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The PEER view on the suggested focus areas of Horizon 2020

OVERVIEW

PEER is a partnership of eight of the largest publicly funded interdisciplinary environmental research centres in Europe ¹, founded in 2001 with the aim of combining forces to follow a joint strategy in environmental sciences, to contribute to building a European Research Area and to enhance research contributing to sustainable development.

The PEER institutes welcome the general approach of Horizon 2020 in taking a starting point in societal challenges. The PEER institutes have particular competences to deal with these challenges. The interdisciplinary environmental research that the institutes carry out is relevant to all seven challenges that have been identified for Horizon 2020 in the “Proposal for a Council decision establishing the Specific Programme implementing Horizon 2020 - The Framework Programme for Research and Innovation 2014-2020” (document 17633/12 of 12 Dec 2012).

PEER welcomes the intention of the European Commission to strengthen cross-cutting research activities focusing on problem solving. In these research efforts, it is highly important to aim not only to develop new technologies, but also to consider environmental and other wider societal factors affecting sustainability, social acceptance and diffusion of new concepts and technologies. The PEER centres are highly experienced in pursuing interdisciplinary research crossing sector borders.

While supporting the idea of integrated, cross-cutting activities, PEER notes that job creation through research and innovation is a highly complex endeavour. Studies have shown that simply relying on technological innovation will not be sufficient: societal innovations and innovative policies are crucial. These should be developed across policy sectors. For example, environmental legislation has been a driver of new market opportunities for innovative companies. However, environmental legislation can also stifle innovation if it is too rigid and inflexible when it comes to the use of novel solutions in responding to environmental challenges.

1. The PEER members have a combined budget of about €580 million and approximately 6,300 members of staff. This paper is submitted by the following institutions: Alterra – Wageningen UR (The Netherlands), CEH – Natural Environment Research Council (United Kingdom), Irstea (France), Danish Centre for Environment and Energy, Aarhus University (Denmark), SYKE - Finnish Environment Institute (Finland), Helmholtz Centre for Environmental Research - UFZ (Germany), CIENS – Oslo Centre for Interdisciplinary Environmental and Social Research (Norway). JRC/IES did not contribute to this document.

Horizon 2020 should build on important research demands that have been identified in previous Framework Programmes. For example, ecosystem services were identified in FP7 as an important concept for safeguarding goods and services important to humankind. They are relevant across many focus areas such as food production, the provision of clean water as well as adaptation to climate change. Research aiming at sustainable solutions in food production and long-lasting jobs in this area needs to recognize potential competition of the food production service with other services of land use, water or soil. Ecosystem services should be similarly recognized in other areas such as health, blue growth and sustainable cities and communities.

The PEER institutes agree with the assessment of the Commission that “there is untapped potential for the European economy to be more innovative, productive and competitive whilst using fewer resources and reducing environmental impact.” In aiming at realizing this potential through research, sustainability aspects should have a high priority in all work programmes of Horizon 2020. It should translate into calls for innovative research on resource and energy efficiency, protection and sustainable use of biodiversity and genetic resources, ways of ensuring sustainable use of critical resources such as water, development of a green economy, and research broadly supporting climate change mitigation and adaptation. In the proposed strategic programme for Horizon 2020 most of the topics are noted, but there is too strong an emphasis on purely technological solutions. Greater attention should be devoted to research on the societal aspects of change and also to the fundamentals of renewable resources within the context of biodiversity and ecosystem services. There is also a need for research that explores how innovations and policies from several sectors interact and thereby affect Europe’s ability to respond to major societal challenges. These observations form the base for our detailed comments on the suggested priorities for Horizon 2020.

The PEER institutes have been actively involved in a large number of projects funded by the EU’s Framework Programmes for Research and Development. Based on this experience and our international and national work we wish to bring forth the following viewpoints for consideration in the development of the future work programmes of Horizon 2020. We raise particular issues that should be included in the forthcoming work programmes. Our focus is on programmatic research that is intended to serve, in particular, policy development and implementation, supporting innovation and the creation of jobs in Europe. The structure of this position paper follows broadly the focus areas of the strategic programme drafted by the Commission.

COMMENTS AND SUGGESTED PRIORITIES IN HORIZON 2020

Health and care have important environmental dimensions

Significant health challenges in Europe are caused by lifestyle related diseases. Therefore the solutions cannot be purely medical. The development of policies for health and care require recognition of the roles of changes in lifestyle and the environment in ensuring health. By introducing environmental knowledge in cure, prevention and care and by promoting population health interventions that include redesigning the environment to make healthy choices easier, new and more affordable health and care can be developed. This would include adapting to changing environmental and climate factors.

