

Bio-based economy in Europe: state of play and future potential - Part 2

Summary of the position papers received in response of the European Commission's Public on-line consultation





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Bio-based economy in Europe: state of play and future potential Part 2

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to the European Commission's Public on-line consultation

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Agriculture and **F**isheries,
and **B**io**T**echnology
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- **Special thanks go to the members of the Inter-service Group on the bio-based economy**

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1. Executive summary

This report summarises the 35 position papers received from organisations directly or indirectly linked to the bio-based economy in response to the public consultation on the 'bio-based economy for Europe: state of play and future potential'.

Definition of a bio-based economy

The respondents support a public goods-oriented global and coherent strategy for a sustainable bio-based economy focusing on a recycling community, conservation of ecosystems and equitable sharing. An alternative definition of the bio-economy could be:

A public goods-oriented bio-based economy based on:

[...] production paradigms that rely on biological processes and, as with natural ecosystems, use natural inputs, expend minimum amounts of energy and do not produce waste as all materials discarded by one process are inputs for another process and are reused in the ecosystem⁽¹⁾.

Benefits and risks of fostering a bio-based economy

Fostering a bio-based economy can contribute to achieving the following results.

- **A lower carbon economy and sustainable primary production** — reduction of CO₂ emissions, resource and land-use efficiency.
- **Building competitive bio-industries**—new business opportunities, higher potential for value creation through cascading use of biomass and reuse of waste materials, and EU global market leadership.
- **A resilient and sustainable food chain** —contribution to global food security, new agricultural practices to avoid competition between food and non-food use of biomass, and improved animal health and welfare.
- **Developing the European science base and stimulating high-skilled jobs** —new integrated structures between researchers and research funders, further research and innovation excellence in Europe, European leadership through knowledge and technology transfer, and Economic and employment stimulus to rural and regional development.

Potential **risks could arise at the level of food, agriculture and the environment**, particularly if policies are developed and implemented in a disintegrated way. Risks include competition between food supply and biomass production, reindustrialisation and centralisation of the agri-food production, relocation of innovative industry actors, over-exploitation of natural resources and loss of biodiversity, and loss in consumer trust.

Achievements and obstacles of the bio-economy today

A **socially and environmentally beneficial bio-economy** already exists to some extent. The organic farming sector has successfully established the term 'bio' or 'organic', and the industrial sectors from agriculture and food production, wood production and materials transformation have established sustainable production processes. The European forest-based sector is a particularly good example where

⁽¹⁾ Franz Fischler, 2010, at the KBBE 2010 conference (<http://www.kbbe2010.be>) referring to WWF Denmark.

public and private organisations have successfully worked together in solving complex challenges.

A number of sectoral policies have been put in place at European level to support the development of a bio-based economy (FP7, CAP, LMI and KET), but further **integration between policies** is needed to avoid contradictions in policy goals and ensure a level playing field for all actors. Further obstacles are identified in the impacts of **climate change** which are likely to increase existing problems, and **societal concerns** regarding biotechnologies. Missed opportunities arise also **from the insufficient implementation of existing legislation** and **difficult access to public money** for public-private partnership and demonstration projects.

Proposed actions to support the development of a bio-based economy

- **Fostering effective governance and involvement of the society** through transparent communication and stakeholder involvement at all levels (EU, national, regional and local).
- **Building a strong research and innovation base** by supporting research covering the full innovation cycle, introducing lighter application procedures and production fostering the European Research Area, link existing funding instruments and programming initiatives, better uptake of research results into policy development, and defining sustainability criteria for products and processes.
- **Enhancing the creation of jobs and ensuring availability of required skills** through dedicated training programmes (e.g. the Marie Curie Actions or national equivalent), facilitating researchers' mobility between academia, industry and policy, regulatory and media environments, and defining appropriate education targets.
- **Building competitive bio-based industries** by developing an eco-label for bio-based products, improving the availability of raw materials, creating a level playing field, and providing special actions for growing SMEs or start-ups.
- **Creating an enabling policy setting** introducing a new agricultural raw material policy, providing a clear political commitment and continuous coordination between relevant bio-based economy sectors and policies, addressing bio-based economy needs in updates to major EU and national legislation (CAP, Waste Framework Directive, EU support to biofuels and bio-energy, research and innovation programmes, EU Cohesion Policy and development programmes).
- **Address the international dimension of the bio-based economy** by taking a leading role in promoting international cooperation in bio-based research on societal challenges of relevance to developing countries aiming to meet global commitments and goals and in developing internationally shared sustainable frameworks for global and regional partnerships.

2. Introduction

In order to unlock the innovation potential of the bio-economy while minimising adverse socioeconomic and environmental impacts, the European Commission proposes to put forward a European strategy and action plan towards a sustainable bio-based economy by 2020. The main objective of this initiative is to address the technological and societal challenges in building the bio-economy in the next 10 years taking into account longer-term time horizons, with increased emphasis on the sustainable use of natural resources, competitiveness, socioeconomic and environmental issues.

The proposed initiative responds to the Europe 2020 strategy launched in 2010 and it underpins the Innovation Union ⁽²⁾ and Resource Efficiency ⁽³⁾ flagship initiatives. The new strategy will propose a framework for stronger coherence between the various policies and funding instruments at EU and Member State level, and a better alignment of the research agendas for innovation in the bio-economy. It will highlight the policy initiatives needed to deliver the full potential of Europe's bio-economy sectors, taking into account the needs of farmers, fishermen, industry, consumers and society at large. Such a framework is timely and relevant in light of the preparation of the new Common Strategic Framework ⁽⁴⁾.

Stakeholders had the opportunity to voice their informed opinions and suggestions for supporting the shaping of this strategy by responding to the public consultation on the 'bio-based economy for Europe: state of play and future potential' ⁽⁵⁾ between 22 February and 2 May 2011. In the form of a questionnaire, respondents were asked to provide their vision on potential benefits and risks of fostering a bio-based economy in the future, their views on the current achievements and existing obstacles that hinder the functioning of the bio-based economy today and, finally, their suggestions for future actions needed. In addition, organisations had the possibility to submit a position paper instead of (or in addition to) filling in the questionnaire.

