ECO-INNOVERA

RESEARCH AND INNOVATION STRATEGY

Eco-Innovera

Boosting eco-innovation through cooperation in research and dissemination

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RESEARCH & INNOVATION STRATEGY

Introduction

Development of a Research and Innovation (R&I) Strategic agenda was a key task in the ECO-INNOVERA project. The R&I strategy should be regarded as living document, bringing together the expertise and knowledge of the network, analysed in the light of the most recent policy and research developments at different points of time.

The main output of this task was a series of strategy documents, each presenting a progressively broader and more detailed analysis. Previous strategy documents were a Position paper, an Interim strategy and a Synthesis Report on Systemic Eco-Innovation by the Dutch Research Institution TNO. These can be downloaded at https://www.eco-innovera.eu.

This document contains the final strategy.

Where the position paper had a horizon of 1-2 years and synthesised the outputs from the workshops and meetings conducted under related tasks, describing the landscape of eco-innovation activities and identify shared high-level priorities and interests of project partners.

The interim strategy had a horizon of 2-4 years and was built upon the position paper as a basis for engagement and discussions with a range of stakeholders. This final strategy document builds on the interim strategy and focuses on the key elements of the agreed strategic research agenda and the proposed actions.

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Executive Summary

ECO-INNOVERA is a European network (ERA-Net) funded by the European Commission with the objective to promote the research, development and implementation of eco-innovation. The network comprises 24 partners, with a diverse membership taken from policymakers, research funders and innovation agencies.

Task 1.2 develops a Research and Innovation strategy for ECO-INNOVERA. The Research and Innovation strategy identifies and prioritises value-adding activities for the partners individually, jointly and at European level. This document identifies discrete activities that the network partners can take forward to accelerate and increase the impact of eco-innovation at national and European scales.

Two key strategic priorities for the future have come out of the work of ECO-INNOVERA:

1. Eco-Innovation is well established in various forms throughout the partners. Target markets, policy drivers, processes and technologies vary, but eco-innovation is being successfully deployed. There is a need to continue to share methodologies and successful practices across the partners and more widely. To continue to provide a community of practice and a knowledge exchange facility.

2. There is an opportunity to have much greater impact by focusing on systemic innovation. Looking at eco-innovation at the level of the sociotechnical system. The ECO-INNOVERA partners have identified two ways in which we can develop eco-innovation at the system level:

    2.1. Build a community of practitioners providing thought leadership, facilitation and cascade mentoring

    2.2. Develop opportunities to incorporate eco-innovation challenges into markets where systemic change is already happening. Areas where business as usual is not sustainable in the coming decades, and where both at national and EU levels there are major programmes to develop new socio-technical systems to meet the needs of future citizens. Examples of areas where the need for systemic change have been identified at the EU level include:

        *   Cities and urban living
        *   Transport
        *   The energy ecosystem
        *   Resource efficiency

By continuing to build a community of practice we can support the wider use of eco-innovation thinking to create incremental improvements in the products and services available in the market.

By aligning work on systemic eco-innovation with major challenge areas identified both nationally and at the EU level we can more effectively influence policy makers and funders, and demonstrate at a much larger scale the value of eco-innovation in navigating towards a more sustainable future.

Introduction

ECO-INNOVERA is a European network (ERA-Net) funded by the European Commission with the objective to promote the research, development and implementation of eco-innovation. The network comprises 24 partners, with a diverse membership taken from policymakers, research funders and innovation agencies.

In the Description of Work (DoW) submitted by the network to the Commission, task 1.2 details a number of activities to be completed in order to develop a Research and Innovation strategy for ECO-INNOVERA. At this level, the ERA-Net functions as a project, intended to form a solid foundation for the better co-ordination of eco-innovation in Europe.

The ambition of the consortium partners, however, goes beyond the project described in the DoW. We believe there is a unique opportunity to build a larger programme of activities, based on the intersection of interests of 24 partners. The Research and Innovation strategy identifies and prioritises value-adding activities for the partners, individually and jointly or at European level. It is the start of the process by which the ERA-Net moves beyond a project into pro-active network. Our ultimate objective is that the network becomes self-sustaining.

