

"Environmental technologies" Action Plan

Guidelines for the promotion of environmental technologies in Luxembourg

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1. Background

1.1 A growth sector and a job creator, in Europe as well as worldwide.

Following the information and communication technologies (ICT) and biotechnologies in recent decades, eco-technologies are now the *new boarderline* of technology. Indeed, faced by many environmental challenges our planet is exposed to, it became necessary to "reinvent" many industrial processes, products and services. The economic prospects are considerable.

The volume of the global market for environmental technologies and related services amounts to about 1,000 billion Euros¹. Within the EU, these activities represent currently more than 260 billion Euros, or 2.2% of GDP and 3.5 million jobs, amongst them 75% in labor intensive sectors, such as water management or solid waste management.²

Major markets (EU-25 - 2004)		€ bn	Major markets (EU-25 - 2004)		€ bn
Water	Wastewater Management	52.2	Environment protection		5.7
	Water supply	45.7	Renewable energy production		6.1
Soil remediation and groundwater		5.2	Eco-construction		40.0
Waste	Management, solid waste recycling	52.4	Environmental Management of companies		5.8
	Recycled materials	24.3			
Controlling air pollution		15.9	Department for Environment		11.5
Controlling noise and vibration		2.0	Environmental measurement / instrumentation		1.0

DG Environment, 2006.

By 2020, the volume of the global market will more than double and average annual increases of 2 figures are expected in many segments, with rates of around 15% for the decentralized management of water and automated processes for waste sorting and rates above 20% for thermal and photovoltaic solar energy, hybrid vehicles or bioplastics.³

1.2 A response to the commitments of environmental protection, particularly the implementation of the Kyoto Protocol.

Luxembourg is bound to meet various commitments on international as well as European level, including some commitments very close to maturity.

In the area of climate change, Luxembourg pledged in 1997 to reduce its greenhouse gas emissions by 28% during the period 2008-2012 compared to 1990. This means that Luxembourg can issue approximately 9.5 million per year during the period 2008-2012.

This is only a first step, because to prepare the "post-Kyoto 2012 " period, the " Energy Package - Climate ", under discussion in the European Council, introduced new objectives for 2020: 20% increase in energy efficiency, reducing 20% of GHG emissions (or 30% if international agreement); achieve a ratio of 20% of renewable energies in total energy

¹ BMU et UBA (Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit) et (Umweltbundesamt) (éd.) 2007 Umweltpolitische Innovations- und Wachstumsmärkte aus Sicht der Unternehmen. Forschungsprojekt im Auftrag des UBA.

² European Commission, DG Environment – "Eco-industry, its size, employment, perspectives and barriers to growth in an enlarged EU". September 2006.

³ Source : BMU et UBA, op. cit.

consumption in the EU (currently at 8.5%), reaching a ratio of 10% of biofuels in total consumption of vehicles.

In addition, the rapid economic and demographic development of Luxembourg over the past two decades accentuates the pressures on the environment, with impacts on water, air and the natural environment .

It follows the needs of rapid and multiple solutions based on environmental technologies.

1.3 A European axis to promote innovation and economic diversification (Lisbon, Göteborg, ETAP).

The strengthening of environmental standards and objectives of productivity of natural resources creates a dynamic of continuous improvement of environmental technologies .

Within the European Union, action for innovation and environmental technologies is structured in two main texts:

- The *Lisbon Strategy* that makes innovation and research a high priority of the economic development policy of the EU. The *Luxembourg National Plan for Innovation and Full Employment* is part of this strategy. It seeks to strengthen synergies between environmental protection and economic growth.
- The *Göteborg Strategy*, which aims to integrate sustainable development into all policies of the European Union. This strategy recommends in particular to direct public and private investment into new and environmental friendly technologies.

In line with these two texts, the European Commission adopted in January 2004 the *Action Plan ETAP* (Environmental Technology Action Plan), which aims to "make the European Union an undisputed champion of environmental technologies .

This plan follows three priorities:enhancing the transition from research to markets, improving market conditions (regulatory frameworks, access to finance, public markets ...) and actions on a worldwide level (support for environmental technologies in developing countries). It is developed in close cooperation with Member States, so that the "Eco-technology" action plan may be the Luxembourg national programm in the ETAP framework.

