

**2012 Orientation Paper on the Environment
(including climate change)**

(09 June 2011)

DRAFT

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Objective:

Promoting sustainable management of the natural and human environment and its resources by advancing our knowledge on the interactions between the biosphere, ecosystems and human activities, and developing new technologies, tools and services, in order to address in an integrated way global environmental issues. Emphasis will be put on prediction of climate, ecological, earth and ocean system changes, on tools and on technologies for monitoring, prevention and mitigation of environmental pressures and risks including on health and for the sustainability of the natural and man-made environment.

I CONTEXT

Innovation Union aspects

The Innovation Union initiative underlines that research and innovation are key drivers of competitiveness, jobs, sustainable growth and social progress. The work programme 2012 has been designed to support the implementation of the Innovation Union initiative and in particular to bring together research and innovation to address major challenges.

The work programme can contribute to the innovation objective in two ways, and constitutes a significant change to the approach in earlier work programmes:

1. By supporting more topics aimed at generating knowledge to deliver new and more innovative products, processes and services. This will include pilot, demonstration and validation activities.
The focus on innovation will be reflected in the description of the objectives and scope of the specific topics, as well as in the expected impact statements. The innovation dimension of the proposals will be evaluated under the evaluation criterion 'Impact'.
2. By identifying and addressing exploitation issues, like capabilities for information and dissemination, and by enhancing the use of the generated knowledge (protection of intellectual property rights like patenting, preparing standards, etc).

Information on the Risk-Sharing Finance Facility (RSFF), an innovative financial instrument under FP7, is available online¹. The Commission will respond to further needs of potential beneficiaries for information on the RSFF (by, e.g. awareness-raising activities in conjunction with the European Investment Bank, participation to thematic events).

Approach for 2012

The orientation designed for 2012 takes into account the European Research Area (ERA) objectives and recent major EU policy initiatives such as the Flagship Initiatives on Innovation Union and Resource Efficiency which are of key strategic importance for the EU environment research. The 2012 Environment (including climate change) work programme, under the heading '*Transformative and Responsible Innovation*', will respond to global societal challenges in the framework of resource efficiency and climate resilience. Specific objectives for the environment and climate research are:

¹ <http://www.eib.org/products/loans/special/rsff/index.htm?lang=en> and http://ec.europa.eu/invest-in-research/funding/funding02_en.htm

- Provide knowledge-based options for addressing major **societal challenges** notably climate change, biodiversity loss, land and sea management and resource efficiency.
- Develop and strengthen European leadership in **innovation** including key **environmental technologies** pursuing a broad concept of innovation, both research driven innovation and new business models, eco-design, services (e.g. ecosystem services) and innovation in **policy, governance and consumption behaviour**.
- Promote and facilitate **knowledge transfer, assessment, uptake and exploitation** of scientific data and results, in particular through demonstration and delivery of innovative tools and services such as ecosystem services and earth observation systems.

These objectives are addressed through **five challenges** which are forming the key research priorities for the 2012 work programme. The challenges are closely linked and integrate the various sub-activities of the Environment (including climate change) Theme, and thereby create a new challenge driven structure for the Environment work programme.

6.1 Coping with climate change	<i>Sub-activity 6.1.1 Pressures on environment and climate</i> <i>Sub-activity 6.1.2 Environment and health</i> <i>Sub-activity 6.3.1 Environmental technologies</i> <i>Sub-activity 6.4.1 Earth and ocean observation systems and monitoring methods</i>
6.2 Sustainable use and management of land and seas	<i>Sub-activity 6.2.1 Conservation and sustainable management of natural and man-made resources and biodiversity</i> <i>Sub-activity 6.2.2 Management of marine environments</i> <i>Sub-activity 6.3.2 protection, conservation and enhancement of cultural heritage, including human habitat</i> <i>Sub-activity 6.4.1 Earth and ocean observation systems and monitoring methods</i>
6.3 Improving resource efficiency	<i>Sub-activity 6.3.1 Environmental technologies</i> <i>Sub-activity 6.3.3 Technology assessment, verification and testing</i> <i>Sub-activity 6.4.2 Forecasting methods and assessment tools for SD</i>
6.4 Protecting citizens from environmental hazards	<i>Sub-activity 6.1.3 Natural hazards</i> <i>Sub-activity 6.1.2 Environment and health</i> <i>Sub-activity 6.3.1 Environmental technologies</i> <i>Sub-activity 6.4.1 Earth and ocean observation systems and monitoring methods</i>
6.5 Mobilizing environmental knowledge for policy, industry and society	<i>Sub-activity 6.1.1 Pressures on environment and climate</i> <i>Sub-activity 6.1.2 Environment and health</i> <i>Sub-activity 6.4.1 Earth and ocean observation systems and monitoring methods</i> <i>Sub-activity 6.4.2 Forecasting methods and assessment tools for SD</i> <i>Sub-activity 6.5.1 Dissemination and horizontal activities</i>

Innovation dimension of the activities

The 2012 Environment work programme aims to extend its activities towards applications and demonstration activities by putting a strong emphasis on the participation of small and medium enterprises (SMEs) and end-users in all the activities. A key feature is the introduction of the challenge driven approach with expected high socio-economic impacts in support of the Innovation Union and Resource Efficiency Flagship Initiatives. The work programme promotes innovation by including bottom-up topics on key sectors e.g. demonstration of water and waste technologies and resource efficiency. The Environment Theme supports the European Economic Recovery plan, through participation in the Public-Private-Partnerships (PPPs), notably in the area of 'Energy efficient Buildings' and 'Green Cars'.

For projects whose results are nearing market introduction, standardisation is often a key enabler for interoperability, ensure product quality, open markets and free trade and thereby building consumer confidence. Standardisation can help to foster access to the market of innovative solutions and thus help ensure the practical application of research results. As such, projects could strengthen future innovation by considering the inclusion of pre- and co-normative research tasks and the integration of standardisation organisations to support standardisation.

SME relevant research: In the 2012 work programme efforts are made to encourage industry/SME participation notably through bottom-up approaches and SME-targeted topics. Mandatory level of SME-participation is introduced as an additional eligibility criterion (see section II topic descriptions and section III). This approach is particularly applied in the areas of resource efficient technologies, processes and services in support of the Resource Efficiency Initiative and demonstration of most promising prototypes and tools derived from previous European environmental research activities in the areas of water and waste applications. SME participation is further encouraged through various SME-friendly topics across the work programme.

Dissemination actions are addressed throughout the work programme:

Open access in FP7: Beneficiaries funded partially or entirely by the Cooperation Programme under the Environment (including climate change) Theme are required to deposit peer-reviewed articles resulting from projects in an institutional or subject-based repository, and to make their best efforts to ensure that readers have open access to these articles within six months of publication.

Each proposal under this Theme should allocate appropriate efforts and resources to dissemination to promote the use and uptake of the results.

Specific dissemination topics to strengthen science-policy interface are introduced in the area of geo-engineering, air quality and marine research.

A feasibility study: to explore opportunities to extend open access to data in order to enhance transparency, credibility and efficiency of research and further promote the use of data and results for policy and/or business purposes.

Overall expected impact: It is expected that the 2012 work programme through its research and innovation actions will boost European competitiveness by promoting novel applications and tools for improved resource efficiency of natural resources (e.g. water, land, marine). It is expected that the work programme will stimulate the SME participation notably in the area of environmental technologies. In addition, the results

obtained will provide support for evidence-based decision making, notably for EU policies in the field of environment e.g. air, marine, water, chemicals policies and support to Resource Efficiency initiative.

- International cooperation

International cooperation continues to be an integral part of the Environment Theme throughout the work programme and all topics are open for participants from the International Cooperation Partner Countries (ICPC). The strategic approach for international cooperation of EU environmental research includes annual identification of major cooperation countries and/or regions.

In 2012, cooperation with India on water technologies and management is foreseen as a follow-up of the 6th India-EC Science & Technology Steering Committee meeting which was held in March 2010. This activity aims to strengthen and coordinate research partnership between EC, Member States and India in line with the activities of the Strategic Forum for International Cooperation (SFIC).

- Cross-thematic approaches

Public-Private Partnerships (PPPs)²: A joint call in the context of the Public-Private-Partnership 'Green Cars' is organised by Theme 4 Nanosciences, nanotechnologies, materials and new production technologies, Theme 6 Environment (including climate change) and Theme 7 Transport (including Aeronautics).

A cross thematic call in the context of the Public-Private partnership 'Energy-efficient Buildings' is launched involving Theme 3 Information and Communication Technologies (ICT), Theme 4 Nanosciences, nanotechnologies, materials and new production technologies, Theme 5 Energy and Theme 6 Environment (including climate change).