Previous work under this task has been described in the Position Paper (ECO-INNOVERA XXXX), and in the Interim Strategy (ECO-INNOVERA XXXX). In this document the outputs of two workshops are incorporated with the earlier work to identify discrete activities that the network partners can take forward, either directly or through influencing others to act, to accelerate and increase the impact of eco-innovation national scales and at a European scale.

Definitions and Frameworks

Definition

The ECO-INNOVERA Partnership has adopted the definition of eco-innovation introduced by the Eco-innovation Observatory (EIO):

> *"Eco-innovation is the introduction of any new or significantly improved product (good or service) process, organizational change or marketing solution that reduces the use of natural resources (including materials, energy, water and land) and decreases the release of harmful resources over the whole life-cycle". (EIO 2010)*

The EIO distinguishes between eco-innovation and eco-industries. Eco industries form sector(s) originating in environmental technologies but also including "green products and technologies" and "green energy", that is serving markets for environmental goods and services. Eco-innovations are considered to be solutions that are novel to both a company and to the market, but may not be driven by explicit requirement to reduce environmental impact. Typically the driver is reducing costs of materials/energy in order to increase competitiveness. (EIO 2010)

The terms eco-efficiency and eco-effectiveness are also sometimes used. In general terms, eco-efficiency approaches tend to work within the boundaries of an existing industrial system, and can be viewed as "doing more with less". Eco-effectiveness approaches imply change at a system level, and are associated with highly circular industrial systems based on a "waste is food" approach as introduced in the influential publication "Cradle to Cradle", referring to "industrial systems that emulate the healthy abundance of nature".

A useful typology for eco-innovation (OECD2009) broadly distinguishes measures as either being primarily technological change or primarily non-technological change.
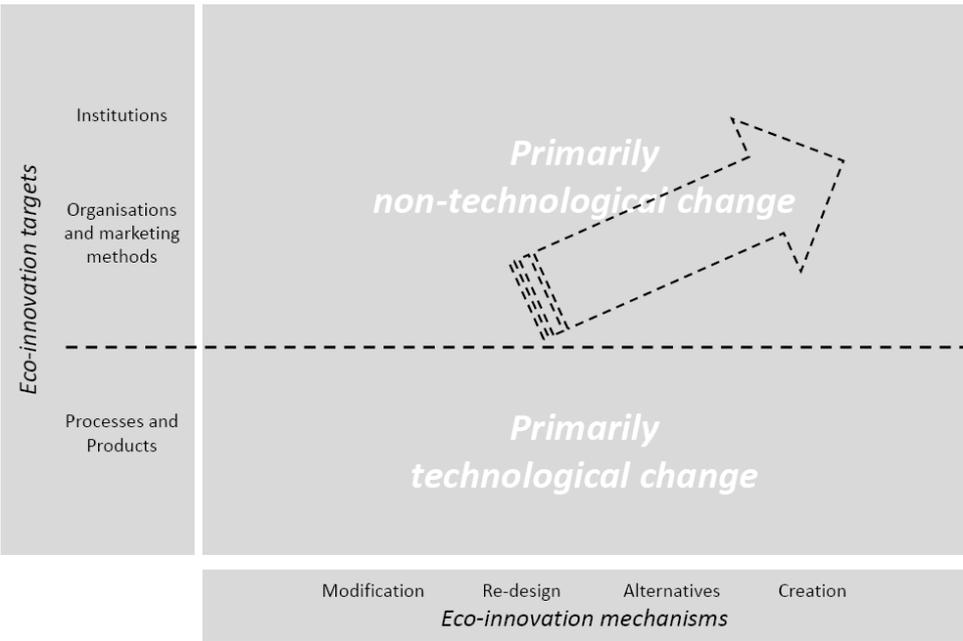

Figure 1: A typology for eco-innovation (OECD, 2009)

The direction of EU environmental policy over the last 30 years broadly corresponds to the direction of the arrow on this diagram. From measures focused primarily focused on pollution control/end-of-pipe technologies, through to cleaner manufacturing / full life cycle approaches through to measures intended to change patterns in consumption and production.

