

Mogelijkheden voor BODEM onderzoek binnen Horizon 2020

Hieronder volgt een overzicht van mogelijk interessante topics voor bodem onderzoek binnen het Horizon 2020 programma (2014-2015). Dit sluit niet uit dat er nog meer interessante topics zijn binnen het Horizon 2020 programma. De complete werkprogramma's zijn te vinden op de website van de Europese Commissie: http://ec.europa.eu/research/horizon2020/index_en.cfm?pg=h2020-documents. Op 11 december worden de calls gepubliceerd en tot die tijd kunnen er nog veranderingen plaatsvinden. Meer informatie over Horizon 2020 is te vinden op www.agentschapnl.nl/Horizon2020.

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SC 2: Food security, sustainable agriculture and forestry, marine and maritime and inland water research and the bioeconomy

SFS-2-2014/2015: Sustainable crop production

Specific challenge: European crop production is facing more and more difficulties in remaining competitive in the global market for many reasons. Some of these reasons are the loss of soil fertility and the consequent massive use of expensive external nutrient inputs, notably Nitrogen and Phosphorous, for which European agriculture is almost totally dependent on imported products, or on fertilizers produced with expensive industrial processes, which generates greenhouse gases (GHGs). Therefore, more sustainable crop management strategies are needed to maintain or increase soil fertility. Inappropriate soil and water management and the overuse of external inputs in intensive crop production systems, represent an economic loss for the farmer and a significant burden for the environment and subsequent impact on human health, as they contribute significantly to ground water and surface water pollution, GHGs emissions, the build-up in soil contaminants, such as heavy metals and organic pollutants. Better soil management and optimisation of fertilisers and water are of paramount importance for conciliating the necessary competitiveness and the long-term sustainability of the entire intensive crop production sector in Europe.

Scope: Proposals should address one of the following issues (A) and (B), and should clearly indicate to which one they refer.

A. [2014] External nutrient inputs

Proposals should find innovative and effective strategies to improve the management of external nutrient inputs and water, and optimise their use efficiency at farm level to improve both yield and quality. Novel approaches could include integration of precision farming latest tools and techniques, such as advanced automation, variable rate applications, remote sensing, field and crop sensors, ICT technologies, to achieve a comprehensive strategy for optimising external nutrient inputs and water management in European intensive agriculture and provide significant progress beyond the current state of the art. Novel technologies and approaches should allow reaching improved sustainability in different intensive crop production systems, decreasing negative impacts on the environment and providing better product quality and benefits to human health. In-field demonstration of the proposed technologies on a relevant scale to prove concept feasibility should also be foreseen. Proposals should fall under the concept of 'multi-actor approach'.

B. [2015] Assessing soil-improving cropping systems

Proposals should assess real benefits that soil-improving cropping systems and agronomic techniques, e.g. precision farming, crop rotations, Conservation agriculture, can bring to European agriculture, as well as to identify and minimise limitations and drawbacks. Benefits may include a more rational use of natural resources, reduced energy needs, decreased GHG and other toxic gas

emissions, soil fertility conservation, above and below ground biodiversity conservation and increased productivity. Limitations and drawbacks may include increased weeds, soil pathogens and problems with certain types of crops in relation to climatic conditions. Scientifically supported and field tested evidences of the mentioned beneficial effects of minimally disturbed soil, and no till or low tillage strategies, as well as of drawbacks and methods to minimise them, are needed to promote the adoption of soil-improving systems and techniques by European farmers. Considering the different pedo-climatic conditions and the varieties of cropping systems in Europe, the development of tailor-made soil-improving strategies, techniques and machinery suitable to different farming areas and adapted to different crops and crop systems, should help to overcome the current barriers that prevent their adoption by European farmers.

Proposals should fall under the concept of 'multi-actor approach'.

The Commission considers that proposals requesting a contribution from the EU in the range of EUR 8 million for (A) and EUR 9 million for (B) would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: Proposals should show how some, or all, of the following impacts will be achieved:

- Improvement of ground and surface water quality.
- Reduction of soil contaminations with toxic compounds and heavy metals.
- Conservation of biodiversity and wildlife.
- Improved human health, through the reduced release of pollutants and GHGs.
- Scientific support to relevant EU policies¹⁹
- Sound scientific evaluation of benefits and drawbacks of soil-improving cropping systems and techniques.
- Reduction of soil erosion and improvement of soil quality and structure
- Increased European farmers' competitiveness through the reduction of production costs.
- Reduction of the negative environmental impact of crop production through less soil disturbance, better exploitation of soil biodiversity and functions and more rational use of external inputs, water and natural resource base.

Type of action: Research and innovation actions

SFS-4-2014: Soil quality and function

Specific challenge: Agricultural soils provide the basis for crop and animal production and in turn are impacted by the different types of land use, water quality, management practices, choice of crops, cultivars and genotypes. Effects include not only changes to chemical and physical soil properties but also to the composition of the soil biological community and plant-soil-microbial interactions. Understanding this complex and fragile interplay is crucial for developing on-farm soil management

and conservation practices to increase agricultural productivity whilst avoiding degradation of this virtually non-renewable resource in environmentally sustainable ways.

Scope: Proposals should provide a comprehensive analysis of the various types of agricultural land use in Europe along with the effects of agricultural land use and management on soil properties and soil functioning. They should further propose ways by which the 'soil environmental footprint' of different cropping systems and management interventions can be established. Proposals should test new approaches to on-farm management that enhance key soil attributes for crop productivity and yield stability taking into account below and above ground aspects. Work should take into account various types of crop and livestock farming systems and pedo-climatic zones across the EU. In line with the objectives of the EU strategy for international cooperation in research and innovation and in particular with the implementation of the EU-China dialogue, proposals are encouraged to include third country participants, especially those established in China²⁵. Proposals should fall under the concept of 'multi-actor approach'²⁶ and allow for adequate involvement of the farming sector in proposed activities.

The Commission considers that proposals requesting a contribution from the EU in the range of EUR 3–5 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact:

- Improved capacity and methods to assess soil-management interactions and their impact on soil functions
- widely accessible and cost efficient tools to monitor the 'health status' of agricultural soils by practitioners in the agricultural sector
- increases in crop productivity, quality, and yield stability in conventional and organic farming systems through improved practices for soil husbandry including crop rotations
- enhanced climate and environmental performance of agricultural activities (e.g. through reduced adverse impacts on agricultural soils)
- support to CAP environmental objectives and development of further policies in the area.

Type of action: Research and innovation actions

SFS-5-2015: Strategies for crop productivity, stability and quality

Specific Challenge: Crop productivity is determined by genetic variability and the complex interactions of the genotype (G) with its environment (E) in the context of specific management interventions (M). Understanding and capturing the dynamic of these above and below ground interactions in breeding programmes and farm management is considered as critical to address concerns over stagnating yields and yield gaps, building resilience to biotic and abiotic threats and further progress in crop improvement.

Scope: Proposals should propose smart approaches and tools to improve identification, prediction and introduction of useful genetic variation in crops, as well as favourable combinations of genotypes and management practices in a range of environments. They should tackle crop improvement in a holistic manner, and seek for novel breeding targets to improve yield, yield stability, quality, biotic/abiotic stress tolerance/resistance and environmental benefits. Activities and results should feed into breeding programmes as well as help diversifying and optimising crop management at different stages of plant development. In line with the objectives of the EU strategy for international cooperation in research and innovation, proposals are encouraged to include participants established in third countries²⁷. Proposals should fall under the concept of 'multi-actor approach'²⁸ and allow for adequate involvement of the farming sector in proposed activities. This action allows for the provision of financial support to third parties in line with conditions set out in Part K of the General Annexes. The Commission considers that proposals requesting a contribution from the EU in the range of EUR 3–5 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected impact:

- Increased knowledge on complex plant-environment interactions and suitable combinations of genotypes and management practices
- Continuous dynamic breeding sector through the development of novel breeding strategies and tools
- Increased productivity and stability of the agricultural sector through improved varieties and crop management strategies which allow for increased diversity and show higher adaptability to particular environments including under a changing climate

Type of action: Research and innovation actions

SFS-7-2014/2015: Genetic resources and agricultural diversity for food security, productivity and resilience

Specific challenge: Genetic diversity in agriculture and forestry - both within and between species - is commonly recognised as a pre-requisite to ensure food security, productivity as well as resilience of crops, forests and animals vis-à-vis biotic and abiotic threats in changing environments. Widening the genetic basis of crops, forest trees and animals as well as diversifying production is therefore essential. This requires coordinated efforts to enhance conservation, access and use of a wide range of genetic resources conserved in ex-situ and in-situ/on-farm conditions. Local livestock breeds, forest plants and crops are a particularly important source of genetic variation as they are associated with a number of favourable characters such as robustness, adaptation to local – often marginal – conditions or organoleptic and health attributes. They also provide the basis for products with a regional identity for which there is increased consumer interest. Despite these benefits their use has been decreasing partly because of lower productivity as compared to modern, high yielding and more uniform breeds

and varieties. The improvement of local breeds and crops provides opportunities for diversification in agriculture along with new openings for regional, high quality products and for economic development.

