



EN

Horizon 2020

Work Programme 2016 - 2017

12. Climate action, environment, resource efficiency and raw materials

Important notice on the second Horizon 2020 Work Programme

This Work Programme covers 2016 and 2017. The parts of the Work Programme that relate to 2017 are provided at this stage on an indicative basis. Such Work Programme parts will be decided during 2016.

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Introduction

The objective of the Societal Challenge 'Climate action, environment, resource efficiency and raw materials' is to achieve a resource – and water – efficient and climate change resilient economy and society, the protection and sustainable management of natural resources and ecosystems, and a sustainable supply and use of raw materials, in order to meet the needs of a growing global population within the limits of the planet's natural resources and eco-systems.

To achieve the greatest possible impact of the research and innovation activities in 2016-2017, this Societal Challenge will – for the areas on climate change, environment and resource efficiency – prioritise actions which take a systemic approach to promote a more resource efficient, greener and more competitive economy as a key part of smart, inclusive and sustainable growth, and to deliver on Horizon 2020's climate and sustainability goals and the objectives of the General Union Environment Action Programme to 2020¹.

Systemic innovation is understood as innovation that aims at responding to a societal challenge by obtaining a system-wide transformation through affecting the system's economic, social and environmental dimensions as well as their interconnections. This implies a trans-disciplinary perspective that integrates technology, business models and economic organisation, finance, governance and regulation as well as skills and social innovation. Systemic innovation therefore calls for the adoption of a challenge-driven, solutions-oriented research and innovation strategy that crosses disciplinary boundaries and involves co-creation of knowledge and co-delivery of outcomes with economic, industrial and research actors, public authorities and/or civil society.

Within this systemic approach, the Societal Challenge 'Climate action, environment, resource efficiency and raw materials' will focus on research and innovation which unlocks private and public investment in future solutions for a resource efficient, climate smart economy with a sustainable supply of raw materials. There is a consistent need to demonstrate Europe's potential for systemic innovation and market uptake of technological and non-technological solutions through large-scale demonstration projects. A transformative agenda on this scale requires major changes in attitudes and behaviour patterns and the contribution of social sciences and humanities will be essential to inform successful solutions. Complementary research and innovation activities are organised around the demonstration projects. Societal Challenge 'Climate action, environment, resource efficiency and raw materials' will act as trailblazer for ensuring that the investment of 35% for climate action and 60% for sustainable development across the whole Horizon 2020 Framework Programme will deliver maximum impact for economic, environmental and social sustainability.

This systemic approach is in line with Horizon 2020's Responsible Research and Innovation² (RRI) cross-cutting objective, engaging society, integrating the gender and ethical dimensions and ensuring access to research outcomes. The ethical dimension of the activities, including

¹ Decision No 1386/2013/EU of the European Parliament and of the Council of 20 November 2013

² http://ec.europa.eu/research/swafs/pdf/rome_declaration_RRI_final_21_November.pdf

relevant socioeconomic implications, should be taken into account, such as personal data protection and privacy, protection of participants and researchers, ensuring informed consent, dual use and potential misuse of the research results, fair benefit sharing when developing countries are involved, animal welfare, etc.

Given the transnational, global nature of climate change and the environment, and their scale and complexity, as well as of the raw materials supply chain, activities cover both EU level and beyond, thus contributing to the Commission's priority 'A Stronger Global Actor'. International co-operation aims to boost the effectiveness of the actions promoted, within a scale-and-scope approach, e.g. GEO and the IPCC. Third countries, regions and international partners or programmes have been selected in order to maximise the impact and accelerate progress, e.g. the Belmont Forum. Impact is also expected on the implementation of the Sustainable Development Goals.

The cross-cutting nature of the issues addressed by this Societal Challenge results in a number of research and innovation areas which can most effectively be developed jointly with other Horizon 2020 parts (Leadership in Enabling and Industrial Technologies and other Societal Challenges), and in complementarity with other programmes e.g. LIFE, the Natural Capital Financing Facility (NCF) under the LIFE programme, or the European Structural and Investment Funds (ESIF). Coherence and synergy with actions at national, regional or local levels, via the ESIF and links to EU Presidencies, and with other initiatives such as Joint Programming Initiatives (JPIs) and the European Institute for Innovation and Technology's (EIT) Knowledge and Innovation Communities (KICs), is also reinforced.

In addition to the call H2020-SC5-2016-2017 'Greening the economy', activities relating to climate action, environment, resource efficiency and raw materials are also found in the calls:

- H2020-IND-CE-2016/17 'Industry 2020 in the Circular Economy' (on eco-innovation),
- H2020-SCC-2016/17 'Smart and Sustainable Cities' (on sustainable cities through nature-based solutions),
- H2020-BG-2016-2017 'Blue growth – demonstrating an ocean of opportunities' (on the Arctic),
- H2020-SFS-2016-2017 'Sustainable Food Security – Resilient and resource-efficient value chains' (on Earth Observation for Africa),
- H2020-LCE-2016-2017 'Competitive low-carbon energy' (on applied geo-sciences)
- and in the SME Instrument call H2020-SMEInst-2016-2017.

Call - Greening the Economy

H2020-SC5-2016-2017

INTRODUCTION

Within the overall objective of taking a systemic approach³ to moving towards a more resource efficient, greener and more competitive economy, this call addresses the priority areas of climate services, moving towards a low-carbon Europe, nature-based solutions for territorial resilience, water, raw materials, Earth observation and cultural heritage for sustainable growth. Further actions are also foreseen to ensure support to policy in the areas of Societal Challenge 'Climate action, environment, resource efficiency and raw materials'.

All activities funded under this call should as far as possible use data resulting from or made available through different initiatives of the European Commission. In particular, the utilisation of GEOSS (Global Earth Observation System of Systems)⁴ and Copernicus (the European Earth Observation Programme)⁵ data, products and information should be privileged⁶. Likewise, in line with EU cooperation with the European Space Agency (ESA), activities should use ESA Earth Science data as far as possible. The data, both from ESA missions or third party missions, are for the vast majority of cases available for free web download (further details are available at <http://eopi.esa.int>). All activities related to Earth observation data and other spatial data should comply at best with and build upon the existing Infrastructure for Spatial Information in the European Community (INSPIRE)⁷.

A novelty in Horizon 2020 is the Pilot on Open Research Data which aims to improve and maximise access to and re-use of research data generated by projects. Projects under the Societal Challenge 5 'Climate action, environment, resource efficiency and raw materials' Work Programme 2016-17 will by default participate in the Pilot on Open Research Data in Horizon 2020, except for topics SC5-13-2016-2017, SC5-14-2016-2017, SC5-15-2016-2017, SC5-16-2016-2017 and SC5-17-2017 in the call 'Greening the economy'. Projects funded under the other calls of this Work Programme may participate in the Open Research Data Pilot in Horizon 2020 on a voluntary basis.

³ Systemic innovation is described in more detail in the introduction to this work programme part.

⁴ www.geoportal.org

⁵ www.copernicus.eu

⁶ Copernicus data and products, where available, should be used by the research and innovation community following the free, full and open access approach approved in the Commission Delegated Regulation (EU) No 1159/2013 of 12 July 2013. This would include the data from the Copernicus space infrastructure (Sentinels missions) and where affordable, the Copernicus Contribution mission data, when the latter can be of use for Horizon projects developing new Copernicus Services. Applicants are advised to consult information on the availability of Copernicus Sentinel Data and access to Copernicus Contributing Mission data on the Commission's website: http://ec.europa.eu/growth/sectors/space/research/index_en.htm. Where possible, proposers are also encouraged to use the Earth Observation Data Warehouse: <http://copernicusdata.esa.int/web/cscda/home>.

⁷ <http://inspire.ec.europa.eu/>

Projects have the possibility to opt out of the Pilot. Participation in the Pilot is not taken into account during the evaluation procedure. Proposals will not be evaluated favourably because they are part of the Pilot and will not be penalised for opting out of the Pilot.

A further new element in Horizon 2020 is the use of Data Management Plans (DMPs) detailing what data the project will generate, whether and how it will be exploited or made accessible for verification and re-use, and how it will be curated and preserved. The use of a DMP is required for projects participating in the Open Research Data Pilot. Other projects are invited to submit a DMP if relevant for their planned research. Only funded projects are required to submit a DMP.

Beneficiaries in projects participating in the Pilot on Open Research Data are invited to follow the GEOSS Data Sharing Principles and to register in GEOSS the geospatial data, metadata and information generated as foreground of the project. Further information on GEOSS can be found from: <http://www.earthobservations.org>.

Proposers are encouraged to use FIWARE for some or all of their platform developments, when relevant. FIWARE enablers are available at www.fiware.org under open source licence for business use. Free online training, a sand-box environment and technical support are available; equally, proposers may contribute to the evolution of FIWARE.

CLIMATE SERVICES

The objective of the actions in this part of the call is to build Europe's capacity to respond to and improve resilience to climate change by strengthening significantly the nascent global market for demand-driven climate services for both climate change mitigation and adaptation needs. The recent IPCC Fifth Assessment Report has shown very clearly that collective, urgent action is needed to keep the planet's climate within tolerable levels of warming. Keeping the world within the 2°C warming boundaries is estimated to cost between 0.04% and 0.14% of GDP per year during this century, but also to create huge benefits. President Juncker's commitment of leading 'the fight against global warming [...] in line with the objective of limiting any temperature increase to a maximum of 2 degrees Celsius above preindustrial levels' calls for a transformation and deep decarbonisation of the whole economy. A 'forward-looking climate policy' implies the reduction of fossil fuel emissions by 80 to 95% by 2050 compared to 1990 – and their complete phase-out by 2100 – and significant adaptation efforts.

In this overall context, there is increasing demand for translating the existing wealth of climate data and information into integrated and customised tools, products and information ('climate services'). These will then enable a more systemic approach to risk management, leading to climate-smart, strategic decisions at various levels for a range of end-users (businesses, the public sector, and individuals) and supporting EU mitigation and adaptation

policies⁸. For example, tools combining climate variability analysis and energy demand projections can improve energy supply planning and guard against shortages during critical times; planners and engineers can use long-term climate forecasts to decide where buildings or infrastructure should be sited as local flood risks change, or to design bridges that will withstand changing flood and wind stress risks; health agencies can use tools combining seasonal rainfall forecasts with exposure and demographic information to assess risks of malaria or dengue fever epidemics and to take precautionary measures. The definition of 'Climate Services' that can be found in the European research and innovation Roadmap for Climate Services⁹ states that this term covers 'the transformation of climate-related data – together with other relevant information – into customised products such as projections, forecasts, information, trends, economic analysis, assessments (including technology assessment), counselling on best practices, development and evaluation of solutions and any other service in relation to climate that may be of use for society at large'. Climate services target both adaptation and mitigation to climate change. The development of climate services will open broad market opportunities both to public and private operators to provide customised, high added-value services to a variety of users in relation to the risks and opportunities that climate change may bring to business, administrations and citizens. The development of markets for climate services will in turn make the EU a world leader in this sector and contribute to wealth and job creation. This action will also leverage the Copernicus Climate Change services (C3S), by both promoting broader use of Copernicus data and by supporting with research results the development of the operational service.

Realising the full market potential implies challenges, which need to be tackled by specific research and innovation activities. In the first place, this requires defining and matching the demand of end-users, also through the development of adequate interfaces between suppliers and users, to enable the uptake of climate information and services in real decision-making processes.

A better understanding of the demand and supply sides of the market is therefore needed, as well as a thorough assessment of the barriers and constraints associated with the provision and use of climate services, including gender issues. Even more crucial in building the business case for climate services is associating scientists, suppliers/purveyors and users with the process of developing and demonstrating the added value of climate service products for end-user communities/sectors (i.e. co-design and co-development). In this context, the European Commission undertook a call for ideas for demonstrators in the climates services domain, the results of which have been taken into account in shaping this call.

Addressing knowledge gaps to improve capabilities for predicting the evolution of climate and better estimating future possible impacts remains at the core of improving the quality of climate services. In this respect, the challenge is to ensure that scientific developments benefit

⁸ See the Roadmap to 2050 (COM (2011) 112) and An EU Strategy on adaptation to climate change (COM/2013/216)

⁹ <http://tinyurl.com/EUroadmapCS>

from the feedback of users and operational services such as C3S, and thereby deliver scientific improvements which enhance the relevance of services to end users.

Proposals are invited against the following topic(s):

SC5-01-2016-2017: Exploiting the added value of climate services

Specific Challenge: Responding to the climate change challenge requires climate-informed decision-making at all levels. The challenge is to minimise risks and costs and to seize opportunities.

Climate services (see introduction to this section of the call for a definition) have the potential to build the intelligence behind this transition, through the transformation of the wealth of data, information, model output and related methodologies into customised services and products that mainstream climate change into decisions and actions at all levels.

Bringing climate services to the market requires serving the demand of end-users and developing the business interface between suppliers and users of climate services.

The specific challenge of this action lies in the development of climate services concepts that are ready to be used, or show potential for future deployment, demonstrating the added value of using climate information and services by end-users in their operational decision-making.

Scope: Proposals should address only **one** of the following:

a) Demonstration of climate services (2016 – Innovation Action – IA): In order to measure the added value of climate services for end-users, they must be 'user-centric'. As such, climate services need to be co-designed and co-developed through close collaboration of suppliers/purveyors and users. This action will support the user-driven demonstration of climate services in sectors or business networks in which their deployment can already take place at the current state of knowledge, or with limited incremental efforts. Proposals therefore need to prove the maturity and sustainability of the concept, while also addressing the replicability and marketability of the proposed services.

The action funded must respond to a formulated need for climate services by end-users that are served by climate service suppliers or business intermediaries; the demonstration project must be co-designed and co-developed with these end-users. The core of the action should be the demonstration of climate services in relation to issues where climate-related intelligence can support tangible decision-making processes in the public or private domain.

Actions with the main objective of developing supply-driven methodologies, assessing knowledge gaps or pure networking activities will not be funded.

The added value of the climate service provided has to be measurable and should be validated by the end-users collaborating in the demonstration projects. The projects should communicate the added value of the services to other relevant end-user communities that must be specified in the proposal. If relevant, gender aspects in relation to the services may be

addressed. The action should also adequately address the barriers which currently hamper the full deployment of climate services in the given area and solutions to tackle these.

Given the focus on demonstrating the added value of a proven concept, the projects should be capable of delivering final results in a relatively short time period (typically within a project duration of two to three years). The funded action for climate services may be part of a larger development (e.g. infrastructure, wind farm) that is funded by additional or follow-up resources, be it private or public. One example is the relevant regional/national schemes under the European Structural and Investment Funds (ESIF), in particular under the European Regional Development Fund (ERDF), or other relevant funds such as the Instrument for Pre-accession Assistance (IPA II). Please note, however, that reference to such additional or follow-up funding will not lead automatically to a higher score in the evaluation of the proposal.

The response to the Call for Ideas launched by the Commission in December 2014 showed a wide range of demonstration possibilities with estimated budgets between EUR 0.8 million to EUR 5 million. Based on this outcome, the Commission considers that proposals requesting a contribution from the EU of up to EUR 5 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

b) From climate service concepts to piloting and proof-of-concept (2017 – Research and Innovation Action – RIA):

This action addresses areas where climate services show potential for being developed. Increasing the added value of climate services relies on matching the demand for services and the competences in the field. However, the availability of data, information and services does not always correspond to users' needs. Within a co-designed process, there is a need to develop future applications in the most promising fields and to mobilise end-user communities where demonstration projects are not yet feasible. This action should co-design (involving both suppliers/purveyors and users) pilot applications that support the proof-of-concept phase of climate services with high added-value in potential markets. The action should create case studies to address methodological issues, develop the user/provider interface, and test the relevance of climate services with a view to co-designing demonstration projects with the end-users at a later stage.

This action focuses on broad areas of application with a European or global scope. Proposals should take into account and where possible build upon activities addressed by other initiatives such as the ERA-NET Cofund action on climate services opened in the Horizon 2020 Societal Challenge 5 call of 2015.

Actions should foresee activities to cluster with other projects financed under this topic and – if possible – also under other parts of Horizon 2020.

The Commission considers that proposals requesting a contribution from the EU in the range of EUR 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: a) The project results are expected to contribute to:

- facilitating rapid deployment and market uptake of climate services by demonstrating their added value;
- providing added-value for the decision-making process addressed by the project, in terms of effectiveness, value creation, optimised opportunities and minimised risks;
- increasing the provision of climate services with added value to the end-users;
- fostering market uptake of climate services;
- offering concrete solutions to overcome barriers hampering deployment of climate services in the specific area of application.

b) The project results are expected to contribute to:

- providing added-value for the decision-making process addressed by the project, in terms of effectiveness, value creation, optimised opportunities and minimised risk;
- enhancing the potential for market uptake of climate services demonstrated by addressing the added value;
- ensuring the replicability of the methodological frameworks for value added climate services in potential end-user markets;
- promoting a better informed and connected end-user community.

Type of Action: Research and Innovation action, Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

SC5-02-2017: Integrated European regional modelling and climate prediction system

Specific Challenge: European decision makers and businesses currently lack access to a consistent and authoritative Europe-wide set of climate simulations at appropriate spatial and temporal scales upon which regional, national and local climate-related risk assessments and climate change adaptation programmes and businesses could be built. There is high demand for, and an urgent need to develop, integrated multi-model ensemble climate predictions at European scale which can provide actionable climate information and assessments. This integrated climate prediction system should go hand in hand with coordinated regional modelling and observational studies to constitute a robust foundation for Europe-wide climate service activities. It should be based on user requirements and provide trustworthy and easily accessible climate information which can be utilised across Europe and beyond.

Scope: The main research objective of this action is to develop an innovative European regional ensemble climate prediction system based on a new generation of high-resolution climate models, covering timescales from seasons to decades initialised with observations. The action should conduct a series of multi-method and multi-model experiments in order to better capture uncertainties, and provide user-centred and demand-driven information which addresses user needs at various levels.

The system should focus on near term (~1-40 years) predictions, which is the time span most relevant for many decisions of businesses and public authorities for infrastructure and other planning.

The regional downscaling programme, an integral part of the multi-model ensemble prediction system, should target Europe at the best technically achievable spatial resolution. Methodologies should be transferable to other geographical areas. Evaluation of model results against observations is considered essential.

Climate model data should be widely disseminated, and therefore need to be easily accessible and available in line with Copernicus Climate Change service specifications.

Strong engagement with stakeholders and climate information end-users, including public sector policy-makers, business organisations and customers representing specific market sectors is an essential requirement of this action.

In line with the strategy for EU international cooperation in research and innovation (COM(2012)497), international cooperation is encouraged, in particular with countries having developed similar systems and with countries wishing to develop capacities.

The Commission considers that proposals requesting a contribution from the EU in the order of EUR 13 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts. Up to one action shall be funded.

Expected Impact: The unique ensemble of climate predictions developed in this action should become the reference climate information from regional to local scale across Europe to assess the impacts and risks of climate variability and change as solid basis upon which investment decisions, spatial planning, policy and adaptation options can be built. More specifically, project results are expected to contribute to:

- increasing the credibility and usability of climate predictions, and the identification and characterisation of trends in regional climate extremes;
- providing an authoritative foundation of climate information to assess the impact of climate change;
- boosting climate service market applications at European level for a variety of sectors, based on the new information;
- supporting the building of a climate resilient economy and strengthening civil protection;

- closing the gap between 'top-down' climate information provisions and 'bottom-up' end-user requirements.

Type of Action: Research and Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

SC5-03-2016: Climate services market research

Specific Challenge: Climate services are a specialised field, but have the potential to evolve into a promising market, able to scale up the cost-effectiveness of climate change adaptation and mitigation in Europe and beyond. To enable the growth of the climate services market, there is a need to better understand the nature and scope of both the demand and supply sides, and to assess constraints and opportunities, so as to identify the untapped potentials and enabling conditions for market development in Europe.

Scope: Actions should address **one** of the following:

a) Defining the European and international climate service market characteristics and foresight into market growth: Proposals should develop a comprehensive analysis of users, their needs, constraints and capabilities, and a systematic assessment of European climate services providers/purveyors – operating at national, European and international levels – together with their business models and services provided. Based on this, the potential for market development should be assessed. This covers assessing the potential of including climate services in the decision-making process of perspective users (public administrations, business, individuals); translating users' needs into the required services, access and capabilities; assessing the divide between users' needs/perceived market potentials and services supplied, and identifying service and innovation gaps and responses.

b) Climate services market barriers and enabling conditions: Proposals should assess the constraints and enablers – of scientific, technical, legal and socioeconomic nature – for the uptake of climate services and the growth of the market, leading to identification of gaps and responses. Proposals should develop a comprehensive analysis including: the assessment of policy environments and supportive frameworks (e.g. incentives, voluntary schemes, and standards); the assessment of the implications of competition and synergies among different provision modes (public/private, EU/national/local level); the analysis of ethical, legal and intellectual property implications of provision and use of climate services, including the assessment of criteria and protocols for quality assurance and quality control.

