THEME 6 ENVIRONMENT (INCLUDING CLIMATE CHANGE)

DRAFT OUTLINE ORIENTATIONS FOR 2013

JANUARY 2012

DRAFT

CONTENTS

Objective

The objective of the Environment (including climate change) Theme is the sustainable management of the environment and its resources through advancing our knowledge of the interactions between the climate, 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 systems changes, on tools and on technologies for monitoring, prevention, mitigation of and adaptation to environmental pressures and risks including on health, as well as for the sustainability of the natural and man-made environment.

I Context

Political Landscape

The orientation designed for the 2013 work programme takes into account the major recent policy drivers including Europe 2020 and the Flagship Initiatives "Innovation Union" and "A Resource Efficient Europe", while paving the way for Horizon 2020.

Approach for 2013

The intention is to consolidate the efforts made in the 2012 work programme, re-emphasising a challenge driven approach addressing broader topic areas with EU added value, linking research and innovation. This work programme will consolidate the endeavours of the 2012 WP to stimulate innovation and SME participation through bottom-up topics implemented by the two-stage submission and evaluation procedure. In addition, the assessment of the Specific Programme objectives and priorities the Environment Theme covered until now, have been taken into account. This coverage analysis regarding the FP7 Specific Programme shows that all of the Environment Theme's objectives and areas have been addressed to a greater or lesser extent in the calls to-date.

The input received from the Environment Advisory Group is reflected both in the approach and in the objectives. In its 2011 report, the Environment Advisory Group stressed that environmental research should contribute to smart growth, a larger concept than eco-innovation, addressing environmental issues across Europe that can stimulate the "green economy" in a way that fosters inter-disciplinary approaches. At the same time environmental research activities should be re-balanced to maintain fundamental and technological research and innovation while enhancing social and economic innovation to ensure a better quality of life for the people of Europe.

Strategic inputs from relevant policy DGs have been asked especially in terms of policy foresight and long range priorities. Reflected below are also priorities suggested through regular contacts with partner DGs, such as DG ENV, MARE, SANCO and CLIMA. Research agendas of relevant International Programmes (e.g. GEOSS, WCRP, DIVERSITAS[1] etc) have been considered. Activities of the ETPs (European Technology Platforms) are closely followed and taken into account, in particular those of the *Water Supply and Sanitation*

[1] GEOSS (Global Earth Observation System of Systems); WCRP (World Climate Research Programme); DIVERSITAS (International Programme of Biodiversity science)

(WSSTP), *Sustainable Chemistry* (SusChem), *European Construction Technology Platform* (ECTP) and *Forest-based Sector Technology Platform*.

In contributing to **ERA** the Article 185 initiative 'BONUS' will be continued. Preparatory work on the Joint Programming Initiatives on water and on climate will be supported through the 2012 WP update.

Under the heading "**Transformative and Responsible Innovation**", the 2013 work programme will address three specific objectives related to i) addressing **major societal challenges**; ii) developing and strengthening **European leadership in environmental innovation**, pursuing a broad concept of innovation covering both technological and socio-economic innovation; and iii) promoting and facilitating **knowledge transfer**, **assessment, uptake and exploitation** of research and innovation data and results. These objectives will be met under the five key priorities that cut across the 11 sub-activities defined in the Specific Programme: Coping with climate change; Sustainable use and management of land and seas; Improved resource efficiency; Protecting citizens from environmental hazards; and Mobilising environmental knowledge for policy, industry and society. To address these objectives, broader topics going beyond the limits of individual sub-activities as set out in the Specific Programme, will be defined.

(1) Coping with climate change	*Sub-activity 6.1.1 Pressures on environment and climate* *Sub-activity 6.3.1 Environmental technologies* *Sub-activity 6.4.1 Earth and ocean observation systems and monitoring methods*
(2) Sustainable use and management of land and seas	*Sub-activity 6.2.1 Conservation and sustainable management of natural and man-made resources and biodiversity* *Sub-activity 6.2.2 Management of marine environments* *Sub-activity 6.4.1 Earth and ocean observation systems and monitoring methods*
(3) Improving resource efficiency	*Sub-activity 6.3.1 Environmental technologies* *Sub-activity 6.3.3 Technology assessment, verification and testing* *Sub-activity 6.4.2 Forecasting methods and assessment tools for SD*
(4) Protecting citizens from environmental hazards	*Sub-activity 6.1.3 Natural hazards* *Sub-activity 6.1.2 Environment and health* *Sub-activity 6.3.1 Environmental technologies* *Sub-activity 6.4.1 Earth and ocean observation systems and monitoring methods*
(5) Mobilizing environmental knowledge for policy, industry and society	*Sub-activity 6.4.1 Earth and ocean observation systems and monitoring methods* *Sub-activity 6.4.2 Forecasting methods and assessment tools for SD* *Sub-activity 6.5.1 Dissemination and horizontal activities*

Innovation Dimension of the activities and bridging towards Horizon 2020

Measures to underpin the innovation dimension in the 2013 WP will expand on some of the pilots and specific measures from the 2012 WP while at the same time new actions will be developed. A **challenge driven approach** across the boundaries of the sub-activities and defining broader area level topics will encourage **bottom-up initiatives** - moving away from prescriptive topics and allowing more freedom for innovative approaches and ideas with appropriate scale.

The emphasis on facilitating **knowledge transfer** including utilising open access to publications and open data sources, the scale up of good practices, assessment, validation, uptake and exploitation of scientific date and results for policy-makers, industry and society at large, will continue. Innovative measures to improve the **communication and transfer of knowledge** both to policy making, business and to citizens in particular to young people will reinforce the expected impact. In particular initiatives examining the "rebound effect" of technical efficiency gains that often increase consumption but erode the benefits of that efficiency will be supported. Furthermore activities on standardisation will be continued.

