroneous/inadequate basis, as it appears from a number of papers/studies, including the one available here: http://www.ppo.bugge.com. B) The assumptions concerning food availability and especially food prices rest, at least partially, on an erroneous/inadequate basis, as it appears from a number of papers/studies, including the works of a number of distinguished scientists working as experts in the relevant areas, such as the Danish Professor Claus Felby and the German Professor Wolfgang Friedt, and including the one available here: http://www.ppo.bugge.com. It may be noted that the great price reduction of protein feed shown in Part 1 #1 Figure 1, which applies to oilseed cakes and distillers grain, actually counteracts the increased prices of food/fodder crops, and it may even lead to lower meat prices as compared to the use of whole food/fodder crops. C) Especially relevant to developing countries, a number of oil plants, such as the Jatropha, act as desertification defiers/soil improvers/field protectors, so they actually increase productivity and land available for food production, as it appears from a number of sources including the Jatropha pages at http://www.malifolkecenter.org, and http://www.ppo.bugge.com/. D) Especially relevant to developing countries, the use of biofuels from local oilplants, such as the Jatropha, will often replace the use of draught animals, the feedstock requiring much more land than needed for the biofuel production, or hard labour, preventing the tillage of available land, and therefore it will actually lead to higher productivity including higher food production, more complete and efficient land use, and increased wealth, welfare, and self sufficiency, in rural areas, thus also improving economic and demographic conditions, as it appears from a number of sources including http://greentrac.org/biofuel.php and http://www.ppo.bugge.com/. 2) The scenario of locally grown, produced, and used, biofuels, especially PPO from Jatropha and a number of other oil plants, in the developing countries, is completely missing from all analyses so far. As it appears from 1C+D), a great source of opportunity, wealth, welfare, and self sufficiency, of rural areas in developing countries, and thereby an important part of future agriculture/fuel conditions, is thereby completely overlooked. This is one of the reasons for my writing about City Thinking here: http://www.ppo.bugge.com/cities.html. 3) - 4) - 5) The inclusion of sustainability criteria is extremely important, but it must be based upon reality, neither upon well meaning celebrities without insight in the subject at hand, nor upon large scale industrialized solutions that are easy to manage and plan on a large scale. Further, it must be adequately detailed, and it must result in differentiated subsidies/rules so that the environmental benefits are maximized. In addition to the sources in 1) and 2), the responses and other publications under News and Publications http://www.eppoa.org are relevant.
7	EPPOA (2)	Agricultural production should be localised and the huge external inputs reduced/negated with a radical; shift to intensive small scale mixed production methods that largely cater for the surrounding communities. These systems will be highly labour intensive and great efforts should be made to dissipate the skills required and to encourage such production.

		Alternative land use policies should be introduced. Land should be made available to people who want to start small scale sustainable agricultural production. It is looking increasingly likely that, in the not to distant future, we will see major changes in climate, energy supply and the economy. This makes assumptions based on the previous years of huge energy consumption and ever increasing levels of debt somewhat redundant.
8	Fact Foundation	1. - 2. Why is solar energy not included in your energy scenarios? It is not only bioenergy since wind and hydro have a place... 3. - 4. just see what can be produced in a sustainable way (and without import from developing countries, unless these have overproduction of renewable energy), will probably not be more than 5%, but should be calculated. Consider especially biofuels from wastes and residues and only little from specially grown energy crops. 5. crucial
9	IMACE	1. Please take into account the additional food/feed requirements in the coming decades: +50% by 2030; +100% by 2050. This will eat away the future yield increase. 2. The use of electricity for transport. Several countries are now starting to facilitate investments/infrastructure etc. 3. The analysis we have seen seems pretty appropriate. 4. Indicative targets: 5-6% for 1st generation biofuels and 4-5% for 2nd generation biofuels in the EU (2020). 5. Essential.
10	LRF	1. It is important to use the full potential of agriculture and forestry to provide renewable energy as well as food security. 2. n 3. n 4. n 5. Inclusion of sustainability criteria is very important when designing biofuels and bioenergy policies. If goals are set then we also need to ensure they are met not influencing environment or climate in a negative way but they provide solutions.
11	MVO	Improve yield by using higher yielding varieties or varieties that a draught resistant or can stand long periods of rain Improve yield by using the best practices available. Apply precision farming which uses only the most necessary amount of fertilizer, water, herbicides and pesticides directly at or near the plant. High Conservation Value Areas should be protected. This means: make clear which areas are HCVA and enforce the law. In case the HCVA is located in developing countries the population should be supported to make a decent living in a way that does not harm the HCVA.
12	Oxfam	1. Order of priorities. Our problem has always been the adoption of volume targets first, and then sustainability criteria. That means no politicalpressure, and no investment. 2. Public/political pressure to change priorities (First guarantees about sustainability, than volume targets). That would mean a serious political

		debate



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Intelligent Energy Europe

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Biofuel policies for dynamic markets