For both, based on appropriate surveys and analysis of case studies, proposals should develop best practices and recommendations for both climate services providers/purveyors and policy makers, with a view to growing the market and enhancing users' access to quality services.

Adequate involvement of, and outreach to, relevant stakeholders and multiplier organisations, as well as feedback and linkages to the relevant platforms and research and innovation actions

in the field should be ensured. The topic calls for a strong trans-disciplinary approach. The participation of partners with a sound track record in market research is expected.

Projects with duration of maximum 2 years will be financed.

The Commission considers that proposals requesting a contribution from the EU in the range of EUR 1.5 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: The project results are expected to contribute to:

- enhanced access to climate services;
- greater reliability of climate services;
- better relevance and use of climate services for and by user organisations, through a supportive environment for business and the development of existing and creation of new markets, building market share;
- the development of a new generation of highly-customised climate services, tailored for users' needs;
- strengthening and broadening the use of climate services to new sectors/users.

Type of Action: Research and Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

SC5-04-2017: Towards a robust and comprehensive greenhouse gas verification system

Specific Challenge: According the IPCC's 5th Assessment Report, atmospheric concentrations of CO₂, CH₄ and N₂O have increased to levels unprecedented in at least the last 800 000 years. CO₂ alone has increased by 40% since pre-industrial times, primarily from fossil fuel emissions and also from net land use change emissions. Trust in any international agreement under UNFCCC aimed at limiting global warming will depend on our ability to make accurate estimates of greenhouse gas (GHG) emissions as well as provision of mitigation services allowing robust reporting and verification against independent data and analyses.

However, a better understanding of the carbon and nitrogen cycle in the earth-climate system remains one of the key knowledge gaps. It is therefore essential that we increase our capability to identify more accurately the stocks and fluxes of these important greenhouse gases and at the same time develop methods and technologies that will enable us within the next five to ten years to accurately estimate and also verify CO₂, CH₄ and N₂O emissions from key sources.

Scope: Actions should quantify more accurately the stocks and fluxes of CO₂, CH₄, and N₂O in Europe at both regional and continental scales through improved descriptions of key processes and feedbacks, state-of-the art methodologies, models and tools and by exploiting observations from a wide range of monitoring networks (in-situ and satellite). Special attention should be given to independent verification of data reported in countries' greenhouse gas inventories and to the improvement of the methods/approaches currently used for estimating greenhouse gas emissions (e.g. national inventories, tracer transport inversion using atmospheric and oceanic measurements, land-use measurements and models). Proposals should aim to develop widely accepted and scientifically robust methodologies in order to decrease to acceptable levels uncertainties associated with emission estimates and better identify human-induced emissions. The development and improvement of methodologies should also address the need for versatility of application, for example for the tracking of land-based mitigation activities and provision of results relevant to current and potential future land-based GHG accounting systems. Furthermore, issues such as data standards, transfer of information and tools, and replicability of methodologies and tools outside Europe (mainly in developing countries) should also be addressed.

The Commission considers that proposals requesting a contribution from the EU in the range of EUR 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: The project results are expected to contribute to:

- facilitating the development of an operationalised greenhouse gas monitoring, reporting and independent verification system;
- improving the ability to monitor and verify greenhouse gas emissions under an international climate agreement by significantly decreasing current uncertainties associated with greenhouse gas emission estimations;
- supporting EU climate policies by providing reliable information on greenhouse gases in Europe over appropriate spatial and temporal scales;
- providing input (such as data, models, methods) to key international programs and assessments (Global Carbon Project, IPCC, Future Earth).

Type of Action: Research and Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

SC5-05-2016: A 1.5 million year look into the past for improving climate predictions

Specific Challenge: Ice cores contain unique and quantitative information about past climate forcing and responses and have provided essential evidence about mechanisms of climate change, underpinning our understanding of future climate change. The challenge is to extend

the record/analysis back to the so called 'mid-Pleistocene transition', when the frequency of glacial cycles changed considerably in response to orbital perturbations. This will allow to better constrain the climate response to future GHG emissions and unravel key linkages between the carbon cycle, ice sheets and atmospheric and ocean climate. A realistic target is to acquire a new ice core from the Antarctic that will contain a record back to 1.5 million years (Myr), but a suitable site where such ice exists has not yet been identified and will require a significant integrated effort.

Scope: The action should support the preparations for new ice-drilling campaigns in Antarctica and help screen suitable sites where future drilling could provide ice-core records, extending up to 1.5 million years into the past. It should aim to define the feasibility of acquiring a 1.5 Myr ice-core record and establish a technical and logistic roadmap for the development of an international drilling campaign, while developing the financial engineering and the framework for international cooperation necessary to support the future endeavour.

In line with the strategy for EU international cooperation in research and innovation (COM(2012)497), international cooperation is encouraged.

In agreement with the Commission services, projects should ensure appropriate flexibility so as to respond in real time to potentially fast-changing policy scenarios.

The Commission considers that proposals requesting a contribution from the EU in the range of EUR 2 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts. Up to one action shall be funded.

Expected Impact: The project results are expected to contribute to:

- creating the pre-conditions for the future drilling campaign to take place;
- fostering, ensuring and coordinating the commitment of Member States and international partners in the future drilling campaign;
- enabling the deployment of the most innovative techniques, technologies and methodologies;
- sustaining the leadership of the European ice-core community, including through interaction with the International Partnership in Ice Core Sciences (IPICS).

Type of Action: Coordination and support action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

TOWARDS A LOW-CARBON EUROPE

The objective of the actions in this section of the call is to deepen the analysis of possible and

cost-effective trajectories for Europe to achieve its medium and long-term climate objectives while maximising societal benefits and economic prosperity. The EU is committed to pursuing policies which are consistent with the overall political objective of keeping the global mean temperature increase below 2°C. The EU has confirmed its target to achieve domestic emissions reduction of at least 40% by 2030. Furthermore, based on the 'Roadmap for moving to a low-carbon economy in 2050', pursuing a deep decarbonisation pathway will require at least an 80% reduction of domestic greenhouse gas emissions in the EU by 2050 (compared to 1990). In addition, several research results assessed by the IPCC (5th Assessment Report) show that all pathways leading to a reasonable probability to keep average warming below 2°C imply global net near-zero or even negative emissions by the end of the century. A socio-economic transformation of this scale will require a paradigm shift and will have massive spill-over effects across the whole of society, but with different distributional implications, benefits and costs across individual economic sectors and social groups.

Proposals are invited against the following topic(s):

SC5-06-2016-2017: Pathways towards the decarbonisation and resilience of the European economy in the timeframe 2030-2050 and beyond

Specific Challenge: In the broad spectrum of the feasible decarbonisation pathways, the challenge for political and economic decision-makers is to weigh uncertain impact chains against potentially devastating damage, immediate and medium-term engagement against long-term benefits, and the need for global mitigation efforts against differences in economic and political outlook on the international scene. It is therefore imperative to build a comprehensive evidence-based framework for research, business, investment and policy decision making which is able to assess the socio-economic implications of and incentives for medium- to long-term decarbonisation pathways (including their associated costs, benefit and risks), the challenges of planning medium- to long-term technological transitions, the adequacy of future global commitments for achieving long-term climate goals as well as the risks and costs of climate change. This action should be built around the co-design of pathways and scenarios with economic and societal actors and address relevant cross-sectorial perspectives of the decarbonisation of the European economy.

Scope: Trans-disciplinary approaches, including social sciences, are considered necessary to address this specific challenge.

Projects should also foresee activities to cluster with other projects financed under this topic and – if possible – also under other parts of Horizon 2020.

Proposals should address **one** of the following:

a) Managing technology transition (2016): The decarbonisation of European society will require a series of gradual or rapid technology changes in different sectors such as power generation, transport, industry, agriculture, and residential energy use. The massive deployment of new or existing low-carbon and smart technologies within a relatively short

time represents an enormous challenge for innovators, regulators and investors, as well as for users and citizens. Proposals should explore and address the challenges of planning technological transition ahead of time and prioritising within and between different sectors in Europe so as to support stringent mitigation policies, taking into account among other aspects the inertia in innovation systems and lock-in effects. Special emphasis should be given to non-technological factors and drivers and innovative solutions influencing the development and deployment of low-carbon and smart technologies within the transformational requirements of the deep decarbonisation pathways for the timeframe 2030-2050 and beyond.

Proposals should also explore the inter-linkages between large-scale deployment of low-carbon technologies and intra-EU and international trade, energy security, job creation and the competitiveness of the European economy, as well as the necessary policy interactions across different governance levels (EU, national and sub-national). In addition, proposals should address the socio-economic and environmental implications of deep decarbonisation, including the consequences for supply chains and production of goods (e.g. agriculture, industry, feedstock, raw material availability) and the impacts on various social groups (including gender aspects). Proposals should also identify necessary changes in investment patterns, financial mechanisms and regulatory incentives in order to achieve sustainable growth, job creation and ambitious low-carbon goals.

Proposals should provide a research and innovation framework which allows the co-design of pathways and scenarios with key economic and societal actors and addresses relevant cross-sectorial perspectives of the decarbonisation of the European economy.

The Commission considers that proposals requesting a contribution from the EU of between EUR 4 million and 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.

b) Assessment of the global mitigation efforts in the perspective of the long-term climate goal (2016): The Parties of the United Nations Framework Convention on Climate Change (UNFCCC) agreed to limit the rise of global mean temperature to 2°C compared to pre-industrial levels, in order to prevent dangerous anthropogenic (i.e. human-caused) interference with the climate system. The 21st Conference of Parties of the UNFCCC, known as COP21, which will be held in December 2015 in Paris, will mark a milestone in the course of international efforts to engage on global climate action consistent with the 2°C target.

Proposals should analyse the adequacy of the outcomes of COP21 and the pledges of major emitting countries in view of the long-term climate goal. Proposals should also address the available pathways and necessary level of actions that will be needed to be on track with the objective of limiting temperature increase to below 2°C. Furthermore, proposals should analyse the implications and opportunities emerging from the UNFCCC negotiations on European decarbonisation and broader objectives, particularly in view of industrial competitiveness, green growth, international trade, energy security, public finance and cross-border capital flows.

In line with the strategy for EU international cooperation in research and innovation (COM(2012)497), international cooperation is encouraged, in particular with countries that substantially contribute to global greenhouse gas emissions. Proposals should include partners from (non-European) high-, middle- and/or low-income countries.

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

c) The risks and costs of climate change for Europe (2017): Climate change can induce large – or eventually extremely large – environmental and socio-economic damage. Defining and assessing complex impact chains under different climate change scenarios – from unmitigated to effectively mitigated – including macro-economic consequences (such as impact on growth and welfare) as well as non-market damage constitute a prerequisite of policy-making. In this constantly evolving research area, efforts must continue to further develop modelling tools and formulate more detailed and downscaled projections associated with the possible consequences of climate change, also taking into account climate tipping points and low-probability, high-impact events. Proposals should build on the latest results of climate science, with special regard to the IPCC's 5th Assessment Report and also relevant European projects¹⁰, and contribute to the evolution of methodologies in physical science, risk assessment and economics. Improved methodologies should then be applied to the analysis of possible impact chains, as well as to the economic valuation of climate action (mitigation and adaptation) in the EU at various levels (regions, countries, economic sectors) over medium to longer-term timeframes. Proposals should focus their analysis on Europe, but take into consideration the global context of climate change.

The Commission considers that proposals requesting a contribution from the EU of between EUR 4 million and EUR 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: Project results are expected to contribute to:

a)

- fostering the design and implementation of cost-effective medium to long-term technological transitions, consistent with decarbonisation pathways and economic development in Europe and beyond;
- providing a medium to long-term vision on low carbon technological development and deployment in Europe, within the context of a global economy;
- fostering greater transparency of models, methods and tools;

¹⁰ For example the PESETA II project (<http://peseta.jrc.ec.europa.eu/>)

- contributions to major international scientific assessments (e.g. IPCC);
- enhancing the science-decision making interface, through co-creation/co-design with economic and societal stakeholders;

b)

- providing a thorough analysis of the adequateness, potential and barriers of international mitigation efforts in the perspective of the long-term climate target, and their repercussions for EU goals and policies;
- identifying most pressing areas for policy action at European or national/regional level;
- contributions to major international scientific assessments (e.g. IPCC);
- enhanced scientific cooperation with third countries;

c)

- providing more accurate and downscaled economic valuation of climate-induced impacts and risks in Europe;
- decreased uncertainties concerning the economic valuation of climate action in the EU, over the longer term (2050 and beyond);
- fostering greater transparency of models, methods and tools;
- contributions to major international scientific assessments (e.g. IPCC).

Type of Action: Research and Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

SC5-07-2017: Coordinating and supporting research and innovation actions on the decarbonisation of the EU economy ¹¹

Specific Challenge: There is a constant need for strengthening the information flow and enhancing the exchange of experience on on-going and future European and international research and innovation activities concerning low-carbon transition scenarios, as well as for maintaining continuous dialogue between the scientific community, economic and societal stakeholder groups and policy-makers in order to better support EU policy processes targeting the decarbonisation of Europe's economy between 2030 and 2050 and beyond.

Scope: The action will support the work of a panel of personalities, expected to be established by the European Commission. The panel's role will be to provide strategic-level, trans-

¹¹ This activity directly aimed at supporting the development and implementation of evidence base for R&I policies and supporting various groups of stakeholders is excluded from the delegation to EASME and will be implemented by the Commission services.

disciplinary advice to the European Commission in this area of research and to ensure co-design through appropriate engagement of relevant stakeholders. This action should create a network of leading scientists and relevant research projects in the field of EU decarbonisation strategies, contributing to the definition of robust scientific statements and coverage of knowledge gaps. The project should from an early stage establish links with policy-makers and stakeholder groups at EU, national and sub-national level, in order to inform policy and business processes and set up feedback loops. The project should provide foresight analysis on emerging issues, produce sectoral and macro-economic syntheses emanating from results of EU-funded projects, and elaborate recommendations on current and emerging policy-relevant issues. It should also engage in active communication and dissemination of results. This action will have to be implemented in close cooperation with the European Commission's Directorate General for Research and Innovation in order to allow for constant alignment with and support for policy initiatives.

The Commission considers that proposals requesting a contribution from the EU of between EUR 2.5 million and EUR 3 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts. Up to one action shall be funded.

Expected Impact: Project results are expected to contribute to:

- enhanced coordination of European and Member State research and innovation actions on decarbonisation pathways and scenarios;
- better informed policy and business processes within a cross sectoral and integrated perspective, based on the latest scientific findings and recommendations for managing a low-carbon transition at various levels;
- the introduction and further development of the notion of cost-effectiveness, resulting from better medium-to-longer term planning and coordination.

Type of Action: Coordination and support action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

NATURE-BASED SOLUTIONS FOR TERRITORIAL RESILIENCE

Human societies are facing a broad range of challenges in urban, rural and natural areas: climate change, unsustainable urbanisation, natural disasters, threats to food security, biodiversity loss, air pollution, degradation of natural capital and ecosystem services, or water quality and scarcity.

The objective of this part of the call is to position Europe as world leader in innovation through nature based solutions to these challenges to simultaneously improve economic (new products, services, business models, mobilization of new investments), social (jobs, well-

being, community solidarity and health) and environmental (preservation and restoration of biodiversity, ecosystems and ecosystem services, sustainable land use and spatial planning, land take and soil sealing, as well as reduced air and noise pollution) resilience of rural and natural areas by taking into account the wider system and aiming at ecological stability.

Nature-based solutions are inspired or supported by nature and simultaneously provide environmental, social, cultural and economic benefits. Nature-based solutions, such as well-connected green and blue infrastructure, green and unsealed surfaces in cities, green roofs, natural water retention measures, and salt marshes and dunes for coastal protection, use the properties and functions of ecosystems to provide water regulation, flood risk protection, climate change adaptation, etc. They are designed to bring more nature and natural features and processes into cities, landscapes and seascapes, through locally adapted and systemic interventions. They are locally attuned, resource efficient, multi-purpose, multi-functional and multi-beneficial¹². These key features of nature-based solutions make them different from 'grey' infrastructure, such as artificial river banks, dikes, etc. Robust EU-wide evidence of the cost-effectiveness and longer-term social, economic, cultural and ecological benefits of these solutions is currently lacking and this has prevented their wider deployment.

The outcomes of the Horizon 2020 Expert Group on nature-based solutions¹³ have been largely taken into account in prioritising the challenges identified in this part of the call to be addressed through the deployment of nature-based solutions and the knowledge gaps for which further evidence is necessary.

EU-wide evidence and a European reference framework about the cost-effectiveness of nature-based solutions to address societal challenges would contribute to creating a global market, supporting both supply and demand, mobilising new investment strategies and promoting their large-scale deployment.

It should be noted that actions addressing resilience in cities are found in the part of the 'Smart and Sustainable Cities' call on sustainable cities through nature-based solutions, in part 17 of this Work Programme.

Proposals are invited against the following topic(s):

SC5-08-2017: Large-scale demonstrators on nature-based solutions for hydro-meteorological risk reduction

Specific Challenge: Economic damage costs from extreme hydro-meteorological events (such as floods, droughts, storm surges, landslides) are increasing throughout Europe. Further investment in traditional, engineering solutions for risk prevention is no longer possible in

¹² For instance, nature-based solutions to enhance surface water retention of a river through re-connection of floodplains with the river watercourse will, in addition to flood risk mitigation, also enhance biodiversity, improve the ecological status of freshwater ecosystems, reduce habitat fragmentation, provide health and recreational benefits and improve the general attractiveness of the landscape for citizens and businesses. For natural water retention measures, see www.nwrm.eu

¹³ http://ec.europa.eu/research/environment/index_en.cfm?pg=nature-based-solutions

several cases, due to the very high costs, and to the limited flexibility offered by such solutions to cope with extreme events for which changes in frequency, intensity and distribution may be expected due to climate change. Nature-based solutions can be flexible, multi-beneficial alternatives to traditional engineering, but adequate proof-of-concept for their upscaling and replication is lacking.

Scope: Via large-scale demonstration, projects should aim to:

- develop, demonstrate and deploy innovative systemic and yet locally attuned nature-based solutions, including green and blue infrastructure and ecosystem-based management approaches, in rural and natural areas, including particularly sensitive ones such as mountainous and coastal areas, for hydro-meteorological risk reduction at watershed/landscape scale. Solutions should be incorporated in an integrated design concept for land management and planning and be co-designed and co-deployed in a trans-disciplinary multi-stakeholder and participatory context with due consideration to and integration of social and cultural aspects and climate change effects;
- develop a comprehensive framework for the comparison of green and blue/grey/hybrid hydro-meteorological risk prevention and reduction solutions, taking into account wider land use and adaptation to the effects of climate change, considering impacts on landscape, local communities and cultural acceptance as well as co-benefits such as biodiversity conservation/enhancement, more sustainable local livelihoods, human health and well-being, climate change mitigation, etc.;
- identify and assess barriers related to their social and cultural acceptance and policy regulatory frameworks and propose ways to overcome them;
- develop methodologies, tools and best practices enabling the replication and up-scaling of nature-based solutions in different contexts, including replication of innovative investment strategies, governance and business models, as well as performance assessment tools, protocols and standards for the design, operation and maintenance of these solutions;
- provide a consolidated evidence-base on co-development processes, performance standards, cost-effectiveness, operational requirements, life cycle costs and the multiple benefits of nature-based solutions as economically, socially, culturally and environmentally viable alternatives for hydro-meteorological risk reduction and climate change adaptation at watershed/landscape level, also considering the potential and limits of the solutions under different circumstances and conditions;
- establish long-term sustainable data platforms considering existing initiatives and alternative options, such as pan-European web-based repositories, securing open, consistent data and performance measurements and interoperability of data infrastructures to ensure effective communication, public consultation, exchange of practices and sharing of experiences and a continuous building up of the 'knowledge portfolio' in the longer term (i.e. following project completion).

Proposals shall address **all** of the above points.

The contribution of social sciences and humanities to these processes is considered necessary.

Projects should envisage resources for clustering with other projects funded under this topic, under topic SC5-10-2016, and relevant topics on sustainable cities through nature-based solutions funded under the 'Smart and Sustainable Cities' call in part 17 of this Work Programme.