Scope: Proposals should address one of the following issues (A) or (B), and should clearly indicate to which one they refer.

A. [2014] Traditional resources for agricultural diversity and the food chain

Proposals should enhance description and evaluation as well as management and performance of local varieties and breeds along with their respective farming and (seed) production systems.

Measures deployed should potentially span from research to demonstration and dissemination as well as development of (environmentally and economically) sustainable production schemes. Proposals should have a relevant socio-economic dimension, tap into knowledge from the formal and informal sectors, encourage the creation of networks within and between regions and address the value chain for regional high quality products. Overall, activities should capture more systematically the value of diverse and so far untapped genetic resources and encourage their broader use in breeding activities, in farming and in the food chain. Proposals should address either livestock or crop genetic resources (including from forest trees as relevant in farming activities). Proposals should fall under the concept of 'multi-actor approach'³⁰ and allow for adequate involvement of the farming sector in proposed activities.

B. [2015] Management and sustainable use of genetic resources

Proposals should implement comprehensive actions to improve the status and use of (in particular European) ex-situ and in-situ genetic collections. More specifically, they should support acquisition, conservation, characterisation/evaluation and especially the use of specific genetic resources in breeding, farming and forestry activities. Furthermore, proposals should undertake broader dissemination and awareness raising activities. In doing so, they should closely liaise with relevant on-going initiatives e.g. seeking to harmonise, rationalise and improve management of existing collections and databases³¹. In line with the objectives of the EU strategy for international cooperation in research and innovation, proposals are encouraged to include participants established in third countries³². This action allows for the provision of financial support to third parties in line with conditions set out in Part K of the General Annexes. Proposals should address crop, forest and/or livestock genetic resources.

The Commission considers that proposals requesting a contribution from the EU in the range of EUR 3–4 million for (A) and EUR 5–7 million for (B) would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected impact: Proposals should show how some, or all, of the following impacts will be achieved:

- improved in-situ/on-farm management and evaluation of genetic resources by the farming sector
- productivity and economic gains in specialised farming systems from the conventional and organic sectors

- promotion of traditional and/or underutilised crops (and their wild relatives as relevant) and breeds
- increased availability of diverse, high quality products, e.g. with enhanced health benefits for consumers
- economic benefits for farmers, other types of SMEs and regional economies through the expansion or creation of new products and markets
- broader adaption of livestock and cultivated plants (crops, forest trees for agriculture/agro-forestry) to limiting or changing agro-climatic conditions, e.g. by enhancing robustness through the use of adaptive traits from landraces and local breeds
- enhanced quality and scope of European ex-situ collections and in-situ collections/on-farm management
- enhanced methodologies for management, conservation, characterisation and evaluation of genetic resources
- increased transfer of genetic material into breeding programmes, farming or forest practices, i.e. identification of useful traits (variation) in collections
- increased awareness on the value of genetic resources, engagement of end-users and contribution to implementation of international commitments in the area (e.g. International Treaty on Plant Genetic Resources for Food and Agriculture, ITPGRFA)
- more extensive use of genetic resources in agriculture and forestry
- overall contribution to food security by supporting innovations in breeding and farming

Type of action: Research and innovation actions

SFS-8-2014/2015: Resource-efficient eco-innovative food production and processing

Specific Challenge: To remain competitive, limit environmental degradation and optimise the efficient use of resources, the development of more resource-efficient and sustainable food production and processing, throughout the food system, at all scales of business, in a competitive and innovative way is required. Current food production and processing systems, especially in the SME sector, need to be revised and optimised with the aim of achieving a significant reduction in water and energy use, greenhouse gas emissions and waste generation, while at the same time improving the efficiency in the use of raw materials, increasing climate resilience and ensuring or improving shelf life, food safety and quality. New competitive eco-innovative processes should be developed, within the framework of a transition towards a more resource-efficient, sustainable circular economy.

Scope: The SME instrument consists of three separate phases and a coaching and mentoring service for beneficiaries. Participants can apply to phase 1 with a view to applying to phase 2 at a later date, or directly to phase 2.

In phase 1, a feasibility study shall be developed verifying the technological/practical as well as economic viability of an innovation idea/concept with considerable novelty to the industry sector in which it is presented (new products, processes, design, services and technologies or new market applications of existing technologies). The activities could, for example, comprise risk assessment, market study, user involvement, Intellectual Property (IP) management, innovation strategy development, partner search, feasibility of concept and the like to establish a solid high-potential innovation project aligned to the enterprise strategy and with a European dimension. Bottlenecks in the ability to increase profitability of the enterprise through innovation shall be detected and analysed during phase 1 and addressed during phase 2 to increase the return in investment in innovation activities. The proposal should contain an initial business plan based on the proposed idea/concept. The proposal should give the specifications of the elaborated business plan, which is to be the outcome of the project and the criteria for success.

Funding will be provided in the form of a lump sum of EUR 50,000. Projects should last around 6 months.

In phase 2, innovation projects will be supported that address the specific challenge of Sustainable Food Security and that demonstrate high potential in terms of company competitiveness and growth underpinned by a strategic business plan. Activities should focus on innovation activities such as demonstration, testing, prototyping, piloting, scaling-up, miniaturisation, design, market replication and the like aiming to bring an innovation idea (product, process, service etc.) to industrial readiness and maturity for market introduction, but may also include some research. For technological innovation a Technology Readiness Levels of 6 or above (or similar for non-technological innovations) are envisaged; please see part G of the General Annexes.

Proposals shall be based on an elaborated business plan either developed through phase 1 or another means. Particular attention must be paid to IP protection and ownership; applicants will have to present convincing measures to ensure the possibility of commercial exploitation ('freedom to operate').

Proposals shall contain a specification for the outcome of the project, including a first commercialisation plan, and criteria for success.

The Commission considers that proposals requesting a contribution from the EU of between EUR 0.5 and 2.5 million would allow phase 2 to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts. Projects should last between 12 and 24 months.

In addition, **in phase 3**, SMEs can benefit from indirect support measures and services as well as access to the financial facilities supported under Access to Risk Finance of this work programme. Successful beneficiaries will be offered coaching and mentoring support during phase 1 and phase 2. This service will be accessible via the Enterprise Europe Network and delivered by a dedicated coach through consultation and signposting to the beneficiaries. The coaches will be recruited from a central database managed by the Commission and have all fulfilled stringent criteria with regards to business experience and competencies. Throughout the three phases of the instrument, the Network will complement the coaching support by providing access to its innovation and internationalisation service

offering. This could include, for example, depending on the need of the SME, support in identifying growth potential, developing a growth plan and maximising it through internationalisation; strengthening the leadership and management skills of individuals in the senior management team and developing in-house coaching capacity; developing a marketing strategy or raising external finance.

Expected impact:

- Enhancing profitability and growth performance of SMEs by combining and transferring new and existing knowledge into innovative, disruptive and competitive solutions seizing European and global business opportunities.
- Market uptake and distribution of innovations tackling the specific challenge of Sustainable Food Security in a sustainable way.
- Increase of private investment in innovation, notably leverage of private co-investor and/or follow-up investments.
- The expected impact should be clearly described in qualitative and quantitative terms (e.g. on turnover, employment, market seize, IP management, sales, return on investment and profit).

Type of action: SME Instrument (70%)

BG-7-2015: Response capacities to oil spills and marine pollutions

Specific challenge: The development of deep sea resources exploitation (particularly offshore Oil and Gas) is moving maritime operations to extreme pressure and low temperature conditions, with many unknown factors and limited response capacity.

As shown by the Gulf of Mexico accident in 2010, besides the lack of appropriate means to deal with a large scale pollution event at high depth/pressure, it is particularly challenging:

- to predict and measure the evolution of the pollution (e.g. oil spill, chemical pollution), in order to balance efficiency of the response with its environmental impact.;
- to design an appropriate response combining the right mix of interventions (e.g. mechanical collection, burning oil on surface, use of dispersants, bioremediation, natural dispersion or transformation of spilled oil...).

Given these challenges and to reinforce national capacities, the mandate of the European Maritime Safety Agency (EMSA) was extended to provide assistance to EU Member States to respond to pollution from oil and gas installations (besides pollution from ships).

There is a need to develop the capacity for rapid response to unanticipated and episodic marine pollution events in different types of oceanic conditions, including in closed basins and open seas, by advancing scientific and technological knowledge.

Scope: Proposals should aim at developing an integrated operational response capacity to major offshore and/or coastal pollution events (particularly oil & gas), including in extreme oceanic

conditions. The integrated approach should combine oceanographic prediction of the pollution behaviour, understanding of the pollution impact including the role of marine microbial communities, use of physical, chemical and biological remediation and its impact on ecosystems, the use of specialised vessels and underwater (autonomous) vehicles. Proposals should improve the European operational response capacity to such events, with in particular integrated models and tools that can be tested for a better preparedness and support decision making in the management of such events. They should also cover, as appropriate, recommendations for infrastructure works to help protect sensitive ecosystems in high risk areas.

In line with the objectives of the EU strategy for international cooperation in research and innovation (COM (2012) 497), proposals should benefit from the inclusion of partners established in third countries, in particular the US and Canada⁵⁵, given the high potential for knowledge sharing in this field.