This report summarises the 35 position papers received in response to this consultation and should be read in addition to the analysis of the results from the questionnaire — the Report on the European Commission's public online consultation 'Bio-based economy for Europe: state of play and future potential'.

⁽²⁾ COM(2010)546 final of 15 March 2011.

⁽³⁾ COM(2011) 21 final of 26 January 2011.

⁽⁴⁾ COM(2011) 48 final of 9 February 2011.

⁽⁵⁾ http://ec.europa.eu/research/consultations/bioeconomy/consultation_en.htm

3. Respondents' profiles

In total, 35 position papers were submitted by organisations directly or indirectly linked to bio-economy sectors: agriculture, food and feed, forestry, paper, energy, waste, environment, industrial biotechnology, bio-based textile and plastics (natural fibres and bio-plastics), chemistry, and health (chiropractic).

The vast majority (77 %) of papers were submitted by representatives from:

- *industry* (11 papers — representing different industrial sectors such as forest industry, paper, bio-plastics, food processors, bio-industries, and textile);
- *public sector* (seven papers — administrations in charge of agriculture, food and feed, transport, environment, waste, energy, industrial biotechnologies and research policies);
- *academia* (six papers — research institutes and FP7 project consortia dealing with agriculture, horticulture, forestry and biodiversity, energy/biofuels, and the environment); and
- *European Technology Platforms* (three papers — forest-based sector and organics) which represent both, industry and research.

The remaining papers came from *multinational companies* (three — agriculture, food waste disposers and bio-industrial products), *non-governmental organisations* (two — environment, agriculture and forestry), *international organisations* (two — the FAO and a microbial resource research infrastructure) and one *SME* (forestry).

4. Definition of the bio-based economy

All actors generally support the definition of the bio-based economy provided in the Commission's background paper for the public consultation:

[...] a low waste production chain starting from the use of land and sea, through the transformation and production of bio-based products adapted to the requirements of end-users. More precisely, a bio-based economy integrates the full range of natural and renewable biological resources — land and sea resources, biodiversity and biological materials (plant, animal and microbial), through to the processing and the consumption of these bio-resources. The bio-economy encompasses the agriculture, forestry, fisheries, food and biotechnology sectors, as well as a wide range of industrial sectors⁽⁶⁾, ranging from the production of energy and chemicals to building and transport. It comprises a broad range of generic and specific technological solutions (already available or still to be developed) which could be applied across these sectors to enable growth and sustainable development, for example in terms of food security and requirements for industrial material for future generations⁽⁷⁾.

In addition, organisations participating in the public consultation have suggested alternative definitions or a refocus of the Commission definition. For example, the technology platform TP Organics suggests broadening the scope of the definition in order to keep enough flexibility in view of potential future developments. They recommend a public goods-oriented bio-based economy based on:

[...] production paradigms that rely on biological processes and, as with natural ecosystems, use natural inputs, expend minimum amounts of energy and do not produce waste as all materials discarded by one process are inputs for another process and are reused in the ecosystem⁽⁸⁾.

Among others, the Food and Agriculture Organisation of the United Nations (FAO) highlights the need to think in terms of a 'sustainable bio-based economy' through an ecosystem approach and enabling environment⁽⁹⁾. Along these lines, the Alliance for Beverage Cartons and the Environment (ACE) calls for including the 'sustainable sourcing of raw materials'.

There is a strong voice for a *recycling economy*, prioritising (or cascading) the use of renewable resources, putting energy use at the end of the chain, after reuse and recycling of the material, and creating a synergy between food, material and fuel. In addition, the Spanish KBBE Representative urges the maintenance of an energy mix, considering the use of biomass for biofuel/bio-energy production in parallel with other means of bio-energy production such as solar and wind energy.

A *global and coherent strategy* for a bio-based economy should become an integral part of the overall economy benefiting from synergies with other industrial sectors, while taking into account sector-specific challenges and opportunities.

Finally, some disagreements with the definition provided were, however, voiced. The European Environmental Bureau (EEB) expresses concerns about the current focus

⁽⁶⁾ Within the context of this consultation, the use of biotechnology in the medical/pharmaceutical sector is not included in the bio-based economy.

⁽⁷⁾ http://ec.europa.eu/research/consultations/bioeconomy/introductory_paper.pdf

⁽⁸⁾ Franz Fischler, 2010, at the KBBE 2010 conference (<http://www.kbbe2010.be>) referring to WWF Denmark.

⁽⁹⁾ The ecosystem approach is also supported by the Belgian National Coordination Committee for the International Environmental Policies (CCIEP).

on meeting the demands of increasing production and consumption. Instead, the transition towards a bio-based economy should focus on maintaining functioning ecosystems as the basis of all bio-based and non-bio-based production and managing the demands of the European population through *equitable sharing* instead.

Contrary to the definition provided in the Commission input paper to the consultation, the Belgian National Coordination Committee for the International Environmental Policies (CCIEP) advises to *fully integrate the medical and pharmaceutical use* of biotechnology as far as it concerns the health and environment debate.

5. Benefits and risks of fostering a bio-based economy

(a) Benefits

Organisations who submitted a position paper to the consultation identified an array of potential benefits in fostering a bio-based economy. A coherent strategy for a bio-based economy could play a significant role in formulating effective responses to pressing global challenges such as climate change, CO₂ emissions, resource efficiency, sustainable economic growth, global food security and health. To achieve these benefits and to minimise adverse effects on the environment, the economy and society, measures towards achieving a bio-based economy are pressing.