Frameworks

In addition to a working definition of eco-innovation, we need a framework that can map and explain the complex range of options within eco-innovation. Where, when, how and at what level are you intervening?

Previous work has confirmed that no single framework would be sufficient to present and explain the range of eco-innovation policies and activities to a broad audience base.

Currently, ECO-INNOVERA makes use of two frameworks with different objectives and application:

- Eco-innovation landscape: a pragmatic "bottom-up" approach which maps known activities against quasi "sectors" including resources, agri-food, manufacturing, construction and services.   Originally developed as a spreadsheet tool for internal use, we are evaluating the use of visualization software to increase its utility and application.

- CML framework: an open framework designed primarily for use by policymakers. Its current status is described later in this document.

Eco-innovation landscape

The eco-innovation landscape allows us to present case studies of eco-innovation in practice. Each activity is categorized as belonging to one of eight "sectors"

1. Resources (includes primary resources such as minerals, metals, biomass; water, land, air; also secondary resources such as recycled materials)
2. Agriculture & Food (includes fisheries and forestry)
3. Construction & Infrastructure
4. Manufacturing & ICT (includes advanced materials, nanotechnology, electronics)
5. Health (human, animal, plant)
6. Services (includes tourism, creative industries such as (eco)-design)
7. Cross-cutting (where multiple categories apply or for cross-cutting programmes such as fundamental, social or environmental sciences)
8. Energy & Transport (includes energy generation, energy efficiency, road, rail, aviation, marine; integrated transport/mobility approaches)

In addition to these categories, data may be included as required to represent the following characteristics:

1. **Size and scale of the activity** (for example micro / meso / macro level for a policy intervention, or local/regional / national / transnational/ European/International for a project or network)
2. **Mechanism of the eco-innovation** (Processes & products/ Organizational and marketing methods/ institution, as used in the OECD typology in Figure 1)

3. **Target of the eco-innovation** (modification/re-design/alteration/creation, as used in the OECD typology in Figure 1).
4. **Development status** (Fundamental research/ applied research/ demonstration/ market introduction/ market replication)

We are evaluating alternative visualization techniques with the objective to provide a means to map and compare networks, projects (at an EU and individual country level)

These characteristics can be manipulated, using appropriate tags or filters to simplify the visible content, to present the information in a number of view formats.

This landscape could provide a repository of expert information for communication and awareness raising, help mobilize the eco-innovation community and promote dialogue on developments and good practices in eco-innovation. In particular, it could connect actors and platforms at the European level (e.g. ETPs and EIPs) and promote a common, coherent and coordinated approach.

CML Framework

The Institute for Environmental Sciences (CML) at Leiden University, The Netherlands has developed a policy oriented framework for eco-innovation activities. This work has been financed through a contract with the Netherlands' Ministry of Infrastructure and the Environment, Sustainability Department (CML 2012).

The objective of the CML framework is to provide for an analytical understanding of eco-innovation and the factors of influence at the micro, meso and macro levels. It allows for an individual or benchmark assessment of policies, programmes and projects and will help identify suggestions for optimalisation of the policy, programme or project in question.

Key features of the CML framework are that there are:

- an explicit set of documented societal goals, determining the way performance is to be measured
- an explicit treatment of the core mechanisms influenced directly and how they lead to the performance goals also indirectly through other mechanisms involved.

Within the sub-structure of mechanisms in this framework, a distinction is made between mechanisms that operate at a technology, economy and society level. This recognizes the complex nature of multiple interactions necessary to effect high-impact change.

The framework could help policy makers move from supporting individual sector/material/product/process innovations to a more systemic approach which is necessary if sustainability objectives are to be met.

