ADVISORY GROUP

FP7 – THEME 2
“Food, Agriculture and Fisheries, and Biotechnology”

Brussels, 28-29 June 2010

MEETING REPORT

Introduction and Background

This was the 11th meeting of the FP7 Advisory Group (AG) for Theme 2, “Food, Agriculture and Fisheries, and Biotechnology”. The main purpose of the meeting was to provide a forum for the AG members to give input on the following two key issues:

- Building bioeconomy - bridges and roadmaps; and
- Bioeconomy RTD towards WP2012/2013 - gaps and opportunities.

The special focus of the meeting was on the AG’s dialogue with other FP7 fields, by exploring the value-adding process of interaction with Advisory Groups from other, relevant FP7 areas, particularly Energy, Environment, Health and Socioeconomics.

A special characteristic of this meeting was that its formal presentations were rather brief, thus enabling most part of the time to be allocated to rich and lively interactions around the table, thanks to many, insightful and valuable interventions from all parts of the AG, offering excellent responses to the briefings from the Commission.

Setting the Stage

The new, Europe 2020 strategy will be guided and led by a policy mix of smart growth, sustainable growth and inclusive growth. Therefore, the second half of FP7 and FP8 will be focusing on joint European research aiming towards addressing global grand challenges and expanding the objectives to also cover innovation, hereby strengthening our efforts in building business, sustainable solutions, and inclusive growth on new knowledge.
This new development has strong bearing for, and potentials within KBBE. The present task for the AG of FP7-Theme 2 is to identify (a) what is facilitating framework conditions for RTD, and (b) the major obstacles, along with the critical and the emerging opportunities.

The message from the AG11 meeting is clear. The expansion from RTD to RTD&I is not trivial. Experience in contemporary times (exemplified by the evaluation of FP6) indicates that Europe is in a global perspective mastering high-quality, innovative, and internationally competitive research. But Europe is at the same time dropping behind in building private sector business, as well as new public growth on new knowledge. However, the way forward towards minimizing the risk for Europe to fall behind in global competitiveness is not simply to stretch the current FP funding to cover, besides RTD, the costs of building innovation and business on the new knowledge and technologies generated. In order to improve the societal use of the new knowledge to be generated, new instruments, new roles, new interactions, and new funding are needed.

The Europe 2020 Vision Paper does recognise KBBE to be of importance for the achievement of the European objectives. It is further implicit from this Vision Paper that KBBE in Europe is important for much more than just DG Research activities: KBBE is creating opportunities of relevance for DG Enterprise (growing competitiveness), DG Agriculture (an integrated parameter in agricultural policy), DG Environment (the environment as a Bio-Economy target and constraint), as well as DG Development (grand challenges and knowledge-sharing of importance for new world order).

**Mapping and Building KBBE: Bridges between FP Themes provides basis for new topics**

This Advisory Group has identified in its AG9 and AG10 meetings that a dialogue with AG Energy, AG Environment, AG Health, and AG Socioeconomics would be fruitful, and thus worth the investment of time and attention. This AG enters into such activities realizing that just relating everything to everything is not value adding, due to risks of higher transaction costs, in addition to an overall defocusing. The discussions during the AG11 meeting and the subsequent Working Group reporting (see Annex) have confirmed our assumption that the effort and exercise are indeed valuable and value adding to our advisory role.
What follows is a list of RTDI topics identified from the AGs dialogue on potential “bridges” to be built between Theme 2 (on the KBBE) and other FP7 Themes:

(a) Topics bridging KBBE with Energy

- Competition between use of bioresources, land, fertilizer and water for food/feed and bioenergy;
- RTD in the field of energy efficiency;
- RTD within marine/off shore applications;
- RTD on the use of CO2 – N.B., not only on CCS, i.e., carbon capture and storage!
- Further: a need was identified for improved mapping of available and sustainable European bioresources, as food, feed, industrial, and biorefinery feedstocks.

(b) Topics bridging KBBE with Environment

- Water as a scarce resource in Southern Europe, as well as globally;
- Aquatic production, its sustainable expansion, and the need for understanding the cross cutting environmental impact;
- Soil quality, soil fertility, and soil bioremediation;
- Microbiology and synthetic biology RTD, studied in an integrated way, embracing the environment, food chains, and sustainable biofuels for Europe and the World;
- Beyond greening the chemical industry;
- Forest research: biomass production vs. biodiversity and sustainability;
- For more information on this topic area, please see also the Annex.

(c) Topics bridging KBBE with Health

- Pollutants: origin, dissemination, impact, and eradication;
- Healthy, decease-preventing food, instead of medicine-relying cure;
- Nutrigenomics;
- Metagenomics and meta-transcriptomics of gut microbiomes;
- Antibiotic resistance and use of antibiotics in agricultural production;
- Climate change and human and animal parasites;
- Biorefineries for the production of new medicines, and other, health promoting food ingredients.
(d) Topics bridging KBBE with Socioeconomics

- Global interdependence, within bioresources, arable land, and water;
- Sustainable countryside and rural regions;
- IPR and knowledge sharing – revisited in a more globalised and climate-challenged world;
- A socioeconomic look on Europe as innovator in the World – Do we keep up?