The Commission considers that proposals requesting a contribution from the EU in the range of EUR 4–6 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected impact:

- Develop an integrated capacity to optimally respond to major marine pollution events (particularly oil & gas) combining oceanographic modelling of pollution behaviour, physical, chemical and biological mitigation as well as infrastructures;
- Mitigate negative impacts of marine pollution on the marine environment, coastal economies and communities;
- Improve the integration between the scientific community and relevant government agencies charged with dealing with pollution, including cross-border and trans-boundary co-operation;
- Reduce risks of the new offshore economy and improve the business environment for Blue Growth investments;
- Contribute to the implementation of the Directive 2013/30/EU on safety of offshore oil and gas prospection, exploration and production activities and to the Offshore Protocol of the Barcelona Convention in the Mediterranean;
- Contribute to the effectiveness of EMSA's operational capacity to respond to pollution from oil and gas installations
- Improve societal acceptance of offshore activities.
- Increase competitiveness of European industry including SMEs within the marine industrial sector

Type of action: Research and innovation actions

SC3: Secure, clean and efficient energy

EE 7 – 2014/2015: Enhancing the capacity of public authorities to plan and implement sustainable energy policies and measures

Specific challenge: Public authorities play a key role in the reduction of EU energy consumption and the increase of renewable energy capacity. For instance Member States must produce and implement National Energy Efficiency Action Plans (NEEAPs) and National Renewable Energy Action Plans. They also have the obligation to produce detailed action plans in specific sectors such as the renovation of buildings or the application of high efficiency cogeneration and efficient district heating and cooling systems. Local and regional authorities are also developing plans at their own level and other public authorities play an important role too; national energy regulatory authorities for instance should provide incentives for grid operators (heat, cold, and electricity) to enable network users to produce renewable energies and implement energy efficiency measures. Doing this requires multidisciplinary skills to e.g. assess different cross-sector sustainable energy options, according to technical, environmental, economic and social criteria. It also requires skills to engage stakeholders in both the definition and implementation of the solutions, and to secure funding. The situation regarding the availability of these skills varies from country to country; e.g. while certain public authorities have a long tradition of using energy performance contracting, others have not tried yet; or while a few Member States oblige large cities to develop urban mobility plans, such plans are not common practice in other countries.

Scope: Proposals empowering public authorities to develop, finance and implement ambitious sustainable energy policies and plans (for instance under the Covenant of Mayors initiative), on the basis of reliable data and analyses. Public actors should be encouraged to look at sectors with high energy saving potential such as buildings, industry and urban mobility. The geographical coverage should be well justified on the basis of European added-value. Capacity building should be an integral part of project proposals.

The following actions are part of the scope:

- Raising the capacity of Member States to fulfil their obligation under the new Energy Efficiency Directive.
- Enabling national energy regulatory authorities to address demand issues (e.g. demand response, tariff design, assessment of generation adequacy assessment).
- Capacity building on integrated energy, transport mobility and land-use planning at community and city-level.
- Supporting public authorities in better linking up local, regional and national levels for delivering integrated sustainable energy action planning and projects to achieve synergies and economies of scale.
- Establishing new or exploiting existing networks and other mechanisms to spread knowledge and facilitating the exchange of experiences and best practice on sustainable energy.

- Large-scale capacity building on innovative financing to specific groups of public authorities, such as national, local and regional authorities, energy agencies, structural and cohesion funds managing authorities.
- Defining and implementing standard energy saving packages for households, public sector and industry in particular under Article 7 of the Energy Efficiency Directive.

The Commission considers that proposals requesting a contribution from the EU of between EUR 1.5 and 2 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected impact: Impacts must be measured in terms of number of public officers influenced and number of new or improved policies and plans. The number of final consumers impacted should also be measured in millions of people. In addition, proposals targeting governments should also demonstrate that they accelerate the implementation of the new Energy Efficiency Directive.

Type of action: Coordination and Support Actions

LCE 2 – 2014/2015: Developing the next generation technologies of renewable electricity and heating/cooling

Specific challenge: Complementing the global challenges outlined above, the following technology-specific challenges have to be addressed in 2014:

f. Deep geothermal energy: Development of new drilling technologies and concepts for geothermal energy – New drilling technologies and concepts are necessary to increase the number of economically viable geothermal resources, including in hard rock and high temperature/pressure conditions, and have a demonstrably smaller environmental footprint by comparison to existing drilling methodologies. Cross-fertilisation with hydrothermal oil and gas technologies and operations shall be explored.

g. Renewable Heating and Cooling:

- i. Solar cooling systems – Solar cooling systems reliability remains uncertain causing high installation and operation costs and hampering acceptance. Innovative solutions are needed to reduce the complexity of the installation, to improve components performance and reliability, and to ensure cost reductions.
- ii. Improving efficiency of biomass heating and CHP systems while widening the feedstock base – Micro and small-scale CHP (0.5-250 kW and 0.25-1 MW input power respectively) have a high potential for heat and electricity production for decentralized applications. Cost effective, robust and environmentally friendly micro and small-scale CHP with high thermal and electrical efficiency need to be developed allowing the use of solid, liquid or gaseous sustainable biomass feedstock.

For 2015, the following technology-specific challenges have to be addressed:

f. Deep geothermal energy: *Development of new technologies and concepts for geothermal energy -*

New technologies and concepts for geothermal energy are necessary to increase the number of economically viable geothermal resources, including in hard rock and high temperature/pressure conditions, and to have a demonstrably smaller environmental footprint to existing technologies. Crossfertilisation with hydrothermal oil and gas technologies and operations shall be explored.

g. Renewable Heating and Cooling:

i. *Solar heating for industrial processes*– The potential benefit of using solar heat above 200°C in industrial processes has been already acknowledged. Innovative concepts, processes and technologies for these applications are needed which can be easily integrated into existing industrial plants and processes.

ii. *Improving efficiency of low emission biomass heating and CHP systems while widening the feedstock base* – Current residential-scale boilers can combust only one type of feedstock (e.g. wood chips, wood pellets). New flexible and robust residential-scale low emission boilers for heat applications need to be developed using a wider range of sustainable feedstock (including mixtures) with high ash content such as agricultural and forest residues, upgraded solid or liquid bioenergy carriers with higher energy density and industrial byproducts.

Scope: Proposals should address one or more of the technology-specific challenges described above, including between renewables areas, where new, innovative ideas are welcome. They should bring technology solutions to a higher TRL, from TRL 3-4 to 4-5 (please see part G of the General Annexes).

Technical issues, synergies between technologies, regional approaches, socio-economic and environmental aspects from a life-cycle perspective (including public acceptance, business cases, pre-normative and legal issues, pollution and recycling) need to be appropriately addressed where relevant.

Environment, health and safety issues shall be considered in all developments and appropriately addressed.

An important element for the entire area of renewables will be the need for an increased understanding of risks in each area (whether technological, in business processes, for particular business cases, or otherwise), risk ownership, and possible risk mitigation. Proposals shall therefore include appropriate work packages on this matter.

Proposals shall explicitly address performance and cost targets together with relevant key performance indicators, expected impacts, as well as provide for development of explicit exploitation plans. Proposals should also indicate the current Manufacturing Readiness Level (MRL, see Annex to this work programme) and the activities needed to keep the MRL aligned with the advances in the TRL that will be undertaken in the proposal to ensure the potential for exploitation.

The Commission considers that proposals requesting a contribution from the EU of between EUR 3 to 6 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Technological innovation related to the integration of renewable generation in the industrial and residential sectors can be addressed in the Energy Efficiency call or Smart Cities and Communities call. Improving the energy efficiency of district heating and cooling networks is addressed in the Energy Efficiency call.

Expected impact: The proposals are expected to have one or more of the general impacts listed below:

- Significantly increased technology performance.
- Reducing life-cycle environmental impact.
- Improving EU energy security.
- Making variable renewable electricity generation more predictable and grid friendly, thereby allowing larger amounts of variable output renewable sources in the grid.
- Increasing the attractiveness of renewable heating and cooling technologies by improving cost-competitiveness, reducing complexity and increasing reliability.
- Bringing cohesion, coherence and strategy in the development of new renewable energy technologies.
- Nurturing the development of the industrial capacity to produce components and systems and opening of new opportunities.
- Strengthening the European industrial technology base, thereby creating growth and jobs in Europe.
- Reducing renewable energy technologies installation time and costs.
- Increasing the reliability and lifetime while decreasing operation and maintenance costs.
- Contributing to solving the global climate and energy challenges.

Type of action: Research & Innovation Actions

LCE 11 – 2014/2015: Developing next generation technologies for biofuels and sustainable alternative fuels

Specific challenge: Europe has limited biomass and land resources to cope with an increased demand for fuels and other uses. Thus, in the long-term perspective, new technologies of sustainable biofuels and alternative fuels need to be developed that radically improve the state-of-art, notably in regards to the following sub-challenges:

- a) Improving conversion efficiency, enlargement of the biomass feedstock basis.
- b) Developing alternative fuels through use of new, renewable and sustainable resources from non-biomass non-fossil sources.
- c) Improving the economic, environmental and social benefits, notably regarding cost reduction, minimisation of demand on natural resources (land and water in particular), enhanced energy balance, GHG reductions and development of rural areas.

