Eco-innovation and national cluster policies in Europe

A QUALITATIVE REVIEW

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Executive summary

The study “Eco-innovation and national cluster policies” aims to analyse the current links between cluster policy and eco-innovation in all 27 EU Members States. It examines if national cluster policies in EU Member States are being used specifically to support eco-innovation and in what way.

The information for the study was gathered through interviews with government officers responsible or working on cluster policy and, in some cases external experts from all 27 Member States and was complemented through comprehensive desktop research. As a result, the study presents a qualitative snapshot of the most relevant policies and trends at the national level rather than a quantitative listing of all eco-innovative cluster policies in the Member States.

From the analysis of the information obtained, four main subjects have emerged that are detailed in a chapter on thematic results:

- Cluster policies and eco-innovation targets: Differences between older and newer policies
- Cluster policies and eco-innovation: innovation in the cleantech sector vs. eco-innovation in all sectors
- Cluster policies and eco-innovation: a strategic goal vs. additionality
- Cluster policies and eco-innovation: Differences between top-down and bottom-up approaches

Finally, 27 country profiles on national cluster policy and eco-innovation complete the picture. They provide amongst others an overview of national cluster policy, eco-industry in the country, the approach to cluster policy and eco-innovation, and interesting links of reports and web-pages.

The qualitative review leads the authors to conclude that while national cluster policies’ effects are not strong enough to push the creation of a cleantech industry, they do have the potential to further leverage eco-innovation, either sectorally in the cleantech sector or horizontally as an aspect in other industrial sectors.

To better grasp the potential of cluster policies for eco-innovation and the current use of it, it is recommended to further conduct studies focusing on regional cluster policies, where policies tend to be more specific and targeted.

1. Eco-innovation as an emerging priority in EU-27

ECO-INNOVATION

"Activities which produce goods and services to measure, prevent, limit, minimize or correct environmental damage to water, air, soil as well as problems related to waste, noise and eco-systems. This includes technologies, products, and services that reduce environmental risks and minimise pollution"

OECD and EUROSTAT (1999)

Eco-innovation is an emerging priority in the EU, relating to different aspects of almost all industries. According to the Competitiveness and Innovation Program (CIP) (DECISION No 1639/2006/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL, 2006) eco-innovation is a fairly recent business and technology area which describes innovative products, processes and services aiming at reducing environmental impacts. The term is often used to describe a range of related ideas, from environmentally-friendly technological advances to socially acceptable business practices. More specifically, according to the Environmental Technology Action Plan (ETAP) (European Commission, 2004) eco-innovation may be described as: "the production, assimilation or exploitation of a novelty in products, production processes or in management and business methods, which aims, throughout its life cycle, to prevent or substantially reduce environmental risk, pollution and other negative impacts of resources use (including energy use)".

In recent years, the eco-industry in Europe has grown by 8% annually making it one of Europe's most dynamic industrial sectors with a total turnover estimated to be more than 300 billion EURO. In 2008, 3.4 million people were directly employed in the EU eco-industry, which corresponds to about 1.5% of all European employment. Approximately 600,000 additional jobs were created between 2004 and 2008.

The potential of the European eco-industries is also recognised by the financial community: European companies raised $1.6 billion in environmental technologies Venture Capital investment in 2009. The largest sub-sectors deal with waste management (30% of funds raised), water supply (21%), wastewater management (13%) and recycled materials (13%). In addition to these 'core' eco-industries, a wide range of traditional industries are moving into the eco-industry segment such as construction, automotive, ICT, paper and the chemical industry (ECORYS, Part 1 2009).

Moreover, Europe is considered to be a strong eco-innovation player in the world, accounting for approximately 30% of world turnover in eco-related technologies and services. The EU countries together account for 50% of the recycling industry turnover and 40% of the renewable energy sector turnover globally (EACI 2011).

The future outlook on the market opportunities for eco-innovation is also promising as can be illustrated by two figures from the waste sector. The generation of municipal waste is expected to grow by 25% between 2005 and 2020, and today approximately 50% of plastic materials (equivalent to 12million tonnes per year) still go to landfill (EACI 2011).

1.1. Eco-innovation in eco-industries and in traditional industries

With regard to cluster policies, this study aims to investigate both eco-innovation aspects in eco-industries as well as in traditional industries. For the purposes of this study it is therefore important to clarify the distinction that the authors are making between eco-innovation as innovation in eco-industries and eco-innovation in traditional industries such as manufacturing or the textiles sector.

Eco-innovation in eco-industries

Eco-industries and innovation within that segment relate to the environmental technology, services and solutions sectors, such as wastewater treatment or renewable energy. Eco-industries are clearly addressing environmental and climate aspects. In the past, they very much focussed on dealing with specific symptoms, such as the need to manage growing quantities of waste, the consequences of mercury accumulation in fish, the emission of CFCs and CO2. In certain respects, this approach has been quite successful. For instance it has more or less stopped the growth of the "ozone holes", cleaned up water pollution, it has taken dangerous goods off the market and recycled or cascaded products to some extent (Schmidt-Bleek 2010).

Eco-innovation in traditional industries

In traditional industries, eco-innovation is rather driven by economic considerations, i.e. saving resources, whereby the environmental and climate impact of eco-innovation are interesting "side effects" for society. In the manufacturing industry for example, recycling and resource efficiency can unlock large potentials for innovation, growth and higher profitability. In a medium-sized manufacturing company, on average, material consumption accounts for over 40% of operating costs. When adding electricity, waste and wastewater treatment to the bill, resource costs account for nearly 50% of all costs compared to an average of 20% for personnel costs. In this way, eco-innovation and resource efficiency make common economic sense: manufacturing companies can be more profitable by simply using less resources (REMake 2009).

Environmental industries touch both upon process management aspects (environmental R&D, waste management and recycling) and resource management aspects (including water supply, recycled materials, renewable energy production, nature protection and construction). The expansion of the concept of environmental innovation to traditional industries and sectors increases the potential for cross-fertilisation, where eco-industries and traditional industries meet. As expected, this often leads to further eco-innovation, as innovation usually thrives at the intersection of disciplines.

The Eco-innovation Observatory concludes that *"…eco-innovations are by definition solutions that are novel to the company and to the market, whereas eco-industries aim to produce 'green products and technologies' and generate 'green energy', eco-innovation also encompasses goods or processes that are produced without an explicit aim to improve the state of the environment. In many cases, the motivation to invest in eco-innovation may be driven by the objective of reducing costs for materials and/or energy and thus increasing competitiveness and economic success."* (Eco-Innovation Observatory 2011)

The tables below provide examples for eco-innovation in eco-industries and in traditional industries.

1-1Examples of eco-innovation in eco-industries (European Investment Fund 2010)

ACTIVITY	EXAMPLES OF ECO-INNOVATION
Renewable energy sources	• Biomass (electricity a/o heat generation) • Geothermal • Solar photovoltaic and solar-thermal water-heating • Tidal energy, wave energy • Wind power (onshore and off-shore)
Water management and treatment	• Management of water resources, upgrading of infrastructure • Demand-side efficiency (incl. water metering, gray water recycling,) • Rapid analysis of drinking water and waste water • Online monitoring networks and automated sensing technologies • Restoration techniques for degraded water resources • Disinfection of drinking water, desalination • Wastewater treatment, membranes, reduction of sludge production • Nanotechnologies for water treatment
Waste management and treatment	• Effluent (incl. landfills leachates) treatment • High-efficiency recovery of energy and chemicals, re-use of off-gas • Safe disposal of dangerous substances, especially mercury • Composting units and biogas processing for biodegradable waste
Recycling	• Collection, separation and treatment for re-use or recycling of all materials, in particular plastics, polymers, tires, batteries and accumulators, end-of-life vehicles, ships and planes
Soil	• Techniques of soil remediation
Environmental services and monitoring	• Analysis, including LCA, environmental surveys and expertise • Eco-design of products and services • Environmental services (such as energy contracting)

1-2Examples of eco-innovation in traditional industries (European Investment Fund 2010)

ACTIVITY	EXAMPLES OF ECO-INNOVATION
Conventional energy and energy efficiency	• Carbon dioxide sequestration • Combined heat and power • Fuel cells (materials, membranes, systems…) • Radical innovation in production processes
Energy distribution and storage	• Energy storage (flywheel technology, superconducting magnetic storage…) • High-voltage direct current (HVDC) transmission to shore • Environmentally-friendly Hydrogen production, storage and distribution • Intermediate energy vectors (ethanol, methanol,…)

Industry	• Process optimization using enzymes • Carbon emission management • Alternative equipment for motors, heat power and refrigeration • Eco-friendly materials (ceramics, specialist metals), substitute for chemicals • Process control and intensification – smaller plants with same capacity, better management of supply chain. • Separation processes (membrane, distillation) • Substitutions of hazardous substances in industrial processes
Information and communication services	• Measurement and control of pollution from existing processes • Environmentally friendly "smart metering", semi-conductors for remote reading
Transport	• Advanced uses of biomass/biofuels • Fuel cells • High efficiency energy recycling • Hybrid engines
Construction	• Passive houses • Superinsulation, radiant heating and heat recovery ventilation, local heat generation and cooling, earth-sheltering • Day-lighting, calibrated solar orientation and cross-ventilation • Renewable resources and photovoltaic system • Environmentally-friendly construction materials
Agriculture	• Organic farming, low protein food production • Development of renewal natural resources, bio-energy, bio-materials • Reduction of environmental load, reduction of herbicide / pesticide use • Reduction of water consumption and water use • Reducing Nitrogen pollution (greenhouse gases, nitrates, ammonia) in an integrated way

As illustrated by the table above, and in contrast to innovation in other fields, the major characteristic of the EU eco-industry is undoubtedly its diversity. Activities range from high-tech and complex services in e.g. renewable energy and air pollution control, to mature and well-established applications in recycling and waste management. This also implies that the multiple sub-sectors do have innovation and technological potential, and they, too, vary in finding and validating new opportunities for creating value-added.

SMEs are especially present in the so-called "regulation-driven" markets, such as air pollution control and renewable energy production. In the older sectors such as waste treatment and collection large and multi-national companies are the major actors. Recycling is a particular case with large companies at the top of the collection and processing chain and a base of SMEs that collect, sort and process at smaller scale and feed their output into the production of the larger ones.

1.2. Eco-innovation policy

The complexity of eco-innovation also puts a challenge to policy makers. Most of the time, more than one Ministry or public body is involved in eco-innovation and the borderline runs between innovation policy, industrial policy, energy and transport policies, and environmental policy. This structural split does not favor the fast adoption of new eco-innovation policies and the launch of new support programmes.

Some Member States are doing better than others when it comes to developing effective and comprehensive policy frameworks in support of eco-innovators. It is certainly no coincidence that these are also the countries where the population is most aware about the environmental challenges modern societies are facing. But even the "best in class" still have empty spots in their policy framework for eco-innovation, all the more as this is a young and constantly evolving discipline.

European eco-innovation policy

Eco-innovation policy has translated into a range of policy documents, programmes and legal instruments by the European Institutions. The EU has been instrumental in getting eco-innovation related pieces of legislation adopted in all 27 Member States, and the added-value of a European approach is more evident for eco-innovation than for many other sectors. Nonetheless, we cannot talk about a coherent and strategic overall approach to eco-innovation yet. Some sectors are better covered than others. There is a tendency to consolidate several existing policy instruments into more general and coherent new instruments, as demonstrated n the fields of renewable energy and water, where a host of different earlier Directives have recently been grouped together in coherent Framework Directives.

Recently, eco-innovation has gained further political momentum at European level, particularly with the release of the EU2020 Strategy (2010), one of whose flagship initiatives is on "Resource efficient Europe" under the Smart Growth strand, while another flagship "The Innovation Union" is "refocusing R&D and innovation policy on **major challenges for our society like climate change, energy and resource efficiency**, health and demographic change strengthening every link in the innovation chain, from 'blue sky' research to commercialisation" (European Commission 2011)

The Communication "A resource efficient Europe – Flagship initiative of the Europe 2020 strategy" was released in January 2011. The Flagship initiative outlines a strategic and integrated framework to be adopted at EU level, including long-term agendas for climate, energy transport and innovation policies, the reform of agriculture and fisheries policies, biodiversity, raw materials and other resource-related policies. A detailed roadmap on resource efficiency is expected by the end of 2011.

In its Communication on the Innovation Union, the European Commission makes an important link between innovation and clusters and states: *"Genuinely open innovation requires brokerage, intermediaries and networks in which all players can participate on an equal basis. Internationally competitive clusters play a vital role in bringing together – physically and virtually - large companies and SMEs, universities, research centres and communities of scientists and practitioners to exchange knowledge and ideas."* And offers to stand *"ready to assist and … use its regional research and cluster initiatives to support this change and establish a "smart specialisation platform" by 2012, including further support for the emergence of world class clusters."* (EC Communication, 2010)

National eco-innovation policy

At national level, eco-innovation is broadly defined in a similar way as at European level. However, depending on the national context, the concept is interpreted and applied in a wide range of different policies and instruments. Many Members States do not have an eco-innovation policy as such but address the area under the umbrella of the Europe 2020 packages and other environmental policies.

With the framework of the Environmental Technologies Action Plan (ETAP), Member States have developed National Roadmaps for eco-innovation. A policy mapping exercise for the OECD (WIFO, 2009) confirms that the choice of policy instruments in the ETAP National Roadmaps is related to the innovation potential and the development state of a country. The majority of countries show a strong bias towards supply side instruments. Prevalence is given to R&D support, the support of networks and partnerships, demonstration and commercialisation as well as information services. Less developed countries focus less on supply side instruments and more on demand side instruments such as standards and regulations or technology transfer.

1.3. Drivers and barriers for mainstreaming eco-innovation

Sustainable development requires ten-fold improvements in material, resource, and energy efficiency; adequate reductions in exposure to toxic substances; significant opportunities for stable, rewarding, and meaningful employment with adequate purchasing power; and an adequate level and distribution of essential goods necessary for economic welfare. Major technological, organisational, institutional, and social changes, not just incremental advances, are necessary to achieve sustainability; these changes need to be more systemic, multidimensional, and disruptive (Ashford et al 2011)

What are some of the key drivers for such a systemic change towards eco-innovation and sustainability?

- Regulation: Regulation has always been a strong driver for eco-innovation, especially in traditional industries and in their respective supply chains, since large companies in such industries often face regulatory demands and tend to respond to the stricter rules much faster than SMEs.

- Prices and access to materials: Most European SMEs see limited access to materials as an important driver for eco-innovation. At the same time, they identify current and expected future price increases for energy as the most important incentives for eco-innovation. (Press Release 2011)

- Understanding the interrelation of eco-industries and eco-innovation in traditional industries: The environmental technologies industry is not the only one eco-innovating and understanding the demand and supply aspect of client supplier relationships can be a driver for eco-innovation in both types of industries. (ECORYS Part 1 2009)

- Networks: More than 70% of SMEs pointed to the need for good business partners and good access to external information and knowledge, including technology support services to accelerate eco-innovation uptake and development. (Press Release 2011)

On the other hand, the following main barriers towards mainstreaming eco-innovation have been identified:

- Absence of an established supply chain: The eco-industry is lacking homogeneity and thus there are not enough drivers for the supply chain to organise itself. Due to these weak linkages up and down the supply chain, eco-innovation with market potential often fails to reach the market, or reaches the market late as reported in the report by the Environmental Innovation Advisory Group (ECORYS Part 1 2009). In addition, eco industry players such as SMEs are often located in different European countries and in certain regions, where without the communication channels in the supply chains, they fail to fully take advantage of the internal European market and the opportunities it provides (ECORYS Part 1 2009).

- Information asymmetries: There is insufficient awareness of the market potential of eco-industrial products and services in different European countries and overseas. Potential clients often lack knowledge about the available options there are in a given market. The lack of awareness in the market decreases the competitiveness of these companies. This is especially due to the diversity of applications in the eco-industry and the relatively high level of technical complexity; it is not always known which technologies are in reach of a company. (ECORYS 2 2009)

- Differing standards and legislation: They hamper technology transfer and hinder the efficiency of these products and services across borders. The so-called single European market remains de facto too fragmented, making business at European scale costly. Particularly, the development of a more coherent intellectual property rights (IPR) policy and of a legal framework is crucial, within and outside of the EU.

- Technological skill shortages: A lack of highly skilled personnel which is needed in most areas of the eco-industries sector persists.

1-3Sources of potential drivers and barriers for eco-innovation (Wuppertal et al. 2008)

Supply side factors	Demand side factors	Political context and institutional framework conditions
• Technological development levels and capabilities • Management capabilities • Path dependencies (knowledge accumulation, inefficient production systems)	• Market demand by private entities or individuals • Market demand by public entities • Preferences for system innovation • Awareness levels in markets for environmental performance and innovative products • Awareness levels in society for environmental issues	• Environmental policies (regulatory approaches and incentive based instruments) • Fiscal systems (how are eco-innovative goods and services priced?) • Institutional structure • International agreements

1.4. Potential role of clusters in mainstreaming eco-innovation

Cluster policy aims to increase competitiveness and to accelerate innovation in established industry sectors. In countries where an established eco-industry exists, it might therefore provide interesting opportunities to address market failures that are still hindering the mainstreaming of eco-innovation in the eco-industries sector, as well as in greening traditional industries.

Clusters can support the establishment of a structured eco-innovation supply chain

Clusters foster the establishment of formal and informal networks and are also useful instruments to support the streamlining of supply chains. They help ensuring that supply chains are more integrated, cooperation is formalised, and ultimately that eco-innovators with their products and services are in close contact with actors across the supply chain. Indeed, over the last years collaboration in the industry has increased; the main driving force behind this trend being the demand for integrated approaches in the market, which force highly specialised companies to seek external collaborators to meet this demand (ECORYS Part 2 2009).

Improving cooperation of eco-industries and traditional sectors

The interdependence between eco-industries and traditional industries is apparent and in fact further increasing at a more strategic level. Traditional industries are now looking more and more into sustainable solutions for their businesses, as they move more towards green business strategies or greener manufacturing processes. Thus the interactions across the value chains of multiple industries become evident, with integrated approaches being the ones that are being put forth the most. The cooperation of established cluster organisations in both eco-industries and traditional industrial can therefore create a fertile ground for eco-innovation.

Technological skill shortages

One of the main incentives for companies to join cluster organisations is the high concentration of qualified personnel. The “Innobarometer on Clusters” has found that indeed the most widespread benefit for cluster companies is related to human resources. 64% of the interviewed cluster company managers agreed that their cluster is hiring skilled people (The Gallup Organisation, 2006). Clustering may thus be an efficient means to support eco-innovative companies in addressing the skill shortage of the sector.

Addressing information asymmetries

Current literature suggests that competitiveness in the eco-industries is depended on innovation and knowledge to a rather high degree. Cluster company managers have rated the exchange of information on market (62%), best practices (57%) and information on technologies (55%) very high on the list of benefits of cooperation within a cluster (The Gallup Organisation, 2006). It can be concluded that clusters and cluster organisations add indeed value in terms of technology and

knowledge transfer and foster collaborative relationships between suppliers and clients. They establish a close link between SMEs, large companies and R&D institutions and can thus help to overcome the lack of knowledge sharing and persisting information asymmetries in the eco-innovation sector.

Compliance with legislation in traditional industries

In traditional industries, clustering may also be viewed as a means to achieve a certain level of environmental performance, either to conform to norms and regulations or in order to be able to participate in a voluntary scheme such as an eco-label. In a workshop, a representative of Italian textile and leather clusters underlined that clustering was an opportunity to reduce costs and share resources that would amount to better environmental performance of their individual companies. It was noted that for many SMEs in this traditional sector, environmental performance was not deemed to add a great competitive advantage in terms of price in the market. However, the same SMEs viewed an eco-label received due to improved environmental performance as something positive giving them and added value in the global market, when compared to imported products from third countries such as China or India.

2. General overview of cluster policies and initiatives in EU-27

The number of cluster policies and cluster organisations has steadily been increasing in the EU-27 over the past decade. A variety of studies have demonstrated the relation between industrial clusters and the effect they have on regional innovation and economic cohesion in Europe. (Borghi et al 2010). For growth to become more sustainable and competitive in Europe, innovation and new organisational structures have a key role to play. And clusters are considered to be one of the means to achieve that end.

A vast amount of literature exists of what clusters and their main characteristics are. While the specific definitions vary, a set of characteristics has emerged on how clusters can be defined. As summarised by other authors (Borghi et al 2010), the following list of criteria gives an overview of how can clusters be identified:

- Geographical and spatial proximity of economic activities;
- Vertical and horizontal relations between industry sectors;
- Use of common resources (technology and input);
- Quality of the network or collaboration with "active channels of business transactions, communication and dialogue, sharing specialised infrastructure, labour market and services";
- Social infrastructure allowing this interaction.

2.1. What are cluster policies

While there are cluster initiatives being undertaken throughout Europe, they vary in type (i.e geographical clusters vs. cluster organisations vs. clusters as programmes or just cluster style initiatives). There is a strong emergence of the concept of clusters and the cooperation it entails between business across in regions and across value chains increasing their competitiveness in Europe and across the world. Public support for the emergence of clusters is based on quantitative evidence gathered over the years that industries tend to conglomerate and become naturally concentrated in regions, and that these regions when compared to ones that are not so concentrated tend to perform better economically and are more competitive in the market. At a more specific level, cluster support helps maintain or create employment in regions, and allows firms to be more adaptive and creative in their organisation restructuring efforts, which is deemed necessary due to globalisation and stiff global competition (Borghi et al. 2010; OECD 2007).

There is not a single type of definition across EU Member States for cluster policy and cluster organisations that could be applied uniformly. While the general definitions and the way they are named vary across Member States, cluster policies all aim to promote and support knowledge based network building, which in turn contributes to increased value creation and the development of innovative solutions.

2.2. What are the different types of cluster policies

Cluster policies vary across member states, however, according to the OECD, the main motivation behind establishing such policies is arguably similar across Europe. The main aim is to support their emergence based on "the common assumption about the value of agglomeration of firms and the importance of connecting resources in a given place" (OECD, 2007).

