ORIENTATION PAPER

prepared in connection with the FP7 2013 Work Programme in the area of Food, Agriculture and Fisheries, and Biotechnology (FAFB) research

Important notice:
This paper is made public at an early stage in the adoption process of the work programme to provide potential applicants with the currently expected main lines of the 2013 work programme. It is a working document not yet endorsed by the Commission and its content does not in any way prejudge the subsequent modifications by the Commission, neither the subsequent formal opinion of the Programme Committee nor the final decision of the Commission.

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This orientation paper presents indications only on the potential call

FP7-KBBE-2013-7

and does not develop the potential calls "The Ocean Of Tomorrow" and "ERANET"

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Objective:

Building a European Knowledge Based Bio-Economy[1] by bringing together science, industry and other stakeholders, to exploit new and emerging research opportunities that address social, environmental and economic challenges: the growing demand for safer, healthier, higher quality food and for sustainable use and production of renewable bio-resources; the increasing risk of epizootic and zoonotic diseases and food related disorders; threats to the sustainability and security of agricultural, aquaculture and fisheries production; and the increasing demand for high quality food, taking into account animal welfare and rural and coastal context and response to specific dietary needs of consumers.

I CONTEXT

Political landscape

Against the backdrop of the current economic situation and an increased global competition, the Union has defined a strategy to support smart growth and job creation '*Europe 2020 – A strategy for smart, sustainable and inclusive growth*'[2], highlighting the target of developing an economy based on knowledge and innovation. The Innovation Union Flagship initiative supports this strategy through specific commitments like the 'European Innovation Partnerships' aiming at speeding up the development of technologies needed to meet the major challenges identified. Research and innovation are recognised as key drivers of competitiveness, jobs creation, sustainable growth and social progress.

The work programme 2013 (hereafter WP2013) will align with, and contributes towards, the objectives of Europe 2020, the Innovation Union Flagship, and other EU policies. There is a determined focus on fostering new ideas, supporting world class teams tackling significant societal challenges, and on ensuring that the fruits of our investments and innovative ideas can be properly exploited. In this respect the work programme will represent a smooth transition towards the new research and innovation programme for 2014-2020: *'Horizon 2020'*[3].

Approach for 2013

In line with the Strategy *'Innovating for Sustainable Growth: a Bioeconomy for Europe'*[4], which the European Commission has adopted on 13 February 2012, WP2013 will aim at supporting the shift towards a society which sustainably relies on biological resources (including waste) not only to produce safe food and feed, but also bio-based materials and bio-energy. In this regard, WP2013 will not only support research activities in food, agriculture and fisheries, and biotechnologies, but also the development of bioeconomy markets and EU competitiveness, through activities focused on innovation and demand-side measures.

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1 The term 'bio-economy' includes all industries and branches of the economy that produce, manage or otherwise harness biological resources (and related services, supply or consumer industries), such as agriculture, food, fisheries and other marine resources, forestry.

2 COM(2010) 2020 final

3 COM(2011) 808 final

4 COM(2012)60

This is also in line with the *Political guidelines of President Barroso* for the next Commission[5], which states that "the economic and financial crisis and the scientific evidence of climate change have shown us that we need to invest more in sustainability", and requests that "each and every Community policy will need to be assessed and if necessary adapted in the light of climate change, whether we are talking about water use in agriculture, how to deal with coastal erosion or the implications for fisheries policy". The WP2013 will also contribute to "take EU Research policy to a new level and make it one of the motors of our sustainable development", by making a "greater emphasis on innovation as a cross cutting way of equipping all sectors of our economy to be more competitive so that they face the future with confidence".

To achieve this, WP2013 will address societal needs, and therefore paves the way to Horizon 2020 through a challenge-driven approach. Despite the increasing budget compared to previous years, it includes fewer but broader and less prescriptive topics, allowing bottom-up approaches to deliver innovative ideas. Topics have been developed according to the four focus areas of the Horizon 2020 Societal Challenge "Food security, sustainable agriculture, marine and maritime research, and the bioeconomy".

Sustainable Agriculture and Forestry

Research activities will foster systems-wide approaches with an emphasis on agro-ecological research, integrated concepts and production systems with a higher degree of diversity (e.g. agro-silvo-pastoral systems, intercropping). These broader research topics will be complemented by targeted activities addressing strategically important crops, genetic resources, and specific plant/animal pests and diseases and animal welfare issues. Initiatives for forest research will take particular care of international commitments to contribute to meeting GHG mitigation targets and the Rio+ 20 agenda. As part of enabling research, the provision of tools to foster the exploitation of 'omics' technologies will support innovation in livestock breeding. In addition, specific actions are envisaged to help the assessment of the European agricultural research and innovation system and to look at the effects of trade relations and certification schemes on agricultural systems in Europe and with trade partner regions.

Sustainable and Competitive Agri-Food Sector for a Safe and Healthy Diet

With the overall objective of increasing the sustainability of the food chain at all its steps, the requirements of citizens for safe, healthy and affordable food are addressed via the nutritional prevention of diet-related diseases and depression, and by assuring food quality and authenticity. Reducing energy and water consumption and optimising process control contribute to making food processing and distribution more sustainable and the food sector more competitive. Food security is assessed against global drivers like climate change. This will be complemented by knowledge transfer to SMEs on traditional foods, and by innovation actions targeting the exploitation of results of former Framework Programme projects.

Unlocking the Potential of Aquatic Living Resources

The objective is to contribute to the sustainable exploitation of aquatic living resources and to securing food supply by focusing research activities towards the ecosystem approach to

[5] Political guidelines for the next Commission, José Manuel Barroso, 3 September 2009.

fisheries management and by boosting innovation in aquaculture through selective breeding for species already established and exploring the potential of new fish species. In addition, the potential of algae in converting CO2 into high added-value products and biofuels will be further explored. A new "The Ocean of Tomorrow" joint call will be launched in collaboration with other RTD Directorates: Environment (RTD/I), Transport (RTD/H), Energy (RTD/K) and Industrial Technologies (RTD/G) to promote research and innovation on marine technologies, in particular sensors, anti-biofouling materials, and innovative transport and deployment systems for the offshore energy sector.

Sustainable and Competitive Bio-based Industries

Generation of scientific and technological know-how and its exploitation for addressing societal challenges and industrial competitiveness are at the very core of FP7 biotechnology activities. Past and on-going projects have significantly improved the knowledge base through high scientific productivity and novel technological output. Indeed, one third of the projects generated at least one patent, showing the large innovation potential of biotechnological research. To strengthen this, a dedicated demonstration action and SME targeted topics are proposed, together with a large share of activities addressing a bottom up, variable geometry approach with cross-cutting and cross-thematic topics. This will be accompanied by actions in support of market development of biobased products and processes. Research will focus on the exploitation of the chemical diversity of plants and the potential of algae for CO_2 conversion into chemicals coupled with bioprocess engineering, and further developing the biorefinery concept. Support for synthetic biology and nanobiotechnology complements efforts to strengthen existing biotechnology tools towards production of new molecules and products. The topics of this call support converging research efforts across biotechnology areas, disciplines (science, engineering, market development).

Priorities for WP2013 will be defined so as to ensure the highest European added value, in areas where EU funding is needed to achieve critical mass for research and innovation. WP2013 will support relevant policies and regulations, such as the Common Agricultural Policy; Common Fisheries Policy; Integrated Maritime Policy; Community Animal Health Policy; Water Framework Directive; Marine Strategy Framework Directive; General Food Law Regulation; and regulatory frameworks on relevant areas such as Key Enabling Technologies, the environment, health and safety, resource efficiency and waste. WP2013 will also support regional and cohesion policy, by including activities helping regions, in particular in costal and rural areas, to develop smart specialisation strategies in the bioeconomy and increase the impacts of their research and innovation efforts on their economies by focussing on key sectors where they can develop interregional comparative advantage.

WP2013 will also contribute to the structuration of a European Research Area that will enable Europe to maximise its research and innovation potential. WP2013 will support existing and new public-public partnership initiatives, in particular via several topics establishing ERA-Net and ERA-Net+ aiming at the publication of joint calls, such as on Marine Biotechnology. A topic also aims at co-funding a call on climate-change related adaptation of agricultural systems in Europe by the Joint Programming Initiative on Agriculture, Food Security and Climate Change. Integrated maritime governance at sea basin level will continue to be promoted by contributing to the implementation of the Joint Baltic Sea programme, BONUS

(Article 185). WP2013 will also request that particular efforts are made to integrate research throughout Europe, also by the development of training programmes and Europe-wide networks for knowledge transfer.

- Innovation dimension of the activities and bridging towards Horizon 2020

  The work programme will contain innovation measures in support of activities closer to market such as support to market-uptake, notably through more activities aimed at generating knowledge to deliver new and more innovative products, processes and services.

  This includes activities such as prototyping, testing, demonstrating, and proof of concept, such as a topic specifically supporting the demonstration of the marker potential of biotechnological applications. WP2013 will also include activities specifically supporting the exploitation of research results of former Framework Programme projects, in the field of agriculture and forestry, and in the field of food, health and well-being.

  Innovation is also encouraged by supporting demand-side measures such as pre-commercial procurement in bio-based products, standard-setting on key areas, such as antifouling materials for maritime applications and bio-based products, and regulatory needs such as on organic aquaculture.

  The focus on innovation is reflected in the description of the objectives and scope of the specific topics, as well as in the expected impact statements. The innovation dimension of the proposals will be evaluated under the 'Impact' evaluation criterion.

  WP2013 will support also broader aspects of innovation, notably non-technological innovation such as new business models, for example by helping SMEs to deal with legal issues such as property rights. WP2013 will also make an effort to boost the design and implementation of creative ways of meeting social needs. Several topics are expected to lead to social innovation, for example to help wiser decision making in the forestry sector, or to support mental well-being through healthy diets.

  In the area of food, agriculture and fisheries and biotechnologies, the involvement of industry, and in particular SMEs, is crucial to translate research and innovation into market applications, and it is therefore strongly promoted. Two types of actions are applied to ensure appropriate SME participation: i) a majority of topics require mandatory participation of SMEs. These topics specify a minimum share of the requested EU contribution that shall be allocated to SME participants (from 15% to 75%). In such topics, this minimal participation of SMEs is an eligibility criterion, which excludes proposals not fulfilling this criterion from being selected; b) several topics highlight that the participation of SMEs might be beneficial to achieve the expected impact of the project, such as the topic aiming at demonstrating the potential of biotechnological applications.

  WP2013 will also support dissemination of research results and technology and knowledge transfer activities, so that innovative knowledge can lead to innovative

applications. In particular, a topic supports the creation of a network for the transfer of knowledge on traditional foods to SMEs.

With its strong focus on innovation, WP2013 will not only reinforce the EU's science base in the bioeconomy, but also provide tools to maximise the impact of research and innovation on European societies and economies.

- International Cooperation

  International cooperation is crucial to tackle challenges related to research in Food, Agriculture and Fisheries and Biotechnology, which are global by nature. It is therefore supported and encouraged throughout all the activities and all topics are open to the participation of third countries. Specific support to international cooperation in WP2013 will be based on a mutual benefits' approach and will focus on key strategic partners: China, on infectious diseases of animals and zoonoses, in line with the scope and priorities of the Strategic Forum for International S&T Co-operation[6]; and industrialised partners[7] such as the members of the International KBBE Forum[8], on ecosystem approach to fisheries management, on diet-related diseases, and with the view to harmonise methodologies and standards in bio-based products. A WP2013 action will also support commitments to the Rio+20 United Nations Conference on Sustainable Development. New cooperation opportunities will be sought with the neighbourhood countries on the issue of sustainable biomass production, with Mediterranean countries on agriculture, and with Latin America on biodiversity in agriculture. Twinning will continue between FP projects and similar projects funded by third countries, as an activity of programme-level co-operation to systematically link the research and innovation activities between the EU and strategic third countries partners[9].

- Cross-thematic approaches

  In order to increase the socio-economic impact of EU funded research in key areas of the bioeconomy, WP2013 will include cross-thematic topics following its challenge-based approach. In particular, topics on diet-related diseases and mental well-being have been drafted in coordination with the Health Programme.

  The Commission recently launched its Action plan against the rising threats from antimicrobial resistance[10]. A package of call topics for proposals supporting the aims of

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6 OJ C18 of 24.1.2009, p. 11.

7 A financial contribution may be granted by the European Union in the case of a participating international organisation other than an international European interest organisation, or a legal entity established in a third country other than an international cooperation partner country, such as Australia, Canada, New Zealand, United States, etc, provided that such a contribution is essential for carrying out the indirect action. For more information please see Article 29 of the EU FP7 Rules for Participation.

8 Australia, Canada, New Zealand

9 The Commission reserves the right to ask the coordinators of FP7 projects, during the grant agreement negotiations, to include collaboration activities with projects financed by these third countries. The costs of these activities are expected to be approximately 1% of the total European Union contribution to these projects. Parallel funding is expected from the related research programmes in the third countries for counterpart projects. Twinnings are currently on going with Canada, Australia and New Zealand on bio-products and food and with Argentina and Mercosur on plants, soil and food research.

10 Commission Communication' Action plan against the rising threats from Antimicrobial resistance' COM(2011)748

this Action plan through reinforcing and coordinating research and innovation will be tentatively found in three FP7 Cooperation Work Programmes, Health-2013 (HEALTH.2013.2.3.1-1, HEALTH.2013.2.3.1-2 and HEALTH.2013.3.1-1), KBBE-2013 (KBBE.2013.1.3-05) and NMP-2013 (NMP.2013.1.2-2).
Special attention will be paid to cross-cutting marine and maritime research with the potential launch of a new cross-thematic call "The Ocean of Tomorrow": joining research forces to meet challenges in ocean management". It will be implemented jointly between Theme 2 "Food, Agriculture and Fisheries, and Biotechnology" (FAFB), Theme 4 "Nanosciences, Nanotechnologies, Materials and new Production Technologies" (NMP); Theme 5 "Energy", Theme 6 "Environment (including climate change)" and Theme 7 "Transport (including Aeronautics)". The main objective of the call is to promote research and innovation on marine technologies, in particular sensors, anti-biofouling materials, and innovative transport and deployment systems for the offshore energy sector. The topics and funding mechanisms will allow for large, multidisciplinary and multi-stakeholder topics with an appropriate balance between (basic/applied) research, knowledge transfer and demonstration, and to support a number of specific EU policies.

- Theme specific information

  Socio-economic dimension of research: Where relevant, account should be taken of possible socio-economic impacts of research, including its intended and unintended consequences and the inherent risks and opportunities. A sound understanding of this issue should be demonstrated at the level of both research design and research management. In this context, where appropriate, the projects should ensure engagement of relevant stakeholders (e.g. user groups, farmers and fishermen, civil society organisations, policy-makers) and stimulate a multi-disciplinary approach (including, where relevant, researchers from social sciences and humanities). The work programme will encourage participation by civil society organisations in all topics. Projects raising ethical or security concerns are also encouraged to be attentive to wider public outreach. Research activities should take into account the Protocol on the Protection and Welfare of Animals, and reduce – with a view to ultimately replacing – the use of animals in research and testing[11]. The principle of the three Rs (Replacement, Reduction and Refinement) should be applied in all research funded by the European Commission.

  Participation by women and gender dimension in research: Seeking scientific knowledge and using it to serve society calls for talent, perspectives and insight that can only be secured by increasing diversity in science and the technological workforce. Therefore, equal representation of women and men at all levels in research projects is encouraged. Gender aspects in research are of particular relevance to Theme 2. For example, there may be differences between men and women as regards risk factors, biological mechanisms, behaviour, causes, consequences, management of and communication on diet-related diseases and disorders. Furthermore, roles and responsibilities, the relationship to the resource base (land management, agricultural and forest resources, etc.) and the perception of risks and benefits could have a gender dimension. Applicants should systematically address whether, and to what extent, gender aspects are relevant to the

[11] Decision No 1982/2006/EC of the European Parliament and of the Council of 18 December 2006 concerning the Seventh Framework Programme of the European Community for research, technological development and demonstration activities (2007-2013) – OJ L 412 of 30.12.2006, p.1.

objectives and the methodology of projects. In addition, specific actions to promote gender equality in research can be financed as part of the proposal[12].

[12] Appendix 7 of the Negotiation Guidance Notes *[*ftp://ftp.cordis.europa.eu/pub/fp7/docs/negotiation_en.pdf *]*".

II PROPOSED CONTENT OF CALLS 2013

Activity 2.1 Sustainable production and management of biological resources from land, forest and aquatic environments

Area 2.1.1 Enabling research

Enabling research on the key long term drivers of sustainable production and management of biological resources (micro-organisms, plants and animals) including the exploitation of biodiversity and of novel bioactive molecules within these biological systems. Research will include 'omics' technologies, such as genomics, proteomics, metabolomics, and converging technologies, and their integration within systems biology approaches, as well as the development of basic tools and technologies, including bioinformatics and relevant databases, and methodologies for identifying varieties within species groups.