Scope: Proposals focusing on the long-term perspective should aim at developing the next wave of alternative and sustainable fuels by moving technologies from TRL 3-4 or to TRL 4- 5 (please see part G of the General Annexes). In each case, they should address the c) subchallenge described above. Environment, health and safety issues, regional and social dimension, shall be considered in all developments and appropriately addressed.

An important element will be an increased understanding of risks (whether technological, in business processes, for particular business cases, or otherwise in each area), risk ownership, and possible risk mitigation. Proposals shall therefore include appropriate work packages on this matter.

Proposals shall explicitly address performance and cost targets together with relevant performance indicators, expected impacts, as well as provide explicit exploitation plans. Proposals should also indicate the current Manufacturing Readiness Level (MRL, see Annex to this work programme) and the activities needed to keep the MRL aligned with the advances in the TRL that will be undertaken in the proposal to ensure the potential for exploitation.

Opening the project's test sites and pilot facilities, or research infrastructures for practice oriented education, training or knowledge exchange is encouraged.

The Commission considers that proposals requesting a contribution from the EU of between EUR 3 to 6 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected impact: The new developed technology pathways should permit the use of new feedstock sources that do not compete directly or indirectly with food or feed production for resources, or a more efficient conversion of the current ones. A favourable energy balance is expected, as well as a significant cost reduction, which would permit these fuels to eventually compete favourably with fossil or older-generation equivalent fuels. The development of new technologies will permit robust and reliable assessment of the environmental and social benefits with respect to current technologies, notably in terms of GHG performance, energy balance, efficient use of natural resources, decentralised energy production, and job creation in rural areas, as well as secure and affordable energy supply in Europe or worldwide.

Type of action: Research & Innovation Actions

LCE 13 – 2015: Partnering with Brazil on advanced biofuels

This topic is subject to completion of an agreement with the Brazilian government and thus the text may still change.

Specific challenge: Decarbonising the transport sector is a major challenge in the global fight against climate change. As such, it is a crucial element in the EU Energy Roadmap 2050 and [to be completed with reference to Brazilian regulations / policy initiatives].

In the short-term and medium-term perspective, biofuels are expected to be the main contributors to this de-carbonisation. In order to achieve the EU [and Brazil] policy targets in this domain, and to

address concerns regarding indirect and direct environmental impacts of biofuels, new and advanced biofuels using sustainable feedstock need to be further supported to reach the market.

Brazil is an essential partner in this sector: it has outstanding expertise, a well-established and highly competitive first-generation industry, as well as optimal conditions for the development of an advanced biofuel industry.

Hence in the framework of the EU-Brazil S&T Cooperation Agreement, the European Commission representing the European Union (EC) and the Ministry of Science and Technology (MCT) of the Government of Brazil are working together to benefit from the complementarities in research and innovation, in order to foster the development of advanced biofuels and accelerate their commercialisation both in Brazil and in Europe.

Scope: The proposals should address:

- Exploiting synergies between Brazil and Europe in terms of scientific expertise, industrial capacity and resources.
- Proving that advanced biofuels technologies are technically and environmentally feasible, cost competitive and environmentally and socio-economically sustainable at commercial scale.
- Developing or improving logistic systems for a sound and sustainable feedstock supply.

Proposals should address the first bullet point mentioned above, and at least one of the other two.

They should bring technology solutions to a higher TRL level.

Proposals should aim at moving technologies that reached already TRL 5-6 to TRL 6-7 (please see part G of the General Annexes) through industrial demonstration projects, which may include supporting R&D activities if needed.

All proposals have to include a work package on 'the business case' of the technology solution being addressed. That work package has to demonstrate the business case of the technology and identify potential issues of public acceptance, market and regulatory barriers, including standardisation needs. It should also address, where appropriate, synergies between new and existing technologies, regional approaches and other socio-economic and environmental aspects from a life-cycle perspective.

The Commission considers that proposals requesting a contribution from the EU of between EUR 5 to 10 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected impact: Testing advanced biofuel technologies at pre-commercial industrial scale reduces the technological risks, paving the way for a subsequent market replication. For this purpose, the scale of the projects should permit obtaining the data and experience required so that a first market replication can be envisaged as a next step. The industrial concepts demonstrated should have the potential for a significant social and economic impact, notably in terms of job opportunities and wealth creation in rural areas of Brazil or Europe. Clear environmental benefits should also be obtained. Proposals should appropriately exploit the complementarities between the EU and Brazil, and pave the way for significant enhancement in the cooperation between key researchers, institutions and industries that are active in biofuel research and innovation in the EU and Brazil.

Type of action: Innovation Actions

LCE 14 – 2014/2015: Market uptake of existing and emerging sustainable bioenergy

Specific challenge: Actions are still needed to foster the development of the bioenergy sector and to ensure its sustainability (Renewable Energy Progress Report [COM(2013)175]). One way to do it is to use more and sustainable bioenergy. However, the EU needs to expand the supply of bioenergy produced in the EU, by transforming the EU farmers and foresters to producers of food, feed, bio-based products, energy and energy carriers.

In the short- and medium-term perspective, sustainable bioenergy in all its forms is expected to be the main contributor to this de-carbonisation. In order to achieve the EU targets set out in the RES and Fuel Quality Directives, and to address concerns regarding indirect and direct environmental impacts, sustainable bioenergy technologies (both existing and emerging) need to further penetrate the market.

Scope: Proposals should address one or several of the following bullet points using technologies and systems which are already at TRL 7-9 (please see part G of the General Annexes):

- Setting up or strengthening sustainable local bioenergy supply chains that meet highest environmental criteria and quality standards, including consideration for indirect impacts and energy balances;
- Ensuring development and / or implementation of quality and sustainability standards for bioenergy in all its forms;
- Creating a market for sustainable intermediate bioenergy carriers to enable better technology competitiveness through economies of scale;
- Encouraging European farmers and foresters to produce non-food bioenergy or bioenergy carriers alongside food, feed and other products.
- Development of methodologies for the traceability of biomass feedstocks from which bioenergy is produced (e.g. to distinguish first-generation from advanced biofuels);
- Removing non-technical barriers to widespread production and use of biogas/biomethane as one of the most sustainable fuels available today for use in transport and for incorporation into the grid;
- Ensuring sustained public acceptance of sustainable advanced biofuels;
- Exchange of information on best practices for bioenergy policy, regulations and support schemes to allow the most sustainable and energy efficient use of bioresources.
- Cooperation between different policy areas at national / regional level (e.g. energy, agriculture, environment, waste, transport, etc.) needs to be increased to optimise the regulatory framework and implementing measures for the bioeconomy through exchange of information and best practices;
- All Member States must possess the necessary capacity to enact the EU legislation, while the businesses must make full use of the opportunities that these new markets create for

them. Therefore specific capacity building activities targeting the main stakeholders (e.g. biomass suppliers and users, decision makers, financial institutions, auditors and verification bodies) are needed.

- Tailored financing schemes for supporting investments in innovative and established bioenergy technologies must be implemented, and the most successful schemes replicated.

Regional specificities, socio-economic and environmental aspects from a life-cycle perspective shall be considered. The Commission considers that proposals requesting a contribution from the EU of between EUR 1 to 2 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected impact: Increasing the share of sustainable bioenergy in the final energy consumption. Substantial and measurable reductions in the transaction costs for project developers as well as for the permitting authorities, whilst still fully addressing the needs for environmental impact assessments, including considerations for indirect impacts and energy balance, and public engagement. Development of better policy, market support and financial frameworks, notably at national, regional and local level.

Type of action: Coordination and Support Actions

B.2.7.: Energy Storage Mapping and Planning

The transition to a low-carbon energy system in Europe will likely require much increased storage capabilities for different energy vectors or effluents and other uses of subsoil space. Strategic planning for this transition and for avoiding potential use conflicts requires an appropriate view of available sites that could host such storage facilities and to integrate this view with more advanced planning of the whole European energy system. The study should compile detailed maps covering Europe and its neighbouring countries, and assess the potential of all existing and future storage sites in Europe (underground storage of CO₂, hydrogen, compressed air, natural gas, underground pumped hydro, etc. and above ground storage such as pumped hydro, LNG, liquid air, etc.) and combine this data with existing and future network development plans (e.g.: ten-year network development plan - TYNDP – for electricity, gas, etc.) for optimised spatial planning across borders as well as map these data with planned and potential alternative energy uses such as "Hydrocarbon extraction" or for geothermal energy. As most data exists in a fragmented form, the major work will consist in compiling existing data and to exploit it for an optimised energy systems planning. The study will contribute to strengthen the basis for long term strategic planning and optimising our future energy system and define potential bottlenecks at an early stage. System modellers and policy planners shall be involved since the beginning to ensure that the new set of data will fit their needs for more robust modelling, planning, designing, etc. on a coherent basis and comparable between Member States. This planning shall allow a better assessment of eventual or upcoming bottlenecks in our energy system and to optimise the planning for future cables, pipelines, power plants, storage, etc.