Based on the literature review and for the purpose to clarify the scope of the study, cluster related activities have been broken down into policy level activities and implementation level activities, both of which can be at the EU, national or regional level. The following two diagrams summarise the different types, and further elaborate on their characteristics (OECD 2007).

1-4Policy and implementation at different levels

Policy development level	Directives Legislation Policy communication documents	**At the EU level**
Implementation level	Programmes Funds Organisations Management bodies	**At the national level** **At the regional level**

At all three levels, EU, national or regional, policy is most often translated into action by the establishment of directives, legislation or communications. Policy is then implemented, again at the three levels, through the creation of programmes, the establishment of funds or organisations. While at the EU level, policy is quite general, and aims to cover the European added value of these activities, Member States may deal differently with the establishment and implementation of cluster policies.

Cluster policies are most often integrated or are part of regional development policy, science and technology policy and/or industrial policy in Member States. It is also possible to find an overarching cluster policy, that is more explicit and a policy on its own (OECD 2007). As summarised by Oxford research in their 2008 report of "Cluster policy in Europe" prepared for the European Cluster Observatory, cluster policies can take three forms:

- Cluster development policies where they are more directed at establishing clusters by mobilising funds and relevant stakeholders;
- Cluster leveraging policies which tend to provide indirect incentives to SMEs or other companies to formalise or to join clusters;
- Cluster facilitating policies which create a favourable business environment at the company level, allowing companies to join clusters.

The same report states that, deriving from cluster policies there are usually programmes that are set up with the aim of cluster development. There is a variety of ways that these programmes are carried out; they can either be undertaken by existing bodies, or new actors/organisation may also be set up in order to implement/manage these programmes. In any case, funding usually comes from

the programme itself, on a limited time basis with conditions that apply at the regional/national level (Oxford Research 2008).

The present study uses similar distinctions between the three types of cluster policies, and the clear differentiation between policy, programme and implementing body. It focuses on the policy directing the programme, and mapping out the eco-innovative elements within them. These elements are sometimes explicit, with stated environmental performance goals and sometimes more implicit. Focus shall be placed on cluster policy, and wherever not available, programmes and other initiatives related to clusters.

Existing literature already provides a good summary of the status of cluster policies across EU Member States. Based on our interviews table below summarises which countries have national policies, which have regional ones, which ones have national frameworks for regional policies, and which are those that have various cluster policy related initiatives.

1-5Member States according to types of cluster policies

National policies	France, Luxembourg, Latvia, Lithuania, Portugal, Czech Republic, Greece, Poland, Romania, Bulgaria, Finland
Regional policies	Belgium
National frameworks for regional policies	Austria, Germany, Hungary, Italy, Sweden, UK, Spain
Various policy initiatives	Estonia, Denmark, Ireland, Netherlands, Slovakia, Cyprus, Slovenia, Malta

Cluster policy varies across Member States, the reason being that it is often a bottom up approach tailored to fit needs of industries. The context in which policies are designed is greatly influence by the industries present, the overall economic climate in the country, the pre-existing structures and institutions in place, as well the willingness of cooperation coming from the private sector; as such, while the appropriateness of cluster policy is also dependent at the context of each Member State.

3. Thematic analysis of results

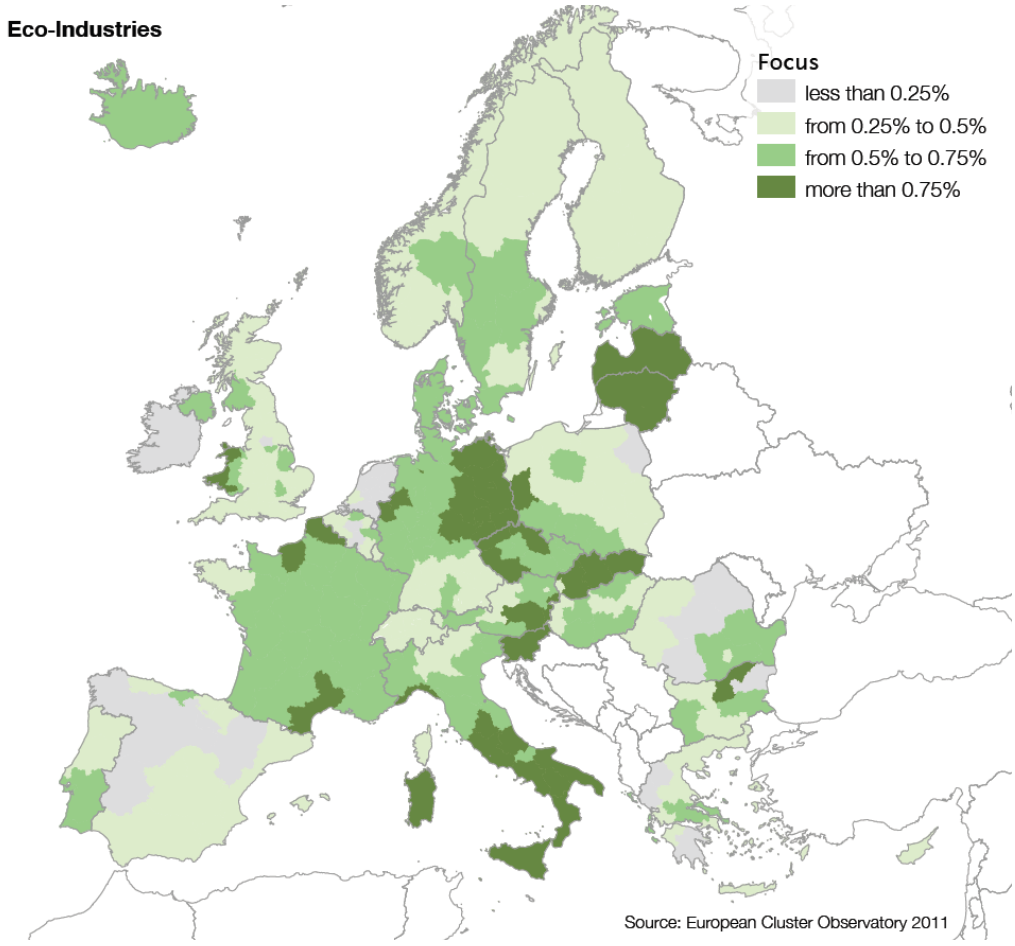
The aim of this study is to analyse the links, if existent, between cluster policy and eco-innovation. It examines if **national cluster policies** in EU Member States are being used specifically to support eco-innovation and in what way.

For the purpose of the study, eco-innovation has been defined as *"… the introduction of any new or significantly improved product (good or service), process, organisational change or marketing solution that reduces the use of natural resources (including materials, energy, water and land) and decreases the release of harmful substances across the whole life-cycle.*" This definition applies to both eco-innovation in the eco-industry sector and in traditional industrial sectors (CIP 2010).

Eco-industries are present across the EU, with some countries leading the way. The map below indicates the geographic concentration of selected eco-industries in terms of percent of economic activity (only including the sewerage, remediation and waste management sectors) across Europe.

The map was constructed using Member States data based on NACE codes. It should be noted that the maps are not truly representative of all eco-industries in Europe, as statistical classifications and data do not exist to capture eco-industry activity to the fullest extent. With the current data available through NACE codes, eco-innovation cannot be statistically represented. NACE codes only available for the sewerage, remediation and waste management sectors are shown on the map as "Selected Eco-industries".

Other important eco-sectors such as renewable energy are currently only being recorded as part of general energy production. It is therefore not possible to map them separately or to include them in the eco-industries sector. This also applies to traditional industries such as construction where eco-innovation is also not being measured and recorded separately.



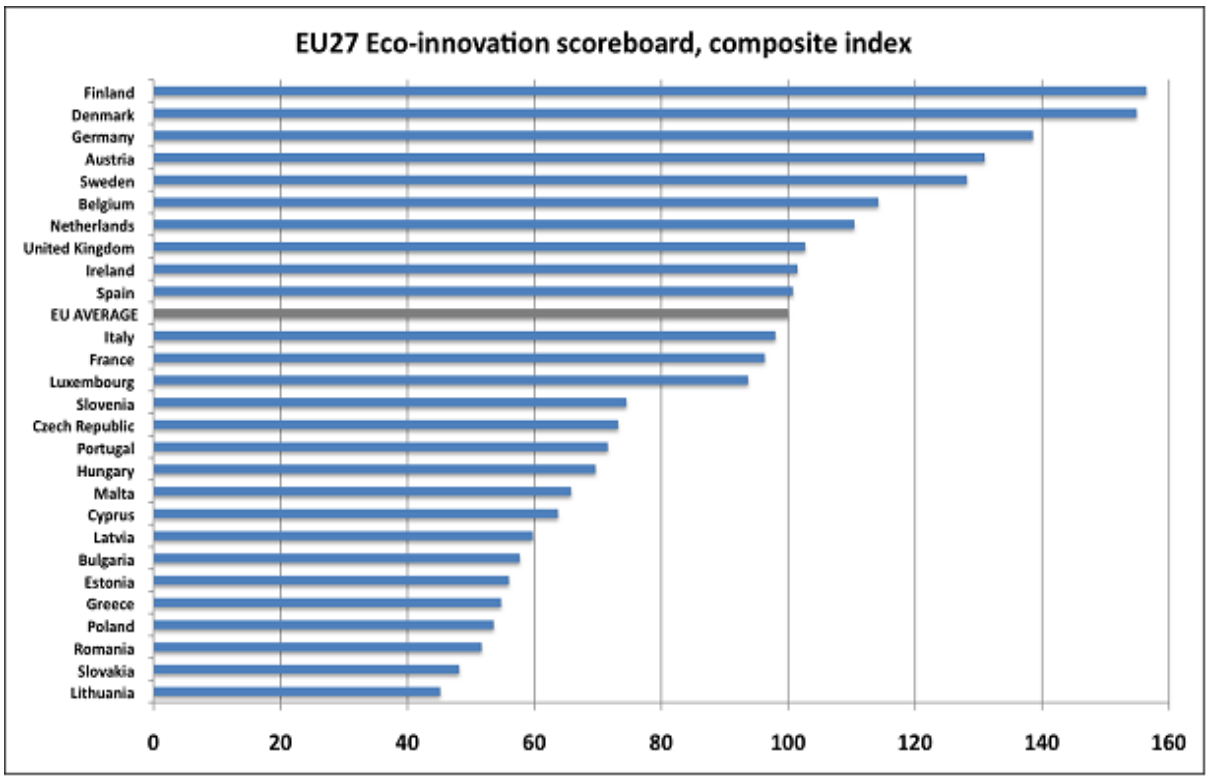
The information gathered through the study is of a highly qualitative nature. Interviews were conducted with 29 representatives from all 27 Member States. Interviewees have been in most cases government officers responsible or working on cluster policy, either from ministries or executive agencies or, in some cases, external experts such as industrial representatives or academic persons. One to two interviews were conducted for each of the countries. In addition, comprehensive desktop research has been carried out to complement the information received through the interviews.

As a result, the study presents a qualitative snapshot of the most relevant policies and trends at the national level rather than a quantitative listing of all eco-innovative cluster policies in the Member States. As such, the information presented cannot be extrapolated to a great extent in other contexts.

In the following sections, we first summarise the results of the study by grouping the qualitative information gathered in four themes. These themes were prominent in all interviews we conducted, and set the scene in terms of how eco-innovation is being approached through cluster policy. After the presentation and discussion of the four themes, the report continues in presenting individual country profiles for eco-innovation cluster policies for the EU-27.

3.1. *Cluster policies and eco-innovation: Innovation in the cleantech sector vs. eco-innovation in all sectors*

Before the presentation of our results, it is interesting to frame the context of the discussions, by referring to the Eco-Innovation Observatory's (EIO) recently published EU-27 Eco Innovation scoreboard, which presents EU member states and their eco-innovation performance (EIO, 2011). This study will not aim to analyse in detail the relationship between our results and the scoreboard, it is nevertheless interesting to refer to it, since it gives an indication of the status that eco-innovation has in general in each of the countries, and if it represents a strong activity in their national economies.



3-1 EU-27 Eco-innovation scoreboard (EIO, 2011)

The interviews with cluster policy makers for the purpose of this study confirmed that at national level eco-innovation is broadly defined in the same way as by the Competitiveness and Innovation Programme (CIP). However, the interviews also show that in practical terms eco-innovation is in fact being referred to and pursued in different ways across the 27 Member States, through their cluster policies. This is also strongly reflected in the different approaches in terms of cluster policy and eco-innovation.

There are **five groups** of countries identified that have slightly different approaches to cluster policy and eco-innovation.

A **first group of countries** views eco-innovation as an inherent characteristic of eco-industries and considers their support for eco-innovation as support for the establishment of cleantech clusters and

related activities. These countries generally have a longstanding tradition in the cleantech sector with an established eco-industry sector within their national or regional economies. This is the case for Austria, Belgium, Denmark, Finland, Germany, France and Luxembourg. With the exception of Luxembourg, these countries are above average performers in eco-innovation (Eco-Innovation Observatory 2011).

Within this first group, some countries questioned the usefulness of trying to integrate eco-innovation as an explicit aspect or goal of national cluster policy generally applicable to all industry sectors. Cluster policy is greatly dependent on the national (and regional) context that varies greatly between the different countries. Some interviewees therefore perceived a top down approach (i.e. from the EU level) forcing a general integration of eco-innovation targets into cluster policy in all sectors as inappropriate. Depending on the context, other types of policy instruments which are widely used in the EU-27 such as feed-in tariffs, green public procurement, or targeted subsidies might indeed be more appropriate and effective for eco-innovation. With the support through these other instruments, in many of these countries, the sector has already become highly competitive with a strong potential on international markets, and is now being further supported through cluster policy. This also fits best with the basic purpose of cluster policy, which is to support innovation and further increase the competitiveness of industrial sectors which have strong economic potential.

The frontrunners on eco-innovation tend to specifically support the establishment of cleantech clusters rather than integrating eco-innovative aspects into general cluster policy for all sectors.

In the second group, countries reported that competitiveness is an important keyword for cluster policy. If the cleantech sector is a competitive industrial sector within a country, cluster policy could theoretically focus on the cleantech cluster as a priority sector. With regard to eco-innovation in traditional industries, it was argued that eco-innovation would naturally be pursued in industry sectors where it provides a competitive advantage. This could mean a significant reduction in costs or access to new markets or customer groups through “eco” products and services.

The appropriateness of prioritizing eco-innovation depends on the potential that eco-innovation has for each sector. This is highly variable, both as regards the industry sector and the relevant aspect of eco-innovation. Energy efficiency is relevant for a number of sectors such as the steel and cement industries, whilst other aspects such as resource efficiency are relevant for manufacturing and the chemicals industry, etc. Some sectors have an excellent potential to improve their environmental performance, whilst for others this potential is rather low. It was therefore felt that the same prescriptive approach at cluster policy level is not appropriate. It should be noted that these comments were made in the context of discussing policy at the national level. The conditions might be different and more favourable if the policy is being developed and implemented at the regional level or in smaller countries where cluster policy can be tailored to the specificities of the industries that are active in the country/region.

The example of the chemical sector was given, where environmental innovation is vital for the competitiveness and thus the sector takes the initiative to become more eco-innovative regardless of public support through cluster policy. Legislation and regulation have been the drivers for introducing eco-innovation to the chemicals industry in some countries. Only then, the interest to

eco-innovate has translated into cluster related networks and cooperative actions within the chemicals industry. Networks, R&D, knowledge exchange and stronger value chains have been developed with the aim of innovating and achieving better environmental performance.

One of the main barriers that eco-innovative companies face are the transaction costs that firms are facing when entering markets, the lack of networks and the presence of information asymmetries across supply chains. Cluster policies would theoretically contribute to mitigate these weaknesses. However, some of the interviewees stated that cluster policy should always only focus on increasing competitiveness and innovation. Eco-aspects, therefore only become relevant if they indeed make a substantial contribution to the competitiveness of a certain industry within a certain country.

The idea that cluster policy should by default promote eco-innovation does not hold up. It is only through strengthening the links between competitiveness and environmental performance, in addition to properly measuring such interrelations, that it will somehow contribute to the case for cluster policy and eco-innovation.

This makes a strong argument that **support for eco-innovation should focus on clearly establishing a link with competitiveness**. Public policy could theoretically have a greater impact if it concentrates on creating conditions that would make eco-innovation vital to business in terms of increasing cost-efficiency.

Another argument pointed out by some in this group is that cluster policy and subsequent cluster organisations have a mission to support innovation in general. Eco-innovation is just one part of innovation and thus considered implicitly. The identification of different types of innovation and individual policies addressing each of them was not considered effective.

It should nevertheless be pointed out, that even though this group mainly focused on eco-innovation as innovation that applies to eco-industries and the establishment of cleantech clusters, these countries at the same time also stresses the importance of eco-innovation in other industrial sectors, but do so more implicitly. For Finland this means general sustainability goals applying to all top priority sectors, implying that industrial sectors undertaking innovation would also inevitable undertake eco-innovation. For other countries such as Germany, eco-innovation is reported to also being undertaken at a high degree by various industries demonstrated by the market demand. This demand for eco-solutions has somewhat contributed to the emergence of a competitive cleantech sector, thus establishing a market pull substantial enough to drive the establishment of eco-clusters.

For the frontrunner group, eco-innovation only becomes relevant for general cluster policy when it can make a substantial contribution to the competitiveness of a certain industry. However, in the sectors where this applies, eco-innovation is seen as an important driver for competitiveness of the sector as well as the eco-industries providing the necessary eco-solutions. In addition, eco-innovation cluster policy should be tailored at a level where it can best address the eco-innovative needs of a specific industry.

A third group of countries views eco-innovation as an aspect which can be supported by cluster policy horizontally. Eco-innovation is essentially a performance aspect that is integrated horizontally into their cluster policy, and relates to all national competitiveness sectors. This is either done in an

explicit way by systematically and explicitly stating eco-innovation goals at the policy level or implicitly by setting up general sustainability goals that ultimately lead to innovation with an environmental benefit, thus eco-innovation. Countries in this group include Bulgaria, Estonia, Greece, Ireland, Latvia, Lithuania, Romania, Slovenia and Sweden.

The countries in this group do not necessarily have established cleantech sectors and they approach eco-innovation as a policy aspect rather than as a sector. Eco-innovation is supported in a horizontal way to ensure that the potential for better environmental performance is used wherever possible. It should be noted though within this group Bulgaria, Estonia, Ireland, Latvia, Lithuania, Romania and Slovakia have scarce references to eco-innovation in their cluster or cluster-related policies.

Within the above group, most generally refer to eco-innovation as a cross-sectoral aspect that should apply to all sectors. In addition, some also state a specific focus on one or two eco-sectors that have strategic importance for their economies. This was the case for Ireland, who only identified wave energy and offshore/onshore wind energy as relevant sectors for cluster policy given their natural abundance. Bulgaria and Romania also view the renewable energy sector as strategically important due to energy security issues.

A fourth group of countries, such as Cyprus, the Czech Republic, Malta, Poland, Italy, Slovakia, Spain and the UK do not have any eco-innovation elements incorporated into their cluster policy. The UK reported that given budget cuts, cluster policy at the national level is no longer as strong as it used to be. As a result, financing for clusters has completely stopped and all clusters are now becoming industry led initiatives. In addition it was clarified, that cluster policy in the country is developed by the BIS, which is in charge of innovation; while eco-innovation is a competence of DEFRA. Another clarification is that in the UK cluster policy is more relevant at the regional level, and that this might be different in that sense.

Italy, Spain and the UK also only have national frameworks of cluster policy, and regions are in charge of developing and then implementing cluster polices regionally; which might be an indication of why national policy does not mention any specific aspects or areas of focus.

The Czech Republic, Malta and Poland said that there is no critical mass for cleantech sector policies. General eco-innovation policies might potentially soon follow, but they are currently in relatively early stages of setting or implementing their policies. This does not necessarily mean there are no cleantech clusters in the countries though. Cyprus and Slovakia have scarce cluster policy attempts.

In the group of countries that are catching up (with the exception of Sweden), eco-innovation is viewed as a horizontal performance aspect for all industry sectors. In at least six countries, eco-innovation does not play a role in their national cluster policy.

Finally**, a fifth group** of countries which relates to the above groups, but is slightly different, such as the Netherlands and Portugal, view eco-innovation as both a sectoral aspect that is relevant for some of their industries and also as innovation that applies to the cleantech sector. At the national policy level, both countries do not prescribe any eco-innovation measures. Nevertheless, after the identification of top priority sectors that are crucial for the competitiveness of the national economy, they allow the sectors (through i.e. stakeholder panels), to set up top priorities for their own

industries. As a results, many of them include eco-innovation or sustainability goals in their mission statements such as in the case of the "Engineering and Tooling Pole" or the "Competitiveness and Technological Pole - Refinery, Petrochemical and Industrial Chemical Industries". In addition, Portugal also identifies the energy sector as a "pole"[1].

Overall it can be said that when asked about the incorporation of eco-innovation into cluster policy, almost all respondents initially referred to the overall sustainability goals or targets that are usually set up in the context of innovation policy or industrial policy.

Going beyond the scope of this study, it should be further explored if indeed sustainability goals and thus increased environmental performance in the implementation stage by default entail innovation. At this point in time, a clear distinction is not being made, and everything that improves environmental performance is characterised as being eco-innovative. This was somewhat expected, since a clear definition in terms of NACE codes for some eco-industries is currently not available and is being aggregated into general categories, and eco-innovation in turn is also not methodologically characterised or standardised in order to be understood the same way across countries and regions.

The majority of countries stated that the incorporation of eco-innovation in cluster policy happens in line with sustainability goals.