KBBE.2013.1.1-01: Development and exploitation of genomic data and tools, phenotyping approaches and breeding concepts to sustainable animal production systems

Call: FP7-KBBE-2013-7 – single stage

The genetic selection of farmed animals is a highly efficient and cost-effective method for modifying animal performance. Up to now most of the emphasis has been on the private benefits it produces for breeders, farmers, retailers and consumers (feed efficiency, milk or meat production, etc.). However the method is expected to be highly efficient for addressing other issues of major public concern, including living with environmental changes, and improving animal health and welfare by harnessing now the benefits of advances in animal genetics and genomics.

The objectives are to exploit and to further implement whole genome sequence data and genomics tools for hunting the genetic components responsible for biological traits variation. The genetic structures of farm animal populations offer unique possibilities for the dissection of complex genetic traits. The aim is the development of innovative methodologies for analyzing the whole animal phenotype association and basic-biology phenotype association within the light of protein networks and biological pathways with the ultimate aim to better understand animal health, production traits and welfare mechanisms. All genotype and phenotype data developed during the project should be stored in an appropriate international infrastructure (repository). The active participation of relevant partners from United States should add to the scientific excellence of the project and lead to an increased impact of the research; this will be considered by the evaluators.

The project should also pave the way for settling an improved programme for the education and the training of bio-informatician in animal science and the improvement of bioinformatics skills of biologists.

Funding scheme: Collaborative Project (large-scale integrating project targeted to SMEs).

Additional eligibility criteria:

- The requested European Union (EU) contribution shall not exceed EUR 9 000 000 per proposal.
- The estimated EU contribution going to SMEs shall be at least 15 % of the total requested EU contribution. This will be assessed at the end of the negotiation, before signature of the Grant Agreement.

Additional information: Up to one project may be funded.

Expected impact: Tools able to link accurately genomics data from farm animals to production, welfare and health traits will help getting the full benefits from the growing amount of these genomics data extensively generated recently. This will promote animal robustness by translating genomic information to:
1- predictive biology of animal health related traits
2- test these new concepts in genomic selection.
3-innovative tools for environmental impact), welfare and product quality.
This will be fruitful to support agricultural/veterinary research but it will also extend our knowledge pertaining to human biomedical research as accurate primary annotation information from farmed animals can be used to 'reverse the flow' of data to illuminate the human genome.

Area 2.1.2 Increased sustainability of all production systems (agriculture, forestry, fisheries and aquaculture); plant health and crop protection

Increased sustainability and competitiveness, while safeguarding consumer health, decreasing environmental impacts and taking account of climate change, in agriculture, horticulture, forestry, fisheries and aquaculture through the development of new technologies, equipment, monitoring systems, novel plants and production systems, crop management through selected plant breeding, plant health and optimised production systems, the improvement of the scientific and technical basis of fisheries management, and a better understanding of the interaction between different systems (agriculture and forestry; fisheries and aquaculture) across a whole ecosystem approach. Research into maintenance of autochthonous ecosystems, development of biocontrol agents, and microbiological dimension of biodiversity and metagenomics will be undertaken.
For land based biological resources, special emphasis will be placed on low input (e.g. pesticides and fertilisers), and organic production systems, improved management of resources and novel food and feeds, and novel plants (crops and trees) with respect to their composition, resistance to stress, ecological effect, nutrient and water use efficiency, and architecture. This will be supported through research into biosafety, co-existence and traceability of novel plants systems and products, and monitoring and assessment of impact of genetically modified crops on the environment and human health as well as the possibility of their broader benefit for society. Plant health and crop protection will be improved through better understanding of ecology, biology of pests, diseases, weeds and other threats of phytosanitary relevance and support to controlling disease outbreaks and enhancing sustainable pest and weed management tools and techniques. Improved methods will be developed for monitoring, preservation and enhancement of soil fertility.
For biological resources from aquatic environments, emphasis will be placed on essential biological functions, safe and environmentally friendly production systems and feeds of cultured species and on fisheries biology, dynamics of mixed fisheries, interactions between fisheries activities and the marine ecosystem and on fleet-based, regional and multi-annual management systems.

KBBE.2013.1.2-01: Agro-silvo-pastoral systems for Europe

Call: FP7-KBBE-2013-7 – single stage

Agro-Silvo-Pastoral systems (ASP systems) are recognised as systems delivering high economic returns to producers while at the same time providing important ecosystem services, such as C sequestration, attractive landscape for recreational activities, water, soil and

biodiversity conservation. However, these systems are complex to establish and manage, they are knowledge intensive and need to be adapted and fine-tuned to local environmental and socioeconomic conditions. To better understand how ASP systems function in regions where they are present and promote their adoption in Europe, the project develops and test combinations of diversified arable farming systems integrating trees, shrubs and livestock production and demonstrates their viability. Attention is paid to impact on the natural environment and to the balanced and efficient use of in-farm and external inputs and resources, such as soil, water, energy and nutrients, with the aim of improving the production of high quality products and the delivery of ecosystems services. The project addresses diverse pedo-climatic situations in Europe, covering as a minimum Northern and Southern European regions. The proposed workplan is requested to show a strong participatory approach component by involving key stakeholders and end-users, such as extension services, farmers and relevant organisations and associations, local/regional rural development programme managers and policy-makers, and by exploiting existing pilot farms for demonstration.
Funding Scheme: Collaborative Project (large-scale integrating project).
Additional eligibility criterion: The requested European Union contribution shall not exceed EUR 6 000 000 per proposal.
Additional information: Up to one project may be funded.
Expected impact: The project will provide better knowledge of existing and new intensive and extensive Agro-Silvo-Pastoral systems and will help develop agro-ecological intensified mixed agricultural systems adapted to different European pedo-climatic conditions and more resilient to pronounced stress conditions. It will demonstrate the viability and the economic sustainability of the developed systems. It will support rural development and farm diversification while mitigating CO2 emissions.

KBBE.2013.1.2-02: Legume breeding and management for sustainable agriculture as well as protein supply for food and feed

Call: FP7-KBBE-2013-7 – single stage

Legumes are of major importance for European agriculture. While they used to be highly grown in agricultural rotations for their effect on nitrogen fixation in the soil and for the production of proteins for human food and feed, their cultivation has significantly decreased since the 60's, amongst others due to increased use of chemical fertilizers in crop production and to price competition from feedstock proteins produced in North and South America. This reduced use of legumes in European agriculture has created a strong disequilibrium for soils, biodiversity, sustainability and mitigation of environmental impacts of agriculture but also in terms of commercial balance and protein dependence, the European feed sector importing more than 70% of the proteins from outside Europe.
The overall objective of the topic is to increase the competitiveness and cultivation of grain legume crops for food and feed in European agriculture through the following actions:
(1) Innovative breeding of a set of grain legume crops to allow for flexible and wider use in agriculture. The project will identify and prioritise targets for varietal improvement, such as yield stability, precocity and maturity date, resistance to biotic and abiotic stress, quality of the proteins for food and feed. Genetic resources that address these targets should be exploited. Advanced breeding tools including -omics technologies, genetic markers and phenotyping platforms should be applied to help develop fast breeding approaches and support modernization of the legume breeding sector.

(2) Development and testing of legume supported cropping systems, e.g. rotations, intercropping and varietal associations.
(3) Selection of appropriate rhizobial strains to support nitrogen fixation and the development of inoculants
(4) Exploration of novel uses of legumes for human consumption.
The project should take into account different European agro-ecological and climatic conditions. It will focus on European grain legume crops and exclude work on soya.
Funding scheme: Collaborative Project (large-scale integrating project targeted to SMEs).
Additional eligibility criteria:
- The requested European Union contribution shall not exceed EUR 5 000 000 per proposal.
- The estimated EU contribution going to SMEs shall be at least 15 % of the total requested EU contribution. This will be assessed at the end of the negotiation, before signature of the Grant Agreement.
Additional information: Up to two projects may be funded.
Expected impact: The project will generate breeding and management tools to reinforce the cultivation of legumes in European agriculture. It will thereby increase the availability of legumes in Europe and diversify protein supply for food and feed purposes. At farming level, results will help to take advantage of the positive effects of legumes e.g. on soil fertility and N-fixation.

KBBE.2013.1.2-03: Integrated approach towards small grain cereal production and diversification in Europe

Call: FP7-KBBE-2013-7 – single stage

Research under this topic aims at improving and diversifying European production of small grain cereals (excluding rice) to increase their productivity, robustness, quality for various uses along with an improved adaptation to more variable environmental conditions, including resistance/tolerance to biotic and abiotic stresses.
Work proposed should follow a comprehensive approach addressing various aspects which could include:

- the characterisation, evaluation and use of genetic diversity (including crop wild relative and land race genetic resources) in breeding activities
- the development of genetic and genomic (pre-) breeding tools
- new breeding approaches including the creation of new population types
- crop management practices, e.g. for cultivation, pest and weed control, also in the context of mixtures and associations with other crops
- development of criteria and methods for grain quality testing

As regards “minor” cereals - i.e. for which there is currently a minor European market - work should also explore the economic potential including possibilities for new food products from these crops,, propose solutions to support their cultivation and broader introduction into the market taking into account regional characteristics.
Individual projects are requested to focus the majority of their work either on “major” OR “minor” small grain cereals and within these categories outline the rational for the choice of crops (one or several) and for the proposed scope of work in relation to the specific needs of the sector.
Funding scheme: Collaborative Project (large-scale integrating project targeted to SMEs).
Additional eligibility criteria:
- The requested European Union contribution shall not exceed EUR 5 000 000 per proposal.

- The estimated EU contribution going to SMEs shall be at least 15 % of the total requested EU contribution. This will be assessed at the end of the negotiation, before signature of the Grant Agreement.

Additional information: Up to two projects may be funded, one targeting major and one minor small grain cereal crops. Attribution of the proposal to any of the two categories needs to be clearly highlighted by the applicants at the time of submission.

Expected impact: Project results will support both the breeding and farming sectors through the development of breeding tools, new varieties with increased genetic variation and improved agronomic, processing and nutritional characteristics. Farmers will particularly benefit from a wider range of available, adapted cereal genotypes, from improved and/or novel management practices to support crop performance as well as from additional venues for income through new products. Overall, the project will contribute to more productive, diversified and resilient European cereal production while at the same time supporting new (regional) markets for food, feed and non-food products and meeting demands of consumers for cereals with increased nutritional and health benefits.

KBBE.2013.1.2-04: Control of pests and pathogens affecting fruit crops

Call: FP7-KBBE-2013-7 – single stage

Pests and pathogens are a central concern for fruit crops and causing significant losses. Trade globalization and movement have facilitated the transfer and spread of plant harmful organisms. In the past years *Drosophila suzukii*, the spotted wing *Drosophila*, originally native in Asia has been described in Europe. Although the pest is recently introduced, serious damages have been reported in a number of fruits (cherries, berries, apricots, currants, figs and grapes). In addition, there is a number of other pests or pathogens of Plant Health concern (quarantine) affecting fruit production, some of which are already present in EU member states.

The project will look for effective and innovative solutions to control at least two pests/pathogens that cause big fruit losses and where management is a challenge. One of the studied pests/pathogens should be *Drosophila suzukii* and the other(s) should be quarantine pest(s)/pathogen(s). In the case of the latter, the quarantine pest(s) or pathogen(s) could be either present within EU territory or present(s) an increased threat for EU member states. Work will provide insight into the biology of the pests/pathogens. The knowledge needs to be translated into the development of practical solutions for controlling the pests/pathogens and limiting damages to fruit production. In addition, the pathways that allowed the introduction of the proposed pests/pathogens (i.e. *Drosophila suzukii* and other quarantine pest(s)/pathogen(s) if present) into the EU should be investigated, aiming at the development of preventive strategies/recommendations for other dangerous fruit pests/pathogens and diseases. The need for international cooperation and linkages to third countries affected by the studied pests/pathogens is encouraged. The economic viability of the proposed alternatives to fruit crop protection should also be assessed. Budget distribution for the work on the various pests/pathogens needs to be well justified.

Funding scheme: Collaborative Project (large-scale integrating project targeted to SMEs).

Additional eligibility criteria:

- The requested European Union contribution shall not exceed EUR 6 000 000 per proposal.
- The estimated EU contribution going to SMEs shall be at least 15 % of the total requested EU contribution. This will be assessed at the end of the negotiation, before signature of the Grant Agreement.

Additional information: Up to one project may be funded.
Expected impact: Activities will result in increased knowledge and development of innovative solutions for pest and pathogen management, reduction of yield losses, and novel phytosanitary measures or products. The presence of Small and Medium Enterprises (SMEs) and industry will facilitate the translation of knowledge to practical solutions. This research is in support of EU Plant Health Policy.

KBBE.2013.1.2-05: Biological control agents in agriculture and forestry for effective pest and pathogen control

Call: FP7-KBBE-2013-7 – single stage

Climate change will probably influence more and more the occurrence, prevalence and severity of plant diseases. Moreover, the risk of biological invasions of new pest and pathogen populations and species to Europe is increased by the globalization of trade and transport. In addition to these, the availability of chemical agents to combat pests and pathogens is limited, since pesticides have proven to be often hazardous for both environment and human health and their use should be reduced or avoided whenever possible. Thus the need for the creation of new sustainable alternatives is significantly increased. Biological control of pests and pathogens can be an effective, sustainable and environmentally-friendly method for crop and forest protection as part of integrated pest management practices.
The project should focus on exploring new biological control agents against a range of important pests and pathogens that cause high economic losses to agriculture and forestry. Solutions should be sought for various cropping systems (protected and non-protected) and various types of forests. The environmental and economic sustainability of the proposed solutions should also be considered. The project is expected to cover also the development of large scale production systems of these biological control agents to ensure rapid introduction into the market. Overlap with the research undertaken by the FP7 funded project 'PURE' or with the research proposed by the topic KBBE.2013.1.2-04: "Control of pests and pathogens affecting fruits" has to be avoided. Both sectors, agriculture and forestry, should be adequately addressed and subsequent budget distribution duly justified. Dissemination to stakeholders should be properly defined to ensure that results will reach, among others, advisory systems operating at national level, farmers and foresters.
Funding scheme: Collaborative Project (large-scale integrating project targeted to SMEs).
Additional eligibility criteria:
- The requested European Union contribution shall not exceed EUR 9 000 000 per proposal.
- The estimated EU contribution going to SMEs shall be at least 35% of the total requested EU contribution. This will be assessed at the end of the negotiation, before signature of the Grant Agreement.

Additional information: Up to one project may be funded.
Expected impact: Research will aim at the generation of knowledge and innovative solutions for pest and pathogen management. It will also support policy (i.e. Directive 2009/128/EC) laying down that all farmers will have to apply the general principles of integrated pest management by January 2014. The research should be targeted to products that can be readily introduced into the market. The required percentage of SMEs will facilitate the translation of knowledge into commercial products. On the choice of biological agents, the demands to be met for registration under EU and national legislation should be taken into account.

KBBE.2013.1.2-06: Improved coordination and collaboration for European reference collections

Call: FP7-KBBE-2013-7 – single stage

The rate of introduction and establishment of new, economically or environmentally damaging plant pests/pathogens and diseases has increased steadily over the last century as a result of expanding globalisation of trade in plants and plant products. This is potentially exacerbated by climate change, EU enlargement, and a decrease in the resources supporting plant health activities in the Member States.

One of the prerequisites for supporting statutory plant health is a reliable and up to date infrastructure of reference collections of regulated and emerging plant pests/pathogens and diseases, accessible to researchers and diagnostic laboratories, and the related scientific and technical expertise. At present in the EU, reference collections of plant pests and pathogens vary in their quality and scope, accessibility, and quality of their management regimes.

The project aims at developing a network of national reference collections relevant to national and European phytosanitary policy. In addition, it aims at restoring, improving and updating of national reference collections (specimens, tissue and DNA), including the development and application of reference criteria. Furthermore, it should provide unhindered access to reference collections to National Plant Protection Organisations (NPPOs) and mandated diagnostic laboratories. It should include the definition of rules for provision and acquisition of reference material. It should provide harmonised quality assurance systems for reference collections, and good collection practice -including protocols for preparation, conservation, shipment and use of reference material. Additionally, links between the various databases of diagnostic tools will be sought, giving a good overview of the state of art. The project should include staff training in skills for handling, conservation, multiplication and use of reference material, including the correct use of DNA reference material.

The project is expected to seek synergies with other relevant FP7 projects (e.g. Q-Detect, QBOL, SharCo, ERA-NET EUPHRESCO etc.) and ongoing initiatives.

Funding scheme: Coordination and Support Action (coordinating action).

Additional eligibility criterion: The requested European Union contribution shall not exceed EUR 500 000 per proposal.

Additional information: Up to one project may be funded.

Expected impact: The project will lead to the creation of a model for sustainable collaboration, coordination and maintenance of trans-national reference collections and databases of diagnostic tools. Consequently, it will help prepare the way to establish EU Reference Laboratories for plant health diagnostics, in line with Regulation (EC) 882/2004. It will provide approved and validated methods and protocols as well as trained staff. It will also be in line with the Microbial Resource Research Infrastructure (MIRRI), which was recently launched by the European Strategy Forum on Research Infrastructures (ESFRI).

KBBE.2013.1.2-07: Novel practices and policies for sustainable wood mobilisation in European forests

Call: FP7-KBBE-2013-7 – single stage

The increased utilisation of wood as raw material and for energy generation offers – along with other renewable energy sources – opportunities for Europe to contribute to a more renewable energy future and thus to reduce its greenhouse gas emissions, to secure its energy supply and to maintain competitiveness, inter alia through enhancing sustainable regional and rural development.