A lower carbon economy and sustainable primary production

A bio-economy has the potential to contribute significantly to the *reduction in CO₂ emissions*. For example, the separate collection of bio-waste and its composting or anaerobic digestion serves as applied climate protection. In conventional landfills, bio-waste is responsible for the formation of climate-relevant methane gas. In Europe, landfills are a major source of methane emissions. With the extension of the separate collection of bio-waste, an effective contribution to the reduction of methane emissions from landfills can, therefore, be achieved. The EU Landfill Directive⁽¹⁰⁾ demands the gradual EU-wide diversion of biodegradable waste from landfills by 65 %. According to the Department of Economy, Science and Innovation (EWI) of the Flemish government, reducing landfilling biodegradable waste by 65 % in the EU-15 alone could save 74 million tons of CO₂-equivalent gases. In addition, CO₂ emissions can be reduced considerably by replacing mineral fertilisers which are produced in energy-intensive processes based on fossil fuels.

Other examples of where product replacement can significantly reduce CO₂ emissions include bio-plastics made from renewable (non-fossil) raw materials which have a lower carbon footprint than traditional plastics; reducing dependency on fossil fuels; increasing the use of wood in the construction sector and replacing concrete where, according to the German National Support Group of the Forest-based Sector Technology Platform (FTP GNSG), one ton of CO₂ is emitted for each ton of cement produced whilst wood structural members have a negative CO₂ balance due to carbon storage during the growth of the wooden material.

Legume futures advocate land-use change to high-carbon stock land cover (e.g. perennial biomass crops and forestry), offering opportunities for the bio-based economy with minimal risks to the environment. Rapid deployment of next generation biofuels has the potential to deliver about one billion tons in emission reductions by 2030, 50 % more than in a scenario where only conventional biofuels are placed on the market.

There is a consensus that significant improvements in *resource efficiency* in the use of renewable resources can be obtained through a cascading utilisation. As argued by the Nova Institute, bio-based materials have a higher input-output efficiency than biofuels. Therefore, material use (single or multiple) of renewable resources should come before energy use. Resource-efficient use of bio-based resources also reduces waste and pollution.

Furthermore, the Belgian National Coordination Committee for the Environmental Policies (CCIEP) proposes *solving the problem of land scarcity in Europe* by

⁽¹⁰⁾ Council Directive 1999/31/EC of 26 April 1999 on the landfill of waste.

integrating, on the same land parcels, food and non-food activities, using by-products and derivatives from agro-farming for non-food industries.

Building competitive bio-based industries

Shifting towards a bio-economy creates *new business opportunities* in the agricultural, forestry and industrial sectors, to name but a few. A shift in agriculture towards the supply of (non-food) feedstocks for biomass can contribute to the ongoing shift of European agricultural policy towards more sustainable and environmentally friendly activities and provide new business and innovation opportunities for European agriculture.

Because the value chains for the material use of biomass are much more complex and longer, the *potential for value creation* is usually higher than if these are used for energy production. Sequential (or cascading) use as described above would be a particularly efficient way of employing biomass associated with optimal value creation. This would contribute to minimising resource use and reducing the competition between different uses (food and feed, chemicals, materials and energy generation (e.g. fuel, biogas or heat)). The FTP GNSG is convinced that by developing and manufacturing bio-based technologies, *the EU will enter the global markets* with high value-added products produced in the EU. This will benefit all EU Member States where the balanced utilisation of natural resources will contribute to the wealth and prosperity of society.

Bio-refineries enable the reuse of waste materials as feedstock for materials and energy. They can produce a broad range of end products and create production systems that dramatically reduce the input needed as well as waste, and support new bio-based industries and the 'greening' of traditional industries. By supporting new bio-based industries and the 'greening' of traditional industries, a bio-economy will change Europe from being a net oil importer to exporter of technology and bio-based products. Bloomberg New Energy Finance estimated the development of Europe's next generation ethanol industry could displace 62 % of its fossil petrol consumption and generate up to EUR 31 billion of revenues in the EU-27 per year by 2020 ⁽¹¹⁾ (Novozymes).

A resilient sustainable and productive food chain

According to the Bio-economy Research and Technology Council, the bio-economy can contribute to ensuring *global food security*. TP Organics highlights the important role of the *organic food and farming sector* in achieving greater food security by re-linking production and consumption patterns to reduce the dependence on external inputs and move towards greater self-sufficiency. Biodiverse farming systems with lower dependence on external resources avoid the endemic stresses of monoculture systems and climate change, thus reducing the increasing risk of diseases and food-related disorders.

If food consumption changed to less resource-intensive products (e.g. less meat and dairy), *agricultural capacity for non-traditional uses* could be released. In such circumstances, substantial land resources could become available for non-traditional uses or for food production for export. By integrating food and non-food activities on the same land parcels and using agro-farming crops by-products and derivatives for non-food industries, competition between food and non-food use of organic matter can be avoided.

⁽¹¹⁾ 'Next generation ethanol and biochemicals: What's in it for Europe?', *Bloomberg New Energy Finance*, 2010.

The German Bio-economy Research and Technology Council argues that in order to meet the desired product and production standards, *biogenic raw materials must be adapted* through breeding or other suitable measures. Plant-based or animal-based foods can be produced, for example, with added health-boosting benefits which may counteract nutrition-related health deficiencies throughout the world. Targeted breeding and modification of the appropriate genes can influence flavour, nutritional characteristics and the content of desired ingredients. Animal health will be an essential requirement in the future production of animal-based foodstuffs. *Animal health and welfare* will be the cornerstone of the essential link between animal protection and health-related consumer protection.

Developing the European science base and stimulating high skilled jobs

The bio-economy has the potential to *further research and innovation excellence in Europe* involving SMEs and multinational companies and more sustainable agricultural policies linked to regional and rural development (European Bioplasticse.V.). The German Bio-economy Research and Technology Council systemic project approaches to problem solutions are leading to *new integrated structures* on the side of the researchers and the research funders.

The CCIEP sees a great potential for the *EU to become a knowledge and technology leader* in the bio-economy. This potential is linked to the EU population profile (ageing society), its diet profile, land profile (fragmented landscapes), agricultural profile (few monocultures) and economic profile (post-industrial economy, transition to a knowledge-based economy). The European profile could become a model for *knowledge and technology transfers*. Agro-ecological methods use and enhance ecological processes in the agricultural environment. Through knowledge exchange, farmers develop incremental innovations to use natural resources more efficiently, by substituting their knowledge and local resources for external inputs.