Following the two previous 'The Ocean of Tomorrow' cross-thematic calls, several topics will be launched to support the implementation of the Marine Strategy Framework Directive³. Cooperation will involve Theme 2 Food, Agriculture, Fisheries and biotechnology, Theme 5 Energy, Theme 6 Environment, (including climate change), and Theme 7 Transport (including Aeronautics). The Ocean of Tomorrow' related topics are implemented in the framework of the Communication 'A European strategy for marine and maritime research' COM(2008 534). The focus will be on research gaps about the definition and monitoring of the 'Good Environment Status' (GES) of EU waters, to be achieved by 2020. Special attention should also be given to the investigation of mitigation measures and SME participation whenever relevant.

Synergies and/or complementarities among projects selected for funding will be encouraged within the same Theme or across Themes. Synergies may be found with activities funded in the domain of Global Monitoring for Environment and Security

² For further details concerning the implementation of the PPP calls please see Annex 5 of the Cooperation work programme.

³ Directive 2008/56/EC of the European Parliament and of the Council of 17 June 2008 establishing a framework for community action in the field of marine environmental policy, OJ L 164 25.6.2008, p. 19

(GMES) under Theme 9 Space⁴. For information on 'The Ocean of Tomorrow' related topics in other themes, see the corresponding work programme chapters⁵.

The topics considered under Theme Environment (including climate change) are:

- ENV.2012.6.2-3 Innovative tools for understanding and integrated assessment of Good Environmental Status (GES) of marine waters
- ENV.2012.6.2-4 Management and potential impacts of litter in the marine and coastal environment
- ENV.2012.6.2-5 Improve scientific knowledge base to support the implementation of the Marine Strategy Framework Directive

- Theme specific information

The novelty of the 2012 Environment (including climate change) work programme is the challenge driven approach which is implemented through fewer but broader topics using a two-stage submission and evaluation procedure. In support of the objectives of the Innovation Union Flagship Initiative, efforts are made to boost industry and SME participation by introducing specific SME-targeted and SME-friendly topics. Furthermore, a shift towards larger scale projects has been introduced with the possibility to support several projects per topic.

The budget of the 2012 work programme is divided into challenges with separate indicative budgets. The work programme 2012 is implemented through a range of funding schemes. The type of funding scheme used and specific features e.g. SME participation are described in the topic descriptions in section II and also in section III. For each funding scheme there are upper limits on the requested EU contribution (for details please see the topic descriptions in section II and general call information in section III). **Funding limits will be strictly applied as eligibility criteria. Proposals that do not respect this limit will be considered ineligible.**

The minimum number of applicants in funding schemes is specified in the section III of this work programme. The duration of the project and the requested EU contribution should be in line with a realistic planning of the project. The budget request should also be in line with the needs of the consortia, within the maximum EU contribution, but not necessarily at it.

Usage of earth observation data: In the context of the cooperation with the European Space Agency (ESA), projects selected for funding are encouraged to utilise ESA Earth Science data. The data, both from ESA missions or third party missions, are for the vast majority of the cases available for free web download (further details for ESA missions and Third Party Missions are available at the <http://eopi.esa.int>). Likewise, the utilisation of data produced from different initiatives of ESA or the European Commission, in particular Global Monitoring for Environment and Security (GMES), is encouraged in all activities of the Environment Theme. (Further details on space data in the context of GMES are available at <http://gmesdata.esa.int/web/gsc/home>).

⁴ Further details are available at http://ec.europa.eu/enterprise/policies/space/gmes/services/index_en.htm

⁵ 'Food, Agriculture and Fisheries, and Biotechnology' (KBBE), 'Energy', and 'Transport (including aeronautics)'

Gender dimension: The pursuit of scientific knowledge and its technical application towards society requires the talent, perspectives and insight that can only be assured by increasing diversity in the research workforce. Therefore, all projects are encouraged to have a balanced participation of women and men in their research activities and to raise awareness on combating gender prejudices and stereotypes. When human beings are involved as users, gender differences may exist. These will be addressed as an integral part of the research to ensure the highest level of scientific quality. In addition, specific actions to promote gender equality in research can be financed as part of the proposal, as specified in Appendix 7 of the Negotiation Guidance Notes.⁶

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⁶ ftp://ftp.cordis.europa.eu/pub/fp7/docs/negotiation_en.pdf

II CONTENT OF CALLS

This section describes all the topics for which proposals will be called in this work programme. For actions not implemented through calls for proposals, please refer to section IV 'Other actions'.

Challenge 6.1 Coping with climate change

A key challenge for the remaining period of FP7 is to develop a more effective interface between climate change knowledge, social and economic systems and the policy making process. Work programme 2012 will strongly contribute to this challenge by exploring in particular the economic opportunities and the costs associated to the development of a low carbon, resource efficient and climate resilient society and economy. It will include key research building blocks for developing future climate services of paramount economic importance for business and society as a whole. It will include mainstream developments of modelling tools and data-sets to support cost-effective mitigation and adaptation policies. It will address the economic impact of mitigation policies on key economic sectors, together with the cost of adaptation. It will explore the potential of economic instruments to contribute to achieving the EU's long-term greenhouse gases reduction objectives, and finally will provide replies to policy makers about the potential, the limits, the costs and the risks associated with geo-engineering options.

ENV.2012. 6.1-1 Seasonal-to-decadal climate predictions towards climate services - FP7-ENV-2012-two-stage

Reliable seasonal-to-decadal climate predictions are of paramount value, since society and key economic sectors (e.g. energy, transport, agriculture, and tourism) have to base their short and medium term planning and decisions on robust climate information and the associated environmental and socio-economic impacts. Although substantial progress has been made in the past, the current outcome of climate models at temporal and spatial scale is not sufficient to meet the expectations and needs of the various stakeholders at European, regional and local level.

In view of developing reliable climate services, research should focus on key problems and uncertainties to advance our understanding of critical processes at different scales. It should take into account trends, interactions, feedbacks, teleconnections and threshold levels of the Earth climate system or its compartments. Actions will include the reliable quantification of the impacts of climate variability and change at regional and local scales and the assessment of the vulnerability of society, economy and ecosystems. Integration of instrumental and Earth observation climate data-sets (and derived knowledge) with high-resolution proxy data-sets obtained from natural climate archives may be considered, including integral field campaigns where necessary.

Proposals may focus on specific knowledge gaps and should demonstrate the degree by which they will contribute to the improvement of the reliability, precision and accuracy of seasonal-to-decadal climate predictions at regional and local scales. The participation of relevant stakeholders involved in the decision making process is highly recommended.

Cooperation with other non-EU initiatives and with non-EU partners in the field is encouraged.

Funding scheme: Collaborative Project

**The requested European Union contribution per project shall not exceed EUR 9 000 000
One or more proposals can be selected.**

Expected impact: Improved preparedness from seasons to years ahead of climatic conditions, in particular for the occurrence of high-risk patterns. Reduced costs of emergency interventions. Better market preparation to availability of climate-dependent products or services (e.g. agricultural products, energy distribution, transport services). Higher business continuity and resilience of society towards the impacts of climate variability and change. Contribution to the World Meteorological Organisation (WMO) Global Framework for Climate Services. New business opportunities for SMEs offering specialised climate services.

Specific feature: Projects selected under this topic will be linked through a coordination mechanism that will be defined during the negotiation stage.

ENV.2012.6.1-2 Development of advanced techno-economic modelling tools for assessing costs and impacts of mitigation policies - FP7-ENV-2012-two-stage

Research on the environmental and socio-economic opportunities and impacts of climate change mitigation policies are of paramount importance for the development of a resource efficient and climate resilient society. Climate-energy-economy models are fundamental tools to evaluate mitigation strategies, assessing the costs and inform decision makers. However, currently available tools have relevant limitations such as the difficulty to represent pervasive technological developments, positive feedbacks, the difficulty to represent non-linearities, thresholds and irreversibility, and the insufficiently developed representation of economic sectors with a significant potential for mitigation and resource efficiency. Research should focus on the development and validation of new models, new model components or in the improvement/upgrading of existing models. Economic impacts of implemented and planned mitigation policies in the EU and beyond should be assessed at different scales and for the key economic and societal sectors. Transparency in the description of the models' functioning, of their strengths and limitations is requested with a view to unequivocally frame the relevant area of application of each model and hence to improve users confidence in the results. The availability of large datasets for model validation purposes has to be taken into account, and their completeness should be improved. International collaboration to address the key challenges in Europe and globally is encouraged. The involvement of relevant stakeholders is highly recommended.

Funding scheme: Collaborative Project

**The requested European Union contribution per project shall not exceed EUR 6 000 000
One or more proposals can be selected.**

Expected impact: Reduced costs, improved acceptance, higher confidence on mitigation trajectories. More effective knowledge-based climate mitigation policy options. Support to the Roadmap for moving to a low carbon economy by 2050.

Specific feature: Projects selected under this topic will be linked through a coordination mechanism that will be defined during the negotiation stage.