2.Definition

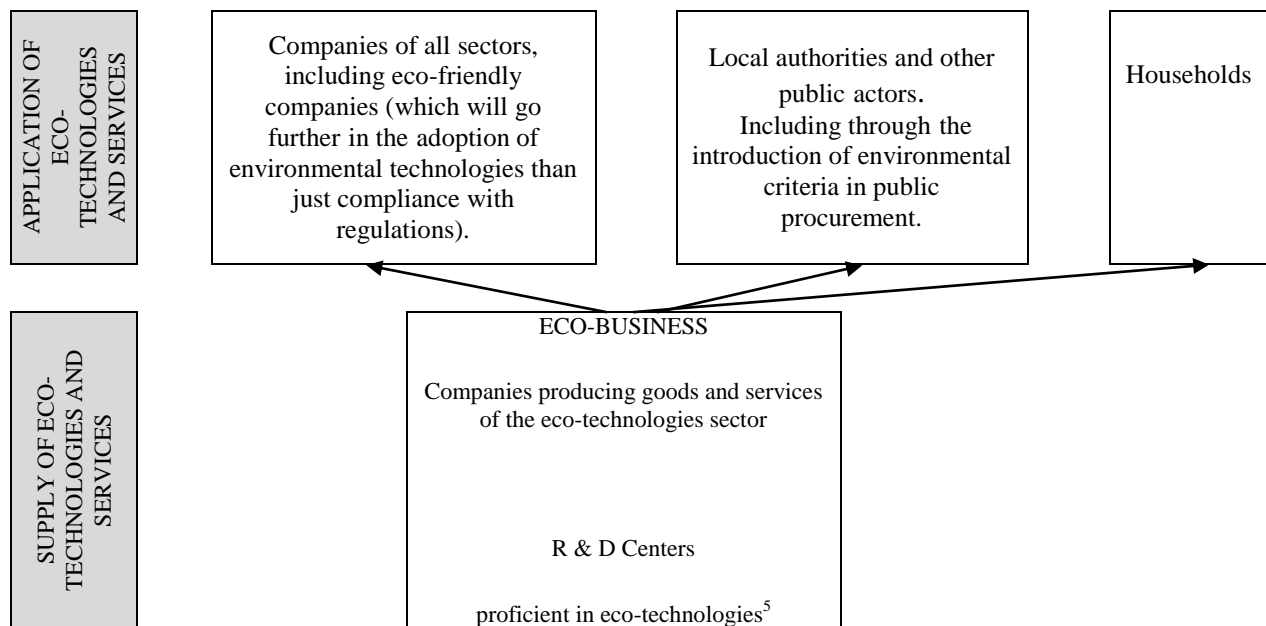
2.1 Definition of eco-technologies.

According to the definition of OECD - EUROSTAT, widely adopted on an international level, environmental technologies help to " *measure, prevent, limit or correct environmental damage (pollution of water, air, soil) as well as problems related to waste, noise, landscape degradation, biodiversity loss and depletion of resources.*"⁴

⁴ In line with the revision of the paper "L'industrie des biens et services environnementaux, Manuel de collecte et d'analyse des données", OECD – Office Statistique des Communautés européennes. 1999.

This definition includes cleaner and sober technologies, technologies with low CO₂ emissions, as well as renewable energy and energy efficiency.

Companies in the sector of environmental technologies, often called "*Eco - companies*," are providing goods and services specific to environmental protection and sustainable development. They distinguish themselves of the so-called "*eco-responsible*" companies, which belong to all sectors of the economy and which grow within the overall framework of sustainable development of the economy (Figure below).