In this context, and in order to provide increased amounts of wood of sufficient quality for its different uses while ensuring sustainable forest management, the project will develop innovative silvicultural and management practices and sustainable harvesting techniques and technologies adapted to different regions and different forest types in Europe. It will take into account their economic viability as well as their long-term impacts on, and the conflicts with, other forest functions, ensuring the vitality and health of forests and minimizing risks of harvesting damage (e.g. soil erosion and compaction, impacts on biodiversity and native species, etc).
Development of innovative services, co-operations and organizational structures could also contribute to overcome bottlenecks in resource mobilisation. In this context, it is important to understand the motivations and decision-making among forest owners, which are at the same time related to the uptake of new innovations and the design of policies affecting wood supply decisions. The project will thus explore the diversity of forest owners and forest ownership structures in Europe in order to come up with innovative policy approaches and recommendations as well as proposals for organisational designs that may enhance effective provision of wood and other public and private forest goods and services.
The project will include demonstration activities as well as dissemination of results to the operational level and decision-makers to ensure the uptake of the findings. The research will provide forest owners, forest managers, forestry extension services and policy-makers across Europe with practical recommendations and guidance.
Funding scheme: Collaborative Project (large-scale integrating project targeted to SMEs).
Additional eligibility criteria:
- The requested European Union contribution shall not exceed EUR 6 000 000 per proposal.
- The estimated EU contribution going to SMEs shall be at least 25 % of the total requested EU contribution. This will be assessed at the end of the negotiation, before signature of the Grant Agreement.

Additional information: Up to one proposal may be funded.
Expected impact: The project will result in increased availability and supply of wood to satisfy the growing demand of the forest-based industries, including renewable energy generation, thus contributing to the competitiveness of the sector and of rural areas. At the same time, it will minimise conflicts with or damage to other forest functions. In addition, the project will greatly improve our knowledge on how to best address segments of forest owners to ensure a more successful uptake of new innovations and a better design of policies.
The project will be well-suited to the involvement of SME's, fostering innovation in the sector.

KBBE.2013.1.2-08: Innovative insights and tools to integrate the ecosystem-based approach into fisheries advice

Call: FP7-KBBE-2013-7 – single stage

The challenge of implementing the ecosystem-based approach to fisheries management requires development and use of innovative scientific methods, new tools and technologies as well as new statistical, modelling tools and assessment methods that go beyond the single-species approaches which used to be, to a large extent, the main sources of scientific advice. It will also require adaptation of current management objectives and practises.
The first objective of the project is to make the best use of new tools and technologies such as genetics, microchemistry, and isotope analyses to develop new knowledge on population distribution, spatial patterns of spawning components, stocks structure and definition, habitat

preferences, species interactions (including food-web and predator-preys interactions), migration patterns, and some biological parameters such as growth and fecundity, for species targeted in fisheries carried out in EC waters as well as for other species caught incidentally or because of fisheries impacts on their habitats or food sources.

The second objective is to develop innovative assessment methods that address multispecies concerns resulting from biological interactions between species. This includes consideration of biodiversity, food-web structures and habitat impacts including indicators of these. A new range of approaches supporting the development of new assessment tools, including ecosystems models such as size-based models and indicators of ecosystem function (e.g. size based metrics, stable isotopes, etc), among other options, should be considered and developed. These approaches and the ecosystem models should be tested using data rich marine ecosystems with a long history of fisheries exploitation, as well as on data poor systems and using simulations. The performance of these ecosystems models should be compared and evaluated with respect to their suitability for fisheries and environmental management purposes, and to their ability to predict responses of a multispecies community of fish to changes in fishing mortality. Future data requirements for correct implementation of these models should be also investigated.

The third objective is to develop an innovative decision support framework that serves to provide an evidence basis for policy makers about the trade-off between various management options on a multispecies basis. The project shall utilise the assessment methods developed under the second objective as a basis to develop interactive tools for decision support and include a series of case studies of possible approaches, involving iterative management plan development with stakeholder interactions and considering the socio-economic effects.

Modelling development and management aspects should be based on close cooperation with the fishing industry in order to integrate fishers' knowledge. In addition, training actions will have to be planned between scientists and stakeholders (including fishing sector, international scientific organisations providing scientific advice on fisheries management and competent authorities for decision-making).

The project should use available information (including historical data sets) from the EC Data Collection Framework (EC Council Regulation No199/2008 and Commission Decision 2008/949). It should also liaise with other relevant national and international research initiatives (e.g. on-going FP7 research activities such as FP7 ECOKNOWS, MYFISH and BENTHIS projects).

Participation of relevant partners from Australia, Canada and New Zealand will add to the scientific and/or technological excellence of the project and ensure effective uptake of on-going international efforts for the implementation of the ecosystem-based approach to fisheries management.

Funding scheme: Collaborative Project (large-scale integrating project targeted to SMEs).

Additional eligibility criteria:

- The requested European Commission contribution shall not exceed EUR 6 000 000 per proposal.
- The estimated EU contribution going to SMEs shall be at least 15% total requested EU contribution. This will be assessed at the end of the negotiation, before signature of the Grant Agreement.
- The project will address the regional dimension of the Common Fisheries Policy (CFP) and at least one case study should be developed in each of the following regional seas: Baltic Sea, North Sea, Northern and Western Waters, and Mediterranean and Black Seas.

- The duration of the proposed project shall be 4 years.

Additional information: Up to one project may be funded.

Expected impact: The project will provide new knowledge, methods, models and tools to support the integration of an ecosystem-based approach in fisheries advice and to support decision-making for ecosystem based fisheries and environmental management. It will be of high relevance to the future management of marine living resources and will support proper implementation of the new CFP, the Marine Strategy Framework Directive (MSFD) and the Habitat Directive.

KBBE.2013.1.2-09: Diversification of fish species and products in aquaculture

Call: FP7-KBBE-2013-7 – single stage

Finfish aquaculture in Europe is largely dominated by few species that provide most of the current production both in terms of volume and value. However, despite the progress made so far in controlling the biological processes it seems that the capacity of the European and global markets to absorb theses products has now become an important limiting factor. Therefore, potential for growth might also depend henceforth on the capacity of the sector to exploit sustainably the aquatic biodiversity through species diversification.

The aim of the project will be to explore the biological and socio-economic potential of new/emerging candidate fish species and subsequently support the diversification of the activity in terms of species, seafood products and markets. This will require a particular effort of research and innovation in understanding new biological models, while developing adequate husbandry practices and technologies.

Considering that throughout Europe work on several "new species" is already ongoing covering different aspects and with different levels of advance and intensity, the project, instead of implementing a "whole lifecycle" approach, will build (without overlapping) on recent and ongoing initiatives and will focus only on targeted issues (i.e., related to reproduction and/or larval rearing and/or nutrition and/or fish health and/or husbandry technology, etc) that constitute to date the main bottlenecks in an aquaculture production context for the fish species that will be considered. Therefore the project will aim at providing specific solutions (e.g., protocols, adequate husbandry methods and technology, (cost-) efficient feeds and veterinary treatments/solutions etc) to specific, species-related documented problems. The species considered by the proposals will be selected based on their documented biological (e.g., availability of broodstock, short time to market size, fillet yield, flesh quality, etc) and economical (e.g., production costs, markets' availability, consumers' acceptability, suitability for product diversification and added value etc) potential for allowing growth of the European aquaculture sector.

The proposals will include a strong socio-economic component with particular emphasis on the potential of each species considered for adding value to aquaculture products along the seafood chain from the farm to the consumer and boosting competitiveness of the sector. Social, economical, market, cultural and legal aspects will be considered. In particular, the project will focus on new products development (as well as on adding value to raw products), will address European and global markets dynamics, marketing and quality standards, certification schemes, competition from local and imported commodities and will provide solid elements for establishing efficient price strategies. It will also consider consumers' and retailers' preferences for new farmed species as well as, for new added value seafood products.

Work on the following species will not be eligible for funding: Atlantic salmon (*Salmo salar*), rainbow trout (*Oncorhynchus mykiis*), carp (*Cyprinus carpio*), sea bass (*Dicentrarchus labrax*), sea bream (*Sparus aurata*), turbot (*Scophthalmus maximus*), European eel (*Anguilla anguilla*), bluefin tuna (Thunnus thynnus) and Atlantic cod (*Gadus morhua*).
Funding scheme: Collaborative Project (large-scale integrating project targeted to SMEs).
Additional eligibility criteria:
- The requested European Union contribution shall not exceed EUR 9 000 000 per proposal.
- The estimated EU contribution going to SMEs shall be at least 15 % of the total requested EU contribution. This will be assessed at the end of the negotiation, before signature of the Grant Agreement.
- The duration of the proposed project shall be minimum 5 years.

Additional information: Up to one project may be funded.
Expected impact: The project will anticipate future success story(ies) in European aquaculture. It will contribute in identifying the most appropriate candidates for fuelling the future growth of the European aquaculture sector. It will remove bottlenecks in science, markets and consumers' perception/preferences. It will contribute in providing solutions to specific obstacles hampering the mastering of the biological cycle of new species in a production context. It will identify the most adequate options for developing new and competitive seafood products in the markets and will pave the way to the development of new markets for new products through the concomitant development of new species biological production and adequate market prospects.

KBBE.2013.1.2-10: Boosting the domestication of established farmed finfish species through selective breeding

Call: FP7-KBBE-2013-7 – single stage

Research and technological development have been essential in mastering the biological cycle of the main European aquatic farmed species and making possible the establishment of relatively stable aquaculture productions. Henceforth, targeted selective breeding will be critical for consolidating the biological pillar of the European aquaculture sector by enhancing predictability of the production and introducing productivity gains and subsequently result in improving the competitiveness of these European seafood products.
The main objective of this project will be to stimulate the development of breeding programmes and/or underpin the existing ones in the following fish species: Atlantic salmon (*Salmo salar*), rainbow trout (*Oncorhynchus mykiis*), carp (*Cyprinus carpio*), sea bass (*Dicentrarchus labrax*), sea bream (*Sparus aurata*) and turbot (*Scophthalmus maximus*). The effort will be equally distributed among these species.
The project will focus on the improvement of specific traits (individual or combined selection strategies), according to their biological and economical potential, according to the biological challenges of the species concerned, as well as, to the needs of the producers and the European seafood sector in terms of final product quality and potential for product diversification.
In particular, the project will investigate the possibilities for measurable/quantifiable genetic improvement by focusing in priority on some of the following traits: 1) resistance to pathogens and diseases that hamper the production and for which no efficient vaccine or no cost/efficient prevention/treatment method exist, 2) growth and filleting yield, 3) adaptability to alternative feeds (and changing diets) and flesh quality. Other specific, clearly defined and

measurable traits maybe considered, assuming that their interest and potential for the species concerned is demonstrated in the proposal.
The project will develop (and/or adapt existing) adequate tools and methods (ideally non-lethal) for the measurement of the selected traits and general fitness in an aquaculture context. Phenotypic, molecular and genetic correlations between the traits considered (and eventually other relevant traits) will be addressed, in particular to avoid unfavourable selection for correlated traits. Protocols and appropriate assessment tools for the monitoring of the selection process and related breeding programmes will also be developed.
The proposal will also include a horizontal component aiming at assessing the economic impact of the project. The analysis should include an economic assessment traits considered for selection, as well as, an overall cost-benefit analysis of selective breeding. An economic review of existing breeding programmes should be conducted to evaluate the potential productivity gains and economic effects to the sector. Furthermore, producers' and consumer's perception of aquaculture selective breeding methods, technologies and products should be considered. A training component will ensure efficient transfer of knowledge and technology towards relevant end-users (scientists, breeders and producers).
Funding scheme: Collaborative Project (large-scale integrating project targeted to SMEs).
Additional eligibility criteria:
- The requested European Union contribution shall not exceed EUR 6 000 000 per proposal.
- The estimated EU contribution going to SMEs shall be at least 25 % of the total requested EU contribution. This will be assessed at the end of the negotiation, before signature of the Grant Agreement.
- The duration of the proposed project shall be minimum 4 years.

Additional information: Up to one project may be funded.
Expected impact: The project will provide knowledge and tools for boosting the development of breeding programmes in the European finfish farming sector. It will contribute in the production of fish with traits of interest (according to the biological, physiological and environmental challenges faced by each species concerned and in particular those related to disease prevention). It will make possible gain in productivity and/or reduction of production costs through selection. It will contribute to the optimization of selection strategies/programmes for the species concerned and will provide measurable estimates of biological and economical benefits from the methods/tools/selection strategies implemented.

KBBE.2013.1.2-11: Assessment of organic aquaculture for further development of European regulatory framework

Call: FP7-KBBE-2013-7 – single stage

Organic aquaculture is a relatively young market segment, which as of 2009 is regulated at the EU level (EC Regulation 710/2009). An assessment of existing research is needed together with few targeted studies on specific issues related to the implementation of the aforementioned regulation. The aim of this project is to enhance the economic development of organic aquaculture and strengthen the science base of the existing regulatory framework to support a possible future revision of this regulation (currently planned for 2013). Proposals should identify the issues that need to be addressed and focus on the review of new and existing knowledge from previous and on-going EU, regional and national projects. The relevance of their outputs in relation to the implementation of the organic aquaculture regulation will be assessed. Among others, particular emphasis will be given to issues related

to farmed species health and veterinary treatments, fish welfare, optimal slaughtering procedures, as well as, to issues related to nutrition and sustainable feeds for aquatic animals farmed under organic production conditions. Furthermore, issues such as stocking density and sourcing organic juveniles need attention. Production - environment interactions need to be analysed to uncover thresholds for an eco-functional intensity of organic production in line with organic farming principles. Closed recirculation systems as discussed in the context of the Codex Alimentarius Guidelines on organic production should be also looked at. Socio-economic investigations of the relationship between organic certification and competitiveness as well as studies on consumer perceptions and sentiments are necessary to guide farmers, regulators, policy makers as well as market actors towards the acceptance of this innovative new sector and to promote its further development. The project will explore the relationship between organic certification (and other certification schemes) and competitiveness of the European aquaculture sector, as well as, the potential for further development of European organic aquaculture in the context of the global seafood market.

Funding scheme: Coordination and Support action (supporting action).

Additional eligibility criteria:

- The requested European Union contribution shall not exceed EUR 1 500 000 per proposal.
- The duration of the project shall be minimum three years.

Additional information: Up to one project may be funded.

Expected impact: Providing scientific advice on the relevant regulatory framework, the project will contribute to the further economic growth of this aquaculture segment. The results will create a scientific basis for a possible future revision of the EU rules for organic aquaculture taking into account different fish species and production systems. The outputs of the project should contribute in reassessing the relevance, measurability and applicability of the technical provisions of the regulation and will contribute in providing science based recommendations for potential updates. Consumer confidence for aquaculture products will improve based on the broad dissemination of the obtained scientific knowledge and good communication from stakeholders.

Area 2.1.3 Optimised animal health, production and welfare across agriculture, fisheries and aquaculture

Optimised animal health, production and welfare, across agriculture, fisheries and aquaculture, inter alia through the exploitation of genetic knowledge, new breeding methods, improved understanding of animal physiology and behaviour and the better understanding and control of pests, parasites and infectious animal diseases and other threats to the sustainability and security of food production, including zoonoses. The latter will also be addressed by developing tools for monitoring, prevention and control, by underpinning and applied research on vaccines and diagnostics, studying the ecology of known or emerging infectious agents and other threats, including malicious acts, and impacts of different farming systems and climate. New knowledge for the safe disposal of animal waste and improved management of by-products will also be developed.

KBBE.2013.1.3-01: Emerging viral vector borne diseases

Call: FP7-KBBE-2013-7 – single stage

There is a close proximity and possible link between the African and European continent in relation to animal health and to the interface of animal and human diseases, in particular vector borne diseases. Profound environmental modifications such as climate change and pan-

societal globalisation are increasing the risk of food animal diseases emerging in new locations with greater frequency. These diseases have a major impact not only on animal health but also on global food production, and trade. Reactive approaches are economical in the short term but may be far more expensive in the long run and may lead to irreparable consequences, such as enzootic establishment of previously exotic diseases. In consequence we need to get further knowledge on these emerging diseases and their potential spread all over Europe.
The project should develop knowledge on the emerging diseases and analyse surveillance systems in order to improve epidemiological surveillance strategies in domestic and wild species. It will also focus on disease detection and control tools. The role of vectors' ecology in virus transmission should be studied. The project should address diseases like Rift Valley Fever (RVF) and other newly revealed diseases, such as Schmallenberg virus. Participation of relevant third countries, in particular those where disease represents a major threat to the EU, as well as those more active in research, and international organisations should be sought. The project should build on results and experience from existing networks in this field.
Funding scheme: Collaborative Project (small or medium-scale focused research project targeted to SMEs).
Additional eligibility criteria:
- The requested European Union contribution shall not exceed EUR 3 000 000 per proposal.
- The estimated EU contribution going to SMEs shall be at least 20 % of the total requested EU contribution. This will be assessed at the end of the negotiation, before signature of the Grant Agreement.
Additional information: Up to one project may be funded.
Expected impact: Prevention and minimising, mitigating the impacts of these diseases

KBBE.2013.1.3-02: Sustainable apiculture and conservation of honey bee genetic diversity

Call: FP7-KBBE-2013-7 – single stage

The aim of this topic is to support innovative research on a) the underlying resistance mechanisms to infectious and parasitic diseases in honey bees and b) maintaining the diversity of endemic honeybee races in Europe. Taking into account the prevailing role of the ectoparasite mite *Varroa destructor* and the associated viruses, the research should focus on the comprehensive understanding of natural resistance mechanisms of honeybees against the mite both as genuine parasite and in its role as virus vector. The research should range from molecular processes to population wide epidemiology and develop strategies for sustainable control and integrated management of *Varroa* based on the disruption of the mite behaviour and/or physiology with the aim, on the long-term, of a therapy free approach.
The research will combine expertise in molecular genomics and transcriptomics, molecular physiology, behavioural sciences, parasitology and virology, as well as apicultural and developmental extension. The role of environmental effects on bee populations may also be considered. At the same time the research will explore how genetic diversity of honeybees could be protected by integrating biological, economical and social components and how it can be utilised to enable sustainable apiculture production and preserve the pollinator role of bees in agriculture.
Funding scheme: Collaborative Project (large-scale integrating project targeted to SMEs).
Additional eligibility criteria:
- The requested European Union contribution shall not exceed EUR 6 000 000 per proposal.

