



Connecting Smart and Sustainable Growth through Smart Specialisation

A practical guide for ERDF managing authorities



November 2012

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Cataloguing data can be found at the end of this publication.

Luxembourg: Publications Office of the European Union, 2012

ISBN 978-92-79-27345-2
doi: 10.2776/70221

Printed in Luxembourg

PRINTED ON ELEMENTAL CHLORINE-FREE BLEACHED PAPER (ECF)

CONNECTING SMART AND SUSTAINABLE GROWTH THROUGH SMART SPECIALISATION

– A PRACTICAL GUIDE FOR ERDF MANAGING AUTHORITIES



November 2012

PREFACE

The Europe 2020 strategy is built on the three objectives of smart, sustainable and inclusive growth to be implemented as '*three mutually reinforcing priorities*'. In order to deliver on these goals and provide a response to the economic and financial crisis, it is of utmost importance that all involved actors connect these areas of action, involving all relevant stakeholders, developing synergies and boosting the added-value of public investments.

To promote a more resource efficient, greener and more competitive economy it is clear that the way ahead has to include significant innovation: sustainable growth needs to go hand in hand with smart growth in order for the EU and its citizens to reap the full benefits of a switch to the green economy.

Europe needs to reinforce synergies between smart and sustainable growth to deal with the climate change, environmental and energy challenges as well as growing resource scarcity. Continuing with our current consumption and production patterns is not an option. We need to change our economies currently based on overuse of natural resources into innovation-driven green economies.

The global demand for environmental technologies, eco-friendly products and services and sustainable design ideas is expected to gather speed in the coming years. The global market, currently estimated at €1.15 trillion a year, could almost double, with the average estimate for 2020 being around €2 trillion a year. EU Member States and regions can seize these opportunities by entering this expanding market. To do so, they need to invest more in the development of research and innovation and entrepreneurial capacity in areas such as sustainable energy, ecosystem services and eco-innovation.

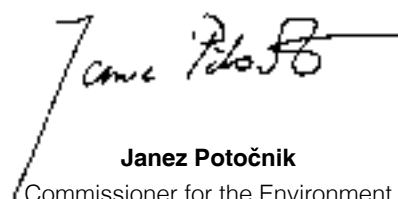
Success in bringing about this shift to a low-carbon and resource efficient economy based on innovation will be determined to a great extent by decisions made at local and regional levels. In the European Commission's proposals for the future of Cohesion Policy, innovation and the green economy take centre stage. Regional policy will be vital for mobilising the potential of EU regions and cities to decouple growth from resource overuse, in particular through a new generation of research and innovation strategies for smart specialisation (RIS3). Many of the measures needed to deliver change will be planned and implemented at regional level. That is why this guide sets out to help prepare and develop the next programming period (2014-2020).

This guide is one in a series of guides prepared in the framework of the Smart Specialisation Platform set up by the European Commission. It is not an academic publication but a practical document with concrete recommendations and examples of good practice that show potential ways forward and to facilitate discussion between public authorities and stakeholders.

We encourage all the authorities and stakeholders involved in the preparation of the next programming period, and implementation of the new programmes, to make full use of this guide. Bringing intelligent action on the environment, climate change and energy as well as into research and innovation strategies for smart specialisation is the best way to develop the green economy – to the benefit of EU's regions and citizens.



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ACKNOWLEDGMENTS

The authors of this guide would also like to thank for their contributions representatives of DG Research and Innovation, DG Energy, DG Climate Action and especially DG Environment.

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ICONS

AREA



Eco-Innovations



Ecosystems



Sustainable Energy

COST



Low > up to million EUR of public investment



Medium > 1-5 million



High > more than 5 million

PROJECT



Small



Medium



Big

KEY POINTS AND RECOMMENDATIONS

To achieve socio-economic development and create jobs, it is essential to connect sustainable and smart growth, in particular, through the research and innovation strategies for smart specialisation (RIS3). It is also important to find practical solutions to de-coupling economic growth from environmental degradation. Innovation is at the core of the efforts to shift Europe's economy and society towards a resource efficient and low-carbon future. The promotion of innovation for sustainable growth requires an holistic approach and a long-term perspective across the policy cycle.

National and regional policy-makers are encouraged to lead the development of an ambitious long-term vision of smart and sustainable growth under the research and innovation strategies for smart specialisation.

The focus on transformative innovation requires the engagement of key stakeholders in all phases from policy design to monitoring and evaluation.

Regional and local perspectives have become more important than ever in fostering sustainable growth. Firstly, regions hold the knowledge about the local innovation systems and have the capacity to mobilise economic actors towards a shared goal. Secondly, they are well positioned to develop a thorough understanding of local natural assets and environmental challenges. There is no 'one-size-fits-all' recipe for the development and implementation of strategies that connect sustainable and smart growth: each region needs to seize its own opportunity within the support for

investments that are provided by the EU's regional policy.

Managing Authorities are encouraged to place sustainable growth at the core of their RIS3. They should assess the regional innovation potential and consider investing in the areas of eco-innovation, ecosystem services and sustainable energy, taking into account their specific strengths and weaknesses.

Many of the sustainability challenges are beyond the scope of local, regional or national action. For example, climate change or reconfiguration of resource value chains cannot be tackled within confined boundaries and require collaboration between many stakeholders acting at different levels.

In promoting sustainable growth objectives under the RIS3, regions and Member States should:

- Actively seek synergies with existing national and European initiatives; and
- Actively exploit the opportunities for cross-regional and international cooperation.

Eco-innovation can be introduced across economic sectors and has significant potential to drive strategic, cross-sectoral collaboration. Eco-innovation comes in many forms including novel or improved products, technologies, services, management, organisational structures, institutional arrangements and lifestyle or behavioural changes. The pervasive character of eco-innovation exposes it to many different barriers and challenging policy targets.

Rather than focusing on individual one-off support measures, regions and Member States should develop a comprehensive policy mix to support both the demand and supply of eco-innovation.

Ecosystems are fundamental to all economies and societies and to human well-being. Ecosystems provide habitats and natural resources and play a key role in climate change mitigation and adaptation. The innovative use of natural assets is a basis for new sustainable economic activities that contribute to smart specialisation and the development of a bio-economy. This approach requires innovative ideas and solutions, which are often based on research and development.

In integrating ecosystem services into RIS3, it is important to take account of sustainable solutions, innovative methods and entrepreneurial ideas that rely on renewable, rather than exhaustible, resources that are available in local ecosystems.

Regions and Member States should make the best use of bio-economy principles in promoting local sustainable growth.

Research and innovation in sustainable energy is the key to achieving the EU climate and energy target for 2020 known as the '20-20-20' target, and also the target for 2050 of a 85% - 90% reduction in carbon emissions. The ability to tap into sustainable energy technology developments varies across the EU because of the differences in natural endowments and economic conditions, as well as in the technological capacities of each EU

Member State and region. Many Member States and regions have considerable opportunities to benefit from the integration of sustainable energy into their RIS3, entailing also a range of opportunities for economic development through expansion of business and research activities in sustainable energy and thus the creation of new jobs. During the next funding period, according to the Commission's proposal, all regions will have to invest a significant amount of ERDF funding in sustainable energy. However, not all regions might have the potential to specifically invest ERDF funding in research and innovation for sustainable energy through the RIS3 process. Nevertheless, each Member State and region should aim to capitalise on the funding opportunities in a smart way and invest in advancing its local research, development, innovation and technological capabilities. The Strategic Energy Technology (SET) Plan, as the technology pillar of the EU energy policy, provides the framework for Member States to accelerate the development and roll-out to the market of cost-competitive and sustainable energy technologies.

It is recommended that the Member States and regions introduce an efficient policy mix of supply and demand measures to stimulate research and innovation in sustainable energy, and also ensure favourable framework conditions and efficient governance in this area.

Innovative activities can range from state-of-the-art R&D to innovative ideas in construction, mobility, design, energy management and business models.

THE PURPOSE AND POTENTIAL USERS OF THIS GUIDE

This practical guide demonstrates that sustainable and smart growth can go hand-in-hand in all European regions and Member States. It is becoming increasingly clear that sustainable economic growth can only be ensured if regions and Member States are prepared to follow the principles of environmental sustainability.

This guide aims to provide answers to the following questions:

- Why do smart growth and sustainable growth complement each other?
- What can be done in the regions to connect smart and sustainable growth?
- How to use the EU's Regional Policy to boost innovation for sustainable growth?

The purpose of the document is to assist the Managing Authorities (MAs) of the European Regional Development Fund (ERDF) in **integrating sustainable growth objectives into their research and innovation strategies for smart specialisation, or RIS3 for short.**

The guide focuses on three thematic areas that are particularly relevant to sustainable growth:

- Eco-innovation;
- Ecosystems services; and
- Sustainable energy.

The guide should also be useful to national, regional and municipal public authorities that are responsible for the implementation of policies in the areas of sustainable energy, eco-innovation, nature protection, agriculture, forestry, industry and enterprise, economic development and employment and social affairs.

Other potential users include local and regional actors who can play important roles in national and regional development and smart specialisation strategies. These are representatives from industry and businesses, finance sectors, research organisations and universities, innovation support agencies and civil society groups.

FIGURE 1 - THE POTENTIAL USERS OF THIS GUIDE ➤

The GUIDE will help...

MANAGING AUTHORITIES OF ERDF OPs TO:

- Assist in integrating sustainable growth into RIS3;
- Help maximise the use of ERDF funds;
- Identify new innovative practices and lessons learned;
- Learn about other useful resources that can be helpful in promoting RIS3 and sustainable growth in regions.

DECISION-MAKERS TO:

- Learn how to produce synergies between smart and sustainable growth goals;
- Learn about successful experiences in other EU regions;
- Find possible synergies between regional initiatives and other initiatives;
- Understand the range of policy instruments that are available to promote sustainable and smart growth

REPRESENTATIVES OF BUSINESS TO:

- Discover the opportunities offered by cohesion policy funding to support green business;
- Make a constructive contribution to the realisation of RIS3;
- Maximise the social and environmental impacts of green business.

FINANCING ORGANISATIONS TO:

- Identify co-funding opportunities for sustainable projects, green business and infrastructure;
- Maximise the social and environmental impacts of sustainable investment

CIVIL SOCIETY ORGANISATIONS TO:

- Identify their roles in promoting social, economic and environmental wellbeing in the region;
- Find synergies and potential partnerships with public and business actors;
- Make a constructive contribution to the conception and implementation of RIS3

RESEARCH ORGANISATIONS AND UNIVERSITIES TO:

- Understand the opportunities offered by the RIS3 and the ERDF;
- Identify their roles in regional projects and programmes;
- Link research with practice;
- Increase the real-life impact of research by translating research results into practice.

1

CONNECTING SUSTAINABLE AND
SMART GROWTHWHY SUSTAINABLE
GROWTH AND SMART
GROWTH COMPLEMENT
EACH OTHER

1 <http://ec.europa.eu/>

2 Ecorys (2012) The number of Jobs dependent on the Environment and Resource Efficiency improvements
<http://ec.europa.eu/environment/>

3 COM (2012) 173 Towards a job-rich recovery, EC communication
<http://ec.europa.eu/social/>

4 EC SWD (2012) 92 – Exploiting the employment potential of green growth
<http://ec.europa.eu/social/>

Many countries have increasingly been facing the challenges of climate change, a deteriorating environment and reduced availability of natural resources. The current financial crisis has increased the need for a reconsideration of the traditional economic models that entail ever-increasing, unsustainable consumption. This is particularly relevant to the European economy, which is experiencing multiple challenges to sustaining prosperity and economic growth. In their attempts to revive industry, job markets and competitiveness, European governments are seeking more innovative and sustainable ways of promoting economic activities, whilst tackling environmental challenges. Thus, there is a growing awareness that planet earth is both the pillar of life and the pillar of the economy.

National and international policy-makers have been adopting strategies for sustainable development, green growth, green economy, bio-economy and sustainable production and consumption (Please see Figure 2). The common challenge for sustainable growth is to achieve a de-coupling of economic growth from environmental degradation.

The EU has set out its vision for the economy in the Europe 2020 strategy¹. This strategy confronts structural weaknesses by proposing progress on three mutually reinforcing priorities: smart growth, sustainable growth and inclusive growth. It stresses the need for a transition towards a low-carbon, resource-efficient economy, as the new paradigm for sustainable growth. Innovation is seen as the key to succeeding in the de-coupling of growth from environmental degradation and resource consumption. It is also a key to pushing smart growth and therefore, to enabling sustainable growth and smart growth to progress hand-in-hand.

Several studies have demonstrated that investing in resource efficiency measures and the environment has generated jobs and sustained economic growth². For example, job growth in the sectors of the green economy in the EU has been positive throughout the recession and is forecast to remain quite strong³. Based on different models, by 2020, the implementation of individual energy efficiency measures could lead to two million green jobs being created or retained, whilst the job potential of the development of the renewable energy sector is estimated at three million jobs⁴.

FIGURE 2 - SOME CONCEPTS DEFINED THAT RELATE TO SUSTAINABLE GROWTH ▼

Sustainable Development is “development that meets the needs of the present without compromising the ability of future generations to meet their own needs.” Sustainable development is a grand paradigm based on three pillars: economic development, social development and environmental conservation. Meeting the needs of the future depends on how well we balance social, economic and environmental objectives when making decisions today⁵.

Green Growth is a concept that has been developed to complement the concept of Sustainable Development. Green Growth aims to shift the pattern of economic growth towards an environmentally-friendly one. The concept was pioneered by Korea, which embraced a vision of a Low Carbon, Green Growth Model for future economic growth. Currently, the concept has been adopted by many other countries and is being promoted by the OECD⁶ and the World Bank⁷. The latter promotes the extended concept of ‘Green and Inclusive Growth’ that addresses the opportunities, which are available to developing countries to take part in the greening of their economies.

The Green Economy is the concept developed by UNEP - the Green Economy Initiative⁸. The Green Economy is defined as an economy that results in improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities. In its simplest expression, a Green Economy can be thought of as one that is low carbon, resource efficient and socially inclusive. Its growth in income and employment is driven by public and private investments, which reduce carbon emissions and pollution, enhance energy and resource efficiency and prevent the loss of bio-diversity and ecosystem services.

The Sustainable Growth concept is applied in the EU context. Sustainable Growth is one of three priority areas in the Europe 2020 strategy. It has a clearly defined focus on the promotion of the competitiveness of the EU economy, including capitalisation on its leadership in green technologies, promoting smart grids, improving the business environment, especially for SMEs, and influencing consumer choice. Sustainable Growth is also about attaining environmental objectives such as decreasing the carbon intensity of the economy, promoting the efficient and sustainable use of resources, protecting the environment, reducing emissions and preventing loss of bio-diversity.

Smart Growth, which is another priority of the Europe 2020 strategy, means improving the EU’s performance in education, research/innovation and the digital society. This is to be done by: encouraging people to learn, study and update their skills; improving academic excellence and the performance of universities; creating new products/services that generate growth and jobs and help to address social challenges; and diffusing information and communication technologies.

Inclusive Growth, which is the third pillar of Europe 2020, contributes to growth in Europe’s employment rate. This entails more and better jobs, especially for women, young people and older workers, and helping people of all ages anticipate and manage change through investment in skills and training. It also involves modernising labour markets and welfare systems and ensuring that the benefits of growth reach all parts of the EU.

The Bio-economy concept in the EU focuses on maintaining and creating economic growth and jobs in rural, coastal and industrial areas, reducing fossil fuel dependence and improving the economic and environmental sustainability of primary production and processing industries. The Europe 2020 Strategy calls for a bio-economy to become a key element in achieving smart and green growth in Europe. The EU Bio-economy Strategy and its Action Plan⁹ aim to pave the way to a more innovative, resource efficient and competitive society that reconciles food security with the sustainable use of renewable resources for industrial purposes, whilst ensuring environmental protection.

⁵ The Brundtland Commission report of 1987 ‘Our Common Future’

⁶ www.oecd.org/greengrowth

⁷ <http://go.worldbank.org/>

⁸ www.unep.org/greeneconomy

⁹ <http://ec.europa.eu/research/>

INNOVATION WITHIN SUSTAINABLE AND SMART GROWTH

As indicated above, innovation is the factor that makes it possible to bind environmental and economic goals together and link them to sustainable growth and smart growth.

Innovation encompasses not only new or improved products and processes, but also new services, marketing, branding and design methods and new forms of business organisation and collaborative arrangements.

Innovation is increasingly understood as evolving in an open system, in which different actors collaborate and interact. Public support for innovation needs to adapt to this systemic perspective and combine efforts to support research and technology with those to develop collaboration between stakeholders.

Figure 3 presents a framework that can help governments and other actors to develop a vision of how different types of innovation can contribute to economic growth that is smart, sustainable and long-term¹¹. It can also help to establish approaches and related policy priorities for moving towards sustainable economic growth. The framework is based on the premise that innovation for sustainable growth should create economic, social and environmental value.

The framework suggests that governments can use the following four approaches in moving towards sustainable growth: *reactive, incremental, radical and transformative*. Some governments use more than one approach but the tendency of both governments and businesses is to follow either a reactive or incremental approach to green transition.

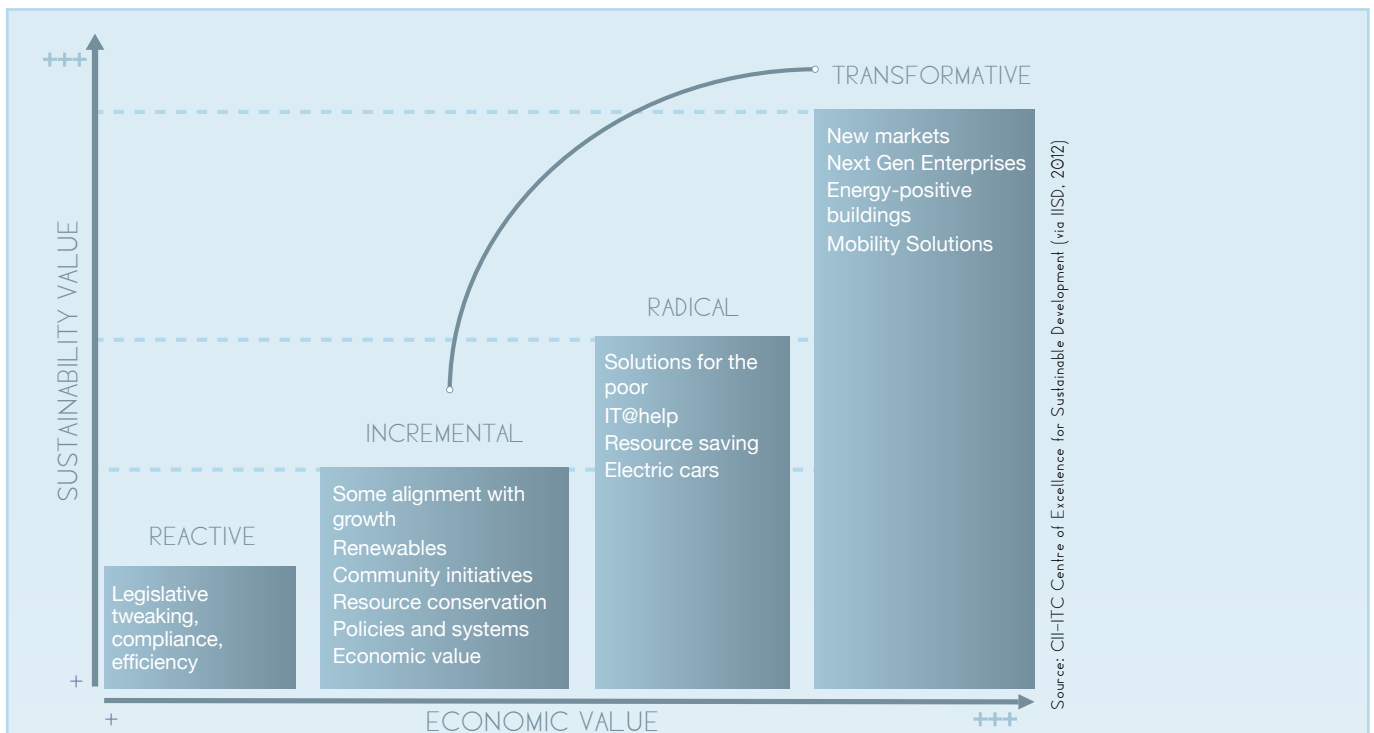
On the other hand, the global demand for eco-innovative and environmental technologies, eco-friendly products and services and green and sustainable design ideas is expected to accelerate at a higher rate in the coming years. There is a consensus that the global market, currently estimated at €1.15 trillion a year, could almost double with the average estimate for 2020 being around €2 trillion a year¹⁰. Many EU Member States and regions can benefit through entering this expanding market. Thus, it is important that they urgently pursue the development of innovative and entrepreneurial capacities in areas such as eco-innovation, ecosystem service development, sustainable energy and low or zero-carbon mobility and also of bio-economy sectors, such as sustainable agriculture and tourism.

Sustainable and smart growth are increasingly being seen as two sides of the same coin. RIS3 can also play an important role in developing multi-level governance for integrated innovation policies, where sustainable growth takes predominance. In addition, they should link together several policy domains and promote an understanding of one region's strengths in relation to those of other regions and of the possible gains to that region, which might be acquired through inter-regional or trans-national cooperation.

¹⁰ Ecorys (2012) The number of Jobs dependent on the Environment and Resource Efficiency improvements <http://ec.europa.eu/environment/>

¹¹ The framework has been developed by the experts of the Indian think-tank CII-ITC Centre of Excellence for Sustainable Development www.sustainabledevelopment.in

FIGURE 3 - FRAMEWORK OF INNOVATION FOR SUSTAINABLE GROWTH



The **REACTIVE approach** which is the easiest and most common approach, normally involves minor changes in legislation and improvements in compliance, together with a limited emphasis on resource-use optimisation. This approach is important in ensuring that environmental performance and efficiency are constantly improving, but little economic value is generated, and limited innovation occurs. For example, tightening water quality requirements can lead to investment in waste water treatment facilities and while this enables 'cleaning up,' it does not address the more fundamental problem of growing wastewater streams. If governments or businesses are introducing such an approach for the first time, then it can demand significant investments, create new markets and additional jobs. However, in many other situations this is often a business-as-usual approach that fails to create new jobs or extra value.

The **INCREMENTAL approach** includes pollution prevention, improvements in the infrastructure of public transport and product stewardship. This approach addresses issues of cost, risk and carbon footprint reduction and, importantly, creates a better understanding of what sustainability actually means. For example, organic agriculture or material efficiency improvements in companies help to reduce impacts, waste and emissions, while simultaneously reducing cost risk and stakeholder resistance. Most governments and businesses use this approach, as incremental changes are the most cost-effective improvements. Improvements become commercialised quickly and value is generated in the short-term.

Reducing waste and emissions is crucial, yet the effects of high economic growth can far outweigh any substantial environmental benefits from these reductions. Incremental solutions are important but they will never overcome the major challenges, such as ensuring a good quality of life for an ever-increasing global population in a resource scarce planet. Incremental solutions only prepare the world for carbon and water efficiency. Moving beyond incremental improvements towards transformative solutions is the only way of creating the value necessary for sustainable growth. ➤

The RADICAL approach

can produce a growth trajectory that will propel economies towards sustainable value and can also make a significant positive difference in society. This approach focuses policies and efforts on shifting traditional ways of thinking about social and environmental issues and on changing institutions and frameworks. Radical innovations are based on technological change and alter or replace traditional solutions. They create better alternatives within existing industries but do not necessarily change these industries fundamentally. For instance, the electric car may be a good alternative to fossil fuel-powered automobiles, but it does not resolve the problems of traffic congestion or the need to provide more parking spaces and larger road networks.

The TRANSFORMATIONAL approach

can help to make a complete shift in the paradigm on which current patterns of production, consumption, working and living are based. It enables people to see beyond the existing horizons of best practices and the most advanced technological innovations. This approach is about the future and how to shape it. In transport, the transformative solution is to think mobility instead of transport. For example, this might lead to the introduction of new mobility schemes such as cycling and car/bike sharing, rather than simply expanding the use of cleaner vehicles. It is this type of change in the thought process that creates those solutions that are transformative.

Transformative innovation will take place far beyond the boundaries of one company or organisation and will require the transformation, replacement or establishment of complementary infrastructures. The next four decades will witness more governments and businesses embracing this approach. It will involve a focus on the combination of bio-mimicry¹² and natural material regeneration, and will create new markets with next-generation solutions and new sectors and job opportunities.

REGIONS ARE IMPORTANT TO SUSTAINABLE GROWTH

Regional economies are keys to innovation and growth. There is a wealth of evidence and practical examples, which confirms that regions and cities play an important role in developing innovation by being the home of industrial clusters, competence centres, incubators, technology parks and many other types of formal and informal innovation spaces. Successful regions and cities become European or global nodes of innovation, technology networks and value chains.

Regions and localities also play a significant role in pursuing sustainable development mainly due to their proximity to many environmental problems, as well as to local know-how on how to prevent and adapt to environmental challenges.

This significant role of the local level was confirmed as long ago as 1992 with the introduction of local action into the UN's Agenda 21¹³.

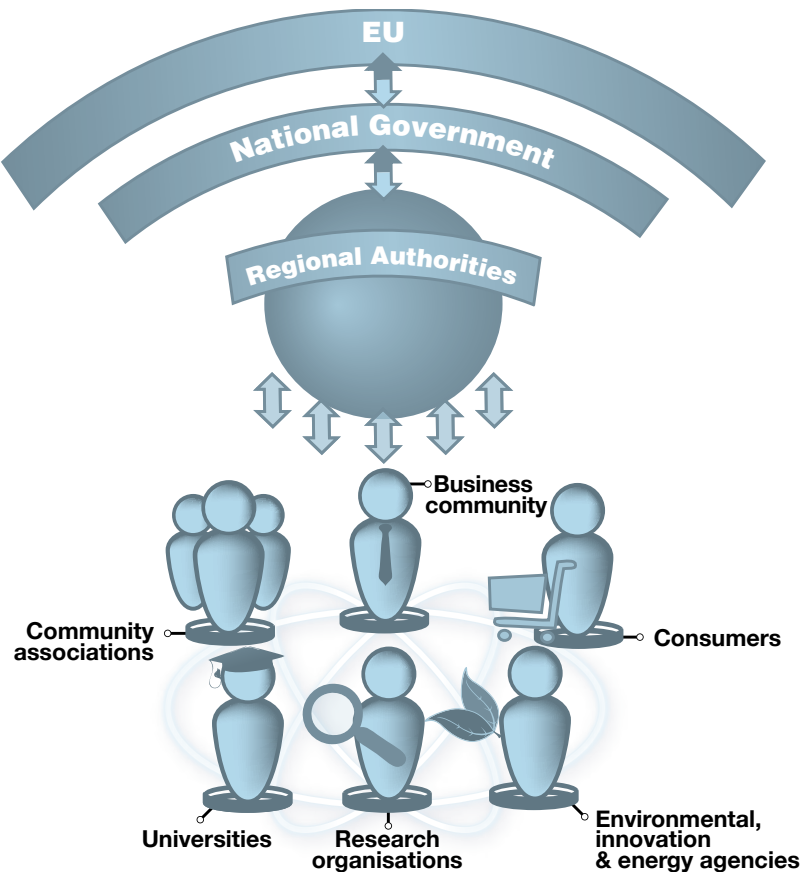
The need to **connect innovation and sustainability** agendas was confirmed in the mid-1990s when the concept of eco-innovation was first coined¹⁴. Eco-innovation then, however, took about a decade to be considered seriously by regional and national policy-makers. Only in recent years, have more European regions recognised the need to tap innovation potential to address social and environmental challenges. Many innovation policy-makers started following a challenge-driven approach to innovation policy by channelling public support to

¹² Bio-mimicry is an innovation method that seeks sustainable solutions by studying nature's best ideas and then imitating these designs and processes to solve human problems, e.g., a solar cell inspired by a leaf. More information and examples are on <http://biomimicryinstitute.org>

¹³ UN (1992)

¹⁴ Fussler and James (1996)

FIGURE 4 - CONNECTING REGIONAL ACTORS FOR THE PROMOTION OF SUSTAINABLE GROWTH ▼



respond to challenges of environmental sustainability and notably climate change, resource efficiency and biodiversity¹⁵. In some cases, **regions pioneered climate change and eco-innovation policies**, before national-level policies were formulated, which was the case in the Vastra Gotaland region of Sweden¹⁶.