3-2Different approaches to cluster related policy and eco-innovation in EU-27

APPROACH	COUNTRIES
Make references to eco-innovation in cluster policy as innovation in the cleantech sector	Austria, Belgium, Denmark, Finland, France, Germany and Luxembourg
Make references to eco-innovation in cluster policy horizontally applying to all sectors	Slovenia, Sweden
Make some scarce references to eco-innovation through cluster policy	Latvia, Lithuania, Estonia, Ireland, Slovenia, Greece, Bulgaria and Romania
Do not make any references to eco-innovation in cluster policy at the national level	Cyprus, the Czech Republic, Italy, Malta, Poland, Slovakia, Spain, UK
Set general sustainability goals, then eco-innovation is prioritized in cluster (or industrial) policy sectorally	The Netherlands, Portugal

3.2. *Cluster policies and eco-innovation: A strategic goal vs. additionality*

As outlined above, the perception of eco-innovation and of its potential for a national economy is the decisive factor for its integration in national cluster policies design. The way Member States approach eco-innovation in their cluster policies, is basically determined by the eco-innovation

[1] Please refer to the country profiles of France, Portugal and Belgium for clarification between the terms "clusters" and "poles"

practice in their own country. In turn, this depends on economic and market conditions, the development level of the eco-industry sector, and the level of environmental performance of their traditional industries.

For countries pursuing eco-innovation in the cleantech sector, eco-innovation is viewed as a strategic goal and a relevant aspect in further strengthening and expanding their eco-industries in a medium to long term. Many of these countries also state internationalisation as one of the key priorities for their clusters, and also indicated an interest for supporting companies in the cleantech sector to become competitive in the global market (global market shares). For many of these countries, sustainability and environmental innovation is also one of the core parts of cluster policy along with internationalisation, job creation and competitiveness.

France for example, explicitly states the interest in establishing globally competitive "Ecotech Poles" at the policy level, with the aim of turning a number of French regions into global players in certain cleantech sectors. The strategic goal is also demonstrated by the investment and concrete programmes that have follow suit in the case for Finland for example, where through their SHOK programme (see country profile for more details), environment was identified as a key priority sector, and thus a SHOK on cleantech was subsequently established, strategically working on the internationalisation and support of Finnish cleantech companies.

For countries without a critical mass in eco-industries, the up-scaling and modernisation of their traditional industries through eco-innovation and cluster policies represent an instrument that would enable them to further push the uptake of these types of technologies and services as well as to create a demand in the market for the future establishment of eco-industries. In this group of countries the economical link between eco-innovation and competitiveness is rather weak, and not pronounced. Eco-innovation or sustainability is not a core element of their cluster policies, and even industrial policies, and as such it acquires the nature of "additionality". For these countries, eco-innovation is an additional short to medium-term target and is not considered an integral part of their economic strategy. This "additionality" is used to allow their industries to become more eco-efficient and thus meeting legislative requirements more efficiently and effectively.

3-3 Eco-innovation and cluster policy: a strategic goal or additionality?

STRATEGIC GOAL	ADDITIONALITY
Eco innovation in cluster policy entails targeting eco-industries	Eco-innovation in cluster policy entails targeting all industries in general
It is usually explicitly stated	It might be implicit or explicit
Eco-innovation is viewed as a driver in the economy	Eco-innovation is viewed as a means of responding to requirements, and an add-on for their industries
Link of eco-innovation concept with economic competitiveness is strong.	Link of eco-innovation concept with economic competitiveness is weaker, yet in some case is emerging.
Have a critical mass in eco-industries	Lack a critical mass in eco-industries
The cleantech sector and eco-innovation is identified as a core goal in their cluster policy and is usually singled out along with economic	The core strategy in the policy does not include eco-innovation. General sustainability goals are sometimes mentioned, and are referred to as eco-

competitiveness, internationalisation, job creation and so on.		innovation.
Tend to belong to first group	Somewhere in between	Tend to belong to latter group
Group 1 Austria (4) Belgium (6) Denmark (2) Finland (1) France (12) Germany (3) Luxembourg (13)	Group 2 Ireland (9) Italy (11) The Netherlands (7) Portugal (16) Spain (10) Sweden (5) United Kingdom (8) Slovenia (14)	Group 3 Bulgaria (21) Cyprus (19) Czech Republic (15) Estonia (22) Greece (23) Hungary (17) Malta (18) Poland (24) Romania (25) Latvia (20), Slovakia (26) Lithuania (27)

NB. The numbers next to countries in parenthesis indicate the rank of the member state in the eco-innovation scoreboard recently produced by the Eco-Innovation Observatory (Eco-innovation Observatory 2011).

Usually the "additionality" countries are also identical with the ones that target eco-innovation horizontally as an aspect that concerns all industrial sectors of interest. Here, the scope tends to be more on improving regional conditions and networks, rather than on internationalisation which is found in the "Strategic goal" group.

While in general terms, these countries can be aggregated together in these three groups, there are in some case other reasons behind their positioning as well. The three groups thus represent just a rough aggregation indicating their approximate position in the spectrum of approaches that are far more complex than presented here.

For example, group one tends to bring together countries with rather large eco-sectors, and also large economies in general, that have a strong potential for internationalisation. Luxembourg, which is also listed in that group, is neither of those, yet is listed under group one, given a very strong interest at the policy level to turn Luxembourg competitive in the eco-sector for strategic and political reasons. The sector was chosen among others and is being supported with top down policies that target the eco-sector regardless of the critical mass it has at this point in time.

Within group two, there are several different cases. The UK, Italy and Spain are decentralized and with variability between regions and priorities. At the national level, eco-innovation is not referred to. At the regional level, such as in the Basque Country, the situation is different with eco-innovation being more explicitly pursued. The same applies to the UK, while at the national level, cluster policy

is rather ambiguous, eco-innovation is more pronounced at the regional level, with many eco-cluster organisations scattered all across the country.

The Netherlands and Portugal have highly bottom up approaches, where they allow priority sectors which are singled out at the policy level, to set up their own mission statements and goals. An overall sustainability goal exists; and once at the sectoral level, sustainability and eco-innovation priorities are often listed as policy statements, with many of the sectors identifying this area of focus for their own clustering policies and related activities. Other countries such as Ireland are too small to set up eco-innovation goals at the policy level and lack critical mass, yet they identify some key strategic sectors related to eco-innovation such as offshore/onshore wind and wave energy as having the great potential for them in the future.

Within the third group, we also have various cases, with some small countries lacking critical mass in eco-industries, and with no specific eco-innovation elements in their cluster policies. Yet this does not necessarily entail that there is lack of activity in eco-innovation and cluster organisation activity. Estonia for example of such a country, which does not include eco-innovation targets in their cluster policies, and lacks a very strong eco-industry. On the other hand, there are more and more eco-clusters being established in the country since the sector is emerging, indicating that the market is moving that way in the general framework of cluster policy support; some of these eco-clusters include the "Eco building and eco design pre-primary application of Enterprise Estonia cluster", the **"Estonian Eco-Cluster",** the "Value creating electronic cluster" and the "Estonia Wind Power Cluster".

Finally, some of the other countries in this third group are at early stages of cluster policy adoption such as in the case of Romania and Bulgaria, and even though eco-innovation seems to be a point politically discussed and referred to more and more, critical mass is an issue that prevents it from being adopted at this stage. It is also perceived that there needs to be a learning curve and time for the policy to be tested in these countries and future assessment of the cluster policies will indicate the role that eco-innovation could potentially have in cluster policies.

3.3. Cluster policies and eco-innovation targets: Differences between older and newer policies

Countries can be categorised into three groups in terms of the age of cluster policies (or cluster policy elements in other policy or initiatives in case they do not have a cluster policy). One group has had some sort of cluster policy in place since the 1990's, the second group started in the new millennium and a final group has more recently started with their own cluster policies in the second half of the 2000's.

3-4 Age of cluster policies across EU-27

BEFORE 2000	2000-2005	AFTER 2005
Austria (4)		Bulgaria (21)

Denmark (2) Finland (1) Germany (3) The Netherlands (7) Spain (10) Sweden (5) United Kingdom (8)	Czech Republic (15) Belgium (with regional variability) (6) France (12) Greece (23) Ireland (9) Luxembourg (13) Malta (18) Slovenia (14)	Cyprus (19) Estonia (22) Latvia (20) Lithuania (27) Poland (24) Portugal (16) Romania (25) Slovakia (26)

NB. The numbers next to countries in parenthesis indicate the rank of the member state in the eco-innovation scoreboard recently produced by the Eco-Innovation Observatory (Eco-innovation Observatory 2011).

Looking at the groups, a couple of observations can be made. It is observed that Member States with cluster policies that are in place for more than 10 years also tend to regard eco-innovation in a more strategic manner focussing on the establishment of a cleantech sector. This also holds true for Belgium, France and Luxemburg from the "middle-age" group.

Moreover, countries with "older" cluster policies generally score above the European average in the EU eco-innovation scoreboard. Here, the establishment of an eco-industry has triggered further support through cluster policy to accelerate innovation and enhance competitiveness. This is indicative that there is a wider policy framework of support for eco-innovation that has given rise to competitive eco-industries sectors, which in turn are now being further supported through cluster policies, given their economic competitiveness and strong potential for internationalisation.

In addition, it should be noted that most countries with an established cluster policy and high scores in eco-innovation, also score high on the European innovation scoreboard (UNU-MERIT, 2010). This goes hand in hand with the opinion expressed by the majority of interviewees that eco-innovation forms an integral part of innovation.

On the other hand, it is also observed that Member States with a recent cluster policy tend to view eco-innovation less strategically. Eco-innovation is basically seen a part of the general sustainability goals and as such might appear in their cluster and industry policies. Generally, these countries do not have an established eco-industry and score below average in the Eco-innovation Observatory. In these countries where the wider eco-innovation policy framework is weaker, it is likely that the eco-industry is not strong and that there is not a high demand for eco-solutions in the market. Thus without an eco-innovative industry, an eco-innovation cluster policy is not appropriate.

The presence or absence of eco-innovation priorities in cluster policies might in part be related to the wider policy framework and support to eco-innovation that is available in each one of the countries. In countries where a better wider eco-innovation policy framework strongly supports the development and uptake of eco-solutions, it would be more likely for eco-innovation cluster policies to be in place.

Countries that have older cluster policies tend to also have a tradition in adopting and implementing innovative policy instruments. Countries that have newer cluster policies are at a

different level on the policy learning curve, and innovation is an aspect that has started being strategically pursued in their industrial policies more recently.

3.4. Cluster policies and eco-innovation: Differences between top down and bottom up approaches

Most Member States use a combination of top-down and bottom-up approaches in their cluster policies. There are interesting cases where industry-led bottom-up approaches to clustering incorporate eco-innovation given the strategic importance it has for their own industry and their competitiveness. This is in contrast with the top down approach of picking the eco-sector and supporting the emergence of eco-industry clusters which more heavily relies on public support.

Some countries which are highly decentralised approach cluster policy at the national level in a strategic and top down approach. Germany for example does not have explicit cluster policy at the national level. The "High-Tech Strategy 2020 for Germany" is the most relevant guiding policy at the national level that basically sets strategic goals for the country among which climate/energy/environment targets. The strategy also refers to clusters, and thus sets the overall framework; federal level policies translate the general framework goals into policy and then action.

This is also the case in the UK, Spain, Italy and Austria where differences between national and regional policies need to be kept in mind. While eco-innovation may not have been explicitly stated in cluster policies at the national level, many decentralised countries have regional policies, which tend to be more specific and concrete in terms of identifying priority sectors and aspects, and in all the above cases they do indeed incorporate eco-innovation goals (either as targeting the cleantech sector, or as eco-innovation in traditional industries).

Other large economies, like France are highly centralised in their cluster policy, and have a rather top down approach. With this approach, the decisiveness in supporting the "ecotech" sector to become globally competitive (main goal of cluster policy in France, to create "global poles")[2] is more pronounced at the national policy level. Inter-ministerial contributions are made during the formulation of the policy, and contributions which shape the policy are being mostly done at that level.

In smaller countries, where polices are centralised, both top down and bottom up approaches are again being used, either simultaneously or exclusively.

Bulgaria, Estonia, Ireland, Latvia, Lithuania, Romania, among others are countries that have a rather top down policy approach, where priority sectors are chosen and subsequently focused on in cluster policy. Eco-innovation is not explicitly incorporated into their policies, and they tend to approach eco-innovation as an aspect to be applied across sectors. Malta reported that they view their approach as being appropriate given the small size of the country and the economy.

[2] Please refer to the country profile of France for clarification on the term "pole"

The Netherlands has a highly bottom up approach, where priority sectors are chosen, then stakeholder/expert group are put together for each of the sectors, and they are asked to determine goals and objectives for themselves, where they often incorporate eco-innovation in their targets. This is being applied to general industrial policy and then also to cluster policy since 2010.

Portugal has combined elements of cluster policy from other countries to set up its own policy framework. Portuguese cluster policy is centred on establishing "global poles" and "regional clusters"[3], such as in the case of France. At the national level, priority sectors are clearly established, with the sectors which have the potential of becoming "global poles" and sectors for "regional cluster" indicated. The detailed priorities per sector are then set using a bottom-up approach. The result is sector based policy goals which often incorporate eco-innovation given the strategic importance for some of these sectors such as chemicals in the country.

The Czech Republic is another example of a country utilising bottom-up approaches. The country initiated its first cluster policy which expired in 2008, using a top down approach. From 2009 onwards the initiative switched to a bottom up approach, where sectoral interests and goals are set to be better incorporated and pursued. This reversal was an explicit strategic decision in view of improving the impact of the policy.

Cluster policies are most commonly bottom-up policies that respond to industrial and economic activity. Hence, those countries with an explicit strategy to support eco-innovation and the establishment of an eco-innovative industry usually use cluster policy to further support the competitiveness of the sector once a certain critical mass has been reached. Conversely, it can be assumed that eco-innovation in cluster policy does not have a leveraging effect for establishing eco-industries and is therefore not used to this end.

A scientific correlation between these different factors cannot be suggested in the context of this study, yet it is interesting to consider the different reasons why these factors are coinciding for each of the groups.

Overall, as mentioned before, for eco-innovation to become more prominent in cluster policy, a clear link between eco-innovation and competitiveness needs to be established in each context. Top down approaches work in order to explicitly anchor eco-innovation in the policy agenda and set general framework conditions (if of course, it is an appropriate public policy in respective Member States). However, without a bottom-up approach, a link may be missing, since eco-innovation which often relates to environmental performance, tends to be interpreted as regulatory requirement rather than efficiency related cost factor that contributes to economic competitiveness.

[3] Please refer to the country profile of Portugal for clarification on the use of terms "poles" and "clusters"

4. National cluster policy and eco-innovation: Country profiles

This section presents individual country profiles for each of the EU-27 member states. Each profile includes a brief overview of the national cluster policy, an explanation if the approach is sectoral or horizontal, a brief overview of the eco-industry in the country, the approach to cluster policy and eco-innovation, and an explanation if eco-innovation through cluster policy is a strategic goal or just valued for its "additionality".

The information for each profile has been gathered through the interviews and additional desktop research. The references used for each of the country profiles are provided at the end of each country section, along with additional links of interesting articles and reports. The information presented in the profiles does not claim to be exhaustive, but rather informative by giving a snapshot of the current state of cluster policy and eco-innovation in member states.

4.1. Austria

Basic Cluster Policy information	
Cluster policy in place since	**1995**
At the National level ☐ At the Regional level ☒ Both ☐	
Ministries responsible for cluster policy	Federal Ministry of Economic Affairs and Labour
National cluster policy addressing eco-innovation	Yes ☐ No ☐ Indirectly ☒

Number of eco-clusters in the country:

☐ None ☐ 1-5 clusters ☐ 6-10 clusters ☒ More than 10 clusters

Years of activity:

☐ Less than 5 years ☐ More than 5 years ☒ More than 10 years

Overview of national cluster policy

There is no explicit cluster policy at the national level in Austria. Cluster policy is developed and implemented by the regions. In previous years, cluster policy references were made in the context of the "National Action Plan for Innovation, 2005-2008". More recently, in 2011, the government published the 2020 Strategy for Research, Technology and Innovation, in which clusters are referred to. The main focus of the strategy is to enable Austria, who has become the leader of the "innovation followers "group to move into the "innovation leaders" group.

Two broad objectives have been identified: The Austrian federal government's strategy for research, technology and innovation addresses these challenges by pursuing two prioritised objectives: "We want to continue developing the potential of science, research, technology and innovation in Austria, thereby making our country one of the most innovative in the EU by 2020, strengthening the competitiveness of our economy and increasing the prosperity of our society."; " We want to continue expanding and leveraging the potential of science, research, technology and innovation in Austria, to tackle the great societal and economic challenges of the future." When talking about

societal and economic challenges, global challenges are also mentioned, which include: global scarcity of energy and natural resources, climate change, demographic change.

In addition to the above, the Austrian Research & Technology Report 2011 (report on RTI in Austria) is currently being developed. The report includes for the first time a chapter on clusters. The report will be published in July 2011 on the BMWFJ website.

While references are made in the policy at the national level in the overall innovation strategy of the country, there are also other attempts to encourage dialogue and coordination between the regions on matters of cluster policy. For this purpose, there is the "Cluster Platform Austria" that has been set up at the national level, coordinated by the Federal Ministry of Economic and Labour. The platform brings together regional cluster actors, at the policy level, and aims to encourage cooperation in terms of knowledge exchange, and also for different regions to go into projects together.

National cluster policy approaches: Sectoral or horizontal

Since nationally there is no explicit cluster policy, there also isn't any sectoral approach in place. At the regional level, cluster policy varies. Most often, the eco-industry is chosen as a sector of focus along with other sectors that are pointed out. For example, in the region of Upper Austria the sectors are: Plastics, mechanotronics, food, logistics, sustainable construction and there is also a networking initiative which is not a cluster on e-mobility.

Overall, each region is responsible to come up with priorities. Hence policies and activities, vary at the regional level, and the assessment conducted in this study at the national level, only represents a small part of the cluster policies in Austria.

Eco-industry in the country

It is reported by the government that the country has become a dynamic and competitive knowledge based economy over the last decades. This is consistent with the strategic goals that the country has set up for itself. The eco-industries in Austria are rather strong, the key sectors being renewable energy, energy efficiency (through passive houses), as well as waste technologies.

Austria's eco-industry generates annual revenues of €10.5 billion and employs about 75,000 people. The Austrian environmental technology industry has been expanding at an annual rate of around 8%.

Approach to cluster policy and eco-innovation

Eco-innovation is often mentioned in the overall in the strategy for innovation, as an aspect to be considered for sustainability and competitiveness. The link between cluster policy and eco-innovation has not been explicitly made at the national level. One should keep in mind though, that cluster policy is more important and more detailed at the regional level, which this study has not looked into; and so this report cannot comment on the relation between cluster policy and eco-innovation at the regional level in Austria.

Eco-innovation and clusters: additionality or a strategic goal?

Eco-innovation is a strategic goal in the country. There are eco-clusters in almost all regions, and the government views eco-industries as competitive industries in the country. Regional governments have initiatives to financially support eco-clusters, by identifying the cleantech sectors as an area of focus. It is reported that especially in the setting up stage of these clusters, financial assistance from the government plays a crucial role for their survival. Management bodies have especially been set up to manage a variety of clusters. In addition, a variety of studies were carried out at regional levels, to identify areas of interest to support. Sustainable construction has emerged as a priority area in this manner in many of the regions.

Interesting links, reports and references

The Austrian Federal Government's "Strategy for Research, Technology and Innovation" (in German only)

Press Release: the "Strategy for Research, Technology and Innovation"

Invest in Austria – Environmental and Energy Technologies

Eco-innovation observatory country report - Austria

4.2. Belgium

Basic Cluster Policy information	
Cluster policy in place since	**Various dates**
At the National level ☐ At the Regional level ☒ Both ☐	
Ministries responsible for cluster policy	Various Ministries
National cluster policy addressing eco-innovation	Yes ☐ No ☐ Indirectly ☒

Number of eco-clusters in the country:

☐None ☐1-5 clusters ☐6-10 clusters ☒More than 10 clusters

Years of activity:

☐Less than 5 years ☐More than 5 years ☒More than 10 years

Overview of national cluster policy

Cluster policy is completely decentralised in Belgium, each of the three regions is in charge of their own policy. There is no national cluster policy.
This study aims to only discuss national cluster policies, but since in the case of Belgium there aren't any national cluster policies to investigate, and since the number of regions is limited to three; a brief overview is provided for the three regions: Flanders, Wallonia and Brussels Capital Region.

Flanders: Cluster policy was initiated in the 90's as economic development policy by the Flemish Government's Department of Economy, Science and Innovation. Over the years, there has been a transition from accrediting clusters and supporting organisations to a policy that is more activity and project oriented. Many clusters in various fields have been established, such as ICT, chemicals,

biotech, renewable energy, food, automotive and logistics. These are also the sectors of focus identified for the 2009-2014 period.

Wallonia: The Government of Wallonia established its regional cluster policy in 2005 ("competitiveness pole" policy). After the identification of five key sectors of competitiveness, five so called "competitiveness poles" were set up in 2006: Skywin (aeronautics and space industry), Biowin (health), Wagralim (agro-industry), Logistics in Wallonia (transport and logistics), Mecatech (mechanical engineering). In 2011, a sixth pole was set up, GreenWin (green chemistry and eco-industries).

The policy is set up in the context of the 2005 Marshall plan, aiming to jumpstart the economy of the region. Five key objectives were set up, among which the formation of "poles".

Apart from the "poles", the Walloon government also recognises clusters. As opposed to the "competitiveness poles" which have a global reach, clusters are groupings that operate at a more regional level.

Brussels Capital Region: In the Brussels Capital region, cluster policy can be found in the Regional Plan for Innovation entitled, 'Contract for Economy and Employment' for the period of 2007-2013. The plan aims to implement a set of measures to improve the regional innovation capacity. There are six objectives, among which clusters are a priority: "Promote the three most innovative sectors; ICT, health and the environment by strengthening the clustering approach in these sectors; Increase the rate of innovation through the implementation of specific programmes; Stimulate the use of innovation through marketing research results and assistance to SMEs so that they assimilate and use innovations; Foster the internationalisation of innovation; Attract and anchor innovative activities; Create an environment that favours innovation"

This region reported lack of critical mass given its very small size as being problematic in the set up of clusters, especially in the field of cleantech. It nevertheless still views it as a key sector for competitiveness and expects the critical mass to build-up over time.