ENV.2012.6.1-3 Strategies, costs and impacts of adaptation to climate change - FP7-ENV-2012-two-stage

Research on adaptation to climate change is imperative in order to better inform and support the development and implementation of adaptation policies and related action programmes at international, European and Member State level. Research should build a strong and comprehensive knowledge base that is required to identify appropriate options and develop medium and long-term strategies for adaptation at national, regional and local scales. Methods and tools should be developed to assess climate impacts, vulnerability, risks and their costs, and to predict the environmental, social and economic effects of adaptation options. Of particular relevance will be the bottom-up assessment of the full economic costs and benefits of climate change adaptation at sector level with particular attention to sectors of high economic and social importance, as well as the aggregation of such bottom-up approaches to enable the estimation of economy wide costs and benefits at EU and national level. Appropriate consideration should be given to human responses to change and to the complex interlinkage of adaptation policies with other policies including the investigation of conflicts and synergies between mitigation and adaptation actions. International cooperation to address key challenges in Europe and globally is encouraged. Participation of stakeholders is highly beneficial.

Funding scheme: Collaborative Project

The requested European Union contribution per project shall not exceed EUR 6 000 000. One or more proposals can be selected.

Expected impact: Reduced costs, better understanding and acceptance of adaptation measures. Improved integration of adaptation research into decision making leading to more effective knowledge-based decision making, in adaptation policy as well as in all other policy and business areas potentially affected by climate change. Enhanced understanding of and participation of society in adaptation measures. Social and economic benefits for the sectors and policy areas mentioned in the White Paper 'Adapting to climate change: Towards a European framework for action'⁷. Research activities under this topic are expected to contribute to an enlargement of the databases of socio-economic data related to climate change impacts, vulnerability and adaptation (e.g. the adaptation Clearing House Mechanism).

Specific feature: Projects selected under this topic will be linked through a coordination mechanism that will be defined during the negotiation stage using project resources.

ENV.2012.6.1-4 Exploiting the full potential of economic instruments to contribute to achieving the EU's greenhouse gas emissions reduction objectives for 2050 - FP7-ENV-2012-one-stage

In the context of greenhouse gas (GHG) emissions reductions needed by 2050 by the EU, this research should address questions key to the design of feasible, cost-effective and efficient mixes of economic instruments to achieve emissions reductions in 2030 consistent with an 80% reduction in greenhouse gas emissions by 2050 in Annex I countries. Research under this topic should take the EU Emissions Trading System (EU ETS) and existing legislation (e.g. renewable policies and energy efficiency standard) as a starting point and cornerstone of the EU's mitigation policy for the coming decades, assessing how the current policy mix may be improved. This can include the possibility of further development of the ETS, e.g. at

⁷ COM(2009) 147 final: <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2009:0147:FIN:EN:PDF>

international level. Furthermore, it has to examine how it can be supplemented with other economic and non-economic instruments to achieve the optimal instrument mix in terms of environmental effectiveness (EU and global), economic efficiency (static and dynamic), administrative feasibility (monitoring and enforcement), and political and legal feasibility. The research is to address the key risks and market imperfections in the use of proposed instrument mixes, (e.g. costs of use under uncertainty, incomplete information and information asymmetries, financial market imperfections, volatility, learning externalities), and demonstrate how these can be managed/mitigated. Consideration may be given to insights from behavioural economics that may help to improve the effectiveness of the proposed instrument mixes.

Funding scheme: Collaborative Project

The requested European Union contribution per project shall not exceed EUR 3 000 000

One or more proposals can be selected.

Expected impact: Identify faster and more cost-effective GHG emissions reductions pathways, foster faster introduction of highly innovative and low carbon technologies, and secure increased EU competitiveness on global markets.

ENV.2012.6.1-5 Explore opportunities, risks, feasibility and policy implications associated with key geo-engineering options - FP7-ENV-2012-one-stage

Deliberate large-scale manipulation of the earth-climate system (geo-engineering) is increasingly explored as an additional potential strategy to counteract anthropogenic climate change. However, geo-engineering options i) suffer from limited understanding of the physical science basis; ii) include major uncertainties regarding effectiveness, impacts and feasibility; iii) lack comprehensive risk assessment.

The action should evaluate the main geo-engineering options in an inter-disciplinary manner, using the latest scientific data and information, in order to assess: i) whether, and if so how, they can effectively contribute to climate change mitigation; ii) their potential impact and associated risks on human and natural systems; iii) their feasibility including costs; iv) the associated governance and legal issues. The action should also identify key knowledge gaps and recommend future research needs. Social and policy implications that are likely to arise from the implementation of these options should also be explored. The action should take stock of the results of previous EU projects in the field.

Funding scheme: Coordination and Support Action (supporting action)

The requested European Union contribution per project shall not exceed EUR 1 000 000

Up to one proposal can be selected.

Expected impact: Inform policy makers and the public about the main geo-engineering options in light of their effectiveness, risks, uncertainties, costs and governance implications. Better consensus on knowledge gaps and research needs (both at short and long term).

Challenge 6.2 Sustainable use and management of land and seas

Natural resources (terrestrial and marine) and ecosystem services constitute the natural capital that supports economies, societies and individual well-being. Good governance requires a quantification of the interactions and trade-offs among ecosystem services and understanding of how biodiversity underpins ecosystem functions and services across time, scales and sectors. Research will focus on developing innovative conceptual frameworks, methods and coherent, shared protocols to provide consistent datasets and knowledge at different scales e.g. by extending the European Biodiversity Observation Network to the global scale within the Group on Earth Observations (GEO) framework. Research will develop innovative approaches to value biodiversity and ecosystem services and to develop public goods and sustainable economic activities from them. The research will benefit landscape users (in particular forest industry, water managers and users, agriculture and agro-industry, urban planners, risk managers) as well as sea area users. Research will also contribute to detect and preserve underwater archaeological sites in accordance with the world Convention on the Protection of Underwater Heritage⁸. It will contribute to maintaining and restoring the ecosystem capacity to deliver products and services required by industry and the society. It will also contribute to set-up multi-purpose 'green infrastructures' based upon landscape ecology. In relation to the marine environment, research is specifically needed to assess and monitor the environmental status of marine waters (Good Environment Status).

ENV.2012.6.2-1 Exploration of the operational potential of the concepts of ecosystem services and natural capital to systematically inform sustainable land, water and urban management -FP7-ENV-2012-two-stage

Ecosystem services and natural capital are increasingly put forward as key conceptual approaches to inform sustainable land, water and urban management and develop innovative public goods and sustainable economic activities. This requires a better understanding of (i) the potential of the ecosystem services and natural capital approach and (ii) how best to operationalise these concepts within key regulatory frameworks and in decision making processes. Integrated natural, social and economic research is needed to assess the ecosystem services relevant to human well-being, and analyse links between and comparisons across locales, sectors, scales and time (for example, across a coherent set of case studies) in a range of social-ecological systems that must at least include fresh water bodies, coastal zones, urban and rural areas and their interfaces. Focusing on the bio-physical control of ecosystem services, research will examine the effects of multiple drivers (including the use of renewable resources), structural and functional factors (including biodiversity and tipping points), and human feedbacks on ecosystem services. Such research is to (i) provide a better understanding of how drivers and management, including the green infrastructure approach, ecological restoration, and EU regulatory framework (e.g. Water Framework Directive), change ecosystem services, and (ii) explore, demonstrate and validate mechanisms, instruments and best practices that will serve to maintain and enhance a sustainable flow of a

⁸ <http://www.unesco.org/new/en/unesco/themes/underwater-cultural-heritage/the-2001-convention/>

⁹ The word 'rural' means 'everything outside urban areas.' Forests, mountain ecosystems, islands, wetlands, pasture, and arable land are rural, as is all other non-urban land cover such as desert, heath, scrub, and moorland.

broad range of services from ecosystems while preserving their ecological value and biological diversity. Focusing on the socio-economic implications of choices on the use of ecosystem services, research will address the trade-offs and synergies between ecosystem services and between components of social and individual well-being that arise from the demands on these systems. Such research is to (iii) qualify and quantify these trade-offs and synergies and link them to the respective stakeholders across locales, sectors, scales and time, (iv) identify the potential for the development of innovative and sustainable processes derived from ecosystem services, and (v) explore, demonstrate and validate instruments and practices that will serve to align disconnected and conflicting interests and take power asymmetries into account in balancing trade-offs in social and individual well-being. In both bio-physical and socio-economic dimensions, work will (vi) develop methods and coherent and shared protocols to provide consistent and integrated datasets and knowledge (vii) and explore and where possible implement ways to ensure the perennity of any key data base, decision support system or other major product of the research. Integrating these strands of investigation, research should examine the potential of existing policies and provide plural and conditional alternatives for enhanced operationalisation of the concept of ecosystem services and natural capital to support the formulation and implementation of regulatory frameworks such as the Water Framework Directive, Air Quality Framework Directive, the Common Agricultural Policy, the Green Infrastructure approach, the Thematic Strategy on the Urban Environment and Environmental Impact Assessments. International collaboration, especially in developing countries is strongly encouraged, to qualify and quantify the interrelations and trade-offs between the provision and use of ecosystem services and natural capital on a global scale.