What makes regions well positioned to tackle both innovation and sustainability?

- On the one hand, **regions have an insight into their own innovation systems, as well as the capacities to mobilise regional innovation stakeholders** through specific policy instruments;
- On the other hand, **regional stakeholders have a good understanding of regional environmental performances, as well as the capacities and competences to take local action to promote environmental sustainability.**

Regions have both the expertise and the capacity to effectively address both innovation and sustainability challenges. In many instances, connecting these expertises, creating collective capacities to act and coming up with innovative solutions is place-specific. Eco-innovation, like any other innovation, should be understood as “occurring because of what are often geographically proximate concentrations and interactions amongst small, fast-moving systems of innovators and their networks”¹⁷. In short, geography matters. It can also be argued that **geography matters more for eco-innovation** than for any other innovation. As indicated above, eco-innovation and sustainable growth require both a good understanding of regional innovation systems and a good knowledge of the environmental and sustainability challenges.

¹⁵ OECD (2005, 2011)

¹⁶ Cooke (2011) Transition regions: Regional-national eco-innovation systems and strategies, *Progress in Planning*, 76 (2011) 105-146

¹⁷ Cooke (2011) Transition regions: Regional-national eco-innovation systems and strategies, *Progress in Planning*, 76 (2011) 105-146

¹⁸ Regional Programme of Innovative Actions is an initiative of the 2000–2006 cohesion policy, which was based on three strategic themes: (1) Regional economies based on knowledge and technological innovation, (2) e-Europe/Regio: the information society at the service of regional development, (3) Regional identity and sustainable development. Link: http://europa.eu/legislation_summaries/

¹⁹ Agenda 21 is a plan of action to be taken globally, nationally and locally by organizations of the United Nations System, Governments, and Major Groups in every area in which human impacts on the environment. Link: <http://www.un.org/esa/dsd/agenda21/>

For example, fossil-based energy production relies on highly centralised production processes, whilst renewable energy needs to be de-centralised and adapted to local conditions. The latter requires local knowledge of industrial and social structures, as well as a technical expertise in energy and in the environmental profile of the region concerned. Each region requires its own, unique strategic reflection and policy-mix to address similar issues. This mix requires integrated policies that can target both innovation potential and the wider social and sustainability conditions, which determine a region's comparative advantages.

All EU regions and cities have **a large degree of oversight over important policy instruments, notably public procurement, urban and land planning and local economic development, as well as environmental protection and energy policies and programmes.** These instruments can be employed to pursue both growth and sustainability, and regional authorities can use such measures as:

- Applying green public procurement, including pre-commercial procurement;
- Promoting research and innovation in regional businesses and clusters;
- Supporting the creation of eco-innovative SMEs;
- Greening local and regional industry, such as construction, tourism and agro-food sectors, by promoting labels and standards;
- Supporting private demand by raising consumer awareness about sustainable lifestyles.

Being closer to the market and to the local business communities, regional authorities can better monitor the take up of green innovations, the adjustment

of enterprises to new business opportunities and changes in people's attitudes, behaviours and preferences. Such knowledge enables the identification of specific challenges in the greening of the economy and the adjustment or fine-tuning of the measures, accordingly.

While reflecting on sustainable growth, regions and localities can draw on their experiences in implementing policies to supporting innovation such as Regional Innovation Strategies and Regional Programmes of Innovative Actions¹⁸ in sustainable development through Agenda 21¹⁹ and in growth-oriented economic policies. The focus on sustainable growth requires innovation policies to be given a direction and a framework that recognises the challenges of climate change, nature preservation, resource efficiency and accessing raw materials.

Sustainable growth pathways also depend on many regional characteristics, including economic structure, social issues, technological advancement and governance, as well as the environmental profile of the region. Regions depend to different extents on policies and regulatory frameworks that are developed at national and European levels, as many sustainability problems have to be addressed by policies initiated and coordinated at these levels or even at a global level. This implies that regional actions have to be embedded in the broader policy frameworks and understandings of wider, often global, trends. Although pursuing sustainable growth is a strategic challenge for all regions, the approaches and instruments used to tackling this challenge will differ between regions. **There is no 'one-size-fits-all' recipe for the development and implementation of approaches to connect sustainable and smart growth.**

FIGURE 5 - SUSTAINABLE GROWTH IN URBAN AND RURAL REGIONS ▼

Very urbanised regions will need to consider different approach than predominantly rural regions. In urban and knowledge driven regions, the sustainable growth potential may be more apparent as a result of a higher density of enterprises, innovators and customers for green products and services. As cities account for 70%-80% of all greenhouse gas emissions globally²⁰, more sustainable solutions in mobility, energy and waste systems should be considered in the overall environmental impact²¹. Many cities are already experimenting with new approaches and early adopters of greening strategies are already witnessing their positive impacts.

For example, in Stockholm all trains and inner city buses now run on renewable fuel and coupled with the adapted district heating and cooling systems, this has reduced CO₂ emissions by 25% since 1990²². In Freiburg, as a result of the introduction of sustainable water management practices, water consumption decreased by 13% over the period 1997-2007²³.

In rural areas with lower population densities and less industrial activities, the strategic options need to take different approaches into account. The Bio-economy Strategy for Europe 2020²⁴ lists a number of propositions on how innovation could complement or transform the activities of traditional sectors, such as forestry, agriculture and fisheries, into sustainable, added-value production. These could be of major importance to regions seeking new strategic development paths. The sustainable growth framework promotes a new assessment of the undervalued, overlooked or unrecognised assets of rural regions. These assets include solar and marine energy and all direct and indirect contributions from ecosystems to human well-being, which are also referred to as ecosystem services. This potential, if smartly unleashed, can have a substantial impact on aggregated growth.

For example, one of the priorities of the 'Smart Specialisation Strategy of Scotland' is to use the richness of natural resources, such as wave power, for renewable energy. This industry already supports more than 11,000 jobs across Scotland. Plans to install up to 10 Gigawatts of offshore wind generating capacity in Scottish waters are predicted to generate around £30 billion or €37.6 billion of investment by 2020, while the sector has the potential to create up to 28,000 jobs and support a further 20,000 indirectly over the same period²⁵.

²⁰ UN-Habitat, the International Energy Agency, UNEP

²¹ As Marcelo Ebrard, the Chair of the World Mayors Council on Climate Change, pointed out 'it's in the cities that the battle to slow global warming will be won'.

²² European Green Capital Award: <http://ec.europa.eu/environment/>

²³ Berrini, M. and Bono, L. Measuring Urban Sustainability: Analysis of the European Green Capital Award 2010 & 2011 application round (2010)

²⁴ EC, Innovating for Sustainable Growth: A Bio-economy for Europe. COM(2012) 60 final

²⁵ 'Scottish Renewables Delivering the Ambition: Employment in Renewable Energy in Scotland' <http://www.scottishrenewables.com/>, see also case study 13 in this guide.

2

THE EU REGIONAL POLICY SUPPORTING SMART AND SUSTAINABLE GROWTH

REGIONAL POLICY IN THE CONTEXT OF THE EUROPE 2020 STRATEGY

²⁶ See: http://ec.europa.eu/regional_policy/

²⁷ Europe 2020: A Strategy for Smart, Sustainable and Inclusive Growth. COM(2010) 2020

²⁸ http://ec.europa.eu/regional_policy/sources/

²⁹ COM (2011) 615 final4, Proposal for a regulation of the European Parliament and of the Council on specific provisions concerning the ERDF and the Investment for growth and jobs goal and repealing Regulation (EC) N° 1080/2006 of 6th October 2011

The general objective of the EU's regional policy is to reduce disparities between Europe's regions and to strengthen economic, social and territorial cohesion. The legislative package put forward by the Commission in October 2011²⁶ indicates that the two central goals for cohesion policy in the new programming period 2014-2020 will be investment for growth and jobs and European territorial co-operation.

Regional Policy is, therefore, one of the key delivery mechanisms of the Europe 2020 strategy in the regions²⁷.

In the EU's regional development agenda, an essential feature of promoting sustainable, smart and inclusive growth is the development of smart specialisation strategies. This is specifically articulated in the Communication 'Regional Policy contributing to smart growth in Europe 2020'²⁸. In this document, the Commission encourages the design of national and regional **research and innovation strategies for smart specialisation or RIS3** as:

- A means of delivering more targeted Cohesion and Structural Fund support; and
- A strategic and integrated approach to harnessing the potential for smart growth and the knowledge economy in all regions.

An RIS3 strategy will be an ex-ante condition for the use of the Cohesion Policy²⁹ in 2014-2020. These strategies are an integral element of new industrial policies that aim to promote productivity-enhancing measures and leverage private resources. They are based on the comparative advantages of regions and can ensure a more effective use of public funds. They can help regions to concentrate their resources on a few key priorities rather than spreading investments thinly across areas and business sectors.

The next programming period of 2014-2020 will concentrate public investment on a limited number of growth-enhancing investment priorities. In light



HOW TO INCORPORATE SUSTAINABLE GROWTH INTO RIS3?

of the challenges posed by environmental degradation, climate change and resource scarcity, the EU Member States and regions need to integrate the sustainability objectives into their RIS3. They also need to use the innovation-oriented Thematic Objectives of the future regional policy to build a low carbon economy and promote sustainable and smart growth.

Regional Policy is becoming one of the main EU policies to foster innovation that responds to the challenges of sustainable energy, climate change and the use of natural resources. It can play a pivotal role in strengthening both the sustainability and competitiveness of European regions.

Therefore, **Managing Authorities are encouraged to place sustainable growth at the core of their RIS3**, as a cross-cutting approach that can tap the potential of eco-innovation, ecosystem services and sustainable energy.

The incorporation of sustainable growth goals should take place at every stage of the RIS3 process³⁰. Figure 6 highlights the main issues that need to be considered at each step in the design of the RIS3. Readers are encouraged to refer to the RIS3 Guide for detailed instructions. This guide is a complement to the RIS3 Guide and focuses on adopting the RIS3 design to eco-innovation, ecosystem services and sustainable energy areas.

This guide will support the process of preparing an RIS3 focusing especially on action planning and implementation (Step 5) most notably by showcasing examples of initiatives successfully undertaken in a number of different regions. In addition, the document addresses the questions of analysing the regional context and its potential for eco-innovation, eco-system services and sustainable energy areas (Step 1) and stakeholder involvement (Step 2). Chapters 3, 4 and 5 provide practical insights on how to act in the specific areas of eco-innovation, ecosystem services and sustainable energy.

³⁰ Check RIS3 Guide for elaboration of each RIS3 Design stages
<http://s3platform.jrc.ec.europa.eu/s3pguide>

FIGURE 6 - INCORPORATING SUSTAINABLE GROWTH GOALS IN RIS3 ACTIONS ▼

RIS3 STEP	QUESTIONS TO BE ADDRESSED
Step 1 Analysis of the regional context and potential for innovation	<ul style="list-style-type: none"> ■ What are the main challenges - barriers to, and drivers of, sustainable growth in your region? ■ What are the existing regional assets and emerging potential for activities that will encourage sustainable growth? ■ What is the existing expertise and knowledge in the region, including research and innovation capacities such as those within universities, which relate to eco-innovation, sustainable energy, etc? ■ What are the competitive advantages and capacities of local industries and SMEs in the fields of eco-innovation, sustainable energy, etc? ■ How dynamic is the local entrepreneurial environment in the areas with the highest potential for sustainable growth?
Step 2 Governance: Ensuring participation and ownership	<ul style="list-style-type: none"> ■ What agencies, organisations, companies and other stakeholders could be involved in designing and promoting specific actions that will contribute to connecting smart and sustainable growth in the region? ■ How can stakeholders best be mobilised to create regional alliances to promote innovations for sustainable growth? ■ How can collaborative action and effective implementation best be organised?
Step 3 Elaboration of an overall vision for the future of the region	<ul style="list-style-type: none"> ■ How can the objective of sustainable growth be integrated into the long-term vision taking into account regional assets, challenges and emerging opportunities? ■ How are smart and sustainable growth connected within this overall vision for the future? ■ How can the vision reflect the global trends?
Step 4 Identification of priorities	<ul style="list-style-type: none"> ■ What is the overall priority for sustainable growth in the strategy? ■ What are the key focus areas to promote innovations for sustainable growth in the region/member state? ■ What are the key technological, sectorial, and horizontal priorities for investment?
Step 5 Definition of coherent policy mix, roadmaps and action plan	<ul style="list-style-type: none"> ■ What strategies, roadmaps, policies and actions need to be undertaken to promote specific niche areas and the priorities for linking smart and sustainable growth? ■ How can the horizontal, vertical and temporal coherence of the policy mix be ensured? ■ How can demand and supply side measures be balanced?
Step 6 Integration of monitoring and evaluation mechanisms	<ul style="list-style-type: none"> ■ How to assess the impact and evaluate and monitor actions and projects that address sustainable and smart growth? ■ How can progress toward sustainable and smart growth be measured?



THE MAIN MESSAGES FROM THIS CHAPTER

- Eco-innovations are central to the promotion of sustainable and smart growth in regions because of their wide-ranging benefits for the economy and the environment;
- Eco-innovation is not limited to specific industries and sectors. It can be introduced into any field via novel or improved products, technologies, services, management and organisational structures, institutional arrangements and lifestyles and social behaviour;
- Eco-innovations should not be seen simply as a remedy for environmental problems, but also as a boost for the economy and strengthening regions' competitiveness in the international market;
- National and regional authorities are well positioned to facilitate transformative changes by supporting various eco-innovations and involving different actors in development and implementation eco-innovative strategies, especially under the framework of regional policy and RIS3.

THE POTENTIAL ACTIONS THAT SHOULD BE PURSUED

- Developing a long-term ambitious vision of a sustainable and smart region and facilitating transformative and system eco-innovations that bring the region closer to realising this vision. This will necessitate involving many local stakeholders in the process;
- Introducing novel policy instruments for eco-innovation support that will create demand for eco-innovative products and services such as green public procurement and directly supporting eco-innovation in SMEs, including providing subsidies and advisory and technical support;
- Supporting not only environmental technologies and 'green products' but also providing strategic support and creating conditions for system eco-innovations.

THE KEY ACTORS TO BE INVOLVED IN ECO-INNOVATION INITIATIVES

- Regional and Local Authorities;
- Business and Industries;
- Research Organisations, Cluster Organisations and Universities;
- NGOs/Citizens/Living Labs/User Groups;
- Regional or Local Innovation or Development Agencies.

THE MOST IMPORTANT ISSUES TO BE AWARE OF

- There is no single policy measure that can support eco-innovation efficiently: there is a need for a comprehensive policy mix if eco-innovations are to flourish and be disseminated;
- The long-standing commitment of the national and regional government to pursuing sustainable growth is an important support factor;
- The specific economic, regulatory, technological and innovation profiles of regions and sectors mean that they respond differently to the various incentives and barriers to eco-innovation;
- Systemic innovations have wider and more long-term positive impacts, but they are the most challenging to design and implement.



ECO-INNOVATION AS AN ENGINE OF SUSTAINABLE AND SMART GROWTH

Eco-innovation is a pervasive concept that is not limited to specific industries or sectors of the economy. Eco-innovations can be introduced in manufacturing, services, organisations, management styles, urban and rural planning and design, agriculture and many other areas. This all pervasive nature of eco-innovation can be instrumental in building healthy, competitive and sustainable national and regional economies.

The European Union is increasingly regarding eco-innovation as being one of the most important drivers of its economy and its international competitiveness. In late 2011, it adopted the Eco-Innovation Action Plan that, by improving the market's uptake of eco-innovation, was designed to increase environmental performance, create growth and jobs and ensure a more efficient use of the scarce resources in the EU³¹.

There are several benefits to the local environment and socio-economy from promoting eco-innovation:

- From an environmental perspective, one of the main results of eco-innovations can be the **reduced use of natural resources** and the **decreased ecological footprint** by restricting the release of harmful substances across the life cycle of a product or service. For example, the manufacturing of biodegradable materials emits around 80% less CO₂ than traditional products based on petrochemicals;

FIGURE 7 - ECO-INNOVATION DEFINED ▼

Eco-innovation is any innovation that reduces the use of natural resources and decreases the release of harmful substances across the whole lifecycle³². Eco-innovation can be found in all forms of new, or significantly improved, products, goods, services, processes, marketing methods, organisational structures, institutional arrangements and lifestyle and social behaviours, which lead to environmental improvements compared to relevant alternatives.

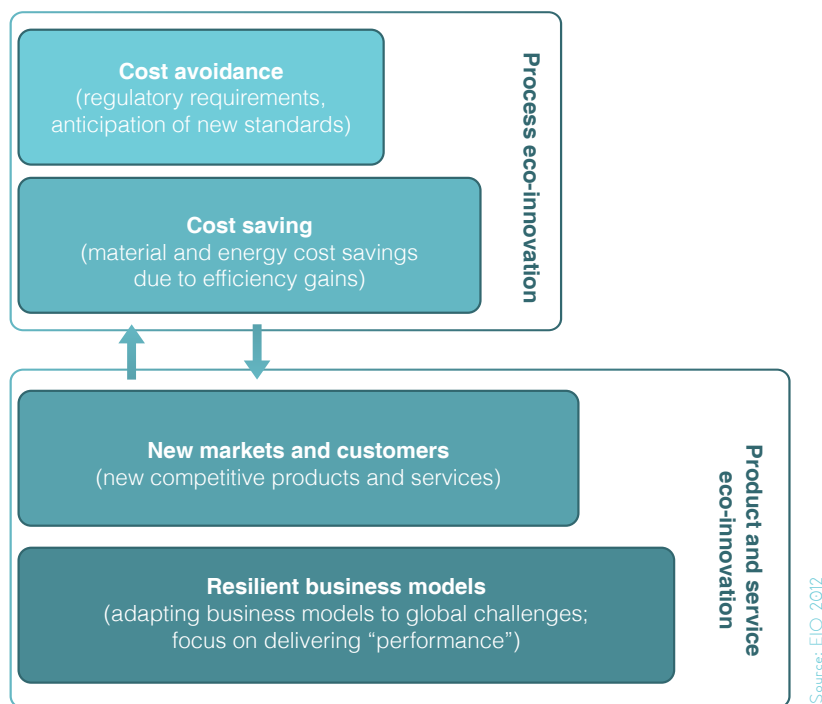
Eco-innovation suggests novel approaches across the material value chains of products and processes, which lower the intensity of material use while increasing service intensity and well-being. These are **material flow eco-innovations**, which help to move societies from the extract-consume-dispose system of today's resource use towards a more circular system of use and re-use, with less total material requirements overall.

It is important to note that eco-innovation is not limited to new technologies or products. It can also lead to changes in consumption and production patterns and have a wider transformative effect. **System eco-innovation** connects many interrelated innovations that improve or create novel functional systems. Such innovations need to engage a range of actors, including government, businesses and citizens, in the regional system and across the value chain.

³¹ The EcoAP (Eco-innovation Action Plan), launched by the EC in December 2011, is the logical successor to the ETAP, the EU's Environmental Technologies Action Plan. <http://ec.europa.eu/environment/ecoap>

³² Eco-Innovation Observatory, www.eco-innovation.eu

FIGURE 8 - BENEFITS OF ECO-INNOVATION ▼



- The environmental benefits of eco-innovations can be paralleled by **economic benefits**, such as reduced material costs resulting from the better use of resources, and increased energy and resources savings throughout the region. For example, a German study on the material-efficiency gains estimated average annual company savings of €196,000 for innovations implemented between 2006 and 2010³³;
 - The introduction of eco-innovations can open up **new market opportunities** that **create jobs** and **strengthen SMEs** in the regions by providing them with competitive advantages. This, in turn, increases the region's competitiveness. It has been estimated that the current €1 trillion eco-innovation market will rapidly expand and reach €2.2 trillion by 2020³⁴;
 - **Social gains** can also result from more sustainable practices, as eco-innovation can make a difference through changing the behaviour and lifestyles of the citizens and this change can result in a more collaborative approach, increased cohesion and improved quality of life and health.
- Because of the wide-ranging potential benefits to both the environment and to the local economy, **eco-innovations should be at the core of sustainable and smart growth in regions**. Their impact on the local environment and the economic and social systems can range from incremental change to an initially disruptive but positive process of transformation.
- Regional and local authorities are in a good position to promote transformative eco-innovations and systemic change.** This is linked with their policy-making powers, their control over public resources and the important role that they can play in facilitating links between business, research and civil society. Thus, by supporting innovation, by promoting projects that advance environmental technologies and eco-efficiency or by engaging in systemic eco-innovation, regional and national authorities can help to transform the way in which the local actors consume resources, interact with local ecosystems and bring value to the local economy.

³³ Eco-Innovation

Observatory Annual report 2011, available on www.eco-innovation.eu

³⁴ Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit (BMU) and Umweltbundesamt (UBA), Umweltwirtschaftsbericht, 2009



OPPORTUNITIES FOR ECO-INNOVATIONS IN THE REGIONAL CONTEXT

Regions have an advantage in that they have specific delivery mechanisms at their disposal that can enhance the take-up of eco-innovation. They can **orient regional and local planning towards eco-innovative measures** and can work together with local communities to design smart systems.

Authorities can encourage their citizens to adopt sustainable lifestyles and consumption patterns by integrating intelligent city planning which promotes mobility solutions like bike or car sharing, green districts or industrial symbiosis programmes. Hammarby Sjöstad in Stockholm is an inspirational example. The design of this eco-district successfully combines the awareness and eco-friendly attitudes of residents with the eco-innovative planning, housing, waste re-cycling, energy and green mobility solutions³⁵.

Each region is encouraged to adopt a more integrated approach, which has a greater chance of having a systemic impact, by **including eco-innovation as one of its priorities in its RIS3**. However, this necessitates a long-term vision and the development of a model for a sustainable and smart region.

There are several **approaches to eco-innovation support that could be considered within each region's RIS3**.

■ **Fostering the development and dissemination of sustainable technologies, products and services:**

New environmental technologies can be used to produce drinkable water, to improve water quality, to create a better water infrastructure and to close the water cycles;

New sustainable products, such as biodegradable materials presented in the Good Practice Case 6 from the Czech Republic, can engender an increased demand in today's markets. Such novel products can open up business opportunities for their manufacturers, whilst having a very limited negative impact during their lifetime.

RECOMMENDATION

Develop a long-term vision for a sustainable and smart region/country and define eco-innovation strategies that will achieve this vision.

■ **Promoting process eco-innovation**

by supporting novel technological and non-technological solutions that reduce the material and energy costs of companies in all sectors. In addition to the environmental benefits, this can, in particular, increase the competitiveness of industries and notably those that are involved in manufacturing. It should be noted that such eco-innovations are also well suited to 'traditional' economic sectors that represent the backbone of many regional economies such as the agro-food sector or the craft area.

■ **Promoting eco-efficiency through non-technological innovations**

can offer a low-risk, low-cost and easy implementation strategy for companies:

The German region of North Rhine-Westphalia has created an efficiency agency (PIUS-Check)³⁶ that analyses the economic and ecological potential in production processes. A support scheme has also been put in place for companies so that they can take on board the advice generated by the PIUS-Check audit measure (Please see Good Practice Case 2).

³⁵ Please see www.hammarbysjostad.se, another example is Tweewaters district in Leuven, Belgium described in the Good Practice Case 5

³⁶ Please see <http://www.efanrw.de/>

- **Investing in ICT** offers attractive opportunities for improving economic and environmental performance in construction and housing, energy, transportation and other sectors:

The Green Tech Valley in Austria hosts the world leading cluster, 'EcoWorld Styria,' that comprises 200 companies and research centres specialising in environmental engineering (Please see Good Practice Case 1);

Municipalities in Estonia and Finland³⁷ have developed a web-portal for energy management in buildings owned by municipalities to improve energy efficiency and ecological performance. This is another example of the innovative use of ICT for sustainable development.

³⁷ Please see <http://e3portal.vtt.fi/index.asp>

³⁸ See www.plan-c.eu

RECOMMENDATION

Consider giving priority to systemic eco-innovations, in order to achieve a wider, long-term impact for the RIS3.

³⁹ Sustainable city design is one of the more prominent and popularised examples of systemic eco-innovation. Many lessons and ideas can be drawn from experiences of e.g. Hammarby Sjöstad in Sweden (www.hammarbysjostad.se/) or DigiEcoCity model originated in Finland (www.digieco.city.com)

⁴⁰ See www.futuremotion.cz/ (in Czech)

- **Support for systemic eco-innovations**, including comprehensive solutions often based on innovative business models such as smart cities, sustainable mobility and industrial ecology:

*The region of Flanders in Belgium has endorsed a programme on **sustainable material management**, called Plan C. This programme is implemented by the Flemish Public Waste Agency³⁸. It aims to build a 'transition network' of individuals and organisations from all sectors to co-create innovations in sustainable*

material management;

*Another case is the **industrial symbiosis** network in the United Kingdom supported by the ERDF, (Please see Good Practice Case 4 on the National Industrial Symbiosis Programme). The goal of the network is to identify opportunities for synergies between the production processes of companies and the needs of other companies that can recover, reprocess or re-use waste from the original production processes;*

Other examples of how regions and local communities are becoming smarter and more sustainable come from the cities of Venlo in the Netherlands, Leuven in Belgium and the 'Smart Region' initiative in the town of Vrchlabi in the Czech Republic:

- ▶ *Venlo is seen as the first cradle-to-cradle region in the world and has made extensive efforts to foster a culture of sustainable innovation amongst the region's businesses (Please see Good Practice Case 5);*
- ▶ *The city of Leuven is redesigning an industrial site to become a residential neighbourhood with a sustainability philosophy applied to buildings, lifestyle, mobility, recycling, energy and business (Please see Good Practice Case 5)³⁹;*
- ▶ *The Czech town of Vrchlabi is cooperating with the CEZ a.s. company to equip 4,500 households and enterprises with the energy 'smart' meters and the infrastructure for electromobility by the year 2015.⁴⁰*

CLUSTERING GREEN COMPANIES

THE SUCCESS OF
AUSTRIA'S GREENTECH VALLEY



AREA



PROJECT



COST

LOCATION

Austria/Styria

FUNDING SOURCE

Federal State of
Styria, ERDF, Private
Investment



Source: <http://www.eco.at/>

Austria hosts one of the world's leading green technology clusters - Eco World Styria. Styria has had a large concentration of environmental companies that dates back to the 1970s. Then in 1998, the local business support agency established a loose network and a web platform to promote green technology projects. By 2005, the loose network had evolved into a **well-founded cluster** and currently, around 200 companies and research centres are actively working in the cluster on the environmental engineering solutions of tomorrow.