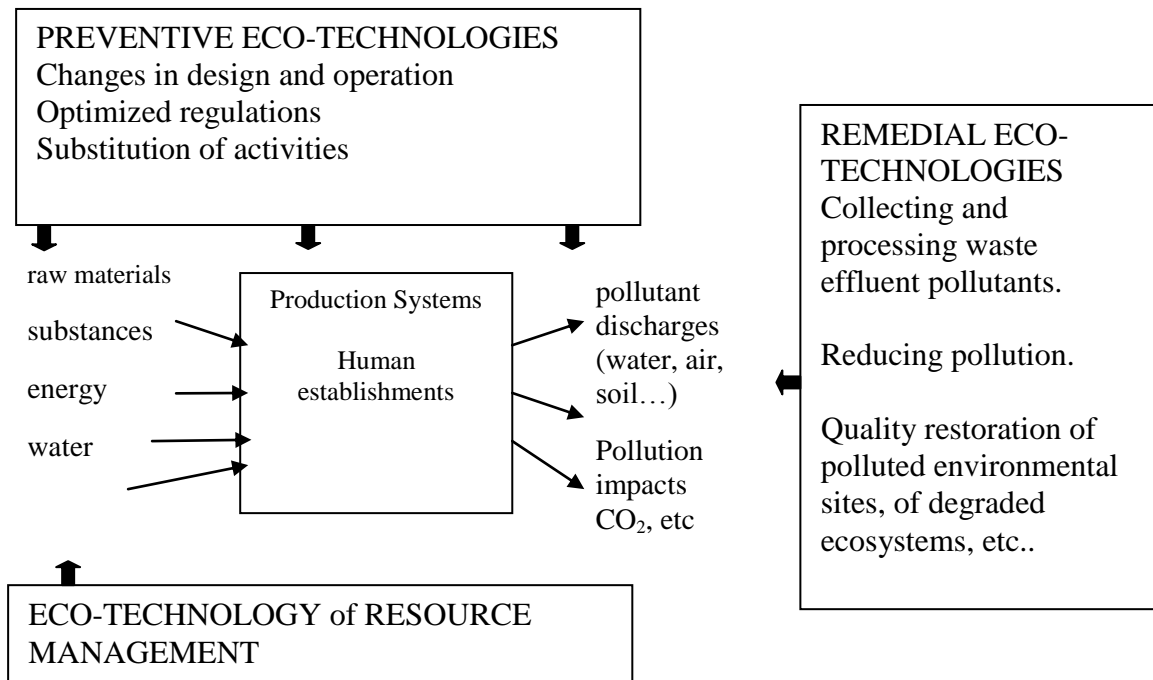


Eco-companies pursue industrial activities (manufacturing of products and equipment) and / or services (engineering, studies, installation and operation of equipment, etc). These activities are generally classified into three categories⁶ :

- “remedial” eco-technologies, which aim to reduce end-of-pipe or after the fact, the effects of releases from production and consumption systems (collection and treatment of effluents and waste, regeneration of environmental quality of contaminated sites, etc).
- “preventive” eco-technologies, designed to introduce changes in the design and development of production and consumption systems, in order to make them cleaner and more resource efficient. (eco-construction, eco-design, environmental regulations of processes, recycling materials, etc.).
- eco-technologies relative to the management of natural resources which affect in particular renewable energy and water supply.

⁵ Eco-technologies can be developed in R&D departments of Eco-companies or in any other research centre, public or private.

⁶ One has to underline the growing importance of monitoring and measuring technologies next to the need for stringent data management which are essential in a activity domain where the definition of performance goals is closely related to detailed knowledge on polluting emissions and on the capacity of eco-systems to absorb polluting agents.



2.2 Ranking Summary.

In summary environmental technologies can be grouped by thematic areas, cross-cutting areas and by types of activities:

Thematic areas

- Water: cycle management of surface water and groundwater (collection, cleaning, supply, reuse, wastewater treatment).
- Soils : remediation.
- Waste: management, treatment, recovery and recycling of solid wastes of all types, management of recycled materials.
- Air and odor: the fight against ambient air pollution and odors.
- Noise and vibration: the fight against noise and vibration.
- Natural environment, ecosystems and landscape: protection and restoration of environmental quality and biodiversity.
- Energy management: Reduction of energy consumption in products, processes and services.
- Renewable energies: solar, wind, biomass / biogas, hydro, geothermal, heat pumps, biofuels.
- Radiation: protection against natural radiation (excluding nuclear).

Cross-cutting areas

- Eco-design, engineering of a cleaner and more sober production, environmental regulation of processes.

- Industrial Ecology.
- Eco-construction, eco-materials.
- Eco-planning, environmental approach to urban planning.
- Sustainable mobility, eco-logistics, vehicles (hybrid, electric, hydrogen ...).
- Environmental management of companies and organizations.
- Regulatory studies, preparation of applications for environmental approvals.
- Environmental risks, impact studies.
- Education, training and information.

Subdivision by type of activity

- Advice, studies, engineering, training.
- Manufacture, installation and distribution of materials, equipment and products.
- Measurement, control, analysis, IT and environmental mapping.
-

3. Luxembourgish strategy.

3.1 The environmental technologies action plan in the context of the governmental strategy.

The "Eco-technology" action plan is the result of the coalition agreement on the governmental programm 2004. The program has selected "environmental technology" as an axis of economic development in the framework of the government's economic promotion and company propection policy.

In recent years, the Ministry of Economy and Foreign Trade has put in place a "Logistics" action plan (2006), followed by the "Health Technologies" action plan (2007). The "Eco-technology" action plan is, in-line with these initial plans, an additional axis of the policy of economic "multi specialisation". This policy, focusing on a selection of particularly promising sectors, aims to develop these sectors in a prospective of sustainable economic development.

The "Eco-technology" action plan encourages the development and the promotion of eco-technologies in Luxembourg. It sets guidelines and offers from the beginning, a non-exhaustive list of concrete measures.

The plan was prepared by a working group of the Ministry of Economy and Foreign Trade, in collaboration with Luxinnovation, the University of Luxembourg, the Centre de Ressources des Technologies pour l'Environnement (CRTE / CRP Henri Tudor) and the company RDI Consultant (Paris, F).

It is now time to strengthen the operational part of the plan by completing the first steps through a dynamic and interdisciplinary process, involving all public and private economic actors and opening new collaborations between municipalities, administrations, ministries and other institutions.

3.2 The double goal of the environmental technologies action plan.

The "Eco-technology" action plan is in the perspective of a "sustainable economy", ie the implementation of synergies between economic development and environmental protection. It has a double goal:

- **Improve the productivity of natural resources, including energy resources and reduce environmental impacts.** The goals are to increase the overall competitiveness of the Luxembourg economy by reducing costs of energy and resource consumption and to improve the quality of life of the population by reducing polluting emissions.
- **Expand the field of environmental technologies as part of diversification of the Luxembourg economy.** The aim is to develop a new vehicle for sustainable economic growth and employment based on the existing potential of eco - companies in the Grand Duchy and the various opportunities at hand to strengthen that particular economic sector.