National cluster policy approaches: Sectoral or horizontal

Cluster policy in all three regions is sectoral. Please refer to the section above for the sectors. All three regions have identified environment and eco-industries as sectors of focus.

Eco-industry in the country

Prominent eco-industries in the country are the renewable energies, energy efficiency in building and in manufacturing, advanced waste and wastewater management technologies and systems, onshore and offshore wind, photovoltaic, smart grids and bio energy.

Regions are also taking their own initiatives in order to position themselves as regions for cleantech. For example, the Flanders Cleantech Association brings together regional cleantech clusters, science parks and technology centres in, and strategically promotes the regional cleantech sector in view of attracting investment and internationalisation of companies.

Approach to cluster policy and eco-innovation

Focus is on the eco-industries, rather than eco-innovation in traditional industries. All three regions focus on the eco-industries as strategically important sectors for the future of their economies. There is often a lack of critical mass (for Brussels Capital Region), even though at the policy level, eco-innovation is being put on the agenda.

Eco-innovation and clusters: additionality or a strategic goal?

Eco-innovation is a strategic goal, with all three regions investing in their cleantech clusters. This is demonstrated at the policy level, as well as by the numerous eco-clusters spread all over the country, with new ones also being established as recently as in 2011.

Interesting links, reports and references

Cluster Policy in Flanders

Cluster Policy in Wallonia

Cluster policy in Brussels Capital Region

Eco-innovation observatory country report - Belgium

4.3. Bulgaria

Basic Cluster Policy information	
Cluster policy in place since	**2004**
At the National level ☒ At the Regional level ☐ Both ☐	
Ministries responsible for cluster policy	Ministry of Economy
National cluster policy addressing eco-innovation	Yes ☐ No ☒ Indirectly ☐

Number of eco-clusters in the country:

☒None ☐1-5 clusters ☐6-10 clusters ☐More than 10 clusters

Years of activity:

☐Less than 5 years ☐More than 5 years ☐More than 10 years

Overview of national cluster policy

First attempts to use cluster policy were undertaken in 2004. There is no explicit cluster policy in the country, and it is currently integrated into industrial and innovation policy.

Cluster policy is part of the Operational programme for competitiveness 2007-2013. There are clear references to cluster policy and cluster formation and what the objectives are:

"Policy objectives for 2007 – 2013: It is recognised that cluster policy can have an impact in 3 distinct areas: cluster formation, protecting or enhancing cluster development and encouraging embryonic clusters. All clustering initiatives in the country can be regarded as clusters in their embryonic stage. Thus, priority should be given to speeding up the clusters development processes. Support measures

will have to focus on: the establishing of new and strengthening the existing clusters to help firms specialise and innovate; the cooperation among cluster members and between the clusters and other stakeholders (national/regional/local authorities, universities, intermediaries, etc.) to strengthen the governance of the clusters; the "maintenance" of the human capital."

Currently, the Ministry of the Economy has undertaken a comprehensive study of all the Bulgarian Clusters and is developing both regional and national strategies for supporting these clusters in an attempt to increase the overall competitiveness of the economy.

At the time of compiling this report, the release of the future cluster policy was imminent.

The government decided to establish an explicit cluster policy. For that purpose a mapping exercise screened all exiting companies in the country and categorised them according to traditional sectors of activity as well as in two other categories: those who are "local", draw on local expertise and have potential to only strengthen their activities within the country, and the "traded" ones, that have the potential to internationalise and become competitive in markets outside Bulgaria. The study did not use NACE codes to classify companies, but assessed and sorted them by the potential of their economic activity. With the completion of the study, the government is now releasing the cluster policy and specific action plans. The most relevant document available to the public at this time is only in Bulgarian, and related to the results of the study.

The study is a good indication of the direction that the cluster policy in the country will be taking in the near future.

National cluster policy approaches: Sectoral or horizontal

Cluster policy in the context of general industrial policy is somewhat sectoral. A variety of sectors is being supported. The sectors are generally strongly established in the Bulgarian economy and are viewed as having the potential to render the national economy more competitive. The majority of the clusters in the country are not yet formalised cluster organisations. The sectors of focus are: agriculture, chemicals, energy, food and beverages, manufacturing, pharmaceuticals and transport. The government is currently working on formalising these clusters, into cluster organisations.

Eco-industry in the country

There are no prominent eco-sectors in the country. The air pollution management and renewable energy technologies are the eco-sectors that are viewed as having the most potential in the country.

Approach to cluster policy and eco-innovation

No eco-sectors have been chosen to be analysed in the study or explicitly mentioned in the policy. The main reason is that eco-sectors are not necessarily present already in the country, and since the strategic choice was made to come up with cluster policies to strengthen already existing networks, the eco-industry has not been included in the areas of focus.

Eco-innovation is approached as an aspect that applies to all industries, and it is best tackled through environmental related strategies and environmental legislation. In this manner, the framework

conditions are strengthened, in order to allow the better uptake of environmental technologies across all relevant industrial sectors.

In addition, is it argued that given the size of the industry within the country, it doesn't make sense to set up a separate eco-cluster that works only on renewable energies for example, but it is in fact more efficient for the renewable energy activities to be undertaken within the general energy cluster.

Eco-innovation and clusters: additionality or a strategic goal?

Eco-innovation is additionality for industries in Bulgaria. It is mostly undertaken in the context of environmental and general industrial policy, and not cluster policy. There are no strong cleantech sectors in the country; as such it is viewed as an aspect that applies to all sectors. No leveraging effects of cluster policy to further promote eco-innovation are considered at this point in time.

Interesting links, reports and references

Operational Programme: Development of the competitiveness of the Bulgarian Economy 2007-2013

Presentation of results of the cluster potential study (in Bulgarian)

Eco-innovation observatory country report - Bulgaria

4.4. Cyprus

Basic Cluster Policy information	
Cluster policy in place since	No cluster policy in place
At the National level ☐ At the Regional level ☐ Both ☐	
Ministries responsible for cluster policy	
National cluster policy addressing eco-innovation	Yes ☐ No ☐ Indirectly ☐

Number of eco-clusters in the country:

☒None ☐1-5 clusters ☐6-10 clusters ☐More than 10 clusters

Years of activity:

☐Less than 5 years ☐More than 5 years ☐More than 10 years

Overview of national cluster policy

Explicit cluster policies both on national and regional level have not been established in Cyprus. The economy of Cyprus consists largely of small to medium sized enterprise with limited sectoral concentration. Thus, the fragmented nature of the national economy hinders efforts towards cluster policy development and lowers their priority in the eyes of policymakers (according to the Nicosia Chamber of Commerce). Clustering activities and strategies are therefore pushed forward through generic national policy and law. Due to the size of the country, no regional distinctions are made within policy.

However, the development of new policies has been pushed by regional chambers of commerce and national research institutes to focus on specialised industry through the Industrial Policy Framework. Sporadic initiatives towards clustering have been introduced. A study by the Nicosia Chamber of Commerce suggests that policy push to establish clustering initiatives is significant for the economic development, however the lack of geographical and industrial concentration provides little evidence to support such notions. The formation of clusters may have further been hindered as no industrial sector has significantly developed or contributed to the economy in a specialised manner.

National cluster policy approaches: Sectoral or horizontal

As the current policy framework does not specifically target clustering initiatives, it is neither horizontal nor sectoral. However, this lack of policy has pushed clustering initiatives to utilize industry specific policies and therefore leans more towards a sectoral approach. E.g. The Chamber of Commerce and Industry is initiating the creation of an 'innovation zone' in collaboration with research institutions. Sectoral Policy is being targeted to attract ICT companies to this zone.

The emphasis on cluster formation has gained increased support by research bodies and government institutes.

Eco-industry in the country

As there is no cluster policy in Cyprus this also means that clusters are not subject to specified or governed eco-initiatives or environmental performance measures. Waste-management is predominantly tackled individually by companies. National law has however implemented initiatives requiring companies to manage their own waste packaging. This is governed by a directive regarding the treatment of waste.

Cyprus faces a number of key environmental challenges including water scarcity (key challenge), waste water management, and industrial waste management. The food and beverage as well as the manufacturing industries have shown emerging trends toward implementation eco-innovative regulations and support are limited but have increased in number over the past decade. Furthermore, the business sector is being encouraged by governing bodies to promote eco-efficiency as a profitable attribute to their processes. An example of this is the Life Water initiative set up by the Ministry of Environment with support from the European Commission, which promotes water quality management programmes www.life-water.eu .

Approach to cluster policy and eco-innovation

The Cypriot Planning Bureau is the governing entity responsible for developing Cyprus' innovation strategy. This includes policy formulation to drive research and business practices to tackle eco-challenges. As there are no direct overarching clustering initiatives, eco-innovation initiatives are developed mainly through a governing sectoral approach. The government has prioritised green research and development within the business sector, specifically in water and waste management, and energy efficiency. This trend is further stimulated by additional European funds made available for eco-innovation testing in these three key environmental challenges.

Eco-innovation and clusters: additionality or a strategic goal?

Based on findings, it would be suggested that Cyprus targets eco-innovation and cluster formation as an additionality rather than a concrete strategic goal. According to the Cyprus Environmental Technologies Action Plan, governing bodies mainly focus on diffusion rather than research of environmental technologies. It seems that most initiatives arise from environmental factors becoming problematic to the national economy rather than to increase efficiency and competitiveness. Much like eco-initiatives, clustering activities are targeted indirectly based on industry performance. The sectoral nature of both eco-innovation and clustering initiatives, combined with a lack in clustering policies further strengthen arguments for additionality rather than a strategic approach. The realm of eco-innovation trends and existing programmes strongly outweighs any current efforts towards cluster establishment.

Interesting links, reports and references

WATER is the result of a joint effort of the Cyprus Department of Environment, ATLANTIS Consulting Cyprus and Frederick University and aims to promote water quality protection

Cyprus Institute of Energy

Coping with Drought and Water Deficiency From Research to Policy Making, ARID Cluster, 2005

A Potential Regional Cluster in Cyprus, Nicosia Chamber of Commerce and Industry, 2007

Eco-innovation observatory country report - Cyprus

4.5. Czech Republic

Basic Cluster Policy information	
Cluster policy in place since	**2005**
At the National level ☒ At the Regional level ☐ Both ☐	
Ministries responsible for cluster policy	Ministry of Industry and Trade
National cluster policy addressing eco-innovation	Yes ☐ No ☒ Indirectly ☐

Number of eco-clusters in the country:

☐None ☒1-5 clusters ☐6-10 clusters ☐More than 10 clusters

Years of activity:

☐Less than 5 years ☒More than 5 years ☐More than 10 years

Overview of national cluster policy

The Operational Programme Industry and Enterprise which included actions relating to clusters ran in 2004-2006. Initiated by the Ministry of Industry and Trade; the first period of the cluster policy aimed to establish cluster organisations in the country by supporting research and business cooperation.

The main objective of the policy is to support economic development at the regional level by supporting the competitiveness and innovation capabilities of the enterprises across the Czech Republic.

Czech Invest which ran the cluster programme between 2004 and 2008, implemented it in two phases, first by supporting initiation activities in finding partners to set up a cluster organisation and secondly by further supporting the actual establishment of the cluster organisation. Funding for the programme came from the Structural and Cohesion Funds.

Clusters are currently being included in the Operational Programme Enterprise and Innovation (OPEI) 2007 – 2013. The document identifies clusters as being of key importance for R&D, by calling for the support of network s and cluster development, especially targeting SME's; "The focus of the support will be on projects to identify, find and develop clusters, and technology platforms."

In addition, the crucial aspect of why clusters are needed is pointed out: "Currently existing network of technological parks does not provide services for technology transfer on the same level as in developed countries of the European Union. Important innovation potential in the enterprise sector of the Czech Republic will be realised through forming sectoral groups in the form of clusters. This represents a continuation of one of the priorities of the OPIE 2004 – 2006."

National cluster policy approaches: Sectoral or horizontal

The cluster policy in the country, integrated into the innovation policy, is horizontal. There are no priority sectors identified. At the implementation level through the programme that Czech Invest runs, support for this second period is expanded from regional to also include internationalisation activities. In addition, there are 3 types of networks that are being supported: clusters, "poles of excellence" and technology platforms. The programme, in accordance with the policy is open to SMEs who are the main target, but also larger firms, universities, research institutes and regional public bodies (aim to set up private-public partnerships).

Eco-industry in the country

While the country does not have a highly competitive eco-sector, among the new member states it does have one the most prominent ones after Poland. In 2008, 1.89 percent of the total workforce in the country worked in the eco-industries. The country imports and export eco-technologies, mainly related to the waste, water and recycling. Another important eco-sector that is prominent is eco-construction (passive houses). There is also a renewable energy sector that is becoming more and more active (biomass).

Approach to cluster policy and eco-innovation

Eco-innovation is not mentioned or referred to in the context of national cluster policy. As mentioned before, the cluster policy is not sectoral, but rather horizontal, and eco-aspects are not explicitly mentioned in any form.

Cluster policy in the country at this point in time has the main goal to support innovation and competitiveness of industries, by establishing networks for cooperation, mostly at the regional level. No additional targets are set in terms of eco-performance.

Nevertheless, cleantech is promoted as an interesting sector to attract international investments in the country, for example on the Czech Invest website. In that context, it is interesting to note, that the presence of clusters and cluster organisations are highlighted as one of the reasons why to invest in the Czech cleantech sector.

Eco-innovation and clusters: additionality or a strategic goal?

Eco-innovation is considered an aspect valuable for its additionality in the country. There are no specific measures to support eco-industries or improvements in the eco-performance of their traditional industries through cluster policy. Nevertheless, there are some eco-clusters that have emerged, and this is viewed in positive light, which indicates that there might be an interest in the future, in case the policy becomes sectoral, to potentially also focus on eco-industries or eco-aspects in general. There are several renewable energy and water treatment clusters across different regions, which are already in place.

Interesting links, reports and references

Operational Programme Enterprise and Innovation (OPEI) 2007 - 2013

Czech Invest – Cluster information

Czech Invest - Cleantech

Eco-innovation observatory country report

4.6. Denmark

Basic Cluster Policy information	
Cluster policy in place since	**1990's**
At the National level ☐ At the Regional level ☒ Both ☐	
Ministries responsible for cluster policy	Ministry of Science, Technology and Innovation along with others
National cluster policy addressing eco-innovation	Yes ☐ No ☐ Indirectly ☒

Number of eco-clusters in the country:

☐None ☐1-5 clusters ☐6-10 clusters ☒More than 10 clusters

Years of activity:

☐Less than 5 years ☐More than 5 years ☒More than 10 years

Overview of national cluster policy

Cluster policy has been used in Denmark since the early 90's. There has been a transition of how cluster policy is used in the country, from initially aiming to create very big clusters in major industries, to slowly passing the responsibility to the regions catering for regional sector preferences. Currently cluster policy references at the national level in Denmark can be found in industrial and innovation policy, although they are scarce. In the latest programming periods, cluster policy at the national level has been reduced significantly while policies and initiatives take up at the regional level, with many new programmes being put in place. Since the scope of the study is on national cluster policies, no further research was conducted on regional policies in Denmark and so no information can be provided for policies at the regional level.

National cluster policy approaches: Sectoral or horizontal

Since cluster policies are integrated in different policy areas, each policy area in its turn identifies different sectors of focus. The list of sectors is rather exhaustive and varies from one region to the other. When it comes to cleantech, the "Business Innovation Strategy in the Cleantech area" is a relevant strategic document, yet without any explicit references to clusters. Since eco-aspects and eco-innovation is high up in the business agenda in Denmark, many clusters naturally formed in these sectors. An example is the choice of energy, climate and environment as a priority area for strategic research in the latest strategic document published by the government.

Eco-industry in the country

The eco-industries sector is very strong in the country. Denmark is a leading exporter of environmental solutions and technology worldwide. Prominent eco-clusters in the country are in the fields of water related technologies, industrial resource efficiency and recycling, large scale wind power, hydrogen and fuel cells, and biofuels.

Total Danish exports of environmental technology solutions for water, waste and air rose by an average of 8% per year between 2001 and 2006.

Approach to cluster policy and eco-innovation

Danish policy chooses its focus areas for sectors and markets based on systematic assessments. The country assesses the strength and competitiveness of its industry periodically. Key areas are: R&D, markets competitiveness and internationalisation. The cleantech sector is a competitive sector in the country, and it features as a strategic sector of focus in many regions.

Clusters have also been established in climate-related sectoral areas in a number of regions. Cluster formation is viewed as an interesting aspect to further support the eco-industries at the regional level, as mentioned in the Danish Business Strategy on Climate Change. It is important to note that the government makes a clear link between competitiveness, job creation and the eco-industries sector, based on market data and information.

Eco-innovation and clusters: additionality or a strategic goal?

When talking about eco-innovation and the cleantech sector, focus is on R&D and business support mechanisms. Eco-innovation is viewed primarily as innovation in the cleantech sector, and it is

definitely a strategic goal for the government. Nevertheless, while there are many eco-clusters all across the country, at the national level, policy is not a driver in the emergence of eco-clusters. At the national level, the government sets strategic industrial goals and shapes the long term agenda of the country, while regions tend to be the ones utilising cluster policy as an instrument to support networking activities and increase the competitiveness of enterprises.

Interesting links, reports and references

Danish Business Strategy on Climate Change

Action plan to promote eco-efficient technologies 2010-2011

Report on Priority Areas for Strategic Research (in Danish)

Report on Danish Business Clusters (in Danish)

Eco-innovation observatory country reports - Denmark

4.7. Estonia

Basic Cluster Policy information	
Cluster policy in place since	**2006**
At the National level ☒ At the Regional level ☐ Both ☐	
Ministries responsible for cluster policy	Ministry of Economic affairs and Communication
National cluster policy addressing eco-innovation	Yes ☐ No ☒ Indirectly ☐

Number of eco-clusters in the country:

☐None ☒1-5 clusters ☐6-10 clusters ☐More than 10 clusters

Years of activity:

☒Less than 5 years ☐More than 5 years ☐More than 10 years

Overview of national cluster policy

Cluster policy in the country is integrated into R&D and innovation policy, and is a component of it. It has been in place since 2006, before the current programming period started with the use of the Structural and Cohesion Funds. The programming period with cluster references is in place is from 2007 until 2013, and an impact assessment of the policy is expected to take place in 2012. The most relevant policy to cluster policy is the Innovation strategy "Knowledge–based Estonia" 2007-2013, with the aims of supporting innovation, entrepreneurship, competitiveness through research and development, and an overall favourable innovation environment. The main goal of the cluster policy is network building, attracting investment and internationalisation.

National cluster policy approaches: Sectoral or horizontal

The cluster policy approach in the country is horizontal. There are no sectors of focus for clusters identified, and the reason behind this is the small size of the country and the interest to support all

sectors that might be eligible for funding, through the programme run by Enterprise Estonia. At the policy level, while cluster policy does not have priority sectors, innovation policy in general (into which cluster policy is integrated into) focuses on prioritised key sectors: ICT, biotech and materials. Key socioeconomic challenges are also addressed also by sector such as environment, energy, security, health care. Yet it was mentioned that apart from the above mentioned list, all sectors are eligible for cluster funding if they satisfy some requirements. Projects that are in these sectors, may receive extra points in the evaluation stages in the cluster programme.

Eco-industry in the country

The eco-industry in the country is not particularly strong. It was reported that sustainable construction, energy efficiency, optimisation of energy production and use and the waste sector are the most prominent eco-sectors in the country. This is in fact manifested through projects that Enterprise Estonia has supported, in their work on cluster related projects.

Approach to cluster policy and eco-innovation

There is no specific focus on eco-industries through cluster policy. At the cluster policy level, no sustainability or eco-innovation goals have been set. Yet at the implementation level, through their cluster programme, initiatives that submit proposals first get evaluated on the core components for the clustering efforts, and it is explicitly mentioned that extra bonus points are awarded if the initiatives contributes to the development of energy efficiency, health care and environmental protection sectors.

Nevertheless, it is perceived that eco-innovation is related to environmental performance and as such it is not a competence of the cluster policy and related programmes, but rather of environmental and regional policy.

Eco-innovation and clusters: additionality or a strategic goal?

Eco-innovation in Estonia is viewed as an add-on to industries. Many of the industries heavily rely on web based application and the internet, with ICT and the creative industries being strong in the country. The additionality of eco-innovation is applied to the rather traditional manufacturing sectors in the country, and as such it is only a rather small component of cluster activities in the country. There are nevertheless a handful of eco-clusters that have emerged in the country over the past couple of years such as the Estonian eco cluster (www.solarbase.ee).

Interesting links, reports and references

Enterprise Estonia

Eco-innovation observatory country report - Estonia

4.8. Finland

Basic Cluster Policy information		
Cluster policy in place since	1996	
At the National level ☒	At the Regional level ☐	Both ☐

Ministries responsible for cluster policy	Ministry of research, Min of Industry
National cluster policy addressing eco-innovation	Yes ☒ No ☐ Indirectly ☐

Number of eco-clusters in the country:

☐None ☐1-5 clusters ☐6-10 clusters ☒More than 10 clusters

Years of activity:

☐Less than 5 years ☐More than 5 years ☒More than 10 years

NB. They are not clusters as understood at the EU level. But rather "hubs of economic activity", which in Finland is understood as clusters.

Overview of national cluster policy

The definition of what clusters are in Finland is generally different than the ones in the rest of Europe. Cluster policy in Finland does not consider clusters as geographical concentrations but rather thematic networks that do not necessarily have to be physically close to each other such as in traditional regional clusters and related policies. The main reason why is because of the small size of the population coupled with the high geographic spread of its industry.

The main purpose of industrial policy is to make sure that jobs and certain functions within the economy stay in the country and do not get outsourced to other countries. There is no policy to create clusters but to support them, in the form of networks. Since 1996 Finland has had The Centres of Expertise Programme in which cluster policy fits overall, as a result of the hard recession that Finland underwent in the beginning of the 90's. Before then policy used to be regional, with regions creating their own strategies. In the current framework period since 2007, "collaborative networks" were added. There are 13 thematic networks, with the participation of 22 centres across the country. They promote collaboration and can be considered clusters.