Eco World Styria focuses on a research-industry-government cooperation model to take eco-innovation to a higher level. The cluster offers its companies an attractive range of services, including **market strategy support, innovation potential evaluation, R&D partner identification, funding services and investor search**. Eco World Styria and its strategic partners can secure sustainable growth for the cluster clients through the entire value chain in the areas of biomass, solar energy, material flow management and waste and water.

"Support for research and innovation, the availability of skilled labour and mechanisms to encourage export will shape the future growth of clean technologies"

Bernhard Puttinger
Eco World Styria Director

The total budget of the cluster development project during 2007 – 2012 amounted to €888,800. Half of this funding came from the ERDF. The success of the cluster has helped to raise significantly the level of self-financing, which currently amounts to around 40%. This includes the cluster membership fees and revenue from projects and services.

Thanks to this support, **Styrian companies are becoming world market leaders in environmental technologies**. There are 170 companies with an average growth rate of 19% per year, which is nearly double the worldwide average in the cleantech market. In addition, **the cluster has already helped to create 5000 new jobs to grow the local economy**.

KEY MESSAGE

Targeted efforts to support the clustering of innovative cleantech companies can make the region/country a market leader in environmental technologies and services.

For further information please see:
<http://www.eco.at/>

PIUS-CHECK

SUPPORT FOR THE
RESOURCE EFFICIENCY OF SMES



AREA



COST

LOCATION

Germany/North
Rhine-Westphalia

FUNDING SOURCE

Federal State of North
Rhine-Westphalia,
Private Investment



Source: Direct Industry website (<https://news.directindustry.com/>)

With the growth of markets, there is a parallel increase in their resource requirements. This means that resource efficiency is no longer the number one priority simply from an ecological perspective, as it is now becoming important for long-term economic success. Whilst many large companies are making major efforts to increase their resource efficiency, most small and medium sized enterprises (SMEs) just do not have the capacity to undertake the same exercise. This is the reason why the regional government of North Rhine-Westphalia (NRW) provides targeted support for SMEs through the PIUS-Check initiative.

The PIUS-Check support measure was launched by the NRW Ministry for the Environment in 1998 and is managed by the Effizienz-Agentur NRW (EFA). The EFA aims to promote cleaner production methods in SMEs and has developed a **toolbox with a range of consultancy services**. Its goal is to outline the potential for operational savings in production cycles and to work out solutions to achieve these savings by performing a **process-oriented material flow analysis**. The SME involved is then shown two to three possibilities to improve their resource efficiency within just nine days.

"There is so much hidden potential for optimisation in production processes that more sustainable economic management is actually very simple. The challenge is to detect the potential."

Jan Hedemann
ifu Hamburg

The EFA is organised in a form of **public-private partnership**. It approaches companies as a private-sector enterprise, whilst at the same time acting as a neutral, non-commercial partner. It has accumulated experience in a range of sectors, and its knowledge of appropriate methods and optimal support measures has become a decisive factor.

The total costs of an audit are between €10,000-15,000. Up to two-thirds of these costs can be covered by the national clean production programme called VerMat. This programme is organised by the German Resource Efficiency Agency that is responsible to the Federal Ministry of Economics and Technology. EFA also assists SMEs in applying for funding for the audits. The total time spent on the PIUS-Check from the initial meetings to the planning of the potential measures is six to nine months.

Since the PIUS-Check was initiated in 2000, more than 500 audits have been conducted. Around 216 or some 40% of the companies involved have made notable improvements in their resource efficiency.

KEY MESSAGE

The provision of consultancy services and appropriate financial instruments can significantly improve SMEs' resource efficiency.

For further information please see:

- <http://www.pius-info.de>
- <http://www.efanrw.de/>



HOW TO TAKE ACTION: FOSTERING ECO-INNOVATION THROUGH SMART SPECIALISATION STRATEGIES AND POLICY SUPPORT

ANALYSIS OF THE REGIONAL CONTEXT AND ITS POTENTIAL FOR ECO-INNOVATION

When designing appropriate strategies and support mechanisms, the authorities, whether regional or national, should start with a strategic analysis of the assets, potential, challenges and opportunities. This analysis provides the basis for their action to promote eco-innovation.

Depending on the sector, industry or thematic focus, the analysis can include:

- **Conducting foresight and prospective studies** with the involvement of eco-innovation experts and policy planners to develop a strategic vision of a sustainable region, city, local industry or economic sector, including the inherent challenges, barriers and opportunities;
- **Assessing the performance and needs of the companies and SMEs** in terms of eco-efficiency, eco-innovativeness, productivity and environmental management practices, as well identifying the specific barriers and challenges they are facing;
- **Analysing the sustainability, the environmental performance and the impact/footprint** of the major industries in the region or country and their value chains;

RECOMMENDATION

While planning eco-innovation strategies and activities, conduct a robust analysis of the existing and emerging drivers of, and barriers to, eco-innovation.

- **Determining the performance, potential and competitiveness of the eco-industries and clean-tech enterprises**, identifying the barriers that hinder their economic success and also their needs in terms of policy support;
- **Identifying the local and international market opportunities** for eco-innovative products and services to assess how industries and SMEs might best benefit from these;
- **Consulting with relevant stakeholders** about the potential to realise or implement large scale projects such as sustainable cities or industrial symbiosis that represent systemic approaches to addressing sustainability;
- **Developing an understanding of the barriers and drivers:** each country and region has its own particular characteristics. These include its industrial and technological base, orientation and innovativeness of policies and culture and natural assets. These can all influence the success of eco-innovation (Please see Figure 9). Also if there are many factors that can influence each potential eco-innovative solution, project and programmes planners need to adjust their analysis to the types of eco-innovation on their agendas.

FIGURE 9 - BARRIERS TO, AND DRIVERS OF, ECO-INNOVATION ▼

Whilst regional, and sometimes national, governments are central to policies and support for eco-innovation, it is their enterprises, including SMEs, which invent, implement or adopt eco-innovations. There are several general drivers and barriers that influence the involvement of enterprises in eco-innovation⁴¹.

⁴¹ See Eco-innovation Observatory report for 2010: www.eco-innovation.eu/reports

DRIVERS

The drivers recognised by the companies are those that show that eco-innovation makes financial and environmental sense and they include:

Economic factors, such as:

- The current and anticipated high prices of energy and raw materials;
- The growing market for eco-innovative products and services;
- Access to subsidies and fiscal incentives;
- The availability of good business partners.

The regulatory and policy framework, where the most influential are⁴²:

- The existing or anticipated environmental regulations and standards;
- Voluntary codes or agreements for environmental good practice;
- Clustering and the targeted support of cluster initiatives.

Organisation and company capacity-related factors such as:

- The availability of technological and field expertise;
- Organisational and management capabilities.

BARRIERS

The barriers barriers for companies should always be taken into account by those people at national, regional or city levels who are attempting to design eco-innovation strategies.

Barriers related to economic and financial factors are:

- Lack of funds within the enterprises;
- Uncertain demand from the market;
- Uncertain return on investment;
- Poor access to public subsidies and fiscal incentives.

Barriers in terms of organisational capabilities include:

- Lack of qualified personnel;
- Lack of expertise-related knowledge;
- Limited capacity to improve material efficiency.

Systemic deficiencies and other factors hampering eco-innovations are:

- Limited environmental awareness amongst consumers that results in low demand for eco-innovation⁴³;
- Lack of regulatory incentives;

⁴² Includes also the ones indicated in the last Community Innovation Survey (2006–2008)

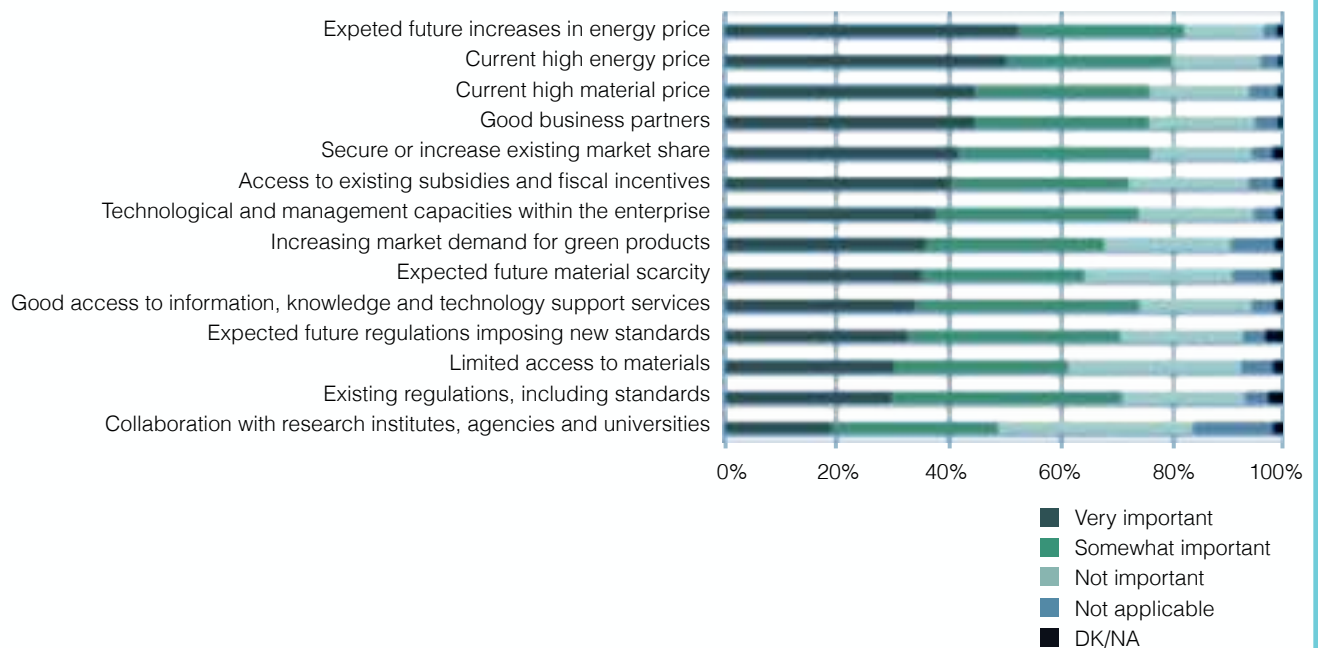
⁴³ Please see Eco-innovation Observatory report for 2010: www.eco-innovation.eu/reports

- “Technological lock-in” in the economy⁴⁴;
- Dominance in the market of established companies;
- Weak cooperation between research and industry.

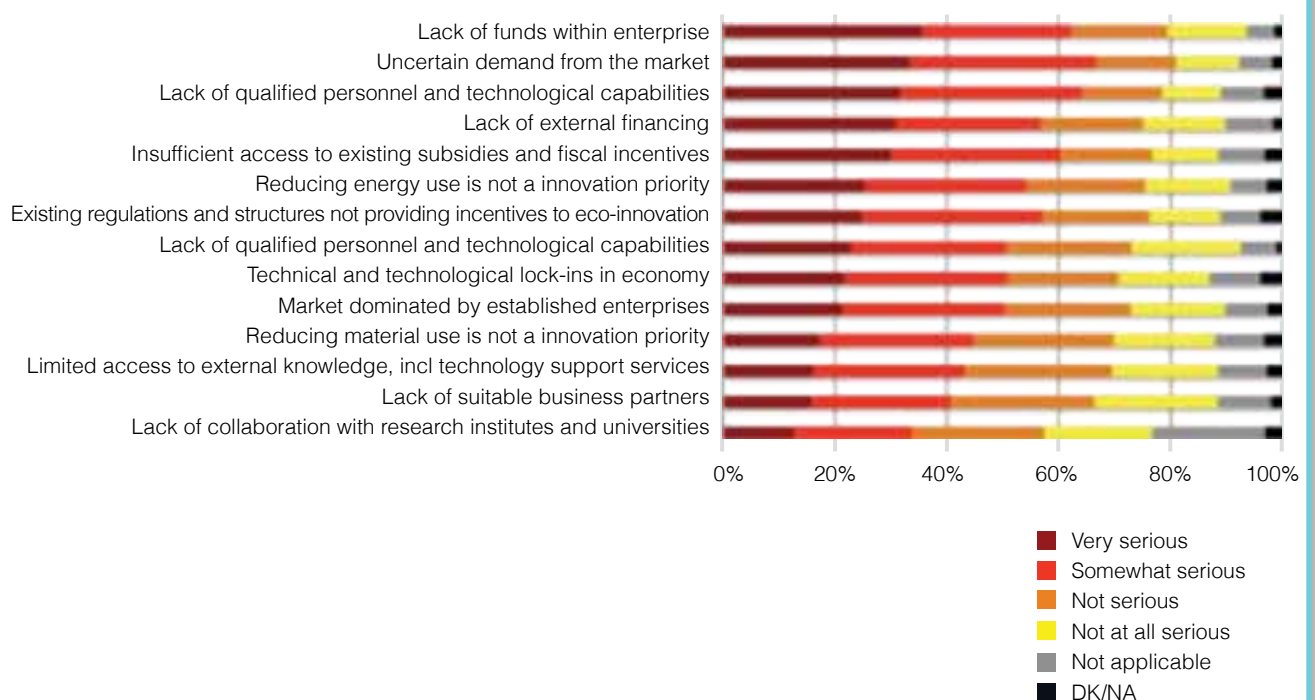
44 Technology lock-in is a form of economic path dependence – the market selects a technological standard and gets locked-in or stuck with that standard even though there are better alternatives.

The importance of drivers and barriers differs between sectors. This should be taken into account by those policy-makers, who are attempting to encourage eco-innovation. The major supporting factor in achieving sustainable growth is the overall national or regional government’s commitment to the sustainability agenda and simultaneous pursuit of its economic and environmental goals

DRIVERS OF ECO-INNOVATION IN EUROPE



BARRIERS TO ECO-INNOVATION IN EUROPE



source: Eurobarometer survey, 2011

ENSURING THE PARTICIPATION OF STAKEHOLDERS

Eco-innovation is a process that requires the participation of many different types of stakeholders. This is particularly true of systemic eco-innovations, when a wide range of actors should be involved, including national/regional/local governments, local businesses, NGOs, social enterprises, academia and research centres.

RECOMMENDATION

For a successful eco-innovation strategy, and, in particular, systemic eco-innovation, involve a wide range of stakeholders from business, industry, research and civil society.

The role of the private sector is fundamental. SMEs and larger companies providing products and services are among the first to benefit from becoming more resource efficient or entering new markets with their eco-innovative products and services.

However, there is still the potential for market failure, which justifies the intervention of the public sector in providing a level-playing field for economic activity in this area. National, regional and local

authorities can ensure favourable policy and regulatory framework and the development of projects and innovative schemes that address environmental and economic issues. In this way, business opportunities are created and, at the same time, local citizens and consumers are provided with incentives to change their behaviour.

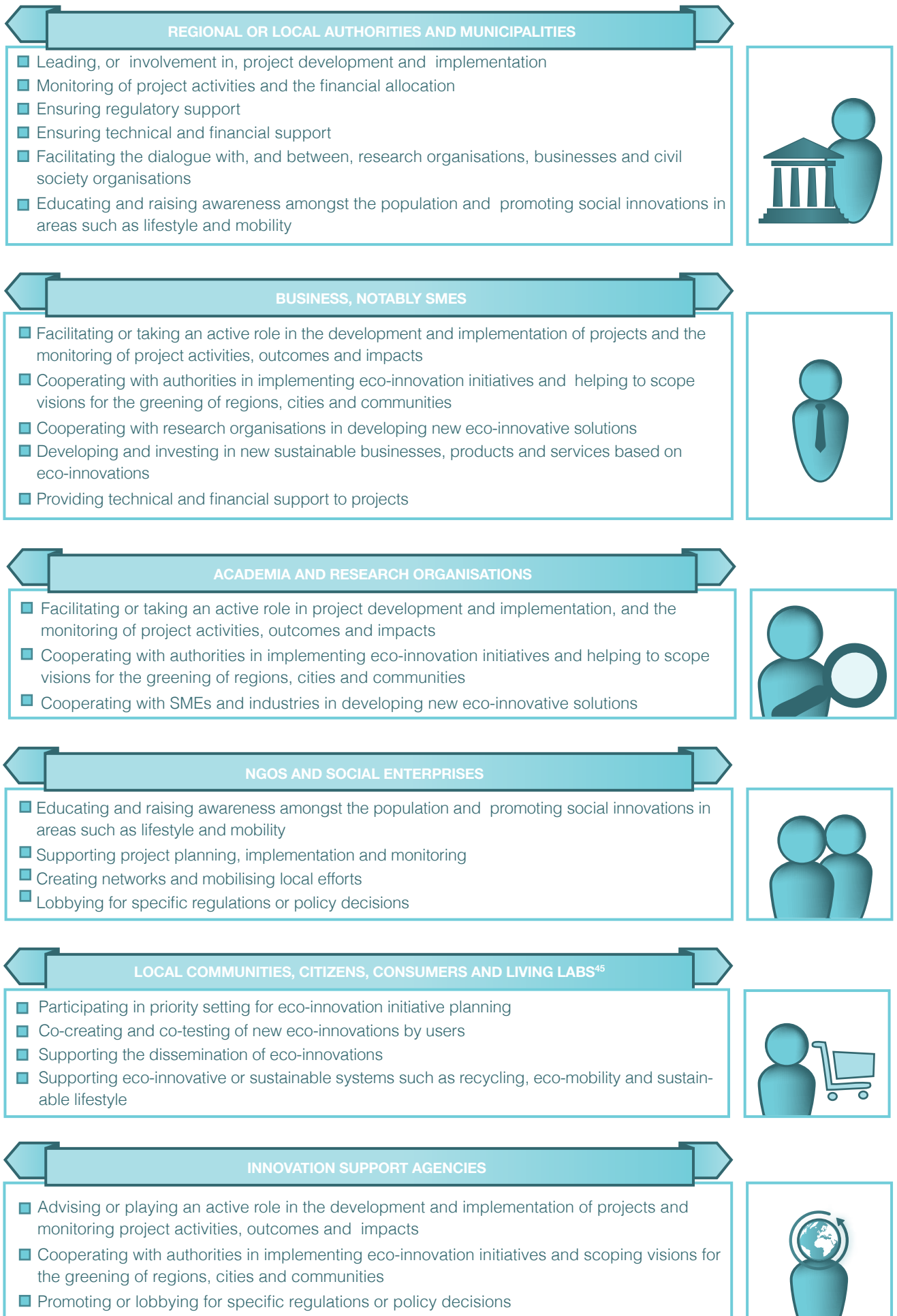
Eco-innovation is about changing people's lifestyles and consumption patterns, as well as producing more organic and positive types of interaction with the local ecosystems. It is with this ambition that **regional and local authorities should promote cooperation and interaction between NGOs, community representatives, user groups, social and private enterprises and research centres.**

NGOs can provide support for eco-innovation projects, play an advisory role in their implementation and raise awareness amongst local citizens. Eco-innovation can offer social enterprises the opportunity of engaging communities in sustainable revenue generating practices. Research centres are also very important in providing assistance to enterprises through their R&D activities and analysis.

⁴⁵ Please see

<http://www.openlivinglabs.eu/>

FIGURE 10 -POTENTIAL STAKEHOLDERS IN THE ECO-INNOVATION INITIATIVES ▼



POLICY MEASURES AND ACTIONS

In planning and designing specific measures to promote eco-innovation, Managing Authorities can make use of a wide range of policy instruments or measures.

RECOMMENDATION

To achieve far reaching results in promoting eco-innovations, develop a comprehensive policy mix that includes both supply and demand side measures.

SUPPLY-SIDE MEASURES

These measures provide direct financial, technical or advisory support to potential eco-innovators such as SMEs, research organisations, clusters, associations and NGOs. These support measures can include:

- Financial and technical support for R&D, testing and commercialisation, via subsidies and the provision of R&D infrastructure;
- Education, training and mobility support schemes;
- The promotion of networks and partnerships stimulating eco-innovation;
- Advising on improving eco-/material-/energy-efficiency;
- Information and brokering.

For instance, the EU's Cohesion and Structural Funds are used, in particular, to support networks and partnerships by establishing competence centres, clusters or science and technology-parks, and also technology platforms and innovation networks:

46 www.cphcleantech.com

47 www.ecomarkproject.eu/en

48 www.enworks.com

This is evident in the support for green technologies within the policy of the EcoWorld Styria cluster in Austria (Please see Good Practice Case 1), as well as in the Zealand and the Capital Regions of Denmark, where a cluster has been developed to promote opportunities for cleantech companies⁴⁶.

Funding for R&D in the public and private sectors is often granted to promote networking and collaborative research, develop R&D infrastructure and mount demonstration projects focusing on resource efficiency, energy efficiency and clean energy. At the same time, training and advisory services for start-ups, companies and entrepreneurs can have a significant impact on scaling up eco-innovations:

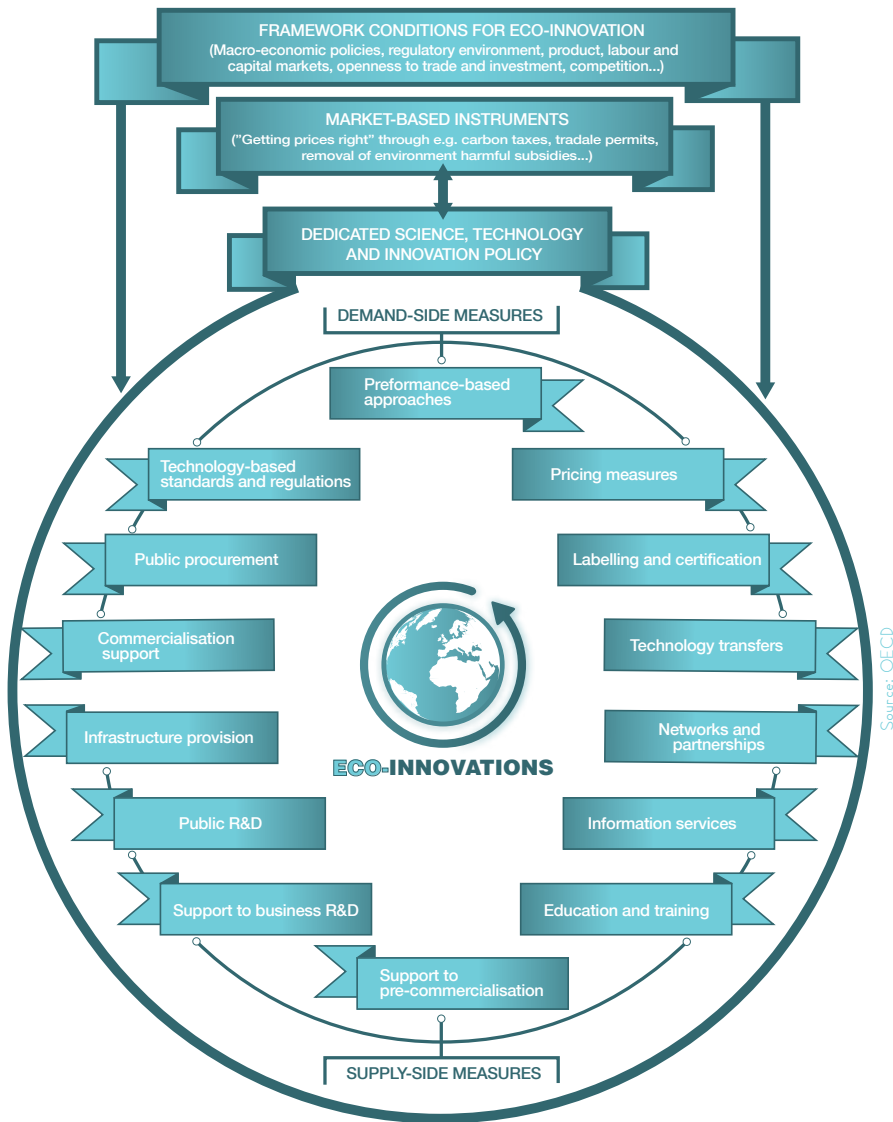
Regions in Greece, Spain, France, Italy and Slovenia initiated the ECOMARK project⁴⁷, through which they developed frameworks for training and advisory services to strengthen the innovation capacities of local SMEs in fields of environmental technologies and sustainable logistics;

Also, the Enworks initiative in the North West of England, which is supported by the ERDF, was very successful in improving resource efficiency in SMEs⁴⁸.

RECOMMENDATION

In supporting eco-innovators, build on good practices from other EU regions and countries, taking into account both their successes and failures.

FIGURE 11 - POLICY MEASURES FOR SUPPORTING ECO-INNOVATIONS



Source: OECD

DEMAND-SIDE MEASURES

These measures provide indirect support to eco-innovations by boosting demand and creating favourable framework conditions for their take up by the market. Such measures can include:

- Designing regulations and standards so that they favour eco-innovative products, services and technologies;
- Introducing green public procurement (GPP)⁴⁹, including pre-commercial procurement;
- Developing green labelling and certification of products and services;
- Stimulating private demand for green products and services through

various schemes such as tax breaks, eco-vouchers and innovation vouchers⁵⁰;

- Increasing consumers' knowledge and awareness of eco-innovative products and services.

Green labelling and GPP are already in use in many EU countries, and there have been many cases of GPP targets being pioneered by municipalities or regional authorities:

⁴⁹ GPP criteria in 20 different product groups have been developed by the European Commission: <http://ec.europa.eu/environment/gpp>

⁵⁰ www.ct.innovans.be

RECOMMENDATION
Make innovative use of the policy instruments to create regional and local demand for eco-innovation.