In urbanizing societies, nature and green environment are becoming increasingly important as means to improve or sustain mental and physical health for all population groups. The recognition

of such ecosystem services represents a new departure in health and care policies, and requires supporting research that Horizon 2020 should deliver. New types of innovative projects that bring together health, care and environmental professionals have the potential to reduce the ever increasing cost of health and care that seriously stresses European economies.

Food security, biodiversity and ecosystem services

The food-energy-water nexus has been widely recognized as an important concept in dealing with global food security. It is also relevant in the European context, especially when coupled with the concept of ecosystem services and the broader European responsibility over Earth's resources, as reflected in Europe's international commitments on, for example, climate change, biodiversity, transboundary waters and combating desertification. Policies that seek to secure food production need good understanding of how the health, integrity and efficacy of food producing ecosystems are dependent on biodiversity and ecosystem functioning in their surrounding landscapes. There is also a need for knowledge of how ecosystem services contributing to food security and a healthy environment can be maintained and enhanced and how food production can be best combined with other ecosystem services. Scenario development and analysis can be used for deriving innovative management options. Considering that in Europe cultural and (semi-)natural landscapes are very much interlinked, approaches need to be broad in order to cover not only agricultural areas but the whole landscape with all its components and processes.

Loss of biodiversity and genetic resources is threatening the production of food, timber and fibres. Research has demonstrated the crucial role that key species groups such as pollinators play in food production, and reduced yields have already been observed. Policy development acutely needs research that can provide innovative ways to protect these species. The dynamics of invasive alien species and the risks these pose to food production and ecosystem integrity should also be a priority topic of European research. The risks and associated costs related to alien species increase because of climate change and increasing global mobility of goods and people. The productivity of food and wood to ongoing changes in the environment and in consumers' demands can only be maintained by the sustainable use and management of the genetic resources underlying these production systems.

There is a need to gain deeper understanding of how the CAP and other key policies affecting land use and biodiversity can be improved to increase sustainability. Analyses should focus on spatial and temporal trends in the state of different ecological systems and on the links between food production systems, other land use and ecosystem health across Europe. The various synergies and trade-offs need to be taken into account. Policy analyses should include research on governance (i.e. institutions, instruments and measures influencing land use at different scales, as well as their implementation) and serious efforts to create and maintain dialogues between research and policy.

The emergence and diffusion of technological and social innovations that increase resource and energy efficiency in food production and processing should be explored further. Research needs to analyze the impact of these innovations on biodiversity and ecosystem services and their long-term consequences. Integrated research responding to societal challenges should deliver a better understanding of closed loops, industrial symbiosis and alternative ways of linking ecosystem functions and services with food production systems so that overall values of provision of ecosystem services per land unit increases while resource use and threats to biodiversity decrease.

Soils play a key role in food security but also in the cycling of organic and inorganic matter, water quality and climate. Soil microorganisms play a crucial role in maintaining soil ecosystem services

as pollinators do above-ground. Globally, soils are by far the largest source of biogenic greenhouse gases, strongly affected by management practices, contaminations from point and diffusive sources as well as land-use change. Thus, the sustainable management and restoration of soil resources are a major challenge. Addressing this challenge requires a comprehensive approach and fundamental understanding of soil functions and services as well as restoration potential. Instead of focusing on single services (e.g. food production or water purification) Horizon 2020 should initiate interdisciplinary, system oriented research for soil management and restoration.

Consumers make important decisions affecting the ways how food is produced. Improved understanding of the factors affecting the decisions of consumers would provide information which is useful for producers, consumers themselves and policy makers. Studies of “footprint” and “virtual water” have been powerful in demonstrating the dependence of European food production and consumption on ecosystem services and resources elsewhere. These approaches should be extended by research that deals with the processes in which European production and consumption patterns affect land-use, biodiversity and ecosystem services – as well as food security and health in third countries. Research should therefore help in identifying pathways of global sustainable food production and consumption, and the actions that can contribute to such change.