Funding Scheme: Collaborative Project

The requested European Union contribution per project shall not exceed EUR 9 000 000. One or more proposals can be selected.

Expected impact: Improved understanding of how ecosystem services and natural capital contribute to human well-being across locales, sectors, scales and time. Contribution to more sustainable ecosystem management maintaining and enhancing a sustainable flow of a broad range of services from ecosystems while preserving their ecological value and biological diversity. Contribution to more effective and inclusive management of ecosystem services balancing trade-offs in social and individual well-being. Increased EU competitiveness by innovative processes and services derived from operationalising the concept of ecosystem services and natural capital.

Specific feature: SMEs are expected to play a role in developing services and products derived from ecosystem services or in assessing and monitoring them. Projects selected under this topic will be linked through a coordination mechanism that will be defined during the negotiation stage using project resources.

Additional eligibility criterion: Projects will only be selected for funding on the condition that the estimate EU contribution going to SMEs is 15% or more of the total estimated EU contribution for the project as a whole. This will be assessed at the end of the negotiation, before signature of the grant agreement. Proposals not fulfilling this criterion will not be funded.

ENV.2012.6.2-2 Assessing global biological resources: the European contribution to the Global Earth Observation Biodiversity Observation Network¹⁰ (GEO BON) - FP7-ENV-2012-two-stage

Although the number of existing biodiversity observations is very large, these observations are very uneven in spatial, temporal, topical, and taxonomic coverage. This heterogeneity of the biodiversity datasets needs to be addressed in the context of the implementation of several environmental policies like the Habitats Directive in Europe, the future Marine Strategy Directive Framework, or the Intergovernmental Science Policy Platform on Biodiversity and Ecosystem Services (IPBES). The topic is intended as a European contribution to the assessment of global biological resources, across both terrestrial freshwater and marine ecosystems, linking biodiversity to environment structures. It will support the implementation of the GEO Biodiversity Observation Network (GEO BON), which is developing a coordinated, global network gathering and sharing information on biodiversity and ecosystems. It will integrate long-term national and European biodiversity resources and Global biodiversity data sources, (e.g., LTER-Europe, UNEP-WCMC, IUCN and its RedList of threaten species, GBIF), into GEO BON to provide a basis for dynamic and adaptive strategies for biodiversity conservation under changing environmental and societal conditions. Comprehensive and standardized biodiversity datasets, biological knowledge and filling out of taxonomic gaps at different scales using remotely-sensed, *in-situ* and collection-based observations will be delivered. Changes affecting the stock and nature of biological resources will be estimated by modelling distributions of species and their sensitivity to environmental changes. The project will deliver observation and monitoring protocols to assess long-term status and trends in biodiversity, in Europe specifically in under-sampled areas. SMEs are expected to participate in the data handling and the development of the observation system components enabling emerging biodiversity services and products (e.g. new business models for use and protection of biodiversity, applications to biomaterials and biosensors).

Funding Scheme: Collaborative Project

The requested European Union contribution per project shall not exceed EUR 9 000 000 Up to one proposal can be selected.

Expected impact: Global system of in-situ marine and terrestrial observations, integrated with remote sensing measurements, for the monitoring and assessment of global biological resources. Reinforced cooperation between national governments, supporting the development of national BON's in Europe. Strengthened knowledge on global biological resources integrating biodiversity, climate and ecosystem data and resources. Reduced risk from biological invasion. Improved biodiversity data interoperability arrangements. Support to the monitoring requirement of the UN Convention on Biological Diversity (UN CBD).

Additional eligibility criterion: Projects will only be selected for funding on the condition that the estimate EU contribution going to SMEs is 15% or more of the total estimated EU contribution for the project as a whole. This will be assessed at the end of the negotiation, before signature of the grant agreement. Proposals not fulfilling this criterion will not be funded.

¹⁰ This topic will provide knowledge and information on biological resources complementary to the actions conducted in GMES initiative (Global Monitoring for Environment and Security) e.g. GMES Land Monitoring Services.

ENV.2012.6.2-3 Innovative tools for understanding and integrated assessment of Good Environmental Status (GES) of marine waters ('The Ocean for Tomorrow') - FP7-ENV-2012-two-stage

The Marine Strategy Framework Directive (MSFD) defines GES having regard to the structure, functions and processes of marine ecosystems. In addition, marine biodiversity is a key descriptor for the assessment of the environmental status of marine waters. However the understanding of the relationships between pressures from human activities and climatic influences and their effects on marine ecosystems including biological diversity are still only partially understood. There are a number of aspects of these relationships which need to be better understood in order to support the ecosystem based management and fully achieve a good environmental status (GES) of marine waters, the objective of the MSFD. The topic will contribute, in a harmonized way for the four regions identified in the MSFD, to (i) improve our understanding of the cumulative impact of human activities -and variations associated to climate on marine biodiversity, (ii) test indicators (referred in the Commission Decision on GES) and develop options for new ones for assessment, particularly for biodiversity, at several ecological levels (species, habitat, ecosystems), -and the characterization and status classification of the marine waters, (iii) develop, test and validate, on the basis of observations, innovative integrative modelling tools in order to further strengthen our understanding of ecosystem and biodiversity changes in space and time due to human impacts and climatic influences. The resultant outputs and models should be developed for implementation as operational tools for managers and policy makers with a view to reduce pressures through actions. The project shall also contribute to (i) enable the development of adaptive management (ecosystem-based management approach) strategies and management measures taking into account the role of industry and relevant stakeholders, (ii) provide economic and social assessment of the consequences of management practices, (iii) identify the barriers (socio-economic and legislative) that prevent progress towards GES, (iv) provide a set of policy options for the relevant authorities to prioritize actions to reduce pressure from human activities and climatic influences. In addition the project should propose and demonstrate the utility of innovative monitoring systems capable of providing data on a range of parameters, efficiently and effectively, that may be used as indicators of good environmental status.

Funding Scheme: Collaborative Project

**The requested European Union contribution per project shall not exceed EUR 9 000 000
Up to one proposal can be selected.**

Expected impact: Contribute to the implementation of the Marine Strategy Framework Directive (MSFD) and associated Commission Decision on Good Environmental Status (GES) in particular to the requirements of descriptor 1 (biological diversity) and also those parts of descriptors 4 and 6 that relate to the impacts of human activities and climatic influences on biological diversity. Promote EU-wide harmonisation in the environmental status classification of the marine waters in the four regions for a coherent implementation by all Member States. Improved capacity to provide assessments and where possible predictive advice and strengthen the knowledge base necessary to address sustainable management of seas and oceans resources. Contribute to enhance European leadership in innovation on the field of marine environment monitoring tools.

Specific feature: The participation of SMEs is encouraged particularly with regard to the development of the monitoring systems.

Additional eligibility criterion: Projects will only be selected for funding on the condition that the estimate EU contribution going to SMEs is 15% or more of the total estimated EU contribution for the project as a whole. This will be assessed at the end of the negotiation, before signature of the grant agreement. Proposals not fulfilling this criterion will not be funded.

ENV.2012.6.2-4 Management and potential impacts of litter in the marine and coastal environment ('The Ocean for Tomorrow') - FP7-ENV-2012-two-stage

The Marine Strategy Framework Directive (MSFD) describes marine litter as one of the 11 descriptors for determining Good Environmental Status (GES). The Commission Decision on the criteria and methodological standards on good environmental standards of marine waters requires Member States to assess the distribution, properties and quantities of marine litter. Litter enters the marine environment from numerous sources and is dispersed throughout the seas by winds and currents. Evaluations of sources alone are not sufficient to measure the various negative impacts caused and long term monitoring in the marine environment is required. Working at the European scale will be essential for litter evaluation in the marine and coastal environment and for measuring the degradation processes using standard protocols.

To address this need the project should aim at providing estimates of the quantities of marine litter discarded into the marine and coastal environment, describe the composition and distribution of litter, including rates of fragmentation to micro-particles (in particular micro-plastics). It should also aim to provide a better informed answer to the scale of the physical and chemical impacts on marine organisms. The topic will contribute, in a harmonized way for the four regions identified in the MSFD, to further developing and testing indicators (referred in the Commission Decision on GES), especially those relating to biological impacts and to micro-particles (in particular micro-plastics) and for the assessment of their potential social, economic and ecological harm.

The project shall also contribute to (i) the development of management strategies and management measures taking into account the role of industry and relevant stakeholders, (ii) the development of environmental integrated impact assessments (including economic and social aspects) in order to adapt the management practices, (iii) the identification of barriers (socio-economic and legislative) related to the marine litter that prevent the achievement of the GES, (iv) the provision of a set of policy options for the relevant authorities. Furthermore the project should propose and demonstrate the utility of innovative monitoring systems capable of providing data, on a range of related parameters, efficiently and effectively, that may be used as indicators of good environmental status. This will be done taking into account the on going process of cooperation between Member States, stakeholders and the Commission on the implementation of the MSFD on marine litter.