Networking actions in the environment field will seek to engage the various actors and stakeholders in the public and private sectors to enhance interactions between local, national and global practices in a **cross-sectoral way**, so as to best identify relevant solutions and innovations for sustainability by addressing the challenge of insufficient knowledge of user needs.

SME relevant research

SME targeted bottom-up approaches will be further continued to enhance innovative ideas with specific activities to engage European companies and SMEs in promoting market potential and breakthrough, including socio-economic aspects of environmental innovation through demonstration activities with focus on successful prototypes deriving from previous research activities. The aim will be to reach 15% across the 2013 call priorities.

Piloting **new innovation actions** will include exploring ways to introduce prizes to encourage innovative environment research ideas, building access to sharing earth observations data in innovative ways, incubators for commercial viability in the environmental technologies area, social innovation (e.g. governance and ecosystem management), pre-commercial procurement and promoting awareness raising actions generally across the Theme.

Dissemination actions

Dissemination activities are addressed throughout the work programme. Each proposal should allocate appropriate efforts and resources for dissemination to promote the use and uptake of results. A specific dissemination and knowledge transfer topic is introduced for climate, disaster reduction, international economic development and raw materials.

Overall expected Impact

It is expected that the 2013 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 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 and climate, e.g. soil, water, chemicals, disaster reduction, mitigation and adaptation, and support EU initiatives on Climate Action, Resource Efficiency and Eco-Innovation.

International Cooperation

International cooperation efforts will focus on actions that reflect the overarching messages and objectives of Rio+20 and the recent Durban outcome: green economy and sustainable development paying attention to the Millennium Development Goals and strengthened international climate action. Regional networking for clustering of projects, uptake of research results and knowledge platforms will aim at enhancing the scope of future cooperation with Latin America, ASEAN and Mediterranean third countries. Other issues with international components include climate change (in particular for Arctic, oceans and atmosphere), natural disasters (Japan and Asia) and GEO capacity building. Contributions to multilateral initiatives such as IPCC and GEO will continue.

Cross-thematic approaches

Cross-thematic approaches are foreseen to support actions on oceans and marine technology (e.g. sensors); land use and raw materials. There will also be continued support for Public-Private Partnership namely Energy Efficient Building.

Measures in 2013 WP to increase **socio-economic impacts** of funded research include: outreach to sectors beyond typical environmental research community by bottom-up calls, fostering innovation, targeting public authorities, encouraging governance approaches and facilitating participation of industry and particularly SMEs.

II CONTENT OF CALLS

Area 6.1 Coping with climate change

Indicative budget: M€ **4 TOPICS**

Coping with climate change
In the light of cautionary evidence coming from earth observations and the high trends in global greenhouse gas emissions, research will on one side focus on reducing key uncertainties linked to the functioning of the earth-climate system and quantification of climate change impacts, and on the other side explore the potential of adequate mitigation and adaption policies to contribute to the Roadmap for moving to a competitive low carbon economy in 2050[2]. In particular, research will address the fundamental processes that couple land surface, atmosphere, ice-caps and oceans as well as the cumulative effects of climatic and non-climatic stressors on marine geochemistry and biodiversity. Moreover, research will further explore atmospheric processes and pollutants, spanning the stratosphere and lower troposphere and their impact on climate change and land ecosystems. Research and innovation will contribute to better quantification of impacts associated to high-end scenarios (>2°C) in order to inform policy makers on risks, opportunities, costs and benefits linked to different adaptation and mitigation pathways, their synergies and trade-offs. In this context, issues related to climate change and land use, land use change and associated GHG emission monitoring, reporting and verification will also be explored. Research will also analyse issues related to broad societal transformation required to move towards a low-carbon economy and society, including the potential contribution of suitable local and regional policies to support climate action, the role of social innovation and barriers and constraints to the adoption of behavioural changes. Actions relevant to EU climate change policy issues, knowledge sharing and capacity building will be emphasised.

Indicative topics:

ENV.2013. 6.1-1 Climate-related ocean processes and combined impacts of multiple stressors on the marine environment

The Ocean plays a key role in regulating climate and its processes are acknowledged to be sensitive to climate change. Recent scientific literature points out that synergies, combination and feedbacks of single pressures on the marine environment may result in even amplified impacts. In particular, research should enhance the specific knowledge on those relevant ocean processes which influence and are influenced by climate; on the cumulative effects of climate change in combination with non-climatic stressors, including the feedback mechanisms; and on the impacts and feedbacks of greenhouse gases increase on marine chemistry and biological dynamics, particularly in the context of ocean acidification. Under the comprehensive framework of a multi-forcing assessment, proposals may address different processes and impacts, and may focus on different geographical areas, depending on their

[2] Commission Communication 'A Roadmap for moving to a competitive low carbon economy in 2050', COM(2011)112 Final 8.3.2011

specific relevance to the common objective of reducing uncertainties, quantifying impacts and ultimately supporting climate related policies.

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*:*

Call*: ENV-2013*

ENV.2013.6.1-2 Atmospheric processes, eco-systems and climate change

At all levels, from the lower troposphere to the stratosphere, natural and anthropogenic emissions initiate or affect atmospheric processes which interact, also through feedback mechanisms, with ecosystems and climate. Dedicated studies based on different types of observations, including those requiring large-scale field experiments where appropriate, should improve the understanding of key processes like for example:

- at land surface/lower troposphere level, the interaction between pollutants, climate change and ecosystems;
- at different levels of the troposphere, the formation and properties of clouds and the influence of emissions from aircrafts or ships thereon;
- and at stratospheric level, the depletion of ozone, which was surprisingly evident in spring 2011 over the Arctic and Northern Europe.