MAKING ENDS MEET

THE INDUSTRIAL SYMBIOSIS NETWORK
TRANSFORMING WASTE INTO A RESOURCE



AREA



PROJECT



COST

LOCATION

UK/West Midlands

FUNDING SOURCE

Region of West Midlands, UK Government, ERDF



Source: NISP publication

The Industrial Symbiosis Network helps to identify opportunities to recover and reprocess waste products from one industry that can then be re-used by other businesses. This, in turn, reduces the amount of waste going to land fill, cuts carbon emissions and creates greener jobs. In essence, it is a **brokerage initiative** to increase business opportunities and contribute to the sustainable growth of the region. The project was piloted in the West Midlands in 2003 and because of its success it has been replicated across the UK since 2005. This roll-out has taken place under the umbrella of the National Industrial Symbiosis Programme (NISP).

The programme works directly with businesses of all sizes and sectors. The network is managed by International Synergies, the world's leading expert in the practical application of industrial symbiosis. It provides the tools and techniques to enable the participating firms to accurately identify in-house material streams. This data is collected and other regional companies are invited to attend a 'Synergy' workshop where **experienced industrial symbiosis practitioners analyse the data and identify the profitable links that might be established between companies.** For examples, meat and bone meal processed from animal by-products is now being used to fuel cement kilns.

To date, around €1.24m of ERDF funding has been allocated through the programme, which has also attracted a similar amount of co-funding. The strong regional governance, via programme advisory groups that are industry-led, has proved to be immensely important in engaging with the business community.

The Industrial Symbiosis Network has produced impressive results. **It is estimated that in the UK, the programme has contributed to a reduction of 39 million tonnes of carbon dioxide, diverted 38 thousand tonnes of waste from land fill, generated €1.24 billion in additional sales and created or safeguarded over 10,000 jobs.**

"Cutting costs and generating new income streams is of interest to every business, whatever sector or market you're in".

Peter Laybourn,
NISP Programme Director

KEY MESSAGE

The success of the industrial symbiosis initiative is largely due to the fact that it is publicly funded and offers benefits to businesses from any sector.

For further information please see:
<http://www.nisp.org.uk/region.aspx>

The City of Budapest was the first local authority in Hungary to adopt a green procurement scheme. By 2011, this practice had spread and the annual GPP value in Hungary had reached €228.6m.⁵¹

However, pre-commercial and R&D procurement focused on eco-innovations occurs only in Finland, Italy and the Netherlands:

The region of Turku in Finland cooperated with the Finnish Funding Agency for Technology and Innovation (Tekes) to implement procurement procedures for the supply of passive houses to be used for social housing, through the Sustainable Communities and Innovative Public Procurement programmes. Some 31 houses were planned to be built and the selection criteria for the tender included a calculation of the life-cycle costs and the level of CO₂ emissions from the proposed method of energy production.⁵²

More far-reaching results can be achieved by **promoting synergies between demand and supply measures**:

The City of Basel in Switzerland is an example that combines building regulations and financial incentives to increase the number of its green roofs. The municipality introduced:

- *An incentive programme of financial support for green roof installations;*
- *A research grant to investigate the benefits of green roofs was awarded to the University of Applied Sciences in Wädenswil;*
- *A new Building and Construction Law that stipulated that all new and existing flat roofs must be greened⁵³.*

The **implementation of RIS3 activities addressing sustainable growth** can follow any of these three strategies:

- **Adapting existing measures, programmes, activities** – Introducing eco-innovation targets can improve the environmental and economic performance of existing policy measures and regional, national and local programmes:

For example, authorities can redesign their public procurement procedures by introducing greener requirements for products and services and establishing closer relationships with sustainable suppliers⁵⁴;

Existing waste management schemes and on-going clean production programmes can be reviewed to clean the entire value chain and transform these programmes into closed cycles where waste is used as a resource. For example, the Flanders region of Belgium has a 'Transition Management' programme that has focused on closing the material cycle and introducing waste prevention priorities into its waste management policy.⁵⁵

- **Testing and demonstrating** eco-innovation are important activities in an RIS3. They can help to build eco-innovation expertise and experience in regions and countries, and they can also contribute to the development of competitive eco-innovative companies and industries. These activities can range from low risk pilot initiatives such as:

Encouraging eco-efficiency measures in SMEs, as in the Good Practice Case PIUS-Check in Germany;

To more risky R&D-based projects that aim to develop novel eco-innovative

⁵¹ www.ktk-ces.hu and also EC GPP News alert

⁵² more examples on GPP are on <http://ec.europa.eu/environment/>

⁵³ <http://www.grabs-eu.org/casestudies.php>

⁵⁴ http://ec.europa.eu/environment/gpp/case_en.htm

⁵⁵ www.ovam.be/jahia/Jahia/pid/973?lang=en

TOWARDS A CIRCULAR ECONOMY

VENLO SCALES UP THE CRADLE TO CRADLE APPROACH



AREA



PROJECT



COST

LOCATION

Netherlands/Venlo

FUNDING SOURCE

Province of Limburg,
Dutch Government,
ERDF



Source: Planet Green website (<http://videoplantgreen.discovery.com/>)

The main premise of the Cradle to Cradle® philosophy is that products can be designed in such a way that after their normal lifetime they can be perpetually re-used for something new. Waste and other materials can either be returned to the environment as biological substances or circulate as resources within closed-loop industrial cycles, without being relegated to a low-grade use. The region of Venlo, located in the southeast of the Netherlands, is developing diverse initiatives that test the Cradle to Cradle® (C2C) concept in practice. It is also the first region in the world to apply the C2C principles on such a large scale.

This development was instigated by a documentary about C2C, which was broadcast on Dutch television in 2006. It proved to be so inspirational that Venlo turned itself into a region that experiments with “the way we make things”. With the support of the province of Limburg and the Dutch Government, Venlo launched an **ambitious plan to boost social, economic and environmental welfare in the region, whilst also creating a C2C knowledge base that could be exported across Europe and beyond.**

Currently in Venlo, the C2C principles are not only applied to the **manufacture of products**, but also to the development of **large buildings** and the **organisation of living and working areas**. The city's **procurement criteria** stimulate innovation by stating desired the outcomes such as a building that produces oxygen, or purifies water and thus they promote as much creativity as possible. There is already a strong community of those enterprises that are devoted to the C2C philosophy. Instead of aiming simply to reduce their negative impacts on the environment, they are actively seeking ways of making positive impacts, and are also generating money through this approach.

Venlo is now contributing its expertise to a collaborative €9m European project that is led by the Eindhoven region and has 50% co-funding from the ERDF. In this project, the partners will develop instruments and guidelines which simplify the implementation of Cradle to Cradle® in business areas.

KEY MESSAGE

In Venlo, the municipal authorities have been pivotal in creating conditions for C2C initiatives by forging public-private partnerships, supporting innovation, experimentation and demonstration, using public procurement as a powerful tool and developing C2C principles and targets.

For further information please see:

- <http://www.c2cexpolab.eu/>
- <http://www.venloernieuwt.nl/en/>

solutions like:

That of the Czech Republic where university research resulted in a completely new type of biodegradable material (Please see Good Practice Case 6).

The regional policy funds are also available to support research and innovation clusters and networking in green technology fields. Network support programmes can also indirectly support state-of-the-art eco-innovations within clusters and companies (Please see Good Practice Case 1 of the Austrian Eco-World Styria green technology cluster).

■ **Novel large-scale measures**, which can offer wider possibilities for eco-innovations, especially for systemic eco-innovation projects such as sustainable cities, neighbourhoods and regions and industrial symbiosis. Inspiring examples exist throughout Europe and they can offer their hard-won experience to other regions, cities and industrial networks:

Venlo in the Netherlands became the first region in the world to apply cradle-to cradle principles in all of its spheres including manufacturing, building, organisation of living and working areas and public procurement (Please see Good Practice Case 4);

Industrial symbiosis programmes have been successful, particularly in the UK (Please see Good Practice Case 3). This programme developed many synergies between various industries and companies, generated new jobs and had a very positive environmental impact through decreasing waste, emissions, energy loss and natural resource inputs;

Sustainable cities initiatives like Tweewaters in Leuven, Belgium

(Please see Good Practice Case 5) and Hammarby Sjöstad⁵⁶ in Sweden invest in sustainable buildings, energy, water, waste and mobility infrastructures and promote changes towards sustainable behaviour and lifestyles, sustainable mobility and sustainability-oriented education.

56 www.hammarbysjostad.se

57 http://ec.europa.eu/regional_policy/

RECOMMENDATION

In designing monitoring and evaluation frameworks for strategies, programmes and activities under RIS3, consult experts and also the resources available on the platform of the Committee of Regions.

MEASURING PROGRESS IN ECO-INNOVATION PROJECTS AND PROGRAMMES

While planning eco-innovation focused projects and programmes, Managing Authorities should apply a comprehensive Monitoring and Evaluation (M&E) framework with a well-defined and measurable set of indicators that will trace progress in activities, outputs and results. It is important to understand that the wide variety of eco-innovative solutions and the projects and programmes that promote eco-innovation each require specifically designed M&E systems and indicators to measure their progress.

While this guide presents some examples of indicators that can be used in eco-innovation projects and programmes (Please see Figure 12), programme developers should refer to resources and guides for the monitoring and evaluation of programmes and projects such as those on the Committee of Regions dedicated platform⁵⁷. They should also consult monitoring and evaluation experts during their planning processes.

FIGURE 12- EXAMPLES OF INDICATORS TO BE USED IN ECO-INNOVATION PROGRAMMES AND PROJECTS ▼

RESOURCE INDICATORS	OUTPUT INDICATORS	RESULT INDICATORS
Finance invested	No. of Eco-Patents filed	ENVIRONMENTAL CO ₂ reduced Water, air or soil quality improved Reduced eco-footprint of products, processes, companies
Finance allocated for R&I in eco-innovation projects	No. of publications on eco-innovation submitted to journals	(ECO)INNOVATION Application of eco-patent in product Popularity or sales of the new product in local market Start of spin-off(s) based on the R&D project/initiative
Human effort in eco-innovation activities (days)	No. of companies with improved energy/material efficiency properties	ECONOMIC Increase in resource efficiency or productivity, %age savings Profit from eco-innovative business Increase in turnover, revenues, return on investment
Training and capacity building (days/€)	No. of SME acquired EMAS/other eco-certificates	SOCIAL Improved quality of life No. of green jobs created %age of people with improved access to a sustainable and better infrastructure
Organisational or regulatory means introduced	No. of SMEs received training in resource and energy management	

IN SUMMARY

It is important to note that despite the thematic and sectoral diversity, eco-innovation in RIS3 should be addressed via the set of policy measures that could fuel innovation in many sectors. It is essential to create a demand for eco-innovative products, services, technologies and management practices. The authorities should make best use of the accumulated good practices in other regions and countries for facilitating sustainable growth in their own region or country.

TWEEWATERS

THE MOST AMBITIOUS SUSTAINABLE
URBAN PROJECT IN BELGIUM



AREA



PROJECT



COST

LOCATION

Belgium/Leuven

FUNDING SOURCE

Flemish Government,
FP7, Private Invest-
ment



Source: Ertzberg website

The Tweewaters community is the largest **inner city development** in Belgium. Its objective is to convert 11 hectares of a large industrial zone into a sustainable urban area. This area will have 1,200 dwellings and offices to welcome its 5,000 new residents and will present itself as a 21st century town. The project is part of the Energy Hub demonstration project within the FP7 for improving energy efficiency at district level. It began in December 2010 with a total budget of €11.7m and should be completed by the end of 2014.

The city developer Ertzberg, along with experienced industrial partners such as VITO, Eneco, Energy IT and Canalco, has defined a holistic vision for the Tweewaters development in which takes account of all aspects of modern society. An essential part of this vision is **an ambitious sustainable and ecological approach**.

Tweewaters will have **compact buildings** with a maximum integration of sustainable materials that will lead to a 70% CO² footprint reduction and decrease the heat demand by 45%. A new type of district **energy infrastructure** is being developed including advanced systems for matching supply and demand of energy and incorporating advanced heat storage technologies such as thermo-chemical materials. The remaining energy needs will be fulfilled with 100% locally-produced green electricity and green heating that will even be able to supply energy to the surrounding neighbourhoods. The project is also taking on board **waste management, water recycling, mobility alternatives, use of space, consumption and new business models** for local production. The model that has been designed reduces the initial energy consumption by 82% and establishes Tweewaters as a CO² negative district that will produce an annual saving of more than 9000 tonnes of CO².

The project demonstrates an ambitious concept that has been embedded in the practical construction activities. The different aspects of the Tweewaters initiative are being developed in such a way that they are totally replicable in other city districts.

KEY MESSAGE

Tweewaters is a model which demonstrates that ecological concerns and comfortable, aesthetic living can go hand in hand and, at the same time this marriage can significantly reduce the energy bills of the inhabitants.

For further information please see:
www.tweewaters.be

PROMOTING SUSTAINABLE MATERIALS

CZECH COMPANY INTRODUCES NEW BIODEGRADABLE FABRIC



AREA



COST

LOCATION

Czech Republic/
Nationwide

FUNDING SOURCE

Czech Government,
ERDF,
Private Investment



A Czech company called STAVOS Chlumec n. Cidl has developed **a unique biodegradable material** in cooperation with the University of Hradec Králové. After a certain period of time this material decomposes in the soil and does not impose any ecological burden on the environment. One application of this material will be in the manufacture of flowerpots that will make it much easier to plant trees without destroying their root systems. Currently, no similar product is available on the market.

To upscale this innovation to the production stage, the company applied for a grant and was awarded co-financing by the ERDF, within the framework of the Operational Programme on Enterprise and Innovation (OPEI). This funding was used to purchase new technologies for the mass production of the biodegradable material. At the same time, the production lines were modified to ensure an automatic, high-quality and reliable system. The total budget of the project was CZK 9,365,000 or €374,000, 60% of which came from the OPEI. The new technologies have enabled the company **to increase its productivity by a factor of four, to enhance the quality of its products and reduce its energy consumption by 75%.**

The enterprise and the university will continue to cooperate in the development of even better flowerpots, which will promote the growth of the plant's root system and ensure that it has access to fertiliser over a longer period of time. The company is also exploring the possibilities of applying new technologies to food packaging and other processes.

KEY MESSAGE

Supporting the innovative potential of businesses paves the path towards sustainable growth.



FURTHER READING ECO-INNOVATION

SOURCE	DESCRIPTION	WHERE TO FIND IT
ECO-INNOVATION OBSERVATORY	This platform presents structured information and data on eco-innovation. It contains EU Member State profiles, the Eco-Innovation Scoreboard and analyses of emerging and leading eco-innovation areas and their barriers and drivers. The good practice example repository has over 200 examples of successful eco-innovation initiatives that can inspire new project ideas.	www.eco-innovation.eu
DG ENVIRONMENT ECO-INNOVATION ACTION PLAN PLATFORM	This web portal includes articles on eco-innovation policy matters, good practices, R&D, business and funding, as well as expert interviews. The EcoAP Forum provides an interactive platform where the eco-innovation community, including national and regional authorities, can discuss and exchange their experiences in promoting eco-innovation in Europe.	http://ec.europa.eu/environment/ecoap/index_en.htm
OECD	This web portal contains publications, guides, policy briefs and presentations on green growth and eco-innovation.	www.oecd.org/innovation/green
UNEP DTI/ SCP BRANCH	This web portal is a rich source of information and guidelines on life cycle thinking, life cycle management practices, sustainable resource management, sustainable design and sustainable procurement. It should be useful to public authorities, companies and non-specialist managers.	www.unep.fr/scp/
BLUE ECONOMY WEB PORTAL	This is a repository of good practice examples on eco-innovation. It also provides several reports that are relevant to eco-innovation themes.	http://www.blueeconomy.eu
EIT CLIMATE-KIC	This website provides information on the activities of the climate innovation community in Europe, which focuses on the management of climate drivers, water management, low carbon cities and zero carbon production. It is of interest to businesses, education establishments and research organisation as well as local and city authorities, as many of the innovations are demonstrated and tested in local environments.	http://www.climate-kic.org/
INNOVATION-SEEDS	This web-tool features state-of-the-art environmental R&D results and an exhaustive eco-innovation funding guide. It also presents screened environmental R&D results and provides functional technical descriptions that allow companies and policy-makers to understand their specific use and value. Innovationseeds users can find appropriate solutions in areas such as eco-design, water, waste, climate change and natural hazards.	www.innovationseeds.eu
ECO-IP	The Eco-innovation Platform (Eco-IP) is a European platform established under the Europe INNOVA initiative, with the aim of accelerating the take-up of eco-innovative solutions in Europe. The initiative focuses on the development and testing of new or better innovation support mechanisms for innovative small and medium sized enterprises (SMEs), in particular in technological and industrial fields.	http://www.europe-innova.eu/web/guest/eco-innovation/eco-innovation-platform

4

INTEGRATING ECOSYSTEM SERVICES INTO SMART SPECIALISATION STRATEGIES



THE MAIN MESSAGES FROM THIS CHAPTER

- A region's natural assets can be the basis for the development of novel sustainable solutions and business initiatives that can contribute to smart specialisation;
- Scientific and monitoring activities focused on natural asset management can result in innovative initiatives, including new business opportunities;
- Ecosystems important role in climate change mitigation and adaptation and in decreasing the impact of natural disasters allows large cost-savings;
- Every region has the opportunity to benefit from its natural assets. However, it requires sustainable solutions, innovative methods and ideas and reliance on the renewable, rather than on the exhaustible, resources that its local ecosystems can offer.

THE POTENTIAL ACTIONS THAT SHOULD BE PURSUED

- Assess the potential of integrating the ecosystem's assets and services into the RIS3, in particular, to develop the bio-economy;
- Facilitate cooperation between the key regional actors, including agriculture and forestry organisations, agro and bio-energy companies and research centres;
- Conduct a comprehensive monitoring, analysis and evaluation of ecosystem services and assets that will require the involvement of scientific experts;
- Build the capacities of local authorities and stakeholders for sustainable economic and ecological planning;
- Identify and pursue the synergies that are offered by EU policies and strategies

THE KEY ACTORS TO BE INVOLVED IN ECOSYSTEM SERVICE SUPPORT INITIATIVES

- Local Authorities;
- Agencies dealing with biodiversity/water/forestry/agriculture/fisheries;
- Research Organisations and Universities;
- NGOs and Citizens;
- SMEs, Entrepreneurs and Larger Companies.

THE MOST IMPORTANT ISSUES TO CONSIDER

- Focus on innovation opportunities, whilst integrating ecosystem services in RIS3, in particular, through bio-economy;
- Reflect on ecosystem services that should include a discussion about the limits on the use and substitution of natural assets by man-made infrastructures and products;
- Ensure quality monitoring data and engage scientists and technical experts;
- Promote partnerships between public, business, research and NGO communities.



WHY ARE ECOSYSTEM SERVICES IMPORTANT TO ECONOMIC SUSTAINABILITY?

Natural capital underpins national and regional economies and societies and individual well-being. Water, food, resource supply, medical treatment, local climate and air quality stabilisation, recreation and mental and physical health all depend on natural ecosystems.

Every region has the opportunity to benefit from its natural assets. However, any measures that are taken should use innovative methods and ideas and rely, above all, on the renewable, rather than on the exhaustible, resources that its ecosystems can offer. Capitalising on ecosystem services should always involve a consideration of the limits on the use and substitution of natural assets by man-made infrastructures and products.

Today, 16.6% of European jobs are indirectly linked to natural assets, a further 6.7% are directly linked and 2.6% are mostly based on natural assets⁵⁸. Managing natural assets in a sustainable manner can help to ensure more long-term employment and Europe's 'Bio-economy Strategy'⁵⁹ recognises the importance of such a management approach. It supports the development of smart sustainable farming, fisheries and aquacultures and suggests that investment in ecosystems and green infrastructure offers sound economic returns. These can be achieved by boosting, for instance, the local eco-tourism industry, developing medical treatment and biomedicine production and creating conditions for sustainable agriculture.

THE ECONOMIC VALUE GENERATED BY ECOSYSTEM SERVICES

The economic value of ecosystem services cannot be calculated directly, but preliminary estimates of their worldwide value is \$33 trillion per year. For instance, global marine ecosystems enable an annual fish harvest worth up to \$240 billion. Some 87 out of the 115 leading global food crops depend upon animal pollination⁶⁰.

Coral reefs provide food and resources for over 500 million people in 94 countries or regions that are estimated at \$375 billion per annum. In addition, the value of the coral reef services for:

- Natural hazard management is up to \$189,000/hectare/year;
- Tourism is up to \$1 million/hectare/year;
- Genetic materials and bio-prospecting is up to \$57,000/hectare/year;
- Fisheries up to \$3,818/hectare/year.

Local ecosystems should be seen as the backbone of a local bio-economy based on the sustainable use of renewable resources. These include bio-energy, ecosystem services, sustainable approaches to food, resource-efficient bio-materials, bio-mimicry⁶¹ technologies and also tourism and lifestyles based on ecological principles.

Ecosystems also have a direct link to innovation and sustainable growth because of their important role in climate change mitigation and adaptation.

⁵⁸ TEEB: A Quick Guide to The Economics of Ecosystems and Biodiversity for Local and Regional Policy Makers (2010)

⁵⁹ <http://ec.europa.eu/research/>

⁶⁰ TEEB – The Economics of Ecosystems and Biodiversity for Local and Regional Policy Makers (2010)

⁶¹ Bio-mimicry is an innovation method that seeks sustainable solutions by studying nature's best ideas and then imitating these designs and processes to solve human problems, e.g., a solar cell inspired by a leaf. More information and examples are on <http://biomimicryinstitute.org>

Ecosystems regulate the global climate by storing and sequestering greenhouse gases, for instance, forests are very effective carbon stores. Biodiversity plays an important role by improving the capacity of ecosystems to adapt to the effects of climate change.

Ecosystems moderate extreme weather or natural disasters, including floods, tsunamis, avalanches and landslides. This is because wetlands and flood plains can soak up floodwater, whilst trees can stabilise slopes and coral reefs and mangroves protect coastlines from storm damage.

The values and countless benefits of natural capital and ecosystems are, however, often poorly understood. They are rarely reflected in any form of economic and social accounting and are not priced on the markets. Estimates suggest that the potential social returns can increase by 40% for woodland and by 79% for grasslands, when the multiple ecosystem services provided are taken into account⁶².

The continuous loss of forests, soils, wetlands and coral reefs is largely due to the lack of recognition of ecosystem services and the fact that their relatively large economic contribution is practically invisible. The losses of species and other natural assets like fisheries are partly driven by focusing on immediate profits rather than on long-term values. Missed opportunities to protect and invest in this natural capital contribute to the crisis in ecosystems and biodiversity that is becoming more evident. The degradation of soil, air, water and biological resources has a negative impact on public health, food security, business opportunities and economic growth. These problems along with the increasing challenges of adapting to climate change and preserving and managing natural assets necessitate innovative approaches and timely actions.



OPPORTUNITIES FOR REGIONAL AND LOCAL DEVELOPMENT, BASED ON ECOSYSTEM SERVICES

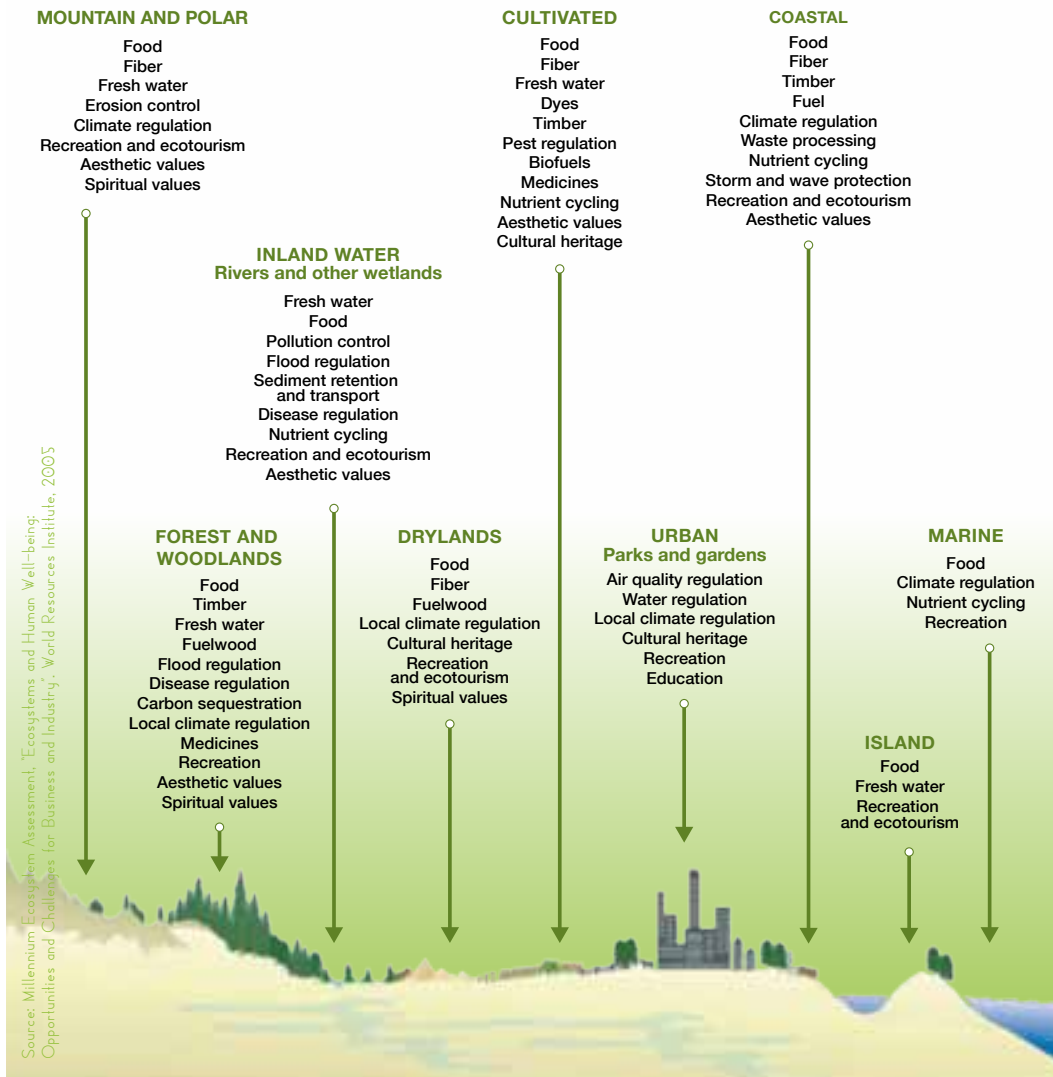
Natural assets and ecosystem services can promote the development of **novel sustainable solutions and business initiatives and contribute to building a local bio-economy:**

The promising potential of local sea resources is being harnessed in Ireland. Seaweed, which has been a largely undervalued resource, is now being used in food and medicine and researchers are focusing on algae and its possible use in bio-energy production (Please see Good Practice Case 7);

A Swedish company called 'Ecoera' has tapped into soil ecosystem services and established a business model that offers a new type of climate compensation service. This 'Biochar Carbon Sequestration' stores a significant amount of carbon in soil and this, in turn, produces a financial return from the carbon credit market (Good Practice case 8).