Within the same framework, a new policy instrument has been introduced: the Strategic Centres for Science, Technology and Innovation (SHOK). They are public-private partnerships put in place in the form of a limited company with the strategic aim for these partnerships to be self-sustainable on the long run, and outlast programming periods. The centres are thematic, and the main purpose is to work in this framework with the aim of accelerating innovation and to boost industrial clusters that are already in place in order for them to adopt new radical forms of innovation. The partners in each of the SHOK work together to create a strategic research agenda and then implement it.

National cluster policy approaches: Sectoral or horizontal

The approach of cluster policy in the country is sectoral. Focus is placed on knowledge intensive industries, the manufacturing sector as well as industries that are unique in the country and provide strong revenues, such as forestry. The sectors are: energy and environment, forestry and chemicals, ICT, machinery/materials/production. The sectors above are then the focus areas of cluster programmes which are being implemented in the country.

Eco-industry in the country

The eco-industry in the country is strong. In the recent Eco-Innovation Observatory report, Finland was ranked as the most eco-innovative country in EU27 (EIO, 2011) Prominent environmental sectors in the country are renewable energy, energy efficiency, resource efficiency across industrial sectors, sustainable forestry, waste and wastewater treatment technologies, water technologies and recycling. Eco-innovation is approached as innovation in the cleantech sector, a sector that is prominent in Finland. In addition, eco-innovation is also a core part of almost all other industrial sector activities as well. Traditional industries that are prominent in the country are highly resource intensive, with forestry and the related pulp and paper industry as well as the production of wood as a raw material giving rise to demand for eco-innovation.

Approach to cluster policy and eco-innovation

In Finland, eco-innovation through cluster policies is approached with a focus on the cleantech sector. This is demonstrated by the choice of sector focus at the policy level, with energy and environment being one of the four selected. In addition, eco-innovation is also pursued in the other sectors, with environmental performance and sustainability being referred to in almost all cases.

Eco-innovative aspects are specified in detail in the case of the Energy and the Environment (CLEEN Ltd) SHOK as being:

- Carbon-neutral energy production
- Distributed energy systems
- Sustainable fuels
- The energy market and smart grids
- Efficient energy use
- Resource-efficient production technologies and services
- Recycling of materials and waste management
- Measurement, monitoring and assessment of environmental efficiency;

It was reported that eco-innovation is in fact highly embedded in almost all activities, and as such it is often a given that environmental aspects shall be considered in all activities related to sectoral clusters.

Eco-innovation and clusters: additionality or a strategic goal?

Eco-innovation is a strategic goal in the country, and has been for two decades now. The link between competitiveness and environmental performance has been long established in the country. With internationalisation of Finnish companies being one of the key goals of cluster policies, the policy in place counts on the strategic differentiation of companies as offering high tech solutions in terms of technology and services in the cleantech sector. This indicated that while the country counts on these type of technologies to ensure the efficient use of their resources, it also counts on the demand in the global market for these type of technologies/services, which will increasingly become more prominent.

Interesting links, reports and references

Evaluation of the previous policy related to Clusters

Information on the SHOK programme

Energy and the environment: CLEEN Ltd

Eco-innovation observatory country report - Finland

4.9. France

Basic Cluster Policy information	
Cluster policy in place since	2005
At the National level ☒ At the Regional level ☐ Both ☐	
Ministries responsible for cluster policy	Ministry of Economy, Finance and Industry
National cluster policy addressing eco-innovation	Yes ☒ No ☐ Indirectly ☐

Number of eco-clusters in the country:

☐None ☐1-5 clusters ☐6-10 clusters ☒More than 10 clusters

Years of activity:

☒Less than 5 years ☐More than 5 years ☐More than 10 years

Overview of national cluster policy

Cluster policy in France is centralised at the national level. It was initially put in place in 2005 for a period of three years. The first phase focused on the establishment of the clusters, R&D results and on labelling the clusters as "pôles de competitivité". A positive evaluation was conducted in 2008, after which the second phase of the cluster policy was announced for 2009-2011. This second phase is focused on consolidating the work of the clusters, supporting internationalisation, and opening up of the clusters globally, but more specifically towards Europe. The second phase has now been extended until 2012. A new evaluation is to take place starting September 2011 and the results and future of the cluster policy is expected to be announced in July 2012.

The labelling of the clusters has a purpose to establish networks for cooperation between different regional clusters in France, and form networks or participate in European or National projects together. The main goal is to allow clusters to work in a complementary manner and to reduce unproductive competitive behaviour and duplication of efforts. This principle was initially applied to the aeronautics industry, and since it proved efficient, for the latest period it is being applied to the "ecotech" industry.

National cluster policy approaches: Sectoral or horizontal

Approaches in the French cluster policy are rather sectoral. While the Ministry of Economy, Finance and Industry plays the most critical role, cluster policy in France is an inter-ministerial policy, where each ministry is asked to identify priority sectors for their own sectoral activity. Then the policy is put together in a centralized way with the contributions from all.

Priority sectors are not strictly identified in the context of cluster policy, but rather in the context of industrial policy, and they more or less cover all sectors. The absence of clear priority sectors for the future, or sectors of great competitiveness, as identified as in other member states, leaves the possibility open during the implementation stage for a variety of sectors to apply for projects to officially become "clusters".

Eco-industry in the country

The eco-industry in France is gaining more and more prominence in the economy. In 2008, with the release of the plan Ecotech2012 for France, the sector came into focus, and its importance in contributing to the French economy was valorised. The current estimated turnover of the industry is at 60million EUR, and it provides jobs to 400,000 persons.

Within the Ecotech plan, the industry is split into three categories, based on their maturity level and the potential for growth:

- Pillar 1 - Technological Paris: decarbonised vehicles, solar and photovoltaic, onshore and offshore wind power, carbon capture and storage , and 3rd generation Biofuels.
- Pillar 2 - Growth sectors: energy efficiency in buildings (thermal retrofitting, upgrades in heating equipment), biomass, recycling and energy recovery from waste, biofuels, site remediation, marine life protection.
- Pillar 3 - Historical base: waste management, water and sanitation, nature preservation, biodiversity preservation, air and noise pollution management.

While the focus of the plan is rather sectoral (activity sectors within the eco-industry), concluding remarks also stress the importance of promotion eco-innovation as a whole to all sectors of industry.

Approach to cluster policy and eco-innovation

The link between cluster policy and eco-innovation has been made more clearly in France than in many other EU member states.

Already in 2008, within the context of the Ecotech plan 2012, the "Recommendations of the strategic committee for eco-industries" was released by special committees, recommendations among other included to utilise cluster policies and cluster activities in supporting the "ecotech" sector.

The recommendations include:

"In order to reinforce the dynamic nature and help structuring the eco-industries sector, there should be a group put in place between existing eco-clusters to:

- *Increase cooperation between eco-clusters, based on the same model that was used for the aeronautics clusters.*
- *The eventual labelling of one or many "ecotech" clusters and the structuring of the competences in the eco-technologies sectors in the entire country*

- *The quick setup and financing of instruments that would support new enterprises, incubators, financial bodies and business angels for this sector."*

Results since then include the labelling of six new clusters dedicated to eco-technologies, in the areas of water, waste management, construction and energy. These are: Avenia, DREAM, EAU, Energivie, Gestion des eaux continentales, Team2.

With some sectors such as green chemistry also identified as interesting sectors of focus, eco-innovation is also supported through clustering activities, and result of this being the cluster of Axelera in Rhone Alpes, that focuses on Chemistry and Environment.

Eco-innovation and clusters: additionality or a strategic goal?

Eco-innovation in the country is mostly understood as the emergence of "eco-tech" clusters that will ultimately strengthen the environmental technologies and services sector in France, which is viewed strategically important. The importance that the government is placing in establishing the link between cluster policy and eco-innovation is also demonstrated by the recent release (dating January 2011) of a study commissioned by the Ministry of Economy, Finance and Industry which is entitled "The development of eco-industries in France through the mission given to Competitiveness Poles". The report clearly discussed the potential link that should be made use of, and the synergies to be considered between cluster policy and the emergence of the "ecotech" sector in France as a competitive sector.

The strategic importance of eco-innovation is also demonstrated in the context of cluster policy, with the inclusion of a series of programmes that target eco-industries such as instituts d'excellence pour les énergies décarbonées (IEED) or Prêts verts, as areas that cluster policy should pay attention to, and highlighted to clusters as funding programmes to take advantage of.

Interesting links, reports and references

The Ecotech 2012 Plan for France

"Developing eco-industries in France – Summary of main results" report. Boston Consulting Group. 2008.

"Recommendations of the strategic committee for eco-industries"

"The development of eco-industries in France the mission confided to Competitiveness Poles"

Eco-innovation observatory country profile - France

4.10. Germany

Basic Cluster Policy information	
Cluster policy in place since	**1995**
At the National level ☐ At the Regional level ☐ Both ☒	
Ministries responsible for cluster policy	Ministry of Economy, Finance and Industry

National cluster policy addressing eco-innovation	Yes ☐ No ☐ Indirectly ☒

Number of eco-clusters in the country:

☐None ☐1-5 clusters ☐6-10 clusters ☒More than 10 clusters

Years of activity:

☐Less than 5 years ☐More than 5 years ☒More than 10 years

Overview of national cluster policy

Cluster policy in Germany has been used in one way or another since the mid 90's. At the national level, cluster policy is currently being formulated within the framework of the "High-tech Strategy for Germany", which is its innovation strategy. Originally launched in 2006, it was decided to continue with the same strategy in 2010, by renewing it and renaming it "High-Tech Strategy 2020". The new strategy has continuity with the previous one, yet some new priorities have been added. The strategy includes references to cluster support and formation, and references a variety of measures, either sector-specific or not. Some of the main aims of the high-tech strategy is to create lead markets, to strengthen collaboration between science and industry, and support growth and employment by ensuring the effective commercialisation of research results. Partnerships become crucial in this context, and clusters contribute to this network building and cooperative type of exercise. The aim of the cluster policy within the high-tech strategy is to further strengthen existing clusters and networks and also to support the establishment of new ones.

Cluster policy also exits at the regional level. It is reported that there are no coordination bodies for cluster policy between the federal and regional level, nor between the federal states. Nevertheless, in practical terms, cooperation is indeed taking place, yet this is being done on a case by case basis.

National cluster policy approaches: Sectoral or horizontal

The high-tech strategy, in which national cluster policy fits, is "sectoral" in the sense that there are key thematic areas of focus that have been identified. These are: health (health research, medical technologies); climate and energy (environmental technologies, energy technologies, plant/crops research); mobility (automotive, aeronautical, maritime and space); security (terrorism, organized crime, and natural and environmental disasters). The thematic areas identify the highly competitive areas of focus that research and innovation will focus on until 2020. Many of them are eco-sectors, while the environmental sustainability and climate safety elements are highly integrated throughout the other thematic areas as well.

Eco-industry in the country

The German government reports 1.8 million people currently work in the eco-industry sector in the country, with the renewable energy sector and energy efficiency being key areas of strong growth in the last few of years. "Environmental export goods "are also clearly on the rise; as an example, the global market share of export volume of German renewable energy enterprises increased from €0.5 billion in 2000 to €9 billion in 2007. The sector is viewed as highly competitive and its added value to

the economy and the contributions it makes to other industrial sectors is also clearly demonstrated in Germany.

Approach to cluster policy and eco-innovation

Cluster policy at the national level fits into innovation policy, which in turn makes many references to eco-innovation.
Looking at the High-tech Strategy, the focus is to create lead markets and cooperation between science and industry in order to support a highly competitive economy. It is interesting to note, one of the main statements of the High-Tech Strategy:

"We want to make Germany the leading provider of science- and technology-based solutions in the areas of climate/energy, health/nutrition, mobility, security, and communication. The HTS focuses on these areas, and this is also creating growth and employment in Germany."
Examples of what type of projects they are highly interested in are also listed, and these entail in many case eco-innovation. Some of the examples are:
"The High-Tech Strategy has formulated the following central examples of forward-looking projects:

- CO_2-neutral, energy-efficient and climate-adapted cities
- The intelligent restructuring of the energy supply system
- Renewable resources as an alternative to oil
- A million electric vehicles in Germany by 2020
- Increasing Internet use whilst making it less energy consuming"

Eco-innovation and clusters: additionality or a strategic goal?

In the High-Tech Strategy for Germany, it is stated that the country has a high potential in positioning itself and getting a great share of the global market in wastewater, air purification and waste disposal technologies, as well as RE sources, construction of plants and related engineering services. "With a view to the current economic situation, investing in these technologies can secure jobs and economic growth for Germany in the long term"

Eco-innovation is a strategic goal for Germany as demonstrated throughout its innovation policy, but not necessarily through cluster policy. Competitiveness is believed to be key for cluster policy; which in turn is to leverage the most competitive sectors of any economy. In Germany, the eco-sector is indeed one that comes highly into play.

There are a variety of examples in the country. The strategic approach is demonstrated at the implementation stage of the policy as well, where many of the chosen Leading Edge Clusters are indeed from the eco-industry, or have an eco component i.e. "Solar Valley – grid parity for solar power in Germany" or "Cool Silicon – Climate friendly communications" clusters.

Interesting links, reports and references

The High-tech strategy for Germany 2020

Germany's Leading-Edge Clusters

Eco-innovation observatory country profile - Germany

4.11. Greece

Basic Cluster Policy information	
Cluster policy in place since	**2005**
At the National level ☒ At the Regional level ☐ Both ☐	
Ministries responsible for cluster policy	Ministry of Development General Secretariat for Research and Technology Greek Regional Authorities
National cluster policy addressing eco-innovation	Yes ☐ No ☒ Indirectly ☐

Number of eco-clusters in the country:
☐None ☐1-5 clusters ☒6-10 clusters ☐More than 10 clusters

Years of activity:
☐Less than 5 years ☒More than 5 years ☐More than 10 years

Overview of national cluster policy

The Greek policy plans and strategies are developed through documentation, directives and legislation rather than through concrete programmes and organisation. Such 'documentation' focuses on the means by which cluster development should be pursued and aims to provide a framework outline containing various fields of policy.

Greece's cluster policy and clustering initiatives are handheld by the Corallia – Hellenic Technology Cluster Initiative (www.corallia.org), a public-private partnership established in 2006, which focuses solely on stimulating economic activity and growth in knowledge intensive and export-oriented technology centres.

Policies targeted (directly or indirectly) at clustering activities date back to the 90's in Greece but due to a rather fragmented approach remained unsuccessful. In 2005, a pilot program was set up under the Corallia Cluster Initiative to develop clustering support from a single reference point. The initiative is co-financed by the national budget, structural funds and private sector investments.

New national policy concerning cluster development is currently under discussion (May 2011) with contribution made by four key ministries:

1. Ministry of Development
2. Ministry of Education, Lifelong Learning and Religious Affairs - General Secretariat for Research and Technology

3. Ministry of Economy, Competitiveness and Navigation
4. Ministry for the Environment, Physical Planning and Public Works

National cluster policy approaches: Sectoral or horizontal

The policy approach in Greece is (for the majority) horizontal. Direct objectives within this approach target clusters or concentrations of companies (potential clusters) that can compete on a global level, are knowledge intensive, are capable of promoting foreign direct investment and will promote Greece into a value added service market. A major drawback in Greece's policy planning and strategy outlook to date has been the exclusion of clusters which are in an embryonic or declining stage.

The effectiveness of cluster policy implementation is however largely subject to the promotion by Greek Regional Authorities (General Secretariats and Managing Authorities of the Regional Operational Programmes. This leads us to belief that the implementation of a more sectoral approach is indirectly and directly supported by various regional programmes and initiatives aimed to stimulate progressive industries. To date, seven such authorities (supervised by the Ministry of Interior, Public Administration and Decentralization) have adopted cluster policy suggestions within their Regional Innovation Strategy (RIS) and Regional Innovation and Technology Transfer Strategies and Infrastructure Programmes (RITTS). Clustering activity has been highest in the construction, ICT, food and beverages, and pharmaceutical industries.

It may thus be suggested that policy planning takes on a horizontal approach while practical implementation is both sectoral and horizontal.

Eco-industry in the country

There are no eco-clusters in Greece; eco-initiatives are typically incorporated and governed within specific sectors of industry. Leading eco-initiatives in Greece were found in the food processing and chemicals industry, where the core areas of eco-innovation revolved around waste management and water efficiency.

Greece's environmental priorities include 'the protection of biodiversity, the reduction of the effects of pollution to human health and the ecosystems, the sustainable use of natural resources taking into account the predictions on the effects of climate change and the adoption of a new (green) growth model'(Hellenic Ministry of Environment, Energy & Climate Change, 2010).

Measures of innovation rank the country below the EU27 average. Eco-Innovation is no exception to this though government funding and scientific research personnel is adequate. According to the Eco-Innovation Scoreboard, Greece ranks low, with only four (new) member states featuring a poorer performance. Poor performance in eco-innovation seems to be comprehensive across indices – this statement is further backed by a zero venture capital investment measure into Cleantech in 2009 (Venture Capital Forum in Greece, 2009).

Approach to cluster policy and eco-innovation

Though a strong emphasis is placed on the development of innovation clusters such as the Nano/Microelectronics & Embedded Systems Cluster (mi-Cluster, Corallia, 2011), eco-innovation has not been found to be a direct sub target of innovative practices within clusters. It is fair to say that up to date, focus on eco-innovation has not been pushed within cluster policies. New cluster policies are currently under development.

Within current discussion on cluster policy amendment; contribution made by the Ministry of Development has limited environmental focus and the ministry of Education (research) is of the opinion that clusters themselves and individual companies should independently target and implement eco-innovation practices. Pending contributions from the Ministry of Environment, Physical Planning and Public Works are expected to place a stronger focus on eco-innovative practices primarily in light of meeting growing EU regulations and current requirement of waste water management practices in key sectors. The implementation of an annual cluster impact assessment programme is currently also under discussion.

The implementation of environmental cluster policies has been perceived beneficial in a number of key industries. These include agriculture, chemical based industries, construction, energy and utilities, food and beverages, and manufacturing.

The Ministry of Education, Life-long Learning and Religious Affairs is responsible for current policy development surrounding eco-innovation, which ties in with the development of the Greek National Strategic Framework for Research and Innovation which places the environment and sustainable development in its top three priorities.

Eco-innovation and clusters: additionality or a strategic goal?

National policy focussing on eco-innovation seems fragmented; with initiatives ranging in a wide range of industries. This is not very different from the current approach to innovation policies in Greece. It is assumed that contribution from the Ministry of Environment toward clustering activities will highlight an increased correlation with eco-innovation activities. The main industry focus is likely to be resonating in already emerging areas such as waste management, eco-tourism and green banking.

At present, it has been suggested that eco-innovation is more of an additionality in Greece as it lacks a concrete framework or action plan. The promotion of eco-innovative practices is handheld in a case-by-case manner, which excludes explicit priorities. Increases in eco-innovation practices in Greece are largely dependent on access to capital and the emphasis within environmental policies. Though still limited, both areas have witnessed an increase in importance amongst policy debate and could have the potential to rapidly increase Greece's eco-innovation intake.

Interesting links, reports and references

Hellenic Nano/Microelectronics & Embedded Systems Cluster

Eco-Innovation Support - The Science & Technology Park of Crete

Hellenic Bio Cluster

Eco-innovation observatory country profile - Greece

4.12. Hungary

Basic Cluster Policy information	
Cluster policy in place since	**2007**
At the National level ☒ At the Regional level ☐ Both ☐	
Ministries responsible for cluster policy	Ministry of Economy
National cluster policy addressing eco-innovation	Yes ☐ No ☒ Indirectly ☐

Number of eco-clusters in the country:

☐None ☐1-5 clusters ☒6-10 clusters ☐More than 10 clusters

Years of activity:

☐Less than 5 years ☒More than 5 years ☐More than 10 years

Overview of national cluster policy

The national cluster policy in Hungary was established in 2007. It is horizontal and the main focus is to increase innovation, competitiveness and employment levels in the country. Given the small size of the country, cluster policy only exists at the national level, although some minor differences exists on how these policies are implemented at the regional level.

An accreditation system for clusters has been established in the country as a means of implementing the policy and supporting the emergence of competitive clusters. The system is similar to the German cluster benchmarking system, and the purpose is to allocate special emphasis on the champions, thus championing innovation and also further support them in their innovation activities (which is part of the economic development plan of the country). Benefits of the accreditation include certification of their activities, and extra points for accredited clusters in national competitions.

There are currently 15 accredited clusters in the country, of which 6 are eco-clusters. More accreditations are on-going.

National cluster policy approaches: Sectoral or horizontal

Cluster policies in the country have to be considered in the context of other economic priorities that are gaining prominence. In the beginning of 2011, the new Szechenyi plan was put in place. The plan's main objective is to improve the competitiveness of the country and create 1 million jobs over the next 10 years by focusing on 7 "breakout" points: health industry, development of green economy, residential property policy; development of business environment, knowledge economy (science – innovation – growth); employment and transport.

Cluster policies tie into the support for the health/bio industry, science innovation and growth and to a certain extend the development of a green economy, although no explicit relation has been made to the last point. Cluster policies in the country explicitly focus on science and innovation.

Eco-industry in the country

Prominent eco-sectors in the country are the renewable energy sector, energy efficiency in buildings, eco-innovation in transport and environmental biotechnology.

There are currently six accredited eco-clusters in Hungary, some focus on eco-innovation in general such as ENIN, while other have a technological focus such as the Wastewater Technologies Cluster.

It is reported that in the POLUS programme, which runs the accreditation of the Hungarian clusters, energy, machinery/automotive, ICT and environmental industry are the most popular sectors among the supported applications.

Approach to cluster policy and eco-innovation

Cluster policies are horizontal and focus on innovation. Eco-innovation is thus implicitly also included there. Despite the emergence of eco-clusters in the country in past few years, there is no explicit support for the formation of eco-clusters yet. Looking at the policy in its political context and with the theme of the Green Economy picked as one of importance in the Szechenyi plan, there might be indirect encouragement for eco-clusters to emerge, but not due to an explicit sectoral focus. It is nevertheless stressed that horizontal cluster policy is best fitted for the economy of the country given the size and nature of its industry.