Depending on the focus, proposals should- where relevant - improve the representation of these processes in models to improve climate predictions and services, as well as the assessments of socio-economic implications.

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*:*

Call*: ENV-2013*

ENV.2013.6.1-3 Impacts of high-end scenarios

Observations and trends show a growth of greenhouse gases emissions which dangerously approach high-end scenarios leading to projected average temperature increase higher than the 2°C target set by the Copenhagen accord. A better quantification of impacts and vulnerabilities associated to a range of high-end scenarios is needed in order to inform policy makers on risks, opportunities, costs and benefits linked to different adaptation and mitigation pathways, their synergies and trade-offs, while appropriately recognizing the inherent uncertainties in long-term projections. Impacts, vulnerabilities and adaptation options should be elaborated for key economic and social sectors on European, national and regional scale and confronted with scenarios for the 2°C or lower targets.

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*:*

Call*: ENV-2013*

ENV.2013.6.1-4 Land cover and land-use change and climate change mitigation

Changes in land-use/land-cover and land management practices affect emissions of carbon dioxide, methane and nitrous oxides and alter key physical properties and processes (albedo, energy balance, water cycle) and thus have an important impact on climate. Research should assess the net mitigation potential of major land cover and land use transformations (including indirect land use change) and their interplay with energy and food security concerns. Furthermore there is a need to further improve the relevant monitoring, reporting and verification methods.

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*:*

Call*: ENV-2013*

Area 6.2 Sustainable use and management of land and seas

Indicative budget: M€ **8 TOPICS**

Sustainable use and management of land and seas
The challenge is to improve the knowledge base on how natural systems react to pressures in order to underpin the implementation of the transition phase to resilient, sustainable and resource efficient societies. Research and innovation will target the development of novel concepts and implementation mechanisms for the best use of the ecosystem and biological resources. Research will also explore the growth and innovation potential of emerging financing mechanisms and concepts such as biodiversity offsets and no net loss of biodiversity. Research will investigate the potential of Green Infrastructure (including forests and green areas in the urban environment) and the restoration economy and will deliver integrated governance strategies and tools for land and water resources management under complex, multi-stressor conditions and therefore support EU water policy. Innovative solutions will be sought to protect and conserve soil resources through combating land degradation and desertification**.** Innovative applications for Earth Observation in land use monitoring will be supported. Research will address challenges associated with the sustainable exploitation and management of Europe's deep sea resources and marine technology, notably sensors, in cooperation with other Themes.

Indicative topics:

ENV.2013.6.2-1 Water resources management under complex, multi-stressor conditions

The challenge is to underpin decision making and risk assessment in complex multiple stress conditions (combination of e.g. organic and inorganic pollution, flow and morphology alteration, climate change, pathogens, mixtures of toxic compounds, emerging pathogens etc). Research should have a clear user perspective and aim to enhance our understanding of stressors interactions, species interactions, species-stressor-relationships and impacts on the ecological functioning, stability and resilience. It should develop holistic approaches to underpin the diagnosis of the ecological status of the water systems in relation to multiple stress conditions, assist in the identification of relevant stressors responsible for the deterioration of the ecological status of a water basin and the prognosis of the ecosystem responses and ecological recovery to management measures on different spatial scales to improve the situation.

***Funding Scheme*:** *Collaborative Project*
The requested European Union contribution shall not exceed EUR 9 000 000.
One or more proposals can be selected.
***Expected impact**:*
***Call**: ENV-2013*

ENV.2013.6.2-2 Toxicants, environmental pollutants and land and water resources management

Research should provide a common knowledge base for toxicants and environmental pollutants and improve our understanding, decision support and modelling capacity regarding the sources, the transport (soil, surface waters, sediments, groundwater, receiving waters), fate (spatial and temporal variability, transfer times, degradation etc) and associated ecological risk assessment. Emphasis must be given to emerging substances and their metabolites and degradation products. It should also deliver new biomarkers and bioassays for detection, early warning signals, impact assessment and monitoring approaches to determine the effectiveness of control measures and abatement options.

Funding Scheme: *Collaborative Project - 15% of EU contribution going to SMEs*
The requested European Union contribution per project shall not exceed EUR 12 000 000.
Up to one proposal can be selected.
Expected impact*:*
Call*: ENV-2013*

ENV.2013.6.2-3 Transition to sustainable societies based on ecologically sound exploitation of natural resources

Fundamental societal transformations are required in order to move towards sustainable, low-carbon and climate resilient European societies consistent with the objectives set, amongst others, in EU's Sustainable Development **and Biodiversity** Strateg**ies**, the "Climate and Energy package (20/20/20 targets)" and the Roadmap for moving to a competitive low-carbon economy in 2050. Research will investigate mechanisms behind societal transformation, including issues such as innovative environmental governance; the potential contribution of local and regional action to European policies; the factors enabling adoption of behavioural changes and acceptance of green, low-carbon technologies; and the development of new adaptive strategies focused upon sustaining prosperity, well-being and **no net loss of biodiversity** through the novel exploitation and use of **green infrastructure,** biodiversity and ecosystem services. Opportunities for innovation (including social innovation), co-benefits and job creation will be identified to help the private sector, households, communities, local and regional governments respond and adapt to global environmental changes and support the development of green growth strategies in Europe.

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:
Call: *ENV-2013*

ENV.2013.6.2-4 Sustainable Landcare in Europe

Taking full stock of existing scientific data and results obtained from relevant EU and nationally funded projects, integrative and interdisciplinary research must fill the knowledge gaps in the understanding of the complexity and functioning of soil systems to support the development of innovative, mitigation and restoration measures at landscape scales to combat soil erosion, land degradation and desertification under different conditions around Europe and by doing so to contribute directly to the implementation of the UNCCD Convention. It will also carry out an integrated impact assessment of the existing EU policies and strategies related to EU soil and land management to establish potential incoherence and contradictions.