- The estimated EU contribution going to SMEs shall be at least 15 % of the total requested EU contribution. This will be assessed at the end of the negotiation, before signature of the Grant Agreement.

Additional information: Up to one project may be funded.

Expected impact: Although *V. destructor* is not the sole cause of each and every colony loss, it has been repeatedly shown to be a key factor in colony death. Removing the mite from the complex equation of honeybee health removes the pressure on the honeybee's extensive natural defence against other health challenges. Using sustainable control/management strategies of *Varroa* should ease beekeepers' concerns and could help to re-establish wild and feral bee populations, thus protecting pollination-dependent agriculture, ensuring both food security and pollination services in natural ecosystems. Combining this research together with honey bee genomic diversity should allow the identification of future threats and emerging diseases like what happened with the Colony Collapse Disorder (CCD) and to enable agriculture to deal with future environmental changes. It will help to integrate beekeepers into stock improvement programmes instead of relying on a few sources of queen bees. Economically this approach will provide potential for new income through pollination services and selected bee stock marketing.

KBBE.2013.1.3-03: Sustainable animal production: an integrated and multi-factorial approach

Call: FP7-KBBE-2013-7 – single stage

The aim of this topic is to contribute to our understanding of the multi-factorial dimension (infectious agents, genetics, nutrition, and management factors) of animal pathologies linked to the intensification of production, so-called 'production diseases' and to help to provide effective control strategies to reduce the impact on animal health and welfare.

The research will target at least pig and poultry pathologies like for example neo-natal mortality, gut and respiratory disorders, leg disorders(s), metabolic disorders etc. It will consider the various aspects of the production system: breeding-genomics, feeding, animal health parameters, animal-based welfare indicators, bio-security and hygiene, and husbandry practices. Socio-economic aspects should be carefully analysed with the impact on the costs and efficiency of production and in particular, those related to welfare improvement. The approach should target intensive farming systems where 'production diseases' are likely to be more prevalent. The project should include training and dissemination activities.

Funding scheme: Collaborative Project (large-scale integrating project targeted to SMEs).

Additional eligibility criteria:

- The requested European Union contribution shall not exceed EUR 9 000 000 per proposal.
- The estimated EU contribution going to SMEs shall be at least 20 % of the total requested EU contribution. This will be assessed at the end of the negotiation, before signature of the Grant Agreement.

Additional information: Up to one project may be funded.

Expected impact: Better understanding of the various factors involved in 'production diseases' in pigs and poultry will help to propose adequate and effective multi-factorial control strategies. Economic analysis of the strategies proposed will help to increase competitiveness of the livestock industry. In addition, a sustainable management of livestock production will contribute to the production of better quality products in a welfare friendly approach that will match consumers' expectations. Therefore the project will provide insights

into the resilience of livestock farming systems, taking into account health, welfare and economics.

KBBE.2013.1.3-04: Coordination of research between EU and China on major infectious diseases of animals and zoonoses

Call: FP7-KBBE-2013-7 – single stage

There is common concern that globalisation of food production, including meat, milk and eggs, animal infectious diseases have the potential for very rapid spread irrespective of national borders, causing serious socio-economic and possibly public health consequences. International trade of animal product is constantly increasing. China is a major player in livestock with half of the world swine industry together with an intensive poultry production and a growing cattle industry.

An intensive co-ordination of research activities from the EU and China in the field of animal disease will improve scientific collaborations for the benefit of food safety and food security. The scope of this co-ordinated action is to link the research activities carried out on the one side by the European research programmes (EU Framework Programmes and EU Member States' national programmes including those involving international partners) and, on the other, by related research programmes coordinated by China national institutions, e.g. Chinese Academy of Agricultural Sciences (CAAS). The areas targeted would focus on major viral diseases affecting poultry, pigs and cattle.

The project will ensure a wide-range networking of the relevant scientific communities and stakeholders and the systematic establishment of linkages between the ongoing research and innovation projects from the EU and China. Co-ordination of activities from both sides could include a combination of i) broad networking of the respective scientific communities (via meetings, workshops on diagnosis methods and epidemiological control tools, etc); ii) twinning of large sets of research projects/consortia from the counterparts' programmes, with meetings and exchanges of information, data, materials and methods; iii) short-term exchanges/visits and training of scientists and researchers (in particular young scientists and researchers), iv) dissemination of results (meetings, exchanges of information by web-conference, etc).

This action will provide a long term vision on future common research activities and will contribute to the international policies of the EU. Furthermore, it should also lead to a coordinated planning of relevant future research initiatives.

Funding scheme: Coordination and Support action (coordinating action).

Additional eligibility criteria:

- The requested European Union contribution shall not exceed EUR 1 000 000 per proposal.
- Minimum number of participants: 3 from different Member States or Associated Countries and 1 from China.

Additional information:

- Up to one project may be funded.
- The China Academy of Agricultural Sciences (CAAS) intends to support or/and carry out mirroring and complementary actions. The systematic cooperation with these complementary activities should be reflected in the proposal. This will be considered in the evaluation of the proposal.

Expected impact: A wide co-ordination of research activities in this area from the EU and China, which are both major players in these fields, will scale-up EU-China collaboration, in line with the EU-China Science and Technology (S&T) co-operation agreement. The project

will ensure a wide-range networking of the relevant scientific communities and stakeholders and the systematic establishment of linkages between on-going animal health research, training programmes and innovation projects in the veterinary field from the EU and China. The project will also improve training opportunities for EU researchers, especially young generation of both sides.

KBBE.2013.1.3-05: Ecology of drug resistant bacteria and transfer of antimicrobial resistance throughout the food chain

Call: FP7-KBBE-2013-7 – single stage

The increasing resistance to antimicrobial drugs has become a major threat to human and animal health worldwide. Inappropriate use of antimicrobial substances has favoured the emergence and spread of resistant micro-organisms. This has limited the therapeutic value of these drugs, resulting in difficult to treat infections, extra suffering, mortality and cost. Antimicrobial resistance can spread to humans and animals (terrestrial and aquatic) via direct or indirect contact, consumed food/feed and through the environment. Transferable resistance determinants are of particular concern in this respect. Therefore, there is a need to analyse the epidemiology and mechanisms of emergence and spread of antimicrobial resistance. Whilst the project should mainly focus on the role of the total food chain as reservoir and disseminator of antimicrobial resistance, it should also consider other relevant transmission pathways (e.g. environment, wildlife, companion animals, humans). Research should include surveillance of resistant bacteria in animals, foodstuffs and the environment. In addition, it should identify risk factors and propose key actions to reduce emergence and spread of antimicrobial resistance throughout the food chain. Usage of antimicrobial substances will be correlated with occurrence of bacteria with antimicrobial resistance in the food chain. Research should assess the animal health, animal welfare, food safety and economic impacts of antimicrobial resistance in the food chain. The project should evaluate the contribution of the food chain to the spread of antimicrobial resistance in humans. It should also address as far as possible the environmental impact.

Funding scheme: Collaborative Project (large-scale integrating project targeted to SMEs).

Additional eligibility criteria:

- The requested European Union contribution shall not exceed EUR 9 000 000 per proposal.
- The estimated EU contribution going to SMEs shall be at least 15 % of the total requested EU contribution. This will be assessed at the end of the negotiation, before signature of the Grant Agreement.

Additional information: Up to one project may be funded.

Expected impact: The generated knowledge would allow evaluating animal health, animal welfare, food safety and economic impacts of antimicrobial resistance in the total food chain, and minimising the transfer and spread of antimicrobial resistance. The European added value lies in contributing to the EU policies on combating antimicrobial resistance, strengthening the competitiveness of European food producers, improving food safety and enhancing consumer trust.

Area 2.1.4 Socio-economic research and support to policies

Providing the tools needed by policy makers and other actors to support the implementation of relevant strategies, policies and legislation and in particular to support the building of the European Knowledge Based Bio-Economy (KBBE) and the needs of rural and coastal development. The Common Fisheries Policy and the new European Maritime Policy will be

supported through a whole ecosystem approach for the harvesting and the farming of marine resources. Research for all policies, including the Common Agricultural Policy, will include socio-economic studies and cost-benefit analysis, comparative investigations of different farming systems including multifunctional ones, cost-effective fisheries management systems, the rearing of non-food animals, interactions with forestry and studies to improve rural and coastal livelihoods.

KBBE.2013.1.4-01: Building the KBBE ERA

Call: FP7-ERANET-2013-RTD

Please note that this orientation paper does develop information on Eranet topics.

KBBE.2013.1.4-02: Strengthening the KBBE ERA

Call: FP7-ERANET-2013-RTD

Please note that this orientation paper does develop information on Eranet topics

KBBE.2013.1.4-03: Boosting the translation of FP projects' results into innovative applications in the field of agriculture, forestry, fisheries and aqaculture

Call: FP7-KBBE-2013-7 – single stage

The main aim of this topic is to allow building on results from projects funded under EU Framework Programmes (FP5, FP6, FP7) and ERA-Nets in the field of agriculture, forestry, fisheries and aquaculture, to prove the technical and economic viability of methodologies, processes, prototypes, models, technologies etc. -developed under these projects- that offer a potential economic interest but which cannot be commercialised directly. Eligible activities (mainly demonstration, although some limited applied RTD activities might be eligible if properly justified) under this topic will focus on specifications, testing and validation of existing results of FP projects for reaching the last development stage before products or processes enter the production and/or the market. Proposals should fit into the overall business and innovation needs of the SMEs involved and should demonstrate clear exploitation potential and economic benefits for them. Applicants should hold the necessary rights to exploit the results and knowledge to be used in their application and the proposals should clearly and convincingly describe how this knowledge/technology will be brought forward enough to reach the stage of innovative application within the duration of the project.
Funding scheme: Collaborative Project (small or medium-scale focused research project targeted to SMEs).
Additional eligibility criteria:
- The requested European Union contribution shall not exceed EUR 1 000 000 per proposal.
- The estimated EU contribution going to SMEs shall be at least 50 % of the total requested EU contribution. This will be assessed at the end of the negotiation, before signature of the Grant Agreement.
- The duration of the proposed project shall be maximum 2 years.

Additional information: Up to eight projects may be funded.
Expected impact: This topic is expected to contribute in tackling the paradox of EU research, i.e. being world leader in producing high level scientific knowledge but underperforming in terms of translation into applications and innovative products and services. Considering the specificities of the economic sectors falling under this Activity of the KBBE, this topic is expected to contribute in paving the way from the development of scientific knowledge and

technologies to the market by stimulating the development of new patents, dedicated business plans and innovative marketable applications.

KBBE.2013.1.4-04: Improving the capacity of agro-meteorological crop modelling to integrate climatic variability and extreme weather events

Call: FP7-KBBE-2013-7 – single stage

The aim of this topic is to improve food security by better cope with modelling of extreme weather events. In the framework of discussions related to food security and to the functioning of markets, whether at EU or world level, the capacity to produce short-term production forecasts is becoming increasingly important. In the EU a capacity to produce yield forecasts on the basis of agro-meteorological models has been developed in the last 20 years. These short-term forecasts are utilised, among others, by the Directorate General for Agriculture and Rural Development as part of its monitoring of agricultural markets. At the world level, agro-meteorological models are important tools to monitor food security and are at the root of early warning systems.

For addressing climate change impacts on global food production, food security and food prices there is a need to better integrate effects of changes in climatic variability and extremes, including heat waves, droughts and floods, into crop model assessments. Previous assessments have failed to account sufficiently for such effects which, given current projections of increases in some extreme weather phenomena under climate change, may lead to a severe underestimation of yield losses and yield variability under increase of extreme climatic events projected within climate change scenarios.

The project will aim at improving the capacity of agro-meteorological models to project the impact of extreme weather events, both in the short term and the long term. Extreme events are expected to increase under climate change. The research should aim to assess the capacity and the ability of the existing modelling approaches, both based on deterministic and on stochastic or probabilistic approaches, to address the increase in frequency and impact of climatic shocks or extreme events on crop yield forecasts and crop biomass formation. The project should look at the assessment taking into account crop system diversity by geographic area.

Given the importance of the subject and the variety of types of extreme events, it is expected that this project will involve several research communities outside the EU.

Project results are expected to lead in an improvement of the capacity of agro-meteorological models to better deal with extreme events. In particular, it is expected that the results of the project will be integrated into the yield forecasting system developed by the Joint Research Centre Monitoring Agricultural Resources (MARS). At the EU level, this is expected to lead to better short-term forecasts. At world level, project results should contribute to improve food security monitoring and early warning systems.

Funding scheme: Collaborative Project (small or medium-scale focused research project).

Additional eligibility criterion: The requested European Union contribution shall not exceed EUR 2 000 000 per proposal.

Additional information: Up to one project may be funded.

Expected impact: Project results are expected to lead in an improvement of the capacity of agro-meteorological models to better deal with extreme events. At the EU level, this is expected to lead to better short-term forecasts. At world level, project results should contribute to improve food security monitoring and early warning systems.

KBBE.2013.1.4-05: Agriculture and trade development in EU`s Eastern Neighbours

Call: FP7-KBBE-2013-7 – single stage

The aim of this topic is to gain a better understanding of the agricultural production potential and the role it could play for Europe and internationally.

Several countries of the Commonwealth of Independent States (CIS) have sizeable agricultural sectors. This does not apply only to Ukraine and Russia which are major players in the arable crop sector on world markets but also other countries such as Moldova which is an important fruit and vegetable and wine producer and exporter.

In a world where long-term food security is an issue –feeding the world population by 2050 – it is important to look at untapped potential for food, feed and biomass. The sheer weight of the agricultural sector in Russia and in Ukraine and the implication for international and EU trade call for a better knowledge and monitoring of current and potential development of their sector. The need for an appropriate knowledge applies obviously to the grain sector, for which Russia and Ukraine are strong competitors on world markets, but extends, for example, to their potential to produce biomass for material and energy use, to the restructuring of the processing industry and the implications for the future competitiveness of these countries and potential foreign direct investment.

The development of international trade in agriculture of these countries depends upon the dynamics of the sectors but also on their participation in trade agreements. This concerns the EU with which so-called Deep and Comprehensive Free Trade Agreements (DCFTA) are being negotiated and also intra-regional trade with the customs union between Russia, Belarus and Kazakhstan.

The research project will aim at investigating the development of the agriculture, food and non-food sectors and of the policies implemented in Armenia, Azerbaijan, Georgia, Kazakhstan, Moldova, Russia and Ukraine. The investigation will cover in full details the major sectors in these countries. More specifically, it will address biomass availability and possible trade opportunities for the European bio-economy. All policies with a bearing on the development of the sector will be analysed (the various elements of agricultural policy, trade policy, industrial policy, macro-economic policy, etc.). In addition, the policy analysis will extend to all areas which are important for trade and business development, such as: Sanitary and Phytosanitary (SPS) standards, tax policy, Foreign Direct Investment (FDI), Intellectual Property Rights (IPR), contract enforcement, business development service providers etc. The findings of the policy analysis relevant for ERAWATCH will be made available in a form suitable for integration. etc. In order to provide insights on medium-term possible development, modelling of the sector in the major countries (in particular Ukraine and Russia) on the basis of partial equilibrium model will be explored.

Regarding trade in agriculture and food products, the potential/actual impact of the DCFTAs with the EU will be analysed through economic modelling. The impact of the Customs Union between Belarus, Russia and Kazahkstan on the investment climate as well as bilateral trade relations with the EU will be analysed also.

Funding scheme: Collaborative Project (small or medium-scale focused research project).

Additional eligibility criterion: The requested European Union contribution shall not exceed EUR 1 500 000 per proposal.

Additional information: Up to one project may be funded.

Expected impact: The project will provide useful insights in sectoral and policy developments in the concerned countries. It will also deliver simulations / impacts of bilateral

trade agreements. This will entail better informed bilateral trade relations between these countries and the EU.