A European agricultural policy towards more sustainable and environmentally friendly activities will provide an *economic and employment stimulus to rural and regional development in Europe*. Novozymes expect that green jobs will be created at local level, as outsourcing is not possible because the long-distance transportation of biomass is not feasible. Within the EU-27, the bio-economy offers great potential for job creation, not only in the agriculture and technology sectors, but also in the construction, waste and transport sectors. This regional development will harness Europe's global expertise not only in the agricultural sector, but also in industrial sectors of the economy, such as the chemicals and plastics industries.

(b) Risks

Despite the optimism shared by all actors when it comes to shifting towards a bio-economy in Europe, a number of risks were identified at the level of food, agriculture and the environment, as well as the potential negative effects from several policy options.

Food, agriculture and the environment

All actors agree that a major risk in fostering a bio-economy lies in the increased *competition between food supply and biomass production*. To avoid this, biofuels should be at the end of the life cycle of bio-based products, and all options available for increasing productivity and safeguarding harvests should be exploited. The FAO highlights the need to manage direct or indirect impacts on food security due to changes in production practices and patterns of production (e.g. phytosanitary risks associated with some biofuel crops, movement of organic waste, etc.).

Furthermore, emphasis of the bio-economy on goods and biotechnology based on genetic modification (GM) and biomass commodity production might lead to a *reindustrialisation and centralisation of the agri-food production*, which is more beneficial to large-scale companies, forcing small-scale producers in marginal regions and traditional biotechnologies out of business. Large-scale solutions decrease the possibilities of adjusting new technologies to local conditions with a risk of developing less resilient agricultural and food systems.

Since agriculture is expected to remain the largest water-consuming sector, natural resources such as water and fertile soil tend to be exposed to *over-exploitation*. Combined with an already decreasing availability due to the effects of climate change and intensive management practices, groundwater and soil pollution resulting from, for example, badly managed bio-waste and pharmaceuticals, entering the water supply through, for example, faeces, urine, washing, etc., as well as an existing and rising demand for food, could undermine world food security, as underlined by the Centre for the Development of Industrial Technology (CDTI) and the European Environmental Bureau (EEB).

In moving towards an economy that would make increasing use of natural resources from land and sea as a dominant growth model, the complex balances and of the global and local ecosystems and their services should not be neglected. As the CCIEP put it, the European Bio-based economy strategy should not jeopardise the *protection of biodiversity*.

TP Organics warn that *consumer trust may be jeopardised* if no differentiation is made between a traditional and a GM-based bio-economy. This could result in the loss of the established identity of the 'bio' or 'organic' and other EU quality products, wasting a lot of effort made at all levels establishing consumer trust in the first place.

Policy

The FTP GNSG advise the *careful development and implementation of policies* supporting one way of utilisation over another (e.g. bio-refineries using wood biomass or commercial wood species for energy generation). Such policies can easily lead to the suppression of natural market trends that are critical and long-term functioning tools in development trends.

Legume Futures and the CREPE (Cooperative Research on Environmental Problems in Europe) project warn that there is a general risk of *disconnecting the bio-economy from agriculture, fisheries, forestry and food (AFFF) policy*, refocusing policy, including research policy, away from questions relating to agriculture, food and forestry to the bio-economy with a new model for driving 'innovation'. As a result, paradigms for extracting economic value from research and development could be applied to unlock wealth creation through 'innovation', enabled though proprietary knowledge and technology. Policy rooted in the realities of improving the performance and sustainability of the AFFF sectors could be replaced, or at least influenced, by a narrow focus on proprietary biotechnology based solutions developed in isolation from the resource base that they depend on, for example, processes on farms and in forests.

Finally, if the EU fails to support the development of these bio-based industries (e.g. the bio-plastics industry), this could result in the *relocation of innovative industry actors* with a commitment to more sustainable and renewable products outside the EU (European Bioplastics e.V.).

6. Achievements and obstacles of the bio-based economy today

(a) Achievements

Numerous achievements were identified by the different actors in the agricultural and industrial sectors as well as in the policy field. A socially and environmentally beneficial bio-economy already exists to some extent. The term 'bio' or 'organic' is widely accepted as a reliable reference for organic food, obtained through organic farming with its numerous benefits, as explained in the previous section (TPorganics).

Large industrial sectors from agriculture and food production, wood production and materials transformation have long established a bio-based economy based on sustainable production and conversion of biomass into a range of food, health, fibre and industrial products and energy (CEPI).

The *European forest-based sector* is a heterogeneous and complex web of people, services and products, starting and ending with sustainable forest management and, in between, producing a wide range of sustainable products and services. The majority of these products are being recovered and reused several times before ending up as bio-energy. This is a good example of the public and private sectors working together to find solutions for complex societal challenges (Forest-based sector TP).

Primary food processing industries are making efforts to ensure the sustainability of the food chain in line with the emerging development of the EU bio-based economy. This is done on several levels, specifically by supporting the increase of sustainable food production while ensuring competitive and profitable food production and food safety; reducing environmental impact of food production through employing best environmental practices; water recycling and efficient use of water; investing in knowledge, skills, research and development (PFP).

In the *bio-plastics sector*, brand leaders have expressed interest in, or have already committed themselves to, the long-term shift to using bio-plastics and biopolymers for their product packaging. In addition, bio-plastics are being increasingly used in more durable applications such as cars, home appliance, cosmetics, mobile phones, office machinery, children's toys and building materials (Bioplastics in Europe).

A number of sectoral *policies* have been put in place at European level to support the development of a bio-based economy in Europe. The European Commission's Directorate-General for Research and Innovation promotes and finances research into industrial biotechnology through the seventh framework programme (FP7), and the Directorate-General for Enterprise and Industry is seeking to facilitate the early adoption of new bio-based products as part of the Lead Market Initiative (LMI) by including relevant and important recommendations for the bio-based sector. The latter Directorate-General stimulates the use of industrial biotechnology via the Key Enabling Technology (KET) initiative, developing, among other things, possible policy measures to promote the industrial deployment of biotechnology. Finally, the Directorate-General for Agriculture and Rural Development is looking at integrating industrial crops in the new common agricultural policy (CAP). Whilst these initiatives are extremely important, they need to be further integrated and move beyond a mere sum of parts (Bio.be).