INSTRUMENTS, AS PUBLIC INTERVENTIONS
- Prescriptions & regulations
- Economic instruments
- Information & Values
- Infrastructure

Instruments

MECHANISMS

SOCIETY LEVEL
- Culture
- Institutions
- Organisations

ECONOMY LEVEL
- Macro-structure
- Sectors & Systems
- Firms &Organizations
- Markets

TECHNOLOGY LEVEL
- Products / Product systems
- Processes: Production
- Processes: Consumption
- Processes: Recycling

Mechanisms

PERFORMANCE METRICS (MICRO, MESO & MACRO)
- Economic performance
- Environmental performance
- Social performance

Goals

Figure 2: Eco-innovation framework, as proposed by CML

The CML framework could be also used by research funders to reduce the high uncertainty in the evaluation of the performance of eco-innovation projects and programmes; helping policy makers and programme owners to achieve specific goals, and project developers to consider all relevant factors in an eco-innovation project.

Key Research and Innovation Needs

The ECO-INNOVERA partners and other stakeholders we have consulted suggest that there are two clear needs for ongoing work to develop and embed eco-innovation:

1. Continue to develop a community of practice and a knowledge exchange facility for the incremental deployment of eco-innovation in suitable sectors.

2. Focus on systemic innovation to achieve much greater impact and scope for eco-innovation, targeting fundamental transformation of industry sectors

Community of Practice and Knowledge Exchange

Many European companies are already implementing eco-innovation. The EIO cites a recent report in which 27% of innovating companies in the EU increased their material efficiency as the result of implemented changes (EIO 2011). The 2011 Eurobarometer survey on eco-innovation reported that around 45% of companies had introduced a product, process or organization eco-innovation in the last two years. A small proportion of these (4%) reported that this change led to a more than 40% reduction in material use per unit output that is at the level approaching a Factor 2 eco-innovation. For the vast majority of companies, the improvements were more modest and incremental.

These eco-innovations are in some cases supported by various national, regional or other innovation support schemes, or may an internal response to drivers such as increasing energy or material costs. Several funding agencies have evaluated the effectiveness of support schemes and there is good evidence that support for incremental/low-cost eco-innovation measures provides a good return on investment and are particularly effective in terms of supporting SMEs. (EIO 2011 and references cited therein)

It is important to ensure that European companies continue to make progress in this 'incremental' eco-innovation.

Strategic Need

To continue to develop eco-innovation there is a need to:

1. Connect active practitioners into a community of practice so that individuals are supported and knowledge shared.

2. Provide a knowledge sharing platform so that examples, case-studies, tools and methodologies can be widely distributed.

3. Specifically gather evidence of the successful deployment of eco-innovation to support policy makers, research funders, business and academics to understand the value and potential of eco-innovation.

Actions

The proposed actions are:

1. Continue to develop the ECO-INNOVERA website as a resource for eco-innovation practitioners covering theory, tools, methodologies and examples.

2. Develop the map of eco-innovation projects to become a resource for all stakeholders.

3. Build links to other national and EU groups and projects with an interest in eco-innovation to encourage widespread adoption of eco-innovation thinking.

4. Build the community of practitioners into a self-organising network for mutual support and study, using the website and workshops to link them together around shared topics.

   NB. Experience to date suggests that to be sustainable a community of practice must serve the needs of the practitioners so that it is self-organising and self-maintaining. If it fails to offer regular and on-going value to the target group of practitioners it will not survive.

5. Use the community of expert practitioners to provide evidence on the value and importance of eco-innovation to policy makers, research funders, business and academics.

Discussions at the ECO-INNOVERA Final Conference in Copenhagen in September 2014 supported these proposed actions, and plans are now being made to carry forward to develop the network as a self-sustaining community of practice.

Systemic Innovation

Europe, as an industrialized economy, is an intensive user of resources with consumption averaging around 14.5 tonnes per person. While there have been relative improvements in material efficiency, material consumption increased by 7.8% in absolute terms between 2000 and 2007 at the same time as the economy grew by 35%, as yet the efficiency gains have not been sufficient to bring about a reduction in the overall use of natural resources.

European policy, as articulated in the European Commission's Roadmap to a Resource Efficient Europe and the EcoInnovaton Action Plan, implies an absolute decoupling between economic success and the use of natural resources. The current trajectory for eco-innovation improvements, even if the small proportion of companies achieving near Factor 2 improvements could be massively expanded, cannot achieve this objective.