The plan aims simultaneously to accelerate the integration of environmental technologies in all sectors of the economy (demand for eco-technologies) and to increase the luxembourg promotion of eco-technologies through its eco-enterprises and R&D Centers. It aims at:

- promote the adoption of environmental technologies and encourage innovation and research in this area;
- expand existing businesses in the environmental technologies sector;
- encourage already established companies in the traditional sectors of the economy to move into these new markets;
- help to create new businesses and start-ups in this sector;
- encourage foreign companies of the sector to invest in Luxembourg;
- support companies exporting environmental goods and services.

3.3 Preliminary studies.

The preparation of the Action Plan was based on three complementary studies:

- The University of Luxembourg has examined the dynamics of international markets in the sector of environmental technologies . This study identifies promising markets and areas of technology, thus contributing to the pre-selection of slots likely to constitute the priority axis of the plan.⁷ This detailed bibliographic work will be completed by interviews with European experts.
- Luxinnovation established, in accordance with the preparation of the ECODEV Cluster, a mapping of companies currently operating in Luxembourg in the field of eco-technologies, as well as of concerned R & D laboratories. Detailed qualitative interviews were conducted in conjunction with a sample of companies and major research institutes.⁸
- RDI Consultant, in support of the two previous studies, reviewed the "framework conditions"⁹ necessary for the development of the sector of eco-technologies in

⁷ Dipl.-Ing. Patricia Hammer, Prof. Dr. Christian Schulz, "Perspectives de développement des éco-industries dans sept pays européens" - Université du Luxembourg, Unité de Recherche IPSE (Identités. Politiques, Sociétés, Espaces) – October 2008.

⁸ Laurent Magi, "Cluster EcoDev – Le cluster des ECOTEchnologies et de DEVeloppement durable – Etude de potentiel" – September 2008.

⁹ Regulatory framework or incentives for the development of makrets, financial issues, training, support to innovation and R&D, etc.

Luxembourg. This review contributes to the identification of measures and instruments, whether transverse or thematic, provided by the Action Plan.

3.4 Convergence with other existing or to be adopted plans and programs. 1

Sustainable Development Action Plan 2009-2014.

Luxembourg has committed twice to develop and implement a sustainable development policy at the national level.

Sustainable development is build on three pillars: a successful and sustainable economy, protection of natural and human environment, the social-economic equity and social protection.

This commitment resulted in the approval in 1999 of a National Plan for Sustainable Development (NPSD) by the Luxembourg Government. Following the publication and dissemination of this Plan, work has focused on developing a set of indicators of sustainable development and establishing a legal framework¹⁰ for sustainable development. A new NPSD is currently under way .

The "Eco-technology" action plan reflects the priorities of the National Plan for Sustainable Development (NPSD) and aims to be one of the declensions of the new operational NPSD.

3rd Action Plan for SMEs (April 2008).

Due to the weight of SMEs in eco-companies, the "Eco-technology" action plan is designed to revolve around the 3rd Action Plan for SMEs. This plan recognizes the potential for development of environmental technologies, particularly in relation with sustainable construction. It also offers "to promote environmental technologies and energy efficiency by introducing a specific innovation cluster, bringing together all stakeholders in this area."

National Plan for Innovation and Full Employment

Another important convergence appears with the National Reform Program of the Grand Duchy of Luxembourg, entitled "National Plan for Innovation and Full Employment," presented to the European Commission in 2005. This program should enable Luxembourg to reach the Lisbon objectives.

The integrated Guideline 11 of the plan emphasizes "the economic opportunities offered by the environmental protection and a rational use of natural resources." This guideline recommends to promote "an energy competitive policy, eco-efficiency and sustainable patterns of consumption".

National Plan for Rural Development

To support the development of rural areas which cover more than 90% of the Grand Duchy, the Ministry for Agriculture, Viticulture and Rural Development has developed the National

¹⁰ Law of 25th June 2004 on the coordination of the national politics related to sustainable development.

Strategic Plan for Rural Development of the Grand Duchy of Luxembourg for the programming period 2007-2013.

This plan was developed in close consultation with the agricultural sector, concerned authorities and national bodies, and in collaboration with the European Commission.

Three priorities were identified:

- Improving the competitiveness of agricultural and forestry sectors
- Improving the environment and landscape
- Improving quality of life in rural areas and encouraging diversification

List of priority areas important to national public research

In order to establish a list of priority research themes with high potential for social-economic fallout for the next decade, the National Research Fund has implemented in 2006-2007 the prospective study called "FNR Foresight".