Because of the substantial investments that might be necessary for implementing the nature-based solutions, additional or follow-up funding (private or public) should be sought, including from relevant regional/national schemes under the European Structural and Investment Funds (ESIF), in particular under the European Regional Development Fund (ERDF), or other relevant funds such as the Instrument for Pre-accession Assistance (IPA II). To this end, projects could seek contact with ERDF/IPA managing authorities and with the authorities who developed the Research and Innovation Smart Specialisation Strategies (RIS3). Please note, however, that reference to such additional or follow-up funding will not lead automatically to a higher score in the evaluation of the proposal.

In line with the strategy for EU international cooperation in research and innovation (COM(2012)497), cooperation and synergies with similar international demonstration activities on nature-based solutions for hydro-meteorological risk reduction and climate change adaptation, funded under different financial arrangements or programmes, is encouraged to facilitate mutual learning, sharing of experience, networking and follow-up. The project proposals could already indicate which interested regions/countries or other partners have been pre-identified for contact during the project.

The Commission considers that proposals requesting a contribution from the EU of at least EUR 12 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: Projects are expected to contribute to:

- the EU being recognised as a leader in nature-based solutions for hydro-meteorological risk reduction and climate change adaptation and thus enhancement of territorial, socio-economic and ecological resilience and coherence;
- the mainstreaming of nature-based solutions in land use planning, landscaping and territorial policies due to the provision of appropriate tools and best practices to assist decision makers, designers, competent authorities, planners, practitioners, enterprises, citizens and other stakeholders in reducing hydro-meteorological risks and in climate change adaptation;
- development of an integrated EU-wide evidence base and a European reference framework on nature-based solutions and the stimulation of a new culture for 'land use

planning' that links the reduction of risks with local and regional sustainable development objectives;

- enhanced market demand for nature-based solutions for hydro-meteorological risk reduction and climate change adaptation, due to the availability of protocols and standards for their design, operation, maintenance, performance monitoring and measuring of their broader economic, societal and environmental benefits;
- improved disaster risk management, due to enhanced capacity for providing quantitative assessments of nature-based solutions for disaster risk reduction and climate change adaptation;
- reduced human and financial costs due to better and more flexible disaster risk management with nature-based solutions;
- enhanced implementation of EU policies for disaster risk prevention and reduction, for climate change adaptation¹⁴, for Green Infrastructure¹⁵, and for water management (Water Framework Directive, Floods Directive, Blueprint to safeguard Europe's water resources), as well as of international frameworks, such as the Sendai Framework for Disaster Risk Reduction 2015-2030. Contribution to the priorities of the EIP Water.

Type of Action: Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

SC5-09-2016: Operationalising insurance value of ecosystems

Specific Challenge: There is an increasing trend worldwide in the occurrence and severity of disasters. This trend will be further aggravated by global changes, including environmental and climate change ones. As a result, individual households, industry, private investors and public authorities are finding themselves increasingly exposed to changing and multiple risks. Ecosystems, through the provision of their services, can provide more holistic solutions to disaster risk reduction and to the mitigation of the effects of climate change, while serving multiple purposes. For instance, they can simultaneously mitigate the impacts of hazards, enhance social, economic and environmental resilience, and reduce the exposure and vulnerability of communities, businesses, properties and other economic assets.

To promote the uptake of ecosystem-based approaches for disaster risk reduction and climate change adaptation, the theoretical and empirical exploration of the concept of insurance value of the ecosystems – the value of the sustained capacity of ecosystems to reduce or eliminate risks to human society and economic activities caused by global change or natural hazards – and methodologies for operationalizing the concept are needed.

¹⁴ An EU Strategy on adaptation to climate change, COM (2013) 216.

¹⁵ An EU-wide strategy on Green Infrastructure: Enhancing Europe's Natural Capital, COM(2013)249

The insurance value of ecosystems comprises both an estimate of reduced risk, due to the physical presence of an ecosystem, and of the capacity to sustain risk reduction (resilience of the system) under global change. The insurance value of ecosystems has so far been overlooked in research and practice: e.g. socio-economic approaches to estimating insurance value are poorly developed, methodologies for quantifying and qualifying the insurance value of ecosystems are still in their infancy, and relevant institutional and economic incentives to protect, enhance or restore this insurance potential are lacking.

Nature-based solutions, by means of their proper insurance capacity, can provide cost-effective solutions for disaster risk management and reduction, and for climate change adaptation, but can also be used for the protection, restoration and conservation of ecosystems and thus enhance the insurance value of the latter.

Scope: There is need for trans-disciplinary research on the insurance value of ecosystems, also involving legal, economic and financial expertise, to derive relevant quantitative assessments and propose ways through which such concepts can be practically used, for instance to provide incentives for promoting nature-based solutions in risk management and climate change adaptation agendas. Trans-disciplinary and participatory approaches including natural and social sciences and humanities are therefore considered necessary.

Actions should assess the potential of the insurance value of ecosystems and operationalize it in the design, development and implementation of risk reduction strategies. Proposals should aim to:

- develop methodologies and conceptual frameworks for assessing and monetising the insurance value of ecosystems and to integrate this into disaster risk management and climate change adaptation agendas. Analyse the qualitative and quantitative components and features of ecosystems needed to sustain the insurance capacity of ecosystems, including in urban areas. Provide evidence of the effectiveness of preventing further (ecosystem) degradation and of implementing nature-based solutions to protect, enhance and restore the insurance value of ecosystems, and for the potential of scaling-up from local to regional or other larger geographic scales;
- establish truly comprehensive participatory processes that engage all relevant stakeholders, e.g. individuals, industry, private investors, financial institutions and insurance companies and/or public authorities, in the evaluation, development and implementation of the insurance value of ecosystems taking account of the cultural dimension of the insurance value of ecosystems and people's perceptions of risks and insurance;
- develop and validate reliable and evidence-based methodologies to quantify short-term and long-term costs, benefits and co-benefits, at different scenarios, of increasing insurance capacity of ecosystems;

- provide EU standardised data, methodologies and models for quantifying insurance value by translating risk reduction and adaptive capacity into (monetary and non-monetary) value for different actors;
- develop and validate innovative financial frameworks and incentives and recommend changes to legal and/or regulatory frameworks for maintaining and/or enhancing the insurance capacity of ecosystems.

Proposals shall address **all** of the above points.

Projects should foresee activities to cluster with other projects financed under this part of the call, and relevant topics on sustainable cities through nature-based solutions funded under the 'Smart and Sustainable Cities' call in part 17 of this Work Programme.

The Commission considers that proposals requesting a contribution from the EU in the range of EUR 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: Projects are expected to contribute to:

- providing a robust scientific underpinning on the quantification, qualification and valuation of the insurance value of ecosystems to enable its full operationalization;
- integrating ecosystems insurance value into conventional insurance policies, leading to lower premiums for land and property insurance policies and decreased public costs for risk management and reduction;
- developing new public and private sector insurance models for resilience;
- increased participation and commitment of insurance companies to maintain or enhance the insurance capacity of ecosystems through innovative business models;
- increased deployment of multi-purpose and flexible, nature-based solutions by contributing to the development of policies that maintain or enhance the insurance capacity of ecosystems
- creating new business models that involve insurance companies in restoration activities;
- enhanced natural capital;
- creating business opportunities and a market for the preservation, restoration and protection of ecosystems and natural capital;
- supporting the objectives of the EU Adaptation Strategy¹⁶, particularly concerning the promotion of climate resilient investments and decision-making in the public and private sectors and the priorities of other EU and international policies, such as the EU Green

¹⁶ An EU Strategy on adaptation to climate change, COM (2013) 216.

Infrastructure Strategy and the Sendai Framework for Disaster Risk Reduction, where this is relevant.

Type of Action: Research and Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

SC5-10-2016: Multi-stakeholder dialogue platform to promote innovation with nature to address societal challenges¹⁷

Specific Challenge: Nature-based solutions have a large – but largely untapped – potential for delivering multiple ecosystem services (such as carbon sequestration and soil water retention and purification) contributing to green growth, climate action and territory resilience. To promote innovating with nature and speed up market up-taking of nature-based solutions for solving societal challenges there is a need to establish science-policy-business-society interfaces to allow for continuous dialogue and interaction. Such interfaces can take the form of multi-level partnerships, which bring together multi-disciplinary scientific expertise, policy, business and society, including NGOs, CSOs, and citizens as appropriate.

Scope: The EU multi-stakeholder innovation platform should aim to develop an integrated evidence base and a European reference framework on nature-based solutions and to promote the co-design, testing and deployment of improved and innovative nature-based solutions in an integrated way and at multiple scales and levels (from European to national, regional and local). This can be best achieved through strategic, effective and sustained dialogue, interactions and exchanges between science, policy, business and society to mainstream both the available knowledge into policy making and practice, and the needs of policy makers and practitioners into research and innovation policy and agendas. The platform must take due account of the outcomes of the large-scale demonstration projects to be funded under the 'Nature-based solutions for territorial resilience' part of this call as well as those on sustainable cities through nature-based solutions funded under the 'Smart and Sustainable Cities' call in part 17 of this Work Programme. It should also create synergies with other highly relevant ongoing (such as the Biodiversa ERA-net¹⁸) or upcoming (such as the EU Mechanism for Biodiversity and Ecosystem services¹⁹) initiatives.

Actions should:

- establish a broad multi-stakeholder (science, policy, business, society, including SMEs, public and private investors) and multi-level (local, regional, national and EU)

¹⁷ This activity directly aimed at supporting the development and implementation of evidence base for R&I policies and supporting various groups of stakeholders is excluded from the delegation to EASME and will be implemented by the Commission services.

¹⁸ <http://www.biodiversa.org/>

¹⁹ Horizon 2020 Work Programme SC5-10c-2015: Coordinating and supporting research and innovation for the management of natural resources: An EU support mechanism for evidence-based policy on biodiversity & ecosystems services.

innovation platform that facilitates the development of committed innovation partnerships for testing and deploying improved and innovative nature-based solutions (think-and-do-tank);

- steer dialogue to identify specific domains and priorities where further research and innovation is needed for marketable nature-based solutions;
- identify, communicate (e.g. by developing appropriate handbooks) and promote successful innovative nature-based solutions, including best practices, to foster their large scale deployment;
- identify potential regulatory, economic and technical barriers and propose concrete ways to overcome them;
- foster dialogue and collaboration across levels and with key strategic international partners. In line with the strategy for EU international cooperation in research and innovation (COM(2012)497), international cooperation is encouraged, in particular with key strategic international partners such as Latin America, countries participating in the Belmont Forum, and South East Asia.

Proposals shall address **all** of the above points.

In agreement with the Commission services, projects should ensure appropriate flexibility so as to respond in real time to potentially fast-changing policy scenarios.

The Commission considers that proposals requesting a contribution from the EU of up to EUR 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: Actions are expected to lead to:

- strategic, effective and sustained multi-stakeholder dialogue between science, policy, business and society, functional within six months of the onset of funding;
- emergence of a global market for nature-based solutions through:
 - o EU-wide evidence and increased awareness among stakeholders, decision and policy makers, practitioners and public about the multiple benefits, cost-effectiveness and economic viability of nature-based solutions to address societal challenges;
 - o better use of available knowledge for informed decision making, innovative solutions and more effective deployment;
 - o reduced (regulatory, institutional, cultural etc.) barriers;

- identification of users' needs, market potential and knowledge gaps to inform a market-oriented EU research and innovation policy agenda for nature-based solutions;
- improved coordination among EU Member States and Associated and Accession Countries on research, innovation and demonstration activities for nature-based solutions;
- improved cooperation and synergies with relevant strategic international research and innovation programmes and key strategic international partners such as Latin America, countries participating in the Belmont Forum, and South East Asia in order to create a global market on nature-based solutions.

Type of Action: Coordination and support action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

WATER

The objective of this part of the call is to harness the strong potential for European industry (including SMEs) to become global market leader in the water sector by continuing the efforts undertaken in the 2014-2015 Focus Area call 'Water Innovation: Boosting its value for Europe', i.e. bringing innovative water solutions to the market and supporting the implementation of the objectives of the European Innovation Partnership (EIP) and the Joint Programming Initiative on Water.

Water is a key resource and intervention at EU level is crucial to meet water demand from increased urbanisation and agriculture, and to manage the competition for scarce water from multiple uses and the water/energy nexus. Moreover, water, as part of the Sustainable Development Goals agenda, can provide additional opportunities for international co-operation (e.g. in the Mediterranean region). Water issues are therefore addressed across the entire Horizon 2020 structure and integrated in the work programmes of LEIT and of several Societal Challenges. Within the concept of the systemic approach of Societal Challenge 'Climate action, environment, resource efficiency and raw materials', actions to boost water innovation for Europe and beyond are also addressed in the areas of the Work Programme on the circular economy, sustainable cities, climate services, territorial resilience etc. Topics in the Work Programme 2016-2017 with a clear relevance to water issues, in addition to those listed in this part of the call, include the following:

- SC5-01-2016-2017: Exploring the added value of climate services
- SC5-02-2017: Integrated European regional modelling and climate prediction system
- SC5-03-2016: Climate services market research

- SC5-08-2017: Large-scale demonstrators on nature-based solutions for hydro-meteorological risk reduction
- CIRC-02-2016-2017: Water in the context of the circular economy
- SPIRE-01-2016: Systematic approaches for resource-efficient water management systems in process industries
- SCC-02-2016-2017: Demonstrating innovative nature-based solutions in cities
- LCE-26-2016 Cross-thematic ERA-NET on Applied Geosciences.

Moreover a high number of topics in the calls H2020-SFS-2016-2017 'Sustainable Food Security – Resilient and resource-efficient value chains' and H2020-RUR-2016-2017 'Rural Renaissance – Fostering innovation and business opportunities' also address issues related to water management in agriculture and/or food production.

Proposals are invited against the following topic(s):

SC5-11-2016: Supporting international cooperation activities on water²⁰

Specific Challenge: The outreach and opening of the Water JPI to third country partners is increasingly raising interest among the latter. Building on this momentum, the challenge is to further enhance the opening of the Water JPI to international cooperation and thus contribute to creating a coherent European Research Area that is open to international cooperation in the area of water – a global research and innovation challenge *par excellence*. In addition, it is foreseen that this topic would consolidate the alignment of national, EU and international water research and innovation programmes, which is one of the key objectives of Joint Programming Initiatives. Finally, there is a need to support the post-2015 global goal for water, building on related international activities taking place at United Nations level.

Scope: Proposals should aim to create a framework and permanent dialogue to encourage the opening in a structured and strategic manner of the Water JPI to international cooperation with key international water research and innovation programmes and funding and investment institutions. Proposals should also investigate activities to align with and support the post-2015 sustainable development agenda, in particular the Sustainable Development Goal on water and its impact on other goals, such as nutrition, education, health, etc. Flagship actions for possible joint funding between the members of the JPI Water, international cooperation partners and international programmes of strategic importance for the EU should be identified and prepared for.

This action should also organise and develop the knowledge base required to address water challenges and EU policy priorities within a global perspective. This can be accomplished through access to an integrated analysis of research results and recommendations arising from

²⁰ This activity directly aimed at supporting the development and implementation of evidence base for R&I policies and supporting various groups of stakeholders and the promotion of coherent and effective cooperation with third countries is excluded from the delegation to EASME and will be implemented by the Commission services.

national and EU funded research and innovation projects in the area of water research and innovation. The ultimate result would be more efficient knowledge transfer, wider dissemination and take-up of research findings both in terms of policy and innovation. In addition, it would strengthen links with relevant water sectors and the Water Supply and Sanitation Technology Platform.

The Commission considers that proposals with a duration of five years requesting a contribution from the EU in the range of EUR 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: Projects are expected to contribute to:

- increasing the scale and ambition of water research and innovation activities beyond the level that would otherwise be sustainable, increasing the overall coherence and efficiency of the use of European resources and valorising European know-how on water solutions at global level in the context of the post-2015 sustainable development agenda;
- making the Water JPI, in collaboration with the European Commission, a privileged and attractive partner for global cooperation in research and innovation, notably in the context of the Belmont Forum;
- a strengthened role of the Water JPI for underpinning knowledge and evidence for supporting the implementation of related EU policies and for fostering the EU's position in global water-related negotiations and fora.

Type of Action: Coordination and support action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

SC5-12-2016: Food systems and water resources for the development of inclusive, sustainable and healthy Euro-Mediterranean societies²¹

Specific Challenge: Rapid demographic, socio-economic, and climate changes are threatening the sustainable development of the Mediterranean region, especially the capacity of its agriculture to cope with increased demand for food production in a scenario of water scarcity and increasing competition for water use between different sectors. To address this challenge, it is recognised that a significant and well-coordinated research effort at regional scale is needed to find innovative solutions to sustainable food production and water use. In its recent conclusions on a partnership for research and innovation in the Mediterranean area, the EU Council recalled the importance of creating a stable long-term and sustainable framework to deal with these challenges, based on the principles of co-ownership, integration, mutual

²¹ This activity directly aimed at supporting the development and implementation of evidence base for R&I policies and supporting various groups of stakeholders and the promotion of coherent and effective cooperation with third countries is excluded from the delegation to EASME and will be implemented by the Commission services.

benefit and shared benefit between both shores of the Mediterranean basin. To ensure a long term commitment from the participating countries in a well-structured and integrated partnership, it is necessary to prepare the ground by integrating various related on-going joint programming activities on food and water into a large scale coherent programme with well-defined objectives and implementation actions.

Scope: The objective of this action is to bring together the main national research funding owners and/or managers involved in the PRIMA joint programming process, including the non-European participating states and their institutions, around a jointly designed Strategic Research Agenda with appropriate governance and implementation structures. A critical mass of players and increased synergies between all relevant stakeholders (e.g. relevant ministries responsible for sustainable agricultural production systems and water resources management, research institutions and universities, farmers' organisations) will be key elements for addressing the challenge.

In agreement with the Commission services, projects should ensure appropriate flexibility so as to respond in real time to potentially fast-changing policy scenarios.

The Commission considers that proposals requesting a contribution from the EU of up to EUR 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: Projects are expected to contribute to:

- reinforced cooperation and coordination of food systems and water research programmes within a long term partnership involving research funding bodies, universities, ministries or any other stakeholders from the two sides of the Mediterranean area;
- reducing fragmentation of efforts and enhance a collective ownership;
- facilitating consultation, awareness and commitment;
- supporting structural, long-lasting progress toward sustainable economic and social development in the Mediterranean;
- unlocking the innovation potential of participating countries in water management and use for food security;
- optimising the launch and implementation of a long term partnership, ensuring an appropriate funding from the participating countries and leverage effect.

Type of Action: Coordination and support action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

RAW MATERIALS

The EU is highly dependent on raw materials that are crucial for a strong European industrial base, an essential building block of the EU's growth and competitiveness. However, Europe is confronted with a number of challenges along the entire raw materials value chain, from sustainable exploration, extraction, processing, recycling and after mining activities to secure a sustainable access to non-energy non-agricultural raw materials used for industrial purposes, including Critical Raw Materials.

The actions in the raw materials part of the Societal Challenge 5 are expected to contribute to the implementation of both the Raw Materials policy²² and the Strategic Implementation Plan²³ of the European Innovation Partnership (EIP) on Raw Materials. The actions are complementary to and synergetic with the new Knowledge and Innovation Community (KIC) on Raw materials²⁴, selected under the Horizon 2020 call of the European Institute of Technology (EIT) in support of the objectives of the EIP on Raw materials.

The main focus of the raw materials part of this call is on securing the supply of minerals and metals through sustainable innovative production technologies for primary and secondary raw materials. This part is complementary to the cross-cutting call on 'Industry 2020 in the Circular Economy', which focuses more on resource efficiency, re-use and product life cycles.

In order to reach the critical mass of available funding, issues related to bio-based materials (wood-based and natural rubber) are mainly targeted by Societal Challenge 2 'Food security, sustainable agriculture and forestry, marine, maritime and inland water research, and the bio-economy'²⁵ and the Joint Undertaking for Bio-Based Industries (BBI), with the exception of one topic in this call specifically targeting the supply of wood²⁶. Similarly, substitution of critical and scarce raw materials is mainly addressed under the Industrial leadership pillar of Horizon 2020 in the part on 'Advanced materials and nanotechnologies'²⁷.