KBBE.2013.1.4-06: Support to agricultural policy

Call: FP7-KBBE-2013-7 – single stage

With the recent proposals of the CAP and Horizon 2020 a renewed emphasis will be put on agricultural research and innovation. Few studies exist and suggest a high return on investment on European, national and regional level. Systematic research and data are needed to accompany this new policy approach addressed in sub-task 1.
Equally important are farm-level indicators to get an in-depth picture of the impact of the CAP at farm level (sub-task 2).
The task is based on 2 sub-tasks:

a) Measurement of impact of research in the agriculture of the EU
The aim of this topic is to better target public agricultural research spending in the EU. It is estimated that public research dedicated to the agricultural sector amounts to above EUR 3 billion per year in the EU (Eurostat, Government budget appropriations or outlays on R&D (GBAORD) data). In addition, the private sector invests sizeable amounts, although there are no statistical data dealing with private investments in research. It is usually assumed that every EUR 1 invested in public research attracts another EUR 2 from the private sector, yet it is still to be checked whether this rule of thumb is still relevant.
The assessment of the impact of research in the development of the sector is arduous. The major works (done in particular by Alston) focus on productivity growth. Apart from the difficulty of attribution of productivity growth to research, another difficulty of measuring the impact in terms of productivity is that a large body of research is meant to achieve other objectives than increasing productivity (increase sustainability, etc).
Investigate the public and private effort in research in the agriculture and related sectors and develop tools to measure the impact of agriculture research: impact on productivity but on other research objectives.
Methodology:
- Analysis of current research expenses both public and private (trends, sources, objectives) in agriculture;
- Economic modelling to measure impact on productivity and other indicators, time lags, etc.
- Case studies or other methods for the measurement of impacts taking into account such aspects as: process (programming, stability of funding, structures, public-private partnership, and coordination), distinction between fundamental research and applied research, factors of success of results implementation on the ground level.
The project will provide recommendations regarding the improvement of the delivery of research.

b) Establishing and testing farm-level indicators
Since its inception, the Common Agricultural Policy (CAP) has had to cater for an ever increasing range of objectives. The original market stabilisation and income support goals have been augmented by including environmental sustainability and the contribution of agriculture to climate change adaptation and mitigation. With the CAP post-2013, the aim will be to better align the policy to the objectives and targets of the Europe 2020 Framework such as innovation or resource efficiency.

It will therefore be important to have an in-depth picture of the impact of the CAP at farm level. The scope of issues to be covered imply to work on the basis of data collected with a representative sample of farms across the EU. Therefore, there is a need for the establishment of a data infrastructure of the CAP on the basis of farm-level indicators. For reasons of coherence and synergies, this initiative will have strong links with FADN and include the testing of farm level indicators.
Research questions will be the following:

- Indicators, data and proxies: address methodological questions on relevant indicators and data, including methodologies for determination of net impacts and establishment of counterfactuals for measuring the impact of the CAP at farm level across a large array of fields, including farm economics, environmental sustainability (including impact of agri-environmental measures, greening of direct payments, Natura 2000, High Nature Value areas, etc.), knowledge transfer and innovation and other societal needs and in relation to the range of CAP instruments (e.g. rural development measures, direct payments, market measures, etc.). The methodology should allow analysing the jointness between the different objectives of the CAP at farm level (e.g. economic impact of environmental objectives of the CAP). The scheme will monitor at least the following variables at farm level: economics (income, productivity, input/output terms of trade), environment (biodiversity, soil, emissions and water), and social (employment).
- Develop an approach suited to contribute to the monitoring and evaluation of the relevant policies taking into account existing relevant initiatives and methodologies (e.g. agri-environmental indicators, Common Monitoring and Evaluation Framework for Rural Development, Organisation for Economic Co-operation and Development (OECD) indicators, etc.);
- Establish a pilot network of farms (representing EU farm diversity), well suited for the gathering of data on the basis of farm-level indicators with a view to test indicators and methodologies.

Funding scheme: Collaborative Project (large-scale integrating project targeted to SMEs).
Additional eligibility criterion: The requested European Union contribution shall not exceed EUR 5 500 000 per proposal. The indicative requested EU contribution per sub-task shall be: EUR 3 000 000 for "sub-task a" and EUR 2 500 000 for "sub-task b".
Additional information: Up to one project may be funded.
Expected impact: The project will contribute in supporting the implementation of the CAP.
In particular for sub-task a:
The project will deliver a thorough picture of agricultural research in the EU. It will deliver tools enabling to better evaluate short-term and long-term impacts of research and recommendations. These elements will allow policy makers and other stakeholders at Member State and EU levels to better design and implement research programmes in agriculture.
For subtask b:
The project will provide significant contribution to the field of policy assessment relevant to the CAP but also to other EU and national policies (e.g. environmental policies) in order to achieve better targeting of policy measures. Lessons learned and recommendations to be utilised for the establishment of an operational EU-wide system at the European Commission.

Area 2.1.5 "The Ocean of Tomorrow" call - Joining research forces to meet challenges in ocean management

Please note that a separate orientation paper on "The Ocean of Tomorrow 2013" potential joint call will be tentatively published and it is therefore not developed in this orientation paper. For details on the topics, please consult the relevant document on the Participant Portal.

The aim of this potential call will be to support the EU integrated maritime policy's objective of a thriving maritime economy, making the most of marine resources in an environmentally sustainable manner, in line with the EU Strategy for Marine and Maritime Research[13]*. The Strategy helps deliver the full potential of the maritime economy to the 'EU 2020' goal of a smart, inclusive and sustainable growth for Europe.*

The tentative orientation paper for "The Ocean of Tomorrow 2013" will possibly include four actions as follow:

- **Biosensors for real time monitoring of biohazard and man made chemical contaminants in the marine environment**
- **Innovative multifunctional sensors for in-situ monitoring of marine environment and related maritime activities**
- **Innovative antifouling materials for maritime applications**
- **Innovative transport and deployment systems for the offshore wind energy sector**

Activity 2.2 Fork to farm: Food (including seafood), health and well being

Area 2.2.1 Consumers

Understanding consumer behaviour and consumer preferences as a major factor in the competitiveness of the food industry and the impact of food on the health, and well-being of the European citizen. The focus will be on consumer perception and attitudes towards food including traditional food, understanding societal and cultural trends, and identifying determinants of food choice and consumer access to food. The research will include the development of data bases on food and nutrition research.

KBBE.2013.2.1-01: Impact of food and nutritional behaviour, lifestyle and the socio-economic environment on depression and proposed remedial actions

Call: FP7-KBBE-2013-7 – single stage

Depression is one of the most prevalent, severe and disabling disorders in the EU and places a heavy burden on individuals and families. It is creating growing challenges for health and social welfare systems and causes high productivity losses for the EU-economy. This project should look into the multi-faceted links between nutrition and depression. It should analyse the two-way relationship between food intake, food composition, nutritional behaviour, conditions such as anorexia or obesity and depression. The project should build on recent preclinical and clinical findings on food choice respectively nutritional behaviour as response to chronic or psychosocial stress, and also consider relevant epidemiological and cohort studies regarding long-term health effects of different socio-economic environments. It should discuss the findings against the background of industrial, societal and demographic changes and trends including sustainability issues. This should also include the analysis of factors such as the increasing share of consumption of industrially prepared meals (including fast food), the implications for nutritional behaviour of smaller family sizes and increasing number of single households, alongside the increasing social and health inequalities and the ageing of the EU-population. The project should analyse the role of food, nutritional behaviour, body-image perception and anorexia or obesity as risk factors for depression, along with the protective role of certain food composites such as omega-3 fatty acids contained in fish and in certain plants, vitamin D, actives or ingredients to control the glycemic index of the food formula and other nutritional elements. Possible actions in food safety, health and other relevant policy areas should be analysed. Research in this area requires a holistic and innovative approach in close collaboration with many different players and sectors. This call topic is targeted on unipolar depression only. Research on clinical treatment is not included in this call topic.

Funding Scheme: Collaborative Project (large-scale integrating project).

Additional eligibility criterion: The requested European Union contribution shall not exceed EUR 6 000 000 per proposal.

Additional information: Up to one project may be funded.

Expected impact: 1) The European added value of this topic lies in filling existing gaps in the understanding of the link between nutritional aspects like food intake, food composition, nutritional behaviour, conditions such as anorexia or obesity and unipolar depression against the background of changes and trends in food production, lifestyle factors, and wider social determinants. 2) A list of proposed remedial actions and support to guiding policy at EU- and Member State levels, relevant stakeholders and practitioners as well as citizens in dealing with depression and taking preventative measures.

Area 2.2.2 Nutrition

Understanding beneficial and harmful dietary factors as well as the specific needs and habits of population groups as a major controllable factor in the development and reduction of occurrence of diet-related diseases and disorders including obesity and allergies. This will involve the investigation of new dietary strategies, the development and application of nutrigenomics and systems biology, and the study of the interactions between nutrition, physiological and psychological functions. It could lead to reformulation of processed foods, and development of novel foods and ingredients, dietetic foods and foods with nutritional and health claims. The investigation of traditional, local, and seasonal foods and diets will also be important to highlight the impact of certain foods and diets on health, and to develop integrated food guidance.

KBBE.2013.2.2-01: New technologies to study brain function in relation to eating behaviour

Call: FP7-KBBE-2013-7 – single stage

Information and guidelines directed towards consumers have not achieved the targeted goal of making consumer choices healthier and more sustainable. It is still unclear what makes consumers decide to choose one food over another. Scientific evidence is lacking on the relationship between the life-long learning process, physiological changes and eating habits on the one hand and food selection and valuation on the other. The way the brain translates perceptions, emotions and knowledge into food choices and the role played by memory, vision, sensory and reward systems and also by the sense of mental well-being are far from clear. An understanding of the underlying brain mechanisms that control food selection and valuation is needed in order to be able to counteract them and give the correct advice to consumers, thereby also preventing the onset of diet-related diseases. This area has been difficult to address due to the fragmentation of specialist expertise, the cost of powerful techniques and lack of harmonisation in the interpretation of the results. Critical mass needs to be reached in order to provide scientists and public health professionals with insights into how to prevent clinical obesity and overweight, eating and malnutrition disorders in an effective and acceptable fashion.

The aim of this topic is to develop, adapt, optimise and validate new or existing tools and technologies, such as brain imaging, which would help to connect the data on eating behaviour with the 'softer' knowledge on reasons for individual consumer choices. Where appropriate, gender issues should be considered. These technologies should contribute to study obesity and weight management, eating and malnutrition disorders from a completely different perspective. It should offer unique potential for identifying objective measures of stimuli for food intake, satiety and even restraint in eating. Sharing knowledge, best practice, capacity and databases should help identify synergies and create the breakthroughs and innovations needed to develop more effective measures on nutrition and lifestyle. Participation of relevant partners from Australia, Canada, New Zealand and/or the USA will add to the scientific and/or technological excellence of the project and ensure uptake of on-going international efforts in this area.

Funding scheme: Collaborative Project (large-scale integrating project).

Additional eligibility criteria: The requested European Union contribution shall not exceed EUR 9 000 000 per proposal.

Additional information: Up to one project may be funded.

Expected impact: Development and validation of new research methods, model systems and techniques, such as advanced imaging techniques, will contribute to providing the objective measures and science-based evidence needed to develop a strategy for prevention of diet-related diseases with the ultimate goal of promoting a healthy and active population and a high quality of life. The results are expected to contribute to better dietary guidelines and advice to consumers, not least by improving communication and education on eating habits both within and outside Europe, thereby leading to social innovation. The project will support the European public health policy, such as the White Paper on Nutrition, Overweight and Obesity-related Health Issues.

KBBE.2013.2.2-02: Factors influencing the human gut microbiome and its effect on the development of diet-related diseases and brain development

Call: FP7-KBBE-2013-7 – single stage

The species and composition of the human gut microbiome have recently been discovered to be potential key factors in the development of innate and adaptive immune function, in development of metabolic syndrome and obesity and in brain development and behaviour. There is therefore a need to define a 'healthy' gut microbiome and to understand better its ability to absorb and metabolise food components and to influence energy expenditure and its role in diet-related diseases and brain development. The effects of diet (including food production methods), age, physical activity and other lifestyle factors on the human gut microbiome and its effects on the development of metabolic syndrome and obesity and/or on brain development and behaviour should be studied. The specific species of the human gut microbiome predicting metabolic syndrome, obesity and other co-morbidities and influencing the regulation of developmental programming of the brain should be identified. A multidisciplinary approach combining genetic, epigenetic, metagenomic, metabolomic, microbiological, physiological, nutritional, immunological, experimental and computational modelling expertise is necessary to gain insights into factors influencing the effects of human gut microbiota on metabolism. Appropriate epidemiological studies and preclinical trials are needed in order clearly to demonstrate the role of the human gut microbiome and the effects of the different factors. Use of existing data/studies on the human gut microbiome is encouraged. Where appropriate, gender issues should be considered. The project further contributes to the International Human Microbiome Consortium and is encouraged to comply with its principles. Participation of relevant partners from Australia, Canada, New Zealand and/or the USA will add to the scientific and/or technological excellence of the project and ensure uptake of on-going international efforts in this area.

Funding scheme: Collaborative Project (large-scale integrating project).

Additional eligibility criterion: The requested European Union contribution shall not exceed EUR 9 000 000 per proposal.

Additional information:

- Up to one project may be funded.
- A complementary topic will be presented in the work programme of Theme 1 Health on a "high impact research initiative on metagenomics for personalised medicine approaches". During the negotiations, if collaboration between the selected projects can be demonstrated to offer added value, the interconnections and interfaces between these projects but also with other projects in the field will be discussed in order to optimise the cooperation between the projects selected and to ensure maximum synergies.

Expected impact: The project is expected to increase the knowledge of the human gut microbiome. This will contribute to development of new approaches for prevention of metabolic syndrome, obesity and metabolic impairment of the brain and other organs by reshaping the gut microbiome through lifestyle changes, replacement therapies, development of pro- and prebiotics and innovative personalised products. This topic will have an impact on prevention of diet-related diseases with the ultimate goal of promoting a healthy and active population and a high quality of life, both keys to delivering on the EU2020 priority of a socially inclusive and healthy Europe. The European added value lies in the fact that the expected results would be of benefit to European citizens, as they will help to inform new strategies on public health and contribute to the development of new scientific data to support the legislation on health and nutrition claims. This will increase the competitiveness of the European food industry.

KBBE.2013.2.2-03: Food-based solutions for eradication of vitamin D deficiency and health promotion throughout the life cycle

Call: FP7-KBBE-2013-7 – single stage

Vitamin D deficiency affects a large proportion of the world's population. Scientific evidence indicates that vitamin D plays a key role in bone health. The current evidence, however, does not support other benefits of vitamin D intake. Higher levels if intake have not been shown to confer greater benefits, but in fact have been linked to other health problems. The aim of this topic is to explore food-based strategies to bridge the gap between current intakes of vitamin D in European populations and dietary targets. Data are provided to determine vitamin D requirements in specific population life-stage subgroups, particularly pregnancy, lactation, infancy, childhood and adolescence. In addition, human intervention studies are carried out to explore further the existing epidemiological observations linking vitamin D and non-skeletal health outcomes. Technological solutions in the food sector will be explored to underpin appropriate and sustainable food-based strategies to prevent vitamin D deficiency. The advantages and limitations of such technological solutions will be compared to those offered by promoting better lifestyles and healthier diets. The ongoing work carried out by EFSA regarding the safety of vitamin D and the possible revision of tolerable upper intake levels are taken into account. Where appropriate, gender issues should be considered.
Funding Scheme: Collaborative Project (large-scale integrating project)
Additional eligibility criterion: The requested European Union contribution shall not exceed EUR 6 000 000 per proposal.
Additional information: Up to one project may be funded.
Expected Impact: Together with dietary recommendations, the project will inform on appropriate and sustainable food-based strategies that could contribute to reducing vitamin D deficiency, to preventing diet-related diseases, and to improving health and quality of life of citizens. It will also inform on new strategies on public health. Besides, this project will increase competitiveness of the European food industry through the development of new food products. It will also complement the activities of EFSA and national food policy and regulatory bodies and support European public health policy in general.

Area 2.2.3 Food processing

Optimising innovation in the European food industry through the integration of advanced technologies into traditional food production including fermented food, tailored process technologies to enhance the functionality, quality and nutritional value of food including

organoleptic aspects in food production including new foodstuffs. Development and demonstration of high-tech, eco-efficient processing and packaging systems, smart control applications and more efficient valorisation and management of by-products, wastes, water and energy. New research will also develop sustainable and novel technologies for animal feed, including safe feed processing formulations and for feed quality control.

KBBE.2013.2.3-01: Development and industrial application of sensors for food processing operations

Call: FP7-KBBE-2013-7 – single stage

The aim of this topic is to develop versatile and affordable sensors to be applied for the quantitative, real-time, on-line or in-line control of critical quality and performance attributes for raw and in-process materials during food processing in the context of Process Analytical Technology (PAT). The sensors can also be part of a software sensor for statistical data analysis and interpretation, and can be used as a tool predicting the features of the final product. The rapid, sensitive and easily cleanable sensors developed ensure both food quality and safety and therefore reduce the amount of non-conforming products to be wasted, thereby leading to higher production sustainability. The sensors, are integrable in systematic preventive approaches such as the Hazard Analysis and Critical Control Point (HACCP) method, and serve as building-blocks for practical decision-making tools and early warning systems. They are auto-adaptive, quickly operative for any product or condition and robust to the variability of raw materials and line operators. Dissemination to equipment producers and the food industry and demonstration activities in the food industry are required to fill the gap between development of the concepts and practical implementation.