⁶² TEEB – The Economics of Ecosystems and Biodiversity for Local and Regional Policy Makers (2010)

FIGURE 13 - EXAMPLES OF VARIOUS ECOSYSTEM SERVICES ▼



The development of a green infrastructure⁶³ can boost local economies, especially by enhancing the attractiveness of the area to tourists. There are many successful examples of this approach including⁶⁴:

The Hoge Kempen National Park that was set up in a former coal mining area of Belgium. The aims were to revive the local economy, to restore and further develop the natural values of the region and to support nature tourism and education. The revenues from eco-tourism in this park are now as much as €24.5 million per year;

Another example is the National

Forest, a major green infrastructure initiative in central England. It has provided 20 new sustainable tourism attractions and attracts 8.7 million visitors annually. This brings €321 million per year to the local economy.

Urban green infrastructure projects can be the locus for innovative ideas that have economic, environmental and cultural value:

In the Good Practice Case 12, the Green Roof Programme in Basel demonstrated a number of positive results, such as energy saving, promotion of biodiversity, reduced rainwater runoff and overheating,

⁶³ Further information on 'Green Infrastructure' at: http://ec.europa.eu/environment/nature/ecosystems/index_en.htm

⁶⁴ Institute for European Environmental Policy (IEEP), "Green infrastructure implementation and efficiency", Final report (2011)

as well as a positive influence on the health and well-being of inhabitants.

There is also a significant prospect of stimulating **social eco-innovations** through the involvement of communities in the preservation and sustainable use of their local natural resources. This can change people's attitudes and lifestyles and promote social entrepreneurship, whilst introducing a sustainable approach that relies on natural assets:

The Green Growth toolbox, presented in Good Practice Case 11, puts social and behavioural changes at the centre of building nature-friendly communities that tap into the economic opportunities of eco-system services.

⁶⁵ <http://www.vanerkulle.org/>

⁶⁶ <http://www.vanerkulle.org/vk/>

⁶⁷ www.azoresbiportal.angra.uac.pt

⁶⁸ More information available at http://colloquebioindication.asconit.com/ang_presentation.php

⁶⁹ A bio-indicator is an organism or biological response that reveals the presence of pollutants by the occurrence of typical symptoms or measurable responses. Bio-monitoring is the use of the properties of an organism to obtain information on certain aspects of the biosphere.

In Sweden, the region with the biosphere reserve 'Lake Vänern Archipelago and Mount Kinnekull'⁶⁵ has developed innovative local sustainable development based on its very rich natural capital and creative initiatives such as 'Biosphere entrepreneurship'⁶⁶ and 'Nature Conservation as a Business Idea.'

Innovations are particularly needed in the **monitoring of ecosystems and biodiversity**. Such monitoring will not only supply more detailed knowledge that can be used to ensure the long-term sustainability of the regional economy but can also lead to the creation of new services, economic activities and SMEs.

Databases of bio-geographical and/or socio-economic data, such as those in the Azorean Biodiversity Portal platform⁶⁷ or the SIGRS-GISOR project (Please see Good Practice Case 9) provide support

for bio-geographical and macro-ecological research and innovative services for new economic activities. For example, they enable regions or territories to benefit from open access to bio-diversity data or mappings/estimations of the technical potential for renewable energy.

Collaboration between universities, research centres and an SME⁶⁸ has led to cutting edge innovations in research and monitoring techniques promoting the application of bio-indicators and the bio-monitoring⁶⁹ of ecosystems. Its scientific efforts helped to create innovative approaches and management tools for the preservation of natural assets.

EXTRA BENEFITS OFFERED BY CARBON MARKETS

While investing in ecosystems that have carbon sequestration potential, regions could also benefit from the opportunities of the existing carbon markets, via the **Joint Implementation (JI)** instrument of the Kyoto Protocol.

JI is a project-based approach through which countries can earn credits toward their emission targets under the Kyoto Protocol. JI projects are conducted jointly between two Annex I countries, which include all EU27 Member States. Tradable carbon credits can be earned by implementing a broad array of carbon sequestration activities including re-forestation, avoided de-forestation, agriculture and forestry management that enhances carbon sequestration.

Read more about JI at <http://ji.unfccc.int/>

BIO-ECONOMY IN IRELAND

UNLOCKING THE ECONOMIC
POTENTIAL OF SEAWEED



AREA



PROJECT



COST

LOCATION

Ireland/Nationwide

FUNDING SOURCE

Irish Government,
ERDF, FP7



Source: Earth Sky website ('A breakthrough in making biofuel from seaweed')

For years, seaweed has been known for the valuable compounds it contains. These have been used for medical treatment and as food additives, thickeners, dyes and fertilisers. Yet it remains a relatively undervalued natural resource. In Ireland, researchers are investigating its potential for industrial applications.

In the past two decades, there have been many debates about the potential of the Irish seaweed sector, as more than 500 kinds of seaweed can be found around its shores. Seaweeds are of interest to the nutraceutical, pharmaceutical, cosmetic, bio-fuel and animal feed industries. Their harvesting and processing is a traditional activity in Ireland providing employment to coastal communities. It is estimated that Ireland's seaweed and biotechnology sector is currently worth €18 million per annum and employs 185 people.

The 'Sea Change – A Marine Knowledge, Research and Innovation Strategy for Ireland 2007-2013' indicated that seaweed production and processing sector should increase significantly to reach a turnover of around €30 million by 2020. **Ireland has made strenuous efforts to develop the seaweed cultivation sector and continues to identify new compounds and extraction techniques that can be used in industrial production.**

Irish research efforts have also demonstrated the potential for using seaweed as a source of sustainable energy. Currently researchers at NUI Galway's Ryan Institute are involved in a major €14 million European collaborative project funded by the ERDF. NUI Galway's share of this EnAlgae project is valued at almost €1.2 million.

The project aims to develop best practices for algal biomass production and bio-energy and bio-remediation technologies that can help to accelerate the commercialisation of the sector. It involves 19 partners from 7 EU Member States who will work together until 2015 pooling their expertise in the development and piloting of new algal-based technologies. The Irish partners are responsible for the initial step of producing the biomass required for conversion to bio-fuel through cultivating macro-algae biomass at sea in a one hectare facility.

"Innovation is key to ensuring that the full potential of the Irish seafood sector is fully realised. We will be working closely with the industry to ensure that the cultivation sector expands to meet market demand".

Jason Whooley
CEO of Irish Sea Fisheries Board

KEY MESSAGE

By investing in research and innovation, Ireland is transforming and promoting its traditional sectors so that they can contribute to economic growth and the creation of jobs.

For further information please see:

■ <http://www.enalgae.eu/>



HOW TO TAKE ACTION: ECOSYSTEM SERVICES FOR SMART AND SUSTAINABLE GROWTH

Integrating ecosystem services development into RIS3 offers promising opportunities for regions and Member States to strengthen their economic sustainability, whilst preserving their environment and increasing their resilience to climate change and natural disasters. Technical assistance funds can be directed to innovative ways of maintaining and improving local ecosystems such as water, forests and biodiversity. They can also be used to create and maintain green infrastructure, sustainable agriculture and land use and bio-based solutions, as well as promoting scientific developments and the monitoring and assessment of the assets of ecosystems.

RECOMMENDATION

Any assessment should focus not only on natural assets, but also on local scientific, technological and entrepreneurship capabilities that could help to create innovative sectors in the bio-based economy.

ANALYSIS OF THE REGIONAL CONTEXT AND ITS POTENTIAL FOR ECOSYSTEM SERVICE DEVELOPMENT

In order to discover the potential opportunities related to local ecosystem services, authorities should assess their natural assets, the local scientific, technological and entrepreneurship capabilities and the challenges and economic benefits. The full picture can be obtained by conducting the following activities.

- **Analysing the state of regional ecosystems and evaluating the natural assets and ecosystem services**, which can outline the costs and benefits of different policy options and highlight the best local strategies for enhancing both well-being and economic sustainability. Many tools for the evaluation of natural assets and ecosystem services are available including:

The Cost Benefit Analysis (CBA), which is a widely-used performance yardstick that uses evaluation estimates. Multi-criteria analysis (MCA) and Participatory Appraisal (PA) do not require monetary evaluation. They are designed to

help decision-makers to integrate complex actions and multiple opinions into a single framework. Information about tools for the evaluation and appraisal of ecosystem services is widely available⁷⁰.

- **Assessing the research, innovation and entrepreneurship potential** for integrated activities to build a bio-economy. It is important to identify whether there are research experts who can provide a scientific basis and ensure an eco-monitoring that would prevent any risk to the local nature systems. The most innovative activities, be they green infrastructure-based systems or new bio-products and services, need knowledgeable and entrepreneurial people for their implementation. Thus, research and innovation facilities and highly qualified teams will be required, when a region or a country adopts ambitious plans to build a bio-based economy:

In Wales the ERDF co-funded the 'Bridge Marine Science Group'⁷¹ cluster which supports marine and aquatic science businesses, to assist them in gaining global business by encouraging them to work together as well as to encourage Welsh graduates to start up enterprises in this sector (comment: as the Irish case is already cross referenced earlier, we can add this very good example which we overlooked (regioStars winner 2011)).

- **Establishing a monitoring and data collection system** that will provide useful information for the evaluation of natural capital and ecosystem services and the further planning of local ecological and economic development strategies such as a bio-based economy:

The 'Guyafor' project provides French Guiana with a valuable tool for monitoring its forests and this is a network of installations to measure carbon sequestration. The project creates a base for innovation in adapting to climate change and for regional development⁷²;

Monitoring and reporting systems can benefit from modern tools like geographical environmental information systems and other easy-to-use ICT and satellite technologies (Please see Good Practice Cases 9 and 11).

- **An analysis of potential barriers and drivers** can secure the viability and resilience of ecosystem service support-based projects and programmes. These can range from a general understanding of the importance of ecosystems' benefits to society, through regulatory and capacity issues to knowledge about the purpose and implementation of projects (Please see Figure 14). Such information is vital to project planners:

Good Practice Case 11 demonstrates how local municipalities can address these issues through the use of a specifically-designed support package including training, assistance in the development of a strategic vision and the use of accessible ICT tools to manage conservation data.

⁷⁰ For example: World Bank; IUCN; TNC (2004) How much is an ecosystem worth? Assessing the economic value of conservation This brochure introduces the approach of ecosystem services and compares different valuation methods

⁷¹ http://ec.europa.eu/regional_policy/videos/

⁷² <http://www.cirad.fr/en/research-operations/>

RECOMMENDATION

Invest in monitoring and data collection systems, which can provide proven information for capitalising on ecosystem services and the further planning of local ecological and economic development strategies.

FIGURE 14 - BARRIERS TO, AND DRIVERS OF, ECOSYSTEM SERVICES DEVELOPMENT ▼

BARRIERS

The sustainable and efficient use of ecosystem services and natural capital are hindered by a number of barriers such as:

- A lack of vision and understanding of the opportunities offered by ecosystem services, in particular, in term of innovations;
- Ecosystem services are often undervalued and exploited, as they have no role in the formal market. As ecosystem services are traditionally considered to be free, there are no means of attaching a monetary value to these services;
- There is no regulatory framework for most ecosystem services that can clarify ownership rights, set limits, assign values, quantify the delivery of services and target benefits to buyers;
- There is a lack of capacity to perform a comprehensive analysis of ecosystem services, which is the case with even the most motivated authorities, coupled with a lack of entrepreneurship, innovation and R&D for bio-economy development;
- The potentially high transaction costs of quantifying and verifying the ecosystem services, which hampers further planning.

DRIVERS



Initiatives supporting ecosystems services can benefit from several drivers, such as:

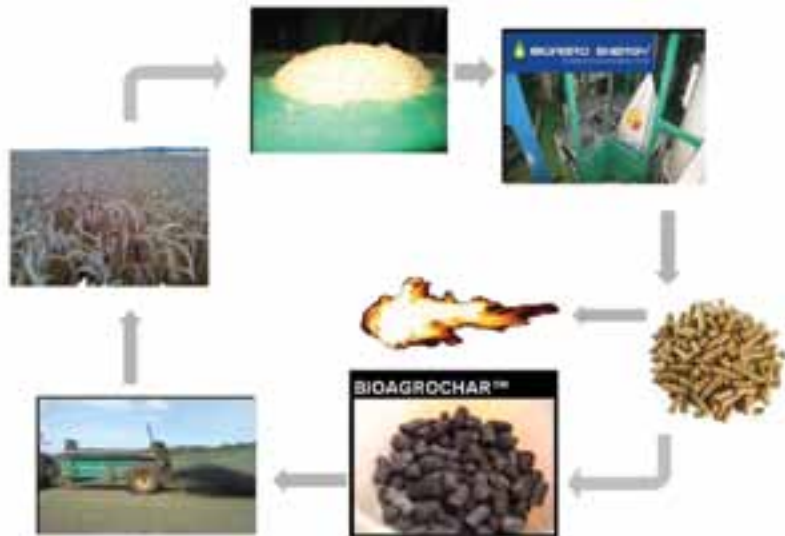
- The availability of ecosystems with high cultural or natural heritage and recreational or educational values, in particular, national parks and UNESCO sites of biosphere reserves⁷³;
- The availability of a long-term vision for ecosystem services and their role in the economic prosperity of regions/countries;
- The presence of universities, laboratories and research centres and companies in areas related to natural assets and ecosystems;
- A supportive policy and regulatory environment, which stresses the sustainable use of natural resources, rather than their unlimited exploitation and also encourages small scale entrepreneurship and collaboration with environmental protection agencies;
- The availability of financial and technical resources, with well-designed management;
- High quality monitoring data to be used in the analysis of eco-system services.

⁷³ <http://www.unesco.org/new/en/natural-sciences/>

BIOCHAR CARBON SEQUESTRATION

SWEDEN OFFERS A CLIMATE COMPENSATION SERVICE

	AREA
	COST
LOCATION Sweden/Nationwide	
FUNDING SOURCE Private Investment, Swedish Government, EU LIFE (indirectly)	



Source: <http://ecoera.se/solutions>

Ecoera is a bio-energy technology transfer company that has been spun-off from Chalmers University of Technology in Sweden. Using some of the results from a four-year EU LIFE project with a budget of €5m, it has introduced a technology system that bridges agricultural soil carbon and the Carbon Accounting Systems of companies.

The process, which is the basis of Ecoera's business, starts with by-products from agriculture that do not have traditional areas of use. These residues are usually land filled and, as such, are a potential source of methane emissions. However, using these residues as raw material and blending them according to specific formulae, Ecoera manufactures bio-agropellets which are combusted in a low oxygen environment in a process called pyrolysis. This produces agricultural Bioagrochar™ which, when assimilated by soil removes carbon. In addition, the pyrolysis process produces syn-gas, which can be used for heat or bio-fuel production. The biochar is returned to the fields as a soil enhancer and studies have shown that it increases the soil's fertility and thereby, lowers the dependency on artificial fertilisers.

"The downside of this technology is that there are no downsides."
David Andersson,
CEO of Ecoera

Ecoera has developed a business model around this technology and now offers a new type of climate compensation service called Biochar Carbon Sequestration. On the farm, the biochar provisions the soil ecosystem by increasing its nitrogen-holding capacity. Currently this voluntary climate compensation is sold to emitters at a higher rate but the rate will go down as the system is scaled up. In the end and with the right policies, farmers should be able to be paid to store carbon in their soil, which would represent a fair carbon tax.

KEY MESSAGE
Investment in cooperation on research and development between universities, research centres and the private sector provides a seed bed for spin-offs that can scale up innovations in environmental technology.

For further information please see:
<http://ecoera.se/>

ENSURING THE PARTICIPATION OF STAKEHOLDERS

One of the success factors of the RIS3 targeting ecosystem services and green infrastructure lies in the active involvement of a wide range of stakeholders, including representatives of the academic research community, civil society organisations, local entrepreneurs, relevant agencies and local authorities. It is important to develop efficient exchanges and long-term partnerships between these stakeholders both under the umbrella of RIS3 and in individual projects.

RECOMMENDATION

Ensure an efficient exchange between the research community, civil society organisations, local economic actors and agencies dealing with nature preservation, forestry, agriculture, tourism and other relevant aspects.

The initial, crucial, step is to bring all stakeholders to the same level of understanding of the importance of natural ecosystems and green infrastructure. Scientific actors will have a significant role in promoting this understanding. They can also provide methodologies to conduct the full-scale analysis of the opportunities offered by ecosystem services and to compare the risks and benefits of different planning options. The involvement of local agencies that are responsible for aspects like forestry, agriculture and tourism will

RECOMMENDATION

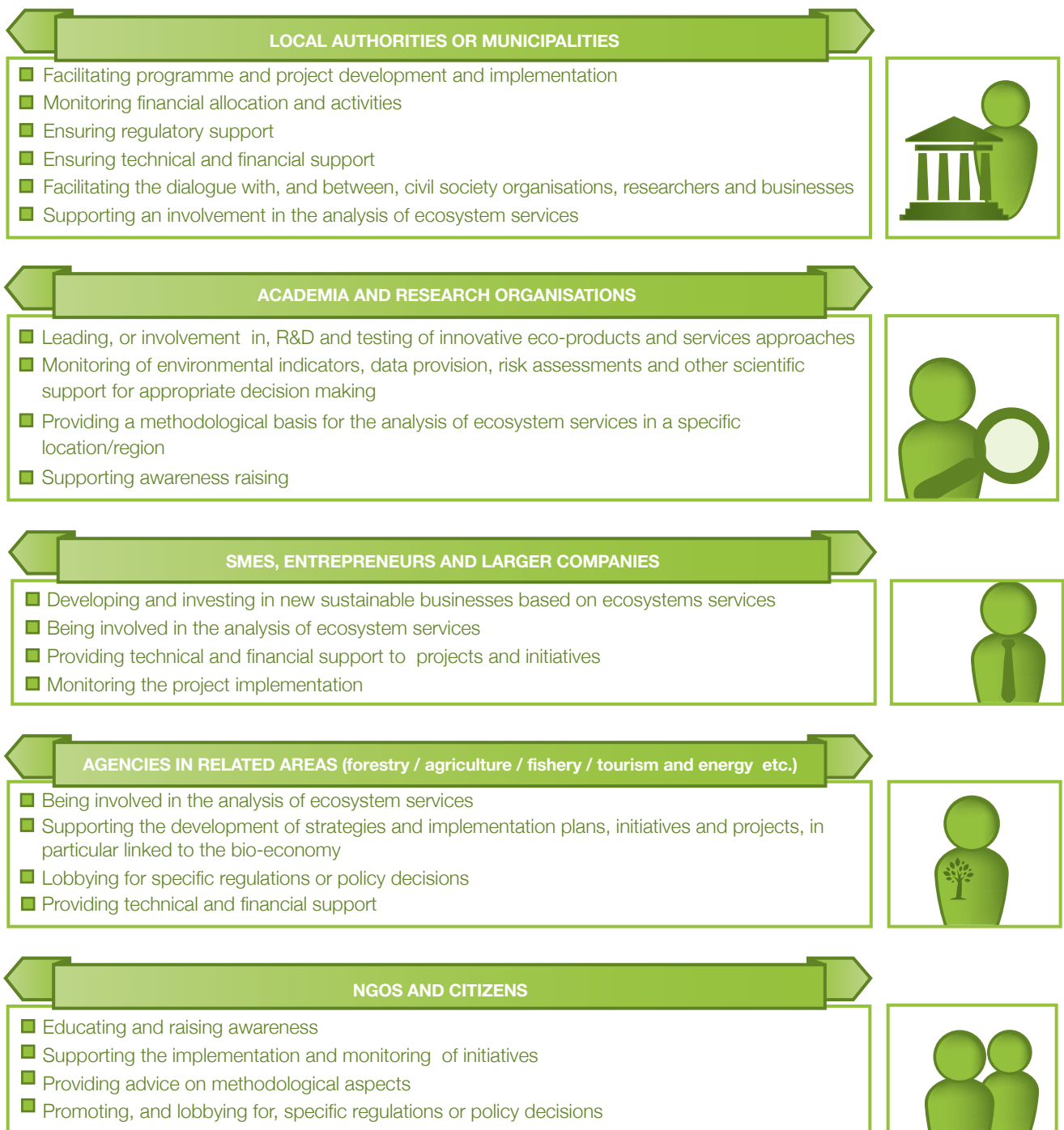
In capitalising on ecosystem assets involve both economic and non-economic stakeholders in planning, implementation and M&E. This will ensure that environmental priorities are not overtaken by economic objectives.

be important both in the analysis and planning and in helping to ensure that potential conflicts are avoided.

Local authorities play a key role in specific initiatives and projects and should have a strategic interest in them. NGOs, and especially those with environmental missions, will often have a great enthusiasm for ecosystem related initiatives. In the absence of regional and local environmental NGOs, national or even international NGOs should be involved. They can make an immense input to public education and mobilisation both in programme or project implementation and also to framing the regulatory needs.

Building local bio-economies and developing green infrastructure can offer a range of sustainable business opportunities for local entrepreneurs and SMEs in areas such as ecotourism, agri-business and land and forestry management services. Therefore, it is important to ensure their participation in the planning processes under the RIS3. In addition, many businesses are transforming their value bases and adopting corporate social responsibility principles. Involvement in nature restoration activities can give them an opportunity to progress in their CSR performance.

FIGURE 15 - POTENTIAL STAKEHOLDERS IN ECO-SYSTEM SERVICE SUPPORT INITIATIVES ▼



DEFINING A COHERENT POLICY MIX, ROADMAPS AND ACTION PLAN

Based on the analysis of the data that has been collected and the results of the evaluation of natural assets, authorities will need to design the activities that should be undertaken. For this, the Managing Authorities should:

- **Pursue policy screening** to identify whether there are policy deficiencies that hinder the development of

eco-system services and sustainable natural resource management-based activities;

- **Introduce policy support measures and instruments** that can be helpful in pursuing ecosystem services and local bio-economy development. For example, municipal authorities and other local stakeholders often lack knowledge of sustainable economic and ecological planning. In such

cases, the cohesion policy support can be directed to capacity building, training, exchange programmes and advisory activities:

Relevant lessons can be learned from North Carolina, US. The local conservation agency offers a toolbox including a handbook, a GIS dataset and web resources, along with training for local decision-makers. This aims to help in building nature-friendly communities that conserve declining habitats alongside any new developments (Please see Good Practice Case 11).

RECOMMENDATION

Make the best use of policy instruments that promote local bio-economies and innovative capitalisation on ecosystem services.

74 <http://www.gov.pe.ca/agriculture/BCI>

■ **Seek synergies** offered under other EU policies and strategies, such as:

- ▶ The Bio-economy Strategy for Europe;
- ▶ The Common Agricultural Policies (CAP), in particular the European Agricultural Fund for Rural Development (EAFRD);
- ▶ The Common Fisheries Policies (CFP);
- ▶ The Integrated Maritime Policy (IMP); and
- ▶ EU environmental policies on resource efficiency, energy, climate change, sustainable use of natural resources and protection of biodiversity and ecosystems.

It is suggested that regions should use the Cohesion and Structural Funds, especially in the framework

of RIS3, **to uncover the innovation potential of ecosystems services to lead to sustainable growth** by promoting activities using these three strategies.

■ **Adaptation of the existing measures, programmes and activities.** Each country or region has long-lasting, locally and nationally driven policies and programmes on conservation, biodiversity, agriculture, land, water or forestry:

The Bio-economy Crop Initiative implemented in Prince Edward Island, Canada, aims to assist local farmers to pursue emerging market opportunities by producing crops for the local bio-economy, whilst working to improve the environmental sustainability of the Province⁷⁴.

These adaptation strategies can also involve greening the innovative policy instruments that support sustainable economic activities in various sectors. For example, demand side measures like green public procurement and green standards and certification can be applied to support the economic competitiveness of products and goods produced and harvested in an ecologically sustainable way. This also helps to ensure the economic viability of the eco-friendly enterprises in bio-based economic sectors:

Barcelona City is a good illustration. Since 2004, it has been applying Responsible Timber Procurement and thus, all the wood products purchased by local authorities must be derived from sustainable forestry (Please see Good Practice Case 10).

■ **Experimentation and demonstration** projects can include:

RECOMMENDATION

Seek synergies with other EU policies and strategies.

Pilot initiatives promoting ecosystem support and economic development, which will have wider dissemination potential, for example:

The Swiss city of Basel has the largest area of green roofs per capita in the world. This offers the potential to promote biodiversity, reduce rainwater runoff and overheating and influence positively the health and well being of inhabitants. This Swiss experience shows how a campaign strategy can turn sustainability initiatives from a once-off pilot measure into a mainstream approach (Please see Good Practice Case 12).

R&D projects developing original research and testing can generate innovative techniques of sustainable and renewable resource-based production, business development and many other innovative activities that will ultimately contribute to bio-economy development, for example:

An innovative research development on carbon sequestration in agriculture eventually led to the emergence of new generation of SMEs pursuing unique green business models based on soil ecosystem services of carbon sequestration (Please see Good Practice Case 8).

■ **Investment in natural capital and green infrastructure**, such as forests, rivers, coastal zones, parks, eco-corridors and other natural or semi-natural features. This could be the key to maintaining a sustainable environment in which the economy and society can prosper together. Investing in natural risk prevention through dikes and wetlands means that the cost of disaster rehabilitation can be avoided and this cost would normally be much higher than

providing such defences. This is relevant both in increasing the need for adaptation to climate change and for the preservation of natural resources. Well-designed disaster prevention schemes can preserve ecosystem services, such as water quality and quantity and benefit biodiversity in agricultural and coastal zones. Such investments can also have a positive effect on the potential for local economic development by creating jobs and services. There is also significant innovation potential, as green infrastructure development requires a combination of creative design and a scientific base. Innovative approaches and instruments are applied in following projects:

The GRaBS (Green and Blue Space Adaptation for Urban Areas and Eco-towns) project⁷⁵ has enabled urban designers, architects and planners across Europe to create or remodel outdoor spaces and buildings to ensure that they are resilient to climate change and extreme weather;

Rhône-Alpes has used innovative contracts with local stakeholders to restore 'green corridors' that reduce the erosion of biodiversity⁷⁶. The contracts have initiated the construction of crossing points for wildlife, agro-environmental measures, the restoration of riverbanks and wetlands, awareness-raising and the acquisition of land by the regional authorities.

⁷⁵ http://ec.europa.eu/regional_policy/projects/

⁷⁶ http://ec.europa.eu/regional_policy/projects/

RECOMMENDATION

While planning investment in green infrastructure, review the innovative approaches and tools, which are based on the latest research and international experience.

THE POWER OF MAPS

INVESTING IN GEOGRAPHIC INFORMATION SYSTEM FOR SUSTAINABILITY



AREA



COST

LOCATION

France, Germany, Switzerland/ Upper Rhine region

FUNDING SOURCE

Regional Governments, ERDF



The Upper Rhine region extends across areas of France, Germany and Switzerland. It has considerable potential for renewable energy production but the lack of previous cross-border cooperation has hampered the design of an effective policy framework. Now however, the objective of the region is to create a **common geographical information system (GIS)** for collecting, processing and visualising data. The outcome should be a set of maps and socio-economic data that the Upper Rhine Conference, the framework body for cross-border cooperation, and its partners can use to reach informed decisions about the future planning of the region.