Based on the proposals emerging from this exercise, the Government has identified in 2007/2008a number of research fields as priority areas, respectively, as key areas of national public research. Among the fields related to environmental technologies was selected as a priority area:

- Sustainable management of water resources

and as key areas:

- Biodiversity and understanding of ecosystems
- Utilisation and natural sustainable sources of energy
- Sustainable management of agro-systems
- Spatial and urban development

Plans and studies related to energy and CO₂.

The National Action Plan on energy efficiency (Directive 2006/32/EC), published on February 8th 2008¹¹, sets an indicative national overall target for energy savings of 9% for the ninth year of application of the directive and foresees many steps (efficient renovation and construction buildings, identification of the potential for reducing consumption in the industry, use of energy efficient technologies and renewable energy, etc.). The plan also covers energy efficiency in the public sector, which joins directly one of the action levers identified by the "Eco-technology" Action Plan.

- *The 1st Action Plan to reduce CO₂ emissions*,¹² released in April 2006 by the Ministry for Environment, introduced a series of measures to limit the dependence of

¹¹ Title "Erster Nationaler Energieeffizienzplan Luxemburg im Rahmen der EU-Richtlinie über "Endenergieeffizienz und Energiedienstleistungen" (2006/32/EG)".

¹² Also take into consideration the « second Plan national d'allocation des quotas 2008-2012 pour le Luxembourg (PNAQ 2) » of the Ministry of Environment.

Luxembourg vis-à-vis fossil fuels and to promote energy savings, mainly in transport, industry, public sector, households and small businesses.

Following a first evaluation of the Plan, completed in 2007, additional measures to those of the 1st Plan have been suggested for the energy production, transports, construction and industry.

- The *study of the potential of renewable energies* (LUXRES - Luxembourg Renewable Energy Sources), made in 2007, provides an overview of the Luxembourg situation showing a strong potential in the areas of solid biomass and biogas. The study proposes on this basis several scenarios for the mobilization of various sources of renewable energy in 2010 and 2020.

4. The current environmental technologies sector in Luxembourg and definition process of the sectoral priorities of the Action Plan.

4.1 Mapping of environmental companies and R & D skills.

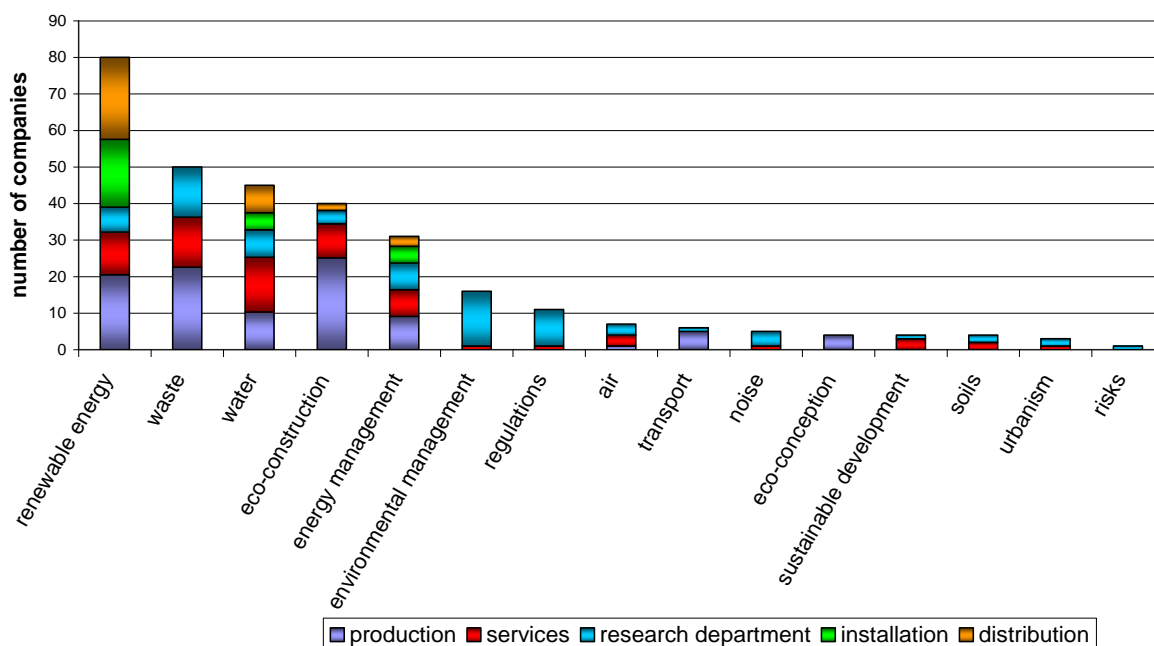
In connection with the preparation of the ECODEV Cluster, Luxinnovation drew up a map¹³ of actors in the supply of eco-technologies in Luxembourg.