Funding Scheme: Collaborative Project

**The requested European Union contribution per project shall not exceed EUR 3 000 000
Up to one proposal can be selected.**

Expected impact: An improved knowledge base for the management of litter in the marine environment in the context of addressing major societal challenges. The knowledge generated and its transfer will support the implementation of EU policies such as in particular the requirements of the Marine Strategy Framework Directive (MSFD) and associated Commission Decision on Good Environmental Status (GES) and more broadly the Integrated Maritime Policy (IMP), the Thematic Strategy on the Prevention and Recycling of Waste, the Common Fisheries Policy (CFP). Enhanced European leadership in innovation in the field of marine environment monitoring tools.

Specific feature: The participation of SMEs is encouraged particularly with regard to the development of the monitoring systems.

Additional eligibility criterion: Projects will only be selected for funding on the condition that the estimate EU contribution going to SMEs is 15% or more of the total estimated EU contribution for the project as a whole. This will be assessed at the end of the negotiation, before signature of the grant agreement. Proposals not fulfilling this criterion will not be funded.

ENV.2012.6.2-5 Improve scientific knowledge base to support the implementation of the Marine Strategy Framework Directive ('The Ocean for Tomorrow') - FP7-ENV-2012-one-stage

The Marine Strategy Framework Directive (MSFD) and the associated Commission Decision on the criteria for Good Environmental Status (GES) highlight the need to advance our knowledge and to improve our understanding of the good ecological status of marine waters due to be achieved in 2020 (MSFD target). Marine research may provide the knowledge necessary to define, assess, monitor and achieve the GES of the seas. The main aims of this topic are: extract the knowledge of related EU and national research funded activities in the area of marine environment, synthesise it and make it widely accessible in a usable form for civil society at large, policy and decision makers, industry and SMEs; identify the needs for further research to improve the scientific underpinning for the implementation of the Directive. The information should be organised by major themes such as, descriptors, criteria and indicators, pressures and impacts according to the Directive and Member States deliverables (assessments, determination of GES, targets, monitoring and measures). In order to ensure the uptake of the results the project should involve the decision and policy making authorities, civil society organizations, industry and SMEs. The project should also contribute to the establishment of an effective collaboration between the relevant stakeholders. It should assess options for the development of a structured science / policy interface platform sustainable on the long term in support to the implementation of the Marine Strategy Framework Directive and the related Commission Decision on Good Environmental Status.

Funding Scheme: Coordination and Support action (supporting action)

**The requested European Union contribution per project shall not exceed EUR 1 000 000
Up to one proposal can be selected.**

Expected impact: Improved access to marine research project results to decision and policy making authorities, civil society organizations, industry, SMEs. Strengthen the scientific base in the policy, decision making and implementation process of the Marine Strategy Framework Directive (MSFD) and related Commission Decision on Good Environmental Status (GES). Recommendation for a science/policy interface platform to support the process.

Specific feature: The project should take into consideration relevant EU initiatives such as the Eranet SEAS-era and BONUS-185, WISE-marine, EMODnet.

ENV.2012.6.2-6 Development of advanced technologies and tools for mapping, diagnosing, excavating, and securing underwater and coastal archaeological sites - FP7-ENV-2012- one-stage

Sea-level rise, human activities-offshore, drilling, fishing, dredging and construction, put at risk sustainability and authenticity of European underwater, coastal cultural heritage and submerged landscapes inundated since the post-glacial sea-level rise. The topic aims to develop innovative non destructive technologies, tools and methodologies to improve the early detection and location of underwater and coastal archaeological sites, to guide the process of underwater survey and to excavate archaeological remains while securing their conservation, compatible with their future management and monitoring. Case studies should show how the techniques and instrumentation to be developed, are effective with realistic trials on submerged sites. Training needs for technology use should be addressed.

Cooperation between scientific institutions, enterprises, SMEs, and with public or responsible authorities is expected. The participation from third countries, in particular Mediterranean Partners countries, is welcomed.

Funding Scheme: SME-targeted Collaborative Project

The requested European Union contribution per project shall not exceed EUR 3 000 000. One or more proposals can be selected.

Expected impact: Contribute for future standardization by developing best practices and affordable solutions in terms of cost user friendliness that could be widely used at European level. The results of the research in this area should have a high potential for transferability, clearly benefit SMEs and create a favourable economic impact on the sectors of activities concerned.

Specific feature: This topic is mainly addressed to SMEs, in appropriate partnership with research institutions and other stakeholders. Involvement of R&D performing SMEs is encouraged to ensure maximum impact. Involvement of SMEs carrying out non-technological tasks is appropriate.

Additional eligibility criterion: Projects will only be selected for funding on the condition that the estimate EU contribution going to SMEs is 30% or more of the total estimated EU contribution for the project as a whole. This will be assessed at the end of the negotiation, before signature of the grant agreement. Proposals not fulfilling this criterion will not be funded.

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Challenge 6.3 Improving resource efficiency

Europe is facing the question of sustainable growth at a time of increasing energy prices, carbon constraints and greater competition for resources and markets. In this context, improving resource efficiency within and across all sectors of our society is not only recognised as the way to reduce our societal ecological footprint and to preserve our fragile environment and its ecosystems services, but also as an opportunity to create a new European economy with strong global competitive advantage by 2020. The overall objective of this challenge is to fasten the transition towards a culture of 'saving, re-use and recycling' to achieve smart and greener growth and build up more sustainable patterns for consumption and production. This call supports the major recent EU policy initiatives ranging from the Europe 2020 Strategy to the Resource-efficient Europe and the Innovation Union Flagship Initiatives, the EU Strategy for Sustainable Development as well as the EC Communication 'Tackling the challenges in commodity markets on raw materials'¹¹. Therefore, the focus is to enable and accelerate the development of (i) innovative ideas and new market opportunities for eco-efficient technologies, processes and services contributing to decreasing material inputs, increasing resource productivity, minimising waste and recycling waste as a resource of secondary raw materials, which will offer new opportunities for SMEs; (ii) adequate decision support tools (indicators and models) to enable policy makers and other stakeholders to choose the best mix of policy options, as well as to analyse and monitor the progress towards resource-efficiency; (iii) standardisation requirements in the field of environment.

ENV.2012.6.3-1 Innovative resource efficient technologies, processes and services – FP7-ENV-2012-two-stage

Natural resources including fuels, mineral resources, but also water, air, soils, biomass or land are facing higher demand and intensification of use. Therefore greater efforts have to be made to fully valorise their potential and avoid growth ruptures while mitigating unsustainable pressures on the environment. New innovative solutions are essential for the necessary transition towards a more resource-efficient and circular economy.

Research should provide new knowledge and develop highly innovative technologies, processes or services for radical improvement of resource-efficiency in and across major sectors of the European economy¹². The specific objectives¹³ are (i) to reduce input, maximise resource productivity and minimise waste from processing along the value chain, (ii) to re-use, recycle and recover valuable materials notably from urban waste, and/or (iii) exploit alternative solutions taking into account the potential of services. The proposals shall demonstrate expected resource efficiency and environmental gains, assess market barriers and demonstrate medium-term potential of the proposed solution, include a Life Cycle

¹¹ Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions of 2.2.2011, COM(2011) 25 final

¹² Including sectors such as agriculture, forestry, chemistry, paper, textile, manufacturing water treatment.

¹³ Research for intelligent mining, the substitution of critical raw materials or the recycling of strategic metals in electronic scrap is addressed in the NMP Theme and therefore is not covered in this call topic. In addition, proposals mostly targeting energy, ICT, space or transport technologies should be addressed to the relevant themes of the FP7 Cooperation Programme and fall outside the scope of this topic.

Assessment approach as appropriate¹⁴, benchmark with respect to best available technologies¹⁵ and contribute (where appropriate) to the standardisation process.

Social and organisational changes should be also considered, while re-thinking, where appropriate, processes and products, the related value chains, and their relations to consumption patterns and possible rebound effects. In addition proposals will have to demonstrate tangible measures and progress towards the implementation of Resource-efficient-Europe and the Innovation Union Flagship initiatives and relevant EU policy initiatives.

Funding scheme: SME-targeted Collaborative Project

The requested European Union contribution per project: (as appropriate, wide range expected from such a bottom up call).

One or more proposals can be selected.

Expected impact: Proposals will demonstrate a clear impact towards:

(i) reducing the pressure on primary raw materials and help preserving the environment and reducing pollution, (ii) fostering the use of secondary raw material, including – if relevant – in the context of urban mining, (iii) building up on more sustainable consumption and production patterns, (iv) increasing the role of SMEs as end users or developers of green technologies, and (v) opening opportunities for new start-ups and markets in the medium-term.