One of the projects in the collaboration between French and German universities and research centres is building a **GIS-based planning tool for renewable energy**. This tool acquires and develops data, creates a common language and definitions for national data comparison, clarifies the rights to use the data and provides an exchange and communication platform for data distribution. The total funding for this project is €936,356, and half of this amount is financed by the ERDF.

The cross-border nature of the project presented specific technical problems such as the diversity of geographical projections and differences in national methods and definitions. To tackle these issues, common working practices and a network of technicians were developed. Overall, **the project has helped to create a common vision for regional planning and development**. It is also hoped that it will harness underused regional potential and contribute to territorial cohesion.

KEY MESSAGE

Investment in acquiring, processing and visualising geographical data can become a first step in devising sustainability strategies.

For further information please see:
http://sigrs-gisor.org/Cartes_Donnees_FR.html

MEASURING PROGRESS IN PROGRAMMES SUPPORTING ECO-SYSTEMS SERVICES

In planning and implementing ecosystems support programmes and projects, it is important to maintain the involvement of both economic and non-economic stakeholders. Their involvement in monitoring and evaluation is crucial. They will also be helpful in ensuring a balanced assessment of a project's impact and in suggesting ways to mitigate negative effects on the ecosystem balance.

It is also important to apply a comprehensive set of indicators that will reflect the environmental, economic, innovative and social results of the project. In

addition, environmental outcome indicators should cover both the positive and negative impacts that can appear when using ecosystem resources and services.

While this guide presents some indicative examples of indicators that can be used in eco-innovation projects and programmes (Please see Figure 16), the planned activities will have to reflect the focus and objectives of each project.

RECOMMENDATION

Design and apply a comprehensive monitoring and evaluation (M&E) system reflecting environmental, economic, innovative and social impact; Encourage the involvement of a wider circle of stakeholders in the M&E of ecosystems.

FIGURE 16 - EXAMPLES OF INDICATORS TO BE USED IN PROGRAMMES AND PROJECTS SUPPORTING ECO-SYSTEM SERVICE DEVELOPMENT

RESOURCE INDICATORS	OUTPUT INDICATORS	RESULT INDICATORS
Finance invested (€) R&D expenditure (€) No. of trees planted in green infrastructure project Kms of river cleaned up Human effort (days) Training courses (days/€) Organisational or regulatory means introduced Sq kms of land subject to ecosystem rehabilitation measures	Sq kms of land that have been turned into park	ENVIRONMENTAL CO ₂ reduced Water or air quality improved Increased value of the site and neighbourhood
	No. of patents filed	(ECO-)INNOVATION Application of patent in product Popularity (sales) of the new services/ eco/ bio-products in market
	No. of publications submitted to journals	ECONOMIC Increase in resource efficiency or productivity, saving in % Profit from eco-tourism development No. of carbon credits generated Increase in turnover of local tourism/ agro-business sectors Revenues, return on investment in € Behavioural additionality
	No. of reports/briefs produced	
	No. of households involved in eco-agribusiness/tourism business	SOCIAL Improved quality of life/ recreation No. of green jobs created % of people with improved access to green infrastructure
	No. of entrepreneurs that received training in agro-tourism business	

RESPONSIBLE TIMBER

BARCELONA EXCELS IN GREEN
PUBLIC PROCUREMENT



AREA



COST

LOCATION

Spain/Barcelona

FUNDING SOURCE

City of Barcelona



Source: http://www.strethamh.gov/Pages/StrethamNH_Assessing/Timber

The City of Barcelona has gained a reputation as a European leader in sustainable procurement. In 2004, it implemented a governmental measure on **Responsible Timber Procurement**, and a further Mayoral Decree was approved making it compulsory that wood products purchased by municipal authorities should be derived from sustainable forestry. The Decree established a non-exclusive certification system of sustainable forest management, for instance, biodiversity protection and harvest control, which was used as a tendering criterion in all public procurements. The measure was launched to reduce the environmental impact of the city by actively promoting the sustainable use of natural resources and combating illegal logging.

Barcelona has ensured a wide uptake of this green procurement policy. For example, a large share of the wood purchased by the Municipal Funeral Service Enterprise comes from certified sources. In addition, all benches procured by the Parks and Gardens Department and exhibition and poster stands ordered by other City Departments are made from certified wood. The information from the municipal bodies involved in the procurements, shows that **around 78% of the timber purchased from 2004 to 2011 was certified, or in the process of certification. Thus, the negative impacts on the ecosystems were largely being curtailed.**

However, the policy also presents a lot of challenges as many of the tendering processes faced the problem of finding suppliers that met the sustainability criteria. Also, some products may have separate parts made from different types of timber and thus they are difficult to analyse within the overall framework. The implementation of this green procurement policy has also highlighted the need to have a proper monitoring system in place. As wood is used in the value chains of a range of products and services, ascertaining the sustainability of its origin is complex process for both buyers and end of chain suppliers.

To tackle these challenges, the City Council of Barcelona has created an internal committee from all stakeholder departments to monitor the implementation of the policy. The future efforts of Barcelona will focus on activities that will expand knowledge about sustainable wood and forestry certification amongst all the actors involved.

KEY MESSAGE

Green public procurement is a powerful tool that can be used by public authorities to address their sustainability targets.

For further information please see:
<http://www.iclei.org/>

THE GREEN GROWTH TOOLBOX

NORTH CAROLINA PROMOTES THE USE OF ENVIRONMENTAL DATA IN THE PLANNING OF RESIDENTIAL AREAS



AREA



COST

LOCATION

US/ North Carolina

FUNDING SOURCE

State of North Carolina



North Carolina is experiencing an unprecedented growth in population. Between 1990 and 2000, the number of inhabitants grew by 21% and by 2030 the population is expected to increase by a further 50%. This population growth is fueling patterns of land development that threaten the natural ecosystems and quality of life, as more and more developments occur outside the city centres. Currently over 400 km² of forests and fields are being taken each year for the construction of homes, workplaces, shopping centres and infrastructure. Thus, North Carolina's challenge is to build **nature-friendly communities that conserve declining habitats** alongside these new developments.

To address this concern, the Green Growth Toolbox was introduced in 2005. This project is a **cooperative, non-regulatory effort** led by the Wildlife Diversity programme of the North Carolina Wildlife Resources Commission. The main premise underpinning the Green Growth Toolbox is that to achieve green growth, communities need to use conservation data in planning activities.

The toolbox aims to bridge the gap between scientists, land use planners, developers and local decision-makers by offering wildlife data and important wildlife conservation principles so that well-informed decisions can be made that safeguard the natural assets. The toolbox includes **a handbook, a GIS dataset and a web site**. The Wildlife Resources Commission works in partnership with other natural resources agencies and organisations to deliver training workshops and technical guidance.

So far, 45 local governments, including counties and municipalities in North Carolina, have received the Green Growth Toolbox training. This has been carried out through 11 workshops, which specifically targeted those districts that were experiencing a significant development of residential areas. More than 20 local governments have received technical guidance on 31 land use planning projects. The overarching objective of the project is to enrich the quality of life in North Carolina. **It is expected that the application of the Green Growth Toolbox will help to improve water quality, point to new ecotourism opportunities and contribute to the conservation of wildlife resources and the preservation of natural heritage.**

KEY MESSAGE

Sustainability objectives can also be addressed through cooperative, non-regulatory measures, such as the ready-to-use environmental data toolbox for regional planning.

For further information please see:
<http://216.27.39.101/greengrowth/>

GREEN ROOFS

BASEL FOSTERS SUSTAINABILITY THROUGH FINANCIAL INCENTIVES AND BUILDING REGULATIONS



AREA



PROJECT



COST

LOCATION

Switzerland/Basel

FUNDING SOURCE

Canton of Basel, Private Investment



Source: <http://www.thebatconygardener.com/archives/2895/>

The Swiss city of Basel has the largest area of green roofs per capita in the world. The city authorities backed this development as a way of reducing the energy consumption of buildings. However, it was discovered later that these green roofs also promote biodiversity, reduce rainwater runoff and overheating, protect rare species and have a positive influence on the health and well-being of the city's inhabitants.

The building and re-installation of green roofs has been stimulated through two main measures - **financial incentives and building regulations**. Two green roof programmes operated for the two year periods of 1996-1997 and 2005-2006. During each period, CHF1,000,000 or around €626,000 were committed by the Energy Saving Fund to the programmes. In the first campaign, applicants received CHF20 per m² of green roof but these city grants generated 13 times more additional private investment in construction and re-installation. This led to 85,000 m² of roofs being greened and resulted in 4 Gigawatts of annual energy savings.

Due to the success of the first incentive programme and also research into the biodiversity value of green roofs, the canton of Basel passed a Building and Construction Law in 2002, requiring green roofs to be installed on all new buildings that had a flat roof. The regulations also incorporated green roof design guidelines on, for example, creating different habitats, varying substrate layers and using natural soil from the region. The design of large roofs had to involve an expert consultant, who was funded by the canton. During the first incentive campaign, architects and constructors had gained experience of various techniques and this proved to be invaluable in complying with the new building regulations.

The 2005-2006 programme focused on replacing the older roofs, as all new buildings were already subject to the new regulations. **It is estimated that the regulations will result in 30% of all flat roofs in Basel becoming green by 2017.**

KEY MESSAGE

This Swiss experience shows how a campaign strategy coupled with a well-grounded regulatory framework can transform one-off pilot measures into mainstream approaches to sustainability.

For further information please see:
<http://www.grabs-eu.org/casestudies.php>

IN SUMMARY

- In pursuing eco-systems services and bio-economy objectives via RIS3, the Managing Authorities should focus on opportunities for innovation. These can be found in the direct scientific and monitoring activities, the application of creative ideas in green infrastructure design and the innovative approaches of bio-based entrepreneurship development;
- It is also important to develop partnerships between local authorities, the private sector, conservation organisations and other interested parties, as well as to involve citizens. The active participation of such partners in the monitoring and evaluation of ecosystem service initiatives is essential;
- Finally, in eco-system service capitalisation activities, it is necessary to continuously reflect on the limits to the use and substitution of natural assets by man-made infrastructures and products. It is important to ensure that economic goals do not overtake environmental objectives.


**FURTHER READING -
ECOSYSTEM SERVICES**

SOURCE	DESCRIPTION	WHERE TO FIND IT
DG ENVIRONMENT	Provides information and studies on green infrastructures.	http://ec.europa.eu/environment/nature/ecosystems/index_en.htm
DG RESEARCH	Includes information on European Bio-economy Strategy, research funding news, as well as country profiles and success stories.	http://ec.europa.eu/research/bioeconomy/index_en.htm
TEEB	The 'Report For Local and Regional Policy Makers' examines what local governments can do for natural resource use and management. It gives practical guidance on how to deal with the challenge of biodiversity loss, at a local and regional level. The report is a useful advisory tool for policy-makers, administrators and managers, and it will also be of interest to representatives of NGOs, regulatory bodies and the judicial system.	http://www.teebweb.org/
EUROPEAN ENVIRONMENT AGENCY	The report 'Green infrastructure and territorial cohesion' explores the concept of green infrastructure and contains further analyses of the integration of green infrastructure into policy sectors. It provides examples of monitoring systems and spatial information that can be used to plan green infrastructure at national and regional levels. It also presents a number of good practice examples that might inspire project developers.	http://www.eea.europa.eu/publications/green-infrastructure-and-territorial-cohesion

5

RESEARCH AND INNOVATION IN SUSTAINABLE ENERGY



THE MAIN MESSAGES FROM THIS CHAPTER

- Sustainable energy innovations are the key to achieving the EU climate and energy target for 2020 known as the '20-20-20' target, and also the target for 2050 of a 85% - 90% reduction in carbon emissions;
- The development of capabilities in sustainable energy-related research and development and demonstration projects will help regions and Member States to meet the EU's targets for energy and climate change. The SET Plan, as the EU strategy for research and innovation in the field of energy, provides guidance on the actions to be undertaken by Member States;
- Every EU Member State and region has the potential to introduce innovations in sustainable energy, which can range from the state-of-the-art R&D to innovative ideas in building, mobility, design and energy management.

THE POTENTIAL ACTIONS THAT SHOULD BE PURSUED

- Assess renewable energy and energy efficiency potential that is technically, economically, socially and sustainably exploitable;
- Assess R&I and technological potential to pursue sustainable energy innovations;
- Identify barriers to sustainable energy innovations and determine measures to address them;
- Pursue innovation in the policy domain by introducing a set of measures and incentives that will facilitate sustainable energy innovations at every stage of the innovation cycle;
- Seek synergies with other relevant programmes that support R&D and demonstration projects in the field of sustainable energy.

THE KEY ACTORS TO BE INVOLVED IN ECOSYSTEM SERVICE SUPPORT INITIATIVES

- Local Authorities;
- Innovation and Energy Agencies;
- SMEs, Large Companies, Technology Providers, Cluster Organisations and ESCOs;
- Research Organisations and Universities;
- NGOs and Consumer Associations;
- Financial Actors.

THE MOST IMPORTANT ISSUES TO CONSIDER

- Each MS or region has its own set of conditions and factors that can drive or hinder initiatives and projects that aim to promote research and innovation in sustainable energy;
- Each MS or region has its unique natural potential for the exploitation of renewable energy resources, as well as its own specific situation in terms of energy efficiency;
- Each type of technology has a specific set of barriers and responds to particular drivers;
- Whilst ambitious sustainable energy-focused R&D programmes are not feasible in many regions, each Member State or region has opportunities to stimulate innovative measures when investing in sustainable energy in buildings, mobility, services and other areas.



FOSTERING RESEARCH AND INNOVATION FOR SUSTAINABLE ENERGY

In the EU, energy policy objectives are closely linked to sustainability goals. To achieve its economic, social and environmental objectives, the EU has to address major energy-related issues such as a growing dependence on energy imports, volatile oil and gas prices, climate change, increasing demand and obstacles to a fully competitive internal energy market. Addressing climate change goes hand-in-hand with a greater security of energy supply for Europe. Greater use of sustainable energy sources and introducing energy efficiency measures are methods of reducing its dependence on external sources.

In 2007, a commitment was made to transform Europe into a very energy-efficient, low carbon economy. The EU set a series of demanding climate and energy targets that are to be met by 2020, known as the '20-20-20' targets⁷⁷.

The EU Strategic Energy Technology Plan (SET-Plan)⁷⁸ adopted in 2008, took these targets further by setting a 2050 vision to reduce EU greenhouse gas emissions by 80% - 95% by pursuing the following goals:

- 1 Accelerating knowledge development, technology transfer and up-take;
- 2 Maintaining the EU's industrial leadership in low-carbon energy technologies;
- 3 Fostering science for transforming energy technologies to achieve the 2020 Energy and Climate Change goals; and
- 4 Contributing to the worldwide transition to a low carbon economy by 2050.

Success in achieving Europe's 2020 goals largely depends on decisions taken at local and regional level. Regional Policy plays an essential role in building the low carbon economy and driving investment in smart and sustainable growth through addressing climate, energy and environmental issues.

Whilst a few regions and Member States of the EU are already world leaders in energy efficiency, and in the use of renewable energy sources, substantial catching-up is needed in other regions. Also, if the EU is to keep its leading position, further research and innovation efforts are needed in the more-advanced Member States and regions.

The ability to tap into sustainable energy technology developments varies across the EU because of the differences in

⁷⁷ http://ec.europa.eu/europe2020/pdf/targets_en.pdf

⁷⁸ Strategic Energy Technology Plan (SET-Plan), <http://setis.ec.europa.eu/about-setis/>

79 Regional Policy

contributing to sustainable growth in Europe, EC.

http://ec.europa.eu/regional_policy/

80 http://ec.europa.eu/regional_policy/projects/

natural endowments and economic conditions, as well as in the technological capacities of each EU Member State and region.

Thus, **achieving the 20-20-20 targets across the regions poses a serious challenge, which will require further transformation of the energy system, continuous research and innovation and radically novel solutions.**

At the same time, achieving these targets also provides a range of opportunities for economic development including:

- Expansion of businesses and research activities in renewable energy;
- Energy efficiency in industry and buildings and urban planning;
- Sustainable bio-fuel and biomass production;
- Smart grids and other ICT based solutions focusing on monitoring;
- Energy loss prevention and higher energy efficiency provision;
- Fuel cell and hydrogen technology development;
- New mobility and other initiatives.

These developments are also expected to help mitigate the impact of the economic crisis, to boost smart and sustainable economic growth, based on innovation efforts, and to create new jobs across Europe and internationally. For example, the overall estimates show that achieving the EU target of renewable energy contributing 20% of the overall energy consumption by 2020

could provide about 410,000 additional jobs⁷⁹. Therefore, major economic and social gains from investment in renewable energies and energy efficiency can be expected, in particular in less developed regions and Member States.

The majority of regions have some technologically viable potential for renewable energy deployment, while all have room for energy efficiency improvements. Regions and cities can invest in **research and innovation in renewable energies and energy efficiency**, according to their local energy potential. Regions should see renewables and energy efficiency as drivers of development and smart growth, especially in rural and coastal areas and in remote regions and islands that can tap into their marine energy potential:

An excellent example comes from Scotland, where the renewables R&D programme is focused on offshore renewable energy. This programme has been given an important role in helping the Scottish Government to achieve its target of producing the equivalent of 100% of Scotland's electricity demand from renewables by 2020 (Please see Good Practice Case 13);

Implemented in the South West of England, the Wave Hub is an example of a project that supports the advancement of technology (R&D) activities in the field of marine renewable energy within an EU Convergence Region⁸⁰.

HARNESSING WIND, WAVES AND TIDES

SCOTLAND INVESTS IN OFFSHORE WIND AND MARINE ENERGY



AREA



PROJECT



COST

LOCATION

Scotland/ Nationwide

FUNDING SOURCE

Scottish Government,
ERDF



Source: <http://coastalcare.org/2010/10/tidal-power-the-next-wave/>

Scotland is increasingly exploiting the economic opportunities that are emerging from the shift towards a low carbon economy. It is estimated that Scotland has around 25% of Europe's offshore wind and tidal energy resources and 10% of its potential wave energy. So **wind and marine energy technology development are political priorities**, and the Government has set an ambitious target of producing 100% of Scotland's electricity demand from renewable, by 2020.

The offshore wind energy sector has significant commercial potential, and the renewables industry currently supports more than 11,000 jobs across Scotland. The plans to install up to 10 Gigawatts of offshore wind generating capacity in Scottish waters are predicted to generate around £30 billion or €37.6 billion of investment by 2020. This will create up to 28,000 jobs in the industry and a further 20,000 jobs in supporting industries and services, over the same period of time.

Scotland is currently a world leader in wave and tidal energy technologies as a result of its accumulated expertise, its range of test facilities and its large capacity for energy production. Efforts have also been devoted to supporting business development in technology maintenance services. **The focus of Scotland's strategy is not just on how to best harness its huge natural resources, but also on how to develop next-generation, renewable technologies for a global market.**

The main elements of the Scottish renewable energy strategy include **strong government-business-academic cooperation, an attractive regime for investors, subsidies for testing and deploying technologies, investment in infrastructure and the regulatory environment** and the early development of **a strong pool of expertise.**

KEY MESSAGE

The Scottish renewable energy strategy demonstrates how ambitious government targets can promote sustainable growth and how a well thought out mix of support measures can help to achieve the overall goals of such a strategy.

For further information please see:

- <http://www.offshorewindscotland.org.uk/>
- <http://www.scottish-enterprise.com/about-us/>



OPPORTUNITIES FOR RESEARCH AND INNOVATIONS IN SUSTAINABLE ENERGY IN THE MEMBER STATES AND REGIONS

The economic and innovation opportunities related to sustainable energy in the EU's regions and Member States are vast. However, it is important that regions position themselves strategically in selecting investment strategies under regional policy. It is possible to identify two distinct approaches to investing in sustainable energy:

- Investment in renewable energy installation, basic energy efficiency measures and smart grids, which are widely seen in regional projects; and
- Investment in state-of-the-art research and innovation in sustainable energy such as technologies and advanced energy efficiency materials and measures.

While the benefits of the investment in energy infrastructure and energy efficiency activities are well recognised, it is strategically important that regions and the Member States also **focus on the**

fields that have the best perspectives for sustainable and smart growth and global competitiveness. Here, they can **build on entrepreneurial discovery and innovation and research processes** which will enable them to build unique knowledge and will also contribute to the higher competitiveness of the region or the country concerned.

In promoting the sustainable energy targets via the RIS3, regions and Member States can select various approaches that are unique and fit closely with the local context, resource endowment, technological capacities and real needs.

For example, the ambitious and R&D intensive programmes that aim to push regions to the frontlines of the global market, such as the one pursued in Scotland (Please see Good Practice Case 13), would be very challenging for many other regions and countries to pursue. Nevertheless, all regions can tap into innovative practices based on the improved organisation of industries and housing sectors, novel energy management instruments and low-tech innovative solutions best adjusted to local conditions.

All regions are encouraged to make the best possible use of existing state-of-the-art knowledge and pursue local context-oriented innovative ideas in integrating the sustainable energy objectives and activities into the region's RIS3. In assessing their positions and assets for their RIS3 strategies, Member States and regions are invited to make full use of the knowledge developed within the framework of the SET-Plan. They can benefit considerably from using the **SET-Plan Roadmaps**, which put forward concrete action plans aimed at raising the maturity of 7 identified technologies to a level that will enable them to achieve large market shares by 2050⁸¹, as well as using the **SET-Plan Technology Map** developed by the EC, as a source of reliable and

⁸¹ <http://setis.ec.europa.eu/about-setis/>

RECOMMENDATION

Focus on sustainable energy fields with the best perspectives for growth and global competitiveness, building on the entrepreneurial discovery process to define areas for research and innovation.

THE SET-PLAN ROADMAPS identify for each technology:

- The key challenges and bottlenecks;
- The actions to be undertaken to tackle them;
- The investment needed and the most suited instruments;
- The coherence between actions at EU and Member State level;
- The priorities;
- The optimal level of intervention;
- The possible impacts on the policy goals.

THE SET-PLAN TECHNOLOGY MAP provides:

- A concise assessment of a wide portfolio of low-carbon energy technologies;
- Their current and future market penetration and the barriers to their large-scale deployment;
- The on-going and planned R&D and demonstration efforts;
- Reference values for their operational and economic performance, which can be used for modelling and analytical work to support the implementation of the SET-Plan.

The Technology Map was last updated in 2011 and it now includes 20 technologies, covering the whole spectrum of the energy system. The 2009 and 2011 Technology Maps can be accessed at:

<http://setis.ec.europa.eu/about-setis/technology-map>.

THE SET-PLAN CAPACITY MAP

This Map's reports provide a rough estimate of the current corporate and public research and development investments in low-carbon energy technologies in the EU-27. The objective is to offer a benchmark of current R&D spending to serve as a basis for comparison with future R&D investments, in order to address the key technology challenges identified in the SET-Plan. The 2007, 2009 and 2011 Capacity Maps can be accessed at:

<http://setis.ec.europa.eu/about-setis/analyses>.

FIGURE 17 - SET-PLAN SUPPORT TOOLS ▲

practical information on energy technologies. Another valuable resource is the **SET-Plan Capacities Map** that covers R&D investments in low-carbon energy technologies within SET-Plan (Please see Figure 17).

Well-designed **policy support instruments** are important in enhancing the take-up of sustainable energy innovation at local level. National and regional authorities have the innovative policy

RECOMMENDATION

In integrating sustainable energy into your RIS3, cooperate with the national representatives in the SET-Plan Steering Group to benefit from synergies with other initiatives and co-financing opportunities.

SUSTAINABLE BUILDINGS

THE GREEN BUILDINGS CLUSTER IN LOWER AUSTRIA SHOWS SUCCESS



AREA



PROJECT



COST

LOCATION

Austria/ Lower Austria

FUNDING SOURCE

Government of Lower Austria, Austrian National Government, ERDF



Source: RegioStars Awards 2011 publication

The Green Buildings Cluster has driven cooperation between innovative companies in the fields of sustainable building, refurbishment and living and lifestyles in Lower Austria. It has **forged synergies** and **expanded networks between local enterprises, R&D organisations and skilled craftsmen**. These improved relationships have stimulated innovation in the refurbishment of buildings, promoted the use of low-energy, sustainable energy technologies and resulted in healthier interiors and more comfortable standards of living.

Lower Austria has many multi-story buildings and over half a million single-family houses that are old and in need of refurbishment. Back in 2001, the region recognised the opportunities that energy efficiency improvements could bring to local economic development. Then, in 2007, the existing Timber Cluster and the Green Building Cluster merged and this new network has a current membership of over 200 cluster partners, more than 80% of which are SMEs.

The cluster offers **specialised consultancy and training services** for its members to improve their cooperation, qualification, marketing and communications. The cluster is also the first contact point for those from outside, who are seeking international partnerships with projects in the region. It has also helped to shape building codes and new financial incentives, and now around 50% of all the new buildings are passive energy houses.

The economic impact of the Green Buildings Cluster has been significant. **In its ten years of activity in the region, 273 projects have been carried out with a total value of €34 million. These projects' activities have created an additional 253 jobs and have had added a total value of €19.3 million to the Lower Austria region.** The total cost of the cluster's EU co-funded activities in the period 2007-2012 is estimated to amount to over €3.4 million, with a total ERDF contribution of around €937,370.

KEY MESSAGE

Clusters can be mediating platforms on which to build relationships and trust between local SMEs, large companies, researchers and public administration. This helps to shape innovation-friendly framework conditions and promotes the internationalisation of enterprises.

For further information please see:

- <http://www.ecoplus.at/en/>
- <http://www.tci-network.org/news/card/434>

instruments and specific delivery mechanisms of the RIS3 framework at their disposal. These can include both:

- Supply side measures that directly support R&D, innovation and implementation activities such as grants, subsidies, capacity building and infrastructure provision; and
- Demand side measures such as green public or preferential procurement, feed-in-tariffs, eco-vouchers and motivation schemes for consumers. These indirectly increase the take up of clean energy technologies and services and energy efficient materials, transport and products.

In order to strengthen the demand side innovation, **public authorities should play an exemplary role.** An illustration of this might involve the **state-of-the-art renovation of public buildings** to improve energy efficiency and the use of renewable energy. In playing such a role, they are invited to build on the results of research projects under the Energy-efficient Buildings (EeB) PPP supported by FP7⁸², as well as on other relevant EU level and national research.