This mapping identifies, in mid-2008, 188 eco-enterprises showing potential for innovation, 28 agencies (in particular joint local authorities, very present in the field of water and waste), and 6 public research institutions working in the field of eco-technologies (CRP and University). In addition “facilitating” actors have been identified which are involved in the field of eco-technologies (Energy Agency, Luxinnovation, IFSB, chambers, etc.).

The sectoral analysis of the activities of eco-businesses shows that the sectors of energy, namely renewable energy and energy management, as well as those of eco-construction, waste and water are particularly well represented. However, it should be noted that renewable

¹³ This cartography, which will be updated on a regular basis, gives priority to those companies representing an innovation potential. It only lists some of the eco-companies active in crafts, which have been recommended by the Chambre of crafts. Source : Dr L. Magi, "Cluster EcoDev", op. cit.

energy is mostly built-up of installers and distributors.



*Number of enterprises by activity*¹⁴

In addition to the R & D capacity of eco-enterprises above, identification of research skills relevant to the eco-technologies, within the University and CRP, highlights the role of the following institutes:

Research Institutes	Core competencies for environmental technologies
CRTE - Resource Center for Environmental Technologies (CRP Henri Tudor)	Energy management; renewable energies, sustainable development; eco-design; eco-construction; sustainable water management; multi-criteria evaluation; clean technologies and process engineering; environmental modeling
EVA - Environment and Agro-Biotechnology (CRP Gabriel Lippmann)	Water; pollution of air and soil; renewable energy; ecology; agriculture; waste management; sustainable management of aquatic and terrestrial ecosystems; application of biotechnology of the agricultural and forestry sectors; sustainable land management
Resource Center for Information Technology for Construction (CRP Henri Tudor)	Eco-building, sustainable development, Eco-design, ICT.
ESRU - Engineering Science Research Unit (University of Luxembourg)	Design and construction, energy, renewable energy, environment, automation and mechatronics; Development of technological solutions; Sustainable use of resources; Center of Expertise.
IPSE - Research Unit for Identities, Politics, Society, Space (University of Luxembourg)	Urban Planning; economic geography environmental modeling spatial studies urban mobility.
LPV - Photovoltaics Laboratory (University of Luxembourg)	Renewable energies (solar photovoltaic)

¹⁴ If a company is active in more than one activity domain, it will pop up in all of them. Furthermore, those companies which have a production process and very often a distribution activity or installation business will only be counted once in the production statistics. Finally, those companies who are active in the installation business but who also to distribution will only pop up in the distribution statistics.

The analysis of the sectoral distribution of skills of public research demonstrates similarities with the areas of eco-enterprises. Thus renewable energy, with a focus on solar and biomass, the eco-construction and energy efficiency are particularly well represented.

An inventory made by Luxinnovation was completed by detailed interviews with a sample of 25 eco-companies and 3 research institutes. The interviews helped to identify different innovative projects¹⁵ and to highlight obstacles to the development of eco-technologies, as perceived by the eco-enterprises, and their expectations in terms of government support.

4.2 Promising markets and technology sectors.

The University of Luxembourg has made a preliminary identification of markets and promising fields of technology from a "meta-analysis" of national and international publications on eco-technologies available in seven European countries - Germany, France, Austria, Sweden, Switzerland, the Netherlands - and in Belgium (Walloon Region).¹⁶

This systematic analysis of over 40 reports and studies identified by cross checking the fields of eco-technologies that can be considered as being particularly interesting opportunities (technologies in development phase, emerging markets, high growth markets, etc.). These first results will be validated through interviews with European experts.

For example some of the markets and technology areas identified at this stage of the analysis are listed below.

Water	Decentralized water management. Metrology, teleprocessing, network monitoring. Stormwater management. Membrane technology and nano-technologies.
Waste	Recycling technologies. Automatic processes of separation and sorting. Capture of biogas. Production of secondary energetic materials
Soil	Remediation technologies and services.
Energy	Decentralized energy systems ("smart grid"). Software, optimization services and energy regulation.

¹⁵ For example, projects utilising biomass, projects in the field of renewable energies, eco-construction, work on optimising the management of buildings and the production of goods containing components which can be recycled.

¹⁶ Patricia Hammer, Christian Schultz, IPSE – " Perspectives de développement des éco-industries", op. cit.

	Teleprocessing energy. Energy storage. Thermal and photovoltaic solar energy, solar air conditioning. Wind. Biogas and other forms of biomass. Synthetic biofuels.
Eco-design, materials	Bioplastics. Agro and Bio-materials. Efficient use of raw materials. Eco-construction. Eco- materials in buildings.
Environmental information technology	Modelling, mapping. Géomonitoring. ICT and sustainable development.
Mobility	Hybrid vehicles, electric. Eco-mobility services.
Other	Technologies to fight electromagnetic pollution. Services associated to carbon markets.

The study by the University of Luxembourg provides also a comparative analysis of development trends in the sector of environmental technologies in all studied countries, as well as an observation of the main geographical targets, retained by exporters of environmental goods and services of each country.