A demonstration phase will assess the cost-effectiveness of measures and innovative techniques for restoring soil functions and mitigating land degradation. In view of reducing the impact of soil sealing, research will also develop and validate, through pilot projects or case studies with demonstration cases, cost-effective methods and techniques (i.e. innovative permeable materials, construction methods) for the sustainable use of soils in the built environment.

Funding Scheme: *Collaborative Project - 15% of EU contribution going to SMEs*
The requested European Union contribution shall not exceed EUR 9 000 000.
One or more proposals can be selected.
Expected impact*:*
Call*: ENV-2013*

ENV.2013.6.2-5 Urban biodiversity and green infrastructure

Urban green infrastructure, such as parks, forests and tree plantations, urban farming areas etc., can contribute to reverse the trend of biodiversity loss and to link and strengthen diverse ecosystems and their services in urban and rural areas. It can help build resilience, for example in terms of adapting to climate change, and make important socio-cultural and economic contributions. Research needs to assess status, trends, the role, the needs and the potential of urban biodiversity and ecosystem goods and services provided by urban green spaces with focus on linking environmental services with socio-cultural and economic services. Research will require an interdisciplinary approach. Of particular interest is the exploration of the innovation potential regarding the provision and exploitation of ecosystem services. Therefore SMEs need to be involved.

Funding Scheme: *Collaboration Project - 15% of EU contribution going to SMEs*
The requested European Union contribution shall not exceed EUR 6 000 000.
Up to one proposal can be selected.
Expected impact*:*
Call*: ENV-2013*

ENV.2013.6.2-6 Sustainable Management of Europe's Deep Sea and Sub-Sea floor Resources

Although the deep sea and sub-sea floors environments are still largely unknown current research suggests that these environments modulate the global climate and contains immense mineral and biological resources. Research should thus focus on: (i) assessment of the long-term availability of deep-sea raw material resources that can be extracted using sea-bed mining techniques; (ii) understanding associated geological processes, e.g. the effect on the stability of methane hydrates and its repercussions for climate change or continental slope failures/tsunamis; (iii) assessment of the resilience of deep-sea and sub-seafloor ecosystems to resource extraction activities, determination of the recovery conditions and tipping points beyond which their recovery is irreversible; (iv) development of practices, including management practices, and standards, governing economically viable, environmentally sound and socially acceptable resource exploration and extraction;(v) assessment and demonstration of new monitoring technologies.

Specific feature: A significant involvement from the industrial sector will be required, ranging from large industrial companies (e.g. Oil & Gas, Telecommunications) to SMEs. The assessment and demonstration of relevant technologies should be included as an activity within any proposal submitted to this topic.

Funding scheme: *Collaborative Project - 15% of EU contribution going to SMEs*

The requested European Union contribution shall not exceed EUR 9 000 000.
Up to one proposal can be selected.
***Expected impact**:*
***Call**: ENV-2013*

ENV.2013.6.2-7 Improved monitoring of the impact of cropland areas on the environment using global Earth observations

In order to assess the impact of cropland areas and crop change on the environment, research under this topic should a)contribute to the development of crop production projections through the use of global mapping strategies in order to assess the changes in the distribution of cropland areas and the associated cropping systems and evaluate the impacts of these changes on the broader environment; b)provide Earth Observation techniques, crop and agricultural land use monitoring methods, model development, and spatial and statistical analysis, with the purpose of better understanding agricultural land use changes and their impact on biodiversity and ecosystems; c)integrate coordinated satellite, in-situ and meteorological data into the GEOSS Data-CORE, enable the interoperability of this data and make it available to users in support of the development of the G20 Global Agricultural GEO Monitoring Initiative (GEO GLAM); and d) enable communities to compare results based on disparate sources of data over a variety of global cropping systems.
Funding scheme: *Collaborative Project - 15% of EU contribution going to SMEs*
The requested European Union contribution shall not exceed EUR 9 000 000.
Up to one proposal can be selected.
***Expected impact**:*
***Call**: ENV-2013*

JOINT CALL "THE OCEAN OF TOMORROW"

ENV-OCEAN-2013.6.2-8a Innovative Sensors For In-Situ Monitoring Of Marine Environment And Related Maritime Activities

Research will build upon recent developments in related fields (*power efficient circuitry, miniaturisation wireless data transmission, disposable systems, networking, gps, batteries etc*) to develop effective robust, flexible sensors and their packaging that will be suitable for large scale production and will provide reliable in-situ measurements of a range of key parameters for the assessment of the Good Environment Status, to support EU policies (Common Fisheries Policy, Integrated Maritime Policy) and to meet requirements under GOOS & GEOS. Development will be expected to a level that enables demonstration of functionality within the real operating environment. Proposals should also address web enabled networking of sensors, collaboration with GMES and GOOS and standardisation in accordance with the *DCH, INSPIRE directive.*
Funding scheme: *SME-Targeted Collaboration Project – 30% of EU contribution going to SMEs*
The requested European Union contribution shall not exceed EUR 6 000 000 (tbc).
One or more proposals can be selected.
Expected Impact:
***Call**: ENV-OCEAN-2013*

ENV-OCEAN-2013-6.2-8a Biosensors For Realtime Monitoring Of Contaminants In The Marine Environment[3]

Based on most recent knowledge on genomics and physiology as well as on materials (including nanotechnology) information technologies and relevant existing detection/monitoring technologies, the research under this topic should aim at developing and testing novel biosensors that can provide real time, in situ real time in situ monitoring of marine pollutants and high impact and presently difficult to measure analytes, such us, algal toxins, synthetic organics, herbicides/pesticides and polycyclic aromatic hydrocarbons (PAH) and real time detection of critical changes in the marine ecosystems caused by environmental pollutants, either individually or synergistically under multi-stressor conditions. Proposals should include a test phase to demonstrate the potential application of the biosensor(s) on environmental and/or aquaculture related applications.