Eco-innovation and clusters: additionality or a strategic goal?

Eco-innovation in the context of cluster policy until now is viewed for its additionality. Yet, with the Green Economy focus in the overall economy plan, strategic interest might change, and it might become more strategic and oriented to the emerging eco-industry in the country.

Interesting links, reports and references

The New Szechenyi Plan information

The New Szechenyi Plan Press Release Summary

Hungarian Economic Development Centre

Eco-innovation observatory country profile - Hungary

4.13. Ireland

Basic Cluster Policy information		
Cluster policy in place since	**2007**	
At the National level ☒	At the Regional level ☐	Both ☐

Ministries responsible for cluster policy	Ministry of Enterprise, Trade and Employment
National cluster policy addressing eco-innovation	Yes ☐ No ☐ Indirectly ☒

Number of eco-clusters in the country:

☐None ☒1-5 clusters ☐6-10 clusters ☐More than 10 clusters

Years of activity:

☐Less than 5 years ☒More than 5 years ☐More than 10 years

Overview of national cluster policy

Cluster policy in Ireland is at the national level, given the small size of the country, and is included in enterprise policy. The concept of clusters doesn't apply in Ireland at the geographical level; but rather sectoral. Sectoral clusters are in fact made up of sectoral agglomerations that are often spread all over the country, and constitute all together one cluster.

The driving force behind the policy is the strategic decision to focus on further supporting the knowledge based service economy that has made Ireland competitive in the past couple of decades.

According to the Department of Jobs, Enterprise and Innovation report on clusters, "Ireland by 2013 will be internationally renowned for the excellence of its research, and will be to the forefront in generating and using new knowledge for economic and social progress, within an innovation-driven culture."

National cluster policy approaches: Sectoral or horizontal

National cluster policy is in the context of general innovation and enterprise policy. With the establishment of the National Development Plan 2007–2013, the country is focusing on supporting the development of the ICT, biotechnology, nanotechnology and sustainable energies sectors.

As such cluster policy indirectly focuses on these sectors. But other sectors are not excluded.

Other sectors that have either emerged as clusters or have the potential to form clusters include: marine, agriculture, chemicals, low carbon concrete (sustainable construction), digital media, food and beverages, high end manufacturing, pharmaceutical.

Clustering is being pushed by policy but sectors are picked based on prominence in the market and competitiveness levels. There is deliberate drive to promote export policy and to drive the sectors to become international, and attract foreign investment.

Eco-industry in the country

The country does not have a very strong eco-industry, with only 0.34% of the Irish workforce employed in eco-industries (2008) and with only 0.14% of total Irish exports are related to eco-innovation. The most prominent eco-industry is the renewable energy sector, with wind (onshore and offshore) and wave energy.

Approach to cluster policy and eco-innovation

There is no direct support to eco-industries or eco-innovation in general in terms of policy. But there is a lot of clustering activity in the renewable energy sector, due to the country's strong potential in exploiting natural resources in terms of wind, onshore and offshore, as well wave energy. Clustering activities are indeed happening in this sector, and the interest is to establish a strong skills base and build up expertise because they are going to need it for the large scale deployment plans that are under works. There are proposals to set up green zones and green cluster, with the aim of promoting eco-industries in Ireland, as mentioned in the "Developing the Green Economy in Ireland Report" from 2009.

Eco-innovation and clusters: additionality or a strategic goal?

Eco-innovation is a strategic goals, but not through cluster policies. It is believed that cluster policies should focus on supporting competiveness and innovation, and often, eco-innovation will fall within this category. This is exemplified by the other factors that influence the establishment of eco-clusters. Ireland has very high goals and targets, i.e. 40% renewable energy by 2020; as such there is a lot of policy as well as economic activity that is being undertaken in this context. The constraints are most often innovation constraints and not resource constraints, and as such natural clustering activities are taking place.

Interesting links, reports and references

Department of Jobs, Enterprise and Innovation – Report on Irish Clusters

Developing the Green Economy in Ireland Report

Eco-innovation observatory country profile - Ireland

4.14. Italy

Basic Cluster Policy information	
Cluster policy in place since	**1990's**
At the National level ☐ At the Regional level ☐ Both ☒	
Ministries responsible for cluster policy	Regional authorities and governing bodies
National cluster policy addressing eco-innovation	Yes ☐ No ☒ Indirectly ☐

Number of eco-clusters in the country:
☐None ☐1-5 clusters ☐6-10 clusters ☒More than 10 clusters

Years of activity:
☐Less than 5 years ☒More than 5 years ☐More than 10 years

Overview of national cluster policy

In Italy, clusters, or Industrial Districts as they are called have been existing for a long time. There is no dedicated and explicit cluster policy at the national level but rather a generally established framework in the form of a law through which industrial districts can be recognised as such and

which would in turn mean that they can benefit from various programmes and participate in different types of activities at the regional level. Regional authorities and governing bodies are responsible in implementing the policy in their own administrative areas.

More recently, in 2009 the country set up a new law on "network contracts," (NET) which aims at supporting collaboration among SMEs to increase their potential for innovation, research, and development. This is another form of a policy instrument that also supports the establishment or emergence of clusters or networks, this time designed to be particularly suited for SMEs. This is being undertaken within the framework of the Small Business Act.

Industrial Districts tend to be in various sectors that are usually traditional sectors prominent in the Italian economy such as manufacturing and handcraft, agriculture, trade and financial services and tourism.

National cluster policy approaches: Sectoral or horizontal

Industrial Districts policy at the national level is horizontal, and no sectors have been identified. Regionally this sometimes changes, where the regional implementation programmes might identify sectors of interest based on regional economic activity.

Eco-industry in the country

The cleantech sector is not yet very prominent in Italy. The existing eco-industry in Italy is made up of services and to lesser extent products that are related to energy efficiency in buildings and diffusion of renewable energy in the country. Given the size and importance of its manufacturing industry, material efficiency is also an eco-aspect that is increasingly become more important in relevant industrial sectors in the country. Overall, eco-innovation is approached as a cross cutting topic that applies to all industrial sectors.

Approach to cluster policy and eco-innovation

There are no links being made at the policy level between cluster policy and eco-innovation. Eco-innovation in the country is mainly understood as environmental performance improvement, and not innovation in the cleantech sector.

Even though there are no references to eco-innovation in cluster policy, there are some Industrial District initiatives in various regions which have environmental performance improvement through cooperation in the context of cluster programmes running. An example of the industrial district of leather and textiles in Prato can be given, where members of the Industrial District are cooperating in order to achieve EMAS accreditation, with positive effects on reducing costs of the certification, cooperation to share the related resources and knowledge exchange. It is reported that in terms of eco-aspects, these types of cooperative action through clusters are more probable then anything that leads to radical eco-innovation. Various other studies have also been produced in recent years, with policy makers and researchers in Italy clearly making the link between the potential of using the Industrial Districts and the cluster approach in achieving better environmental performance and other environmental management certifications in Italian enterprises (see links below).

Eco-innovation and clusters: additionality or a strategic goal?

As mentioned before, there are no links between eco-innovation and cluster policy at the national level, and it is thus not being pursued in a strategic way. Nevertheless, at the implementation level, certain Industrial Districts are tapping into the additionality aspect of better environmental performance by implementing cooperative actions through the existing network structures of the Industrial Districts.

Interesting links, reports and references

The UNIDO Cluster/Network Development Programme: The Italian Experience of Industrial Districts

Eco-innovation and economic performance in industrial clusters: evidence from Italy by Sara Tessitore, Tiberio Daddi, Fabio Iraldo. 2010

Environmental innovations, local networks and internationalization by Giulio Cainelli, Massimiliano Mazzanti, Sandro Montresor. 2011

Ecodistretti 2009. Made the "green" in Italy: the environmental policies of local production systems and industrial districts by Roberto Cariani. 2009 (link not available)

Eco-innovation observatory country profile - Italy

4.15. Latvia

Basic Cluster Policy information	
Cluster policy in place since	**2005**
At the National level ☒ At the Regional level ☐ Both ☐	
Ministries responsible for cluster policy	Ministry of Economics – Department of Entrepreneurship and Industry
National cluster policy addressing eco-innovation	Yes ☐ No ☐ Indirectly ☒

Number of eco-clusters in the country:
☒None ☐1-5 clusters ☐6-10 clusters ☐More than 10 clusters

Years of activity:
☐Less than 5 years ☐More than 5 years ☐More than 10 years

Overview of national cluster policy
Latvia has high concentrations of economic activity within varying sectors and regions. This has led to a fragmented definition of clusters. Most of the key sectors (in terms of national contribution) have upstream and downstream linkages which suggests an attractive environment for clustering activity to be formally addressed.

Due to their fragmented nature, existing cluster policies may be considered to be in their early stage of development. As various clustering activities and concentrations of firms have been identified

across sectors, thorough impact assessment is required to validate the best path forward. Until date most cluster support initiatives are typically short term and have been sporadic across sectors. The development of further incentives and policies to support cluster formation are largely dependent on the allocation of state budget.

National cluster policy approaches: Sectoral or horizontal

Cluster policies are by and large sectoral in their approach. This is mainly because Structural funds, which are the main funding source of clustering initiatives, typically target clustering activity indirectly by focusing on high potential industry sectors. Existing policy and funding currently focuses on a few key industries which maintain (potential) clusters. The PHARE Programme in Latvia (1999-2002) investigated the potential for cluster development and identified four sectors which showed potential for cluster formulation. These include engineering and machinery, information communication technology, forestry, and pharmaceuticals and science research.

Eco-industry in the country

In April 2011, Latvia signed an agreement with the EEA and Norway Grants worth € 73 Million. Within this budget a strong focus is based specifically on promoting eco-innovation and adaptation to climate change. These initiatives were further boosted by the development of two eco-innovation specific policies developed by the Ministry of Environmental Protection and Regional Development:

Policy 1 - Inter-disciplinary research and capacity building for environmental policy integration

Policy 2 - Environmental technologies and eco-innovation

Until early 2011, Latvia had no explicit eco-innovation policy strategy or an environmental action plan. Eco-innovation was and is still primarily targeted indirectly via programmes on innovation, energy and environmental challenges.

The Development Program of the Riga Region 2005-2011 contains explicit (primary) objectives towards developing energy and environmental infrastructure in this key region of Latvia. Waste management is a core challenge and efforts are underway to re-cultivate old dumpsites, implement waste collection points and the construction of regional landfills. Such initiatives are being pushed throughout regions in Latvia.

Approach to cluster policy and eco-innovation

Just as the strategy towards cluster policy remains fragmented, so too are the R&D programmes and measures towards eco-innovation potential in Latvia. Year by year various repetitive studies have been conducted in numerous renewable energy fields including 20 studies into biomass, 16 into bio gas, 17 into biodiesel, 11 into wind energy and 4 into solar energy. This fragmentation of industries and lack in complementary research further complicates decision making with regard to cluster policy and eco-innovation. At present efforts to develop coherent eco-innovation policies targeting clusters are in the pipeline but require more structure and validation. It may be said therefore that eco-innovation within clusters takes place through indirect initiatives.

Eco-innovation and clusters: additionality or a strategic goal?

Added economic value is currently measured in Latvia through the assessment and potential of various industries and regions. This has led to a situation where cluster policies remain secondary and are prevailed by fragmented industry initiatives. National budgets are more concerned with direct support to industry, while any additional funds or grants may be allocated to further exploring the potential for clustering activity.

In terms of eco-innovation, a stronger focus has been placed on promoting and developing eco-innovative technologies. The promotion of energy efficiency and alternative energy sources are mentioned in several state programmes. Latvia has grasped an understanding of eco-innovation as a tool toward strong future economic improvements rather than a legislative boundary. Though it ranked in the bottom ten of the Eco-Innovation Scoreboard, efforts are being made to rapidly move up the ladder. The best results to date in terms of eco-innovation developments have been measured in the wood industry (inspected by the forest stewardship council) and bio-cosmetics – which received strong support from the Latvian Cabinet of Ministers.

This generic focus on eco-innovation may relate to mandatory EU renewable energy targets set by the EU (40% by 2020) and the newly elected Government's long term innovation priority. Further stimulants include the successful procurement of grants to tackle environmental challenges.

Interesting links, reports and references

15 Examples of Latvian Eco-Innovation and Integration of Environmental Policy

PHARE

Clusters and Cluster Policy in Latvia, Baltic International Centre for Economic Policy Studies

Latvia -Single Programming Document, 2003

Eco-innovation observatory country profile - Latvia

4.16. Lithuania

Basic Cluster Policy information	
Cluster policy in place since	**2008**
At the National level ☒ At the Regional level ☐ Both ☐	
Ministries responsible for cluster policy	Ministry of Economy
National cluster policy addressing eco-innovation	Yes ☐ No ☐ Indirectly ☒

Number of eco-clusters in the country:

☐None ☒1-5 clusters ☐6-10 clusters ☐More than 10 clusters

Years of activity:

☒Less than 5 years ☐More than 5 years ☐More than 10 years

Overview of national cluster policy

Cluster policy in Lithuania is integrated into innovation policy and industrial policy. Efforts have increased significantly since 2008, in order to establish a stronger cluster policy in the country.

Currently, the government views cluster policy as one of the key components in the policy mix, which will make the economy competitive. In recent years the government has invested efforts and resources in conducting "Cluster development study" and mapping exercises.

Cluster policy in the country is highly sectoral, with the sectors of focus identified in the assessment done over the past two years. Funding for cluster projects comes from national budgets as well as the Structural and Cohesion Funds.

Lithuania has set up the Clusters of Excellence Network (KCT), which is a public body aiming to coordinate networking actions and support the promotion of cluster organisations and activities.

National cluster policy approaches: Sectoral or horizontal

Following the development of a Lithuanian industrial cluster study eight industry sectors with potential for cluster development were identified. These are: machinery and equipment manufacturing industry, wood processing and furniture industry, textile and clothing industry, food and beverage industry, chemical industry, information and communication technology sector and biotechnology sector, lasers and components sectors. It is also noted, that apart from these priority sectors within industrial policy, there are three additional aspects (not priority) which are also of importance: the printing sector, wellness and medical tourism and "eco-dimension".

According to the government, it is expected that at least some of these industries over the next few years will establish effective cluster operations.

Eco-industry in the country

The existing eco-industry in the country is not very strong; although Lithuania promotes the cleantech sector as an area for investment.

The main focus within the cleantech sector is on renewable energies, with Lithuanian companies in photovoltaic cell production and assembly. Other cleantech sectors of interest were noted as being the waste/wastewater technologies sector.

Approach to cluster policy and eco-innovation

Cluster policy does not identify the cleantech sector as a priority sector, given the lack of critical mass and the relative importance that other sectors have in the country. Nevertheless, "eco-dimension" (although not a priority sector) is an area of focus, in a sense bringing the eco-innovation aspect into the cluster policy agenda.

There are some examples of eco-clusters that have been established; i.e.Solar Energy Cluster, set up in 2010, in the field of photovoltaic cells.

Eco-innovation and clusters: additionality or a strategic goal?

Eco-innovation at this point in time is not a strategic goal, but rather an additional aspect that could bring about benefits to companies and their competitiveness.

Interesting links, reports and references

Lithuanian Cluster Development Study

Clusters of Excellence Network (KCT)

Ministry of Economy – Information on Clusters

Eco-innovation observatory country profile - Lithuania

4.17. Luxembourg

Basic Cluster Policy information	
Cluster policy in place since	2001
At the National level ☒ At the Regional level ☐ Both ☐	
Ministries responsible for cluster policy	Ministry of Economy and Foreign Trade
National cluster policy addressing eco-innovation	Yes ☒ No ☐ Indirectly ☐

Number of eco-clusters in the country:

☐None ☒1-5 clusters ☐6-10 clusters ☐More than 10 clusters

Years of activity:

☐Less than 5 years ☒More than 5 years ☐More than 10 years

Overview of national cluster policy

In Luxembourg, the policy on research and development (R&D) and innovation is generally defined and implemented by three ministries: the Ministry of Higher Education and Research, the Ministry for Economy and Foreign Trade, the Ministry of the Small and Medium sized Businesses and Tourism. Cluster policy is part of innovation policy, and has been used in a variety of ways since 2001. Cluster policy has gained more prominence in the last couple of years, with Luxembourg now utilizing the policy instrument very strongly.

Luxembourg uses cluster policy as one of the main components in its National R&D and Innovation Policy. Effective innovation networks are recognised at the policy level as being key in increasing the competiveness of the country's economy, and as such among the variety of other instruments used, cluster policy features prominently.

The policy is being implemented with the set up of the Luxembourg Cluster Initiative which was launched in 2002. The initiative is run by the Luxinnovation agency and is active in bringing together

the different cluster organisations that have been set up in the country. The agency also runs the individual clusters that are part of the Luxembourg Cluster Initiative.

National cluster policy approaches: Sectoral or horizontal

The cluster policy approach in the country is highly sectoral. The country is very strong in general in banking and financial services. In recent years, the government has made a strategic decision to diversify its economy to increase its competitiveness, and as such new key priority sectors of focus have been chosen, to which industrial policy offers great support through a variety of policy instruments. Cluster policy targets these sectors heavily, and there is one cluster organisation set up for each. All of them come together under the Luxembourg Cluster Initiative.

The identified sectors are space, materials, ICT, bio-health, eco-innovation, in addition to maritime and logistics and innovation and crafts.

Eco-industry in the country

The government has made a strategic decision to diversify its economy, and as such decided to focus on highly knowledge intensive and forward looking sectors, to be developed and further strengthened in the country. One of the sectors identified is eco-innovation, as in eco-industries.

The government has placed high importance on eco-innovation, and the sector is heavily promoted with a variety of policies, such as grants and financing and clusters.

The eco-industry in the country is mainly made up of SMEs which work in the sustainable construction, waste and water management and renewable energy sectors. The Eco-innovation cluster identifies these sectors as: eco-Construction/ eco-materials; renewable and alternative energies (biomass, biogas, photovoltaics); eco-design/eco-conception; rational use of energy.

Approach to cluster policy and eco-innovation

Eco-innovation is approached as a sector rather than an aspect. It is being directly and explicitly promoted with cluster policy as a key competitive sector for the future of the country.

Eco-innovation and clusters: additionality or a strategic goal?

Eco-innovation is a strategic goal. As previously mentioned, the government views the sector as one that has a strong potential to contribute to the diversification of its economy which is on the top of the political agenda in the country.

Interesting links, reports and references

National Action Plan for Innovation and Full Employment

Luxembourg Cluster Initiative

Luxembourg Eco-Innovation Cluster

Financing for eco-technologies in Luxembourg

Luxembourg National R&D and Innovation Policy

Eco-innovation observatory county profile – Luxembourg

4.18. Malta

Basic Cluster Policy information	
Cluster policy in place since	**2006**
At the National level ☒ At the Regional level ☐ Both ☐	
Ministries responsible for cluster policy	
National cluster policy addressing eco-innovation	Yes ☐ No ☐ Indirectly ☐

Number of eco-clusters in the country:

☒None ☐1-5 clusters ☐6-10 clusters ☐More than 10 clusters

Years of activity:

☐Less than 5 years ☐More than 5 years ☐More than 10 years

Overview of national cluster policy

Malta initiated its cluster policy after joining the EU. The key catalyst to clustering activity in the light of Malta joining the EU was through Malta Enterprise which focuses on attracting inward investment to Malta and supporting its enterprises (on an overarching scale).

To date, Malta has not developed an explicit cluster policy. Cluster policy planning and strategy is a direct and integral part of the national industrial policy and has been instituted within industrial policy since 2006. Initially, cluster establishment was mainly supported through public policy and funding, but in recent years there has been a shift to increased industry led initiatives.

The national strategy known as 'Vision 2015 and Beyond', aims to identify unique economic development opportunities by leveraging Malta's unique assets. The strategy, which may be indirectly connected to policy planning, identifies the potential for clustering initiatives.

The development of cluster support and policy planning is financed by the Ministry of Investment, Industry and Information Technology under the current government for the period 2008-2013.

National cluster policy approaches: Sectoral or horizontal

Due to the size of the country, one cannot speak of regional division in Malta, thus there is no form of regional cluster policy. Though national strategy is such that it does not implement policy directly towards clusters, strategies are more often than not aimed at specific high potential sectors which often run parallel to the industries of the country's strongest clusters. The main aim in cluster development and support is to enable Maltese companies to internationalise. Given the small size of

the country and the small size of industry and companies, critical mass is a major barrier to developing industries. Strong sectoral approach is therefore of priority; such initiatives have an indirect positive effect on the formation of future clusters.

Eco-industry in the country

Malta has the highest population density in the EU which has excessively increased the demand for natural resources and basic products. Malta faces environmental challenges, especially within urban regions. Key environmental challenges concern the quality and stabilisation of water, soil and air, as well as improvements in the efficiency of solid and liquid waste management.
Eco-innovation not widely applied in the country. However, the emergence of eco-innovative strategy seems to have increased in national priority. Current support for eco-innovation is primarily diffused through voluntary and grant schemes.

Approach to cluster policy and eco-innovation

Cluster policy does not target environmental performance or eco-innovative practices. Eco-innovation only relates to environmental policy at present and there is no explicit linkage between environmental strategy and cluster policy. Though policy at national level has not targeted the formation of environmental industries or eco-clusters, various support initiatives have been implemented to stimulate the growing waste and recycling sector which may potential develop into a cluster. A scheme established by Malta Enterprise called the 'ERDF Innovation Action Grant' aims to catalyse the uptake of SME pro-environmental practices. Eco-innovative practices have directly and indirectly been improved due to a higher emphasis on generic innovation activity with the National policy agenda. As there are limited number of clusters and industries, there are currently no initiatives to develop or promote the formation of eco-clusters.

Eco-innovation and clusters: additionality or a strategic goal?