Funding scheme: Collaborative Project (small or medium-scale focused research project targeted to SMEs).

Additional eligibility criteria:

- The requested European Union contribution shall not exceed EUR 3 000 000 per proposal.
- The estimated EU contribution going to SMEs shall be at least 20 % of the total requested EU contribution. This will be assessed at the end of the negotiation, before signature of the Grant Agreement.

Additional information: Up to three projects may be funded.

Expected impact: This topic boosts the competitiveness of the European processing industries and increases the number of patents in this area. It also contributes to reducing food waste and to production sustainability, through more efficient control of processes. The results of research on this topic are of interest and potential benefit to SMEs in the IT, equipment and food industries. Strong participation by SMEs in the project itself will contribute to reaping that benefit. The European added value lies in the need to build up critical mass for multilateral efforts by all the players mentioned above.

KBBE.2013.2.3-02: Network for the transfer of knowledge on traditional foods to SMEs

Call: FP7-KBBE-2013-7 – single stage

The objectives are: (1) transfer knowledge and apply research results in traditional foods in SMEs; (2) develop a strategic research and innovation agenda for traditional foods; and (3) foster entrepreneurship. SMEs producing traditional food products, in particular craft producers, usually have little capability of their own for research and innovation and seldom possess the financial and human resources needed to participate in collaborative projects with universities or research centres. Ethnic foods may be considered in this topic as well.

The first aim of this topic is to establish or support a network that transfers innovative knowledge to SMEs or among existing SME programmes, clusters or associations. The network initiates and facilitates collaboration to develop or improve sustainable and innovative processes and technologies with the objective of improving the quality, safety and environmental performance of traditional food products made by SMEs. At the same time, production protocols for traditional products are stabilised. The network helps SMEs to deal with legal issues in food innovation such as intellectual property rights and the European food law – also making the best possible use of labels for geographical indications and traditional specialities –, and supports their product development strategies and competitiveness.
A second task for the network is, where necessary, to come up with a strategic research agenda for traditional foods that is based on specific food groups and responds to the needs of all stakeholders.
As a third task, the topic stimulates innovation and entrepreneurship among food researchers, commercial take-up of food R&D results, and entrepreneurial networking. Training modules and programmes for food researchers are developed, translated into a variety of languages and implemented.
By extending the field of activity of the European Innovation Partnership (EIP) on 'Agricultural Productivity and Sustainability' into food processing, and in close collaboration with it, the network makes use of existing or emerging innovative activities and entrepreneurship training programmes at local, regional or national level, e.g. those funded by the rural development programmes of the Common Agricultural Policy or by local, regional or national initiatives. The funds for the network are used mainly to fund action at cross-regional, cross-border or EU level. The network makes the tools developed available to other stakeholders.
The network is made up of several sub-networks, each having a limited focus – for example a region, a language, a food or a food group, a specifically defined production system or innovative and fair distribution concepts – in order to address directly the SMEs targeted. The network can also connect ongoing national or regional initiatives such as the national platforms of the European Technology Platform (ETP) 'Food for Life' or projects supported by other EU schemes. SMEs, clusters or associations are expected to take a leading role in governance of the project.
Funding scheme: Coordination and Support Action (supporting action).
Additional eligibility criterion: The requested European Union contribution shall not exceed EUR 4 000 000 per proposal.
Additional information: Up to two projects may be funded.
Expected impact: The results of the project are expected to be of interest and potential benefit to the SMEs and other market players that are members of the network or collaborate with it. The actions facilitate effective transfer of innovations to and between stakeholders in the traditional agri-food business in order to maintain and increase the competitiveness of the agri-food sector, in particular of SMEs, on an increasingly global European market. Other kinds of impact are consumer satisfaction and a contribution to a transparent and sustainable supply chain. Europe-wide, the entrepreneurship training part has a marked impact on entrepreneurship, by addressing innovation skills gaps, and on capacity-building, by generating motivated and knowledgeable entrepreneurs in the food sector. The high European added value of this action lies in the support it will give to the EU Innovation Union in the form of upgrading and sharing knowledge, contributing to a socially inclusive and healthy Europe, and developing sustainable collective governance approaches at local, regional, and national levels. Achievement of the three tasks on a regional basis also supports Member States and

regions in developing their smart specialisation strategies by focusing, where appropriate, on the traditional food sector, with a view to strengthening regional competitiveness and the regional economy. The challenge is pan-European and clearly goes beyond national interests. Projects supported under this topic lead to greater integration of research players and activities from across the European Union, and from the candidate countries.

Area 2.2.4 Food quality and safety

Assuring chemical and micro-biological safety and improving quality in the European food supply. This will include understanding the links between microbial ecology and food safety; developing methods and models addressing the integrity of the food supply chains; new detection methods, traceability and its further development, technologies and tools for risk assessment, including emerging risks, management, and communication, as well as enhancing the understanding of risk perception. This will also include science based methods for risk benchmarking in the field of food safety.

KBBE.2013.2.4-01: Assuring quality and authenticity in the food chain

[Cross-cutting with Activities 2.1 Sustainable Production and 2.3 Biotechnology]

Call: FP7-KBBE-2013-7 – single stage

Globalisation and the growing complexity of the food chain, combined with recent food scares, have raised consumer awareness regarding the quality and authenticity of the food they consume. 'Food authenticity' means the assurance that food purchased by consumers matches its description, e.g. the declaration of specific quality attributes in high-value products, origin (e.g. geographical, botanical, species, etc.), production method (e.g. organic farming, traditional production methods, sustainable production), processing technologies (e.g. irradiation heating, freezing), environmental footprint, social impact, quality control procedures (e.g. pesticide residues analysis), certification and compliance with set food standards. European consumers are prepared to pay extra for added-value foods and are increasingly demanding understandable and reliable information on food labels. These trends have added to the need to harmonise food standards and develop accurate tools to verify that foods match their description and to detect fraud. In addition, there is a need to coordinate and harness transnational capacity and resources, especially databases, reference materials, training and research capabilities and priorities. The main objective of this topic is to determine the current state of the art, to centralise, share and harmonise existing data and know-how, to identify gaps, to prioritise research needs and, subsequently, to coordinate research activities in the area of food quality and authenticity assurance by launching competitive calls[14]. These research activities may include providing reference materials and databases, conducting feasibility studies, identifying markers to confirm the quality and/or authenticity of foods (or potential adulterants), developing, validating and standardising verification methods, understanding consumer concerns, attitudes and perceptions relating to food authenticity and promoting dissemination of results and technology transfer.

Funding scheme: Collaborative Project (large-scale integrating project).

Additional eligibility criterion: The requested European Union contribution shall not exceed EUR 9 000 000 per proposal.

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14 http://cordis.europa.eu/fp7/competitive-calls_en.html

Additional information: Up to one project may be funded.
Expected impact: The European added value lies in offering authentic, high-quality food from sustainable production to consumers and in strengthening the competitiveness of European food producers by enabling them to add value to their products. The results of the project are expected to help food producers to communicate better the qualities, characteristics and attributes of the different food commodities. In addition, determining the authenticity of foods can reduce trading blocks and prevent fraud in the form of false descriptions, substitution of cheaper ingredients and adulteration, along with incorrect origin labelling. This will allow consumers to make informed choices and restore consumer confidence. The research activities launched within this project should clearly support EU policies on food quality, marketing standards and food information to consumers.

Area 2.2.5 Environmental impacts and total food chain

Protecting both human health and the environment through a better understanding of the environmental impact on and from food/feed chains. This will involve study of food contaminants and health outcomes, monitoring of environmental effects, developing enhanced tools and methods for the assessment and management of impacts on, and resistance of, food and feed chains to global changes, in particular to the environment. Assuring quality and the integrity of the food chain requires new models for commodity chain analysis and total food chain management concepts, including consumer aspects.

KBBE.2013.2.5-01: Assessment of the impact of global drivers of change on Europe's food security

[Cross-cutting with Activity 1 'Sustainable Production']

Call: FP7-KBBE-2013-7 – single stage

The aim of this topic is to obtain a comprehensive picture of the effects of the global drivers of change (climate, economic concentration and market structure, financial power, resource competition, marginalisation, property rules, geo-political shifts, consumer preferences, nutritional behaviour, etc.) on European and global food demand and production and, consequently, food flows. The research focuses on the vulnerability of European food systems in a context of socio-economic, behavioural, institutional and agro-ecological change and look into the new challenges and opportunities that the food sector will face in future. Vulnerability assessment methodologies, improved food security and dynamic modelling tools for determining the sustainability frontiers of different food production systems under newly prevailing conditions are reviewed, upgraded or developed. Following the analysis, scenarios are designed for the desired developments in the food supply chain. Research activities address the major societal risks associated with globalisation as a means of predicting change, provide insight into conflict prevention and resolution and guide policy-making. Recommendations to underpin Europe’s medium- and long-term food security situation are formulated for EU policy-makers with a view to promoting social innovation and stability in Europe and its partner regions.
Funding scheme: Collaborative Project (small or medium-scale focused research project).
Additional eligibility criterion: The requested European Union contribution shall not exceed EUR 4 000 000 per proposal.
Additional information: Up to one project may be funded.
Expected impact: The European added value of this topic lies in its potential for an integrated approach encompassing, in a single conceptual framework, the total food system

from consumers to ecosystems while addressing all involved in the system, either in their individual dimension and/or in their interactions. This innovative approach has the capacity to correct the currently dysfunctional food system – characterised by relatively high numbers of malnourished, micronutrient-deficient and overweight people – thanks to a better understanding of the interdependence of production, trade and stocks, of the unpreparedness to meet the vagaries of the weather and of the incentives needed to create a food system that is more equitable, healthy and sustainable. Research draws attention to the direction in which innovation has to be channelled in order to arrive at the desired innovation in food consumption patterns and behaviour, in business models and legal frameworks and in the role and management of real grain stock reserves and ways to mobilise these in times of need.

KBBE.2013.2.5-02: Saving water and energy for resource-efficient food processing

Call: FP7-KBBE-2013-7 – single stage

The aim of this topic is to provide engineering offering a means for significant and simultaneous saving of water and energy[15] along the entire length of the post-harvest chain at all scales of business: from supplying raw ingredients to processing (operations and cleaning), packaging, warehousing, distributing, retailing and household handling of food commodities. A sufficiently representative sector of the food industry has to be targeted; the selection has to be well justified in terms of technological and policy relevance. Optimised, emerging and novel food production and storage technologies, equipment and/or logistics are developed for sustainable, environmentally-benign, water- and energy-efficient and consumer-friendly food manufacturing and handling, whilst improving or at least maintaining food quality and safety. For that purpose, a diagnosis has to be performed of the water and energy consumption of the food processing and the whole food chain in the sector targeted. This also involves considering the rebound effect, process modelling and simulation, and an environmental, social and economic life-cycle assessment of processes in line with the International Reference Life Cycle Data System (ILCD) handbook. Dissemination to equipment producers and the food industry and demonstration activities in the food industry are required to fill the gap between development of the concepts and practical implementation.

Funding scheme: Collaborative Project (small or medium-scale focused research project targeted to SMEs).

Additional eligibility criterion: The estimated EU contribution going to SMEs shall be at least 20 % of the total requested EU contribution. This will be assessed at the end of the negotiation, before signature of the Grant Agreement.

Additional information: The topic aims at financing a limited number of small or medium-scale focused research projects targeted to SMEs with an overall maximum budget of EUR 18 000 000.

Expected impact: The European added value lies in an innovation-driven increase in the competitiveness of food producers and food equipment manufacturers, in particular SMEs, while reconciling sustainability imperatives. Involving SMEs in the project itself contributes to achieving these societal objectives. The research leads to notable reductions in water and

[15] For the purposes of this topic, the term 'energy saving' is used as in the Communication *Energy Efficiency Plan 2011*, which says that "Technically, 'energy efficiency' means using less energy inputs while maintaining an equivalent level of economic activity or service; 'energy saving' is a broader concept that also includes consumption reduction through behaviour change or decreased economic activity. In practice the two are difficult to disentangle and – as in this Communication – the terms are often used interchangeably."

energy consumption, while at the same time ensuring sustainable economic growth. The research contributes to the objective of a resilient, sustainable and productive food chain as planned in the "Innovating for Sustainable Growth: A Bioeconomy for Europe" Strategy. Besides that, it also contributes to achieving the specific resource- efficiency objectives for 2020 and beyond, as planned in the "Roadmap for a resource-efficient Europe", which is a key part of "A resource-efficient Europe", one of the flagship initiatives of the Europe 2020 Strategy. Both aim to help transform Europe into a knowledge-based, resource-efficient economy.

Area 2.2.6 European Research Area

KBBE.2013.2.6-01: Exploitation of results of Framework Programme projects in food, health and well-being by small and medium-sized enterprises

Call: FP7-KBBE-2013-7 – single stage

The aim of this topic is to allow SMEs to take up research results from earlier FP funding in food, health and well-being. This follow-up project turns the scientific and technological knowledge available into sustainable and innovative processes, products or services, thereby clearly going beyond the earlier project(s). It involves a demonstration phase or proof of concept, a business plan and an environmental, social and economic life-cycle assessment in line with the International Reference Life Cycle Data System (ILCD) handbook (if applicable). The proposal has to show that the knowledge was generated earlier and that the results have already been achieved and are available for further research and development – mere 'expected results' are not acceptable as a basis for project selection. This has to be shown in an annex to part B of the proposal that contains the relevant deliverable or at least the executive summary of the final report of the earlier project. Although the principal research has been carried out in earlier project(s), further research and development remains central to the project and allows SMEs to get nearer to actual application.

Funding scheme: Collaborative Project (small or medium-scale focused research project targeted to SMEs)

Additional eligibility criteria:

- The estimated EU contribution going to SMEs shall be at least 75 % of the total requested EU contribution. This will be assessed at the end of the negotiation, before signature of the Grant Agreement.
- The duration of the proposed projects shall be maximum two years.

Additional information: The topic aims at financing a limited number of small or medium-scale focused research projects targeted to SMEs with an overall maximum budget of EUR 10 000 000.

Expected impact: This approach pays more attention to the innovation phase. Beyond adding to the impact of an earlier project, it also improves the S&T capabilities, the innovation potential and the competitiveness of the SMEs taking part. The European added value lies mainly in the leverage effect on private investment, the cooperation of private companies with foreign partners on a scale not possible at national level and the reduction of the commercial risk by actually applying existing and ready-to-use research results actually applicable across Europe and beyond, through effective dissemination and take-up activities.

Activity 2.3 Life sciences, biotechnology and biochemistry for sustainable non-food products and processes

Area 2.3.1 Novel sources of biomass and bioproducts

The production of bio-mass in terrestrial environments is of greatest importance for the development of the KBBE as this will deliver feedstocks and precursors for nearly all bio-industries or directly saleable end-products.
Research and development activities will foster the optimisation of these biomasses for industrial purposes. It will generate knowledge in metabolic control, pathway design, metabolic engineering in plants, animals and other organisms (such as fungi)[16]*, and domestication and breeding, also improving agricultural traits. Novelty will rely to some extent on screening of terrestrial biodiversity and discovery of new organisms and new biochemical pathways. The development and optimisation of novel expression systems in terrestrial organisms will eventually lead to new products and practices.*

KBBE.2013.3.1-01: Plant High Value Products - from discovery to final product[17]

Call: FP7-KBBE-2013-7 – single stage

The terrestrial plant biodiversity remains an untapped source of natural bioactive molecules of importance for various industrial applications, such as high value agro-chemicals, pharmaceuticals, biomaterials, cosmetics, flavours, food additives, food supplements etc. Their efficient utilization requires an integrated and comprehensive effort from the stage of biodiscovery, including plant bioprospecting, through identification of suitable bioactive compounds, then to optimised domestication and cultivation strategies for selected plant species or ecotypes, metabolic engineering of the selected biochemical pathways to improving the productivity and finally to product development and commercialisation.
The projects will engage in a full chain of research and innovation needed to bring to market new or improved products aiming at innovative methodologies in order to tackle the existing bottlenecks and addressing the needs of the bio-industry. The focus is on the efficient exploitation of the novel bioactivities, especially in case of unusual and/or underutilised plant species/ecotypes. This includes sustainable access to raw material, particularly in case of plants that are endangered, protected or difficult to collect and cultivate, and improvements in technical aspects of the metabolic engineering pipeline (e.g. metabolomics, new gene mining concepts, isolation of biomolecules, their purification and sustainable production either *in planta*, bioreactors, or in alternative biological systems). The projects can explore interactions of plants and other natural organisms (e.g. fungi, microorganisms) to achieve the objectives.
The targeted plants can originate from a broad range of European and/or non-European species (e.g. medicinal or aromatic), either cultivated (e.g. industrial crops) or collected from the wild. The full use of the residual plant biomass should be explored in a cascade biorefinery approach. The projects are to be industry-driven and will include demonstration activities to prove the techno-economic feasibility and effectiveness of production and extraction systems. Downstream processing and separation aspects will form an integral part of the projects. Economic and regulatory issues shold also be taken into account both in

[16] However, the focus will be on plant and animal biotechnology. Microbial biotechnology will be mainly covered in Areas 2.3.3 and 2.3.5.
[17] This topic cuts across Area 2.3.1 Novel sources of biomass and bioproducts and Area 2.3.4 Biorefinery.

respect of conditions found in Europe and outside of Europe. The projects shold adhere to relevant international legislation on sustainable use and equitable sharing of biological resources[18]. Dissemination and training activities (e.g. summer schools, press releases, open days) will form an essential part of the projects.