Funding scheme: *Collaborative Project - 15% of EU contribution going to SMEs*
The requested European Union contribution shall not exceed EUR 3 000 000 (tbc).
One or more proposals can be selected.
Expected Impact:
Call*: ENV-OCEAN-2013*

[3] Topic managed by KBBE Theme

Area 6.3 Improving resource efficiency

Indicative budget: M€ **5 TOPICS**

Improving resource efficiency
Improving resource efficiency will help Europe to stimulate its economy and face the challenge of sustainable growth at a time of increasing energy prices, carbon constraints and greater competition for resources and markets. Research and innovation activities will aim to address the challenge of transitioning to a green economy while supporting important EU policy commitments included in the Roadmap on A Resource Efficient Europe[4] and to contribute to measuring progress towards the green economy. The EIP initiatives on water efficient Europe and raw materials will also be supported. Global assessment of water resources will be performed based on the integration of in-situ and space observation data. Research and innovation will promote the development of highly eco-innovative technologies, processes and services favouring a bottom-up approach. Eco-innovation demonstration projects in selected areas will aim to foster the exploitation of new solutions, management and business models. The latter will increase the chances of market penetration and contribute to the implementation of current environmental standards. Research and innovation will also support technologies and tools for consolidation of eco-industries in the area of cultural heritage. In the area of raw materials activities will be undertaken in cooperation with other Themes, e.g. cutting-edge technologies, processes and services for the optimum use of raw materials.

Indicative topics:

ENV.2013.6.3-1 Turning waste as a resource through innovative technologies, processes and services

The overall objective of this topic is to reduce environmental impacts through innovative solutions that lead to a reduced demand for raw materials and contribute to more efficient use of materials generally , thus supporting important EU policy commitments reflected in the Roadmap to a Resource Efficient Europe. Proposals shall focus on solid waste management and address one of the following two sub-topics:

1. *Valorisation of urban solid waste*. Research shall focus on the development of innovative solutions for the handling, separation, processing or transformation of urban solid waste and/or the development of new added-value products and services with good market potential based on recycled urban waste. This activity should contribute to more efficient urban mining and to a more circular economy.
2. *Recovery of raw materials from industrial waste*. Research shall address new and economically viable solutions for the collection and preparation for reuse of raw materials (including critical metals and minerals as defined in the context of the Raw Materials initiative[5]) from key industrial sectors such as construction, chemicals, aerospace, machinery and equipment, automotive or ICT. The objective of this topic is to contribute to the sustainable supply of raw materials of economic importance in Europe, thus helping

[4] Commission Communication Roadmap to a Resource Efficient Europe COM(2011) 571 Final 20.9.2011
[5] http://ec.europa.eu/enterprise/policies/raw-materials/critical/index_en.htm

to create a bridge with future Horizon 2020 activities on "Climate action, resource efficiency and raw materials". This topic complements related activities to be supported under the NMP Theme.

In both cases, proposals should demonstrate how the research foreseen will contribute to improving the environment, including how it will promote the development of new economic opportunities, improve resource efficiency and boost competitiveness. Proposals should also demonstrate that the proposed solutions have the potential to be substantially more sustainable, from a life cycle perspective, than current practice and should consider both direct and indirect impacts. Pilot trials at an appropriate scale should be envisaged to facilitate future market uptake.

Funding scheme: *SME-Targeted Collaborative Project - Open*
One or more proposals can be selected.
Expected impact*:*
Call*: ENV-2013*

ENV.2013.6.3-2 Eco-innovative demonstration projects

A significant gap still exists between the availability of new technologies and their successful commercialisation into marketable products. The aim of this topic is to support the effective demonstration of eco-innovative technologies which in spite of their high environmental and commercial potential did not succeed in reaching the market. Priority will be given to technologies that would enable stricter, smarter and more ambitious environmental standards to be reached than those currently in place. The overall goal of this action is to demonstrate the market viability of these technologies. Participation is open to all industrial sectors. Indicative fields of application of the projects are: construction and demolition waste; remediation of soil; pesticides and fertilisers in agriculture; urban mining; waste electric and electronic equipment, including rare elements and gold; climate change adaptation. Demonstration proposals related to water applications shall be addressed under topic ENV.2013.6.3-4.

Funding Scheme*:* *SME-Targeted Collaborative Project*
The requested European contribution shall not exceed EUR 6 000 000 (tbc)
One or more proposals can be selected.
Expected impact*:*
Call*: ENV-2013*

ENV.2013.6.3-3 Water efficiency and innovation demonstration sites

The objective of this topic is to mobilise industry, Member States and stakeholders into promoting innovation in the water sector, leading to the effective implementation of European Directives and policies while achieving multiple objectives, such as the reduction of water consumption, improved efficiency of distribution systems, promotion of re-use of water, reduction of flood risks, minimisation of energy use, enhancement of the quality of water services, and others. This will be achieved through the launch of large full-scale demonstration projects that should seed a number of "Water Efficiency and Innovation Sites" in areas of urban, industrial, agricultural and natural ecosystem water use, and that will test and disseminate new technological, organisational and management approaches. This topic is a contribution to the foreseen European Innovation Partnership on "Water Efficient Europe".

Funding scheme: *SME-Targeted Collaborative Project*
The requested European contribution shall not exceed EUR 6 000 000 (tbc)
One or more proposals can be selected.