With the Biodiversity Strategy 2020, the EU has set itself goals to safeguard natural environments, and especially those that underpin the livelihood of European citizens and Europe’s economy. Research on maintaining and restoring ecosystem services must go beyond the provisioning services of agriculture. The management of the agricultural sector (including measures taken within the CAP) should be better linked with biodiversity conservation and the management of other ecosystem services (especially regulating services), taking into account what is broadly known as Green Infrastructures. Research on biodiversity must consider economic and other values of biodiversity, reflect the impact of diverse policies, integrate scientific fields and cover different components, including societal, socio-economic relations and purely environmental aspects. Studies of the links between ecological levels and spatial scales provide answers to questions such as how the response mechanisms of individuals, populations, or species to anthropogenic impacts, land-use and climate change translate into larger scale patterns of species’ distributions and interactions, ecosystem functioning and services. The role of IPBES in guiding sustainable use of biodiversity, genetic resources and ecosystem services will be of particular interest in future research supporting policy development.

Blue economy and the potential of aquatic living resources

Lakes, rivers, coastal areas and the open seas play an increasing role as sources of valuable raw materials, in the production of renewable energy and as providers of a wide range of other ecosystem services. The possibilities to make waterborne traffic resource efficient and carbon neutral are often better than for other modes of transport. The sustainable use of these aquatic ecosystem services requires research that enhances the understanding of the dynamics of the systems, and also of the continuum from watersheds through coastal and transient waters to the open sea.

The poor state of coastal waters leads to losses of valuable ecosystem services. Sustainable use and remedial action should be based on studies that provide knowledge of the couplings and links between the different systems. European research into the diversity of aquatic systems should also recognize wider ecosystem services that, for example, algae or aquatic macrophytes may provide

and that can lead to innovative products and sustainable economic activities.

Monitoring the state of aquatic systems sets major challenges for the development of sustainable “blue” economies and for the remediation of damaged systems. Earth Observation techniques provide spatially and temporally reliable data on various aspects of inland waters, coastal and open sea areas, which can be used not only to increase the accuracy of environmental information but also to focus remedial measures on relevant hot spots. Earth Observation and GIS techniques enable the coupled analysis of terrestrial and marine systems, which might trigger further interdisciplinary research and innovations.

Smart green cities and communities

Communities and cities cannot be transformed without taking into account interdependencies between social, economic and environmental development. Focusing on technology and economy in urban planning will not lead to smart cities and communities, but needs to be supplemented with studies that improve understanding of societal processes, and take into account overall social and demographic dimensions.

Sustainable urbanization requires an integrated approach to deal with the urban environment and its functions. In Europe urban form changes rather slowly and decisions on infrastructure fix the course of development for a long time into the future. This highlights the need to carefully consider new land use, housing, energy and transport solutions. The energy, water and transport nexus is particularly important and needs to be addressed in new research. Ways of reducing the environmental impacts and ecological footprints of cities need to be explored together with the support for green infrastructures. This provides opportunities to improve the overall quality of life, including, for example, by improving air quality.

Small scale household production of energy and food in cities can reduce the dichotomy between consumption and production. European research should focus on comparative analyses of the transformations across Europe, thereby identifying innovative solutions and processes. As Europe is undergoing significant societal changes ahead of many other continents, it has potential to act as a forerunner in developing smart models of urban form and everyday life. Ageing and multicultural populations pose new requirements on the quality of urban environment. Social and cultural aspects should therefore be part of the research and development supporting innovations. Questions of justice need to be addressed as well.

European cities are in many cases forerunners in the transition towards a low carbon and resource efficient economy but, at the same time, they are hotspots of social change, of polarisation and growing poverty in countries shaken by the economic crisis. Research dealing with cities and communities should focus on governance systems, regulations and social innovations that have the potential to promote and improve urban sustainability. Research into new ways of allowing participation of citizens in landscaping and design may also pave the way for innovations and democratization of urban decision-making.

Smart technologies have the capacity to make urban life more eco-efficient in areas of energy, transport and water supply and sanitation. In developing these technologies there is a need to also consider demographic change, migration and urban planning (green spaces, recreation functions). New services will be adopted quickly, if they respond to social practices and every-day needs. The intelligent use of buildings, public space and green infrastructure has a vast potential to enhance the liveability of urban areas and local economy. ICT provides opportunities for new interactive monitoring and learning systems, where insights in, for example, the factors affecting real energy

use can be gained. Europe should be a forerunner in interdisciplinary studies that explore the interaction between smart technological solutions, housing, green infrastructures, ecosystem services, consumer behaviour, as well as interactions between producers and users of products and services.