Funding scheme: Collaborative Project (large-scale integrating project targeted to SMEs).

Additional eligibility criterion: The estimated EU contribution going to SMEs shall be at least 25% of the total requested EU contribution. This will be assessed at the end of the negotiation, before the signature of the Grant Agreement.

Additional information:

- This topic represents a major effort to support innovation in the European Plant and Biorefinery sectors, enhance competitiveness of the European biotechnology industries and provide a considerable effort to the European Bio-economy.
- The topic aims at financing a limited number of large collaborative projects within an overall maximum budget of EUR 20 000 000.

Expected impact: The projects will advance the sustainable use of terrestrial plant biodiversity for diverse germplasm to enable a better assessment of species potential, and development of sustainable methods for obtaining the required feedstock, and then converting them to high value products. The European Added Value will lay in the development of novel plant-based 'eco-friendly' products with bioactive properties, especially in pharmaceutical, cosmetic or agrochemical sectors, leading to significant environmental and economic benefits for the society at large. The products developed will be advantageous to the consumers by being cheaper, more readily accessible and more environmentally friendly compared to the existing alternatives. The projects will strengthen the competitiveness of European plant biotechnology industry, as well as increase competition in research and innovation. This topic is particularly well suited for an active engagement of International Cooperation Partner Countries. Their involvement should strengthen the expected impact of the research to be undertaken. This will be assessed at the evaluation. The projects funded should be complementary and reinforce related on-going FP7 KBBE projects on the plant biotechnology. It is expected that the projects will anticipate future trends and consumer demands with a strong focus towards the market and product commercialisation.

KBBE.2013.3.1-02: EU-Latin America Partnering Initiative on sustainable biodiversity in agriculture

Call: FP7-KBBE-2013-7 – single stage

The biodiversity preservation and utilization in agricultural systems is vital not only for the environmental protection but also for the sustainable development of the European and global bio-economy. The project developed under this topic will contribute to identifying promising underutilised crops, their conservation/domestication, and to exploring opportunities for the sustainable commercial use of the natural biological resources in agriculture. The project will have a dual aim: first identifying and linking existing agricultural resource collections (e.g. plant germplasm banks, botanical gardens, agro-microbial strain collections), as a network to facilitate transfer of knowledge and technology between the stakeholders, in order to lessen environmental pressure on endangered or protected plant species, with their associated beneficial microorganisms, and second, identifying among them suitable resources, which

[18] such as the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits arising from their Utilization to the UN Convention on Biological Diversity.

could be subsequently used for sustainable commercial use, especially for the benefit of the local communities and family farmers. The second aim should target in particular novel or underutilised agricultural plants. The participation of the International Cooperation Partner Countries, especially from Latin America is seen as critical in the project and is especially encouraged. The project will develop efficient communication and dissemination tools (e.g. a website, conferences, activities aimed at general public, summer schools etc), engaging in dialogue with relevant stakeholders (international policy makers, NGOs, etc), to contribute to the dual aims, and will ensure a long lasting impact of the project. The project should fully adhere to relevant international legislation on sustainable use and equitable sharing of biological resources[19]. The project should take stock of the related past and on-going projects and to complement them in an integrative approach.

Funding scheme: Coordination and Support Action (coordinating action).

Additional eligibility criteria:

- The requested European Union contribution shall not exceed EUR 1 000 000 per proposal.
- Minimum number of participants: 3 from different Member States or Associated countries and 3 from different ICPC from Latin America.

Additional information:

- Up to one project may be funded.
- Participants from Latin American countries in a Science and Technology agreement with the European Union will support their participants to the project. Participants from other Latin American ICPC countries could be funded by the EU. The cooperation with complementary actions should be reflected in the proposal. This will be considered in the evaluation.

Expected Impact: The topic addresses two issues with high societal relevance and of public concern: improved global efforts for biodiversity protection in agriculture, and the sustainable use of the natural biological resources, especially for the benefit of the local communities and family farmers. The project will raise public awareness on plant biodiversity preservation in agriculture and will support a structured global environment for cooperation between relevant stakeholders in this area. The effectiveness and long-term impact of the project will be ensured by including complementary European and global participation.

Area 2.3.2 Marine and fresh-water biotechnology (blue biotechnology)

The economic and scientific potentials of aquatic environments (principally marine but including freshwater also) remain insufficiently explored using the power that modern biotechnology provides. Moreover, their resources remain largely untapped by European industry. Extreme or specific environmental conditions (e.g. in temperature, pressure, salt content, pH, chemical composition) and the enormous biodiversity of these ecosystems offer multiple opportunities for bio-prospecting, exploitation and use of microbes (e.g. cyanobacteria, fungi), plants (micro- and macro-algae) and animals (e.g. fish, molluscs, sponges) and their physiological performance and genes. This can lead to novel products or sources for industrial applications (e.g. bio-processing, biomass, bio-energy, bio-materials, specialties, pharmaceuticals, and aquaculture) and beyond.

[19] such as the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits arising from their Utilization to the UN Convention on Biological Diversity.

KBBE.2013.3.2-01: Marine biotechnology ERA-NET

Call: FP7-ERANET-2013-RTD

Please note that this orientation paper does develop information on Eranet topics.

Marine and freshwater biotechnology within the potential "The Ocean of Tomorrow 2013" joint call

Please note that a separate orientation paper on "The Ocean of Tomorrow 2013" potential joint call will be tentatively published and it is therefore not developed in this orientation paper. For details on the topics, please consult the relevant document on the Participant Portal. The tentative orientation paper for "The Ocean of Tomorrow 2013" will possibly include two actions in the field of marine and freshwater biotechnology:

- **Biosensors for real time monitoring of biohazard and man made chemical contaminants in the marine environment**
- **Innovative antifouling materials for maritime applications**

KBBE.2013.3.2-02: The CO_2 algae biorefinery[20]

Call: FP7-KBBE-2013-7 – single stage

Algae represent a promising alternative to convert CO_2 (e.g. from the atmosphere of capture in industrial processes) into high added-value products and biofuels. Algae biorefineries can thus alleviate food *versus* fuel conflicts and may become particularly advantageous for regions with limited biomass availability and land unusable for agriculture.

The topic aims at developing innovative approaches to tackle the major challenges intrinsic to the development of the algae biorefineries. The proposals under this topic should focus on the production of high value-added products such as polymers, pharmaceuticals, high value oils and chemicals, bioactive compounds, colorants, etc. The potential integration with other processes (such as the production of biofuels, water treatment or carbon sequestration) and the valorisation of all products should be considered to assure the economic, environmental and social viability of the whole concept.

Strong weight will be put on industrial leadership of the projects. They should include the development of suitable algal strains and cultivation parameters. Boundaries to this aim include algal biodiversity exploration (bioprospecting, natural growing conditions), improvement of photosynthetic efficiency, customising and maximising added value products' yields and development of algae cultivation methods adapted to mass production. Design and development of different cultivation systems with innovative and efficient configurations should also be included together with sustainable downstream processes such as harvesting, dewatering, product extraction, purification, formulation as well as its integrated conversion. Projects should include demonstration activities to prove the techno-economic viability of the proposed concept. The overall sustainability approach (e.g. water and energy saving) as well as its Life Cycle Assessment should be critical elements of the project.

Funding Scheme: Collaborative Project (large-scale integrating project targeted to SMEs).

Additional eligibility criterion: The estimated EU contribution going to SMEs shall be at least 25% of the total requested EU contribution. This will be assessed at the end of the negotiation, before the signature of the Grant Agreement.

Additional information:

[20] This topic cuts across Area 2.3.2 Marine and fresh-water biotechnology (blue biotechnology) and Area 2.3.4 Biorefinery.

- This topic represents a major effort to support innovation in the European Marine and Industrial Biotechnology sectors, enhance competitiveness of the European biotechnology industries and provide a considerable effort to the European Bio-economy.
- The topic aims at financing a limited number of large collaborative projects within an overall maximum budget of EUR 20 000 000.

Expected Impact: Delivering a robust scientific and technological basis for substantiating strategic decisions for the industrial development of algae for high added-value products. The integrated production of biofuels and other bulk products such as food and feed proteins and fertilisers together with the targeted high value added products can increase the cost competitiveness of the biorefinery concept. The projects will as well strengthen the competitiveness of the European marine biotechnology industry and by reducing technical bottlenecks in this area making the whole sector more attractive to investment by the biotechnology industry.

Area 2.3.3 Industrial biotechnology: novel high added-value bio-products and bio-processes

This Area will address the development and application of industrial biotechnology for the production of high-value products such as fine and speciality chemicals, antibiotics, vitamins, detergents, etc. Industrial biotechnology enables industries to deliver novel products which cannot be produced by conventional industrial methods; in addition it will make possible replacing chemical processes by more resource efficient biotechnological methods with reduced environmental impact, thereby extending and strengthening the KBBE.
Research and development will enable among others the discovery of novel enzymes and micro-organisms with novel applications, the elucidation and optimisation of their functions, improvements in concept and design of bioreactors, such as biocatalytic process design, advancing fermentation science and engineering, and improving up- and down-stream processing where relevant.

KBBE.2013.3.3-01: Support for demonstrating the potential of biotechnological applications[21]

Call: FP7-KBBE-2013-7 – single stage

Europe stands strong in producing world-class research but lags behind its main competitors in innovation and commercial exploitation. Enhancing the patent system in Europe, facilitating technology transfer and improving access to finance could facilitate bringing scientific breakthroughs to the market place. This demonstration action will address some of these issues by providing support for bringing research results closer to market, thus enhancing the economic impact of the Biotechnology programme.
The demonstration action will introduce a real innovation focus by promoting the exploitation of results and offering seamless support to the industry and in particular SMEs. The demonstration activities will address technical and economic feasibility issues that will accelerate market introduction of the innovative bio-based goods and services.
The demonstration action is bottom up, with the specific scope of the proposal defined by the participants. Proposals should nevertheless fit within the "Life sciences, bio-technology and bio-chemistry for sustainable non-food products and processes"-Activity described in the

[21] This topic is relevant to the whole Activity 2.3.

Specific Cooperation Programme[22]. The action is primarily aimed at industrial participants who should take the lead in the demonstration phase with research, academic or other organisations providing advisory and support services in a possible supporting role. The projects need to have a clear link with the preceding research phase and help to commercialise research results. Activities can include testing of product-like prototypes, scale-up studies, performance verification and implementation of new technical and non-technical solutions. However, the demonstration projects are not meant for further research and development activities. Projects can rely on existing demonstration plants or infrastructure but should not include the construction of new ones. Proposals should also include detailed economic viability check, market studies/business plans or market strategies.

Funding scheme: Collaborative Project.

Additional information:

- This topic represents a major effort to support innovation in the Biotechnology sector, enhance competitiveness of the European biotechnology industries and provide a considerable effort to the European Bio-economy.
- The topic aims at financing a limited number of small to large collaborative projects within an overall maximum budget of EUR 20 000 000.
- The EU contribution to the project is restricted to demonstration activities, other activities and management.

Expected impact: Projects under the scheme for demonstration aim at bridging the gap between research and market, while keeping a pre-competitive nature. The concept is to prove the techno-economic viability of a new solution (itself an outcome of a successful research project) that offers a potential economic advantage, but which cannot be directly commercialised. The expected impact should be clearly described both at qualitative and quantitative level, providing an indication of the expected economic impact, e.g. on turnover, employment or target markets as well as expected patent applications or licence agreements, creation of spin-off companies, etc. Through this demonstration action, commercial companies, especially SMEs, will be able to receive seamless support for the further development of successful research results. This should help prepare and facilitate market introduction of scientific breakthroughs. This is particularly relevant in the field of biotechnology where the timelines for technology maturation can be extended. Projects ensure to respect basic ethical principles and include provisions for communication and dissemination of results.

KBBE.2013.3.3-02: Bioeconomy and bioregions[23]

Call: FP7-KBBE-2013-7 – single stage

The bioeconomy can significantly contribute to the future development of rural, coastal and industrialised regions by improving the sustainable exploitation of their natural and industrial resources, for example by creating supply chains for residues and waste as feedstock for bio-based industries, or the setting up of networks of biorefineries.

The objective of this topic is to develop region-specific bioeconomy strategies based on a socio-economic, environmental and technological assessment of the bioeconomy potential of

[22] *2006/971/EC: Council Decision of 19 December 2006 concerning the Specific Programme Cooperation implementing the Seventh Framework Programme of the European Community for research, technological development and demonstration activities (2007 to 2013).*

[23] This topic is relevant to the whole Activity 2.3.

the different regions in Europe (at sub-and supranational level in Europe). To achieve this, the project will 1) develop criteria to describe the regions in terms of their bioeconomy potential (e.g. based on geographical location, climate, predominance of bioeconomy sectors, bioclusters, job situation, existing skills, resources and technologies, etc); 2) compile a catalogue of instruments and measures (ranging from education, research and innovation to infrastructure, including advisory and support services to SMEs) that can be correlated against the criteria and will foster the development of regional bioeconomies; 3) create a catalogue of good practices and case-studies on bioeconomy that can be used as inspiration for the development of regional smart specialisation strategies; and 4) prepare regional profiles based on the developed criteria that will describe the state-of-play of the bioeconomy in the selected regions and propose instruments and measures to improve the exploitation of this potential.
The project will liaise with local, regional and national authorities and relevant stakeholders (e.g. bioclusters) to establish the regional profiles. It will create a network structure that will encourage the exchange of best practices and the creation of synergies between regions. As such, it will also contribute to the development of smart specialisation strategies of regions in accordance with the new European cohesion policy, notably by making data available in a form suitable for insertion in existing catalogues such as the European Cluster Observatory, the Regional Innovation Monitor or the Smart Specialisation Platform.
The activities of the project will take into account existing FP7 and CIP projects and other initiatives supporting the bioeconomy at regional and national level.
Funding Scheme: Coordination and Support Action (supporting action).
Additional eligibility criterion: The requested European Union contribution shall not exceed EUR 1 000 000 per proposal.
Additional information: Up to one project may be funded.
Expected impact: The project will allow regions to recognise their bioeconomy potential and assist them in formulating clear targets to promote their local bioeconomy and in creating a favourable environment to attract public and private investment. The project will contribute to implementing the objectives of several European policy initiatives, such as the Bioeconomy Strategy, rural and coastal development and regional policies.

KBBE.2013.3.3-03: Opening markets for bio-based products: Standardisation, labelling and procurement[24]

Call: FP7-KBBE-2013-7 – single stage

Bio-based products create entirely new markets or enter markets dominated by well-established petro-chemical products. Regulatory instruments like standards and labels can significantly contribute to the uptake of bio-based products in consumer markets and in public procurement. The objective of this topic is to:

- Develop standard test methods and test data for generally applicable European standards on functionalities of and standard sustainability criteria for bio-based products that are compatible with previous work on standardisation, e.g. on the determination of bio-based content (carbon and biomass), product functionalities and biodegradability. As a minimum, these standards need to be developed for biopolymers, -lubricants, -surfactants and -solvents.
- Assess the suitability of the Ecolabel criteria for bio-based products, in view of possibly creating a dedicated product group and further developing and improving the Ecolabel

[24] This topic is relevant to the whole Activity 2.3.

criteria for bio-based products in accordance with the developed standards on functionality and sustainability criteria.

- Create an initial European product information list for bio-based products that will contribute to enabling public procurement for bio-based products and promote their uptake in consumer markets

The proposal should ensure a link with the activities of the European Committee for Standardisation (CEN) concerning bio-based products and take into consideration related standardisation mandates (already issued and in process) and existing national and EU-funded projects. The proposal should explore possibilities for harmonising standards and normative measures in the EU, US, Japan, China, Brazil, and other major trading partners. The mobilisation and networking of relevant stakeholders, such as industrial organisations, public bodies, research organisations, ensures the effective dissemination and implementation of the developed standards. The usability of the product information list should be tested with target user groups, for which existing FP7 and CIP projects may be taken into account.

Funding Scheme: Collaborative Project (large-scale integrating project).

Additional eligibility criterion: The requested European Union contribution shall not exceed EUR 6 000 000 per proposal.

Additional information: Up to one project may be funded.

Expected impact: Standards will reduce barriers to trade in bio-based products and expand the market potential and the competitiveness of European bio-based industry. Labels and an information list on bio-based products provide consumers and public procurers with clear information on these products' environmental performance, encouraging sustainable choices. Furthermore, the project will contribute to realising the objectives of different relevant European policy initiatives, including the Lead Market Initiative in Bio-based Products, the Industrial Policy, the Environmental Technology Action Plan and the EU Strategy for Key Enabling Technologies and the Bioeconomy Strategy.