***Expected impact**:*
***Call**: ENV-2013*

ENV.2013.6.3-4: Assessing global water resources through the use of Earth observations

Research under this topic aims at contributing towards the sustainable management of the world's water resources and building knowledge of the global hydrological cycle. The main focus will be on a) addressing the qualification and estimation of water resources at the global level and their temporal evolution, based on the modelling of the water cycle; b) testing of new parameters and data sources in the monitoring of global water resources, including those provided by European scientific remote sensing missions, seeking to improve current monitoring capabilities in terms of resolution and reliability; c) integrating the required in-situ and remote-sensing data from various regions of the world into the GEOSS Data-CORE, in support of the development of a system of systems for assessing global water resources, water scarcity and drought; and d) providing knowledge and information on ground water, coastal zones, floods and droughts to public authorities, decision makers and citizens, including developing countries. This research should be conducted within an international framework including non EU partners.

Funding Scheme: *Collaborative Project*
The requested European Union contribution shall not exceed EUR 9 000 000.
Up to one proposal can be selected.
***Expected impact**:*
***Call**: ENV-2013*

ENV.2013.6.3-5 Energy efficient retrofitting and renewal of existing buildings for sustainable urban neighbourhoods

This topic is a contribution to the "Energy efficient Building" (EeB) Public Private Partnership. The objective is to develop improved, easy to use tools that support cost-effective decision making through design, planning and implementation of renewal/retrofitting projects (including decisions such as demolishing vs retrofitting) and that promote well being, quality of life and resource efficiency (integrating an appropriate LCA approach). This topic also targets the development of affordable, cost-effective solutions for renewal and retrofitting groups of buildings that deliver significant energy efficiency improvements and help mitigate the heat Island effect through addressing multiple resource challenges (such as transforming waste to energy, for example). Sufficient emphasis should be given to the demonstration and verification of the impact potential of the tools or solutions developed. Quantification of improvements in resource efficiency, improved health and comfort and lower greenhouse gas emissions is expected. Economic Impacts including cost-benefit and investment recovery time should also be considered.

Funding scheme: *SME-Targeted collaborative Project*
The requested European Union contribution shall not exceed EUR 3 000 000 (tbc)
One or more proposals can be selected.
Expected impact:
***Call**: ENV-2013*

Area 6.4 Protecting citizens from environmental hazards

Indicative budget M€ **4 TOPICS**

Protecting citizens from environmental hazards
In view of the recent natural disasters in Japan and Asia, research and innovation will explore more thoroughly ways and means to better learn how to prepare, prevent, warn, defend and react in view of similar events. This will contribute to more reliable and precise earthquake and tsunami early warning systems, to sound methodologies for implementing stress tests for main infrastructures and to new means for defending coastal areas and populations from multiple hazards (including coastal and flash floods). Moreover, the analysis of recent approaches to post-disaster management will contribute to new and better communication and decision-making frameworks capable of ensuring stakeholders' and citizens' confidence. Novel global approaches to protect citizens' health from emerging environmental risks will be explored, in particular research will enhance a comprehensive understanding of - and comparable data on - population exposures in Europe. By combining large-scale exposure data with population health data from the European Health Examination Survey[6], new approaches, technologies, and devices aiming to reduce exposures to e.g. noise, electromagnetic fields, chemicals, can be developed. Research will also contribute to progress on environmental health impact assessment to improve available tools and their usability for policy makers in policy assessments.

Indicative topics:

ENV.2013.6.4-1 Assessing individual exposure to emerging environmental stressors and predicting health outcomes: paving the way for a EU-wide assessment

The majority of major chronic human diseases are likely to result from the combination of environmental exposures to chemical and physical stressors and human genetics; however, the environmental determinants are poorly understood in comparison to the genetic factors. Thus, new approaches relying on the concept of the individual exposome, representing all environmental contributors to disease received by an individual during a life-time, are needed to better understand the underlying mechanisms of environment-health/disease associations. The aim of the research is to collect new harmonised and standardised large-scale exposure data from European populations to improve the quality and comparability of the input data across countries, with attempts to link exposure data to health register health data. The latter could consist of existing data available in health registries or could be collected together with exposure data, e.g. through a pilot European Health Examination Survey. Individual exposomes should be characterised by developing new predictive biomarkers based on epigenetics or other approaches. Strategies to improve the bioinformatics tools to handle the large amounts of data generated should also be considered.
Funding scheme: *Collaborative Project*
The requested European Union contribution shall not exceed EUR 15 000 000.

[6] http://ec.europa.eu/health/data_collection/tools/mechanisms/index_en.htm#fragment1

Up to one proposal can be selected.
Expected impact:
***Call**: ENV-2013*

ENV.2013.6.4-2 Closing gaps of knowledge and reducing exposure to electromagnetic fields (EMF)

As previous studies have been inconclusive as regards possible health effects of exposure to EMFs, further research should be carried out to better understand the possible mechanisms generating biological effects through the use of novel approaches, as well as to collect and improve exposure and health risk assessment of EMFs, also to underpin policy development. The research should also propose new technological and non technological means to reduce exposure. Possible research areas include the role of radiofrequency (RF) exposures in neurodegenerative diseases, behaviour and ageing; quantification of personal exposures from various sources; and exposure and health effects from intermediate frequency (IF) fields.

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:
***Call**: ENV-2013*

ENV.2013.6.4-3 Coastal threats in Europe: Impacts on societies

Recent climate-related and tsunami catastrophic events in coastal areas have highlighted the increased exposure and vulnerability of societies in growing urban areas. There is a need to strengthen the forecasting capability and mitigation of hydro-meteorological hazards and their extremes on the one hand and tsunamis on the other hand. It is essential to capitalise on the knowledge gathered from recent dramatic events and from the past and on-going EU research in order to enhance the forecasting/predictions of catastrophic events and to improve the assessment of risks to societies. Providing timely information and warnings to decision-makers for saving lives or avoiding economic losses should also improve governance. In an international scientific cooperation and EU Policy-driven context, research proposals should therefore focus either on the tsunami hazard and risk key issues or on extreme hydro-meteorological events (e.g. extreme winds, storm surges, high precipitations, coastal floods) which are prone to increase impacts on European urbanized coastal areas. Innovation in risk forecasting, prevention and governance and related technologies has to be well considered.