In the 2016-2017 period, the first large innovative pilot actions at higher TRL levels (6-8) will be launched to demonstrate viability of cost-effective, environmentally sound and safe

²² Communication on the Raw Materials Initiative "Meeting our critical needs for growth and jobs in Europe" - COM(2008) 699 final, and Communication on commodity markets and raw materials - COM(2011) 25 final

²³ <https://ec.europa.eu/eip/raw-materials/en/content/strategic-implementation-plan-sip-0>

²⁴ <http://eit.europa.eu/eit-community/eit-raw-materials>

²⁵ BB-1-2016: Sustainability schemes for the bio-based economy; BB-2-2017: Towards a methodology for the collection of statistical data on bio-based industries and bio-based products; BB-3-2017: Adaptive tree breeding strategies and tools for forest production systems resilient to climate change and natural disturbances; BB-4-2016: Intelligent solutions and tools in forest production systems, fostering sustainable supply of quality wood for the growing bioeconomy; RUR-05-2017: Novel public policies, business models and mechanisms for sustainable supply and payment of forest ecosystem services; Other: 2. Specific Grant Agreements (SGAs) for ERA-NET Cofund actions supporting Joint Actions towards Public-Public Partnerships in the Bioeconomy: B. Innovative forest-based bioeconomy

²⁶ SC5-17f-2017: EU network of regions on sustainable wood mobilisation

²⁷ NMBP 03-2016: Innovative and sustainable materials solutions for the substitution of critical raw materials in the electric power system

production of primary and secondary raw materials and to unlock a substantial volume of various raw materials within the EU. For the pilot actions, the opportunities to harness funding from ESIF will be explored. Innovation actions with relevance to raw materials are also targeted by the calls under SPIRE PPP²⁸.

Co-ordination and support actions will target different parts of the raw materials value chain taking into account the wider system, including the framework conditions for sustainable primary and secondary raw materials production that would provide a stable and competitive supply from the EU sources; building the EU knowledge base of primary and secondary raw materials; better co-ordination of the Member States' research and innovation programmes and funded activities; as well as international co-operation with countries producing and using raw materials.

Proposals are invited against the following topic(s):

SC5-13-2016-2017: New solutions for sustainable production of raw materials

Specific Challenge: The EU is highly dependent on raw materials that are crucial for a strong European industrial base, an essential building block of the EU's growth and competitiveness. Securing the sustainable access to raw materials, including metals, industrial minerals and construction raw materials, and particularly Critical Raw Materials (CRM), for the EU economy is of high importance. However, the EU is confronted with a number of technological challenges along the entire raw materials production value chain of primary and secondary raw materials. There is also a need for clean and sustainable raw materials production solutions to avoid environmental damage.

This specific challenge is identified in the Priority Area 'Technologies for primary and secondary raw materials' production of the European Innovation Partnership (EIP) on Raw Materials.

Scope: All proposals should develop sustainable systemic solutions through industrially- and user-driven multidisciplinary consortia covering the relevant value chain of non-energy non-agricultural raw materials.

Assessment of the related environmental and safety risks and a plan to communicate the added value of the proposal to the local communities and society for improving public acceptance and trust should be addressed by all the proposals. Participation of civil society²⁹ from the start of exploration until after-mining activities in a process of co-design, co-development and co-implementation is strongly encouraged.

Projects should include a work-package to cluster with other projects financed under this topic and – if possible – with other relevant projects in the field funded by Horizon 2020, in support of the EIP on Raw Materials.

²⁸ SPIRE 07-2017: Integrated approach to process optimisation for raw material resources efficiency, excluding recovery technologies of waste streams

²⁹ See the paragraph on engaging society in the introduction to this Work Programme

In line with the EU's strategy for international co-operation in research and innovation (COM(2012)497) international co-operation is encouraged.

Proposals should develop solutions validated in lab or in industrially relevant environment, finishing at the level of Technology Readiness Levels (TRL) 4-5.

The Commission considers that proposals requesting a contribution from the EU of between EUR 3 million and 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 shall address **only one** of the following issues:

a) Sustainable selective low impact mining (2016): Proposals should develop new sustainable selective low impact technological solutions for mining of small mineral deposits (including those with chemically complex ore-forming phases) on the land. The proposals have to clearly show integration of mining solutions with the processing and/or metallurgy steps in order to justify economic viability of the overall process. Proposals should include the participation of technology oriented SMEs, as far as possible.

b) New technologies for the enhanced recovery of by-products (2016): Proposals should evaluate the potential by-products existing in primary or secondary raw materials (usually accompanying the major constituents at low concentrations) and should develop energy-, material- and cost-efficient new mineral processing and/or metallurgical technologies and processes to increase the selectivity and the recovery rates of valuable by-products, particularly Critical Raw Materials. The importance of the targeted sources of by-products for the EU economy has to be duly demonstrated in the proposal.

c) New sensitive exploration technologies (2017): Proposals should develop new and more sensitive environmentally sound exploration technologies and solutions (such as remote sensing technologies, innovative multi-method approaches to reprocess existing or new geophysical data) able to identify targets for detailed exploration on the land with lower costs, leading to finding new deposits and to re-assessing the mineral potential for the EU. Any of the metallic, industrial and/or construction minerals could be targeted. The importance of the targeted raw materials for the EU economy has to be duly demonstrated in the proposal. Proposals should include the participation of technology oriented SMEs, as far as possible. Sea exploration is not targeted by this call.

Expected Impact: Projects are expected to justify and provide evidence that they lead to:

a)

- achieving the objectives of the EIP on Raw Materials, particularly in terms of ensuring the sustainable supply of raw materials to the EU and improving supply conditions within the EU;

- pushing the EU to the forefront in the area of sustainable mining technologies and solutions through generated know-how (planned patents, publications in high impact journals³⁰ and joint public-private publications etc.);
- unlocking substantial reserves of new or currently unexploited resources within the EU;
- improving the economic viability of small industrial mining operations;
- improving in the longer term the competitiveness of and creation of new jobs in mining and/or equipment manufacturing industries;
- safeguarding environmental stability and improving the health and safety performance of the operations;
- improving the awareness, acceptance and trust of society in a sustainable raw materials production in the EU;

b)

- achieving the objectives of the EIP on Raw Materials, particularly in terms of ensuring the sustainable supply of raw materials to the EU and improving supply conditions within the EU;
- pushing the EU to the forefront and improving the competitiveness and creation of new jobs in processing, refining, equipment manufacturing and downstream industries through generated know how (planned patents, publications in high impact journals and joint public-private publications etc.);
- increased process selectivity, broader range and higher recovery rates of valuable, particularly Critical Raw Materials;
- unlocking substantial reserves of new or today unexploited resources within the EU;
- increased economic performance in terms of higher material-, energy- and cost-efficiency and flexibility in minerals processing, metallurgical or recycling processes;
- improving the environmental performance of the operations, including a reduction in waste and emissions generation and a better recovery of resources from generated waste;
- improving the health and safety performance of the operations;
- improving the awareness, acceptance and trust of society in a sustainable raw materials production in the EU;

c)

³⁰ High impact journals are defined to be the top 10% (in terms of Scimago Journal Ranking (SJR) index) of all journals within a given scientific category (www.scimagojr.com).

- achieving the objectives of the EIP on Raw Materials, particularly in terms of ensuring the sustainable supply of raw materials to the EU and improving supply conditions within the EU;
- pushing the EU to the forefront in the area of sustainable exploration technologies and solutions through generated know how (planned patents, publications in high impact journals and joint public-private publications etc.);
- increasing the reserves of various primary raw materials within the EU;
- reducing the exploration costs for the industry through new cost-effective exploration technologies, while safe-guarding environmental stability;
- in longer term improving the competitiveness of and creating added value and new jobs in raw materials producing, equipment manufacturing, information and communication technologies and/or downstream industries;
- improving the awareness, acceptance and trust of society in a sustainable raw materials production in the EU.

Type of Action: Research and Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

SC5-14-2016-2017: Raw materials Innovation actions

Specific Challenge: The EU is highly dependent on raw materials that are crucial for a strong European industrial base, an essential building block of the EU's growth and competitiveness. Securing the sustainable access to raw materials, including metals, industrial minerals and construction raw materials, and particularly Critical Raw Materials (CRM), for the EU economy is of high importance.

The challenge for industry is to scale-up promising raw materials production technologies and to demonstrate that raw materials can be produced in an innovative and sustainable way in order to make sure that research and innovation end-up on the market, to strengthen the competitiveness of the European raw materials industries, to meet ambitious energy and climate 2030 targets and to gain the trust of the EU citizens to raw materials sector.

This specific challenge is addressing development of the "innovative pilot actions"³¹ which is one of the major targets of the European Innovation Partnership (EIP) on Raw Materials.

Scope: The main objective is to develop innovative pilots demonstrating clean and sustainable production of non-energy non-agricultural raw materials in the EU from primary and/or secondary sources.

³¹ <https://ec.europa.eu/eip/raw-materials/en/content/strategic-implementation-plan-sip-0#Targets>

All proposals should cover all the following points:

- justify relevance of selected pilot demonstrations, finishing at Technology Readiness Levels (TRL) 6-8, in different locations within the EU (and also outside if there is a clear added value for the EU economy, industry and society);
- facilitate the market uptake of solutions developed through industrially- and user-driven multidisciplinary consortia covering the relevant value chain;
- include an outline of the initial exploitation and business plans (with indicated CAPEX, OPEX, IRR and NPV³²) with clarified management of Intellectual Property Rights, and commitment to the first exploitation;
- consider standardisation aspects when relevant;
- assess health, safety and environmental risks and their management for all proposed actions to avoid environmental damage and maintain overall ecological stability;
- include a plan to communicate the added value of the proposal to the local communities and society for improving public acceptance and trust should be addressed by all the proposals. Participation of civil society from the start of exploration until after-closure activities in a process of co-design, co-development and co-implementation is strongly encouraged.

Wherever possible, proposers could actively seek synergies, including possibilities for funding, with relevant national/regional research and innovation programmes.

Within the projects funded, additional or follow-up funding should be sought, be it private or public, including from relevant regional/national schemes under the European Structural and Investment Funds (ESIF), in particular under the European Regional Development Fund (ERDF), or other relevant funds such as the Instrument for Pre-accession Assistance (IPA II). To achieve this, projects could seek contact with ERDF/IPA managing authorities and with the authorities who developed the Research and Innovation Smart Specialisation Strategies (RIS3). The responsible regional/national authorities could then take an interest in the projects and their expected results. They could engage in the use and deployment of the novel solutions resulting from projects e.g. through pre-commercial public procurement or public procurement for innovative solutions. The project proposals could already indicate which interested regions/countries or other partners have been pre-identified for contact during the project. Please note, however, that reference to such additional or follow-up funding will not lead automatically to a higher score in the evaluation of the proposal.

Projects should include a work-package to cluster with other projects financed under this topic and – if possible – with other relevant projects in the field funded by Horizon 2020, in support of the EIP on Raw Materials

³² Capital expenditures (CAPEX), operational expenditure (OPEX), internal rate of return (IRR), and net present value (NPV)

In line with the EU's strategy for international co-operation in research and innovation (COM(2012)497) international cooperation is encouraged.

The Commission considers that proposals requesting a contribution from the EU of between EUR 8 million and EUR 13 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Proposals shall address **only one** of the following issues:

a) Intelligent mining on land (2016): Proposals should develop and demonstrate new intelligent mining systems to avoid exposure of workers in dangerous operations, to increase efficiency and profitability, and to minimise environmental impacts of the mining operations. Any of the metallic, industrials and/or construction minerals could be targeted. The importance of the targeted raw materials for the EU economy has to be duly demonstrated in the proposal.

b) Processing of lower grade and/or complex primary and/or secondary raw materials in the most sustainable ways (2017): Proposals should demonstrate new systems integrating relevant processing and refining technologies for better recovery of minerals and metals from low grade and/or complex ores, industrial or mining wastes at increased efficiency in terms of better yield and process selectivity. The importance of the targeted raw materials and their sources for the EU has to be demonstrated in the proposal. The solution proposed should be flexible enough to adapt to different ore grades and should be supported by efficient and robust process control.

c) Sustainable metallurgical processes (2017): Proposals should develop innovative metallurgical systems integrating pyro-, hydro-, bio-, and/or electro-metallurgical and/or electrochemical technologies, in order to enhance the production efficiency, metal recovery and selectivity from primary and/or secondary raw materials.

Expected Impact: Projects are expected to justify and provide evidence that they:

a)

- contribute to achieving the targets of the EIP on Raw Materials, particularly in terms of innovative pilot actions on mining for innovative production of raw materials;
- have a market potential and the competitive technology advantage that will be gained through the pilot leading to expanding the EU business and to be implemented across the EU after the project is finished;
- push the EU to the forefront in the area of mining technologies and solutions through generated know how (planned patents, publications in high impact journals and joint public-private publications etc.);
- lead to unlocking substantial reserves of new or today unexploited resources within the EU.

- create added value and new jobs in raw materials producing, equipment manufacturing, information and communication technologies and/or downstream industries;
- lead to improving the health and safety performance of the operations;
- avoid environmental damage and maintain overall ecological stability;
- improve awareness, acceptance and trust of society in a sustainable raw materials production in the EU;

b)

- contribute to achieving the targets of the EIP on Raw Materials, particularly in terms of innovative pilot actions on processing and/or recycling for innovative production of raw materials;
- improve economic viability and market potential that will be gained through the pilot, leading to expanding the business across the EU after the project is finished;
- create added value and new jobs in raw materials producing, equipment manufacturing and/or downstream industries;
- optimise raw materials recovery (increased yield and selectivity) from low grade and/or complex and variable primary and/or secondary resources;
- push the EU to the forefront in the area of raw materials processing technologies and solutions through generated know how (planned patents, publications in high impact journals and joint public-private publications etc.);
- lead to unlocking substantial reserves by giving economic viability to new or today unexploited resources within the EU;
- improve the environmental performance, including reduction in waste generation and a better recovery of resources from generated waste;
- improve the health and safety performance of the operations; improve the awareness, acceptance and trust of society in a sustainable raw materials production in the EU;

c)

- contribute to achieving the targets of the EIP on Raw Materials, particularly in terms of innovative pilot actions for innovative production of raw materials;
- improve economic viability and market potential that will be gained through the pilot, leading to expanding the business across the EU after the project is finished;
- optimise metal production (increased yield and selectivity) from primary and/or secondary resources, while keeping competitive process performance in terms of resource and energy efficiency;

- push the EU to the forefront in the area of metals processing and refining technologies and solutions through generated know how (planned patents, publications in high impact journals and joint public-private publications etc.);
- create added value and new jobs in metallurgy, equipment manufacturing and/or downstream industries;
- improve the environmental (control of emissions, residues, effluents), health and safety performance of the operations;
- improve the awareness, acceptance and trust of society in a sustainable raw materials production in the EU.

Type of Action: Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

SC5-15-2016-2017: Raw materials policy support actions

Specific Challenge: The EU is highly dependent on raw materials that are crucial for a strong European industrial base, an essential building block of the EU's growth and competitiveness. In order to secure the sustainable access to primary and secondary raw materials, including metals, industrial minerals, construction raw materials, wood, and particularly Critical Raw Materials (CRMs) for the EU economy, there is a need to tackle a number of specific non-technology challenges at local, regional, national EU and global levels, as well as gaps in the knowledge on raw materials to foster the supply from the EU sources.

While the challenge to secure the raw materials supply is of a global nature, the actions to respond to the challenge are usually implemented at regional and local levels. There is a need to identify and bring together the EU regions with raw materials production capacity and common Smart specialisation objectives to exploit synergies, gain the trust of citizens and jointly improve the framework conditions, availability and performance of the industry, social aspects, stimulate investment and exchange of knowledge, foster innovation and competitiveness of industries in the raw materials value chains etc.

Specifically, the supply of CRMs to EU is at risk as they are often mined as by-products and still have global recycling rates below 1% after decades of use. There is a need for an expert group covering all the CRMs and as much as possible of their value chains, which would be able to comprehensively map CRM sources, provide recommendations for sourcing and better use of CRMs, including improving the European standards for efficient treatment of WEEE and waste batteries and other end-of-life products, while building on the experience and knowledge of existing specific groups, such as ERECON³³ and CRM-Innonet.

³³ http://ec.europa.eu/growth/sectors/raw-materials/specific-interest/erecon/index_en.htm

One of the major challenges regarding the EU knowledge base on primary and secondary mineral raw materials is the quality, harmonisation of the collected data and information sharing at the different levels within the EU. There is a need to optimise collection of data in Member States.

A specific challenge for the primary raw materials sector is an access to land within the land-use planning in parity with other activities. Most of the EU is densely populated and there are therefore conflicts of land-use caused by the competing interests of different activities and interest with economic requirements such as urbanization, nature conservation, agriculture, infrastructure etc.

For the secondary raw materials sector a proper collection of waste is a pre-condition for optimal recovery of materials from waste, which varies across the EU, Member States and their local governments who apply many different waste collection systems from co-mingled collection systems to separate collection. Decision-makers need more information about the overall performance of different systems, including their economic performance, and a better understanding of the conditions that are necessary for shifting to alternative, better-performing waste collection systems.

Scope: Projects should include a work-package to cluster with other projects financed under this topic and – if possible – with other relevant projects in the field funded by Horizon 2020, in support of the EIP on Raw Materials.

Proposals shall address **only one** of the following issues:

a) Expert network on Critical Raw Materials (2016): The proposed action should develop primarily an EU expert network or structure of networks covering all CRMs and where possible, include the stakeholders covering as much of the value chains as possible.³⁴ In case the new list will not be available at the deadline of the call, proposals should demonstrate the flexibility of incorporating new CRMs in the scope of the project. Proposals should build on the experience and knowledge gained from similar initiatives such as the ERECON³⁵ a network on Rare Earth Elements, and CRM_InnoNet.

In order to support decision making of the producers and users of raw materials and the policy makers the projects should cover all the following points:

- map, comprehensively assess and quantify estimated amounts of existing primary and secondary sources of and alternatives to the different CRMs. ;
- estimate the expected EU demand of various CRMs in the future and identify major trends;

³⁴ The latest public EU list of Critical Raw Materials, expected to be updated in 2016/2017 (otherwise the list of 2014 is applicable (COM(2014) 297)).

³⁵ http://ec.europa.eu/growth/sectors/raw-materials/specific-interest/erecon/index_en.htm

- provide policy and technology recommendations for actions improving the production of the various primary and secondary CRMs and actions for their potential substitution, in order to secure their supply and decrease the relative dependence upon their imports;
- provide a plan for transparent consultation with relevant external stakeholders and effective communication of the findings to the professional and general public across the EU;
- In the case of secondary CRMs, the mapping information on Waste Electrical and Electronic Equipment (WEEE) and waste batteries and other relevant end-of-life products within the EU is crucial, as well as the need to contribute to the further development of European standards for the treatment of WEEE in order to optimise the recovery of CRMs, identifying the most relevant WEEE categories and additional standardisation needs for the further development of CENELEC standards under the European Commission Mandate M/518 EN.

The Commission considers that for this sub-topic, proposals requesting a contribution from the EU of up to EUR 3 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts. Up to one action for this topic part shall be funded.

b) Good practice in waste collection systems (2017): Proposals should cover all the following points:

- map and assess existing waste collection systems in a representative set of EU Member States for a wide range of waste streams, including packaging and paper waste, and end-of-life products (e.g. electrical and electronic equipment, batteries, transport vehicles, tyres, construction products, furniture);
- where feasible assess advantages and disadvantages of different approaches – including environmental and socio-economic impacts – with quantified costs and benefits;
- identify good practices and key elements for effective and efficient waste collection systems, as well as the barriers for implementation and possible solutions to overcome bottlenecks taking into consideration the adaptability of solutions to different regions of the EU;
- validate the identified key elements, good practices, and the measures to overcome obstacles by consulting stakeholders through a participatory approach involving citizens³⁶ and plan targeted dissemination actions.

The Commission considers that for this sub-topic, proposals requesting a contribution from the EU of up to EUR 1.5 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts. Up to one action for this topic part shall be funded.

³⁶ See the paragraph on engaging society in the introduction to this Work Programme.

c) Optimising collection of raw materials data in Member States (2017): Proposals should cover all the following points:

- map and analyse the current situation of collection of data and data sources in all Member States;
- provide recommendations for improvement of data sets and for EU level harmonization with justified benefits for the EU and the Member States and taking into account the INSPIRE Directive;
- demonstrate the applicability of recommendations on a number of improved data sets at Member States level. Improved data sets related to primary mineral raw materials should include for example: data on mineral occurrences and deposits; economic and technical data on mineral exploration and extraction; data on the environmental and social dimensions of extraction and, minerals intelligence data. Data sets related to secondary mineral raw materials should build on raw materials flows at Member state level (Materials Systems Analysis) and be presented in a form of Sankey diagrams. Other data sets on minerals secondary raw materials could also be considered.
- involve all mandated key players for primary and secondary mineral raw materials in Member States, including in particular data providers and relevant public authorities and bodies.
- ensure that information on how data and best practices will be shared and made accessible to the wider EU raw materials community.