Type of action: Public procurement

SC 5: Climate action, environment, resource efficiency and raw materials

WASTE-3-2014: Recycling of raw materials from products and buildings

Specific challenge: Advances in many complex products and buildings, such as energy efficient buildings, electrical and electronic equipment (EEE), (electric) vehicles, airplanes, multi-material packaging solutions, bring to the society benefits in the form of a better performance, reduced transport weight, decreased energy consumption etc. Complex products contain many different raw materials and their reuse, recycling and recovery schemes are also complex and imply different steps, ranging from collection and logistics to refining and purification of materials.

New solutions are needed for the extraction of the raw materials from more complex products and buildings containing a multitude of minerals and metals (including Critical Raw Materials and other technology metals), wood-fibre based materials, polymers and plastics etc.

This specific challenge is identified in the Action area on Recycling of raw materials from products and buildings of the European Innovation Partnership (EIP) on Raw Materials.

Scope: All proposals should facilitate the market uptake of solutions developed through industrially-driven multidisciplinary consortia. Proposals shall address only one of the following issues of sustainable recycling and recovery of raw materials:

- developing innovative technological solutions, including pre-processing technologies, comprehensive metallurgical recovery and advanced information and communication technologies, for the recovery of minerals and metals (including Critical Raw Materials), polymers and plastics, and wood-fibre based materials from complex end-of-life products;
- developing solutions for a better recovery of raw materials (metals, aggregates, concrete, bricks, plasterboard, glass, polymers and plastics, and wood) from construction and demolition (C&D) waste, particularly from the most promising objects, such as deconstruction of non-residential buildings.

The proposals should develop the solutions proving the concept and feasibility at the level of Technology Readiness Levels (TRL) 5-6; please see part G of the General Annexes.

The Commission considers that proposals requesting a contribution from the EU of between EUR 6 and 8 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected impact: In the medium to longer term unlocking a significant volume of various raw materials within EU28 through conversion of wastes or raw materials not currently exploited into valuable resources. In the shorter term measurable increase in the efficiency of exploitation of secondary raw materials' deposits ('urban mines') against the state of the art. Increased range and yields of recovered

materials and energy efficiency, reduced environmental footprint measured by qualitative and quantitative indicators. Contribution to achieving the objectives of the EIP on Raw Materials.

Type of action: Research and innovation actions

WASTE-6-2015: Promoting eco-innovative waste management and prevention as part of sustainable urban development

Specific challenge: The growing waste produced in Europe, particularly in urban areas, where the vast majority of the world population are expected to live by 2050, represents a cost for society and a burden on the environment and, at the same time, a valuable stock of resources that can be exploited. Boosting eco-innovative solutions to prevent waste generation and promote the use of waste as a resource, in line with the objectives of the EU Resource Efficiency Roadmap¹⁵ and the Waste Framework Directive¹⁶, can enhance the natural and living environment in urban and peri-urban areas. Developing and demonstrating such solutions in real-life environments will enhance their market uptake and contribute to sustainable urbanisation worldwide.

Cities are more than spatially extended material artefacts; they are complex systems similar to living organisms that use energy, air, water and nutrients and need to dispose waste in a sustainable way. Adopting an urban metabolism perspective opens the way for innovative, systemic approaches, involving the analysis of resource flows within cities. Integrating in this way economic, social and environmental dynamics, it is possible to understand the socio-economically and gender nuanced patterns of resource use and consumption, and pinpoint drivers of waste-avoiding behaviour, manufacturing and business and public governance models.

Scope: Proposals should adopt an integrated urban metabolism approach and inter-disciplinary research and innovation and take into account the gender dimension where relevant. Proposals should involve active engagement of local authorities, citizens and other relevant stakeholders, using innovative concepts such as mobilisation and mutual learning. Proposals shall address only one of the following issues:

a) Eco-innovative solutions: Demonstration, at an appropriate pilot scale, and market replication, of integrated eco-innovative cost- and energy-efficient technologies, processes and services for waste prevention, treatment, enhanced collection, recycling and recovery of high-grade valuable materials from waste. Approaches should integrate technological and non-technological solutions, including, where appropriate, the use of economic instruments, such as incentives for more sustainable production and consumption patterns, and awareness raising initiatives. Proposals should include the participation of industry, including SMEs as far as possible.

The Commission considers that proposals requesting a contribution from the EU of between EUR 8 and 10 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

b) Eco-innovative strategies: Development of innovative and sustainable strategies for waste prevention and management in urban and peri-urban areas. Proposals should highlight how urban patterns, drivers, consumer behaviour, lifestyles, culture, architecture and socio-economic issues can influence the metabolism of cities. Proposals should highlight the possible benefits to be derived from ecosystems services and green infrastructure, and their gender sensitive application.

The Commission considers that proposals requesting a contribution from the EU of between EUR 4 and 5 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected impact: Significant measurable improvements in the state of the art in waste management in urban and peri-urban areas, and in the operationalisation of the urban metabolism approach for sustainable urban development and reduction of environmental hazards in cities. Contribution, over the long term, to the establishment of European research and innovation leadership in urban waste management and prevention.

In addition, the following specific impacts are expected:

a) Significant improvement in cost, material and, where appropriate, energy recovery efficiency in waste recycling and prevention in the short term. Identification of potential markets for the proposed waste collection strategies, treatment technologies and recycled products, as well as potential for replicability of solutions, based on a return-on-investment study on the short term. Creation, in the short/medium term, of green jobs and/or new SMEs due to effective market uptake of innovative technologies, processes and services, ensuring equality of access to women and men, and social inclusion. Contribution to development of standards, validated by key industrial players, and identifying best available and emerging techniques under the Industrial Emissions Directive.

b) Demonstrable improvement in the short/medium term in the participatory and science-based decision-making and planning for waste management, risk prevention and land-use as an integral part of urban development. Collectively-built, gender-sensitive solutions to promote eco-innovative urban management and re-naturing cities, measurable by qualitative and quantitative indicators. Significant increased competitiveness of soil-ecology-construction-waste treatment-related industries. In the long term, enhanced environmental resilience in urban areas and quality of life both in Europe and internationally.

Type of action: a) Innovation actions and b) Research and innovation actions

WASTE-7-2015: Ensuring sustainable use of agricultural waste, co-products and by-products

Specific challenge: Agriculture generates co-products, by-products and waste streams that are currently not properly taken care of both in environmental and economic terms.

In plant production (e.g. from arable, horticulture, fruit, wine, grassland sectors), losses take place at the farm and post-harvest levels and also down the chain at the level of the retail sector. Co-products or by-products are generated, for instance in the wine sector, which require sustainable use. Straw has been given significant attention in the last years as biomass feedstock and potential trade-offs with its relevance for soil improvement need to be considered.

In livestock production, manure, litter and other effluents management is a challenge, in particular in industrial production systems. While these effluents can be used as fertiliser, they can also be sources of bio-energy or valuable bio-products. The impacts on the environment, with emissions to the air, soil and water need to be evaluated. It is important to consider the whole effluent chain to avoid pollution swapping and health issues, due to possible transmission of pathogens.

Beyond reduction and recycling of agricultural waste, co-products and by-products, there may be opportunities for new processes enabling innovative uses of these materials, also outside the agricultural sector.

Scope: Proposals should evaluate existing techniques and develop new and innovative approaches for efficient use of agricultural waste, co-products and by-products, thereby contributing to the creation of sustainable value chains in the farming and processing sectors (including the organic sector). A range of sector-specific case studies (in terms of sources of waste and uses as well as geographic coverage) should serve to test and take up proposed approaches and technologies. Research and innovation efforts should address crop co-products/by-products/waste as well as manure/effluents. On straw and other crop residues (including in mixture with manure), proposals should develop environmental safeguards such as sustainable extraction rates as well as guidance on optimal use of crop residues (in particular straw) for soil improvement, taking into account the need to maintain soil organic matter levels, and on farming practices to harvest and handle crop residues for alternative purposes.

As regards manure and effluents, proposals should address some or all of the following areas:

- nutrient, energy and biochemical recovery from manure and other effluents;
- improved knowledge on the environmental impact of manure and other effluents, further developing measurements and good manufacturing practices, minimising impacts on water and air quality (emissions and odours);
- sanitary implications of pathogens that can be transmitted from manure and possible control options;
- management chains, from processing to transport and application.

Involvement of industry (including strong participation from SMEs) should be ensured and pilot and/or demonstration activities should be performed. Knowledge platforms should be established. In line with the objectives of the EU's strategy for international cooperation in research and innovation and in particular with the implementation of the EU-China dialogue, proposals are encouraged to include third country participants, especially those established in China. Proposals should fall under the concept of 'multi-actor approach'. This action allows for the provision of financial support to third parties in line with conditions set out in Part K of the General Annexes.

The Commission considers that proposals requesting a contribution from the EU in the range of EUR 7 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Proposals are requested to foresee close interaction with the other proposals selected for funding through creation of a joint stakeholder platform and other joint structures.