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:
***Call**: ENV-2013*

ENV.2013.6.4-4 Stress test against Natural Hazards

Rare low frequency-high consequence natural hazards events can have huge impacts on critical infrastructures and trigger cascading effects. Numerous site specific studies have been carried out in the past using diverse methodologies. Research will be carried out to ensure coherency among the site-specific assessments, capitalise on existing knowledge and contribute to develop a consistent national to European reinforced safety assessment capacity, disaster risk reduction strategy and methods and standards to avoid failure or impacts on

society. Coordination with related actions under the EURATOM programme would be welcomed.

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:

Call*: ENV-2013*

Area 6.5 Mobilising environmental knowledge for policy, industry and society

Indicative budget M€ **5 TOPICS**

Mobilizing environmental knowledge for policy, industry and society
Further efforts will be made to stimulate innovative approaches and tools to facilitate knowledge transfer, assessment, valuation, uptake and exploitation of scientific data and results for policy enterprises and society at large. In addition, environmental knowledge will be harnessed through all forms of innovation (policy, society and enterprises) and uptake processes and proactive communication, such as exploring the complex interactions between production and consumption patterns or the policy and economic implications of post-2013 climate agreements, or the support to EU policies in the areas of societal interest such as disaster risk reduction. Foresight will aim at providing insight into environmental research and innovation initiatives, policy developments and market potential of European clean technologies worldwide. Attention will be paid to sharing and exploitation of knowledge from many varied sources, in particular the EU programme on Global monitoring for Environment and Security (GMES), the Global Earth Observation System of Systems (GEOSS) and the GEOSS DataCore.

Indicative topics:

ENV.2013.6.5-1 Accelerating progress towards the Green Economy

The Green Economy is a vehicle to deliver sustainable development. It offers win-win opportunities to all countries regardless of the structure of their economy or their level of development. It builds on resource efficiency and its progress needs to be monitored. The exchange of best practice between all stakeholders needs to be encouraged at global level. Proposals should be innovative and address one of the following two areas to facilitate the acceleration towards a Green Economy in a global context.

a) Measuring progress: stocktaking

Many initiatives were launched to create indicators and various support tools aimed at quantifying the environmental and the economic impacts of human activities. Research should take stock of the work carried out globally in the field of sustainability indicators, including those that can complement GDP, and in the field of support tools such as those focusing on physical aspects, like life cycle assessments, and those integrating the economic dimension, like input-output databases. An assessment of on-going activities in this field and their outcomes of should be carried out including identifying pragmatic solutions for Europe, and providing readily usable tools for policy makers. Potential research gaps should be identified and suggestions offered on how to overcome them. In addition, the proposal should demonstrate tangible support towards the implementation of the Flagship Initiatives on a Resource Efficient Europe and on the Innovation Union, the EC Communication on a "Roadmap to a Resource Efficient Europe", as well as the EU Strategy for Sustainable Development.

b) Business practices for ' Green Economy' production and consumption post Rio+20:

To ensure post RIO+20 dialogues in the context of 'A Green Economy', the successful proposal should focus on developing and supporting, networking and exchange of best

practice between actors involved in sustainable production and consumption and by encouraging cross-sectoral and multi-stakeholders research to develop sustainable business solutions. Models, tools and practices should be identified that can be replicated and scaled up in different sectors and contexts with a view to improving resource management, supporting job creation, promoting social inclusion and empowerment, and reducing environmental footprints along the value chain.

Funding scheme: *Coordination and Support Action (support or coordination action)*
The requested European Union contribution shall not exceed EUR 3 000 000.
Up to one proposal can be selected per sub-topic.
Expected impact:
Call*: ENV-2013*

ENV.6.5-2 Mobilising environmental knowledge for policy and society

Innovative approaches and tools are needed for policy makers to facilitate the proper consideration and uptake of available scientific knowledge in key areas in policy-making. Proposals should be innovative and address one of the following four key areas to facilitate improved knowledge transfer and uptake, provide appropriate tools and models to manage information and data for policy makers both within Europe and globally, and raise awareness of raw materials:

a) Policy and economic implications of the post-2012 climate agreements

The action will contribute to a better understanding of the key policy and socio-economic implications of post-2012 climate agreements at the global level, as well as the specific benefits, costs and opportunities that this will entail for Europe. Key issues to be addressed may include: effectiveness of the new architecture in delivering the required mitigation objectives; projected socio-economic impacts; the role of low-carbon technology development and transfer; industrial competitiveness and interface between climate change and international trade; trends in energy prices.

b) Better science-based policy decision making in disaster risk reduction

Research efforts should focus on better understanding of decision making processes at different scales (local to international) and how disasters notions are framed by knowledge, personal attitudes and institutional settings. Research should map different decision mechanisms, their flows and actors involved, investigating what levels of risk are actually manageable in different socio-economic conditions and hazards levels, and how impediments in the flow of information are formed and differentiated among vulnerable groups.

c) Empowering international economic development through the use of environmental Earth observations

The action will explore opportunities for economic development, in particular in developing countries, empowered by integrating and exploiting economic development initiatives and environmental earth observations. Capacity building within local communities and local authorities should be addressed, enabling them to collaborate with international development programmes, use environmental earth observation information and products, and engage resource providers such as donors and the financial sector. The action should also look to catalyze the marketing and exploitation of earth observation applications for the creation of new innovative products.

d) Raising societal awareness and tackling skill shortages on raw materials
The objective of this action is to support activities to improve public awareness of the importance of raw materials for resource efficiency and for the economy, to raise the societal acceptance of substitution, replacement and recycling of raw materials and to indentify ways of tackling the problem of skill shortages in the raw materials sector.