Sharing knowledge is an essential component in smart urban development. Open-access data will enable new services, business opportunities and citizen participation. Extensive databases also permit new research and modeling that helps to optimise complex urban interactions. Forecasting and preparing for the future through scenario work are also important applications.

Towards low carbon societies and growth

Rapid technological progress in all sectors of the economy is necessary for a radical shift towards a resource efficient low carbon economy. Both for the identification of hotspots and for the evaluation of progress in policy development and implementation, European research should develop approaches and analyses that help to understand the flow and uses of resources in different economies, taking into account the multitude of relevant environmental impacts. Land-use competition and ways to reduce tension between, for example, bioenergy production, maintenance of carbon sinks and other ecosystem services, are also important areas of research for the development of sustainable low carbon societies.

If technologies and economies are developed with a myopic focus on carbon or greenhouse gas emissions severe adverse side effects are possible, as shown by the first generation biofuels. Therefore, research devoted to the early identification of potential side effects and to integrated analyses of systems change is urgently needed. These can help in avoiding adverse side effects, but also in identifying alternative pathways of change.

Recent research has highlighted that the two degree target is likely to be as dependent on politics as on technological progress. The understanding and fostering of transition to a low carbon society requires carefully planned and extensive studies of relevant social processes and the dynamics of coupled techno-eco-social systems, including the role of different policy instruments in the processes. European research should be devoted to studies paving the way for policy innovations that can end the gridlock that climate policies often run into in the European multi-level governance system.

Radical change can emerge from local transformations. European RDI should support experimental stakeholder driven efforts to create local or regional low carbon economies. Support for such niche innovations increases the likelihood of more widespread substantial change. The main support for such ventures is likely to come through regional funds, but research should explore these cases to develop a more general understanding of the patterns of change. Thereby local efforts and their diffusion can facilitate European-wide policy learning.

Energy efficiency

Decreasing energy consumption should be one of the highest priorities of European societies. A reduction in demand for energy makes the transition to renewable energy sources easier and reduces pressure on natural resources. This involves the development of specific technologies, including those related to cooling, which become increasingly used also as a way to adapt to

climate change. Technological solutions play an important role, but cannot tackle the whole problem. The use and uptake of the technologies is affected by social processes and institutions. Technological research should therefore be coupled with social and economic research, including in depth evaluations of measures to increase energy efficiency. Research should have a system perspective and also examine rebound effects that can obliterate efficiency gains.

Attention needs to be paid to the intersections of energy efficiency measures with social and demographic change. The governance of energy efficiency is significant: How should the policies be designed to include social and environmental justice? For example, how can systems be created that allow the poorest to profit from reduced energy demand?

So far many of the European-wide energy saving actions have been based on simple documentation of measures without in-depth analyses of relevant processes. Several data banks have been created for energy efficiency and related measures but their quality varies and they offer limited opportunities for serious research. European research should encourage critical studies of the processes through which energy efficiency and energy saving develops, and in particular also focus on the barriers of progress.

Smart mobility for sustainable growth

Transport is both a solution and a problem in efforts to achieve sustainable development. Exciting opportunities have emerged and are actively being pursued by key stakeholders in the transport sector. At the same time greenhouse gas emissions from transport continue to increase and transport also causes a host of other serious environmental problems from air quality to noise and risk of groundwater pollution. European research is needed to develop innovative solutions to these well recognized problems.

There is strong research focusing on solutions to current environmental problems such as noise, air pollution and landscape fragmentation in the transport sector. European research should, however, also focus on opportunities to reduce transport demand. A reduction of demand would, by saving energy, make it easier to solve many of the most pressing problems related to transport. Initiating major changes in the volume of transport implies transformations in the whole socio-technical systems related to transport. European research should therefore explore opportunities that can induce and accelerate such changes. This calls for interdisciplinary studies of social, economic and political processes and instruments. Innovative ways of fully internalizing environmental costs in different transport systems should also be explored.

The development of intelligent mobility management and improving the operation of public transport are crucial ways to reduce traffic and need to be studied further. In this context the coherence of taxation, payments, subsidies and other economic instruments is an important field of research. Urban form affects the amount of everyday mobility to a great extent, and thus European research should pay attention to the interaction between urban land use and transport systems.