Bioeconomy towards WP 2012/2013: Tools, drivers, gaps and opportunities

The Advisory Group used the AG11 forum in order to take an analytical look at the new European funding landscape. Of course, this Group is advisory to the Commission with respect to the actions within FP7. However, to fully perform its task, the KBBE AG should also follow the ERA expansion, recently leading to new developments, and focusing on topics overlapping with ours, especially: Joined programming, KIC’s, and the expanding role of ERA-Nets, Technology Platforms, and EIT. The Group asks for a briefing on this topic from the Commission during the next AG meeting. The AG recognizes that JP is not a new instrument, but rather a new ERA development, the funding and role of which are still to be clarified.

AG input to new drivers for WP 2012/2013

The European Climate Foundation has recently (June 2010) provided a foresight report, clearly stating that a transfer in Europe from a fossil based to a non-fossil based society is doable, if politically decided and properly implemented. It is thus relevant for the AG on Theme 2 to recommend that the move “towards a non-fossil based society” is well recognised as a global and European driver.

AG input to new gaps and opportunities for WP 2012/2013

During the AG11 meeting, the Group received an excellent overview from the Commission representatives regarding the current status and content of the updated Reflection Paper. Based on this briefing, the AG members put forward the following list of concrete input on new topics/subtopics:

- Water and land resource efficiency in crop plants (N.B., do not focus calls on one crop species!);
- Robustness in plants/microbial environment – biotic and abiotic stress (N.B., do not focus on one crop species!);
- Brachypodium, a new model species for agricultural crops as a food, feed and biorefinery feedstock;
- Biotech downstream processing - biobased polymers, large volume recovery; CO2 as a carbon feedstock;
- Integrated aquatic/terrestrial production - animals, plants, mussels, algae as well as waste water handling;
- Increase the genetic resource base of European food/feed crops;
- Interactions between plants and microbes – the new era after genomics, focusing on one organism;
- Fungal interactions with plants – mycorrhiza and mycotoxins;
- Microbial biome – the plant ambient microbial flora; the microbial flora of soil and of phylosphere; microbiome of herbivore animal gut flora;
- Safe, wholesome and sound food - benefits and risks of new agricultural products;
- Safer products faster – a new regime for sharing data, benefiting especially the SMEs;
- Cropping systems and crop rotation – for better soil health and also good harvest in future systems;
- Phenotype, interactions and genetics;
- Investigative research and structural assessment, improved utilization of knowledge already in existence;
- Creating jobs from innovation within organic agriculture, ornamental plants, vegetables and fruits.

**Upcoming AG meeting: Points for the agenda**

During AG12, the AG requests an update on the following issues:

- The KBBE landscape (JP etc.);
- Updated statistics for both Joint Calls, Calls with collaboration with BRIC countries, and normal, own Calls (for all, numbers of proposals submitted, funded, and not funded)
This report is a summary of the discussions held during the XIth meeting of the KBBE advisory group (AG) and considers aspects to be further discussed with the Environment Advisory Group in regards to the exploration of potential future Joint or Coordinated calls. In addition, this review provides an assessment of the multidisciplinarity within the activities of the aims of the KBBE-AG, and explores opportunities that will lead to “Responsible Innovations” in research derived from biotechnological developments.

During the discussions the KBBE-AG took into consideration matters related to wider policy issues and multidisciplinarity in research in order to advance the EU position in a competing world. This document represents the initial brainstorming of ideas and issues and thus will require further reflection from KBBE-AG members and in depth discussion with EAG members and at a more advanced stage could be the basis for a conference of experts. Development of the ideas described herein and the implementation of various activities based on this initial meeting should help the EC to set the scene for future Joint calls between the KBBE and Environmental programmes.

During brainstorming the following research areas were considered worthy of deliberation: (1) water scarcity and water quality; (2) new trends in bioremediation and technologies; (3) environmental impact of “greening technologies” (risk assessment); (4) “biology” of soils and their impact on food, as well as non-food biomass chains; (5) opportunities to use seaweeds and algae for abatement of surplus phosphate and nitrogen in coastal areas; (6) off-shore production of energy and food.