Eco-innovative practices in Malta are still somewhat at an early stage and have not yet gained the critical level of priority necessary to become part of a Government's key strategic goal. At present, one may say that eco-innovation is an additionality which is managed and supported mainly by sub-level initiatives and priorities. Lack of critical mass was cited as an important aspect that hinders first the emergence of eco-industries, and also the adoption of eco-innovation in other sectors. When discussing the importance of cluster policy as a strategic goal for Malta, one finds that the fundamental aspects of cluster formation have gained a pivotal position in the Governments agenda. By fundamental aspects, we refer to the support to firm concentration and the development of one or two specific high potential industries. Such activities are a necessity for Malta's economy as current fragmentation in industrial sectors places added strain on the already existing dilemma of lack of critical mass.

Interesting links, reports and references

Malta Enterprise – Agency dedicated to inward investment to Malta and supporting its enterprise (prioritises clustering activity)

Mission 2015 and Beyond – Comprehensive Economic Development Strategy Plan for the Republic of Malta.

Eco-Innovation bid in partnership with Malt Business Bureau

Eco-innovation observatory country profile - Malta

4.19. The Netherlands

Basic Cluster Policy information	
Cluster policy in place since	Early to mid '90s
At the National level ☐ At the Regional level ☐ Both ☐	
Ministries responsible for cluster policy	Ministry of Economic Affairs
National cluster policy addressing eco-innovation	Yes ☒ No ☐ Indirectly ☐

Number of eco-clusters in the country:

☐None ☐1-5 clusters ☒6-10 clusters ☐More than 10 clusters

Years of activity:

☐Less than 5 years ☐More than 5 years ☒More than 10 years

Overview of national cluster policy

Most cluster policies in the Netherlands are at the national level. Yet since there is a sectoral approach, it is generally recognized that some of the policies are more relevant for some regions that others. For example Eindhoven is strong in the high tech industry. In any case, while the policy is being set at the national level, the regional authorities often take charge in the implementation part and so policy may also differ somehow at the regional level.

National cluster policy approaches: Sectoral or horizontal

There is a sectoral approach to cluster policy. The sectors are identified in the context of general industrial policy. They are: agri-food, horticulture, high-tech materials and systems, energy, logistics, creative, life sciences, chemicals, and water sectors. These sectors have been selected after 2010 as priority sectors in the context of "To the Top Strategy: Towards a new enterprise policy".

The new approach to policy making is also bottom up. One of the key cornerstones of the new strategy is: "*Joint decision making:* Research organisations, the business sector and the government (the so-called "golden triangle" or "triple helix") will cooperate within these top areas. Companies and public research organisations will be more involved in formulating the government innovation policy and the research agenda."

It was reported that the same will apply to clusters for these sectors, with the stakeholder groups for each of the sectors setting their own agenda and objectives.

Eco-industry in the country

The country has a relatively established cleantech sector, which is mostly focused on renewable energies, energy efficiency, smart grids, sustainable buildings and sustainable urban mobility.

The country is especially strong in offshore wind energy solutions, and is an exporter of such products globally.

Eco-innovation is also an aspect that is relevant to other industries that are active in the country, such as the chemicals and agro-food.

Approach to cluster policy and eco-innovation

Eco-innovation is mainly referred to as innovation relating to the cleantech sector in the Netherlands. Some of the priority sectors identified are indeed part of the eco-industry: energy, water and to a certain extent life sciences.

Sustainability is an aspect that is also being tackled horizontally, but there are no specific goals associated with it, at least not in the context of cluster policy. The reason is that the whole process aims to be a bottom up approach. And so the groups that are being formed to work on drafting the agenda per sectors are in charge to identify key challenges for their own sectors and to set goals. Funding will be allocated to each sector as such. At the policy level, the government is waiting to see what will come out of the sectoral agendas that are currently being worked on.

Eco-innovation and clusters: additionality or a strategic goal?

Eco-innovation in the country is a strategic goal, as exemplified by the choice of the cleantech sectors as sectors of focus. It is nevertheless stressed that the only reason that cluster strategies are targeting the eco-industries, is because of their competitiveness in the country.

Interesting links, reports and references

OECD report: National Place based policies in the Netherlands

To the Top: New Enterprise Policy

Cleantech Holland

Eco-innovation observatory country profile – the Netherlands

4.20. Poland

Basic Cluster Policy information	
Cluster policy in place since	**2006**

At the National level ☐	At the Regional level ☐	Both ☒
Ministries responsible for cluster policy	Ministry of Economy	
National cluster policy addressing eco-innovation	Yes ☐	No ☒ Indirectly ☐

Number of eco-clusters in the country:

☐ None ☐ 1-5 clusters ☐ 6-10 clusters ☒ More than 10 clusters

Years of activity:

☒ Less than 5 years ☐ More than 5 years ☐ More than 10 years

Overview of national cluster policy

Cluster policy in Poland is part of the national Reform Programme 2020, issued by the Ministry of Economy. Cluster references were first made at the policy level in the country in the "Strategy for Increasing the Innovativeness of the Economy, 2007-2013" in 2006, with goals of supporting joint networking activities in order to build-up and strengthen the innovation infrastructure in the country.

Measures that support clusters were thus included in the national as well as Regional Operational Programmes starting from 2007. At the national level, cluster support is directed by the policy that is in the Innovative Economy Operational Programme, while at the regional level, cluster policy is in the individual Regional Operational Programmes.

There is a recent interest in the government to link cluster policy with "Special Economic Zones" development policy. It is believed that with this linkage, a stronger framework for innovation will be put in place, with an infrastructure that will enable better regional competitiveness and innovation.

At the national level, cluster policies are rather implicit with some instruments (mainly funding instruments) applied by the national government which promote the establishment of clusters in all the Polish regions. The instruments aim to establish cooperative networks, and basically organizations are invited to apply for funding for the establishment and running of clusters.

National cluster policy approaches: Sectoral or horizontal

At the national level, priority areas are deduced from the Operational Programme – Innovation, in which clusters or cooperative networks are mentioned. As such no specific sectors can be pinpointed. Cluster policy at this level is rather horizontal.

At the regional level, cluster policy exists in a more explicit way some regions have identified sectoral priorities and accessed the national fund in addition to local funds and European structural funds for the establishment of clusters.

Looking at the two levels, the regions tend to have more explicit cluster policies per sector, while the national level is more general.

Eco-industry in the country

Employment in the eco-industry in Poland is 1.91% of total employment, with a turnover of €6.6billion. Yet most of the turnover occurs internally and is not due to exports. The major eco-industries in the country are in the renewable energy sector as well as waste, wastewater, recycling and air pollution control. (EIO Poland 2011)

Approach to cluster policy and eco-innovation

Cluster policies in the country are being used to drive innovation, and eco-innovation is an implicit part of that. There is no special focus on cleantech or eco sectors. But looking at the implementation level, there are numerous eco-clusters that have come into existence.

Eco-innovation and clusters: additionality or a strategic goal?

Eco-innovation is currently being viewed as additionality for industries in the country. It is implicitly referred to as being part of innovation, which is the main focus point of cluster policy. Eco-innovation is acknowledged as being relevant to all sectors horizontally, but also in respect to the cleantech sector.

Interesting links, reports and references

Polish Innovation Portal

Cluster based economic development policy report

National Polish Cluster Database

Eco-innovation observatory country profile - Poland

4.21. Portugal

Basic Cluster Policy information	
Cluster policy in place since	2008
At the National level ☒ At the Regional level ☐ Both ☐	
Ministries responsible for cluster policy	Ministry of Economy
National cluster policy addressing eco-innovation	Yes ☐ No ☒ Indirectly ☐

Number of eco-clusters in the country:

☐None ☒1-5 clusters ☐6-10 clusters ☒More than 10 clusters

Years of activity:

☒Less than 5 years ☐More than 5 years ☐More than 10 years

Overview of national cluster policy

Portugal until recently did not have any specific cluster policy. The Portuguese cluster policy, Strategy for Collective Efficiency (SCE) was established in 2008, and it aims to promote cooperation and establish networks among companies, and between companies and other stakeholders to promote innovation and increase the competitiveness of its economy as a whole.

The policy follows the French model and aims to establish so called global "competitiveness poles", in addition to clusters, which have a more regional. Efforts are place in establishing "Competitiveness and technology poles" (CTP's) and in addition what is called "Other clusters" being the regional ones. Each one has different purpose. The poles are defined as the ones having strategic vision and international projection, while the clusters are to support regional economies and job creation.

The CTP's are strongly focused on activities resulting in high levels of R&D, innovation and knowledge creation. They are also supposed to have a leveraging effect on the competitiveness of the industries in the country, and attract investment.

The clusters on the other hand, have to be strongly market oriented, but the purpose of establishing these regional networks is to promote the sharing of common assets and the generation of critical mass through joint innovation projects.

National cluster policy approaches: Sectoral or horizontal

The approach for the cluster policy is sectoral, with the thematic sectors chosen at the policy level. The sectors identified are the biggest ones in the country, and are in fact made up of mostly traditional industries that have a long tradition in the country and are established in the economy for a long time. The main thematic areas are: Tourism, ICT, health, textiles (fashion), agro-food, energy, engineering and manufacturing. In addition, to these main areas, there are also the areas where clusters rather than the poles focus on; furniture, creative industries and wine.

Eco-industry in the country

In terms of eco-industries, Portugal has a strong renewable energy sector that is booming. The literature states the renewable energy capacity in the country has tripled between 2004 and 2009, and it currently represents 36 percent of electricity consumption. Apart from this sector, there are no other major cleantech sectors within the country. Eco-innovation is thus perceived as a cross cutting issue that applies to all industrial sectors which could benefit in terms of upgrading their facilities and practices, and modernisation in general, with the ultimate purpose of increased competitiveness.

Approach to cluster policy and eco-innovation

The cluster policy in Portugal entitled **"**A Strategy for Collective Efficiency (SCE)" aims **"**at innovating, qualifying and modernising a number of enterprises who work at national, regional or local level" indicating that the main focus of the policy is to upgrade the traditional industries in the country, this also meaning in terms of environmental performance. As a first stage, the policy set up a

programme and invited potential poles and clusters within specific sectors to bid to get the label of CTP or cluster, based on a set of requirements. While there are no eco-innovation goals at the policy level, during the assessments of the proposals for the poles and clusters, extra points were given on the overall score if environmental sustainability and eco-innovation goals were also set in the agenda of the bid. Many of the sectors, such as the energy, as well as the refining, petrochemical and chemical Industries and the agro food pole (which is in fact called agro-industry: food, health and sustainability pole) did indeed include better environmental performance and sustainability goals in their strategic goals, indicating that for some of these sectors, the issue is of importance, even if it is not being explicitly dictated from the top level.

Eco-innovation and clusters: additionality or a strategic goal?

At this point in time, the cluster policy in the country is aiming for the additionally of eco-innovation in their industries. Priorities are clearly set on the internationalisation through the poles, and in supporting regional innovation, qualification and modernisation of enterprises through the clusters. The first couple of years of the impact of the policy are to be assessed in 2012, and adjustments shall be made based on the experience gathered so far. There is an increased interest in the enterprises in the country to eco-innovate, yet this interest at this point in time mainly stems from meeting environmental regulatory requirements (although, there are some stand out sectors, where eco-innovation is more about long term competitiveness).

Interesting links, reports and references

Strategy for Collective Efficiency (SCE)

List of Poles and Clusters in the country

Eco-innovation observatory country profiles – Portugal

4.22. Romania

Basic Cluster Policy information	
Cluster policy in place since	2010
At the National level ☒ At the Regional level ☐ Both ☐	
Ministries responsible for cluster policy	Ministry of Economy Trade and Business Environment
National cluster policy addressing eco-innovation	Yes ☐ No ☐ Indirectly ☐

Number of eco-clusters in the country:

☐None ☒1-5 clusters ☐6-10 clusters ☒More than 10 clusters

Years of activity:

☒Less than 5 years ☐More than 5 years ☐More than 10 years

Overview of national cluster policy

Romanian cluster policy is integrated within industrial policy. The integration of the cluster approach within policy planning began in 2009. As a result, the first cluster organisation in the country was established in 2010. The fundamental aim within cluster policy in Romania is to develop specific regional clusters whilst simultaneously establishing a national network of clusters.

The key documentation within national policy planning, which is of significance to clustering activity include:

- A cluster policy paper discussed in the framework of a bilateral agreement of cooperation between the German Agency for Technical Cooperation (GTZ – a Government agency providing technical assistance with limited capital funding throughout the major regions of the world) and the Romanian Ministry of Economy Trade and Business – General Directorate for Industrial Policy and Competitiveness.
- The Industrial Policy document for 2011-2013 dedicates a chapter to clustering activities, specifically competitiveness and innovation clusters
- Within the documentation related to the National Reform Program, mention of clustering initiatives is made in chapters concerning industrial policies.

As cluster policy and activity is not dealt with by one single entity, there are a number of Ministries and mission driven agencies which tackle different areas of cluster initiative development. The principle body dealing with this policy is the Ministry of Economy and Trade.

National cluster policy approaches: Sectoral or horizontal

The public policy that Romania has been pursuing for the last 2-3 years has definitely created a supportive environment towards the establishment and development of clusters. It must be said however that this approach till date is largely bottom up. At a regional level a bottom up approach is has been adopted in Romania toward several sectors which have developed clustering activity. These include the ICT sector, furniture, textiles and clothing, agro-food sector, renewable energies, tourism and maritime.

At present, a number of key cluster organisations have been identified by the government. These industries are supported through various sectoral grant and voluntary support schemes.
Since cluster policy has only been established since 2009, no formal impact assessment has been published till date.

Eco-industry in the country

The eco-industry is not very strong in the country, and there is a lack in critical mass interms of the cleantech sector. Eco-innovation is approached as improved environmental performance. This is applied to a variety of industrial sectors that are present in the country such as tourism, chemicals, and textiles, automotive and so on.

There are however some environmental industries located regionally across Romania. They are gaining active government support and the country aims to develop another renewable energy cluster in the coming years.

Approach to cluster policy and eco-innovation

Currently, cluster policy is not being used to strategically drive eco-innovation through clusters directly or to support better environmental performance in traditional industries. However, due to the existence of various renewable energy oriented clusters and various support schemes to facilitate and promote these clusters; it is fair to suggest that there is some indirect support toward the development of eco-clusters.

The existing eco-cluster organisations in the country are (from interview):

CLUSTER	Field of activities	City
Green energy cluster	Renewable energies	Sfantu-Gheorghe
TURINN Cluster	Sustainable and innovative tourism	Drobeta Turnu Severin
REN ERG Cluster	Renewable energies	Sfantu-Gheorghe
Geothermal Energy Cluster	Geothermal energy	Cluj Napoca

(From interview: Romanian Innovative Cluster Policy, Directorate for Industrial Policies, 2011)

Eco-innovation and clusters: additionality or a strategic goal?

Romania focuses on the additionality that eco-innovation offer for its industries in terms of improved environmental performance and modernisation of their industries. Lack of critical mass at the current time is cited as reason for this approach.

Interesting links, reports and references

GTZ Germany – Completed research surrounding economic activity in Romania

Eco-innovation observatory country profile - Romania

4.23. Slovakia

Basic Cluster Policy information	
Cluster policy in place since	**2005-2009**
At the National level ☐ At the Regional level ☐ Both ☐	
Ministries responsible for cluster policy	NA
National cluster policy addressing eco-innovation	Yes ☐ No ☐ Indirectly ☐

Number of eco-clusters in the country:

☒None ☐1-5 clusters ☐6-10 clusters ☐More than 10 clusters

Years of activity:

☐Less than 5 years ☐More than 5 years ☐More than 10 years

Overview of national cluster policy

There is no explicit cluster policy in Slovakia. There are references to cluster formation in other types of policies. Clusters are mentioned as important policy instruments to increase competitiveness and innovation of enterprises in the Slovak economy. These can be found in the Innovation Strategy for the Slovak Republic for years 2007 – 2013 for example.

Nevertheless, the support at the policy level, as well as at the implementation level for cluster is low in the country. There are no programmes for cluster support reported.

National cluster policy approaches: Sectoral or horizontal

Not applicable, since there are no national cluster policies.

Eco-industry in the country

The eco-industry in the country is rather small. Eco-innovation is approached as environmental performance improvement in traditional industries.

Approach to cluster policy and eco-innovation

Not applicable. In addition, eco-innovation is part of environmental related policies and not part of industrial policy as such.

Eco-innovation and clusters: additionality or a strategic goal?

Clusters in the country are created spontaneously, and not because of any specific type of government support. As such, there are no strategic goals that relate to clusters.

Interesting links, reports and references

Innovation Strategy for the Slovak republic for years 2007 – 2013

Eco-innovation observatory country profile - Slovakia

4.24. Slovenia

Basic Cluster Policy information	
Cluster policy in place since	1999. No longer in place.
At the National level ☒ At the Regional level ☐ Both ☐	
Ministries responsible for cluster policy	Ministry of Economy

National cluster policy addressing eco-innovation	Yes ☐ No ☒ Indirectly ☐

Number of eco-clusters in the country:

☐ None ☒ 1-5 clusters ☐ 6-10 clusters ☐ More than 10 clusters

Years of activity:

☐ Less than 5 years ☒ More than 5 years ☐ More than 10 years

Overview of national cluster policy

"Slovenia Clusters" was considered as one of the measures of the Entrepreneurship and Competitiveness Policy that the Ministry of Economy was implementing during 1999-2004. After that period, and starting from 2005 support to the cluster development programme stopped. From 2008 on the government does not support clusters as defined by EC, but is still supporting networking among enterprises, research institutions, academia through other organizational forms such as Centres of Excellence, Centres of Competence and Development Centres.

Currently cooperation and networking amongst R&D and businesses is supported through three main initiatives that are financed with a total of 350 Mio Euro (2010-2014):

1) Centres of Excellence (combining R&D and invited business sectors)

2) Competence Centres (business initiatives focussing on market-oriented results)

3) Development Centres of the Slovene economy (strong support to new business models)

The Ministry of Economy acted as facilitator in the clustering activities that were undertaken in the country. During the running of the cluster programme, a bottom-up process was used where decision making in terms of objectives and goals was left to the sectors and relevant stakeholders, and at the same time constraints were low.

National cluster policy approaches: Sectoral or horizontal

There is a sectoral approach when it comes to clusters and industrial policy in general. The identified sectors of focus are: automotive, chemical, construction, ICT, energy, manufacturing, textiles, logistics and wood processing.

Eco-industry in the country

Slovenia has a rather strong eco-industry. The EIO reports that eco-industries represent about 3.21% of the GDP in the country. The most prominent sectors are sustainable construction (energy efficiency in buildings), renewable energies and recycling.

Approach to cluster policy and eco-innovation

Slovenia has a number of strategic national targets (2010-2013) with regard to climate change and the environment (within the framework of the 2020 targets). However, Slovenia is not clearly

integrating environmental goals or targets in different sector policies. They form a rather general part of the overall competiveness/entrepreneurship/growth policy.

There are no eco-innovation related targets in the Slovene "cluster" related policies.

Eco-innovation and clusters: additionality or a strategic goal?

Eco-innovation within "cluster policy" is neither strategically used nor is it additional.

In the wider context, an impact assessment for all instruments supporting growth and development in the Slovene economy is currently being undertaken. The ministries are collaborating amongst themselves, in addition with a newly established governmental office for Climate Change, in order to ensure the incorporation of relevant environmental issues.

Interesting links, reports and references

Invest in Slovenia

Eco-innovation observatory country profile - Slovenia

4.25. Spain

Basic Cluster Policy information	
National cluster policy in place since	**2006**
At the National level ☐ At the Regional level ☐ Both ☒	
Ministries responsible for cluster policy	Ministry of Industry, Tourism and Commerce
National cluster policy addressing eco-innovation	Yes ☐ No ☒ Indirectly ☐

Number of eco-clusters in the country:

☐None ☐1-5 clusters ☐6-10 clusters ☒More than 10 clusters

Years of activity:

☐Less than 5 years ☐More than 5 years ☒More than 10 years

Overview of national cluster policy

Regional governments in Spain have been using cluster policy in their respective regions since the early 90's, to support their respective economic environments. At the national level, cluster policy was set up in 2006.

The Ministry of Industry, Tourism and Commerce has been responsible for the development and coordination of the national cluster policy. The goal of cluster policy at the national level differs from the ones at the regional level. It aims to complement the actions undertaken at the regional levels, and its main purpose is coordination and promotion of collaboration at the national level, in addition to bridging gaps in issues related to critical mass in certain industries.

The main instruments implementing the cluster policy at the national level is Innovative Business Groups (AEI) programme. The programme provides funding and support to innovative projects that contribute to business competitiveness.

The Ministry of Industry, Tourism and Commerce states that "The AEIs represent a suitable instrument to overcome problems of a critical mass and implementing innovative projects with impacts on improving business competitiveness. In general, business clusters allow small and medium enterprises take better advantage of new opportunities derived from an increasingly global economy."

National cluster policy approaches: Sectoral or horizontal

Spain has a non sectoral approach to cluster policy at the national level, since the policy is supposed to be complementary to the regional cluster policies that each of the regions has. Regions are not homogeneous in terms of industries and economic activities, or in terms of innovation capabilities.

There is no overarching guiding principle at the national level regarding sectoral choices. The choice is left to the regions, which were implementing cluster policy long before the government at the national level.

Eco-industry in the country

The major eco-sectors in the country are sustainable construction, renewable energies and waste and waste water technologies. Overall, the eco-industry is not judged to be highly competitive, yet it does contribute to the overall economy. It is reported that 1.86 percent of the total workforce of Spain works in the eco-industries.

Approach to cluster policy and eco-innovation

Not much can be said at the national level regarding the streamlining of cluster policy and eco-innovation targets or priorities, as it is not within the scope of the policy and related programme that has been set up.

As mentioned before, there is no sectoral focus at the national level. The main aim of the national cluster policy is to support the "Innovative Business Groups" in order for them to achieve critical mass and establish stronger synergies with the general innovation framework within which they operate. This makes eco-innovation priorities not applicable at this level.

Falling outside of the scope of this study, one needs to look at individual regional cluster policies in Spain, in order to identify the regions, where eco-innovation is a priority in cluster policy either horizontally or in terms of the eco-industries.