Moving towards a zero-waste society

Research, innovation and policy development is needed to transform the future use, reuse and recycling of resources in order to meet the goals of the Europe 2020 Resource Efficiency Flagship

initiative, the Eco-innovation action plan and the Communication ‘Innovation for sustainable growth: a bio-economy for Europe’. A new paradigm for the perception and handling of waste from production and consumption is needed, turning them into new products and services and moving closer to an end-of-waste society. Dedicated European research is needed that can be based on, for example, concepts of industrial ecology and symbiosis.

There is especially a need for innovative ways of transforming production based on non-renewables to bio-based production. New and innovative methods of handling and regulating biological waste material are needed, cascading use of biomass, re-introducing the biomass into the production chain by extracting high value components and products such as biopoly-mers, bio-enzymes and bio-pesticides. Research into novel forms of ecodesign can play an important role.

New concepts are needed for the transformation of household waste into environmentally safe products, suitable for reintroducing into the environment. By using safe by-products it is possible to increase soil carbon stocks and thus preserve ecosystem health while also increasing the carbon sink.

Waste provides examples of the interaction between ecosystem and technosystems. Integrated analyses of how this interaction can be managed both through technological solution and through processes of governance are needed. This would include research into ways to achieve minimization of waste. It may also include research related to the feasibility and impacts of “urban mining”, including mining of industrial waste deposits relative to the mining of pristine materials. In this context it is important to minimize risks, including ways to deal with pollutants that urban mining may release.

Water innovations as global solutions

Europe has a long tradition in high quality water RDI. Yet pressures on European waters are high and in many cases likely to be aggravated further as a consequence of increasing demand, further exacerbated by climate change. Thus, despite efforts to ‘green’ important policies such as the CAP, tensions will remain between the use of water and efforts to restore the state of waters as outlined by the Water Framework Directive.

Water innovations can emerge from research that disentangles conflicts between different policies and actions. This is also likely to provide the necessary knowledge for modifying relevant policies and the legal base (such as the WFD). The R&D should help focus administrative and other resources towards areas where progress can be made. Given the increasing seriousness of water issues throughout the globe such research will also give Europe a leading role in solving some of the world’s most pressing problems.

The supply of water of adequate quality in sufficient amounts is essential for the health of individuals and the cultural and economic development of societies. The growth of water demand for food production and expanding urban areas poses a challenge to water supply systems around the globe. It calls for novel treatment and restoration technologies and management concepts for exploitation strategies, allocation mechanisms and issues related to social, economic and environmental sustainability. River basins have become the key unit in Europe and beyond for solving management problems. Extensive research has supported catchment based management. There is a need to evaluate and put into practice the results of many decades of research on water management and water quality. Special attention has to be given to complex water management under water scarcity, with a focus on the management of scarce water resources in the circum-

Mediterranean region. The management of scarce water resources is likely to require new research focusing on, for example, innovative ways to reform governance and institutions.

Risks to long-term water quality caused by chemicals need to be considered. What risks result from worldwide use of chemicals for our ecosystems, water quality, and in the end, for people? How can these risks be assessed and minimised? Considering the relevance of the chemical industry to the European economy, prospective chemical safety research is required that identifies innovation potential for the development of materials and products and, at the same time, strives to improve our understanding of ecosystem services for the management of chemicals in the environment and pollutant degradation. Creation of intelligent expert systems for integrative risk assessment and management of chemicals in the environment is imperative.

The development of competitive European generic solutions for modelling should provide European e-infrastructures, and foster performance assessment, large scale deployment and pre-normative research. Data and modelling clusters addressing subsurface management aspects for water resources or low-carbon geo-energy applications (i.e. contributing to smart cities and competitive low-carbon energy) as part of an integrated Earth System Modelling network should be enhanced. This includes finding and defining new quality standards through demand-driven model inter-comparison, i.e. the comparison of approaches, concepts and their results, and the development of approaches for tackling uncertainties.

The difficulties, uncertainties and high costs of monitoring the state of waters (above and below ground) represent major challenges for maintaining and improving the state of European waters. European research should enhance the accuracy and cost-efficiency of environmental monitoring as well as the implementation of novel monitoring techniques.

Opportunities to couple citizen observation with technological innovations are rapidly expanding and offer unique opportunities in Europe which has a highly educated citizenry with access to new technology. European research should seize these opportunities and devote significant efforts to develop participatory observation and its coupling to regular monitoring. Such research would pave the way for significant innovations in the water sector with world wide application.