Fresh water, and particularly the quality of fresh water, represents one of the most relevant issues in the current world. From a global standpoint our planet represents a closed system for water, with very little if at all exchange with the rest of the universe. This means that water is a finite resource on Earth and that its quality is of the highest concern. Only a fraction of the water on earth is suitable for human consumption or agricultural use, therefore, water also represents a precious commodity. If in addition we take into account that fresh water distribution is uneven on the Earth’s surface and that current climate changes forecast new periods of heavy rains together with prolonged periods of drought, water use and management are of utmost importance. How biotechnology can promote water conservation, how exploitation of aquatic

* Prepared by AG Members, Juan L. Ramos, Patrick Sorgeloos, and Chiara Tonelli.
resources affect biodiversity and how new emerging industrial activities influence water quality and impact the environment were items considered by the members of the AG as elements to set the scene for discussion of these research activities in the context of a biotechnological/environmental perspective. Constraints on the availability of freshwater can be overcome by enhancing the contribution of the oceans to food production. Although catches from ocean fisheries are unlikely to recover without adequate conservation measures, mariculture or seawater farming of aquatic organisms could become the greater contribution of the oceans to feeding humanity. To be successful, mariculture must close the production cycle to abandon its current dependence on catches; enhance the production of edible macroalgae and filter-feeder organisms; minimize environmental impacts; and increase integration with food production on land, transferring water-intensive components of the human diet (i.e., production of animal protein) to the ocean. Accommodating these changes will enable the oceans to become a major source of food, which we believe will constitute the next food revolution in human history (see Duarte et al., 2009 in BioScience, 59: 967-976).

As a consequence of the relevant advances at the end of the XIX century, important industrial achievements were obtained. This involves the massive mobilization of natural resources as i.e. carbon mine, petrol extraction, etc., and the synthesis of new molecules with properties that have lead to significant improvements in agriculture, health, etc. The other side of these advances is the concomitant production of wastes that demand actions from a number of governmental environmental protection agencies. In recent years there have been a number of relevant advances in understanding the inherent basis of recalcitrance of chemicals in the environment, resulting in what we call “pollution”. Increased consciousness of the problem has led governments to establish monitoring programmes that establish limits of pollutant discharges etc. However, pollution is a serious concern and the OCDE has warned members to take actions directed to reduce pollutants in soils, aquatic systems and air. In spite of the advances in the field many methods of treatment of polluted sites have been of little success and a detailed analysis of the field has revealed that this may be the result of poor performance of microbes in the environment, as well as the inappropriate use of engineering approaches. Multidisciplinarity in approaching these issues is often lacking and more discussion between engineers, biologists, and chemists is needed for the development of novel eco friendly treatments for pollution abatement.

The objective of the KBBE is to develop and consolidate the European Knowledge Base Bio-economy to bring together science, industry and other stakeholders. The Environment programme has among its objective the preservation of the environment. The approach of the KBBE is to identify living
organisms that can be useful in the production of goods and that these products can be obtained through the use of new and novel technology that is environmentally friendly. Within this set of activities is the promotion of new research areas to produce biofuels, and other added value molecules. While the efforts of KBBE can be considered of the utmost relevance, a gap in the lack of Risk assessment has been identified for this new set of activities. Scientists from the KBBE programme and from the Environment programme need to properly assess these new activities through a rigorous Risk assessment programme in order to quantify the impacts of biotechnology in the economy and the environment.

Soil Biology is a wide-reaching area that brings together issues related to soil fertility, the use of marginal lands for production of biomass, and new crops for bioenergy. Soil function and soil health is of utmost relevance to the performance of plants and the establishment of equilibrium among components in soils, including microbes that are critical in establishment of symbiotic association with plants and insects. The impacts of Soil Biology are similarly wide-reaching, with effects on the agricultural production system, on biomass, and on forestry. These actions are related to adaptation of plants to climate change and the use of low input in farming. Soil health should consider the sequestration of CO₂ in soils, the better use of the water holding capacity, and the more efficient use of nutrients with emphasis on nitrogen, phosphorous and potassium. Research on the genetics of soil organisms is also critical for better understanding and a more efficient management of soil biosystems.

The European coastlines are under a high population pressure. The EC sea shores are perfectly visible at night from the space as defined by lights along the coast. Dense populations in these zones have led to the appearance of surplus N and P in coastal waters resulting in the eutrophication of waters. Innovative research is needed to approach issues related to removal of surplus N and P via the use of algae and seaweeds that can then be subsequently used as a source of added value materials. This would combine research on technological development for exploitation of seaweeds and their use, and would benefit from the foreseen restrictions, to be set based on the careful analysis of risk assessment, for the exploitation of fresh water terrestrial systems. Another example is the use of coastal and off-shore facilities for integrated generation of energy (windmills, wave energy, ocean thermal energy conversion OTEC) and for multi-trophic aquatic food production (integrating different niches of the ecosystem, i.e. fish, shellfish and seaweeds for maximizing nutrient recycling). Much knowledge could be gained from the empirical, large scale multi-trophic aquaculture systems, as practiced in several coastal bays in China where – over the past 5 decades - seaweed farming has contributed to significant reduction of nutrient loads in coastal regions.