Specific feature: This topic is mainly addressed to SMEs and industries, in appropriate partnership with research institutions and other stakeholders. Involvement of R&D performing SMEs is encouraged to ensure maximum impact.

Additional eligibility criterion: Projects will only be selected for funding on the condition that the estimate EU contribution going to SMEs is 30% or more of the total estimated EU contribution for the project as a whole. This will be assessed at the end of the negotiation, before signature of the grant agreement. Proposals not fulfilling this criterion will not be funded.

ENV.2012.6.3-2 Policy options for a resource efficient economy – FP7-ENV-2012-one-stage

The need to build a resource-efficient Europe can only be achieved with an adequate policy-mix that optimises synergies and addresses trade-offs between different areas and policies. Research is called for to help to choose the best policy-mix (regulatory and economic instruments and voluntary and information based). The proposal should carefully assess the effectiveness, efficiency and sustainability (in the short and long term) of the different components of the policy-mix and of their combinations, with an emphasis on taking best advantage of synergies and mitigating possible trade-offs. The proposal should firstly perform an in-depth analysis of the reasons that led some resources not to be used efficiently (ex-post analysis). Secondly, the research should investigate new concepts and paradigms to ensure that the resource efficiency dimension throughout the life cycle of products/services is embedded in policy formulation. The proposal should demonstrate that the proposed policy-mix will lead to an absolute decoupling of economic growth from unsustainable use of natural resources and environmental degradation (ex-ante analysis with innovative modelling permitting two-way linkages between the environmental, economic and social pillars). In addition, the proposal will have to demonstrate tangible support towards the implementation

¹⁴ Collected LCA data shall be consistent with the requirements of the International Reference Life Cycle System (ILCD).

¹⁵ The use of the EU pre-programme on Environmental Technology Verification (ETV) is strongly encouraged.

of the Flagship Initiative on Resource Efficiency and Innovation Union, the EC Communication on 'Tackling the challenges in commodity markets and on raw materials' as well as the EU Strategy for Sustainable Development.

Funding Scheme: Collaborative Project

**The requested European Union contribution per project shall not exceed EUR 3 000 000
One or more proposals can be selected.**

Expected impact: Shortening the path towards a resource efficient economy supported inter alia by eco-innovation. Providing decision makers with an analysis of the inadequacy of the current policy mixes regarding resource efficiency and with clear scenarios to help to identify the most appropriate one, leading to truly sustainable use and management of natural resources and contributing to societal advances in the European Union and globally.

ENV.2012.6.3-3 Development of resource efficiency indicators - FP7-ENV-2012-one-stage

Indicators used (e.g. Gross Domestic Product (GDP)/Domestic Material Consumption (DMC)) are not adequate to analyse, monitor and communicate the impact of different resource efficiency strategies on effectiveness, efficiency and sustainability of resource use, and on pollution and environmental degradation/quality improvement. Research on new indicators needs to be developed based on data on and/or modelling of resource extraction, renewable resources, inputs, flows, within and across industrial sectors, and the final outputs evolving physical and economic dimension of resource scarcity and life cycle approaches, taking into account the links between consumption / production, and resource use / environmental impacts / waste generation, must be considered. A global view and an adequate sectoral breakdown should be conducted, distinguishing in particular the public and the private sector e.g. through the use of the national accounts classification (non-financial corporations, financial corporations, general government, households, non-profit institutions serving households and the rest of the world) and also allowing further disaggregation into sections (e.g. manufacturing) and subsections (e.g. manufacture of transport equipment). The product group level may also be considered. In each case, the reference (GDP, population unit, etc.) should be duly justified. Long time series and now-casting should also be considered. In addition, proposals will have to demonstrate tangible support towards the implementation of the Flagship Initiatives on Resource Efficiency and Innovation Union, the EC Communication on 'Tackling the challenges in commodity markets and on raw materials' as well as the EU Strategy for Sustainable Development.

Funding scheme: Collaborative Project

**The requested European Union contribution per project shall not exceed EUR 3 000 000
One or more proposals can be selected.**

Expected impact: Provide the European Union with adequate indicators (building on the work carried out by Eurostat, the JRC, DG ENV, EEA, etc.) to contribute to the achievement of truly sustainable use and management of natural resources by supporting an absolute decoupling between economic growth and environmental degradation as well as to contribute to global social advances in Europe and worldwide.

ENV.2012.6.3-4 Support for standardisation needs in the field of environment - FP7-ENV-2012-one-stage

Standardisation plays an important role in strengthening innovation in the area of environment and this has been recently recognised in key EU initiatives on innovation and resource efficiency. In fact, standardisation can help to foster access to the market of innovative solutions and thus help ensure the practical application of research results. Up to now, research and standardisation communities were not systematically linked, and this generated lost opportunities with regard to the effective translation of research outputs to standards and their use for policy development and implementation. The objective of this topic is to create a platform to bring together researchers, European standardisation bodies and other relevant organisations, and professional associations, especially SMEs, to analyse the current barriers and identify the relevant standardisation needs in the field of environment, as well as the contribution of standards for a more efficient use of resources. This action should help to create a more dynamic standardisation system which fosters breakthrough innovation. It should also help to further consolidate and disseminate standards developed in past EU funded research projects, enhance interoperability and comparability of various standards in the areas of air, water, soil, marine and waste technologies and facilitate the emergence of new ones, analyse the standardisation potential of ongoing projects and identify best practices for facilitating the translation of research outputs to standards.

Funding scheme: Coordination and Support Action (supporting action)

The requested European Union contribution per project shall not exceed EUR 1 000 000. Up to one proposal can be selected.

Expected impact: Strengthen ongoing activities of European standardisation systems in the field of environment. Ensure interoperability of current standards and facilitate the emergence of new standards on key environmental and resource efficient technologies and services. Ensure radical innovation and foster creativity. Improve the dissemination of European standards and their accessibility by policy makers and industry. Foster access to the market of innovative solutions and thus help ensure the practical application of research results.

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Challenge 6.4 Protecting citizens from environmental hazards

The core challenge for the remaining period of FP7 is to provide research support aiming at risk reduction from environmental hazards, including extreme and sudden large events as well as noxious elements present in the environment. This will be achieved by integrating science, innovative technologies and earth observation systems in order to better manage environmental hazards and to reduce their adverse impacts on societies, economies and ecosystems. European research will help society to improve its resilience, to reduce its vulnerability and be better prepared to respond to the threats by promoting an integrated and interdisciplinary approach, bringing natural and social sciences closer and by contributing to the international effort in this field. As far as health risks are concerned, the focus will be on a novel approach for the integration of environmental data on exposures to chemicals and other stressors with human health and well-being data.

ENV.2012.6.4-1 Improving the resilience of society to catastrophic natural hazards through new risk-management partnerships - FP7-ENV-2012-two-stage

Climate change is expected to induce modifications in frequency, severity and duration of hydro-meteorological hazards and extremes. This may lead to increasing changes in vulnerability and thus induce new risk situation for society over time. Furthermore in the field of geo-hazards characterized by low probability - high consequence events, Europe is also at threat of catastrophic events which can hit the growing densely populated urban areas or several sectors of the increasingly interlinked European economy, with very high economic impact. The disastrous effects of the recent earthquake and tsunami in Japan are an evident example. The research challenge is now to strengthen the economic and societal resilience to potential disasters and to improve preparedness, prevention and mitigation through more appropriate risk assessment and new management schemes.

Dynamic vulnerability or exposure patterns – inter alia due to climate change and economic development - will need to be assessed in relation to the occurrence of potential catastrophic events in Europe. In this context, considering key representative geological and/or hydro-meteorological hazards, the research should develop new probabilistic hazards and risk scenarios and improve the methodologies for risk assessment and for estimating disaster impacts. On this basis, the research should elaborate improved risk governance and management responses, with the key goal to improve or redefine the respective roles or possible forms of partnerships between the private sector (including the (re)insurance and finance sectors), the relevant authorities and stakeholders. This will contribute to produce innovative risk management solutions combining a cost-effective variety of risk reduction measures such as risk transfer and financing, adaptation and mitigation.

Funding scheme: Collaborative Project

The requested European Union contribution per project shall not exceed EUR 6 000 000. One or more proposals can be selected.

Expected impact: Contribution to a new pan-European harmonised risk assessment for disaster management scheme and to the elaboration of a new risk management governance approach. Support to EU relevant policies and to the UN Risk Reduction Hyogo framework for action. Reduction of risks of major economic losses through innovative non-structural mitigation measures and new public-private partnerships on financial and insurance schemes.

Specific feature: Partnership with relevant private and public key actors in risk management is highly recommended. Projects selected under this topic will be linked through a coordination mechanism that will be defined during the negotiation stage.