The Commission considers that for this sub-topic proposals requesting a contribution from the EU of up to EUR 1.5 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts. Up to one action for this topic part shall be funded.

d) Linking land use planning policies to national mineral policies (2017): Proposals should cover all the following points:

- review and analyse how exploration and extraction of mineral raw materials in Member States are integrated in land use planning and practices at all levels of implementation (national, regional, local) seeking the harmonization and convergence in national approaches towards minerals policies and land-use planning policies and practices;
- consider how to best link land-use planning with the concept of safeguarding valuable mineral deposits (such as mineral deposits of public importance) in order to ensure the current and future access to the deposits and to avoid ‘land sterilization’;
- take into account the following relevant issues: a) the integration of land use and subsurface planning, b) the assessment of different options for land use where there is no pre-exclusion, c) the INSPIRE Directive, d) information needed in the process, e) e-procedure, f) smart regulation, g) the infrastructure planning and approaches;

- involve civil society, practitioners, land-use planners and mining public authorities at local, regional and national levels³⁷ and should develop a dissemination strategy;
- provide recommendations and publish guidance documents to promote a harmonized approach and good practise sharing among Member States in order to ensure a more effective access to raw materials;
- build on the report 'Recommendations on the framework conditions for the extraction of non-energy raw materials in the European Union' (2014) of the Ad-Hoc Working Group on exchange of best practices on mineral policy and legal framework, information framework, land-use planning and permitting.

The Commission considers that for this sub-topic, proposals requesting a contribution from the EU of up to EUR 1.5 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts. Up to one action for this topic part shall be funded.

e) EU network of mining and metallurgy regions (2017): The purpose is to create a sustainable EU network of regions dedicated to mining (including exploration), processing and metallurgy aiming at improving related framework conditions, social aspects and industry competitiveness.

While the issues of recycling, re-use and product life cycles are covered by the topic CIRC-03-2016: 'Smart Specialisation for systemic eco-innovation/circular economy' in the call 'Industry 2020 in the Circular Economy', the focus of this topic is on mining and metallurgy.

Specifically, this network should cover all the following points:

- establish coherent co-ordination and support mechanisms among a representative number of EU regions, and identify and engage the other relevant EU regions;
- establish the right raw materials framework conditions based on good practices in the addressed regions, including administration, land use planning, investment conditions, training and attracting skilled workforce;
- define Social Licence to Operate (SLO)³⁸ guidelines and develop a toolbox improving communication and transparency during the permitting and licensing procedures and in the production cycle (from exploration, mine operation to rehabilitation and residues and tailings management) by mobilising all the concerned EU's stakeholders (relevant authorities municipalities, mining and other relevant companies, civil society organisations and local communities) which can be affected by a mining project³⁹.

³⁷ See the paragraph on engaging society in the introduction to this Work Programme.

³⁸ 'Social Licence to Operate' (SLO) - the level of acceptance or approval by local communities and stakeholders of mining companies and their operations, also known as public acceptance and trust.

³⁹ See the paragraph on engaging society in the introduction to this Work Programme.

- explore and promote in and across the regions potential synergies between raw materials, value chains, market and societal players in order to create new business opportunities and economic growth;
- plan and establish operational synergies between R&I investments (public and private) and the European Structural and Investment Funds (ESIF) to strengthen competitiveness of the industry, through different improve R&I infrastructure and capacity and to foster market uptake and replication of innovative solutions in the relevant fields;
- perform communication activities across the EU to present, challenge and validate the outputs of the project;
- involve relevant competent authorities, private sector, research and academic organisations, civil society and experts in relevant social sciences and humanities. Participation of regional authorities from all the regions addressed in the proposal is compulsory;
- identify synergies and collaborate closely with the relevant established or new initiatives at the EU and national levels, such as EIP on Raw materials and KIC on Raw materials⁴⁰ and link to circular economy and resource efficiency policies;
- use a multidisciplinary approach, involving in particular social sciences and humanities, in order to better understand the different aspects of Social Licence to Operate (SLO) in mining in a given cultural context. Proposals should also benchmark the EU SLO guidelines and initiatives with those developed internationally (Canada, Australia, USA, etc.).

The Commission considers that for this sub-topic, proposals requesting a contribution from the EU of up to EUR 3 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts. Up to one action for this topic part shall be funded.

f) EU network of regions on sustainable wood mobilisation (wood supply) (2017): The objective is to create a European network of regions for improved and sustainable supply of primary wood raw material that will contribute to improved industrial competitiveness and rural development, whilst preserving EU forest ecosystems and forests' capacity to deliver all their economic, social and ecological functions, and ensuring consistency with relevant EU policy goals (e.g. EU Bioeconomy Strategy, 7th Environmental Action Programme, EU Biodiversity Strategy, EU Forest Strategy, EU Nature legislation; EU climate policy). The network's activities shall cover all the following points:

- establish coherent co-ordination and support mechanisms among a geographically and socio-economically representative number of regions, and identify and engage other relevant EU regions;

⁴⁰ <http://eit.europa.eu/eit-community/eit-raw-materials>

- plan and establish operational synergies between R&I investments (public and private) and the European Structural and Investment Funds (ESIF), notably European Agricultural Fund for Rural Development (EAFRD), to facilitate uptake and replication of innovative solutions;
- identify, exchange and widely disseminate good practices (replicable between the regions) in the area of sustainable wood mobilisation with an aim to establish the right framework conditions. This should build on the European Commission/Forest Europe/UNECE/FAO ‘Good practice guidance on sustainable mobilisation of wood in Europe’ and relevant projects (such as SIMWOOD), and contribute to the strategic orientations of the EU Forest Strategy⁴¹;
- explore and promote potential synergies between materials, value chains, markets and societal players in order to create new business opportunities and economic growth;
- identify synergies and collaborate closely with the relevant established or new initiatives at the EU and national levels, such as the EIPs on Raw Materials and for Agricultural Productivity and Sustainability.

The areas of focus for the regional network activities should at minimum cover the following aspects of framework conditions: (a) forest ownership and land tenure, sustainable forest management, administration, co-ordination and planning, including silvicultural measures; (b) infrastructure and logistics; (c) organisation and transparency of the markets; (d) financing sourcing, legal and fiscal measures; and (e) education, training and skills.

Participation of competent regional authorities relevant to sustainable wood mobilisation is required, notably in the context of establishing operational synergies in the research and innovation area. Participation of relevant competent authorities and actors for sustainable wood mobilisation, e.g. chambers of agriculture and forestry, forest owners/managers associations, academia, research technology platforms/centres, and EU stakeholder organisations, is encouraged.

The Commission considers that for this sub-topic, proposals requesting a contribution from the EU of up to EUR 1.5 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts. Up to one action for this topic part shall be funded.

Expected Impact: The project is expected to contribute to:

a)

- achieving the objectives and the implementation of both the Raw Materials Initiative⁴² and the EIP on Raw Materials, in particular in terms of the access to critical raw materials (CRMs);

⁴¹ COM(2013)659 of 20.09.2013

⁴² http://ec.europa.eu/growth/sectors/raw-materials/policy-strategy/index_en.htm

- better informed decision making by the EU and Member States policy makers and the producers and users of raw materials regarding the supply of raw materials;
- development of European standards for the treatment of WEEE, waste batteries and other relevant end-of-life products that would help towards optimising the recovery of critical raw materials;
- increased recovery rates in the EU as regards CRMs from WEEE, waste batteries and other relevant end-of-life products;
- in longer term reduced EU dependency on imports of CRMs;
- improved awareness of relevant external stakeholders and general public across the EU about importance of the critical raw materials for society, challenges related to their supply and about proposed solutions.

b)

- achieving the objectives of the EIP on Raw Materials in terms of waste management framework conditions;
- better-informed decision-making at EU, national and local levels with regards to waste management framework conditions;
- better performing waste collection systems in EU Member States, including socio-economic and environmental impacts;
- in longer term, reduced EU dependency on imports of raw materials.

c)

- achieving the objectives of the EIP on Raw Materials, particularly in terms of the EU Raw Materials Knowledge Base;
- improving the quality assurance and accessibility of primary and secondary mineral raw materials data in the EU;
- adding to transparency of Member state and EU mineral raw materials data and information;
- facilitating better informed decision-making for raw materials policy at EU and Member State levels, as well as for facilitating investment decisions by industry.

d)

- achieving the objectives of the EIP on Raw Materials, particularly in terms of improving conditions for sustainable access and supply of raw materials in the EU;

- more transparent and efficient exploration and mining permitting and licensing processes in the EU;
- better land-use planning based on a better knowledge of identified or potential deposits and their potential environmental impacts at EU level;
- bringing mineral resources in parity with other natural resources within land use planning whilst implementing the environmental acquis.

e)

- achieving the objectives of the EIP on Raw Materials in terms of improving conditions for sustainable access and supply of raw materials in the EU;
- creating a longer term sustainable network;
- establishing operational synergies between R&I investments and ESIF to improve R&I infrastructure and capacity and to foster market uptake and replication of innovative solutions in the relevant fields;
- improved framework conditions at regional level leading to a more transparent and secure environment for investment in new mining and metallurgy projects in the EU and economic growth in the regions;
- improving awareness of the importance of raw materials for our society and about new ways of mining taking into account environmental, health and safety considerations;
- helping stakeholders to make informed decisions about new mining and metallurgy projects in the EU through engagement of local communities, facilitating social agreements, improving the awareness, gaining citizens' acceptance and trust in a sustainable raw materials production in the EU;
- effective implementation and widespread use of the Social Licence to Operate (SLO) guidelines and toolbox in practice.

f)

- achieving the objectives on sustainable wood supply of the EIP on Raw Materials, the EIP for Agricultural Productivity and Sustainability, the new EU Forest Strategy and the EU Bioeconomy Strategy;
- improving knowledge and framework conditions for sustainable wood mobilisation that result in increased supply of primary wood raw materials to the forest-based bioeconomy, whilst preserving EU forest ecosystems and forests' capacity to deliver all its functions;
- innovation at regional and local levels leading to increased wood-based industrial competitiveness and rural development;

- creation of clusters of regions with common interests on wood mobilisation;
- establishing operational synergies between R&I investments and ESIF to improve R&I infrastructure and capacity and to foster market uptake and replication of innovative solutions in the relevant fields for sustainable wood mobilisation.

Type of Action: Coordination and support action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

SC5-16-2016-2017: Raw materials international co-operation

Specific Challenge: Many countries are facing similar challenges in the field of mineral raw materials as the EU, including dependence on supply of raw material from international markets, shortage of knowledge on raw materials and their flows for decision making by authorities, industry, financial sector etc. Understanding of the global nature of raw materials value chains and ensuring sustainable supply of primary and secondary raw materials for the EU requires knowledge of materials flows at a global level and relevant skills. At present, there is a shortage of specialists in the EU in some areas related to primary and secondary raw materials production and raw materials markets. This is a challenge that needs to be addressed at the EU level together with the relevant countries around the world having expertise in the field. In addition, the global nature of raw materials value chains requires common approach and solutions at a global level in order to ensure fair and unrestricted access to raw materials worldwide. There is therefore a need for a more active involvement of the EU in relevant initiatives and closer collaboration with competent international organisations in the field of raw materials.

Scope: Proposals should address **one** of the following:

a) Demand-supply forecast and raw materials flows at global level (2016): Proposals should develop a common methodology to mineral raw materials flows at global level which could be agreed and used at international level. As a pilot case, focus should be on critical raw materials and in particular the ones used in low-carbon technologies. The methodology should incorporate models on demand-supply forecast in order to allow for dynamic analysis of global materials flows. Proposals should provide recommendations and feed into future policy developments.

In line with the strategy for EU international cooperation in research and innovation (COM(2012)497), international co-operation is required with the US and Japan in the field of Materials Flow Analysis. Where appropriate, synergies with the relevant EU Member States initiatives are to be explored and fostered.

Proposals should build on the outcomes of the Study on Data Inventory for a Raw Material System Analysis and on related studies performed by the International Resource Panel.

The Commission considers that proposals requesting a contribution from the EU of up to EUR 1 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

b) Advancing the idea of a World Forum on Raw Materials (2016): With a view to contributing to the fair and unrestricted access to raw materials worldwide, this action should cover all the following points:

- develop an EU-based platform of international key experts and stakeholders that would advance the idea of a World Forum on Raw Materials and enhance the international cooperation among G20 Member countries as well as the other third countries active in the mining and other raw materials sectors.
- foster sharing of experience with a view to increasing understanding of all aspects of trade in raw materials and strategies to leverage natural resources for wider growth and development in close co-operation with the OECD to contribute to the OECD policy dialogue.
- where appropriate explore and foster synergies with the relevant EU Member States initiatives;
- identify common needs and threats, and develop and promote on international fora recommendations on possible actions to consolidate the efforts of the countries involved towards a more joint and coherent approach towards raw materials policy and investment;
- involve relevant organisations, in particular OECD, International Study Groups, CONNEX, the Intergovernmental Forum on Mining, UNEP Resource Panel, in the planned activities.

In line with the strategy for EU international co-operation in research and innovation (COM(2012)497), international co-operation is required, in particular with G20 Member countries as well as the other third countries active in the mining and other raw materials sectors, and international organisations.

The Commission considers that proposals requesting a contribution from the EU of up to EUR 1 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

c) International network of raw materials training centres (2017): Proposals should create a self-sustainable long-term lasting international network of training centres for professionals. The proposals should involve educational and research institutions in the EU and the leading counterparts in third countries, based on specific country expertise in the primary and secondary raw materials sectors. The network should map skills and knowledge in the EU and the third countries, identify key knowledge gaps and emerging needs, develop roadmap for

improving skills and knowledge, as well as establish common training programmes in the raw materials sectors.

In line with the EU's strategy for international co-operation in research and innovation (COM(2012)497), international collaboration is required. Where appropriate, synergies with the relevant EU Member States initiatives are to be explored and fostered.

The Commission considers that proposals requesting a contribution from the EU of up to EUR 1 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 project is expected to contribute to:

a)

- implementation of the Raw Materials Initiative⁴³ and achieving the objectives of the EIP on Raw Materials, in particular in terms of establishing and maintaining strong and sustainable relationships with the countries concerned, in particular with Japan and US;
- better informed decision-making by authorities and companies at the EU and global levels;
- better understanding of global raw materials flows and market trends.

b)

- implementation of the Raw Materials Initiative and achieving the objectives of the EIP on Raw Materials, in particular in terms of establishing and maintaining strong and sustainable relationships with the relevant international organisations and countries.
- fair and unrestricted access to raw materials worldwide;
- economic stability in the raw materials supply at a global level;
- better informed decision-making at EU and global levels.

c)

- implementation of the Raw Materials Initiative and achieving the objectives of the EIP on Raw Materials, in particular in terms of establishing and maintaining strong and sustainable relationships with the leading training institutions in the relevant countries;
- increasing the EU competence and expertise in the field of the primary and secondary raw materials;

⁴³ http://ec.europa.eu/growth/sectors/raw-materials/policy-strategy/index_en.htm

- improved availability of qualified and skilled workforce leading to higher competitiveness of the EU raw materials industry;
- enhancing the possibility for new cross-sectorial innovations.

Type of Action: Coordination and support action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

SC5-17-2016: ERA-NET Cofund on Raw materials

Specific Challenge: In order to secure sustainable supply of raw materials to the EU society, the raw materials sector needs to strengthen its performance and competitiveness through research and innovation. Stronger integration of national and regional R&I programmes across the whole EU is needed to tap the potential of available funding and to reach the critical mass pushing the EU raw materials sector to the forefront in the sustainable production of primary and secondary raw materials and scarce materials substitution.

Scope: The objective of the ERA-NET is to strengthen co-ordination of national and regional research programmes in the field of non-energy non-agricultural raw materials, while building on the experience of ERA-MIN ERA-NET. This should be achieved in line with the integrated strategy proposed in the EU Raw Materials Initiative (RMI) and the Strategic Implementation Plan of the European Innovation Partnership (EIP) on Raw Materials. The ERA-NET should cover the whole raw materials value chain including exploration, extraction and processing technologies and recycling, as well as substitution.

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 in this area. Proposers are encouraged to include other joint activities including additional joint calls without EU co-funding.

Participation of legal entities from international partner countries and/or regions is encouraged in the joint call as well as in other joint activities including additional joint calls without EU co-funding. Participants from countries which are not automatically eligible for funding⁴⁴ may nonetheless request a Union contribution (on the basis of the ERA-NET unit cost) for the co-ordination costs of additional activities.

The Commission considers that proposals requesting a contribution in the range of EUR 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: Actions are expected to lead to:

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http://ec.europa.eu/research/participants/docs/h2020-funding-guide/cross-cutting-issues/international-cooperation_en.htm

- achieving the objectives of the EIP Raw Materials, particularly in the area of research and innovation co-ordination;
- reduced fragmentation of raw materials research and innovation efforts across Europe;
- improved synergy, co-ordination and coherence between regional, national and EU funding in the relevant research fields through transnational collaboration, and where appropriate international collaboration;
- improved use of human and financial resources in the area of raw materials research and innovation.

Type of Action: ERA-NET Cofund

The conditions related to this topic are provided at the end of this call and in the General Annexes.

EARTH OBSERVATION

The overall objective of this Earth Observation package is to maximise the benefits for European citizens of the Earth observation infrastructure by developing innovative services (e.g climate services and disaster risk and emergency management services) that support more sustainable production and consumption patterns and resilient societies. The research and innovation actions in this part of the call aim to develop innovative solutions to complete the in-situ component of GEOSS and Copernicus and make available an operational information system, enabling the sharing and full, open and unrestricted access to validated Earth observation datasets, through engaging with the private sector to leverage emerging technologies and develop services.

Earth observation (EO) activities under Horizon 2020 are considered an essential element to accompany the investments made by the European Union in Copernicus, the European Union Earth observation and monitoring programme, and in the Global Earth Observation Systems of Systems (GEOSS). The activities addressing Earth Observation funded by Societal Challenge 5, LEIT/Space and Research Infrastructures form a coherent overall approach. Activities under Societal challenge 'Climate action, environment, resource efficiency and raw materials' focus in particular on GEOSS, notably the development of comprehensive and sustained global environmental observation and information systems that stimulate the smart use of strategic resources, support the development of evidence-based policies, foster new environmental and climate services, and develop new opportunities in global markets. Activities under the 'Leadership in Industrial Technologies – Space' part of the programme focus on the evolution of Copernicus and the exploitation of existing European space infrastructure by promoting the development of innovative products and services based on remote sensing, geo-positioning or other types of satellite enabled data.

Moreover, the application and uptake of Earth Observation for the development of innovative applications addressing specific challenges is expected to primarily take place through the

Horizon 2020 Societal Challenges. To that end, users can access Copernicus data and information⁴⁵.

To facilitate access to opportunities for applicants, the following list includes dedicated Earth observation activities in calls in other work programme parts, in addition to those in this call:

- Blue Growth – demonstrating an ocean of opportunities (H2020-BG-2016-2017):
 - BG-9-2016: An integrated Arctic observing system
 - BG-12-2016: Towards an integrated Mediterranean Sea Observing System
- Sustainable Food Security – resilient agri-food chains (H2020-SFS-2016-2017):
 - SFS-43-2017: Earth Observation services for the monitoring of agricultural production in Africa.
- Earth Observation (H2020-EO-2016 and H2020-EO-2017)
 - EO-1-2016 and EO-1-2017: Downstream applications
 - EO-2-2016: Downstream applications for public authorities
 - EO-3-2016: Evolution of Copernicus services
 - EO-2-2017: EO Big Data Shift
- Competitiveness of the European Space Sector: Technology and Science (H2020-COMPET-2017)
 - COMPET-2-2017: Competitiveness in Earth observation mission technologies
- SME Instrument (H2020-SMEInstr-2016-2017)
 - SMEInst-04-2016-2017: Engaging SMEs in space research and development
 - SMEInst-12-2016-2017: Boosting the potential of small businesses in the areas and priorities of Societal Challenge 5

Proposals are invited against the following topic(s):

SC5-18-2017: Novel in-situ observation systems

Specific Challenge: A more systematic observation of the Earth system is required at a resolution and accuracy that cannot always be provided through remote sensing technologies. There is therefore a need to extend and improve the in-situ component of the Global Earth

⁴⁵ Access to Copernicus Sentinel data and service information is provided to users on a free, full and open basis. Licensing conditions may apply. For other satellites data, the DataWareHouse document 2.0 is available at <http://www.copernicus.eu/main/library/technical-documents/> and licensing details can be consulted at http://gmesdata.esa.int/web/gsc/dap_document as well as http://gmesdata.esa.int/web/gsc/terms_and_conditions.

Observation System of Systems (GEOSS) and of the EU Copernicus programme in order to collect the relevant data necessary to cover observation gaps, calibrate and validate remote-sensing data and deliver Earth Observation services, including monitoring variables, for policy makers, local users and citizens.