KBBE.2013.3.3-04: Optimal and cost-effective industrial biocatalysts[25]

Call: FP7-KBBE-2013-7 – single stage

Biocatalysis offers tangible benefits over conventional processes such as cost-efficiency, reduced use of solvents and lower energy requirement. The number of biocatalytic chemical transformations carried out at industrial scale has increased rapidly in the last decades. The full potential is far from being realised and there are high prospects to expand the range of reactions catalyzed by enzymes.

The aim of the topic is to expand the number/type of chemical transformations carried out by enzymes (isolated enzymes or whole cells) at industrial scale. The approach involves optimising enzymatic performance for a targeted reaction and in the industrial context in which it is to be applied.

Proposals should address the development of specific biocatalyst(s) that seamlessly meet the requirements of one or a limited number of targeted industrial processes. The approach could involve the recovery of novel biocatalysts (e.g. from available genomes and environmental metagenomes) and will address the development and implementation of technologies to produce biocatalysts that are suited to the rigours of the industrial environment (e.g. by use of directed evolution, computational technologies, *in silico* enzymes design, protein or cofactor

[25] This topic cuts across Area 2.3.3 Industrial Biotechnology: novel high added-value and Area 2.3.5 Environmental biotechnology.

engineering, etc). Downstream processes and methods for enzyme formulation and immobilisation are also to be developed, considering innovative reactor design and configuration.
Proposals will have a strong industry drive and include demonstration activities of the proposed concept to bridge the gap between lab and industrial scale and to prove the techno-economic viability of the targeted biotransformation. Proposals will aim to generate novel and competitive solutions, preferably with a potential application to other targeted enzymes and processes.
Funding scheme: Collaborative Project (large-scale integrating project targeted to SMEs).
Additional eligibility criterion: The estimated EU contribution going to SMEs shall be at least 25% of the total requested EU contribution. This will be assessed at the end of the negotiation, before signature of the Grant Agreement.
Additional information:
- This topic represents a major effort to support innovation in the biocatalysis sector, enhance competitiveness of the European biotechnology industries and provide a considerable contribution to the Knowledge Based Bioeconomy.
- The topic aims at financing a limited number of large collaborative projects within an overall maximum budget of EUR 20 000 000.
Expected impact: To move closer to industrial application those enzymatic biotransformations which are currently in a laboratory research phase. Enhancing the competitiveness and sustainability of the European biotech and chemical-using industry by the development of sustainable enzymatic biotransformation (e.g. with fewer steps, lower use of toxic reactants and solvents and efficient use of reagents). The project should contribute to the objectives of industrial and innovation policy, such as the EU Strategy for Key Enabling Technologies and the Lead Market Initiative on Bio-based products.

Area 2.3.4 Biorefinery

This Area addresses the development and application of industrial biotechnologies for the conversion of renewable raw materials into sustainable and cost-efficient bulk bio-products (e.g. chemicals such as lactic acid, biopolymers), and/or bio-energy. Regarding biofuels, the focus will be on the development of second generation biofuels with improved energy and environmental balance and which avoid the potential food/fuel conflict.
Aiming at achieving integrated and whole crop use of the biomass, biorefineries can use a broad range of biomass feedstocks, ranging from dedicated agricultural, aquatic, forest biomass chains to residues/waste and by-products of biomass-based industrial sectors.
Emphasis will be on the discovery, characterisation and development of novel enzymes and strains with optimised biocatalyst and microbial function for improved production of energy and bioproducts; characterisation of the structure and composition of the feedstock for optimised pre-treatment and fractionation of the biomass into its components; development of improved bio-processes with increased yield, quality and purity through bioprocess design, process optimisation and integration as well as downstream processing; fermentation science and engineering. Environmental and social aspects will also be incorporated.

KBBE.2013.3.4-01: Preventing and valorising bio-waste in biorefineries[26]

Call: FP7-KBBE-2013-7 – single stage

The envisaged broad implementation of the biorefinery concept for the production of biochemicals, biomaterials and bioenergy will generate vast streams of by-products such as hemicelluloses, lignin, tall-oil, glycerol, etc. These fractions are currently widely underexploited as the focus has been placed on primary feedstock components more accessible for conversion. The sustainability and economic viability of the biorefinery concept call for the exploitation of by-products streams and the development of closed loop systems.

The objective of this topic is to develop biotechnology approaches for the conversion of biorefinery by-products into added value bio-based products, such as chemicals and chemical building blocks, biopolymers, materials, bioactive compounds. Research could also target the development of physico-chemical technologies which are concomitant to the enzymatic/microbial processes as well as sustainable downstream steps for product separation and purification. The feasibility of integrating the approach into a selected biorefinery value chain should be assessed.

Projects will have a strong industry drive and include demonstration activities aimed at proving the techno-economic viability of the developed technologies, including a quantitative technological/economic viability analysis for up-scaling to industrial production. A life-cycle assessment should be carried out in order to evaluate the environmental, economic and social performance of the developed technologies building upon existing and on-going LCA activities in the field of bio-based products and processes.

Funding Instrument: Collaborative Project (large-scale integrating project targeted to SMEs).

Additional eligibility criterion: The estimated EU contribution going to SMEs shall be at least 25% of the total requested EU contribution. This will be assessed at the end of the negotiation, before signatures of the Grant Agreement.

Additional information:

- This topic represents a major effort to support innovation in the Biorefinery sector, enhance competitiveness of the European biotechnology industries and provide a considerable effort to the European Bio-economy.
- The topic aims at financing a limited number of large collaborative projects within an overall maximum budget of EUR 12 000 000.

Expected impact: The economic efficiency and environmental performance of existing and future biorefineries will be enhanced. The projects will create a beneficial economic impact to the bio-based products sector and underpin partnerships and synergies across biorefinery related industrial sectors. The European added value lies in increasing the effectiveness and efficiency of the value chain of bio-based products by reducing losses and generating higher value products or services. The projects will contribute to implementing the objectives of several European policy initiatives, such as the Roadmap to a Resource-Efficient Europe, the Bioeconomy strategy, the Eco-innovation initiatives of the Environmental Technologies Action Plan and the Lead Market Initiative on Bio-based products.

Area 2.3.5 Environmental biotechnology

[26] This topic cuts across Area 2.3.4 Biorefinery, Area 2.3.3 Industrial Biotechnology: novel high added value bio-products and bio-processes and Area 2.3.5 Environmental biotechnology.

The concept of the KBBE implies environmental sustainability which will be promoted through the development and application of modern biotechnology.
Research and development activities will provide solutions for sustainable processes and products as well as for preventing and cleaning-up pollution. This will comprise the application of biotechnologies for the design, manufacture and use of more environmentally benign products and processes as well as for applications such us bio-sensors, bio-remediation, waste treatment and recycling[27]**.**
In addition, this Area will also foster the application of modern biotechnology for the understanding of microbial biodiversity and ecology (e.g. bacterial cell-cell communication). This approach will expand the understanding on systematics and will lead to the unravelling of new genes, pathways etc. with the potential to enrich several of the biosynthetic domains of biotechnology. It will also serve to the purpose of cataloguing and therefore preserving microbial diversity.

KBBE.2013.3.5-01: New, fast, and reliable molecular detection methodologies
Call: FP7-KBBE-2013-7 – single stage

A number of issues require advancing the development of molecular detection methodologies for various applications, in particular related to: a) human pathogen presence and characterisation in foodstuffs, exemplified by the recent EHEC (Enterohaemorraghic Escherichia Coli) crisis; b) compliance with EU legislation on GM food/feed (e.g. novel or marker-free GMOs); and c) customs and excise duty purposes, as specified by the Group of European Customs Laboratory (tobacco and other applicable groups of products). Up to now, molecular analytical techniques have become routine diagnostic tools in a broad range of sectors, like human and animal medicine, plant protection, food/feed traceability and remain relevant, especially PCR (Polymerase chain reaction) diagnostics or related Next Generation Sequencing approaches. In addition, optimal development and application of cost-efficient DNA tools require maximal integration of methods supported through uniform minimal method performance parameters (MPP).
Proposals should aim at two major developments: firstly, to develop at least one new molecular detection method, including method validation for each of the applications mentioned under a-c) above; and secondly, to provide a scientific basis for the establishment of MPP for key molecular technologies: real-time PCR (including digital PCR, High resolution melting PCR) and Next Generation Sequencing (e.g. whole-genome sequencing, exon-sequencing, meta-genomics). Method development should be clearly justified on the basis of socio-economic and other applicable impact criteria. Proposals address in particular the demonstration of fitness of the methods for on-site application, equivalence to existing conventional standards, and potential benefits (e.g. to the food industry in terms of improved efficiency of food analysis). The MPP should be documented by benchmarking technological examples from diverse and representative sectors or be experimentally produced within the project. Particular attention should be paid to the inclusion of methodology support to decision making and to statistically documented uncertainties in the evaluation of the nature/presence of targets under suboptimal conditions (low target quality and/or quantity,

[27] Where wastes can be regarded as feedstocks for bio-processing and biorefinery they shall be dealt with in the respective Areas (2.3.3 and 2.3.4).

stressed or non-culturable cell populations). Training for stakeholders and dedicated communication activities are considered essential.
Funding scheme: Collaborative Project (small or medium-scale focused research project targeted to SMEs).
Additional eligibility criteria:
- The requested European Union contribution shall not exceed EUR 3 000 000 per proposal.
- The estimated EU contribution going to SMEs shall be at least 25% of the total requested EU contribution. This will be assessed at the end of the negotiation, before signature of the Grant Agreement.
Additional information: Up to one project may be funded.
Expected impact: The development of at least 3 new highly sensitive detection tools in total, should significantly contribute to improving quality, safety, identity and traceability of bioeconomy products. It is expected that the selected project will not only address shortcomings of current methodologies used in the areas of consumer protection, customs procedures and excise duties, but will even more contribute to accelerate the use of fast and reliable detection tools in the most cost-effective manner. The development of urgently needed guidance, applicable across a number of areas, is expected to improve overall technological competence, and facilitate development of diagnostic tools and services in the future. It should support flexibility at the analytical, at quality assurance, quality control and at enforcement levels and improve communication between and across sectors.

KBBE.2013.3.5-02: Scientific forum GMO[28]

Call: FP7-KBBE-2013-7 – single stage

This topic aims to provide a forum for scientists to provide evidence-based, relevant and objective information about plant biotechnology governance and research at EU and global level to target groups like a) EU and national policy and decision makers, b) public administrations in Member States and c) the general public. The forum should establish appropriate links with the EFSA, avoiding duplicating or undermining relevant efforts in this regard. All pertinent questions from the ongoing EU discussion of plant biotechnology should be addressed, e.g. scientific reasons for being in favour or against plant biotechnology, but also reasons for not using alternative approaches; benefits and/or potential risks of plant biotechnology, relevant experience gained in major GMO cultivating countries and expected future techno-economic developments. Important ancillary issues in this context, such as potential market dominance of global companies, loss of native landraces/biodiversity, and others should also be answered. Information gathered should be prepared to specifically address the different target groups, taking into account regional agricultural specificities and challenges to be addressed, engineered traits considered, and possible cultural differences in the EU regarding communication.
In order to ensure transparent and unbiased stock taking and communication as far as possible, proposals have to be led by a core group of public scientists. Due to the major communication efforts envisaged, experienced communication experts should be included in the consortia. Proposed consortia should embark on discussions with relevant stakeholders, such as scientists from outside the EU and candidate/associated countries, EU key media representatives and EU consumer groups. Continuous two-way interaction between scientists and target groups should be based on all available modern communication instruments and

[28] This topic is relevant to the whole Activity 2.3.

tools, including on-line and print media, conferences, workshops, bilateral/multilateral meetings and others.
Funding scheme: Coordination and Support Action (coordinating action).
Additional eligibility criteria:
- The requested European Union contribution shall not exceed EUR 1 000 000 per proposal.
- Minimum number of participants: 3 from different Member States or Associated countries and 3 from ICPC countries.
Additional information: Up to one project may be funded.
Expected impact: It is expected that proposals will address the Commission Communication on the Precautionary Principle and the Conclusions of the Environment Council of 2008 in so far as to acquire and communicate up-to-date and unbiased scientific evidence to the target groups. The selected project is expected to contribute to a) creating a better understanding of risks and benefits of products of plant biotechnology within these groups; and to b) contribute to addressing the lack of trust in the governance and decision making of plant biotechnological products in the EU. It is also expected that the project will contribute to re-establishing application of precautionary measures – if necessary - on a sound basis of proportionality, non-discrimination, consistency, and based on an examination of their potential benefits and costs.

Area 2.3.6 Emerging trends in biotechnology

Novel technologies and new trends in biotechnology will be instrumental for the rational advancement of the KBBE. Yet, not all future trends in enabling technologies and interdisciplinary research can be foreseen. However the potentials of e.g. meta-genomics, bioinformatics, systems biology, virtual cell, synthetic biology, and nano-biotechnology have become rather concrete. These and other fields deserve appropriate measures in terms of research and development to facilitate effective transfer and implementation into industrial applications.

KBBE.2013.3.6-01: Novel bioinspired materials and processes

Call: FP7-KBBE-2013-7 – single stage

The recent convergence of nanoscience and biotechnology has led to the development of entirely new class of materials, devices and technologies often nature-inspired and thus referred to as ‘bioinspired’ or ‘biomimetic’. Nanobiotechnology is an emerging field with potential applications ranging from material, chemical and pharmaceutical industry to environmental technologies, and it has only recently entered the commercial exploration period.
The proposals under this topic should exploit the progress in nanobiotechnology in order to develop innovative bioinspired materials, devices and technologies. The approaches could entail both the biomimetic materials constituted of biological building blocks, as well as those based on innovative biotechnology processing. Research undertaken should give due consideration to the tailoring of the bioinspired materials/technology functionalities for given applications as well as to the industrial need of up-scaling the production. The proposals should include under the same umbrella at least two different approaches among which biomineralization, biologically produced nanometals and bioinspired polymers could be considered. Due consideration should also be given to potential environmental and health risks from a life-cycle perspective.

Dissemination of the results and activities to users, industries, firms (SMEs in particular) and citizens leading to a better exploitation of research and raising awareness of its potential should be taken on board within the proposals.
Funding scheme: Collaborative Project (large-scale integrating project targeted to SMEs).
Additional eligibility criteria:
- The requested European Union contribution shall not exceed EUR 9 000 000 per proposal.
- The estimated EU contribution going to SMEs shall be at least 25% of the total requested EU contribution. This will be assessed at the end of the negotiation, before the signature of the Grant Agreement.
Additional information: Up to one project may be funded.
Expected impact: Research undertaken under this topic should contribute through step changes and solutions in nanobiotechnology. It is expected that they pave the way for future applications and markets thus strengthening competitiveness of European industry and SMEs. The projects should target one or several sectors (e.g. chemicals, pharmaceutical, environment, sensor technology) directly related to this high value added and fast growing field.

KBBE.2013.3.6-02: Synthetic Biology towards applications[29]

Call: FP7-KBBE-2013-7 – single stage

The combination of engineering and biology that typifies the synthetic biology, makes it a multidisciplinary field of endeavour. Due its nature and multidisciplinary feature synthetic biology, in synergy with systems biology and metabolic engineering, has significant potential to influence, and transform a range of areas of our economy and society. Lately, its techniques matured and started to move from the bench to commercial applications. Thus, the projects under this topic should be industry driven, aiming on innovative approaches for different applications - industrial, health, environmental, energy, etc. Key challenges to be considered are the engineering of minimal cells, *de novo* design of robust and sustainable biomolecular circuits, orthogonal modules, synthetic pathways, new microorganisms and more robust metabolisms.
The development of synthetic biology brings with it a number of intellectual property issues, safety, ethical, societal and environmental implications. These are crucially important aspects that need to be identified and addressed by any proposal. Applicants should adhere to the Opinion No 25 of the European Group on Ethics in Science and New Technologies to the European Commission "Ethics of Synthetic Biology".
Funding Scheme: Collaborative Project (large-scale integrating project targeted to SMEs).
Additional eligibility criterion: The estimated EU contribution going to SMEs shall be at least 15% of the total requested EU contribution. This will be assessed at the end of the negotiation, before the signature of the Grant Agreement.
Additional information:
- This topic represents a major effort to support innovation in the European Synthetic Biology sector, enhance competitiveness of the European biotechnology industries and provide a considerable effort to the European Bio-economy.
- The topic aims at financing a limited number of large collaborative projects within an overall maximum budget of EUR 20 000 000.

[29] This topic cuts across Area 2.3.6 Emerging trends in biotechnology and Area 2.3.3 Industrial Biotechnology: novel high added-value bio-products and bio-processes.

Expected impact: The projects are expected to advance the research in the filed of synthetic biology and to generate innovative tools and methods for biotechnology applications. The use of synthetic biology (also in combination with systems biology and metabolic engineering) for the development of engineered biological systems for a given application is expected to result in accelerated process design and reduced time-to-market. Furthermore, it is expected to result in scientific breakthroughs, which would increase the industrial competitiveness and would create new economic opportunities. The project results should be of interest and benefit to SMEs. A strong participation of SMEs and other representatives of the industry in the project itself should help contribute to the realisation of that benefit.