ENV.2012.6.4-2 Long-term monitoring experiment in geologically active regions of Europe prone to natural hazards: the Supersite concept¹⁶ - FP7-ENV-2012-two-stage

There is an urgent need to proceed with long-term monitoring and study of European reference sites located on land in high-risk seismic and volcanic areas and their associated landslide zones, to provide a better scientific understanding of the occurrence of those natural hazards. This approach fits in the international 'Supersite' initiative which aims to monitor and study, key regions or areas prone to hazards. The projects should provide focal points for a large geographical region, where all building blocks of a value chain from observations to end users can be linked together and applied to the phases of the risk management cycle relevant for this region. The choice of the geo-hazard 'Supersite(s)' needs to be carefully justified enabling precise geophysical measurements prior to, during and following geohazard events. Where supersites are adjacent to European Seas, coordination with existing marine systems necessary for comprehensive monitoring of the site could be included in the project. The monitoring of the 'Supersites' should be conducted through a fully integrated conceptual approach based on collaboration with existing monitoring networks and international initiatives, developing new instrumentation such as in-situ sensors, and aggregating space and ground-based observations (including from subsurface), and geophysical monitoring. The project(s) will develop and demonstrate the next generation of geo-hazards monitoring/observing systems, and contribute to establishing comprehensive natural hazards observatories through a cross-cutting approach. The development of novel monitoring systems and new instrumentation will be conducted in collaboration with the relevant industrial sectors and SME's. The projects should provide models of ground motion and deformation and necessary information at the 'Supersites' to mitigate and improve the preparedness of geological disasters. The selected project(s) should run a monitoring pilot phase as a European supersite demonstrator.

Funding scheme: Collaborative Project

**The requested European Union contribution per project shall not exceed EUR 6 000 000
One or more proposals can be selected.**

Expected impact: Increased European technical know-how for the monitoring of geological disasters and contribution to the development of the relevant European industrial sector (e.g. space applications, in situ sensors, adapted communication devices). Improved use of observations and related information to inform policies, decisions and actions associated with disaster prevention, preparedness and mitigation. Improved access to observations and related information to facilitate warning, response and recovery to disasters. Increased communication and coordination between national, regional and global communities in support of disaster risk reduction, including clarification of roles and responsibilities and improved resources management.

Specific feature: The projects should collaborate at international level with other supersites to build a successful Global Earth Observation System of Systems (GEOSS) while making a significant European contribution to the GEO 2012-2015 Work Plan. Projects selected under

¹⁶ This topic will conduct long-term monitoring experiments in European areas prone to geohazards complementary to the actions conducted in the GMES initiative (Global Monitoring for Environmental and Security) e.g. GMES emergency management services.
<http://supersites.earthobservations.org/main.php>

this topic will be linked through a coordination mechanism that will be defined during the negotiation stage.

Additional eligibility criterion: Projects will only be selected for funding on the condition that the estimate EU contribution going to SMEs is 15% or more of the total estimated EU contribution for the project as a whole. This will be assessed at the end of the negotiation, before signature of the grant agreement. Proposals not fulfilling this criterion will not be funded.

ENV.2012.6.4-3 Integrating environmental and health data to advance knowledge of the role of environment in human health and well-being in support of a European exposome initiative - FP7-ENV-2012-two-stage

Large amounts of environmental (e.g. on exposure to chemicals or particulate matter) and health data (e.g. disease prevalence, cause-specific mortality, reproductive health) have been collected in various EU regions by many national and EU-funded projects and agencies. Environmental exposures are acknowledged to play a major role in human health and well-being. However, many environmental exposure-health associations remain uncertain due to lack of exploitation and integration of data and of global view on population exposures including critical periods of exposure such as foetal and child development. There is a need for a new way to study the environment-human health relationships, including threshold values and the role of individual variability.

The aim will be to exploit available or to-be-developed novel tools and methods (e.g. remote sensing/GIS-based/spatial analysis, 'omics'-based approaches, biomarkers of exposure, exposure devices and experimental models, new tools for combined exposures, novel study designs, burden of disease methodologies) to integrate and link environmental data with health data and information, and to apply them to (large-scale) population studies including new ones if deemed necessary (a concept that was recently proposed in the literature as 'exposome'). Cooperation with other non-EU initiatives in the field is encouraged.

Funding scheme: Collaborative project

The requested European Union contribution per project shall not exceed EUR 9 000 000. One or more proposals can be selected.

Expected impact: Contribution to the definition of an integrated exposure concept and prediction of individual disease risks related to environment. Reduction of uncertainty in risk assessments of chemicals. Better understanding of the effect of multiple exposures, such as to mixtures of chemicals. Improvement of preventive strategies to lower health costs. Increased EU competitiveness, especially that of SMEs that may find new business sectors in exposure characterisation and modelling. Address the priority goals of the Parma Declaration on Environment and Health (2010). Contribution to EU policies on Environment and Health.

Specific feature: Projects selected under this topic will be linked through a coordination mechanism that will be defined during the negotiation stage.

Challenge 6.5 Mobilising environmental knowledge for policy, industry and society

The future of the global environment depends upon how well innovative environmental solutions are integrated in sectors such as energy, transport, agriculture, forestry and fisheries, health, and urban and spatial planning. This calls for the stimulation of innovative approaches and tools to handle complexity, interactions and interfaces, and to facilitate knowledge transfer, assessment, valuation, uptake and exploitation of scientific data and results for policy, industry and society at large. In the work programme 2012 emphasis will be put on integrative, interdisciplinary and action-oriented approaches which address specific long-term sustainability challenges cutting across sectors, governance levels and national boundaries. Environmental knowledge will be harnessed to all forms of innovation in policy, society and industry through proactive communication and uptake processes. Where relevant, integrated assessments will support the revision of EU environmental and health policies. European companies and SMEs are invited to engage in environmental innovation through demonstration activities with focus on successful prototypes with a market potential deriving from previous EU research activities. Novel earth observation applications such as a global citizen's observatory (an integrated network of community-based in-situ observations to deliver environmental data) will also be supported. Finally, efforts will be devoted to explore and promote further open access to environmental research results and data at EU, national and local levels, in line with the Infrastructure for Spatial Information in Europe (INSPIRE) and Shared Environmental Information System (SEIS) provisions.

ENV.2012.6.5-1 Developing community-based environmental monitoring and information systems using innovative and novel earth observation applications¹⁷ - FP7-ENV-2012-two-stage

New and innovative environmental monitoring and information capabilities can enable effective participation by citizens in environmental stewardship, based on broad stakeholder and user involvement in support of both community and policy priorities. The objective is to develop 'citizens' observatories' using innovative earth observation technologies. These 'citizens' observatories' should include community-based environmental monitoring, data collection, interpretation and information delivery systems. This will require the development of highly innovative monitoring technologies, (e.g. low-cost reliable micro-sensors), which can be embedded into large numbers of instruments, including highly portable devices. Citizens should be able to effortlessly collect environmental data on a range of parameters, automatically transmit this data to suitable data repositories and exchange their knowledge and experience within a citizens' observatory framework, (e.g. using smart phone applications), thereby enabling citizenship co-participation in community decision making and co-operative planning. Advanced data management strategies, based on open e-collaboration, should enable the sharing of data and information, whilst addressing questions of privacy, data standards, quality and reliability. Suitable pilot case studies and acceptance activities should be included to test, demonstrate and validate: the concept of 'citizens' observatories'; the direct transfer of environmental knowledge for policy, industrial, research and societal use; the possibilities for a comprehensive implementation and application of the

¹⁷ This topic will explore new approaches to complete the global network of in-situ sensors necessary to monitor the environment complementary to the actions conducted in the GMES initiative (Global Monitoring for Environment and Security).

technology. Possible examples of pilot case studies could include: civil protection agencies and wide-scale flooding; estimation of personal exposure within various microenvironments (health sector); air quality and noise levels; the identification of flora, birds and wildlife, their habitats and migration paths; the surveillance of invasive alien species and their pathways of introduction and spread; illegal dumping of hazardous materials, etc.

Funding scheme: SME-targeted Collaborative Project

**The requested European Union contribution per project shall not exceed EUR 9 000 000
One or more proposals can be selected.**

Expected impact: Empowerment of citizens and citizen's associations, allowing them to contribute to environmental governance processes in the domains of transparency, knowledge management, accountability and responsiveness. The provision of models for decision-makers, facilitating connections to governance and global policy objectives.

Specific feature: SMEs are expected to play a major role in addressing the goals described, including the development of innovative sensor technologies, data management strategies and new applications to facilitate the exploitation of the data and processed information for policy, industry and society at large. The consortia will be required to cooperate within an open e-collaboration framework to establish common methodologies and standards for data archiving, discovery and access within the GEOSS framework. The data collected should be made available through the Global Earth Observation System of Systems without any restrictions. Projects selected under this topic will be linked through a coordination mechanism that will be defined during the negotiation stage.