However, components of existing in-situ observing and monitoring systems are too often bulky, expensive and power hungry, which hinders their wide-scale deployment for continuous environmental monitoring. The challenge here is to explore and test new technological solutions that would lower the costs of acquiring, deploying and maintaining monitoring and observing stations which would contribute to filling the in-situ observational gaps of Earth observation systems. This issue is especially acute in less developed countries where in-situ Earth observation capacities have deteriorated.

Scope: Actions should develop new, in-situ Earth observation systems, taking advantage of new technology and the latest developments in sensor science so that measurements can be performed using low energy sensors and communication systems, requiring less demanding maintenance. Actions should focus on the transfer and adaptation of new technologies into operational systems, enabling a real breakthrough in the efficiency of deploying and maintaining new in-situ observing systems in a cost-effective way. The research and innovation activities under this topic may take into account concepts such as citizens' observatories, disposable sensors, and the use of unmanned platforms. The project should take into account as much as possible relevant research outcomes from programmes of the European Research Council, the Leadership in Enabling and Industrial Technologies and the European Metrology Research Programme⁴⁶.

Prominent criteria for the selection of the projects will be fulfilling agreed European and international standards regarding the quality of the measurements, and the interoperability for data exchange with other existing monitoring and observing platforms and with user applications. Proposals should establish formal links, where appropriate, with the GEO Global Initiatives (e.g. GEOGLAM, GEOBON, GFOI, GMOS, AFRIGEISS, BLUE PLANET) and with the relevant Copernicus services so that the new monitoring and observing platforms fulfil well-identified needs under these two major initiatives. Test phases enabling proof-of-concept of the observation and monitoring platforms in real conditions should be organised during the course of the project. Participation of SMEs in project consortia is encouraged in order to facilitate the development of innovative and operational systems.

Projects should foresee activities to cluster with other projects financed under this topic and – if possible – also under other parts of Horizon 2020.

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

⁴⁶ <http://www.emrponline.eu/>

Expected Impact: The project results are expected to contribute to:

- improved in-situ components of the GEOSS and Copernicus programmes;
- cost-effectiveness of the new systems when compared to previous ones;
- new opportunities and market development of the European Earth observation commercial sector and for downstream users;
- measurable added value for the Copernicus and/or GEOSS initiatives;
- the provision of information necessary to ensure food, water and energy security, to cope with the scarcity of natural resources, to develop mitigation and adaptation solutions to climate change, and to make communities more resilient to natural hazards.

Type of Action: Research and Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

SC5-19-2017: Coordination of citizens' observatories initiatives

Specific Challenge: Citizens' observatories⁴⁷ are community-based environmental monitoring and information systems which build on innovative and novel Earth observation applications embedded in portable or mobile personal devices. Thanks to the vast array of ubiquitous information and data they can provide, citizens' observatories can enable authorities to obtain evidence and inform environmental policy making, complementing more authoritative in-situ observation and monitoring networks and systems with a very positive cost-benefit ratio.

Citizens are also provided with new opportunities to address environmental issues affecting them and to influence local decision making. Social innovation can be achieved through these novel partnerships which involve the private and public sector, NGOs and citizens, offering new business opportunities for SMEs in the fields of Earth observation and mobile technologies.

These activities are, however, at an early stage and still largely rely on research funding. Risks and opportunities still have to be explored, which requires a comprehensive analysis of their full potential and applicability. There is a need to create a citizens' observatories knowledge base in Europe across disciplines to avoid duplication, ensure interoperability, create synergies and facilitate its gradual uptake by environmental authorities. With an increasing number of citizen-based initiatives, a coordinated approach for the integration of citizens' observations is becoming necessary in Earth observation systems at local, regional and also global level.

⁴⁷ See http://ec.europa.eu/research/environment/index_en.cfm?pg=earth for more information about previously EU funded Citizens' Observatories activities

Scope: This action should bring environmental citizens' observatories and related communities together with existing relevant activities to benchmark and pinpoint best practices, identify barriers and synergies, promote standards, facilitate integration and stronger cooperation solutions, and stimulate a gradual uptake by public authorities of these new technological and methodological approaches. Relevant issues such as technologies and methodologies for engaging citizens, social innovation opportunities, sustainability approaches including the role of the European private sector, especially SMEs, as well as data management and interoperability of platforms should be addressed. A coherent approach should also be taken to ensuring the delivery and uptake of in-situ data and information coming from citizens observatories through GEOSS and Copernicus. Hence, proposals should include a broad range of stakeholders, including public bodies, private sector representatives, research institutions – including from social sciences and humanities – NGOs and citizens' associations.

To address these points effectively, social science research tools and methods will be required.

The Commission considers that proposals requesting a contribution from the EU in the range of EUR 1 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts. Up to one action shall be funded.

Expected Impact: The project results are expected to contribute to:

- improved coordination between existing environmental citizens' observatories and related activities at regional, European and international level;
- expanded geographical coverage and use of environmental citizens' observation through an effective promotion and uptake of best practices and standards;
- wider dissemination and uptake of efficient information and data management and preservation strategies for existing and future citizens' observatory platforms;
- increased opportunities for SMEs and businesses in the field of in-situ Earth observation systems;
- better awareness and use of the citizens' observatories by environmental and disaster risk and emergency management decision makers;
- increased value added of GEOSS and Copernicus through the use of citizens' observations;
- a leading role for Europe in the integration and uptake of citizens' information in GEOSS.

Type of Action: Coordination and support action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

SC5-20-2016: European data hub of the GEOSS information system

Specific Challenge: As part of its 2015 strategic targets GEO has agreed to achieve sustained operation, continuity and interoperability of the GEOSS information system that facilitates access to, and use of Earth observation resources made available by the global GEO community. However the evolution of the current GEOSS information system⁴⁸ indicates that in parallel to this overarching goal there is a need also to strengthen the access to Earth Observation at regional level so that it becomes easier to harvest, consolidate and exploit those data at global level. The specific challenge under this topic is therefore to overcome the fragmentation of the European landscape of existing public and private Earth observation data infrastructures and to maximise their combined exploitation in the light of the evolving demand and supply of Earth observations in Europe. In order to meet this challenge a European data hub of the GEOSS information system should be developed taking into account the global trend towards more open data policies, the availability of new big data technologies and the requirements for the development of the European digital economy. The main function for such a hub would consist in harvesting available resources from relevant GEOSS data infrastructures in Europe and in particular from the distributed Copernicus data infrastructures. Developing such a hub would allow maximising and leveraging on past Community investments to support the GEOSS Common Infrastructure, in particular the broker technology, developed in the framework of several FP7 research projects⁴⁹. This would also help retain ownership in the evolution of this IT technology, which is at the cornerstone of the GEOSS.

Scope: This action will develop a GEOSS European hub consisting of an innovative web-based IT platform to provide users with a unique access point (gateway) to the diverse European range of Earth observation data (space-based and in situ data, from research and operational data infrastructures, across disciplines and communities) and services, as well as other relevant data sources such as socio-economic related ones. This platform should cope in particular with requests from European users willing to discover, access, combine and process multiple Earth observation data and information streams. Full interoperability with the GEOSS Discovery and Access Broker, with GEOSS data hubs developed in other regions of the world, and with environmental infrastructures associated with major EU programmes, legislations and initiatives shall be ensured. This applies especially to the Copernicus programme⁵⁰, the EU Directives related to INSPIRE⁵¹ and the reuse of public sector information⁵², as well as to research infrastructures such as GEANT and the EU High Performance Computing facilities. The GEOSS European data hub should be built in close cooperation with other national and European initiatives, in particular with Copernicus.

⁴⁸ <http://www.geoportal.org/>

⁴⁹ <http://www.eurogeoss.eu/> <http://www.geowow.eu/>.

⁵⁰ <http://ec.europa.eu/enterprise/policies/space/copernicus/>

⁵¹ <http://inspire.ec.europa.eu/>

⁵² <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2003:345:0090:0096:EN:PDF>

Special attention shall be given to user-friendliness for multiple user profiles while ensuring system adaptability, scalability and robustness. At international level, this action should also contribute to the Community Strategy and Implementation plan of the Belmont Forum e-Infrastructures and Data Management Collaborative Research Action⁵³.

The European hub shall be open to academia, the public sector and to the European private sector. Its core concepts of data federation and user customisation shall support an open ecosystem of services and business opportunities and build on past EU research investments in support of the GEOSS information system. Proposals should address the sustainability issue of this platform beyond the project lifetime and a governance model driven by the public sector with possible contributions from private entities.

The Commission considers that proposals requesting a contribution from the EU of between EUR 9 million and EUR 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: The project results are expected to contribute to:

- improved user-friendly discovery, access and exploitation of Earth observation data and information in Europe;
- strengthened European regional approach to GEOSS;
- broader uptake of GEOSS and Copernicus data, information and services;
- increased Earth observation-driven innovation and business opportunities for European SMEs and companies;
- wider commercial exploitation of Earth observation data and products beyond sectors that are not traditionally engaged in Earth observation;
- increased European capacity to address GEOSS societal challenges of prime importance to the EU such as achieving the post-2015 sustainable development goals or implementing adaptation and mitigation strategies to climate change.

Type of Action: Research and Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

CULTURAL HERITAGE FOR SUSTAINABLE GROWTH

The objective of the actions in this part of the call is to harness the full potential of cultural heritage as a production rather than a cost factor and a strategic resource for a sustainable

⁵³ <http://www.bfe-inf.org/>

Europe⁵⁴ and thus ensure its sustainability, safeguarding, resilience and enhancement. The focus is therefore to maximise the intrinsic economic, cultural and societal value of cultural heritage in promoting well-being, cultural diversity and social cohesion. Sectoral and country-based studies have highlighted the significant economic contribution of the heritage sector and its spill-over effects on other sectors of the economy⁵⁵. However, since heritage is constantly being produced and recognised as well as being a shared, non-renewable, non-replaceable, unique resource and a common good confronted with important environmental challenges and disaster risks, possible over-exploitation and under-funding, looking after it to avoid neglect and possible decay is a common responsibility.

The outcomes of the Horizon 2020 Expert Group on Cultural Heritage⁵⁶ have largely been taken into account to prioritise the challenges to be addressed through this part of the call.

Proposals are invited against the following topic(s):

SC5-21-2016-2017: Cultural heritage as a driver for sustainable growth

Specific Challenge: European cities and rural areas are unique cultural landscapes full of character at the core of Europe's identity. They are examples of our living heritage which is continually evolving and being added to. However some of them are facing economic, social and environmental problems, resulting in unemployment, disengagement, depopulation, marginalisation or loss of cultural and biological diversity. These challenges create demand for testing and experimenting with innovative pathways for regeneration. Cultural heritage (both tangible and intangible) can be used as a driver for the sustainable growth of urban and rural areas, as a factor of production and competitiveness and a means for introducing socially and environmentally innovative solutions. The overall challenge is to go far beyond simple conservation, restoration, physical rehabilitation or repurposing of a site and to demonstrate heritage potential as a powerful economic, social and environmental catalyst for regeneration, sustainable development, economic growth and improvement of people's well-being and living environments.

Scope: Proposals should address **one** of the following:

a) Heritage-led urban regeneration (2016)

b) Heritage-led rural regeneration (2017)

For both, actions should develop and deploy via large-scale demonstration projects novel heritage-led systemic approaches⁵⁷ and solutions for sustainable growth. In order to pave the

⁵⁴ Council Conclusions of 20 May 2014 on cultural heritage as a strategic resource for a sustainable Europe

⁵⁵ Tourism is estimated to contribute revenues of EUR 415 billion p.a. to EU GDP and accounts for 15.2 million jobs in the EU – many directly or indirectly linked to cultural heritage (www.wttc.org/site_media/uploads/downloads/european_union2014.pdf). Renovation and maintenance represent 27.5% of the value of Europe's construction industry (www.fiec.eu/en/library-619/key-figures.aspx, figures quoted for 2013) while the conservation market is EUR 5 billion annually (The Joint Programming Initiative on Cultural Heritage and Global Change: a new challenge for Europe Vision Document, version 17 June 2010).

⁵⁶ <http://bookshop.europa.eu/en/getting-cultural-heritage-to-work-for-europe-pbKI0115128/>

way for their rapid replication and up-scaling, a 'Role models' and 'Replicators' approach should be implemented.

The 'Role models' are urban or rural landscapes which have demonstrably and successfully pursued a heritage-led regeneration.

The 'Replicators' are urban or rural landscapes that will be assisted/mentored by 'Role models' and committed to their heritage-led regeneration within the duration of the project, replicating the heritage-led regeneration 'blueprints' of the 'Role models', properly contextualised to fit their particular contexts. The 'Replicators' will therefore proactively seek advice, assistance and mentoring from the 'Role models', have privileged contact with them and access to their know-how, and will participate in the definition of user requirements and the methodology for transferability of solutions, data collection etc.

The higher the number of 'Role models' and 'Replicators' involved, the larger the evidence base and hence the replicability and up-scalability potential of the project outputs under different contexts. The Commission considers that involving six 'Role models' and three 'Replicators' from different Member States would greatly enhance the potential of a proposal for replicating and up-taking of the results across Europe. Beyond this and in line with the strategy for EU international cooperation in research and innovation (COM(2012)497), participation of 'Role models' from non-EU countries is encouraged, since this would further enrich the evidence base of successfully implemented heritage-led regenerations and would thus enhance the replication and impact potential of such activities in non-EU regions (e.g. Latin America) and countries.

Replication critically depends on the timely and active involvement of the 'Replicators' in the project development, the effective and continuous knowledge transfer, mentoring, networking and support by the 'Role models' (e.g. through staff exchanges to enhance their capacity in, among other things, securing the financial resources necessary for the regeneration through innovative financing and business models, partnerships (e.g. public/ private) and mobilisation of investments). The success potential of the proposal will be assessed according to the innovative nature and the replicability potential of the approach; the financing, business and governance models; the mobilisation of new investments; the participatory, multi-stakeholder and trans-disciplinary processes (also securing citizens' engagement and ownership of regeneration plans); the long-term political and financial commitment of the competent authorities in the 'Replicators' to guarantee the project implementation, independently of possible changes in their political context during the course of the project; the capacity for mobilising and leveraging additional investments to secure economic and financial sustainability for the execution of the project; and the soundness of the approach in 'mentoring' and transferring knowledge from the 'Role models' to the 'Replicators' and beyond. Partnerships should involve local and regional authorities, planners, enterprises, academics and local communities in a clearly defined structure with roles and responsibilities properly spelled out for all involved parties. The participation of social sciences and humanities disciplines such as architecture, archaeological sciences, cultural anthropology,

⁵⁷ For more on systemic innovation, please see the introduction to this work programme.

law, economics, governance, planning, cultural and historical studies, is critical to properly address the complex challenges of this topic.

Projects should aim to:

- map, analyse and systematically document successful heritage-led regeneration models in 'Role models', linking where appropriate cultural and natural heritage; make this evidence base readily accessible to an EU-wide community of competent and interested authorities, planners, practitioners, enterprises and stakeholders (including civil society) through innovative communication and training strategies. Particular emphasis should be paid to successful business and management models, financing mechanisms, leveraging of investments, governance structures, urban and territorial plans and legal frameworks. 'Role models' would, if they so wish, also have the possibility of further upscaling their regeneration activities during the life of the project;
- assist 'Replicators' through provision of expertise, advice and capacity building in developing and implementing during the life of the project their heritage-led regeneration plans, including appropriate business and management models, financing mechanisms, governance structures, planning tools and legal frameworks;
- set up a robust monitoring scheme to monitor the performance of the deployed regeneration scheme, so as to assess the impact for the targeted rural and urban areas in an as quantifiable way as possible against a well-defined baseline at the time of the proposal. Performance monitoring should last for a period of at least 2 years within the life of the project. Longer term monitoring commitment beyond the end of the project, while continuing the systematic documentation of the data, will give an added value to the proposal;
- develop methodologies enabling the replication and up-scaling of heritage-led urban regeneration projects in different contexts, including replication of innovative investment strategies, governance and business models;
- identify potential regulatory, economic and technical barriers and propose concrete ways to optimise policy and regulatory and administrative frameworks;
- establish long-term sustainable data platforms securing open, consistent data and performance measurements and interoperability of data infrastructures to ensure effective communication, public consultation, exchange of practices and sharing of experiences and a continuous building up of the 'knowledge portfolio' through future activities under Horizon 2020 and beyond, and long-term (i.e. beyond the life of the project) exploitability of the results.

Proposals shall address **all** of the above points.

Projects should envisage resources for clustering with other projects financed under this topic as well as other projects under the 'Cultural Heritage for sustainable growth' part of this call and – if possible – also under other relevant parts of Horizon 2020.

Because of the substantial investments that might be necessary for the heritage-led regeneration in the urban and rural context, additional or follow-up funding should be sought, be it private or public, from relevant regional/national schemes under the European Structural and Investment Funds (ESIF), including the European Regional Development Fund (ERDF), or other relevant funds such as the Instrument for Pre-accession Assistance (IPA II). In the case of ESIF/IPA, contacts could be established with the funds' managing body during the duration of the projects. In case of relevance for the Research and Innovation Smart Specialisation Strategies, the project proposals could already indicate which interested regions/countries have been pre-identified. Please note, however, that reference to such additional or follow-up funding will not lead automatically to a higher score in the evaluation of the proposal.

The Commission considers that proposals requesting a contribution from the EU of up to a maximum of EUR 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: Projects are expected to contribute to:

- providing new heritage-led urban and rural regeneration paradigms, up-scalable and replicable, replacing the object-oriented approach with a spatial approach in heritage planning and offering new economic and investment opportunities, new products and services, reduced regulative and administrative barriers, innovative governance adopting trans-disciplinary and participatory approaches and promoting citizens' engagement and new local skills and jobs;
- strengthening Europe's capacity as a world-leader in promoting, financing, developing, managing and replicating innovative use of heritage for urban and rural regeneration in Europe and beyond;
- securing heritage conservation and sustainability through fostering collective management, responsibility and ownership of cultural heritage, and establishing a "community of practice" to promote heritage potential as a production (rather than a cost) factor to the society through unlocking its potential as a driver for regeneration and a catalyser for economic growth and jobs;
- providing as quantifiable evidence as possible of the cultural, social, environmental and economic benefits (e.g. set-up of companies, start-ups in new productive activities in different fields new cultural products and services, tourism, construction industry, developing talent, attracting new investment in the regeneration sector etc.) of heritage reuse at different levels, including in deprived or less developed areas;
- mobilising investment and opening up of new market opportunities for businesses through networking at European level competent authorities and stakeholders interested in using heritage to regenerate their cities or rural areas;

- positioning Europe as a leading force in the use of heritage as a means for social, cultural and economic development;
- assisting regions in developing their Research and Innovation Smart Specialisation Strategies by including sound heritage-led urban and rural regeneration projects.

Type of Action: Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

SC5-22-2017: Innovative financing, business and governance models for adaptive re-use of cultural heritage

Specific Challenge: Due to economic problems and social change many historic assets have been facing functional redundancy. These assets are mostly churches no longer used for worship, industrial buildings no longer used for manufacturing, farm buildings no longer used for agriculture, cultural landscapes which are degrading etc. In most instances, the costs for the adaptive re-use of these assets cannot be supported by the public sector or by traditional private sector models relying on return on investment. Innovative financing, business and governance models would fill up this “investment gap” and enable the maintenance of the historic fabric, its integration with the modern world and thus the appreciation of heritage-inherent values and qualities by contemporary societies through optimal adaptive re-use practices.

Scope: Projects should:

- map and analyse existing successful business and management models, financing mechanisms and governance arrangements for adaptive re-use of groups of cultural heritage monuments, cultural landscapes, buildings or sites⁵⁸;
- develop and validate methods, tools, indicators and matrixes that would allow for the replication and up-scaling of successful adaptive re-use practices;
- propose innovative governance arrangements also fostering increased participation by citizens, business models, financing instruments (e.g. crowd funding), new forms of partnerships(e.g. public-private, community-based etc.) and strategies for mobilising new investments for adaptive re-use of groups of cultural heritage monuments, buildings or sites and develop and validate methods, tools, indicators and matrixes for assessing their effectiveness and performance;
- identify cultural, social, economic, institutional, legal, regulatory and administrative barriers and bottlenecks at city, regional, national and EU level for adaptive re-use of

⁵⁸ The scale of envisaged intervention for adaptive re-use of cultural heritage should have a considerable impact not only for the heritage 'site' for which the adaptive re-use is targeted but also for the larger area in which the 'site' is located.

groups of cultural heritage monuments, buildings or sites, and recommend ways to overcome them;

- develop and validate tools with a replicability potential in different local conditions to assist decision-making processes, using multi-stakeholder approaches, involving local communities and underpinned by social science and humanities expertise, for adaptive re-use of cultural heritage.