Expected impact:

- Increased awareness and dialogue across sectors on availability, needs and options for smart use of agricultural waste, by-and co-products through creation of joint stakeholders platform and other joint structures.
- Improved resource efficiency through reduction of waste and improved waste management in primary production. Increased opportunities for valorisation of waste, by-and co-products resulting in environmental and economic benefits for the farming sector (development of new products and processes).
- Enhanced competitiveness through more varied and/or new types of sources for bio-products and bio-energy in the agro-food (conventional and organic) and bioeconomy sectors.
- Improved soil quality and crop productivity – through an optimal use of crop waste (taking into account the need to maintain soil organic matter levels) and nutrient recovery.
- Improved water quality – reducing pollution and eutrophication of ground waters, and thus indirectly marine waters.
- Improved air quality – by reducing livestock emissions.
- Progress towards regulatory and standard development, in particular with respect to environmental protection and food safety.

Type of action: Research and innovation actions

WATER-2-2014/2015: Integrated approaches to water and climate change

Specific challenge: The rising demands of a growing world population for food, water, materials and energy will put increasing pressures on land use, water resources and ecosystems. Increased energy use leads to increased demands for cooling water for thermal power plants. Climate mitigation options such as biomass production for energy (biofuels) might also lead to increased land and water demands. Increased food and feed demand will put increasing pressures on land (e.g. deforestation leading to more greenhouse gas emission) and water resources. Such pressures will be compounded by the impacts of climate change which are likely to further modify the availability and suitability of these resources as well as affect agricultural productivity.

Tools to help explore options for low-carbon pathways, such as climate-energy models, currently lack a comprehensive integration of land-use and water systems, leading to an incomplete picture of the interactions between competing demands and the future viability and costs of adaptation and mitigation options as well as the environmental protection and agricultural challenges.

Despite considerable progress over the past ten years, the forecasting of natural water cycle variability and extreme weather events in the short and medium term still suffers from severe limitations. Improved understanding of the impacts of climate change on the hydrological cycle is necessary in order to better inform decision makers and ensure sustainable water supply and management of water systems, and quality of water bodies, in the EU.

Scope: Proposals shall address only one of the following issues.

a) [2014] Water cycle under future climate:

Proposals should aim to:

- maximise the reliability of projections of precipitation (average, distribution, frequency, intensity) and couple them with water cycle variability at local/regional scales in Europe, over various timescales;
- improve the short-to-medium term forecasting of related extreme events, integrating, where possible, information from available data sources;
- assess the impacts of weather extremes as well as the wider impacts of climate change on the different components of the water cycle in terms of quantity and quality;
- develop risk management strategies and adaptation options for extreme weather and other climate change-related threats at the appropriate scale(s) (local, regional and continental), taking into consideration the role and involvement of the relevant stakeholders, and potentially putting emphasis on highly vulnerable water resources of strategic importance.

The Commission considers that proposals requesting a contribution from the EU of between EUR 6 and 8 million (or more) would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

b) [2015] Integrated approaches to food security, low-carbon energy, sustainable water management and climate change mitigation:

Proposals should aim to:

- develop tools and methodologies for integrating agriculture, forestry, climate change impacts and adaptation with climate-energy-economic models and land-use models, using a multi-disciplinary approach;
- consider the potential role, contributions and limitations of low-carbon options with respect to land and water resources;
- develop a better scientific understanding of the land-water-energy-climate nexus;
- develop integrated strategies and approaches, at different spatial scales (regional, national, continental, global), integrating resource efficient land use, agricultural productivity improvements, sustainable water management and low carbon
- energy transition and analysing interactions with the existing regulatory frameworks in these areas and the potential barriers to implementation.

The Commission considers that proposals requesting a contribution from the EU of between EUR 6 and 8 million (or more) would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected impact:

a) More efficient management of water resources in Europe due to better knowledge of the water cycle under the future climate. Contribution to management planning across the EU in support of the Blueprint to safeguard Europe's water resources, the EU Climate Change Adaptation Strategy and the relevant priority areas of the EIP 'Water'. Contribution in the longer-term to the development of reliable climate services in relation to the water cycle.

b) Increased understanding of how water management, food and biodiversity policies are linked together and to climate and sustainability goals. Reduction of the uncertainties about the opportunities and limitations of low-carbon options, such as bioenergy technologies and resource efficiency measures, in view of relevant near-term policy initiatives. Contribution to future assessments, including those of the IPCC, with multidisciplinary and integrated tools.

Type of action: Research and innovation actions

WATER-3-2014/2015: Stepping up EU research and innovation cooperation in the water area

Specific challenge: Water-related research and innovation is fragmented at EU level and dispersed at national level in several ministries, universities, agencies, regional governments and programmes. To be more effective and increase the added value of related investments, the efforts and strategic research agendas of the many funding networks and organisations existing in Europe need to be integrated to establish transnational and trans-disciplinary research and innovation actions.

Scope: Proposals should address only one of the following:

[2014] Proposals should pool the necessary financial resources from the participating national (or regional) research programmes with a view to implementing a joint call for proposals resulting in grants to third parties with EU co-funding to support the priorities identified in the Strategic Research Agenda of the Water Joint Programming Initiative (JPI). Proposers should also consider implementing other joint activities including additional joint calls without EU co-funding. In 2014, this call should support research and innovation developing technological solutions and services to support the implementation of EU water policy, in particular for water distribution and measurement, waste water treatment and reuse, desalination, floods and droughts etc.

[2015] Proposals should pool the necessary financial resources from the participating national (or regional) research programmes with a view to implementing a joint call for proposals with EU co-funding to support the priorities identified in the Strategic Research Agenda of the Water JPI. Proposers should also consider implementing other joint activities including additional joint calls without EU co-funding. In 2015 the call should support research and innovation to support the

implementation of EU water policy, in particular on sustainable water use in agriculture, to increase water use efficiency and reduce soil and water pollution.

Expected impact: Better use of scarce human and financial resources in the area of water R&I. Reduced fragmentation of water research and innovation efforts across Europe. Improved synergy, coordination and coherence between national and EU funding in the relevant research fields through transnational collaboration. Improved implementation of research and innovation programmes in these fields through exchange of good practices. Contribution to the implementation of the JPI on Water.

Type of action: ERA-NET Cofund

SC5-8-2014: Preparing and promoting innovation procurement for soil decontamination

Specific Challenge: Soil contamination is typically caused by industrial activity, mining and smelting practices, agricultural chemicals or improper disposal of waste and is increasingly becoming a very serious environmental and health problem. Member States are making efforts to establish national decontamination/remediation strategies which are generally very costly. It is therefore crucial for public authorities to be able to identify the most fit-for-purpose and cost-effective solutions.

Scope: Proposals should establish and promote a network of public procurers in the area of soil decontamination/remediation, with a focus on sustainable methods which in particular avoid 'dig and dump', in order to raise awareness, share knowledge, debate common procurement needs and draw up common specifications, taking into account longer-term public sector requirements and socio-economic aspects, with the aim of investigating the feasibility of launching joint pre-commercial procurement (PCP) to find common innovative solutions in the field.

Expected impact: In the mid-term, leverage of additional investment in research, development and innovation in the area of soil decontamination and provision of innovative solutions to address associated challenges. In the medium/long term, promotion of innovation in the sector from the demand side at reduced costs. Over the medium/long term, creation of new markets in the area of soil decontamination/ remediation. Increased competitiveness of SMEs and industrial partners in this area.

Type of action: Coordination and support actions

SC5-10-2014/2015: Coordinating and supporting research and innovation for the management of natural resources

Specific Challenge: The pace of current developments and uncertainties surrounding likely future trends in ecosystems and their services requires further steps to maintain and strengthen the evidence base to ensure that policy makers, businesses and citizens in the EU and Associated Countries can

continue to draw on a sound understanding of the state of natural resources and the wider environment, the possible impact of response options and their consequences in social, economic and environmental terms.

Better coordination of often fragmented research and innovation actions within Europe and beyond is needed, accompanied by timely and open exchange of information and research results to enhance the impact of research and ensure a more efficient use of resources and scientific developments.

Innovative ways are required to mobilise all relevant actors, increase policy coherence, resolve trade-offs, manage conflicting interests, increase participation of citizens in decision-making and improve public awareness and business uptake of research results.

Scope: Creation of European networks to facilitate dialogue among the relevant scientific communities, funding bodies and user communities in Europe throughout the duration of Horizon 2020. Proposals should cover activities such as clustering, coordinating and creating synergies between international, European and nationally funded research and innovation actions, developing joint programmes and projects, creating links with related international programmes, forward looking analysis to establish emerging needs, communication and dissemination activities for an improved science-policy interface, and aligning research with decision-making requirements. This requires cross-disciplinary interaction and an integrated, systemic approach, especially between socio-economic and environmental sciences.

Proposals shall address only one of the following issues:

a) [2014] Enhancing mapping ecosystems and their services: developing a flexible methodology that permits consistent aggregation and comparison across scales for coordination of a transparent, comparable and evidence-based mapping and assessment of ecosystems and their services, including multiple ones, across the entire EU (including the outermost regions) and at national and regional level in order to guide policy- and decision-making. It should also analyse their interdependency, inter-linkages, synergies and potential trade-offs and value their multi-functionality for human well-being, building on the outcomes of the Millennium Ecosystem Assessment (MA) work and the Economics of Ecosystems and Biodiversity (TEEB) studies.

b) [2014] Structuring research on soil, land-use and land management in Europe: a network of funding agencies and other key players in Europe (and possibly beyond) to scope national funded research activities, develop a joint vision and design a strategic research agenda (SRA) for activities on soil, land-use and land management that should be implemented through future joint calls.