Additional eligibility criterion: Proposals will only be selected for funding on the condition that the estimated EU contribution going to SMEs is 30% or more of the total estimated EU contribution for the project as a whole. This will be re-assessed at the end of the negotiation, before signature of the grant agreement. Proposals not fulfilling this criterion will not be funded.

ENV.2012.6.5-2 Demonstration and exploitation of most promising prototypes and tools derived from European research activities - FP7-ENV-2012- two-stage

Previous successful EU funded research projects, often did not succeed to demonstrate the long term viability of their final products (prototypes, operational tools, management systems) and to ensure a widespread uptake by public authorities and the industry. The objective of this topic is to scale up, optimize and demonstrate the innovation potential of those technologies.

Research should focus on the testing of the performance and viability of such technologies in real cases from an integrated point of view (technical/economical/operational/social) including the assessment of their risks (including health) and benefits to the society and the environment. Technology transfer, training activities and standardisation activities in cooperation with appropriate European standardisation bodies should be also included. Focus should be given to environmental technologies in the water and waste sectors that had a systemic, multidisciplinary and transectorial nature and can contribute to several EU policies. Proposals should bring together researchers, industries and enterprises, and regulators to foster knowledge sharing, overcome the current barriers which prevent the wide application of these technologies and assess market needs and potential. A relevant participation of industrial actors and SMEs is requested.

Funding scheme: SME-targeted Collaborative Project

**The requested European Union contribution per project shall not exceed EUR 3 000 000
One or more proposals can be selected.**

Expected impact: To exploit at the maximum the potential of existing technologies and previous results studies in order to increase their chances to innovate (technological and non-technological innovation). Impact is expected in the creation of new markets and on the application and use of innovative environmental technologies and methodologies. To decrease substantially the environmental impact of the existing technologies. To support the development of new standards and better link with the supply site. Better use of knowledge between, business, researchers and end-users. Increased public trust of environmental technologies, improve uptake of innovative environmental technologies and support to the Eco-innovation Action Plan.

Additional eligibility criterion: Proposals will only be selected on the condition that the estimated EU contribution going to SMEs is 30% or more of the total estimated EU contribution for the project as a whole. This will be re-assessed at the end of negotiations, before signature of the grant agreement. Proposal not fulfilling this criterion will not be funded.

ENV.2012.6.5-3 Exploring opportunities for open access to primary environmental data - FP7-ENV-2012-one-stage

Numerous EU funded projects have collected large amounts of data on environmental issues. However, these mostly publicly funded data are not always readily accessible to other researchers or to policy makers or businesses. The Innovation Union addresses the general issue of open access not only to publicly funded peer reviewed scientific publications launched earlier under FP7 but also to primary data. This would enhance transparency, credibility and efficiency of research and promote the use of data and results for policy or business purposes. The aim of this study is to explore in a comparative manner across environmental science disciplines the main barriers and opportunities related to open access (free of charge online access) to primary environmental data, notably from EU-funded projects but also taking into account national and local data. Carried out in association with European environmental research information facilities and networks, the study should identify and document the difficulties and benefits scientists are facing in sharing, accessing and subsequently using 'open' primary data. The quantitative and qualitative analysis of the root causes for existing barriers, whether behavioural, political, legal, technical or other, should translate into an action plan of concrete future remedies, in accordance with the provisions laid down in the INSPIRE Directive and in the SEIS initiative. The work should be based on experience and results from earlier EU-funded projects relevant to this issue and interact with ongoing projects on or providing experiences with open access under the FP7 Cooperation Specific Programme.

Funding scheme: Coordination and Support Action (supporting action)

**The requested European Union contribution per project shall not exceed EUR 1 000 000
Up to one proposal can be selected.**

Expected impact: Increased use of EU funded environmental results through a solid basis for future measures in support of open access to data in the field of environmental research.

ENV2012.6.5-4 Integrated assessment of air pollution supporting the revision of EU air quality legislation - FP7-ENV-2012-one-stage

The foreseen revision of EU legislation on Air Quality requires the availability of reliable methods to carry out a quantitative integrated assessment of the effects of emission abatement

policy options on the reduction of atmospheric pollutants and on human health. EU Member States have developed their assessment capabilities and various modeling tools are already available on a commercial basis to forecast the effects of local and regional air quality plans. The EU has funded relevant activities both in the field of air pollution and on its health implications.

This coordination action should bring together all major activities on air quality and health assessment. It should (i) Consolidate and assess the research results in this domain in order to support the coming revision of EU air quality policy; (ii) Analyze the limitations of the currently available assessment methods; (iii) Evaluate the possibility of implementing in this field integrated modeling tools interconnecting the various model components; (iv) Communicate to key stake-holders – and in particular to policy-makers -state of the art scientific knowledge on emission abatement assessment; (v) Identify key areas to be addressed by research and innovation.

Funding scheme: Coordination and Support action (coordinating action)

**The requested European Union contribution per project shall not exceed EUR 1 000 000
Up to one proposal can be selected.**

Expected impact: Contribution to improved knowledge base on integrated assessment of regional Air quality plans on the regional and local scale. Improved use of scientific knowledge by policy makers and regulatory bodies in Member States. Contributing to guidelines for the coming revision of EU air quality policy.

Specific feature: This action should deliver the requested output on time for supporting the EU Air Quality revision process, and therefore key policy-relevant deliverables should be available within 12 months from the project starting date. The action should continue to support the process during its remaining duration.

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6.6. Horizontal and cross-thematic activities

ENV.2012.6.6-1 EU-India cooperation in water technology: research and innovation - FP7-ENV-2012-one-stage

Water related challenges have been recently identified as an important theme for more ambitious research collaboration between EU, Member States and India, in the context of the Strategic Forum for S&T International Cooperation. India's water resources are stressed and depleting and need to tackle the increasing incidence of both droughts and floods, while sectoral demands are growing rapidly in line with urbanisation, population increases, intensive agricultures, rising incomes and industrial growth. The countries like India therefore need advanced yet cost effective technologies, innovative design approaches and technical standards commensurate to their local conditions. The objective of this call is to develop reliable and cost-effective solutions for producing clean and safe drinking water at community level, reliable, rapid and cost-effective monitoring techniques for the detection of water contaminants, cost effective low energy technologies for treatment of municipal and household wastewater including disposal of sludge/ energy recovery from sludge, and techniques for on-line pathogen monitoring for safe reuse of treated water for intended application. Successful projects should aim either to generate new knowledge by developing innovative technologies/ products beyond current state-of-the-art, or to assess the potential and sustainability of existing technologies, from both the socio-economic and technical point of view, in order to provide real life solutions in specific locations in India facing important water problems. These activities should be implemented in close cooperation with academia, research and development institutions, industry and appropriate stakeholders. A relevant participation of R&D performing SMEs is requested. The EU grant shall cover the participation of the European partners and, where appropriate, partners from third countries eligible for funding, other than partners from India.

Funding scheme: SME-targeted Collaborative Project

The requested European Union contribution per project shall not exceed EUR 3 000 000. One or more proposals can be selected.

Expected impact: Foster innovation in the water sector and create a beneficial economic impact. Help policy makers to solve real water problem, to ensure high quality and safety of drinking water and overcome the barriers for effective and efficient waste water recycling and reuse. Pave the way for subsequent large scale deployment of technologies in view of providing real life solutions in cost effective manner. Contribute to the development of common standards through best practices and benchmark of technologies Strengthen long-term research partnership between EU, MS and India and support related SFIC activities.

Specific feature. It is expected that the Indian Department of Science and Technology (DST) will issue a complementary call to support Indian projects in this field and that the funded projects will cooperate closely. The EU partners should apply to this call, while the Indian partners will have to apply to the DST call and the two proposals will have to be coordinated. The proposals submitted in this call should therefore clearly indicate in their methodology and work description how they envisage coordinating their activities with the complementary proposal submitted in the call of DST. This will be considered in the evaluation. The cooperation may also include clustering activities, joint meetings, exchange of scientists, technology transfer, etc. A balanced effort in terms of research work to be carried out in EU and India should be ensured. For both the water purification and wastewater reclamation and reuse issues, attention will be given to support both type of projects indicated in the above topic description. The European Commission, EU Member States and India authorities are

engaged in a Pilot Initiative on water and bio-resources related challenges in the framework of the Strategic Forum for International Science and Technology Cooperation (SFIC). The objective of the Pilot Initiative is to support strategic cooperation of India-EU and Member States in addressing more effectively global societal challenge in water and bio-resources related issues. The project funded under this activity constitutes an important building block of the Pilot Initiative for developing an EU and Member States strategic research and innovation agenda vis-à-vis and with India.

Additional eligibility criterion: Projects will only be selected for funding on the condition that the estimated EU contribution going to SMEs is 30% or more of the total estimated EU contribution for the project as a whole. This will be assessed at the end of the negotiation, before signature of the grant agreement. Proposals not fulfilling this criterion will not be funded.

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