Sustainable solutions to Europe's crises

Europe struggles with economic and political crises. These crises are framed almost exclusively in economic terms. Yet it is obvious that the crises are also related to the use of natural resources and the environmental impacts that humans have locally, regionally and globally. Neglecting the resource and ecological dimensions in efforts to solve the crises ignores the results of the last 30 years of global change and sustainability research and will lead to new and potentially even more serious crises in the future.

If Europe is faster than other continents in developing resource efficient technologies, products and services (green technologies, cleantech) this will bring benefits and competitive advantages on global markets. European research into the ways that current crises can be overcome should therefore explicitly address the broad sustainability agenda, and in particular fully recognize the boundaries set by the natural environment, globally as well as on the regional to local scale. This is necessary since the solutions to Europe's crises are intimately connected on different scales with development in the rest of the world. Research should explore these issues further through careful studies of the interconnectedness.

The changes in Europe and the recovery from crises have to be monitored not only in the economic realm but in all dimensions of sustainability. This calls for European research that develops and critically evaluates systems for green accounting from the local to the European wide level. There is also a need to assess the relationship between employment and green economy more generally. Systems of governance that steer consumption and production in a sustainable direction, with the explicit target of reducing resource use in absolute terms, need to be explored by examining current institutions and systems of incentives and their replacement with more innovative solutions.

Multidisciplinary research is further needed to identify risks and opportunities to sustainability as emerging from political and economic responses to crises. This is because environmental protection can act as a mediator in reconciliation, yet at the same time economic pressures may easily lead to neglecting sustainability criteria in favour of short-term attempts to maximise profits.

Safeguarding and securing society - increasing disaster preparedness and adapting to climate change

Climate change and extreme weather events have the potential of seriously affecting European societies. Research, development and innovation can reduce the risks. Traditionally the focus has been heavily on technological and other “hard” solutions that increase resilience. The costs, benefits, impacts and effectiveness of these measures should be explored before taking for granted that they are appropriate responses to climate change and extreme events.

Extreme hydrological events cause economic risks and pose challenges for the water sector. Changes in societal vulnerability need to be investigated and innovation should focus on the development of flexible model systems that can flexibly produce scenarios of the most important human-environment interrelationships.

Research has shown that there are, as yet, untapped, resource efficient opportunities for softer approaches using new sophisticated land-use planning approaches and techniques, and green infrastructures. European research supporting policies and innovations should focus on green and soft solutions that not only provide resilience against extreme events or gradual climate change but also numerous co-benefits in terms of amenities and wider ecosystem services.

Environmental monitoring using input from lay observers can become a part of adaptation to climate change. RDI related to adaptation to climate change should therefore explore these novel opportunities and, in particular, resource efficient combinations of “hard” and “soft” approaches, coupled with participatory processes that allow full use of community knowledge.

Successful adaptation requires detailed understanding of the vulnerabilities and different ways of increasing adaptive capacity and resilience, paying attention to the social and cultural issues and governance. In many cases pure technological solutions are unlikely to improve resilience to extreme events and climate change. European research should focus on integrated analyses of risk, adaptation, vulnerability and adaptive capacity.

All adaptation measures should be examined in a wider resource efficiency frame so as to identify sustainable solutions and to avoid maladaptation. The RDI that is required will be interdisciplinary in nature. It creates opportunities for Europe to develop solutions that may also assist adaptation to climate change and extreme events in other parts of the world. Demand for

intelligent combined solutions is also created by the Climate-ADAPT-web portal that can diffuse sophisticated cases as good practice. Horizon 2020 should provide opportunities to encourage this type of innovative work.

CONCLUDING COMMENTS

A selection of focal areas for research always includes a risk that some essential topic gets partially sidelined. Essential new topics may arise from the global concerns, in particular those reflected in the efforts to achieve sustainability following Rio+20 and those supporting the implementation and future updating of the Millennium Development Goals. The crossing of planetary sustainability thresholds may initiate changes that demand urgent research efforts. Therefore discussion and reflection on the issues and themes of the Horizon 2020 work programmes should continue even after the approval of its framework. The PEER institutes are happy to engage in further discussions on developing the European research agendas.

General information about PEER

The Partnership for European Environmental Research was founded in 2001. The eight PEER members together employ 6,300 persons; the combined annual budget is 580 million Euro. They have a long-standing experience in strategic environmental research for national governments, research councils and other central or regional public organisations, as well as for the European Commission and international bodies. Part of the research is carried out in public-private partnerships, or directly commissioned by private companies and NGOs. JRC/IES did not contribute to this document.

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