4.3 Approach of defining sectoral priorities of the Action Plan.

The definition of sectoral priorities of the action plan is built on the work above (mapping of the skills present in Luxembourg, market analysis and promising fields of technology). It will also consider the business potential of certain sectors of the economy, likely to diversify into environmental technologies, and currently untapped potential of R & D in related areas.

This, by involving relevant stakeholders, to highlight sectors and niche markets to target first. Based on a first brief analysis, it is already clear that several areas should be studied carefully, including:

- Renewable energy, because the mapping study identifies a significant set of eco-enterprises and research skills in this area. In addition, opportunities to achieve a higher share of value added in Luxembourg seem possible.

- Energy efficiency and decentralized management of energy systems, because of the number of actors and the presence of subsidiaries of international groups, as well as possible convergences with the actions taken by certain municipalities and in different sectors.
- Eco-construction sector where there are early successes abroad, with a range of stakeholders ranging from engineering and consulting to industrials (production of building materials in particular), combined with interesting research capabilities.

These guidelines are provided as preliminary, because the potential for future development will also be evaluated on other niches, such as sustainable water management, recycling technologies of waste, vehicle technologies, eco - design or information technology and management of environmental data.

5. Measures and instruments of the plan.

The "eco-technologies" action plan develops below a first set of measures and instruments aimed at promoting eco-technologies. This non exhaustive action list, will be clarified and expanded as the work progresses.

5.1 Setting up an ECODEV cluster..

To encourage the development of supply and demand of "eco-efficient" goods and services in Luxembourg, a cluster in the field of environmental technologies and sustainable development will be created in February 2009, called "ECODEV cluster". This platform will serve to bring together all the economic and scientific actors in this field and implement concrete actions in favor of Luxembourg companies. A particular focus will be put on the support to SMEs.

The objectives of the ECODEV cluster are fully integrated in the objectives of this action plan and are aimed primarily at:

- Raise awareness, inform and support businesses that are about to seize new development opportunities in the field of eco-efficient technologies;
- Promote the skills of public research institutes and of enterprises and enhance their technology offers;
- Encourage networking between public and private actors on a national and international level;
- Increase and encourage the transfer of "clean" technologies;
- Encourage and enable businesses to access to national and european public aid to support their projects;
- Helping to increase the number of pilot demonstration projects and R & D and collaborative innovation projects;
- Develop prospective analysis to identify market opportunities.

To achieve these objectives, the cluster will interfere in three main ways:

- *Information and Communications Services* - The cluster will provide thematic information on opportunities related to supply and demand for environmental technologies . The cluster members can more easily meet, know and express their needs. Networking actions will facilitate access to key technologies, to networks of competence and lead to collaboration opportunities among members and with foreign clusters. Different actions are planned:

- Organization of information seminars on topics such as clean manufacturing processes, eco-construction, energy efficiency, renewable energy (biomass, photovoltaic, ...), the recycling technology, financial tools, new regulations, ...
- Promotion of services and skills of public research laboratories;
- Editing of directories with the competences of the cluster members (energy management, renewable energy, water, waste, ...);
- Publication of articles related to eco-innovations;
- Creation of an Internet presence (collaborative platform) dedicated to the ECODEV cluster within the “Portail de l’Innovation”.¹⁷

- *Targeted public and individualized services*- these targeted services aim to meet the specific needs expressed by companies during proactive visits and during interactive discussion days:

- *targeted public services*: targeted technical workshops; visits to research institutes in Luxembourg and the greater region; targeted specific training in relation to eco-technologies; sectoral studies of technologies and markets (strategic and prospective).
- *Proactive Business Services*: proactive visits of industrial and handcrafted companies as well as service; information in the fields of regulation, finance, strategy, technology; advice to businesses in terms of national and European financial support for R & D and environmental and energy projects; transfer of skills and / or technology to a specific need (link with Enterprise Europe Network¹⁸); decision support for eco-efficient investments.

- *Thematic Working Groups* - support services are offered to groups of companies and research institutes based on converging needs and on axis of common development. Two types of services will be implemented, allowing project managers to exchange information on problems, progress, best practices:

- Support for the establishment of working groups around demonstration operations and / or research and development projects (eg working group on energy efficiency in buildings, european R & D projects, ...).
- The organization of working groups aimed at supporting the establishment of grouped operations (studies of market opportunities for Luxembourg, energy performance contracts; actions Etat-exemplaire ...).

¹⁷ <http://www.innovation.public.lu>

¹⁸ <http://www.enterprise-europe-network.ec.europa.eu>

Luxinnovation, as an experienced conference leader of several national clusters is responsible for the implementation and animation of this new cluster. It will act under the authority of the Ministry of Economy and Foreign Trade and use the support of professional organizations such as the Chamber of Commerce and the Chamber of Trade.