Proposals shall address **all** of the above points and efforts should be made to link cultural with natural capital where appropriate.

Projects should envisage resources for clustering with other projects financed under this topic as well as other projects under the “Cultural Heritage for sustainable growth” part of this call and – if possible – also under other relevant parts of Horizon 2020.

The Commission considers that proposals requesting a contribution from the EU of up to EUR 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: Projects are expected to lead to:

- more integrated approaches and strategies for the preservation and valorisation of cultural heritage through its adaptive re-use (securing thus its sustainability) comprising innovative finance (with high leverage capacity), business models and institutional and governance arrangements that foster multi-stakeholder involvement, citizens' and communities engagement and empowerment;
- new investment and market opportunities for businesses in the adaptive re-use of cultural heritage assets, both tangible and intangible, including opportunities for stimulating the creation of start-ups;
- an enabling context for the development and wide deployment of new technologies, techniques and expertise enhancing industrial competitiveness and contributing to economic growth, new skills and jobs;
- innovative adaptive re-use blueprints for culturally, socially and economically inclusive societies with reduced financial and operational burden for the public sector in heritage conservation.

Type of Action: Research and Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

SUPPORT TO POLICY AND PREPARING FOR INNOVATION PROCUREMENT

Proposals are invited against the following topic(s):

SC5-23-2016-2017: Support to confirmed Presidency events (conferences) – Malta, United Kingdom, Estonia

Specific Challenge: Events of major strategic nature, well focused and with the participation of a broad spectrum of stakeholders are of outmost importance for assessing past activities, identifying policy options and priorities, and planning future actions within the areas covered by Societal Challenge 5. Examples are events organised together with successive EU Presidencies, such as PROVIA in the Netherlands and the Innovative Enterprise Presidency conference on Circular Economy Financing in Luxembourg.

Scope: Actions should contribute to creating better synergy between initiatives launched by the Commission and by the Member States, to the benefit of the overall coherence of actions within the field of research and innovation in the areas covered by Societal Challenge 5. Member States which will hold a forthcoming Presidency of the European Union and are in the time range of this Work Programme are Malta and the United Kingdom in 2017 and Estonia in 2018, and they may be particularly interested in this topic. The flagship event addressing transition to the green economy planned under the Presidency of the Slovak Republic in 2016 is covered under topic SC5-24-2016.

Proposals should address issues of major relevance at the time of the events. Innovation should be at the core of the event. An appropriate balance should be present in the proposed action(s), encompassing environmental, economic and social elements and points of view. Participation of non-EU actors is possible. Outreach activities may be included, such as a press programme or events dedicated to the wider public or schools. To avoid limiting the impact of these events, the subject of each event should not overlap with that of other Presidency events over the period 2016-2018.

The commitment of the national authorities to support the event(s) both from a political point of view and with resources is a pre-requisite to submit a proposal. Proposals should be supported by the competent Minister, evidenced in a letter included in the proposal. In order to ensure high political and strategic relevance, the active involvement of the competent national authority/authorities will be positively reflected in the evaluation under the ‘impact’ criterion.

In agreement with the Commission services, projects should ensure appropriate flexibility so as to respond in real time to potentially fast-changing policy scenarios.

2016: Proposals should address Presidency event(s) in Malta.

2017: Proposals should address Presidency event(s) in the United Kingdom or Estonia.

The Commission considers that proposals requesting a contribution from the EU of between EUR 0.10 million and EUR 0.30 million would allow this specific challenge to be addressed appropriately, depending on the size of the event (number of participants). Nonetheless, this does not preclude submission and selection of proposals requesting other amounts. No more than one action will be funded for each Presidency (possibly covering more than one event).

Expected Impact: The action is expected to result in:

- improved visibility, in particular in the hosting country, of the areas covered by Societal Challenge 5;
- identification of policy options and priorities via review and assessment of developments, and sharing of information and comparison of points of views;
- efficient networking of various stakeholders and supporting their activities, e.g. natural scientists, social scientists, researchers, industrialists, investors, local authorities, environmentalists, museums and schools.

Type of Action: Coordination and support action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

SC5-24-2016: Support to confirmed Presidency event (conference) in Slovakia

Specific Challenge: Events of major strategic nature, well focused and with the participation of a broad spectrum of stakeholders are of utmost importance for assessing past activities, identifying policy options and priorities, and planning future actions within the areas covered by Societal Challenge 5. Examples are events organised together with successive EU Presidencies, such as PROVIA in the Netherlands and the Innovative Enterprise Presidency conference on Circular Economy Financing in Luxembourg.

Scope: This action contributes towards the wider objective of creating better synergy between initiatives launched by the Commission and by the Member States, to the benefit of the overall coherence of actions within the field of research and innovation in the areas covered by Societal Challenge 5. This action targets in particular the forthcoming Presidency of the European Union to be held by Slovakia in 2016 (flagship conference addressing transition to the green economy).

Proposals should address issues of major relevance at the time of the event. Innovation should be at the core of the event. An appropriate balance should be present in the proposed action(s), encompassing environmental, economic and social elements and points of view. Participation of non-EU actors is possible. Outreach activities may be included, such as a press programme or events dedicated to the wider public or schools.

The commitment of the national authorities to support the event(s) both from a political point of view and with resources is a pre-requisite to submit a proposal. Proposals should be

supported by the competent Minister, evidenced in a letter included in the proposal. In order to ensure high political and strategic relevance, the active involvement of the competent national authority/authorities will be positively reflected in the evaluation under the ‘impact’ criterion.

In agreement with the Commission services, projects should ensure appropriate flexibility so as to respond in real time to potentially fast-changing policy scenarios.

The Commission considers that proposals requesting a contribution from the EU of between EUR 0.10 million and EUR 0.30 million would allow this specific challenge to be addressed appropriately, depending on the size of the event (number of participants). Nonetheless, this does not preclude submission and selection of proposals requesting other amounts. No more than one action will be funded per Presidency (possibly covering more than one event).

Expected Impact: The action is expected to result in:

- improved visibility, in particular in the hosting country, of the areas covered by Societal Challenge 5;
- identification of policy options and priorities via review and assessment of developments, and sharing of information and comparison of points of views;
- efficient networking of various stakeholders and supporting their activities, e.g. natural scientists, social scientists, researchers, industrialists, investors, local authorities, environmentalists, museums and schools.

Type of Action: Coordination and support action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

SC5-25-2016: Macro-economic and societal benefits from creating new markets in a circular economy

Specific Challenge: The EU has committed itself to a resource efficient growth path. A strong record in eco-innovation and an ambitious EU environment and climate policy has contributed to Europe's global excellence and competitiveness in a range of areas, such as waste and water management, climate adaptation, nature protection and biodiversity enhancement, air quality and soil decontamination. These economic sectors have consistently grown over the last decade and in many cases increased their research intensity. They are critical to moving forward the transition to a circular economy, and are also important sources of growth and jobs, which can be boosted within an enabling EU macro-economic policy framework.

For its dialogue on progress with the Member States notably in the context of the European Semester, the European Commission needs a solid and policy-actionable assessment based on concrete data and indicators of the macro-economic, societal, environmental and labour

market benefits/costs of developing successful and innovative approaches which contribute to the transition towards the circular economy.

Scope: Within the context of the European Semester, the action should:

- facilitate a better understanding and operational use of the current evidence base, including reliable datasets and projections;
- identify market and societal impacts of resource and waste flows – from extraction to end of life;
- identify innovative approaches based on the circular economy concept in Member States;
- assess their economic, societal and resource-efficiency impact on existing or new markets;
- estimate such impacts in the short, medium and long term; and
- estimate and assess the macro-economic, societal and environmental costs and benefits of mainstreaming such approaches.

The project should also elaborate a benchmark between Member States and with a set of performing Third Countries, covering both green and blue growth potentials, further building on achievements in the waste and water sectors, and embedding the role of the digital economy in the analysis.

In agreement with the Commission services, projects should ensure appropriate flexibility so as to respond in real time to potentially fast-changing policy scenarios.

The Commission considers that proposals requesting a contribution from the EU in the range of EUR 0.5 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: The project is expected to contribute to:

- creating a reliable knowledge base and reference framework on the macro-economic, societal and environmental impacts of resource efficiency/circular economy innovations, for both the European Commission and Member States, as potential sources of growth and jobs and on the macro-economic policy conditions for tapping these;
- improving the European Semester's evidence base in areas related to Societal Challenge 5;
- developing options for policies and investments that are economically, environmentally and socially sound.

Type of Action: Coordination and support action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

SC5-26-2017: Pre-commercial procurement on 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 innovative solutions.

The challenge is to address the lack of public demand driven innovation in the soil decontamination sector in Europe. This is needed to close the gap between supply and demand for innovative solutions. Pre-commercial procurement (PCP) has the potential to be an effective demand side innovation action *par excellence*.

PCP enables a buyers' group (consortia of procurers) to procure research and development to create innovative solutions, speed up the time-to-market and provide best value for money.

Scope: Launch of PCP – i.e. a joint procurement of research and development services – to find common innovative and sustainable solutions for soil decontamination/remediation, avoiding 'dig and dump'. The proposal is expected to bring radical and innovative improvements to the quality and efficiency of public soil decontamination services, processes and products.

The core of the consortium should be a qualified 'buyers group' (public procurement consortium), able to implement the action. Additional partners such as business/SME support organisations, innovation agencies or sectoral organisations may be included, to assist procurers in knowing what is available on the market through market consultations.

Proposals shall describe the jointly identified challenge, indicating how it fits into the mid-to-long-term innovation plans of the consortium, why solutions currently available on the market or under development are not meeting their needs, and put forward concrete targets for the desired functionality/performance improvement in the quality and efficiency of their public services. Activities shall include: (1) networking relating to preparation, management and coordination, (2) joint research activities relating to the validation of the PCP strategy and (3) activities for the follow-up of the joint procurement, such as activities for awareness raising, networking, training, evaluation, validation and dissemination of results. Proposals should explain clearly how the creation of jobs, economic growth and new businesses will be assessed as an integral part of the project.

The PCP should deliver successful innovative and fully tested product(s) and/or service(s) that meet the common needs of the buyers' group and that is therefore ready to be marketable. The final aim of the action is to develop innovative and fully tested solutions, which are fit-for-purpose and cost-effective, for soil decontamination/remediation.

Proposals should build on and take care to avoid duplication of the activities undertaken by the BRODISE project⁵⁹.

Project(s) should have a maximum duration of 2 years.

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

The funding rate for Pre-Commercial Procurement (PCP) actions is limited to 90% of the total eligible costs (PCP is procurement of R&D services) to leverage co-financing from the procurers.

Expected Impact: The project is expected to contribute to:

- deployment of innovative solutions to deal effectively with soil contamination that respond to the common needs and beyond state-of-the-art performance targets of the buyers group;
- reduced fragmentation of demand for innovative solutions by enabling public procurers to collectively implement PCP in the area of soil decontamination challenges, which, due to their nature, are better addressed jointly, or which they would not have been able to tackle independently;
- new opportunities for wide market uptake and economies of scale for the supply side through the use of joint specifications, wide publication of results and – where relevant – contribution to standardization, regulation or certification to remove barriers for introduction of innovations into the market;
- creation of new products, processes and/or services ready for market uptake, leading to viable new businesses, jobs and growth.

Type of Action: Pre-Commercial Procurement

The conditions related to this topic are provided at the end of this call and in the General Annexes.

SC5-27-2016: Preparing for pre-commercial procurement (PCP) and/or public procurement of innovative solutions (PPI) in support of climate action, environment, resource efficiency and raw materials

Specific Challenge: Pre-commercial procurement (PCP) and public procurement of innovative solutions (PPI) are effective demand side innovation actions, since they enable public procurers to drive innovation from the demand side by acting as technologically demanding first buyers. This helps to improve the quality and effectiveness of public services and at the

⁵⁹ <http://www.brodise.eu/servlet/Satellite/brodise/eng/home>

same time stimulates opportunities for companies to create, maintain or take international leadership in new markets.

Innovation-oriented public procurements (PCP and PPI) are key to fostering lead markets and generating a critical mass of demand for solutions and services addressing climate action, environment, resource efficiency and raw materials challenges. Barriers to these kinds of public procurement include the absence of cross-border coordination and lack of access to best practices and to knowledge of close-to-market innovative solutions.

Scope: Actions should prepare for PCPs and/or PPIs, which would be suitable for launching in 2018-2019. All areas covered by Societal Challenge 5 are eligible.

The action should deliver all the necessary elements in preparation of the PCP or PPI as described in part E of the General Annexes to this Work Programme.

Proposals should lead to the establishment of buyers' group(s) of public procurers to overcome the fragmentation of demand for solutions and services and to lead to a more rapid market uptake of such solutions and their early deployment. Procurements could address entire value chains in the areas(s) covered.

Proposals should engage public and/or private procurers from each country participating (at national, regional or local level) that have responsibilities and budget control in the relevant area(s).

The network(s) of public procurers/buyers' group(s) created should investigate the feasibility of, test and prepare the launch of joint or coordinated procurements (PCP or PPI), which would ultimately develop innovative, fully tested, fit-for-purpose and cost-effective solutions to address specific challenges in the areas covered by Societal Challenge 5. These solutions should be based on a complete set of common specifications.

Duplication with on-going activities should be avoided, namely the project(s) resulting from WASTE-5-2014 and SC5-26-2017.

Preparation activities for the joint or coordinated PCPs and/or PPIs will be supported, but not the costs of the procurement resulting from any PCP and/or PPI procedures.

Project duration should be 12 months.

Proposals may target delivery of more than one PCP and/or PPI.

The Commission considers that a contribution from the EU of around EUR 50 000 per procurement (PCP or PPI) investigated and prepared 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 project is expected to contribute to:

- creation of a critical mass of procurers of solutions and services in the area of Societal Challenge 5, which would be able to penetrate the market;

- leverage of additional investment in research and innovation;
- increased awareness and successful use of public procurement by procurers to boost innovation;
- reduced fragmentation of public sector demand via creation of a network(s) of public procurers capable of collectively implementing PCPs and/or PPIs.

Type of Action: Coordination and support action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

SC5-28-2016: Transformations to sustainability

Specific Challenge: Climate change, environmental degradation and resource pressures have created unprecedented situations for societies worldwide. Today's urgent challenges of global environmental change will require not only scientific advances and technological adjustments but also deep and enduring social change. A comprehensive new approach to research and action on global environmental change and sustainability is needed that promotes solutions that are at the same time ecologically sound, economically viable and socially just. A new approach to sustainability research from the angle of social transformation will require the active contribution and pro-active leadership from social sciences and humanities disciplines, in terms of bringing relevant existing knowledge, framing the research questions, designing and implementing the research, and helping to derive effective, equitable and durable solutions to global sustainability challenges with a genuine involvement of relevant societal stakeholder groups at all stages of the research and policy process.

Scope: Proposals should pool the necessary financial resources from the participating national regional, or international research programmes with a view to implementing a joint call for proposals resulting in grants to third parties with EU co-funding in this area. Proposers are encouraged to include other joint activities including additional joint calls without EU co-funding.

Participation of legal entities from international partner countries and/or regions, including from Belmont Forum members, is encouraged in the joint call as well as in other joint activities including additional joint calls without EU co-funding. Participants from countries which are not automatically eligible for funding⁶⁰ may nonetheless request a Union contribution (on the basis of the ERA-NET unit cost) for the co-ordination costs of additional activities.

Actions will provide solutions through a new approach to research and action on global environmental change and global sustainability that factors in complex social behaviours and social transformation. This will require transdisciplinary research on the complex processes of

⁶⁰ http://ec.europa.eu/research/participants/docs/h2020-funding-guide/cross-cutting-issues/international-cooperation_en.htm

social transformation to secure effective, equitable and durable solutions that are targeted to local contexts, to comply with the Sustainable Development Goals. The approach should take into account existing experiences and programmes addressing the issue of transformation to sustainability and low-carbon economies and societies, such as FP7, JPI Climate, Urban Europe, the NORFACE network of funding agencies and the International Social Science Council (ISSC) programme, with a strong focus on developing countries.

In line with the strategy for EU international cooperation in research and innovation (COM(2012)497), actions will contribute to implementing multilateral activities such as the Belmont Forum and Future Earth initiatives to address cultural, economic, institutional and political barriers and opportunities and identify which sustainable development pathways linking economic prosperity with social justice and a healthy biosphere are actionable in different contexts.

The Commission considers that proposals requesting a contribution from the EU in the range of EUR 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: Projects are expected to lead to:

- alignment of EU Member States' and international partners' research programmes towards the objectives set by the Sustainable Development Goals;
- strengthened research capacities in low- and middle income countries around the world;
- transformed research on global environmental change by fostering transdisciplinarity, bringing together disciplines, practitioners and societal stakeholders, with the ultimate objective of bringing about transformative shifts to a more sustainable and just world.

Type of Action: ERA-NET Cofund

The conditions related to this topic are provided at the end of this call and in the General Annexes.

SC5-29-2016: Framework Partnership Agreement supporting Joint Actions towards a sustainable green economy in Europe and beyond

Specific Challenge: The European Environment Agency's 2015 State of the Environment Report⁶¹ finds that Europe is making progress in reducing environmental pressures, but that current environmental policies and technology efficiency gains are not likely to be sufficient to address the substantial challenges it faces in protecting its natural capital, stimulating resource-efficient, low-carbon economic and social development and safeguarding its population from environmental health risks. It recommends fundamental, systemic transitions

⁶¹ <http://www.eea.europa.eu/soer#tab-synthesis-report>

in the systems of production and consumption and profound changes in dominant institutions, lifestyles, practices, policies and technological solutions.

The challenge of underpinning and accelerating the transformation of our economy and society to more sustainable development paths has a planetary scale. The post 2015 sustainable development agenda, with a number of sustainable development goals, is likely to give new impetus to address this challenge at global level and will provide a global framework for cooperation to that end.

Operating a systemic transformation for sustainable development requires the mobilisation of all relevant actors: public authorities at various levels, manufacturing industry and business at large, academia, research institutes, finance and insurance, non-governmental organisations and civil society.

It will not happen without a consistent and aligned effort to be planned over many years in research, technological development and innovation, in order to provide a solid knowledge and evidence base for new transformative solutions and co-investment between public and private sectors. An enabling policy framework should help to develop, test and deploy such solutions.

Substantial volumes of investment are required. They cannot be allocated by individual Member States or by European institutions alone. The European Union funding is only a limited part of the total amounts available across Europe. The scale and scope of required effort can be achieved by pooling together research, innovation and financial resources from multiple sources at European and national levels. A properly aligned European Research Area open to the world can make an essential difference in enabling a transformative sustainability agenda to take shape. The alignment of research and innovation agendas across the world will be crucial in bringing about the necessary transformations to which the European Union aspires at a global level. Hence, cooperation with international programmes, including through established channels such as the Belmont Forum, are an important element.

The research and funding landscape in Europe is complex, but there is already a basis of coordinated efforts, notably through a number of joint programming initiatives (JPIs) and ERA-NETs that address various aspects of environmental sustainability, in Europe and globally.

In the area covered by Societal Challenge 5, a Framework Partnership Agreement is foreseen with a view to create research and innovation synergies on a large scale, by organising joint programming actions between the entities responsible for public funding programmes at national, regional and European levels, as well as from international partner countries. This addresses JPIs and ERA-NETs that have a strong bearing on environmental sustainability.

Scope: The purpose of this topic is to create a single⁶² Framework Partnership Agreement to strengthen and simplify cooperation between the European Commission, Member States' and

⁶² This is in line with the objective of transnational coordination of national/regional programmes, with a maximum number of countries participating in the resulting joint actions.

other national/regional programme managers and owners in the fields of relevance of the Societal Challenge 5. This will enable these actors to develop and implement a long-term action plan addressing the specific challenge with a set of ERA-NET Cofund actions. It is expected that the proposal submitted to this call will provide a broad coverage of countries and their different programme managers and owners. Up to one proposal shall be selected under this topic.

The Commission will subsequently invite submission of proposals⁶³ for Specific Grant Agreements under this Framework Partnership Agreement.

The Framework Partnership Agreement will exceptionally last for 5 years in order to cover the remaining duration of Horizon 2020. This is justified by the fact that the Joint actions are planned to be continued until the end of Horizon 2020. Proposals submitted under this topic should include all organisations that intend to participate in future ERA-NET Cofund actions, both in-kind and cash-based.