Examples of relevant issues are: land-use change impacts and trends, including the ones related to bioenergy/bioeconomy resources, spatial planning, soil threats, sustainable use of the soil-sediment-water system, impacts at global level and effects on trading partners, integrating socio-economic research and identifying elements linking to relevant policy domains and multilateral environmental agreements.

c) [2015] An EU support mechanism for evidence-based policy on biodiversity & ecosystems services: setting up an innovative, self-sustainable governance mechanism with a long-term perspective

extending beyond the life of the project to enhance effective and efficient interactions between science, society and policy related to biodiversity and ecosystems services in the EU. This should build on existing science-policy interfaces and include all EU Member States, Associated or Accession Countries and should be open to observers.

Expected impact: Evidence-based policy and appropriate, cost-effective management, planning and adaptation decisions by the public sector, businesses, industry and society through the provision and effective communication of trustworthy and timely science-based information. Enhanced impact of research and innovation activities through better identification of R&I priorities, improved coordination of EU and Member State/Associated Country research and innovation programmes and funded activities, and synergies with international research and innovation programmes.

In addition, the following specific impacts are expected:

- a) In the short term (1-3 years), an enhanced capacity and more consistent approach of Member States, through leveraging and complementing their actions, to carry out their obligations in line with the EU 2020 Biodiversity Strategy and national requirements.
- b) In the short-term establish a jointly agreed vision and SRA and a network of funding agencies determined to implement it through a joint call in a follow-up phase. Enhance synergies and collaboration between national research programmes in the domain. Medium to long-term, improved evidence-based policy making in domains such as agriculture, environment, climate action, spatial planning, energy transition, drinking water production, resource efficiency and cohesion, and for implementing the Rio+20 pledge to achieve a 'land-degradation neutral' world.
- c) Swift response to scientific and technical needs resulting from EU research and innovation and environmental policies in the short term (1-3 years) and further improvements in the medium term (3-10 years). Long-term positive impact on policy- and decision-making to address local, regional, cross-border or pan-European challenges through the provision of knowledge assessments, advice and science-based options and link in with international efforts and fora on biodiversity and ecosystem services.

Type of action: Coordination and support actions

SC5-17-2015: Demonstrating the concept of 'Citizen Observatories'

Specific challenge: New in-situ observatories ('Citizen Observatories') based on citizens' own devices (e.g. smart phones, tablets, laptops, and other social media) used together with innovative technologies can strengthen environmental monitoring capabilities, have the potential to generate new and original applications to reduce investment and running costs of in-situ observations and monitoring applications and solutions, and involve novel partnerships between the private sector, public bodies, NGOs and citizens. However, achieving this depends on further development and testing in real conditions, wider deployment and commercialisation by the private sector and greater user acceptance. This requires leveraging emerging technologies, data and information sharing, developing services and actively engaging in governance at all levels and scales in the domain of environment. It

also calls for innovative approaches and tools to handle complexity, interactions and interfaces and to facilitate knowledge transfer, assessment, valuation, uptake and exploitation of data and results for policy, industry and society at large.

Scope: Proposals should scale up, demonstrate, deploy, test and validate in real-life conditions the concept of Citizen Observatories and the effective transfer of environmental knowledge for policy, industrial, research and societal use, with a focus on the domain of land cover/land use, both in rural and urban areas. Proposals should include a strong involvement of citizens and citizens' associations together with the industrial sector, in particular SMEs, as far as possible. The data collected should complement those from existing systems (e.g. the Copernicus Land Service) and surveys, including national surveys.

The Commission considers that proposals requesting a contribution from the EU of between EUR 3 and 5 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: Lowered cost and extension of the in-situ component of the GEOSS and Copernicus initiatives. Better decision-making through the empowerment and active role of citizens and citizen's associations in environmental monitoring, co-operative planning and environmental stewardship, with special impact on land resources management. Enhanced implementation of governance and global policy objectives. Increased deployment and market uptake of innovative in-situ monitoring techniques. Increased European role in the business of in-situ monitoring of the environment.

Type of action: Innovation actions

SC5-20-2014/2015: Boosting the potential of small businesses for eco-innovation and a sustainable supply of raw materials

Specific challenge: Innovative SMEs have been recognised as being able to become the engine of the green economy and to facilitate the transition to a resource efficient, circular economy. They can play an important role in helping the EU to exit from the economic crises and in job creation. The potential of commercialising innovative solutions from SMEs is however hindered by several barriers including the absence of the proof of concept, the difficulty to access risk finance, the lack of prototyping, insufficient scale-up studies, etc. Growth therefore needs to be stimulated by increasing the levels of innovation in SMEs, covering their different innovation needs over the whole innovation cycle. Innovative SMEs should be supported and guided to reach and accelerate their full green growth potential. This topic is targeted at all types of eco-innovative⁷⁰ SMEs in all areas addressing the climate action, environment, resource efficiency and raw materials challenge, focusing on SMEs showing a strong ambition to develop, grow and internationalise. All kinds of promising ideas, products, processes, services and business models, notably across sectors and disciplines, for

commercialisation both in a business-to-business (B2B) and a business-to-customer (B2C) context, are eligible.

Scope: The SME instrument consists of three separate phases and a coaching and mentoring service for beneficiaries. Participants can apply to phase 1 with a view to applying to phase 2 at a later date, or directly to phase 2.

In phase 1, a feasibility study shall be developed verifying the technological/practical as well as economic viability of an innovation idea/concept with considerable novelty to the industry sector in which it is presented (new products, processes, services and technologies or new market applications of existing technologies). The activities could, for example, comprise risk assessment, market study, user involvement, Intellectual Property (IP) management, innovation strategy development, partner search, feasibility of concept and the like to establish a solid high-potential innovation project aligned to the enterprise strategy and with a European dimension. Bottlenecks in the ability to increase profitability of the enterprise through innovation shall be detected and analysed during phase 1 and addressed during phase 2 to increase the return in investment in innovation activities. The proposal should contain an initial business plan based on the proposed idea/concept.

The proposal should give the specifications of the elaborated business plan, which is to be the outcome of the project and the criteria for success.

Funding will be provided in the form of a lump sum of EUR 50.000. Projects should last around 6 months.

In phase 2, innovation projects will be supported that address the Societal Challenge 'Climate action, environment, resource efficiency and raw materials' and that demonstrate high potential in terms of company competitiveness and growth underpinned by a strategic business plan. Activities should focus on innovation activities such as demonstration, testing, prototyping, piloting, scaling-up, miniaturisation, design, market replication and the like aiming to bring an innovation idea (product, process, service etc) to industrial readiness and maturity for market introduction, but may also include some research. For technological innovation a Technology Readiness Level of 6 or above (or similar for non-technological innovations) are envisaged; please see part G of the General Annexes.

Proposals shall be based on an elaborated business plan either developed through phase 1 or another means. Particular attention must be paid to IP protection and ownership; applicants will have to present convincing measures to ensure the possibility of commercial exploitation ('freedom to operate').

Proposals shall contain a specification for the outcome of the project, including a first commercialisation plan, and criteria for success.

The Commission considers that proposals requesting a contribution from the EU of between EUR 0.5 and 2.5 million would allow phase 2 to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts. Projects should last between 12 and 24 months.

In addition, **in phase 3**, SMEs can benefit from indirect support measures and services as well as access to the financial facilities supported under Access to Risk Finance of this work programme.

Successful beneficiaries will be offered coaching and mentoring support during phase 1 and phase 2. This service will be accessible via the Enterprise Europe Network and delivered by a dedicated coach through consultation and signposting to the beneficiaries. The coaches will be recruited from a central database managed by the European Commission and have all fulfilled stringent criteria with regards to business experience and competencies. Throughout the three phases of the instrument, the Network will complement the coaching support by providing access to its innovation and internationalisation service offering. This could include, for example, depending on the need of the SME, support in identifying growth potential, developing a growth plan and maximising it through internationalisation; strengthening the leadership and management skills of individuals in the senior management team and developing in-house coaching capacity; developing a marketing strategy or raising external finance.

Expected impact:

- Enhancing profitability and growth performance of SMEs by combining and transferring new and existing knowledge into innovative, disruptive and competitive solutions seizing European and global business opportunities.
- Market uptake and distribution of innovations tackling the specific Challenge of 'Climate action, environment, resource efficiency and raw materials' in a sustainable way.
- Increase of private investment in innovation, notably leverage of private co-investor and/or follow-up investments.
- The expected impact should be clearly described in qualitative and quantitative terms (e.g. on turnover, employment, market seize, IP management, sales, return on investment and profit).