(b) Obstacles

The obstacles in moving towards a bio-based economy identified by the actors can be categorised into uncertainties, on the one hand, and missed opportunities with room for improvement on the other.

A number of uncertainties need to be considered in a transition towards a bio-economy. For example, *contradictions in policy goals* hamper the development of bio-economy goals and procedures, and existing policies should be integrated (MTK).

The *impacts of climate change* are likely to increase existing problems such as limited arable land (PFP) and pests and diseases directly affecting livestock production, food security and food safety (the latter causing considerable financial costs to the food production industry and adverse impacts on animal health) (CDTI).

There are *societal concerns* for biotechnologies, which are partly nurtured by a lack of sustainability criteria. In a global world, the safety and sustainability of food produced outside Europe but sold in Europe are, at this stage, not guaranteed — in many instances, food is produced outside Europe by European companies whilst disregarding sustainability and bypassing European legislation (CDTI). Another cause for such concerns is the current focus on more efficient ways to produce and convert biomass into various industrial products, potentially undermining prospects for sustainable agriculture due to the rebound effect, encouraging more intensive practices of land use and greenhouse gas emissions in response to expanding global markets (CREPE), counterproductive to efforts for avoiding further ecosystem collapse (EEB).

In contrast to bio-energy and especially biofuels, the current political and economic framework in the EU does not support the industrial material use of biomass. This results in a market distortion related to raw material supply, investments and research (Nova Institute). Such an *absent level playing field* is also affecting other industries such as the European natural fibre industry; this industry suffers from a penalising policy framework for hemp and flax fibres which, in practice, can be applied widely to substitute conventional materials, for example in bio-plastics and insulation material (EIHA).

Missed opportunities arise, for example, from the *insufficient implementation of existing legislation* (CEPI). In many Member States, the management of bio-waste, for example, is not sustainable and countries are still struggling with the goals of the Landfill Directive. As a result, a majority of the more than 100 million tons of bio-waste produced per year across Europe is wasted and landfilled with municipal waste (Biowaste).

Also, *access to public money* for public-private partnership and demonstration projects in Europe is still difficult (Novozymes). Yet, closely linking private research activity with that in the public sector is a prerequisite for the successful development of the bio-economy. Legal uncertainties which hinder the commercial use of new research findings must be resolved (Bieconomy R&T Council).

7. Proposed actions to support the development of a bio-based economy

(a) Fostering effective governance and involvement of the society

Actors acknowledge that there is a need for good governance with *transparent decision-making procedures* involving society at all levels and based on knowledge exchange. For the bio-economy concept to succeed, acceptance by the public is crucial and can only be achieved by means of (i) *communication campaigns* with full and transparent information to the public and the consumer about the benefits, costs and risks of novel and traditional products and technologies (Bio.be, MTK, Bioeconomy R&T Council, EuropaBio); (ii) *incentivising the uptake and development of bio-based products* through public procurement policies (Finnish Forest Industry, CEPI, Nova Institute, Bioplastics in Europe); and (iii) *fostering knowledge exchange* through interdisciplinary and multi-sector cooperation and partnerships between Member States, regions, academia and the private sector on research, innovation and network-building (CEPI, CREPE, TPoganics, EPSO, MIRRI, Bioeconomy R&T Council, Confederation of Finnish Industry EK).

A *new policy framework for the EU* has to be coordinated by the European Commission, the European Parliament, Member States and regions, including all sectors involved such as agriculture, forestry, enterprise, energy, environment and research (Nova Institute).

(b) Building a strong research and innovation base

To achieve a sustainable bio-economy, there is a strong consensus that further supports the need for basic and applied research, technological development, demonstration projects, translational research infrastructure creation and training activities, involving all actors (including farmers, foresters, fishermen, advisory services, industry (all involved in the supply chain), consumers and society at large), at local, regional, national, European and global level, aiming to achieve cooperative knowledge transfer and a knowledge commons.

Support for research on the following issues is called for:

- recycling technology (ACE);
- forestry and wood utilisation (FTE GNSG);
- biomass utilisation and processing (Finnish Forest Industries);
- community participation programmes such as field schools for farmers (FAO);
- analysis of global agricultural systems and the related flows of resources (Legume Futures);
- marine resources, including algae as a new resource in terms of food and biomass production (CDTI);
- agro-ecological methods for cooperation between agronomists and farmers (CREPE);
- the establishment of a coordinated Europe-wide research programme for industrial biotechnology and bio-based products, covering the entire value chain, including the funding of public-private partnerships for bio-refinery pilot/demonstration plants (EuropaBio);

- modern crop protection and plant biotechnology (Bayer Crop Science);
- a reduction of greenhouse gas emissions (including CO₂) (CEPI).

Participation in EU-funded research and innovation activities should be encouraged by facilitating access to such funding with *simpler application procedures* (or, alternatively, the introduction of national funds to support proposal preparation), including a fast track procedure for small and medium-sized projects. Other measures to attract the best participants to European research programmes could include the introduction of broader topics combined with a higher number of grants available for each topic (EPSO).

To ensure that EU research funding best *covers the full innovation cycle* from research to market uptake, it should allow projects to start with research and take them further to pilot and demonstration, allowing some flexibility in the duration of the project and an ability to extend the original work (EPSO).

Priority should also be given to *fostering the European Research Area* to avoid overlap and fragmentation (Finnish Forest Industries, EuropaBio). This could be done, for example, by streamlining existing European instruments, for instance by working towards coordinated use of infrastructures such as databases, pilot and demonstration facilities (CCIEP). *Links between existing funding instruments and programming initiatives* should be strengthened (CEPI), whilst examining the need for more specific instrument (Bioeconomy R&T Council DE). These could be in the form of new structures and partnerships, for instance to direct and deliver public agricultural research reconsidering the public good nature of the knowledge and technology outputs required (TPorganics).