The EIO has identified the "Eco-Innovation Challenge" which has two components. The first component is to further improve the resource efficiency performance of the EU by promoting eco-innovation and ensuring that the benefits of new solutions are widely disseminated. This is covered in the recommendation of building a Community of Practice and Knowledge Exchange.

The second, and more demanding component is to ensure that the efficiency gains are not offset by growth in the total consumption of natural resources. The EIO estimates that targets for absolute reduction of material consumption ranging from Factor 2 (i.e. 50%) to Factor 5 (80%) will be necessary by 2050 if absolute decoupling of economic growth from material consumption is to be achieved and European policy objectives are to be met. (EIO, 2012).

This objective cannot be met by the kind of incremental improvements being already implemented by businesses across Europe. It requires transformation of entire sectors of the economy. It cannot be delivered by deployment of technological solutions alone; it requires re-evaluation and transformation of entire socio-technical systems.

The opportunities for systemic innovation and the role of eco-innovation in systemic change were explored in two ECO-INNOVERA workshops; one on Systemic Innovation for Sustainable Cities held in Amsterdam in March 2014, and one on Systemic Innovation for Resource Efficiency held in March

2014 in Berlin. The outputs from these workshops are available from the ECO-INNOVERA website (www.eco-innovera.eu/publications).

The thinking of the partners was further stimulated by a report prepared by TNO for the Ministry for Infrastructure and Environment (TNO 2014) that focused on concepts and tools for supporting systemic innovation at national and EU levels.

The results of these workshops were presented and discussed with a wider group at the ECOAP Forum in Hanover in June 2014.

These inputs framed the conclusions of the partners on how best to tackle eco-innovation and systemic innovation.

This is clearly a complex challenge involving many stakeholders. It is not possible for the community of eco-innovation practitioners to drive these changes, no matter how much evidence of successful incremental change is assembled.

Fortunately, there are many sectors where business as usual will not be possible in the future. Major trends and drivers such as shifting demographics, climate and environmental change, and resource constraints, are challenging the existing models. Senior politicians, policy makers and business leaders are responding to these challenges by calling for transformational change. Current examples of sectors faced with systemic transformation include:

- The energy ecosystem – from distributed generation and smart grid technology to demand side management.
- Transport – eliminating congestion and drastically reducing environmental impacts whilst providing improved mobility for a growing population and a growing economy.
- Cities and urban living – the challenge of enabling our urban areas to deliver a strong economy and great quality of life to citizens, whilst reducing the environmental footprint and increasing the resilience and ability to adapt to environmental change.
- Resource efficiency – making more effective use of the materials and resources we use to make our world; cutting the link between economic growth and resource comsumption.

The greatest impact from eco-innovation will come from helping society to tackle major challenges like these.

To achieve this we need to build a theory and practice of eco-innovation within systemic innovation, and to understand that eco-innovation will be part of a much larger story, not an activity in its own right.

Strategic Need
In order to embed eco-innovation as part of the solution to systemic transformation challenges it will be necessary to:

1. Develop an understanding of how eco-innovation fits into large system transformation programmes, and a shared language to work with those programmes.
2. Align programmes so that eco-innovation can become part of the solution for major societal challenges.

3. Provide practical evidence of the contribution of eco-innovation to solving system transformation challenges.

Actions

The proposed actions are:

1. Use the community of practice and its knowledge exchange capabilities to build understanding amongst stakeholders of how to tackle system level eco-innovation.
2. Identify a limited number of major challenges requiring systemic transformation where long range policy and innovation plans are already in place at the EU level.
3. Work with the relevant programme leaders to demonstrate how eco-innovation can help with effective and sustainable systemic transformation, and to integrate it into their programmes.
4. Seek opportunities within these challenge areas for demonstrator projects that will showcase the contribution of eco-innovation to practical solutions.
5. Drive evidence from early projects back into strategic discussions on approaches to major societal challenges.

The key recommendation is to work closely with the leaders of innovation programmes for the major societal challenges that have already been identified at an EU level to incorporate eco-innovation issues and opportunities into their strategies.

Discussions at the ECO-INNOVERA Final Conference in Copenhagen in September 2014 supported these proposed actions; and initial approaches are being made to the management teams of appropriate EU programmes.

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