Eco-innovation and clusters: additionality or a strategic goal?

At the national level, eco-innovation through cluster policy is neither strategic nor additional. At the regional level, regions can approach it either way. This report does not cover the regional level. Please refer to the section above, for additional information.

Interesting links, reports and references

An assessment of the AEI Program in the framework of cluster support policies (2011, in Spanish)

Ministry of Industry, Tourism and Commerce – Information on cluster policy and Cluster Programme

Eco-innovation observatory country profile - Spain

4.26. Sweden

Basic Cluster Policy information	
Cluster policy in place since	**1990**
At the National level ☐ At the Regional level ☐ Both ☒	
Ministries responsible for cluster policy	Ministry of Enterprise, Energy and Communications Ministry of Education (Research)
National cluster policy addressing eco-innovation	Yes ☐ No ☐ Indirectly ☒

Number of eco-clusters in the country:

☐None ☐1-5 clusters ☒6-10 clusters ☐More than 10 clusters

Years of activity:

☐Less than 5 years ☒More than 5 years ☐More than 10 years

Overview of national cluster policy

Studies and research into global cluster activity confirm Sweden to be on the forefront of cluster development. The Swedish cluster policy at the national level is governed by the Ministry of Enterprise, Energy and Communication in close collaboration with the Ministry of Education.

The current cluster structure is considered rather fragmented and has led to a number of cluster organisations to form, but lack coordination. The strong adherence to national governance of cluster policies does not compliment strong local governance. Though primarily nationally governed, some regional policy development has emerged.

National cluster policy approaches: Sectoral or horizontal

The approach toward cluster policy development is not sectoral but rather driven by the potential for growth and the ability to meet competitive challenges, across sectors. This entails a focus on the highest potential for growth and may indirectly privilege the needs of one industry over another.

Despite this purely horizontal approach, cluster policy has gained increased importance in economic policy and when assessed show positive overall results. A certain level of cross sectoral clustering activity has also been identified (e.g. functional food industry is an amalgamation of food technology

and medical technology). Sectors targeted by policy include IT, food and beverages and textiles – this is however not due to the sector they are in but their potential for success.

Transportation, construction and metalwork are the three largest traditional cluster groups in Sweden (in terms of employment).

Eco-industry in the country

The approach towards environmental performance is rather pro-active and is highlighted within national environmental policy. A high focus on academic knowledge and energy technology knowledge has given Sweden an edge in eco-innovative technologies. A key strength within the realm of Swedish eco-innovation lies within its ability to implement eco-innovative technology holistically within entire value chain systems (Swedish government 2009). Leading environmental industries in Sweden include waste management, recycling of industrial material, renewable energy supply and energy efficiency.

Approach to cluster policy and eco-innovation

Swedish cluster policy indirectly targets environmental performance and innovation. Such initiatives are mainly present within a core effort to contribute to increase sustainable economic growth. Though this does include eco-innovation both directly and indirectly, such initiatives are targeted in a generalized way under the umbrella of 'sustainable growth'.

Though Sweden does not target eco-innovation or eco-innovative industries directly within its cluster policies; such initiatives are supported directly and indirectly by both national environmental targets (non-cluster specific) and cluster policies targeting sustainable economic growth (include but not limited to improving and addressing environmental performance issues). However as cluster policy do not specifically target sectors, Sweden lacks policies which specifically address environmental industries.

Through its mission based agencies, Ministries indirectly engage in cleantech initiatives. An example; The Swedish Environmental Technology ; SWENTEC, was commissioned by the ministry of Environment and the Ministry of Enterprise, Energy and Communication to present an Action Plan for Swedish Cleantech in 2009. The report identified 82 key objectives required to support Sweden's cleantech companies to progress. Such initiatives suggest an increased focus on specific environmental performance advancements delegated on national level.

Competiveness of industries is a key factor. Should a cleantech or eco-cluster show strong growth potential, it is likely to gain rapid governing support. A good example of this is the Domsjö Fabriker biorefinery which has received development funding support from the National Swedish Energy Agency (A Biorefinery for the Future, 2009)

There are many impact assessments and evaluations of cluster policy and activity mainly conducted by the mission driven agencies in collaboration with the clusters themselves. Environmental performance measure is a direct aspect which is evaluated under sustainability measures such as waste efficiency and water management. Focus in impact assessment is fundamentally about the economic value and contribution it brings to a cluster rather than its eco-innovative performance.

Eco-innovation and clusters: additionality or a strategic goal?

The formation of clusters within policies and implementation agencies seems to be a concrete strategic goal for Sweden. Though policies so far focus has been on overarching efforts rather than industry specific developments, a clear shift in attitude is identified, especially within mission driven agencies.

Sweden has implemented a range of initiatives and programmes to support a successful development and uptake of eco-innovation practices. Though at the forefront of eco-innovative activities, eco-innovation in Sweden seems to be a strategic goal mainly within specific initiatives and sectors. National policy does not directly address eco-innovation but focuses on rigorous environmental performance and sustainable growth which indirectly catalyse an increased tendency toward eco-innovative development. It would be fair to say therefore that as a national strategic goal, eco-innovation is not a direct concern. As the implementation of eco-innovative practices is growing in a rather fragmented way, it is likely that future policy amendments will focus stronger on promoting eco-innovation.

Interesting links, reports and references

"The Policy practitioners Dilemma - The national policy and the transnational networks", VINNOVA - Swedish Governmental Agency for Innovation Systems

Ketels, C., 2009. "Clusters, Cluster Policy, and Swedish Competitiveness in the Global Economy", Sweden: The Globalisation Council

KK Stiftelsen – Agency promoting research to market uptake and collaboration

Bio refinery example which specifically targets eco-innovation

Eco-innovation observatory country profile – Sweden

4.27. United Kingdom

Basic Cluster Policy information	
Cluster policy in place since	**2001**
At the National level ☐ At the Regional level ☐ Both ☒	
Ministries responsible for cluster policy	Department for Business, Innovation and Skills
National cluster policy addressing eco-innovation	Yes ☐ No ☒ Indirectly ☐

Number of eco-clusters in the country:

☐None ☐1-5 clusters ☐6-10 clusters ☒More than 10 clusters

Years of activity:

☐Less than 5 years ☐More than 5 years ☒More than 10 years

Overview of national cluster policy

Cluster policy in the UK was established at the national level in the early 2000's after the concept came to the policy makers' attention in the later 90's. There is no explicit national cluster policy in the country but references to it in innovation policy. Clusters in the UK are considered the geographical concentration of companies and research institutes and are not necessarily broad networks, and the policy at the national level, consists of promoting them to the regions as policy instruments to support innovation and increase the competitiveness of industries.

The Department for Business, Innovation and Skills (BIS) is the ministerial department in charge of cluster policy, through innovation policy at the national level. In the previous governments the central government provided general guidelines while the then Regional Development Agencies (RDAs) developed their own strategies for the development of clusters. Currently, with the scrapping of the RDA's, cluster policy or cluster development and funding is entirely left up to the private sector. There is no public funding to support cluster initiatives at this point; the private sectors is reactive to costs and if there is a market need for it then in that case clusters are said to be created.

National cluster policy approaches: Sectoral or horizontal

The national approach to clusters policy is highly horizontal. There are no sectors identified, and no prescriptive priorities or goals. Up until 2010, the Regional Development Agencies were handling cluster policy development and implementation for each of their regions, following the general framework established at the national level by BIS. The current status at the regional level, given the change of government and the scrapping of the RDA's is not very well known yet.

Eco-industry in the country

The UK approaches eco-industries as not purely the cleantech sector but also other products and services that can contribute to the emergence of a strong green economy. For example, in a study done for BERR (now BIS), industries that have a strong potential to become competitive in a green economy are cross cutting sectors such as high tech manufacturing (including specific components for wind turbines for example), software (energy saving software), business services, financial services (carbon trading market), chemicals and pharmaceuticals. Looking at the cleantech sector, energy efficiency in buildings, alternative fuels and low carbon services are the most prominent fields that are strong in the country. It estimated the total value of the low carbon and environmental goods and services market is estimated to be at €112b.

Approach to cluster policy and eco-innovation

Cluster policy and eco-innovation are not coordinated at the national level. BIS deals with innovation policy in the broad and more technical sense, which relates to technology, standards and regulations. They also sponsor the Technology Strategy Board (TSB) which is basically the link between government and industry. Cluster policy at the national level is dealt with by BIS, and BIS in turn relies on TSB for the delivery of actions. TSB is sponsoring Knowledge Transfer Network (KTN) and environmental/sustainability and materials are areas of focus.

Eco-innovation is dealt with separately from innovation. Eco-innovation is dealt with by the Department of Environment, Food and Rural Affairs (DEFRA). Softer measures are applied in the case of eco-innovation, which mainly have to do with education, awareness raising and so on. In previous times, eco-innovation used to be very technical in the UK, but now it is viewed as a more holistic and social aspect, which fits in the overall agenda of DEFRA's resource efficient economy initiative.

Eco-innovation and clusters: additionality or a strategic goal?

Eco-innovation and cluster policy are not related explicitly at the national level in the UK. Nevertheless it should be noted, that the regional actors responsible for the policy and its implementation may have different priorities or areas of focus, and that this study cannot comment on the regional activities as they are out of scope. In addition, while at the national level eco-innovation and cluster policies are not strategically used in combination, eco-innovation is in fact being strongly pursued by the government, with a focus on resource efficiency through other means. It is reported that eco-innovation is supported through regulation and other instruments that are much more suitable and that the main aim of cluster policy is to support competiveness of the economy. Eco-innovation may be strategically pursued by certain sectoral cluster, if and only when it becomes a factor that affects their competitiveness.

Interesting links, reports and references

Department of Business, Innovation and Skills (BIS) - Clusters in the UK

Competitive advantage and green business Report by Ernst and Young for BERR

Eco-innovation observatory country profile - UK

5. Conclusions

The study presented above provided a qualitative overview of if and how eco-innovation is being promoted through national cluster policies in EU Member States.

As discussed, eco-innovation is a complex concept that with the current lack of standardisation cannot be uniformly understood across Member States. Yet the complexity of the concept and its all-encompassing nature has also allowed Member States to interpret it according to how it fits best to their national contexts. This has given rise to a variety of different interpretations of how it can be pursued; with each one having its positive and negative aspects.

The analysis of the results resulted in the emergence of a number of common themes across Member States, which are prominent across Europe.

Theme 1: Some Members States approach eco-innovation through their cluster policies as innovation in the cleantech industry, while some others view it as an aspect that is applicable to all industries.

The frontrunners on eco-innovation tend to specifically support the establishment of cleantech clusters rather than integrating eco-innovative aspects into general cluster policy for all sectors.

For the frontrunner group, eco-innovation only becomes relevant for general cluster policy when it can make a substantial contribution to the competitiveness of a certain industry. However, in the sectors where this applies, eco-innovation, as well as eco-industries providing eco-solutions are seen as an important driver for competitiveness. In addition, the same group believes that eco-innovation cluster policy should be tailored at a level where it can best address the eco-innovative needs of a specific industry.

In the group of countries that are catching up (with the exception of Sweden), eco-innovation is viewed as a horizontal performance aspect for all industry sectors. In at least six countries, eco-innovation does not play a role in national cluster policy.

The majority of countries stated that the incorporation of eco-innovation in cluster policy happens in line with sustainability goals.

Theme 2: Some Member States view eco-innovation through cluster policy as a strategic goal, while some others value the "additionality" aspect that eco-innovation can bring to their industries.

For those who view it as a strategic goal the following characteristics apply: Eco innovation in cluster policy entails targeting eco-industries and it is usually explicitly stated; the link between eco-innovation and economic competitiveness is strong and eco-innovation is viewed as a driver in the economy. These countries also usually have a critical mass in eco-industries and as such the cleantech sector and eco-innovation are identified as a core goal in their cluster policy.

Countries in this group include Austria, Belgium, Denmark, Finland, France, Germany and Luxembourg.

For those who view it as "additionality" the following characteristics apply: Eco-innovation in cluster policy entails targeting all industries in general and it is either implicitly or explicitly referred to. The link between eco-innovation and economic competitiveness is not strongly made in these countries and as such it is often perceived as a means of responding to legal requirements, and an add-on for their industries. The countries also often lack critical mass in eco-industries and the core strategy in the cluster policies does not include eco-innovation. Finally, general sustainability goals are sometimes mentioned, and are referred to as eco-innovation.

Countries in this group include Bulgaria, Cyprus, Czech Republic, Estonia, Greece, Hungary, Malta, Poland, Romania, Latvia, Slovakia and Lithuania.

A third group of countries position themselves in between the two groups presented above. These countries are placed in this group either because they have cluster policies at the national level only as frameworks within which regional cluster policies which are more specific is put in place. Or because implicit references to eco-innovation are made, hinting at the strategic approach, which is nevertheless not as pronounced as in the first group.

Countries in this group include: Ireland, The Netherlands, Portugal, Slovenia, Spain, Sweden and the United Kingdom.

Theme 3: There are some differences in the approach to eco-innovation between Member States with a tradition in implementing cluster policies, and Member States which have recently adopted cluster policies.

The presence or absence of eco-innovation priorities in cluster policies might in part be related to the wider policy framework and support to eco-innovation that is available in each one of the countries. In countries where a better wider eco-innovation policy framework strongly supports the development and uptake of eco-solutions, it would be more likely for eco-innovation cluster policies to be in place. Countries that have older cluster policies tend to also have a tradition in adopting and implementing innovative policy instruments. Countries that have newer cluster policies are at a different level on the policy learning curve, and innovation is an aspect that has started being strategically pursued in their industrial policies more recently.

Theme 4: Bottom up or top down approaches and how they influence cluster policy and eco-innovation targets.

Cluster policies are most commonly bottom-up policies that respond to industrial and economic reality. Hence, those countries with an explicit strategy to support eco-innovation and the establishment of an eco-innovative industry usually use cluster policy to further support the competitiveness of the sector once a certain critical mass has been reached. Conversely, it can be assumed that eco-innovation in cluster policy does not have a leveraging effect for establishing eco-industries and is therefore not used to this end.

The qualitative conclusions that can be drawn from this study include:

- Eco-innovation is indeed emerging as an industrial priority across the EU, and this is being demonstrated to a certain extent though some national cluster policies across EU Member States.

- In the context of cluster policies, eco-innovation should always be conceived as either innovation in the cleantech industry or as a horizontal aspect across all industries.

- The market for the cleantech industry often depends on the demand coming from traditional industries, which try to improve their environmental performance. The inter-dependence between these two forces needs to be better valorised and utilised given that innovation often happens at the intersection of disciplines.

- When it comes to cluster policies, critical mass is absolutely crucial for the eco-industry (the cleantech industry); yet critical mass of the industry depends on the general economic framework of the country, as well as on the other policy instruments in place (such as feed in tariffs, subsidies, vouchers and so on) that have enabled their emergence. Cluster policies can only make a difference once the industry has a minimum critical mass.

- Horizontal promotion of eco-innovation in traditional industries through cluster policies is much weaker, since eco-innovation becomes an aspect or an add-on rather than a sector. Its impact is more difficult to measure and not always possible to evaluate.

- Horizontal promotion of eco-innovation in traditional industries through cluster policies has the potential to be important only where eco-innovation is found to be relevant for the competitiveness of a certain industry. Bottom-up approaches work best here, when sectors are given the opportunity to prioritise eco-innovation how they see fit through their cluster policy/organisational goals.

- Even with the lack of eco-innovation goals at the policy level, in some cases, cluster organisations in certain sectors have utilised the cluster structures and the opportunities it offers for shared infrastructure and resources, and knowledge exchange to tackle environmental challenges.

These conclusions indicate, that while cluster policies do not have a strong enough effect to push the creation of a cleantech industry, they do have the potential to further leverage eco-innovation, either sectorally in the cleantech sector or horizontally as an aspect in other industrial sectors.

To better grasp the potential of cluster policies for eco-innovation and the current use of it, it is recommended to further conduct studies focusing on regional cluster policies, where policies tend to be more specific and targeted.

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ANNEX 1

Methodology for the study

Aim and scope of the study

The aim of the study is to provide an overview of cluster policies at national level, which aim to support clusters organisations or cluster initiatives which target eco-industries or eco-innovation in traditional industries. The study aims to identify the relevant policies in the EU27, describe their characteristics and general aim.

The scope of the study is limited to the national level policies in EU-27members states. It is also limited to policy level information and activities, and not the implementation of the policy; although, some examples from the implementation stage are also given, for illustrative purposes.

Research questions

1. In which EU-27 countries do we have cluster policies addressing the development of eco-industries?

2. In which EU-27 countries do we have cluster policies addressing eco-innovation in traditional industries?

3. What are the common themes that are prominent in the relationship between cluster policy and eco-innovation in the national cluster polices of the EU-27?

Limitations

A variety of limitations have been set based on the scope of the study.

First, the study aims to identify and analyse cluster related policy, and not the implementation of the policy. In the case where certain member states do not have any cluster policies, then specific programmes and initiatives may be inquired about and analysed. The study focuses on policies of member states at the national level. It is acknowledge though, that for some of the member states, cluster policy implementation and even policy development is done at the regional level.

Given the size and timescale of the study it is nevertheless believed that national actors are the most appropriate persons to contact per member state, providing the authors with data that applies to the country as a whole, and on how the national policy influences regional policy within the country in question. In cases of highly decentralised countries such as Belgium, with a total absence of national level policy, interviews are complimented by additional desktop research.

Additionally, given the small time scale of the project, field interviews are limited to one person per member state; the authors are confident that given the authoritative source of the list of interviewees, the experts who participated in the study are reliable and quality of the data collected can be assured. All interview data was further supplemented and supported by desktop research.

While this study aims to map and discuss eco-innovation and how elements of it are being integrated in cluster policy in EU member states, the overall conclusions and recommendations of the study do not aim to reflect individual member states, but rather discuss the greater picture and the common approaches that are observed across Europe.

The analytical approach adopted for the study is based on the identified common themes across member states, and the discussion of these themes in the context of information gathered through our desktop research.

Brief country profiles, based on interviews and desktop research data have been compiled for each of the member states.

Data gathering

Types and sources of data

A literature review through desktop research provides the context of the study, with the use of up-to-date and reputable sources. The data gathered is used for the introductory part, and in the process of the questionnaire development. Quantitative data for the statistical mapping is used through an already existing database provided by the SSE. The data is thus directly fed into the mapping system. Qualitative data is gathered through phone interviews. The data sample was chosen based on expert input of knowledgeable/expert contact points per member state. Whenever possible, a representative at national ministry level who works on national cluster policy was approached. The sample size is limited to one representative per country, expect for two countries where two interviews were conducted, thus totalling 29 people. This was deemed sufficient since the study aims to give an overview of member states activities at the national level. The sample is considered adequate and relevant given that the theme of the study is a specialised one, thus limiting the amount of experts to interview per member state. In addition, the contact list has been acquired from the European Cluster Observatory, an authoritative source of information at the EU level regarding clusters in the EU. Interviews were held on the phone, after the prior agreement of the participant. Questionnaires were also sent in advance in order to stress the focus of the study on policy and not implementation and also in order to allow the experts to prepare for the questions. The questionnaire also ensured coherence in the data collection process, allowing the comparison of the input received from different sources. All interviews were conducted in English, language was not a barrier for the interviews, as all interviewees were experts or government officials fluent in English.

Definitions

The following set of definitions is adopted for the purposes of this study.

Cluster: Clusters are geographic concentrations of interconnected companies, specialised suppliers, service providers, firms in related industries, and associated institutions in particular fields that complete but also cooperate (Michael Porter definition 1998). Market and competition form clusters.

Cluster organisation: a cluster organisation is a more formalised institutional set-up, generally having the responsibility for leading cluster initiatives. A cluster organisation often has an office/address, a cluster facilitator/manager, a budget, a website, and sometimes a separate legal entity.

Eco-innovation: *"… the introduction of any new or significantly improved product (good or service), process, organisational change or marketing solution that reduces the use of natural resources (including materials, energy, water and land) and decreases the release of harmful substances across the whole life-cycle."* This definition applies to both eco-innovation in the eco-industry sector and in traditional industrial sectors (CIP 2010)

Cluster Policies: can be defined as specific governmental efforts aimed to support clusters. These governmental efforts can be sorted into categories: facilitating policies, traditional framework policies and development policies.

Facilitating policies are directed towards creating a favourable microeconomic business environment for growth and innovation. Support from the public sector tries to enhance the specific conditions that could improve a cluster's performance.

Traditional framework policies, such as industry and SMEs policies, research and innovation policies, and regional policy often use the cluster approach to increase the efficiency of a specific instrument. Development policies aim at creating, mobilising or strengthening business strategies and co-operation between organisations and people through knowledge-sharing at a regional or cluster level.

For the purposes of this report, cluster policies are defined as national policies aiming at facilitating the emergence and development of clusters in specific related industries and geographical areas. Targeting cluster development is explicitly set out as strategic intention in the respective policy documents and development strategies.

The term cluster initiative is used to denote a cluster development project or cluster organisation. Cluster initiatives are organised efforts to increase the growth and competitiveness of clusters within a region, involving cluster firms, government and academic and research institutions. (Oxford Research 2008)

Eco-innovative cluster policies:
Are cluster policies as defined above that aim to support the emergence and operation of clusters with a focus on eco-innovation, or having eco-innovation as one of their main working priorities.

Eco-industries:
Enterprises having energy and environment related activities as the core source of income is considered part of eco-industries.

There are two broad categories of eco-industries can be considered, one of small and innovative companies acting in the field of, e.g. renewable energy, waste recycling, environmental auditing and

consultancy; the other of more capital intensive enterprises providing goods and services in specific areas, e.g. waste, wastewater, transport. Different policy options are required to address the specificities of each of these categories (DGENTR 2011).

Eco-innovation in traditional industries:

Any form of innovation: new products and services, production processes, organisational or management changes creating business opportunities; and at the same time preventing or reducing environmental impacts, or a more efficient and responsible resources use, including energy use. The concept can be applied to all industries, such as chemical, pharmaceutical, textiles, construction and so on.