Actors also call for the *better uptake of research results into the policy development* framework, for example by addressing negative environmental and social impacts in regions from where raw materials are sourced when setting policies to help Europe deliver the bio-economy (ACE).

Sustainability criteria should be defined and applied to biomass independent of its end-use (with the exception of forest biomass which, according to Finnish Forest Industries already has a high sustainability level in the EU) to ensure a level playing field (CEPI, CCIEP, EuropaBio, Bio.be, Novozymes, Arizona Chemicals). Such criteria should include all three pillars of sustainability (environmental, social and economic). The development of lifecycle assessments for products (Bio.be) and processes should encompass the whole value chain of a bio-based product, addressing the full cycle of extraction, production, commercialisation, use and disposal, shifting from a 'cradle-to-grave' towards a 'cradle-to-cradle' thinking (CCIEP). Besides CO₂ emissions reductions, future key aspects of such life cycle assessments (LCAs) should be biodiversity, soil protection, water conservation, air quality and social sustainability (Bio.be).

(c) Enhancing creation of jobs and ensuring availability of required skills

The *stimulation of high-skilled jobs* will result in a positive feedback in the advancement of the bio-economy and the knowledge-based economy. *Providing a trained and educated workforce* is essential for the research and farming communities as well as industries. Training should be carried out in dedicated training programmes following on from successful schemes such as the Marie Curie Actions at the European level and their equivalent at national level. Already, today, there is a shortage of the relevant skills required for the nascent but rapidly growing bio-economy. Mobility from academia to industry and back to academia should be provided, as well movement between academia/industry environments, and policy,

regulatory and media environments. The European Commission could facilitate the *definition of appropriate education targets*, through, for example, a conference on education and training in cooperation with the responsible national stakeholders, including those responsible for education, for example the respective ministries and European technology platforms (EPSO).

(d) Building competitive bio-based industries

To build competitive bio-based industries, suggestions include supporting the *development of an eco-label for bio-based products*, as well as the promotion of organic and low input farming concepts and systems, in order to maintain consumer trust and confidence in bio/eco/organic food product labelling (TPorganics, CCIEP, CDTI). This should extend to encouraging the use of sustainably sourced renewable resources and materials in bio-based industries (ACE, Legume Futures).

Improving the *availability of sustainable and renewable raw materials* in sufficient quantities and quality and at competitive prices, governed by a clear and coherent legal framework will encourage the continuation of 14 innovative industries in Europe such as forest or bio-plastics industries (Finnish Forest Industries, Bioplastics in Europe). Innovative concepts such as Social Business Development should be fostered. Such a project could, for example, take the form of a reforestation and forest management company securing timber and energy, CO₂ capture and employment opportunities (Vital Village e.G.).

Member States and their administrations need a legal framework as a backup to initiatives in order to implement a *sound management of bio-waste* and adding to soil protection (Biowaste). *Creating a level playing field* is also crucial for sectors of the bio-based economy exposed to international competition, in order to avoid the situation where imported goods, with lower environmental credentials, progressively replace EU-made products due to lower standards of environmental protection. In addition to ensuring fair competition for the emerging bio-based industries in Europe, a level playing field is necessary to avoid diluting the impact of EU environmental policies through replacement by 'less virtuous' imports (Nova Institute, EIHA, EuropaBio, Bio.be, Novozymes, Biowaste). Trading partners should be encouraged to apply equivalent environmental standards. Until such a convergence is in place, the EU should balance unfair competitive advantages of non-bio-based products in order to protect bio-based production (PFP). To stimulate the demand for innovative bio-based products, it is advisable to implement the recommendations developed by the Ad hoc Advisory Group for the European Commission's Lead Market Initiative (LMI) for bio-based products ⁽¹²⁾ (EuropaBio).

Special actions for growing SMEs or start-ups are important in a bio-based economy: for example incentives, financial instruments, networking possibilities, research and innovation or mechanisms for technology transfer (Confederation of Finnish Industry EK). Access to flexible, research-oriented pilot plants should be facilitated to enable companies to use pilot infrastructures during the research and development stage to test and refine industrial processes, reducing lead time and investment costs (EuropaBio).

Plant breeders' rights should not impede seed-saving, improvement and exchange among farmers. Broad patent rights perversely incentivise molecular-level research to maximise proprietary knowledge and so should be restricted (CREPE). In the plant sector, the *familiarity principle* could be an instrument to continue the high safety standards and, at the same time, reduce the effort for deregulation to a manageable

⁽¹²⁾ 'Taking bio-based from promise to market — Measures to promote the market introduction of innovative bio-based products', European Commission, 2009.

level. Large companies could take the lead in getting approval for a certain transgenic plant family or species and then SMEs would have fewer hurdles to overcome when bringing related products to the market (EPSO).

(e) Creating an enabling policy setting

The European Union needs a *new agricultural raw material policy* to rebalance the support of bio-energy and biofuels versus industrial material use. This new framework should cover all industrial applications and should be based on climate protection, resource efficiency, employment (green jobs) and innovation. 'Cascading utilisation' (the sequential utilisation of biogenic raw materials for material and energy uses) could be one option for future support (Nova Institute). Priority should be given to raw materials for a low meat diet, then using biomass for bio-based materials, followed by recycling and, later, its use for biofuel and bio-energy (EEB, but also Bio.be, Nova Institute, Bayer CropScience, and others).

It is only with a *clear political commitment* that the bio-based economy can be successfully promoted as an integrated framework and the transition towards a competitive, sustainable and inclusive bio-based society that is well positioned in the overall EU strategy (Bioplastics in Europe). Coordination mechanisms of all relevant policy domains related to the bio-based economy at EU, national and regional level should be provided (CEPI).

Continuous coordination between relevant bio-based economy sectors and policies is crucial with a view to maintaining healthy and productive environments that are essential for the advancement of the bio-economy (CDTI). These include policies in the area of research and innovation, industry, agriculture and rural development, fisheries and maritime and environment, climate change, energy and trade, forestry, health and consumer protection.