Also, a number of the **European initiatives can offer complementary approaches** to the sustainable energy promotion efforts under RIS 3. These include⁸³:

- The EU Research Framework Programme (FP) for research and innovation, which has a dedicated 'Energy' theme and others addressing energy-relevant issues in the Cooperation Programme⁸⁴;
- Smart Cities and Communities European Innovation Partnership⁸⁵, which supports the demonstration of energy, transport and information and communication technologies (ICT) in urban areas;
- The European Industrial Initiatives of the SET-Plan in the areas of wind, solar, bio-energy, electricity grids and

RECOMMENDATION

Take an exemplary role by introducing state-of-the-art energy improvements in public buildings, thus strengthening the innovation demand side.

carbon capture and storage, which strive to accelerate commercialisation of innovative technologies;⁸⁶

- The European Energy Research Alliance (EERA) which supports the SET Plan by accelerating development of energy technologies through joint R&D, in close cooperation with EU, Member States and European Industry.
- Public Private Partnership Energy-efficient Buildings (EeB), which offer €1 billion to boost the construction sector by researching methods and technologies to slash the energy consumption and CO₂ emissions of new and renovated buildings⁸⁷;
- The Covenant of Mayors that voluntarily commits their municipalities to increase energy efficiency and to use renewable energy sources.⁸⁸

The directions and examples given in this guide only represent some of the opportunities that Member States or regions can exploit in promoting research and innovation in sustainable energy within the framework of RIS3.

Experience has shown that regions are the key actors in developing **technology clusters** that pursue a range of activities along the innovation chain starting from R&D through commercialisation to market dissemination. The activities of such clusters can be tailored to the local context, resource potential and energy needs of each region:

The Baltic Energy Cluster (Good Practice Case 16) introduces and promotes distributed co-generation, which is the simultaneous small and medium scale production of

⁸² <http://www.ectp.org/enewsportal/>

⁸³ Please see also Section 5 of this Guide, which provides larger overview of complementary initiatives

⁸⁴ <http://ec.europa.eu/research/>

⁸⁵ <http://ec.europa.eu/energy/>

⁸⁶ <http://setis.ec.europa.eu/implementation/eii>

⁸⁷ www.e2b-ei.eu

⁸⁸ www.eumayors.eu/about/covenant-of-mayors_en.html

thermal energy and electricity from renewable energy sources, mainly biomass, and by converting water, solar and wind energy. The participants in the cluster work together to develop the research infrastructure, including the establishment of modern laboratories and training-demonstration centres;

In the area of sustainable buildings, there is a successful cluster example from Austria which has been co-financed by the ERDF (Please see Good Practice Case 14). The Green Building Cluster of Lower Austria involves about 200 members, including a large community of SMEs that make up 80% of these members. The rest are bigger companies, research and education institutions and associations, which are active in energy efficient and sustainable building, refurbishment, energy management and energy technologies.

It is important to mention that there are many opportunities for sustainable energy-related innovation in the construction sector, the management of office and residential buildings, urban and rural planning, transport and the manufacturing and service sectors.

Regions can find innovation and economic potential in **improving the energy performance of buildings**. Buildings account for 41% of energy consumption, making this a key investment area to achieve the EU 2020 targets. Such investment can contribute by enhancing resource efficiency and creating local jobs, as well as by establishing businesses that use the Energy Service Company (ESCO) mode⁸⁹. These activities can be promoted through more complex projects covering towns or neighbourhood systems and

combining several technology options or value chains:

Successful lessons can again be learned from the Green Buildings Cluster of Lower Austria, which created synergies between local enterprises, R&D organisations and skilled craftsmen. This led to important innovations in the refurbishment of old and new buildings, low-energy and passive house standards and sustainable energy technologies as well as healthy and comfortable living. The project was a RegioStars award finalist in 2011. (Please see Good Practice Case 14).

In line with the latest EU recommendations, regions and cities are encouraged to fully exploit the existing EU allocations that support a shift to **more efficient modes of transport**. Clean urban public transport, maximising the use of clean and energy efficient vehicles and also non-motorised transport are the priorities:

The city of Funchal (Portugal) implemented a combination of innovative actions on sustainable urban mobility through ERDF⁹⁰. Inspiration can also be drawn from Linköping in Sweden, which in 1997 pioneered a research development and demonstration initiative on establishing a biogas-based public transport system in the city (Good Practice Case 17). This project became economically viable and then it started to expand. Since 2002, there have only been biogas buses in the urban transport fleet of Linköping. Additionally, many private vehicles switched to biogas and the world's first biogas train began to operate from Linköping, in June 2005.

⁸⁹ http://en.wikipedia.org/wiki/Energy_service_company

⁹⁰ http://ec.europa.eu/regional_policy/videos/

BIRŠTONAS – AN ECO-TOWN

A MODEL FOR THE SUSTAINABLE DEVELOPMENT OF A CITY



AREA



PROJECT



COST

LOCATION

Lithuania/ Kaunas

FUNDING SOURCE

EU CONCERTO Initiative under FP7



Source: <http://www.toloskyds.lt/birstonas/>

Birštonas is the smallest municipality in the Kaunas region of Lithuania with only 5,400 inhabitants. Like all Lithuanian municipalities, it is faced with rapidly growing energy prices. **The ECO-town initiative was specifically developed to reduce the energy consumption of buildings** by introducing energy-efficiency measures and using renewable energy sources. It is part of the CONCERTO initiative under FP7.

The Birštonas project covers an area of 35 hectares, which has around 25,500m² of living space including 13 apartment buildings. It involves a large number of demonstration activities, which are based on the demand side, such as showcasing ECO-buildings and the rational use of energy and also on the production side, like demonstrating various renewable energy technologies. The project runs from 2010 to 2014 and has an overall budget of €9m.

The main results of this project are already evident and include **reduced energy consumption, the use of local renewable energy sources and increased energy generation efficiency.**

Heat generation from biomass has accounted for approximately 60% of all energy needs, and the rest has been covered by natural gas. The installation of an additional 2 Megawatts of heat generation capacity that was based on bio-fuel, enabled the reduction of CO₂ emissions and encouraged the use for fuel

of local wood waste from forests and sawmills. At a later stage, a flue gas condensation unit, which is a special method of heat recovery, will be installed to improve energy generation efficiency. Solar collectors and heat pumps will also be provided and these should be able to supply the energy for heating water.

Source: <http://www.ecolife-project.eu/TheProjectBirstonas.html>



KEY MESSAGE

Investment in technology development and demonstration activities is essential to promote the transition to a more sustainable energy system.

For further information please see:

- <http://regions2020.eu/cms/>
- <http://www.ecolife-project.eu/TheProjectBirstonas.html>



HOW TO TAKE ACTION: INTEGRATING RESEARCH AND INNOVATION INTO SUSTAINABLE ENERGY IN SMART SPECIALISATION STRATEGIES

Given the ambitious energy and carbon reduction targets, coupled with the significant financial allocation of the cohesion and structural funds, regions should consider the integration of energy aspects into their RIS3 plans.

When initiating activities focused on sustainable energy, it is important that **Managing Authorities cooperate with their national representatives in the SET-Plan Steering Group⁹¹**. This will help to keep them up-to-date with developments at European and national levels and, more importantly, to find complementarities and synergies with other initiatives and co-financing opportunities.

ANALYSIS OF THE REGIONAL CONTEXT AND ITS POTENTIAL FOR RESEARCH AND INNOVATION IN SUSTAINABLE ENERGY

Innovation strategies and programmes targeting sustainable energy need to start with a 'state-of-play' assessment in order to focus actions and investments on areas, which have the most promising potential. This will require an assessment of the local innovation capacities and technical potential for sustainable energy technologies, as well as an analysis of barriers and drivers.

RECOMMENDATION

Make the best use of the latest innovative tools and technologies such as ICT in assessing the potential for sustainable energy.

■ **An assessment of innovation capacities** underpins any judgement on the type of sustainable energy research and innovation activities that should be included under RIS3. It involves an analysis of relevant R&D expertise, the availability of research organisations with a suitable profile, and also a screening of companies, SMEs and organisations that are capable of pursuing innovative initiatives. These initiatives could cover improving energy performance in companies, transport and the building sector, which are not necessarily based on R&D intensive activities.

■ **An assessment of renewable energy potential** will focus on the potential that is exploitable from the economic, technological, social and environmental points of view. This potential largely depends on the region's natural endowments and geographical location. Often, renewable energy assessment studies have already been undertaken and are available from national or regional energy or environmental ministries or from local research institutes. However, modern methods based on ICT enable a more precise assessment and better-informed and more sustainable planning that includes a consideration of natural heritage, natural hazard zones and accessibility:

The GIS-based planning tool for renewable energy used in the cross-regional GISOR project enables the efficient acquisition, development and sharing of geographical and socio-economic data about this single eco-region that spreads across three countries in the Upper Rhine (Please see Good Practice Case 9).

⁹¹ <http://ec.europa.eu/energy/technology/>

THE BALTIC ECO-ENERGY CLUSTER

A GREEN ALTERNATIVE FOR NORTHERN POLAND



AREA



PROJECT



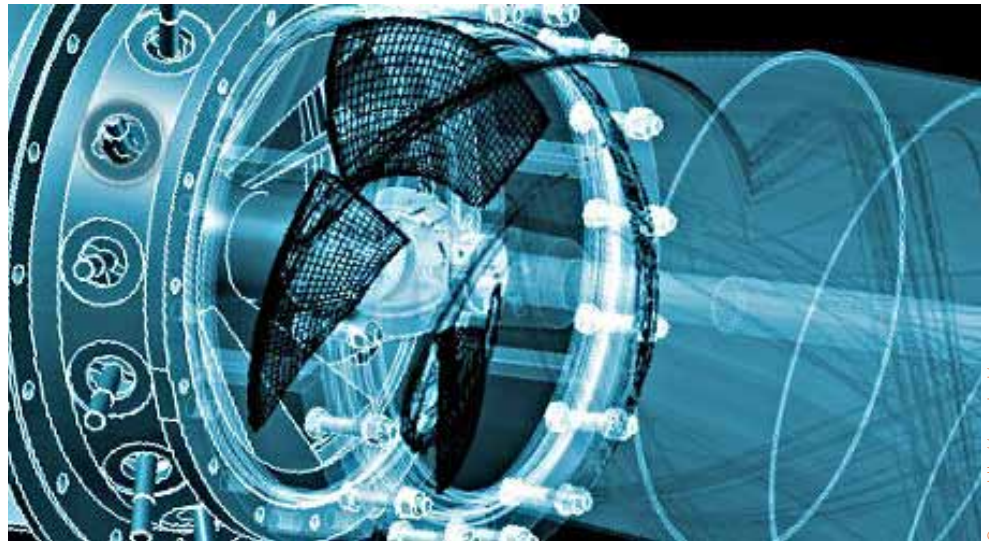
COST

LOCATION

Poland/Pomorskie
and Warmińsko-
Mazurskie

FUNDING SOURCE

Regional Funding,
ERDF, Private Invest-
ment



Source: <http://imp.gdap/>

The Baltic Eco-Energy Cluster (BEEC) was established in 2007 to **better use the largest resource of sustainable energy in Poland and exploit the regional science and technology potential**. Geographically, BEEC's activities cover the area of Northern Poland from Koszalin through Pomorskie Voivodeship to the eastern confines of Warmińsko-Mazurskie Voivodeship. It associates almost 50 partners from academia and local government bodies, as well as businesses that are based in these administrative provinces.

The main mission of the BEEC is to introduce and promote **distributed co-generation**. This is the simultaneous small and medium scale production of thermal energy and electricity from renewable energy sources such as biomass and also from converting water, solar and wind energy. The cluster participants jointly implement the projects that involve the establishing of new agro-energy complexes, which are small and medium-scale co-generation power plants, in the macro-region. They work together to develop the research infrastructure, including the provision of modern laboratories, training and demonstration centres. The BEEC's activities are supported by EU structural funds. The cluster also coordinates the collaboration with other Baltic countries on sustainable energy research and development.

The main effects of the cluster's activities have been a **significant increase in the use of renewable energy sources** in northern Poland, the development of **biomass recycling technology from communal and industrial waste and the reduction of biological pollution** in rural areas. Besides developing new technologies, the BEEC is also improving the competitiveness of the enterprises in northern Poland.

KEY MESSAGE

Cluster development focused on sustainable energy can help authorities to meet the energy needs of their residents in an environmentally friendly way. It can also foster research activities, improve the competitiveness of regional enterprises and increase employment and tax incomes.

For further information please see:

- <http://www.imp.gda.pl/en/beec/>
- <http://www.imp.gda.pl/>

■ **An assessment of energy efficiency and energy savings potential.**

Depending on the focus of the energy efficiency activities such as public buildings, housing, industrial processes or SMEs, the assessment process will be based on different techniques and data collection methods. These can be energy consumption statistics or dedicated surveys but it is useful to know the state-of-the-art techniques that are currently available and can make the most precise assessments:

The ERDF co-funded project, 'EnergyCity',⁹² supported the collection of an extensive set of digital data in seven cities via aerial and ground surveys. Selected urban areas are over flown to collect thermal images using cameras mounted on an aircraft. These images show heat energy losses

92 www.energycity2013.eu

93 <http://setis.ec.europa.eu/about-setis/technology-map>

from buildings, ground features and even objects below the ground. This data enables a much more precise planning of energy efficiency measures.

■ **A comprehensive analysis of the barriers to, and drivers of,**

RTDI in sustainable energy. Each region has its own set of conditions and factors that can drive or hinder initiatives and projects that aim to promote research and innovations in sustainable energy. Similarly, each type of technology experiences a specific set of barriers and responds to particular driving factors. In carrying out this analysis, authorities and the project planner can benefit from the guidance offered in the SET-Plan Technology Map⁹³, which provides a detailed analysis of the barriers faced by each of the 20 energy technologies.

FIGURE 18 - BARRIERS TO, AND DRIVERS OF, SUSTAINABLE ENERGY DEVELOPMENT ▼

In the promotion of sustainable energy innovations, Managing Authorities and project initiators need to be ready to address all barriers to, and drivers of, sustainable energy. These can be classified as follows:

- **Technological and knowledge capital** or in other words skilled people, specialists and engineers and innovative companies. This is a crucial factor in building a new green energy system and in promoting innovation and development in actual projects. As in any other sector, the development of new technologies for energy is the result of the accumulation of knowledge and experience, as well as the creativity of institutions and the population in general. Fragmentation of existing knowledge reduces progress in the sector. In addition, the efficient transfer and adoption of technology is only possible if the recipient has the necessary expertise. Please see also the studies of the ReRisk project⁹⁴, which proved that the adaptive capacity of regions is chiefly dependent on innovation performance;
- **Natural resource endowment** including the sun, biomass, hydro, marine and land resources and local weather and geographic conditions can provide a very good breeding ground for certain types of energy technologies or sometimes even prevent the economic efficiency of others. Countries with abundant sun can successfully capitalise on solar energy solutions, while shifting away from carbon-based energy systems. In the case of biomass energy, water availability is an important issue to consider, as it might have a large impact on the availability of biomass. ▶

94 <http://www.rerisk.eu/>

- **Economic determinants** can include:
 - ▶ Cost competitiveness with fossil fuels;
 - ▶ Cost of implementing energy projects, which can still be high for geothermal energy, fuel cell and hydrogen energy and marine energy;
 - ▶ Prices for raw materials such as steel, concrete, copper, precious and rare earth metals;
 - ▶ Prices for components like turbines;
 - ▶ Grid connection costs and grid transmission capability, especially for renewable electricity projects;
 - ▶ Very tight conditions for financing, as a result of the current economic crisis.
- **Technological factors** facing many energy technologies vary. For example:
 - ▶ The need for grid infrastructure and connections in the area of renewable energy;
 - ▶ Low conversion combustion technologies in biomass-based energy;
 - ▶ Hydrogen and fuel cell technologies still tackle the challenges of performance and durability of fuel cells;
 - ▶ The efficiency of large-volume carbon-free hydrogen production and storage safety of captured CO₂;
 - ▶ The energy density of onboard hydrogen storage and systems integration.
- Often energy technologies experience **administrative barriers**. These include lengthy procedures, too many authorities being involved, inexperienced civil servants, the non-homogenous application of regulations and unclear administrative frameworks.
- **Policy and regulatory environments** can be both a driver of, and a barrier to, the development and dissemination of low carbon solutions. For example, the implementation of feed-in tariffs for renewable energy can ensure the wider diffusion of small green energy installations that have a reduced environmental impact in comparison to large power stations. On the other hand, the continued subsidising of fossil fuel-based energy weakens the competitiveness of renewable energy industries. Additionally, the stability and consistency of the institutional environment ensures clearer market signals like continuous feed-in-tariffs, stable tax benefits and investment. For new or disruptive technologies like hydrogen, the institutional hurdles are a lack of policy and regulatory support in moving from demonstration to large-scale deployment.
- **Cultural factors** are associated with consumer choice, behaviour and perception of, and dedications to, sustainable practices. In many parts of Europe this is becoming a driver for green energy solutions, as both public and private consumers are more and more inclined to go for green energy suppliers that invest in energy efficiency measures. Nevertheless, there is still some resistance to, and lack of social acceptance of, some technologies like wind farms and geothermal. Thus, there is considerable room for activities that promote awareness amongst consumers and changes in their behaviour.

ENSURING THE PARTICIPATION OF STAKEHOLDERS

Initiatives promoting sustainable energy infrastructure and practical measures in a particular community or district will require a strong collaboration network with a range of partners. These can include local authorities, local energy and innovation agencies, NGOs and associations, housing corporations, technology developers and providers, urban planners and architectural specialists.

RECOMMENDATION

Involve a wide range of actors (economic, innovation, public, not-for-profit organisations) in introducing sustainable energy into the RIS3 and in its implementation.

National, regional and local authorities play a key role in sustainable energy initiatives implemented under the cohesion policy support. They are central in defining the energy priorities and integrating them into the RIS3, as well as in facilitating the dialogue with, and between, investors, businesses, research organisations, consumers and civil society organisations.

Local and national innovation and energy agencies are some of the most important stakeholders in regional development initiatives. They have a very clear view of the local needs and potential related to resource endowment, entrepreneurship, innovation and investment. They also have a good perspective on the regional, national and EU's economic and environmental goals. Their involvement is essential in assessing the potential integration of a sustainable energy priority into the RIS3 and they play important roles in the development, management and monitoring and evaluation of concrete actions and projects. Efficient exchange and cooperation should be established between innovation and energy agencies as it could lead to fruitful synergies in meeting national or regional energy and innovation objectives.

A similar role can be played by research institutions and universities and together with businesses, which can also pursue R&D, they can produce state-of-the-art solutions that are specifically tailored to local needs and possibilities.

Ensuring the involvement of the relevant economic actors like businesses, manufacturers, SMEs, technology providers, energy producers, transport companies and ESCOs is very important in many stages of RIS3.

A key enabling factor for the development of sustainable energy in the EU will be citizens' participations and the role of non-profit organisations like NGOs and consumer associations. Strengthening community-based renewable energy is one form of **much needed social innovation**. In many parts of Europe, the booming sector of decentralised renewable energy production is largely in the hands of local associations that buy shares in renewable energy production sites. NGOs and consumers' associations have vast networking potential, expertise, knowledge and interest, both in the sustainable energy field and in project and programme facilitation. Thus, they are welcome stakeholders in the programmes and projects supported under the regional policy. In this respect the proposal in the 2014-2020 cohesion policy on Community Led Local Development (CLLD)⁹⁵ represents a real opportunity to support bottom-up social innovation for sustainable energy.

Depending on the type of programme, the combination of stakeholders to be involved in the project or initiative can vary substantially. For example, in projects that support R&D and the commercialisation of new energy solutions, a partnership should be fostered between research institutes, business companies, innovation support agencies and, if necessary, financial actors. All in all, where a **sustainable energy priority is included in the RIS3, a wider involvement of many types of actors can enable a more effective delivery.**

⁹⁵ http://ec.europa.eu/regional_policy/

FIGURE 19 - POTENTIAL STAKEHOLDERS IN THE SUSTAINABLE ENERGY PROJECTS ▼

POLICY MEASURES AND ACTIONS

After a comprehensive diagnosis of potential, barriers and drivers, the authorities and local project planners need to focus on the development of appropriate activities, projects or support programmes.

During the current and next funding periods, all regions, according to the Commission's proposal, will have to invest a significant amount of ERDF funding in sustainable energy, including renewable energy, energy efficiency and smart grids. However, not all regions have the potential to specifically invest ERDF funding in research, technological development and innovation for sustainable energy through the RIS3 process. Nevertheless, **each Member State and region should aim to capitalise on the funding opportunities in a smart way and invest in advancing its local research, development, innovation and technological capabilities.** The investment decision should be made in a long-term perspective and should also contribute to achieving the vision of a smart and sustainable region or country.

With this in mind, the national and regional authorities should start by:

■ **Conducting a policy screening exercise** to assess the extent to which the policy framework supports the development of research and innovation in the field of sustainable energy. The authorities also need to identify:

- ▶ What support measures are already in place that address innovation and the dissemination of sustainable energy practices and technologies;

- ▶ Whether these are effective in terms of the activities selected; and

- ▶ Whether sustainable energy development and research are hindered by a lack of policy support.

■ **Introducing new, or adjusting existing, policy support instruments** that will assist in the building of a sustainable energy system in the country or region. Today's policy experience offers a wide range of policy instruments including those outlined below.

- ▶ **Supply side measures**, such as R&D subsidies, advisory, training and information support, can be helpful in promoting state-of-the-art research and experimentation with new energy generation processes and technologies and new energy efficient materials. Funding can also support the promotion of networking and collaborative research, setting up competence centres, clusters or science and technology-parks and focusing on energy efficiency and clean energy.

- ▶ **Demand side measures** provide indirect support for sustainable energy technologies and practices by creating a greater market demand through tax-breaks, public procurements, certification and labelling. Green labelling and Green Public Procurement (GPP) are already used and are sustaining the market competitiveness of renewable energy-based electricity. The application of feed-in-tariffs has also been very important to the diffusion of new products and approaches such as solar PV installations that are now installed in households in several EU countries.

In addition, demand for clean energy services can be promoted by increasing consumer awareness, regulatory measures and imposing

RECOMMENDATION

Introduce an efficient policy mix of supply and demand measures to stimulate research and innovation in sustainable energy, and ensure favourable framework conditions and efficient governance.

MAKING URBAN TRANSPORT MORE SUSTAINABLE

LINKÖPING USES 100% BIOGAS FOR ITS PUBLIC TRANSPORT



AREA



COST

LOCATION

Sweden / Linköping city

FUNDING SOURCE

Regional government



Source: MeldEfficient website (<http://www.meldefficient.com/>)

Linköping promotes circular resource flows in the city by producing biogas from food waste and agricultural residues and using it to power the public transport system. The Linköping Biogas plant began operating already in 1997 to treat organic waste from the agricultural sector in Southeast Sweden. Another main purpose was to produce biogas for the city's buses that, in turn, would reduce the local, regional and global emissions from the urban transport system.

The Biogas plant has an annual treatment capacity of 100,000 tonnes of waste and produces 4.7 million m³ of upgraded biogas that is 97% CH₄. This fuels 64 buses and a number of vans and heavy duty vehicles. Due to strong political support and local economic co-operation, the project has been a resounding success. Since 2002, there have only been biogas buses in Linköping and this has produced a reduction of more than 9,000 tonnes per year in CO₂ emissions.

In June 2005, the world's first biogas train headed down the track from Linköping to Västervik. The train had been converted from diesel to bio-methane propulsion by changing the engine and equipping it with enough cylinders to store the compressed biogas that was needed for its journeys.

KEY MESSAGE

Promoting sustainable transport solutions is one of the most effective methods of mitigating climate change and promoting the energy independence of regions, cities and towns.

For further information please see:
<http://www.iea-biogas.net/>

standards such as eco-design and energy efficiency in buildings.

Authorities can also introduce more innovative elements in the form of regional and local incentives for applying innovative energy-efficient materials in the construction and transport sectors, as well as promoting innovative business models and services like ESCO.

- **Introducing an efficient policy mix of supply and demand measures and ensuring favourable framework conditions and efficient governance.** Market based instruments like carbon tax, carbon credit generation and capitalising on the opportunities offered by carbon markets under the Joint Implementation Mechanism of the Kyoto Protocol can create additional stimuli for sustainable energy measures⁹⁶.

- Considering possible **complementarities with other national and current EU initiatives and strategies.** Under the Smart Cities and Communities European Innovation Partnership various technological innovations can be promoted in the areas of smart building, mobility and zero-energy building⁹⁷. The EU Research Framework Programme (FP)⁹⁸ and the forthcoming Horizon 2020⁹⁹ support a wide range of research and innovation projects, while the Energy Efficient Buildings European Initiative (EeB EI)¹⁰⁰ offers support for research and demonstration. The initiatives of the Covenant of Mayors¹⁰¹ can complement the development of a long-term vision of a sustainable and smart region and ensure a wider involvement of stakeholders in initiatives in the energy field.

In selecting priorities for the RIS3, the stakeholders and authorities involved should follow evidence-based methods

building on the comparative advantages of the region and the entrepreneurial process of discovery, as this will produce the greatest positive long-term impact for the region. Some possible approaches are listed below.

- **Experimentation and demonstration** projects can provide valuable opportunities to invest in local research and innovation capabilities and develop locally-tested solutions. There are several excellent examples of regions designing their local economies around the development of sustainable energy industries and this, in turn, has increased their competitiveness:

As illustrated in Good Practice Case 13, Scotland's renewable energy programme provided substantial support for experimentation and R&D activities, which contributed to this region's world leadership in offshore renewable energy technologies;

The German port of Bremerhaven had been a region with high levels of unemployment. However, it experienced a remarkable economic upturn, through its transformation into a major knowledge centre in Germany and Europe¹⁰² on offshore wind power. Targeted investment helped Bremerhaven to develop new fields of excellence and become attractive to companies in the wind energy sector.

Not all regions can promote such large scale programmes but they can mount medium and smaller scale demonstration or pilot projects addressing local needs. These can include the testing of new innovative technologies and practices, and R&D results, like:

The development of new energy efficient materials, 'first of a kind'

⁹⁶ Read more about JI at <http://ji.unfccc.int/>

⁹⁷ <http://ec.europa.eu/energy/technology/>

⁹⁸ http://ec.europa.eu/research/fp7/index_en.cfm

⁹⁹ <http://ec.europa.eu/research/horizon2020>

¹⁰⁰ www.e2b-ei.eu

¹⁰¹ www.eumayors.eu/about/covenant-of-mayors_en.html

¹⁰² Please see more on <http://www.renewableenergyworld.com/rea/>

industrial scale projects for concentrated solar power, marine energy harvesting and second or third generation of bio-fuels with limited impact on land-use; or

New ideas and complex measures that could include more state-of-the-art energy efficient building, architectural design and eco-symbiosis based on energy exchange among several infrastructures (Please also see the systemic solutions discussed below).

R&D and demonstration activities can be promoted by **supporting local innovation clusters** and **fostering incubators** for cleantech start-ups.