Expected Impact: In areas of common interest within the scope of Societal Challenge 5, the Framework Partnership Agreement is expected to:

- establish long-term and more strategic collaboration among programme managers and owners so as to create a globally attractive European Research Area that underpins the transformation towards sustainable development in line with the post 2015 sustainable development agenda;
- establish long-lasting joint programming research efforts with structural impacts between Member States and with international partners, capitalising on the experience of networks such as the Belmont Forum, in areas of common interest within the scope of Societal Challenge 5;
- increase the involvement of programme managers and owners in jointly addressing sustainability challenges, inter alia through ERA-NET Cofund actions, thereby improving the synergy at European and global levels between JPIs and ERANETs within a common strategic framework.

Type of Action: Framework Partnership Agreement

The conditions related to this topic are provided at the end of this call and in the General Annexes.

FAST TRACK TO INNOVATION PILOT

Full details on this pilot are provided in the separate call for proposals under the Horizon 2020 Work Programme Part – Fast Track to Innovation Pilot (Part 18 of this Work Programme).

⁶³ The resulting ERA-NET Cofund actions are actions with specific characteristics that require a particular type of body (programme managers and programme owners).

SME INSTRUMENT

Full details on the continuously open SME Instrument call (H2020-SMEInst-2016-2017) are provided under the Horizon 2020 Work Programme Part – Innovation in SMEs (Part 7 of this Work Programme).

This Work Programme part contributes the following challenge for the SME instrument call:

SMEinst-12-2016-2017: Boosting the potential of small businesses in the areas and priorities of Societal Challenge 5

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, climate-smart 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-innovative⁶⁴ SMEs in all areas addressing the climate action, environment, resource efficiency and raw materials challenge – including but not restricted to the 2016-2017 strategic priorities of systemic eco-innovation and circular economy, nature-based solutions, climate services, sustainable supply of raw materials, harnessing GEOSS Earth observation data, cultural heritage for sustainable growth, and water – 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 welcome.

⁶⁴ http://ec.europa.eu/environment/eco-innovation/index_en.htm

Conditions for the Call - Greening the Economy

Opening date(s), deadline(s), indicative budget(s):⁶⁵

Topics (Type of Action)	Budgets (EUR million)		Deadlines
	2016	2017	
Opening: 15 Oct 2015			
SC5-12-2016 (CSA)	2.00		26 Jan 2016
SC5-24-2016 (CSA)	0.30		
Opening: 10 Nov 2015			
SC5-01-2016-2017 (IA)	20.00		08 Mar 2016 (First stage)
SC5-14-2016-2017 (IA)	28.00		06 Sep 2016 (Second stage)
SC5-21-2016-2017 (IA)	10.00		
SC5-03-2016 (RIA)	20.00		08 Mar 2016
SC5-06-2016-2017 (RIA)			
SC5-05-2016 (CSA)	8.55		
SC5-10-2016 (CSA)			
SC5-11-2016 (CSA)			
SC5-23-2016-2017 (CSA)			
SC5-25-2016 (CSA)			

⁶⁵ The Director-General responsible for the call may decide to open the call up to one month prior to or after the envisaged date(s) of opening.

All deadlines are at 17.00.00 Brussels local time.

The Director-General responsible may delay the deadline(s) by up to two months.

The deadline(s) in 2017 are indicative and subject to a separate financing decision for 2017.

The budget amounts for the 2016 budget are subject to the availability of the appropriations provided for in the draft budget for 2016 after the adoption of the budget 2016 by the budgetary authority or, if the budget is not adopted, as provided for in the system of provisional twelfths.

The budget amounts for the 2017 budget are indicative and will be subject to a separate financing decision to cover the amounts to be allocated for 2017.

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SC5-27-2016 (CSA)			
SC5-09-2016 (RIA)	5.00		
SC5-13-2016-2017 (RIA)	26.00		
SC5-15-2016-2017 (CSA)	5.00		
SC5-16-2016-2017 (CSA)			
SC5-17-2016 (ERA-NET-Cofund)	5.00		
SC5-20-2016 (RIA)	10.00		
SC5-28-2016 (ERA-NET-Cofund)	3.00		
Opening: 14 Apr 2016			
SC5-29-2016 (FPA)			08 Sep 2016
Opening: 08 Nov 2016			
SC5-01-2016-2017 (RIA)		43.00	07 Mar 2017
SC5-02-2017 (RIA)			
SC5-04-2017 (RIA)			
SC5-06-2016-2017 (RIA)			
SC5-07-2017 (CSA)		4.60	
SC5-19-2017 (CSA)			
SC5-23-2016-2017 (CSA)			
SC5-13-2016-2017 (RIA)		10.00	
SC5-15-2016-2017 (CSA)		9.50	
SC5-16-2016-2017 (CSA)			
SC5-18-2017 (RIA)		15.00	

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SC5-22-2017 (RIA)		5.00	
SC5-26-2017 (PCP)		5.00	
SC5-08-2017 (IA)		25.00	07 Mar 2017 (First stage)
SC5-14-2016-2017 (IA)		56.00	05 Sep 2017 (Second stage)
SC5-21-2016-2017 (IA)		10.00	
Overall indicative budget	142.85	183.10	

Indicative timetable for evaluation and grant agreement signature:

For single stage procedure:

- Information on the outcome of the evaluation: Maximum 5 months from the final date for submission; and
- Indicative date for the signing of grant agreements: Maximum 8 months from the final date for submission.

For two stage procedure:

- Information on the outcome of the evaluation: Maximum 3 months from the final date for submission for the first stage and maximum 5 months from the final date for submission for the second stage; and
- Indicative date for the signing of grant agreements: Maximum 8 months from the final date for submission of the second stage.

Exceptional funding rates:

SC5-26-2017	The funding rate for Pre-Commercial Procurement (PCP) actions is limited to 90% of the total eligible costs (PCP is procurement of R&D services) to leverage co-financing from the procurers.
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Eligibility and admissibility conditions: The conditions are described in parts B and C of the General Annexes to the work programme. The following exceptions apply:

SC5-16-2016-2017	Due to the specific challenge of this topic, in addition to the minimum number of participants set out in the General Annexes, proposals shall include <u>at least two</u> participants from international partner countries.
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Evaluation criteria, scoring and threshold: The criteria, scoring and threshold are described in part H of the General Annexes to the work programme.

Evaluation Procedure: The procedure for setting a priority order for proposals with the same score is given in part H of the General Annexes.

The full evaluation procedure is described in the relevant [guide](#) published on the Participant Portal.

Consortium agreement: Members of consortium are required to conclude a consortium agreement, in principle prior to the signature of the grant agreement. However, for the Framework Partnership Agreement for ERA-NET Cofund actions topic, i.e. topic SC5-29-2016, members of the consortium are not required to conclude a consortium agreement since each Specific Grant Agreement will require a consortium agreement.

Other actions⁶⁶

1. GEO subscription⁶⁷

Scope: An annual contribution to the 2016 and 2017 activities of the GEO Secretariat, as subscription to a body of which they are a member, according to Article 121(2)(d) of the Financial Regulation applicable to the general budget of the European Communities.

As a full member of GEO the Commission will pay a contribution on behalf of the EU to the GEO Trust Fund, which is the budgetary structure agreed by the GEO members to fund the GEO secretariat (hosted by the World Meteorological Organisation in Geneva, Switzerland), to ensure the implementation of the Global Earth Observation System of Systems (GEOSS) according to its annual work plan and the continuity of the leadership and participation of the EU in GEO.

Type of Action: Subscription

Indicative timetable: Second Quarter of 2016 and second Quarter of 2017

Indicative budget: EUR 0.80 million from the 2016 budget and EUR 0.80 million from the 2017 budget

2. IPCC secretariat

Scope: The IPCC is the key global climate science-policy interface, underpinning European and international climate policy making and is the leading body responsible for the scientific assessment of climate change. The European Union has an enhanced observer status at the UN and may exercise the following procedural rights at IPCC Sessions: the right to speak in turn, the right to reply and the right to introduce proposals.

The Commission will pay a contribution on behalf of the EU to the IPCC secretariat (hosted by the World Meteorological Organisation in Geneva, Switzerland) with the aim of supporting the preparation of the next IPCC Assessment Report and facilitating the participation of scientists from the EU and from developing countries in this process. The action will also support the organisation of IPCC high-level dissemination events in Europe, targeting policy makers and other relevant stakeholders, in order to provide timely, high-quality and policy-relevant information and strengthen the science-policy dialogue on climate change.

⁶⁶ The budget amounts for the 2016 budget are subject to the availability of the appropriations provided for in the draft budget for 2016 after the adoption of the budget 2016 by the budgetary authority or, if the budget is not adopted, as provided for in the system of provisional twelfths.

The budget amounts for the 2017 budget are indicative and will be subject to a separate financing decision to cover the amounts to be allocated for 2017.

⁶⁷ This activity directly aimed at supporting public-public partnerships with Member States and associated countries, technology platforms with industrial partners and earth observation networks is excluded from the delegation to EASME and will be implemented by the Commission services.

Legal entities:

IPCC secretariat, hosted by the World Meteorological Organisation, WMO, Geneva, Switzerland

Type of Action: Grant to identified beneficiary - Coordination and support actions

The standard evaluation criteria, thresholds, weighting for award criteria and the maximum rate of co-financing for this type of action are provided in parts D and H of the General Annexes.

Indicative timetable: Third Quarter 2017

Indicative budget: EUR 0.70 million from the 2016 budget

3. Support actions for raw materials policy (JRC)⁶⁸

Technical assistance supporting the monitoring and evaluation of the European Innovation Partnership (EIP) on Raw Materials;

This action shall cover the delivery of the following items:

- the EIP Annual Monitoring Report on "Raw Materials Commitments",
- the preparatory work and the finalisation of the EIP Strategic Implementation Plan (SIP) Implementation Document 2017 (e.g. involving stakeholder consultation/meetings, via a Europe-wide questionnaire),
- the preparatory work (e.g. data extraction, development of new indicators) and the finalisation of the Raw Materials Scoreboard 2017 (e.g. involving stakeholder consultation/meetings),
- the completion of the third EIP Call for commitments (preparation of the call and analysis of proposals),
- integrating and developing the elements of the EU Raw materials Knowledge base in the Raw materials Information System.

Indicative number of direct service contracts: one in 2016

Indicative duration: 24 months

Type of Action: Provision of technical/scientific services by the Joint Research Centre

Indicative timetable: 2nd Quarter 2016

Indicative budget: EUR 0.50 million from the 2016 budget

⁶⁸ This activity directly aimed at supporting the development and implementation of evidence base for R&I policies and supporting various groups of stakeholders is excluded from the delegation to EASME and will be implemented by the Commission services.

4. Support actions for raw materials policy (public procurement)⁶⁹

The secretariat supporting the implementation of the European Innovation Partnership (EIP) on Raw Materials;

This action shall ensure constant and high quality support to the European Innovation Partnership (EIP) on Raw Materials. Particularly, it will provide secretariat services to handle the different EIP groups (i.e. High-level Steering Group and Sherpa group and the meetings of operational groups) by ensuring:

- the EIP daily logistics,
- the logistics of the EIP meetings (EIP groups and High Level annual conference),
- minutes taking,
- communication and visibility activities (e.g. EIP website moderation and content update, social network contributions, EIP newsletter).

The secretariat will be the contact point for stakeholders.

Type of action: Public procurement

Indicative duration: 12 months

Type of Action: Public Procurement - new direct contract – 2 service contracts

Indicative timetable: 4th Quarter 2016 and 4th Quarter 2017

Indicative budget: EUR 0.45 million from the 2016 budget and EUR 0.45 million from the 2017 budget

5. External expertise

This action will support the use of appointed independent experts for the monitoring of running projects, where appropriate.

Type of Action: Expert Contracts

Indicative budget: EUR 0.30 million from the 2016 budget and EUR 0.30 million from the 2017 budget

⁶⁹ This activity directly aimed at supporting the development and implementation of evidence base for R&I policies and supporting various groups of stakeholders is excluded from the delegation to EASME and will be implemented by the Commission services.

6. Experts for the preparation of four inducement prizes⁷⁰

Experts of relevant disciplines will be tasked with advising on the preparation of four inducement prizes. Due to the very wide range of issues and specialist disciplines covered by Societal Challenge 5 'Climate action, environment, resource efficiency and raw materials', a distinct grouping of experts per prize is required in order to achieve the necessary depth of expertise. One grouping of up to five experts will therefore be set up for each of the following issues:

- **Inducement prize for achieving a plastic-free water environment** (i.e. in rivers, lakes, seas and/or oceans). The most innovative and effective solution will be rewarded, e.g. for avoiding, collecting or destroying plastic litter, adopting the more appropriate solution.
- **Inducement prize for the circular economy**, addressing the whole value chain, but focusing on the retail sector, ensuring end user involvement and acceptance, and encompassing the entire environmental footprint of good(s).
- **Inducement prize for valorising the potential of cultural heritage for sustainable development**, building heritage-led innovation communities.
- **Inducement prize for new products and services that harness Earth observation data** (in-situ remote, sensing, citizen observatories, crowdsourcing) and that can be further taken up by industry and put on the market to respond to citizens' needs. This inducement prize should leverage the GEOSS (http://www.geoportal.org/web/guest/geo_home_stp) and complement activities carried out within the MyGEOSS project (<http://digitalearthlab.jrc.ec.europa.eu/mygeoss>).

Experts will give advice to the Commission services on (i) the definition of one prize within the given area and the critical amount to be awarded in order to achieve an effective inducement effect, (ii) targeted potential applicants and the communication strategy needed, and (iii) how best to define the specific evaluation criteria. Each grouping will include experts of different disciplines, such as technologies, business, administration, social sciences and humanities. The methodology should build on that already used by the European Commission and by experts in the field of inducement prize design and implementation. An open consultation could also be considered in the preparation phase.

The experts will assist in drafting a complex, articulated set of documents for each prize subject. Experts will be selected from the experts' database produced following the Horizon 2020 call for expression of interest for experts⁷¹. A special allowance of EUR 450/day will be paid to the experts, appointed in their personal capacity and acting independently and in the

⁷⁰ This activity directly aimed at supporting the development and implementation of evidence base for R&I policies and supporting various groups of stakeholders is excluded from the delegation to EASME and will be implemented by the Commission services.

⁷¹ OJ C342 of 22 November 2013

public interest, due to the considerable amount of work and of drafting involved that will entail a level of high level of commitment and a considerable time investment.

Type of Action: Expert Contracts

Indicative timetable: 1st Quarter 2016

Indicative budget: EUR 0.30 million from the 2016 budget

7. Specific Grant Agreements (SGAs) for ERA-NET Cofund actions supporting Joint Actions towards sustainable green economy in Europe and beyond

This action is connected to topic SC5-29-2016 'Framework Partnership Agreement supporting Joint Actions towards a sustainable green economy in Europe and beyond'. Once the Framework Partnership Agreement (FPA) resulting from topic SC5-29-2016 is concluded between the Commission services and the consortium of programme owners and programme managers, each individual ERA-NET Cofund action will be implemented as a Specific Grant Agreement (SGA) linked to the FPA.

Individual topics suitable for SGAs will be identified and discussed in close collaboration with Member States' representatives. For 2017, topics will predominantly address the areas covered by the activities of the JPI Climate, the JPI Water and the BIODIVERSA ERA-NET, without excluding the possibility that the use of the FPA may be proposed for topics in other areas during this period.

The actual submission of the simplified ERA-NET Cofund proposals will only be possible after the Commission services have agreed with the Programme Committee configuration for Societal Challenge 5 the scope, budget and type of each ERA-NET to be co-funded.

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 (normally resulting in grants to third parties) with EU co-funding in this area. Proposers are encouraged to implement other joint activities, including additional joint calls without EU co-funding.

Participation of legal entities from international partner countries is encouraged in the joint call as well as in other joint activities. Participants from countries which are not automatically eligible for funding may nonetheless request a Union contribution to cover the coordination costs of additional activities on the basis of the ERA-NET unit cost.

Proposals will have to pay particular attention to tackling the following challenges:

- adhering to the specific challenges identified for the Framework Partnership Agreement;
- reinforcing synergy at international level, particularly building upon the cooperation initiated with relevant fora such as the Belmont Forum, Future Earth etc, contributing to the implementation of the post 2015 agenda for sustainable development;

- realising systemic and integrated step changes towards a 'green economy' as a vector for sustainable development;
- focusing on projects developing innovative solutions and/or bringing them closer to deployment;
- encouraging business and other stakeholder participation to leverage investment in innovative solutions;
- strengthening the knowledge base for transformative innovation and technology, thereby creating sustainable economic growth and jobs.

Proposals will be evaluated by internal experts, ensuring in particular the compliance with the technical and legal requirements for ERA-NET Cofund actions, compliance with the agreed scope and budget, and overall research excellence.

It is expected that the time from proposal submission to signature of the grant agreement will normally not exceed 4-5 months and thus contribute to a faster launch of joint calls and implementation of actions. Proposals shall not be submitted later than October 31st of the budgetary year.

This activity directly aimed at supporting the development and implementation of evidence base for R&I policies and supporting various groups of stakeholders, and at supporting the promotion of coherent and effective cooperation with third countries, is excluded from the delegation to EASME and will be implemented by the Commission services.

Legal entities: Signatories of the Framework Partnership Agreement (SC5-29-2016). Proposals may include additional legal entities, provided that they fulfil the eligibility criteria for ERA-NET Cofund actions and under the condition that they accede to the Framework Partnership Agreement at the time of the signature of the Specific Grant agreement.

Type of Action: Specific Grant Agreement

Specific Grant Agreements for ERA-NET Cofund actions in the context of the Framework Partnership Agreement resulting from SC5-29-2016.

The standard evaluation criteria, thresholds, weighting for award criteria and the maximum rate of co-financing for this type of action are provided in parts D and H of the General Annexes.

Indicative timetable: 2nd Quarter 2017

Indicative budget: EUR 25.00 million from the 2017 budget

Budget⁷²

	Budget line(s)	2016 Budget (EUR million)	2017 Budget (EUR million)
Calls			
H2020-SC5-2016-2017		142.85	183.10
	<i>from 02.040301</i>	64.28	75.63
	<i>from 08.020305</i>	78.57	107.47
Contribution from this part to call H2020-BG-2016-2017 under Part 9 of the work programme		30.00	10.00
	<i>from 08.020305</i>	30.00	10.00
Contribution from this part to call H2020-FTIPilot-2016 under Part 18 of the work programme		7.15	
	<i>from 02.040301</i>	1.49	
	<i>from 08.020305</i>	5.66	
Contribution from this part to call H2020-IND-CE-2016-17 under Part 17 of the work programme		84.50	70.00
	<i>from 08.020305</i>	84.50	70.00
Contribution from this part to call H2020-LCE-2016-2017 under Part 10 of the work programme		6.00	
	<i>from 02.040301</i>	3.00	
	<i>from 08.020305</i>	3.00	

⁷² The budget figures given in this table are rounded to two decimal places.
The budget amounts for the 2016 budget are subject to the availability of the appropriations provided for in the draft budget for 2016 after the adoption of the budget 2016 by the budgetary authority or, if the budget is not adopted, as provided for in the system of provisional twelfths.
The budget amounts for the 2017 budget are indicative and will be subject to a separate financing decision to cover the amounts to be allocated for 2017.

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Contribution from this part to call H2020-SCC-2016-2017 under Part 17 of the work programme		60.00	40.00
	<i>from 08.020305</i>	<i>60.00</i>	<i>40.00</i>
Contribution from this part to call H2020-SFS-2016-2017 under Part 9 of the work programme			10.00
	<i>from 08.020305</i>		<i>10.00</i>
Contribution from this part to call H2020-SMEInst-2016-2017 under Part 7 of the work programme		25.00	27.50
	<i>from 02.040301</i>	<i>5.31</i>	<i>5.82</i>
	<i>from 08.020305</i>	<i>19.69</i>	<i>21.68</i>
Other actions			
Expert Contracts		0.60	0.30
	<i>from 02.040301</i>	<i>0.06</i>	<i>0.06</i>
	<i>from 08.020305</i>	<i>0.54</i>	<i>0.24</i>
Grant to Identified beneficiary		0.70	
	<i>from 08.020305</i>	<i>0.70</i>	
Provision of technical/scientific services by the Joint Research Centre		0.50	
	<i>from 02.040301</i>	<i>0.50</i>	
Public Procurement		0.45	0.45
	<i>from 02.040301</i>	<i>0.45</i>	<i>0.45</i>
Specific Grant Agreement			25.00
	<i>from 08.020305</i>		<i>25.00</i>
Subscription		0.80	0.80

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	<i>from 08.020305</i>	<i>0.80</i>	<i>0.80</i>
Estimated total budget		358.55	367.15