The bio-based economy should be supported in existing legislation and prioritised in future *updates to major EU and national legislation*.

The reform of the common agriculture policy (CAP) is highlighted by all actors as an important cornerstone for this purpose. Funds from the CAP should, in conjunction with funds from the research framework programme, support the *European Innovation partnership on agricultural productivity and sustainability* to bridge the gap between the research world and the farming community.

A *renewed ecological vision of the CAP* should be supported by measurable and ambitious targets for agriculture under the new biodiversity strategy, aiming to increase the output in quantity and quality whilst reducing the input and respecting the water and land limitations (CCIEP, EEB, Bio.be). In addition, the CAP should secure the constant and regular access to quality and safe agricultural raw materials and stimulate their production for all industrial use, which should also be integrated into national rural development plans (PFP, EuropeBio).

The waste hierarchy of the Waste Framework Directive (¹³) giving biological treatments of bio-waste priority over combustion should be respected (EEB). To stimulate this, bio-waste recycling and/or separate collection targets need to be introduced so that the bio-waste is composted or anaerobically digested. Nevertheless, a certain level of flexibility should be left for the local level in the choice of the waste management system, as a sustainable decision depends on the specific territorial aspects (Municipal Waste Europe). Regulations such as the EU End-of-Life Vehicle Directive (¹⁴) should be used for supporting bio-based products through

(¹³) Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain Directives.

(¹⁴) Directive 2000/53/EC of the European Parliament and of the Council of 18 September 2000 on end-of-life

waste legislations (consider bio-based materials as recycled regardless of how they are recovered) to make bio-based products attractive for the industry. Bio-based products should be able to enter all waste collection and recovery systems, including composting, recycling and energy recovery. Bio-based plastics certified compostable according to EN 13432 should gain unhindered access to bio-waste collection (Nova Institute).

To ensure the creation of demand and effective functioning of the bio-based industries, *a review of current EU support to biofuels and bio-energy consumption* is needed, whether through targets set under the Renewable Energy Directive, through a carbon tax exemption under the Energy Tax Directive or by counting bio-energy as inherently carbon-neutral under the Emissions Trading System (ETS) (EEB). Public procurement as a tool for the awareness raising of bio-based products should be further developed by implementing strong green public procurement programmes for bio-based products (CEPI).

The complementary nature of *EU research and innovation programmes*, the relevant programme under the *EU Cohesion Policy* and relevant parts of the *EU development programmes* could be enhanced, for example by using part of the cohesion funds earmarked for research purposes to *facilitate less developed regions* access to established research networks (EPSO).

At *national level*, a number of countries have already taken the lead in efforts to increase the visibility and support of the bio-based economy in Europe, an example being the Memorandum of Understanding on the bio-economy signed by the Flanders region of Belgium, France, Germany and the Netherlands. Other stakeholders should be encouraged to support such initiatives (Bioplastics in Europe).

The European bio-based economy should develop itself in a flexible way, encouraging Member States to develop, in an environmentally sustainable manner, the bio-based parts or components of their economies in a flexible way and to take into account their respective geographical, developmental, environmental and regional circumstances and priorities (CCIEP). *National bio-economy platforms* should be set up to carry out the necessary tasks of coordination between the political, scientific and business communities to agree on measures that need to be taken at the pre-competition stage (BioÖkonomieRat).

(f) International dimension of the bio-based economy

The EU should promote international cooperation in bio-based research on societal challenges of relevance to developing countries aiming to meet global commitments and goals such as climate change or the Millennium Development Goals. Such cooperation should include:

- *the exchange of technologies* with developing countries, where the EU could pass on their experiences on water use efficiency or pest and disease management — issues that may become relevant as a result of the effects of climate change in Europe, particularly in the southern countries (FAO);
- the support of *capacity-building* for developing country trading partners to manage pests and diseases in their own production systems in order to prevent the introduction of pest or disease through imports to the EU (FAO);

- studies on the *effects of climate change on the various bio-economy sectors* (agriculture, fisheries and aquaculture, forestry, biodiversity, food security and energy security) (CDTI);
- *support to authorities in developing countries* in their efforts to reduce pressure on areas with high natural values (e.g. rainforests) by, for example, establishing global funds to finance farmers rendering eco-services (PFP);
- create *joint research and innovation activities for humanitarian aid* to ensure the innovation in the public sector needed for humanitarian aid in developing countries (EPSO);
- encourage approaches such as those recommended in the FAO's Strategic Objective Sustainable Crop Production Intensification ⁽¹⁵⁾ to achieve sustainable use of natural resources at global level (FAO).

The EU should take a leading role in the development of internationally shared sustainability criteria (including an ethical dimension) and establish bio-friendly and sustainable frameworks through which global and regional partnerships can function, including environmental, social, economic and policy factors (CCIEP, FAO).

⁽¹⁵⁾ <http://www.fao.org/agriculture/crops/core-themes/theme/spi/en/>

Annex — List of position papers

Position papers submitted to the consultation:

Name of Organisation	Acronym	Type	Country
City of Gothenburg		Public	Sweden
European Chiropractors Union	ECU	Industry	United Kingdom
Arizona Chemical		Industry	United States of America
European Plant Science Organisation	EPSO	Research	Belgium
Food and Agriculture Organization of the United Nations	FAO	International organisation	Italy
Alliance for beverage cartons and the environment	ACE	Industry	Belgium
TP Organics Technology Platform	TPOrganics	Technology Platform	Belgium
Forest-Based Sector Technology Platform National Support Group Germany	FTP GNSG	Technology Platform	Germany
Central Union of Agricultural Producers and Forest Owners	MTK	NGO	Finland
Belgian National Coordination Committee for the International Environmental Policies	CCIEP	Public	Belgium
Vital Village e.G.		SME	Germany
Technology Strategy Board		Public	United Kingdom
Spanish KBBE Representative, Centre for the Development of Industrial Technology	CDTI	Public	Spain
Confederation of Finnish Industry EK		Industry	Finland
InSinkErator		Multinational/trans-European private company	Belgium
Department of Economy, Science and Innovation - Flemish Government	EWI	Public	Belgium
Microbial Resource Research Infrastructure supporting the Bioeconomy	MIRRI	International organisation	Germany
European Bioplastics e.V.		Industry	The Netherlands
Departement Landbouw en Visserij, Afdeling Monitoring en Studie, UGent		Research	Belgium
Forest-Based Sector Technology Platform	FTP	Technology Platform	Belgium
Bioeconomy Research and Technology Council		Research	Germany
Ghent Port Company ampc		Public	Belgium