Funding scheme for all three areas *Coordination and support action (coordination action). The requested European Union contribution per project shall not exceed EUR 1 000 000. Up to one proposal can be selected per area.*
Expected impact*:*
Call*: ENV-2013*

ENV.2013.6.5-3: Exploiting a European Open Data Strategy to mobilise the use of environmental Earth Observation data and information

Using open, readily accessible and freely available Earth Observation data and information, proposals should focus on sharing and exploiting data and information from many varied sources, including in particular: open public sector data portals; the EU GMES program; GEOSS and especially the GEOSS Data-CORE, to stimulate better evidence-based policy making and the emergence of new business. The research activities that should be conducted shall a) develop models, innovative environmental tools and information products that can deliver benefits to researchers, European end-user agencies, the industrial sector, policy makers, and citizens; b) enable wide access to scientific data to allow researchers in different domains to collaborate on the same data set, to engage in entirely new forms of scientific research and to explore correlations between research results; c) stimulate the smart use of strategic resources; support the development of evidence-based policies; and develop new opportunities in global markets; and d) empower citizens and citizen's associations, making it possible for them to contribute to environmental governance.
Funding scheme: *SME Targeted Collaborative Project - 30% of EU contribution going to SMEs*
The requested European Union contribution per project shall not exceed EUR 6 000 000. One or more proposals can be selected.
Expected impact:
Call*: ENV-2013*

ENV.2013.6.5-4 Global Regional Networking for clustering of projects, uptake of research results and knowledge platforms

The objective is to establish sustainable S&T cooperation and uptake of research results between EU and third country researchers in the area of climate, resource efficiency and raw materials. Targeted regions are: a) Latin America, b) ASEAN and c) Mediterranean third countries. EU funded projects with high added value and relevance to the region needs will be identified and clustered. Networks will be set up by bringing together researchers and other relevant stakeholders for an interactive dialogue aiming at the identification of research and innovation needs and the tools for enhancing cooperation in the most promising areas. Synergies will be sought with projects funded by other EC instruments (external cooperation) or other parts of the Framework Programme (INCO-Nets). The project is expected to lead to increased awareness of collaboration potential in the field of environment research, and more strategic cooperation between the EU and Latin America, ASEAN and Mediterranean third countries, as well as stimulating concrete successful cooperation activities. Consortia should

include partners from the third countries in the regions. Priority will be given to consortia which can ensure contacts with research authorities or major research institutes.
Funding scheme: *Coordination and Support Action (coordination action)*
The requested European Union contribution per project shall not exceed EUR 1 000 000.
Up to one proposal per area can be selected.
***Expected impact**:*
***Call**: ENV-2013*

ENV.2013.6.5-5 Network of institutes for forward looking analysis and information on research and innovation prospects

Establishment of a network of Institutes with a view to carry out forward looking analysis and collect strategic information about medium and long term environment (climate, resource efficiency and raw materials) related research and innovation trends and prospects bearing in mind policy and market developments as well as policies and programmes of major EU and third country research and innovation actors. The network will propose and monitor indicators for measuring the impact of EU S&T cooperation with third countries. It will produce regular quantitative and qualitative briefings for EU research managers and policy makers dedicated to specific issues or general policies.
Funding scheme: *Coordination and Support Action (coordination action)*
The requested European Union contribution per project shall not exceed EUR 3 000 000.
Expected duration: 5 years
Up to one proposal can be selected.
Expected impact:
***Call**: ENV-2013*

III Other Actions

The 'Environment' Theme will comply with the prevailing requirements for monitoring, and evaluation, both ex-ante and ex-post. New innovative ideas for implementation activities will be explored with a view to paving the way for Horizon 2020. These actions may involve studies and surveys as appropriate implemented through public procurement, and/ or appointing groups of experts.

Preparatory Actions – Prizes and Pre-Commercial Procurement

- feasibility study to explore ways and means to introduce prizes to encourage environment research ideas that can be taken up in calls under Horizon 2020.
  Funding scheme: *CSA, public procurement*

- feasibility study to explore how best to introduce pre-commercial procurement activities in the field of environmental research.
  Funding scheme: *CSA, public procurement*

Monitoring and Evaluation

- ex-post evaluation of FP7 funded research in the filed on environmental (including climate change) research. This study will be subject to contract following a public procurement procedure. If appropriate a Commission Framework Contract will be utilised.
  Funding scheme: *CSA, public procurement*

- Group(s) of external experts for policy relevant analyses and forward looking reflection on environment related research. Group(s) of external experts will be established to provide analyses of past activities in policy relevant areas and to engage in a forward looking reflection on issues related to future environment related research and innovation.
  Funding scheme*:* *CSA, experts appointment*

Identified beneficiary

- An annual contribution to the 2013 activities of the Global Earth Observation (GEO) Secretartiat[7]
  As a full member of GEO the Commission will pay on behalf of the Union a 2012 contribution of EUR 600 000 to the GEO Trust Fund which is the budgetary structure agreed by the GEO members to fund the GEO secretariat (hosted by the World Meteorological Organisation in Geneva, Switzerland).
  Funding scheme*:* *other action*

[7] Contribution paid by the Union as subscription to a body of which they are a member, according to Article 108(2)(d) of the Financial Regulation applicable to the general budget of the European Communities.

Independent expertise

- The use of appointed experts for the evaluation of project proposals and appropriate, of running projects. Setting up of expert groups to advise on or support the design and implementation of Community research policy.

IV Budget

Indicative estimated budget for the Environment (including climate change) Theme for the 2013 work programme - +/- 315 Million €