Type of action: SME Instrument (70%)

Leadership in enabling and industrial technologies: Space

EO 1 - 2014: New ideas for Earth-relevant space applications

Specific challenge: Space systems produce information which often cannot be acquired in any other way. Specifically, the Copernicus data, including the Contributing Missions (current and future), are expected to provide improved data quality, coverage and revisit times, and increase the value of Earth Observation data for scientific work and future emerging applications. Equally, space data obtained for specific purposes can subsequently reveal novel scientific insights which were not specifically intended or expected at the time of space sensor launch. Explorer missions, e.g. at ESA, generate new remote sensing opportunities. In order to fuel this cycle of discovery, and further enhance scientific, operational and commercial exploitation of collected space data related to Earth (now or in the near future), new upstream data products and analysis methods suitable for subsequent integration into applications (such as for instance conducted in the calls of the Horizon 2020 societal challenges, or service product lines) should be generated. In this context space data (i.e.. remotely-sensed data as well as in-space located measurements, gravity data, magnetic data, GNSS signals) could be relevant to a wide variety of Earth-related topics (relevant to earth environment, atmosphere, agriculture, land use, risk, emergency management, security, cultural heritage and archaeology etc.), thereby widening the data scope beyond conventional EO images.

Scope: New and hitherto immature uses of Earth-relevant space-based data (also taking into account specific satellite sensor acquisition modes) should be investigated to enable integration or assimilation into scientific investigations related to Earth system sciences, or forecasting models at regional or wider geographical extent. Attention should be given to space based data covering geographic areas sensitively affecting the earth system, as is the case for instance for the Arctic and Antarctic regions. When considering inclusion of space based data, consideration should also be given to the near real-time access opportunities offered by state of the art and next generation space/satellite communications capabilities.

It is expected that proposals address also how the insights proposed to be obtained from space based data can be validated, e.g. in combination with ground based observations, or in-flight collected data, with appropriate attention also being given to calibration of space data. Research into specification of the uncertainties associated with the derived results should also be included. To enhance the use of intermediate and final products, due attention is also to be given to standardisation of data, best practices, dissemination mechanisms and reference frames. Furthermore, to enable integration into operational services such as Copernicus requires highly automated processes with minimum manual intervention to be developed.

Preference shall be given to the usage of data from space-borne European instruments. In case such European data exists, the primary use of non-European data shall be justified by the applicant.

Proposers may thus find it helpful to consult information on availability of Copernicus Sentinel Data, access to Copernicus Contributing Mission data, at the Commission's web <http://xxxx>.

The Commission considers that proposals requesting a contribution from the EU of between EUR 2 and 3 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected impact: Proposals are expected to prepare the ground for further innovative exploitation of European space data in scientific activities and/or future and emerging applications.

Proposals are expected to have a significant impact in stimulating wide and further exploitation of the used data, be it in scientific or commercial use, or operational services. The application potential of these new data products and concepts will have to be demonstrated through selected examples and demonstration cases. The results shall be actively disseminated in the relevant scientific publications, as well as towards potential user communities as appropriate. For operational exploitation, the needs of the user community are expected to have been validated in order to ensure a positive impact. The research may deliver as well input for drawing up user requirements for enhanced processing tools or future observation instruments.

An important impact is also the applicability of the results for further systematic research usage, either in the context of the societal challenges addressed by Horizon 2020 calls, or research conducted in domains not covered in the scope of other Horizon 2020 funding areas. Results will therefore have to attain the necessary maturity to fulfil this promise. Specific commercial or scientific agreements for usage of results will be positively considered.

Type of action: Research and Innovation Actions. A total of 10 million Euro has been set aside for this topic.

EO 2 – 2014: Climate Change relevant space-based Data reprocessing and calibration

Specific Challenge: Research areas such as Climate Change address long time periods of data records, where historical data are essential to identify reliable trends and anomalies. The data from past remote sensing missions available either from European and non-European missions, must be made accessible in a way to establish seamless time series of similar observations, contributing to the generation of Climate Data Records across sensors and technologies over two decades and more. At the same time, the relevance of space derived variables and products needs to be critically examined, and enhanced to optimally fit the requirements arising from current policy issues in a variety of EU sectors. This includes the needs of assessment of impact of climate change, as well as mitigation and adaptation strategies in different societal benefit areas. This work is complementary to efforts undertaken by ESA in the Climate Change Initiative (CCI), and will require coordination with on-going efforts accordingly.

Scope: The remote sensing data maintained in archives of the relevant data holding agencies will require to be reprocessed to ensure the generation of consistent time series of data and products with the most up to date operational algorithms. These time series shall benefit from the panoply of

available source data to ensure suitability for producing the most reliable, accurate, stable and complete Climate Data Records. Manipulation of historical data at the relevant sources will be required to enable quick analyses, bulk reprocessing and wide access to different science and application communities. Interoperability of diverse observation collections, including all parts of the atmosphere and its boundary (such as ice, fresh water, sea surface and land surface), tropospheric and stratospheric data, sensor calibration and sensor-to-sensor cross calibration will have to be included, as well as estimates of the associated uncertainties, limits and biases. The proposed activities will need to be closely coordinated with the ESA Climate Change Initiative (CCI) and other relevant initiatives of space data calibration in context of CEOS or GEO.

Proposers are advised to consult further information on availability of Copernicus Sentinel Data, access to Copernicus Contributing Mission data, as well as issues recommended to be detailed in the proposals at the Commission's web <http://xxxx>.

The Commission considers that proposals requesting a contribution from the EU of 5.5 million Euro would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected impact: The proposal is expected to significantly contribute to the availability of validated space-based observational data on Climate Change as a long time series, providing consistent Climate Data Records over a time period corresponding to the satellite era. Close cooperation with other relevant on-going activities such the ESA CCI and GEO is expected. Proposers should demonstrate how the work performed adds value to existing data repositories and efforts by the respective remote sensing data holding agencies. Best practices in combining data from different satellites and other sensor in consistent ways should be established and promoted.

Type of action: Research and Innovation Actions. A total of 5.5 million Euro has been set aside for this topic.

EO 3 – 2014: Observation capacity mapping in the context of Atmospheric and Climate change monitoring

Specific Challenge: Climate research, and atmospheric research, are cases that clearly illustrates the full complexity of needs for validation and calibration of space data, and hence of the remote sensing data at source. The latter includes a range of sensors operated by different space agencies that all need to be sufficiently reliable and accurate to contribute efficiently to the generation of Climate Data Records. More atmospheric species, as well as aerosols, need to be monitored, simultaneously and for the same air mass, at local to global level. The transport and dispersion of these various constituents are critical quantities to be monitored. Space based remote sensing data have to be integrated with measurements taken at various places in the atmosphere, from the middle atmosphere down to ground level. Efforts must be coordinated at national and international levels to optimize the use of existing in-situ measurements, establishing observation profiles, the deployment of new measuring systems and the design of campaigns dedicated to the calibration and validation of remote

sensing data. Vicarious calibration techniques requires detailed and complete documentation of the state of the atmosphere at time of satellite overpasses over a variety of land, water and icy surfaces to span a large range of environmental conditions. The integrated use of different technologies or tools for measuring the atmospheric effects can promote further the earth observation for monitoring the environment.

A comprehensive 3-D coverage has to be developed and implemented together with an appropriate validation strategy. While calibration and validation campaigns are conducted at national and international level, particularly to validate specific sensors and satellites, a European coordinated approach in charting systematically the available and needed instrument suites for systematic climate change monitoring in space and time, and the correspondingly required validation campaigns remains elusive.

Scope: To achieve this, research is needed to assess gaps in remote observation availability and suitable approaches for defining virtual observation constellations. It should include mapping of ground based networks, airborne, balloons and sub-orbital platforms as well as space based sensors. Appropriate calibration and validation of data is to be assessed, charting the campaigns that will be needed to cover the climate change monitoring needs in years to come from remote sensing data gathered over land, water and icy surfaces. A mapping of available/deployed sensor technologies and measurements should be performed as a first step, to identify gaps in available systems and current knowledge to characterise the atmospheric, measure atmospheric profiles, profiles and different ground level conditions and ensure the provision of reliable and accurate Climate Data Records for the atmosphere, land surfaces and oceans. This information should also lay the basis for drawing up the need for dedicated calibration and validation campaigns combining instruments and measurements deployed in ground based networks, airborne, UAV, balloons, sub-orbital and in-orbit platforms, as relevant for climate change monitoring. Since this activity is highly reliant on consensus of the users in form of the scientific community involved in subsequent climate change and atmospheric measurements/modelling, the proposal will have to mobilise such key players across Europe and globally, and will have to include mechanisms regarding best practices to reach a consensus on the strategies proposed.

The Commission considers that proposals requesting a contribution from the EU of EUR 6 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected impact:

The proposal is expected to lead to significant advances in greater consistency and cross-calibration/validation of long term space based measurements with ground-based historical references, providing a better overview of uncertainty of available data to generate Climate Data Records, including impacts information of space data. Based on the work done, best practices regarding calibration/validation campaigns should be promoted. Proposals are expected to add value

to the work of bodies such as the Global Climate Observing System (GCOS), WMO Integrated Observing System (WIGOS) and the ESA Climate Modelling User Group.

While this action addresses climate relevant issues, monitored parameters and their uncertainty are important for many other purposes (air pollution, air traffic management etc.) and the availability of project material to the wider GMES/Copernicus community should be ensured as well.

Type of action: Research and Innovation Actions. A total of 6 million Euro has been set aside for this topic.