Primary Food Processors	PPF	Industry	Belgium
The European Association for Bioindustries	EuropaBio	Industry	Belgium
Belgian Association for Bioindustries	Bio.be	Industry	Belgium
Finnish Forest Industries		Industry	Finland
Novozymes		Multinational/trans-European private company	Belgium
Legume-supported cropping systems for Europe	Legume futures	Research (FP7 project)	Germany
European Industrial Hemp Association	EIHA	Industry	Germany
Nova Institute		Research	Germany
Confederation of European Paper Industries	CEPI	Industry	Belgium
European Environmental Bureau	EEB	NGO	Belgium
Municipal Waste Europe		Public	Belgium
Co-operative Research on Environmental Problems in Europe	CREPE	Research (FP7 project)	United Kingdom
Bayer CropScience AG		Multinational/trans-European private company	Germany

European Commission


Bio-based economy in Europe: state of play and future potential - Part 2 - Summary of the position papers received in response to the European Commission's Public on-line consultation

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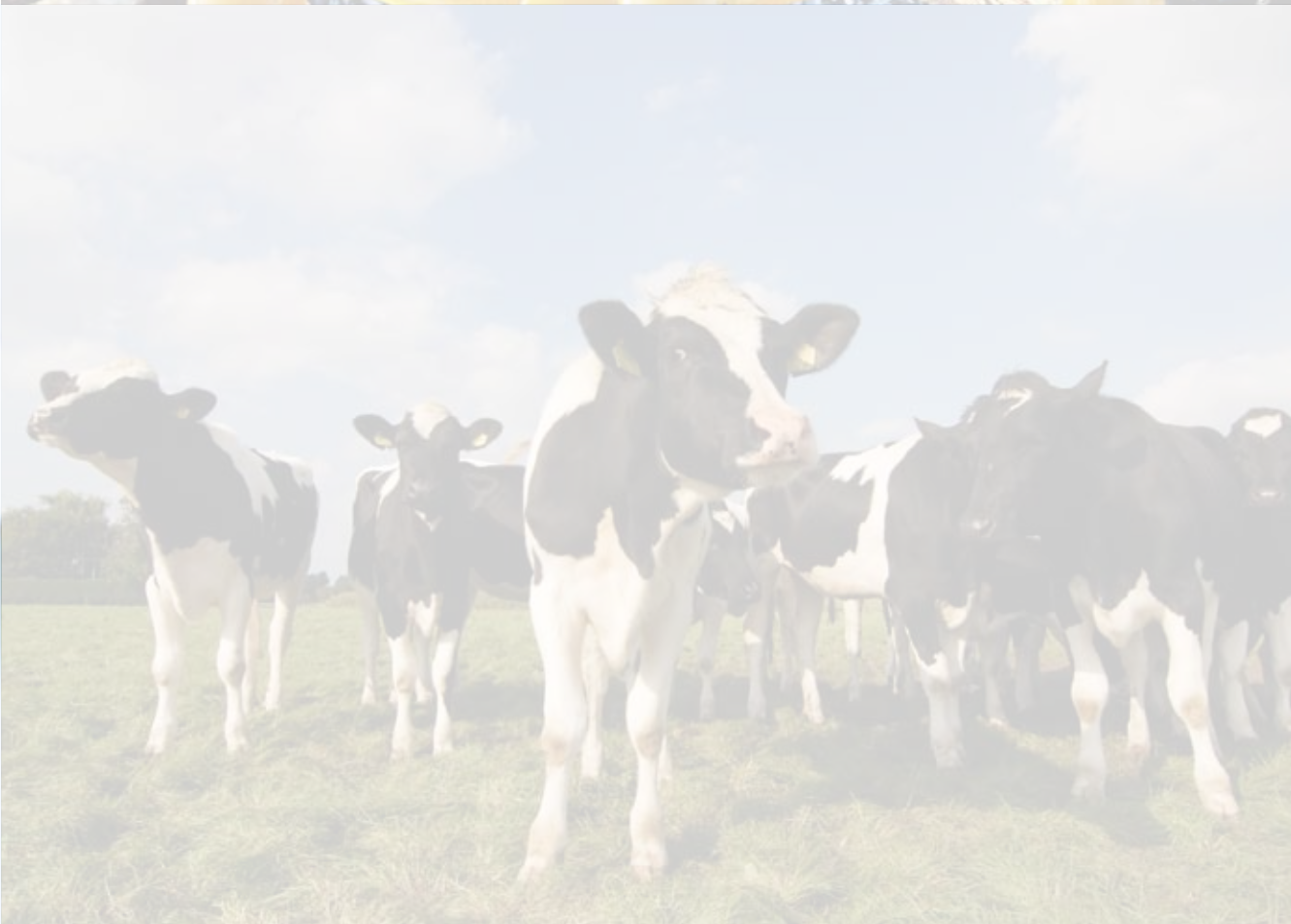
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This report summarises the 35 position papers received from organisations directly or indirectly linked to the bio-based economy in response to the public consultation “Bio-based economy for Europe: state of play and future potential” (Open 17 February – 2 May 2011 available at: http://ec.europa.eu/research/consultations/bioeconomy/consultation_en.htm). It provides a summary of views received from individuals, organizations and public authorities that could assist the Commission in shaping strategy and action plan necessary to develop and promote sustainable European Bio-based Economy.



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