- **Introducing innovative solutions that lead to smart transformations in traditional systems** of energy supply and urban mobility should be seen as an opportunity to simultaneously address local infrastructure needs and build local technological capabilities:

The biogas-based transport system project in Linköping, Sweden, is an example of bold experimentation and novel infrastructure. The ambitious efforts of the city authorities and local research and innovation actors resulted in an innovative scheme, which solves the problem of organic waste and water and secures energy independence for local public and private transport (Please see Good Practice Case 17);

The Birstonas Eco-Town project offered more systemic solutions for local energy and heating. Besides improving the energy efficiency of buildings, it promoted the application of more advanced solutions, including transforming a coal-based heating plant into biomass-based heat generation facility and introducing heat

pumps and solar collector (Please see Good Practice Case 15).

- There are many innovation opportunities in **projects that work to produce systemic eco-innovative solutions**, such as sustainable cities and industrial symbiosis. Relevant examples, such as Tweewaters in Belgium, Hammarby Sjöstad in Sweden and Industrial Symbiosis Projects in the UK, have already been described in this guide. Such projects are of great strategic value, as they guarantee the highest sustainability impacts and their results are expected to be disseminated widely.

Systemic eco-innovation projects always have sustainable energy as one of their major pillars. They do not focus on a single technology, but try to integrate a number of technological and non-technological solutions to achieve superior performance and long-term sustainability. For example, they might use clean energy from solar PVs or biogas, combined with insulation, heat recovery or zero energy buildings. They are often supported by ICT applications that help to monitor and avoid energy loss and they can also be combined with low-carbon mobility solutions. Thus, such projects help to build technical and R&D expertise and promote cooperation between companies and R&I actors on several topics or specialities.

MEASURING PROGRESS IN SUSTAINABLE ENERGY PROJECTS AND ACTIVITIES

¹⁰³ <http://setis.ec.europa.eu/>

¹⁰⁴ For example please see here: http://ec.europa.eu/regional_policy/

While planning their activities, Managing Authorities should include a comprehensive monitoring and evaluation system. Each programme and project should have a well-defined set of indicators that will enable progress in activities, outputs and results to be determined. Indicators will have to reflect the objectives and types of project and these can vary significantly. Some examples of indicators that can be used to measure projects and programmes, which promote research and innovation in sustainable energy, are presented below. Managing authorities can benefit from the Key Performance Indicators elaborated in the framework

of the SET Plan by SETIS (the information system of the SET Plan¹⁰³) which represent a useful toolkit for monitoring and reviewing the overall progress of the European Industrial Initiatives of the SET Plan, of individual research, development and demonstration activities performed in frame of their implementation.

The monitoring and evaluation systems and indicators that are adopted will have to reflect the peculiarities of each project. Project and programme developers should refer to specifically designed resources and guides for the monitoring and evaluation of programmes and projects¹⁰⁴ and should also consult experts in monitoring and evaluation during the planning process.

FIGURE 20 - EXAMPLES OF INDICATORS THAT CAN BE USED IN RTDI-FOCUSED SUSTAINABLE ENERGY PROGRAMMES ▼

RESOURCE INDICATORS	OUTPUT INDICATORS	RESULT INDICATORS
€ allocated for R&I Human effort invested (days) Subsidy (in €) for each kWh of renewable energy Training courses (days/€) Organisational or regulatory means introduced	No. of patents in RES and EE filed No. of publications on RES and EE topics submitted to journals No. of households with improved energy efficient properties No. of SMEs received advice/training in energy management No. of cars/buses running on biogas	ENVIRONMENTAL CO ₂ , SO ₂ reduced Air quality improved
		(ECO-)INNOVATION Application of patents in products and processes Popularity (sales) of the new product on the local market Spin-offs based on the energy R&D project or initiative
		ECONOMIC Increase in energy efficiency savings in € % Profit from sustainable energy projects in € No. of carbon credits generated Increase in turnover revenues and return on investment in €
		SOCIAL No. of jobs created Improved mobility possibilities Improved quality of energy services No. of new businesses created

TOWARDS ENERGY SELF-SUFFICIENCY

NAVARRA REAPS THE BENEFITS OF INVESTMENT IN R&D



AREA



PROJECT



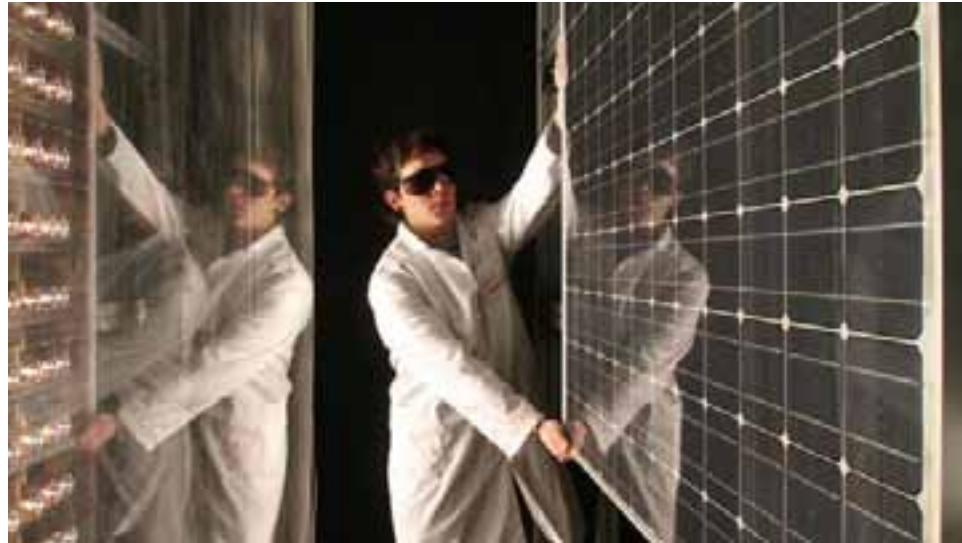
COST

LOCATION

Spain/Navarra

FUNDING SOURCE

Spanish Government, Government of Navarra, ERDF



Source: http://secure.cener.com/documentos/CAT_GENERAL_INGLES.pdf

Navarra is transforming itself from being a region dependant on imported energy into a champion of sustainable energy production. By 2009, 81.2% of the electricity demand in the region was powered by renewables. The total installed capacity of renewable electricity plants was close to 1,507 MW, of which 980 MW was derived from wind power.

Over the last twenty years, Navarra has been actively investing in innovative technologies and the development of a local market for renewable energy. This has implied **the design of regional renewables strategies**, which emphasised the **role of R&D** activities in reaching their objectives. Navarra's institutional support schemes included **financial assistance** and **tax credits** for renewable energy investments and R&D and innovation projects in this field. **In the period 2005-2011, renewable energy companies invested more than €900 million in new projects. Navarra's renewable energy industry also generated 5,000 jobs and 5% of the region's GDP by 2011.**

One key investment was the National Renewable Energy Centre of Spain (CENER). CENER was founded in 2002, and its main activities revolve around R&D&I projects for technology development. It offers assistance to local companies in component testing and certification and in technical and economic feasibility studies. All these activities support the commercialisation of new technology. The Centre has invested in state-of-the-art technological infrastructures, modern laboratories and facilities for testing prototypes. All R&D&I infrastructure projects, including the building of the Centre's headquarters, have been carried out with support from the ERDF, totalling around €5.7 million.

Navarra is advancing the role of renewable energy in the region through its Third Renewable Energy Plan: Horizon 2020. It is also **prioritising renewable energy in the MODERNA Plan - Navarra's RIS3 Strategy**. Recognising its potential, the European Investment Bank will finance the business projects, developed as part of the MODERNA Plan, to a total of €250 million.

KEY MESSAGE

Strategic investment in R&D infrastructure and continuous support for technology commercialisation has led to a global recognition of Navarra as being at the cutting-edge of renewable energy production.

For further information please see:

- www.modernanavarra.com
- <http://www.cener.com/en/index.asp>

IN SUMMARY

- Many Member States and regions have considerable opportunities to benefit from the integration of sustainable energy into their RIS3. Whether and how these opportunities will be deployed depends on the strategic approaches being developed and applied by the RIS3 partners and the Managing Authorities;
- In the current and forthcoming funding periods, regions and Member States should take the opportunity to make a break-through in establishing or upgrading their innovation capacities and capabilities in sustainable energy as well as to join forces within the strategic frame of the SET-Plan. This can help them to ensure sustainable growth for their economies and additional jobs for their citizens.


**FURTHER READING -
SUSTAINABLE ENERGY**

SOURCE	DESCRIPTION	WHERE TO FIND IT
DG ENERGY RENEWABLE ENERGIES	<p>Includes information on EC Communications, action plans and progress reports on energy policy targets. Also provides links to European Technology Platforms in the field of sustainable energy such as:</p> <ul style="list-style-type: none"> ▶ The European Wind Energy Technology Platform ▶ The European Photovoltaic Technology Platform ▶ The European Bio-fuels Technology Platform ▶ The European Technology Platform for the Electricity Networks of the Future ▶ The European Technology Platform on Renewable Heating and Cooling ▶ Zero Emission Fossil Fuel Power Plants ▶ The Sustainable Nuclear Technology Platform ▶ The Fuel Cells and Hydrogen Joint Technology Initiative (FCH JTI). 	http://ec.europa.eu/energy/renewables
DG ENERGY ENERGY EFFICIENCY	<p>Includes policy documents, information on policy implementation, funding, research and demonstration initiatives and explanatory videos on energy efficiency topics.</p>	http://ec.europa.eu/energy/efficiency

SOURCE	DESCRIPTION	WHERE TO FIND IT
DG ENERGY SMART CITIES AND COMMUNITIES	Provides information on the European Innovation Partnership on Smart Cities and Communities. The partnership proposes to pool resources to support the demonstration of energy, transport and ICT in urban areas. The energy, transport and ICT industries are invited to work together with cities to combine their technologies to address cities' needs. Information is given on how the partnership works in practice, what is the funding available for demonstration projects and what kind of projects could be co-financed.	http://ec.europa.eu/energy/technology/
THE SET-PLAN	The SET-Plan establishes an energy technology policy for Europe. It is a strategic plan to accelerate the development and deployment of cost-effective low carbon energy technologies. The SET-Plan Steering Group (SET-Group) is composed of high-level Member State representatives who have sufficient expertise to provide realistic advice on community and national R&I investments. The Information System (SETIS) provides an updated Technology Map, which presents a snapshot of current energy technology market solutions.	http://ec.europa.eu/energy/technology/ http://setis.ec.europa.eu
THE EUROPEAN ENERGY RESEARCH ALLIANCE (EERA)	The objective of EERA is to accelerate the development of new energy technologies by conceiving and implementing Joint Research Programmes in support of the SET-Plan. These programmes combine national and EU sources of funding to maximise complementarities and synergies. EERA members are 15 leading European Research Institutes.	www.eera-set.eu
EIT KIC INNOENERGY	This is a European innovation community on sustainable energy, which comprises 89 members from industry, research and education. It is a long-term (7-10 year) partnership, which focuses on innovations in the fields of: Clean Coal Technologies; European Smart Electric Grids and Electric Storage; Intelligent, Energy-Efficient Buildings and Cities; Energy from Chemical Fuels; Renewables; and Sustainable Nuclear and Renewable Energy Convergence.	http://www.kic-innoenergy.com/

POSSIBLE SYNERGIES WITH OTHER EU INITIATIVES

There are a number of ways in which Managing Authorities can improve the effectiveness of their policy interventions and create synergies with other policies. They can also work with international and national financial institutions to leverage resources and maximise the use of financial instruments.

There are many opportunities to engage with other regions in the exchange of good practices on a whole range of aspects related to sustainable growth. The European Territorial Cooperation Objective of regional policy, and specifically the **INTERREG** and **URBACT** initiatives, can be used for such exchanges.

Macro-regional and sea-basin strategies can be defined as broadly-based integrated instruments covering several Member States and regions focusing on the alignment of policies and funding to increase policy coherence and the overall impact of public spending. Two **macro-regional strategies for the Baltic Sea** and the **Danube Regions** prepared by the Commission, at the request of the European Council, are already underway. The novelty of the method is the way in which it brings countries together to cooperate on setting goals, aligning funding, and working together to achieve their common objectives, with the Commission providing the overall coordination.

In its '**Practical Guide on the EU Funding Opportunities**'¹⁰⁵, the European Commission provides a detailed explanation of how innovative projects and initiatives can benefit from the sources of funding that it provides. The guide includes up-to-date information about the three main sources of funding, namely:

- The 7th Research Framework Programme;
- The Competitiveness and Innovation

Framework Programme; and

- The Cohesion and Structural Funds that are complemented by information about the European Agricultural Fund for Rural Development and the European Fisheries Fund.

The guide also focuses on additional funding opportunities in the fields of research and innovation. It includes information on the Lifelong Learning Programme and international cooperation in education and on LIFE + in the field of the environment. It also describes the research and innovation funding opportunities that are available in countries outside the European Union, through Pre-accession Assistance and the European Neighbourhood and Partnership Instrument.







Managing Authorities and other regional actors can collaborate with the **relevant authorities in their Member States** to develop targeted pilots. National public agencies implementing environmental, energy, agricultural, forestry, industrial, eco-innovation and other policies should be seen as potential partners in various regional initiatives.









A number of **international and European organisations** also implement projects focused on ecosystem protection, in which they seek to cooperate with national and local authorities, municipalities and businesses. These include such renowned organisations as the World Wide Fund for Nature (WWF), the International Union for Conservation of Nature (IUCN), the Regional Environmental Centre for Central and Eastern Europe (REC), BirdLife International and many other national and local NGOs and grass-roots organisations.










Figure 21 provides an overview of other policies and initiatives that can support RIS3 in promoting sustainable and smart growth.












¹⁰⁵ <http://cordis.europa.eu/eu-funding-guide/>

FIGURE 21 - OTHER POLICIES AND INITIATIVES THAT SUPPORT RIS3 IN PROMOTING SUSTAINABLE AND SMART GROWTH

<ul style="list-style-type: none">  ECO-INNOVATION  ECOSYSTEM SUPPORT  SUSTAINABLE ENERGY 	PROGRAMME DESCRIPTION	RELEVANCE TO AREA
<p>¹⁰⁶ The information about the FP7 can be accessed via CORDIS FP7 Service (http://cordis.europa.eu/fp7/home_en.html) and the European Commission FP7 website (http://ec.europa.eu/research/fp7/index_en.cfm)</p> <p>¹⁰⁷ http://ec.europa.eu/research/energy/</p> <p>¹⁰⁸ http://ec.europa.eu/environment/funding/cip_en.htm</p> <p>¹⁰⁹ http://ec.europa.eu/energy/intelligent/index_en.html</p>	<p>Horizon 2020 (FP7) is the EU Framework Programme for Research and Innovation. It will run from 2014 to 2020 with an €80 billion budget. It will combine all research and innovation funding currently provided through the Framework Programmes for Research and Technical Development, the innovation related activities of the Competitiveness and Innovation Framework Programme (CIP) and the European Institute of Innovation and Technology (EIT)</p>	
	<p>The Seventh Research Framework Programme (FP7) supports specific environmental research projects, predominately in the cooperation (collaborative research) programme¹⁰⁶. The FP7 is designed to support a wide range of participants, including private companies and public organisations, as well as individual researchers. The FP7 programme areas of Cooperation and Capacities are particularly suited to supporting research and innovation activities and increasing capacity in the fields of environment and energy, as well as nanosciences, nanotechnologies, materials and new production. Local research centres can create partnerships with enterprises to access funding for scientific and innovation activities. FP7 offers a great variety of opportunities for energy-related, research funding. The most obvious is the ‘Energy Theme’¹⁰⁷ of the Cooperation Programme which is solely dedicated to energy issues and has a budget of €2.35 billion for 2007 – 2013. Apart from this theme there are other themes in the Cooperation Programme that address issues relevant to energy.</p> <p>In Ecosystem support, the two thematic areas are:</p> <ul style="list-style-type: none"> ■ Food, Agriculture and Fisheries and Biotechnology (theme 2), which is built around: <ul style="list-style-type: none"> ▶ Sustainable production and management of biological resources from land, forest and aquatic environments; ▶ Fork to farm which covers food (including seafood), health and well-being; and ▶ Life sciences, biotechnology and biochemistry for sustainable non-food products and processes; ■ Environment, including climate change (theme 6) including predicting changes in climate, ecological conditions, earth and ocean systems; tools and technologies for monitoring; prevention and mitigation of environmental pressures and risks including health risks; sustainability of the natural and man-made environment. <p>Each theme has been allocated € 1.9 billion of funding for the duration of FP7. In response to the societal challenges to be addressed, the themes will have a steep increase in funding for the forthcoming programming period, under Horizon 2020.</p>	
	<p>The Competitiveness and Innovation Framework Programme – Entrepreneurship and Innovation Programme (CIP-EIP)¹⁰⁷ supports projects in eco-innovation through financial instruments, networking of actors and pilot and market replication projects.</p> <p>The Intelligent Energy Europe (IEE) Programme¹⁰⁸ of the Competitiveness and Innovation Programme (CIP) funds action to:</p> <ul style="list-style-type: none"> ■ Foster energy efficiency and the rational use of energy resources; ▶ 	

 ECO-INNOVATION  ECOSYSTEM SUPPORT  SUSTAINABLE ENERGY	PROGRAMME DESCRIPTION	RELEVANCE TO AREA
	<ul style="list-style-type: none"> <input type="checkbox"/> Promote new and renewable energy sources and to support energy diversification; and <input type="checkbox"/> Promote energy efficiency and the use of new and renewable energy sources in transport (STEER). <p>The IEE programme does not fund technical RTD projects. It addresses non-technological barriers and acts as a catalyst for socio-economic, market, regulatory, policy and institutional changes. The programme has a total budget of € 727 million There has also been some relevant work on sustainable construction also under the CIP Eco-innovation programme.</p>	
<p>¹¹⁰ http://ec.europa.eu/environment/life/</p> <p>¹¹¹ http://ec.europa.eu/environment/life/index.htm</p> <p>¹¹² http://ec.europa.eu/research/</p>	<p>LIFE is the EU's financial instrument that supports environmental and nature conservation projects throughout the EU, as well as in some candidate, acceding and neighbouring countries. The LIFE programme supports projects addressing Environmental Policy & Governance and Information and Communication and tackles nine main themes: nature and biodiversity; air; energy; climate; environmental management; industrial production; urban environment; quality of life; soils, land-use and agriculture; and waste and water. Since 1992, LIFE has co-financed some 3506 projects and contributed approximately €2.5 billion to the protection of the environment¹¹⁰. Grants to finance projects is the main type of intervention of the programme. LIFE+¹¹¹ finances demonstration projects based on studies or tests that have shown initially promising results. Project themes include energy production and distribution, renewable energy technologies, energy-efficiency in different areas, as well as the reduction of greenhouse gases.</p> <p>The EC intends to allocate €3.2 billion over the period 2014-2020 to a new LIFE+ Programme for the Environment and Climate Action. Its sub-programme for the Environment will support efforts for the improved implementation and integration of environmental objectives in the Biodiversity theme. This will include the development of best practices for wider biodiversity challenges, while keeping its focus on Natura 2000. An increased focus on the Environmental Governance and Information theme will promote knowledge sharing, dissemination of best practices, in addition to awareness raising campaigns. The sub-programme for Climate Action will support efforts on Climate Change Adaptation that will focus on increasing resilience to climate change.</p>	 
	<p>Eurostars is a programme under EUREKA that is available to SMEs that run R&D activities. It funds collaborative R&D projects, in which at least two partners develop a new technology or a new product.</p>	
	<p>Energy Efficient Buildings Public-Private Partnership (EeB PPP)¹¹²</p> <p>Energy-efficient buildings (EeB) has a financial envelope of €1 billion to boost the construction sector and aims to promote green technologies and the development of energy efficient systems and materials in new and renovated buildings. This is with a view to radically reducing their energy consumption and CO2 emissions. The programme is financed jointly by industry and the European Commission under the Seventh Framework Programme for Research (FP7). This research programme started in July 2009 and is implemented by DG Research and Innovation, DG Energy and DG Information Society and Media. Calls for proposals were launched in July 2010 and have been launched each July un to 2012.</p>	 

PROGRAMME DESCRIPTION	RELEVANCE TO AREA	 ECO-INNOVATION  ECOSYSTEM SUPPORT  SUSTAINABLE ENERGY
<p>The Smart Cities and Communities Initiative of the EU¹¹³</p> <p>This initiative supports cities and regions in taking ambitious measures to progress towards a 40% reduction of greenhouse gas emissions by 2020, through the sustainable use and production of energy. The EU has allocated €365 million for 2013 under this initiative to support the demonstration of energy, transport and information and communication technologies in urban areas.</p>	 	<p>¹¹³ http://ec.europa.eu/energy/technology/</p>
<p>The Biodiversity Technical Assistance Units (BTAU) project seeks to direct commercial loan funding and public subsidies to create or develop profitable micro, small and medium enterprises, which maintain or enhance biodiversity. Technical Assistance Units have been created in Bulgaria, Hungary and Poland to assist with the development of 'Pro-Biodiversity Businesses' in each of these countries. The BTAU project focuses on those areas of nature that have been recognised as having high value and are included in the NATURA 2000 network¹¹⁴.</p>		<p>¹¹⁴ More information is available on BTAU website http://smeforbiodiversity.eu/</p>
<p>The Business and Biodiversity (B@B) aims to set up and operate the online platform including the collection and preparation of up-to-date information on know-how and best practices. This is with a view to:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Facilitating discussion and cooperation between stakeholders and enhancing business and financial sector engagement; <input type="checkbox"/> Preparing sectoral guidance documents on business involvement; <input type="checkbox"/> Developing clear tools (indicators) to measure biodiversity impacts (benefits); and <input type="checkbox"/> Creating an EU B@B award scheme to acknowledge outstanding performance. 		<p>¹¹⁵ More information is available on http://www.undp-drp.org/</p>
<p>United Nations Development Program (UNDP) and its Global Environment Facility (GEF) Danube Regional Project (DRP)¹¹⁵ seeks to improve the environment of the Danube River Basin, protect its waters and sustainably manage its natural resources for the benefit of its nature and people. The DRP helps 13 countries along this river to implement the Danube River Protection Convention primarily through reducing nutrient and toxic pollution and strengthening trans-boundary cooperation in this most international river basin. Through its partnerships with governments, industry, NGOs and local communities, the DRP provides both technical and financial support. It also has sophisticated public participation and communications strategy, which ensures that all Danube stakeholders are kept aware of relevant issues and can reflect their concerns in appropriate action.</p> <p>The DRP is part of the \$95 million GEF Strategic Partnership for Nutrient Reduction in the Danube and Black Sea Basin. This is one of the GEF's largest, and perhaps most ambitious, water-related projects. The GEF Partnership supports the goal of the Commission for the Danube and Black Sea to reduce nutrient and toxic loads to enable the Black Sea's ecosystems to re-attain the levels and conditions that existed in the 1960s.</p>		
<p>National Sustainable Development Initiatives and Agenda 21 normally cover the topics of biodiversity and natural resource conservation. Municipalities throughout EU27 have adopted local Agenda 21 programmes but there are considerable differences between Member States, as levels of involvement in each country range from 10% to 65% of the total number ►</p>		

 ECO-INNOVATION  ECOSYSTEM SUPPORT  SUSTAINABLE ENERGY	PROGRAMME DESCRIPTION	RELEVANCE TO AREA
	<p>of municipalities. These programmes provide a solid basis for the analysis and planning of activities focused on ecosystems protection.</p>	
	<p>The European Energy Programme for Recovery has allocated around € 1 billion to Carbon Capture Storage demonstration and €565 million to Offshore Wind demonstration (http://ec.europa.eu/energy/eepr/index_en.htm).</p>	
	<p>The Research Fund for Coal and Steel (RFCS) supports research projects in the coal and steel sectors. Amongst other aspects, these projects promote environmental protection and the reduction of CO2 emissions from coal use and steel production. A total of €55 million per year is made available to universities, research centres and private companies to finance projects that are relevant to the funds' objectives.</p>	
	<p>The NER300 Funding Programme, under the DG CLIMA's demonstration support initiative, provides substantial funding for the large-scale demonstration of low carbon energy technologies in Europe and it is also the world's largest programme in this area.</p>	
	<p>The Common Agricultural Policy (CAP)¹¹⁶ supports both the supply of bio-energy from agriculture and forestry, as well as the use of bio-energy on farms and in rural areas.</p>	 
	<p>The European Investment Bank offers loans in various formats to support energy investments that depend on project size and category. The lending target for 'energy' was set at € 7 billion for 2009 and 2010.</p>	  

116 http://ec.europa.eu/agriculture/bioenergy/index_en.htm

LIST OF ABBREVIATIONS

BEEC	The Baltic Eco-Energy Cluster
CAP	The Common Agricultural Policy
CBA	Cost-benefit analysis
CF	The Cohesion Fund
CFP	The Common Fisheries Policy
CH ₄	Methane
CO ₂	Carbon dioxide
CSF	The Common Strategic Framework
CSR	Corporate Social Responsibility
C2C	Cradle to Cradle
EAFRD	The European Agricultural Fund for Rural Development
EcoAP	The Eco-innovation Action Plan
EFA NRW	Centre for manufacturing SMEs in the North Rhine-Westphalia
EMAS	The European Eco-Management and Audit Scheme
EMFF	The European Maritime and Fisheries Fund
ERDF	The European Regional Development Fund
ESCO	Energy Service Company
ESF	The European Social Fund
ETAP	Environmental Technologies Action Plan
EU	The European Union
GIS	Geographic Information System
GPP	Green Public Procurement
GW	Gigawatt
ICT	Information and Communication Technologies
IEEP	The Institute for European Environmental Policy
ILO	The International Labour Organisation
IMP	The Integrated Maritime Policy
ISO	The International Organisation for Standardization
IUCN	The International Union for the Conservation of Nature
Ji	Joint Implementation
kWh	Kilowatt-hour

MA	Managing Authority
MCA	Multi-Criteria Analysis
MS	Member State
MW	Megawatt
M&E	Monitoring and Evaluation
NGO	Non-Governmental Organisation
NISP	The National Industrial Symbiosis Programme
NRW	North Rhine-Westphalia
OECD	The Organisation for Economic Co-operation and Development
OP	Operational Programme
OPEI	The Operational Programme Enterprise and Innovation
PA	Participatory Appraisal
REC	The Regional Environmental Center for Central and Eastern Europe
RIS3	Research and Innovation Strategy for Smart Specialisation
RTDI	Research, Technological Development & Innovation
R&D	Research and Development
R&I	Research and Innovation
SET-Plan	The European Strategic Energy Technology Plan
SME	Small and Medium-sized Enterprise
TEEB	The Economics of Ecosystems and Biodiversity
TEKES	The Finnish Funding Agency for Technology and Innovation
TNC	The Nature Conservancy
UNEP	The United Nations Environment Programme
US	The United States of America

European Commission

Connecting Smart and Sustainable Growth through Smart Specialisation

A practical guide for ERDF managing authorities Luxembourg: Publications Office of the European Union

2012 — 104 pp. — 21 x 29.7 cm

ISBN 978-92-79-27345-2

doi: 10.2776/70221

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KN-30-12-120-EN-C



Publications Office

ISBN 978-92-79-27345-2



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