A steering committee, mainly composed of company representatives, but also scientists (CRTE, University of Luxembourg, ...) and institutions (Energieagence, professional ...), will be installed during the creation of the cluster. This committee will provide field expertise both in scientific and economic work on the current and future needs of the market. It validates the annual work program of the cluster.

5.2 Promotion and information of the environmental technologies action plan.

The Board of Economic Development (BED) is responsible for the economic promotion and prospectation in the field of eco-technologies. Thus, in the manner of the actions undertaken for other industries, it is about producing promotional materials (brochures, articles, presentations ...), organizing the tasks of economic promotion and prospectation, being present at major fairs and seminars specialized in the field of eco-technologies etc.

Together with the BED Luxembourg, the Trade and Investment Offices of the BED abroad prospect companies from this sector likely to settle in Luxembourg. The instruments available to the BED -Ecostart facilities, areas of economic activity, public support schemes and access to financing sources- will be made available according to the profile of companies surveyed.

Other public actors are in charge of raising awareness on the domestic market about the offers of Luxembourgish environmental technologies and services. This promotion will be done in close collaboration with the Ministry for Sustainable Development.

5.3 Implementation of the new EU guidelines on state aids for environmental protection.

On 1 April 2008 the European Commission published new Guidelines on state aid for environmental protection "which allows for enhanced aid opportunities for companies implementing measures to protect the environment and rational use of energy beyond the prescribed thresholds. Thus, they allow additional aid if the investment is within the field of eco-innovation and, novelty compared to previous guidelines, the possibility of aid for environmental studies.

This regime is complementary to the instruments mentioned above and will facilitate the use of environmental technologies at the company level, while the former regimes were intended to promote the establishment and development of enterprises producing goods and services that meet the eco-technology criteria.

5.4 Grants and programs in research-development and innovation for eco-technologies.

The action plan encourages companies in the eco-technology sector to increase their use in tools to support research, technological development and innovation. It will promote the implementation of operations and demonstration projects.

The new Community framework for state aid for research, development and innovation (2006 / C 323/01), currently in transcription into national legislation, will be fully used, particularly as regards:

- Aid for the use of consulting services in innovation and innovation support;
- Aid for temporary hiring of highly qualified personnel;
- Assistance in intellectual property, etc..

These new provisions correspond particularly to the expectations of eco-technology companies as the transfer of knowledge, skills and technologies are key factors of success for this important new area of activity.

On the other hand, during their development, companies will be monitored in order to put them in connection with complementary financial support such as those from the SNCI (innovation loans, ...), from the company CD-PME, from the European Investment Fund (EIF), from venture capitalists and business angels investing in eco-technologies.

The action plan foresees also a strengthening of the awarded fundings to public research institutions, the Ministry of Higher Education and Research supports the activities related to environmental technologies in the context of performance contracts covering the years 2008-2010 through which public research institutions commit to fulfill a number of objectives specified with indicators and output results in return for the funding of the State .

Following the Government's decision on the priorities of national public research, the National Research Fund launched the program "CORE" in the first half of 2008, which provides for research areas related to active ?????in terms of eco-technologies, a budget of € 2.5 million for 2008 and a budget of € 5.0 million for 2009.

In the same time the action plan aims to strengthen awareness raising , information, networking and assistance to companies and public research organizations in order to enable them to access the EU funding and to strengthen their international collaborations. These include:

- The 7th Framework Program for Research and Development (FP7): environmental aspects, energy, transport, SME program;
- The Competitiveness and Innovation Program (CIP): eco-innovation and Intelligent Energy Europe (SAVE ALTENER and STEER);
- The European Regional Development Fund (FEDER): regional competitiveness and employment and cooperation;
- The LIFE +: a new financial instrument for the environment;
- The Eureka program: intergovernmental initiative of 38 countries to support of RDI;
- The programs of the European Space Agency ESA, including the program on earth observation.

5.5 Public markets and exemplary role of the state.

Public markets are a particularly interesting lever in order to stimulate the development of environmental technologies in Luxembourg. To this end, the Ministry for Sustainable Development has already established an "ecological department" within the administration of public buildings, to take into account environmental criteria as part of the construction and maintenance of public buildings.

A guide of sustainable construction, facilitating a better consideration of environmental criteria, is also available. In continuation of these projects, other instruments will be evaluated in order to encourage the public purchaser to use green solutions and eco-innovative technologies in the implementation of public projects, thereby stimulating the entering on the eco-technology market by Luxembourgish companies.

5.6 Support for the implementation of the Eco-conception and the adoption of Eco-labels.

The process of eco-design and eco-labels are action levers that have an impact on many sectors of the economy. The European Commission has just proposed a new framework to improve energy and environmental performance of products, and to facilitate their adoption by consumers.¹⁹

This framework is based on expanding the scope of the Directive on eco-design²⁰ and the strengthening of the product labeling. The action plan will develop actions helping to prepare Luxembourg companies to adopt eco-design and eco-labels in order to position themselves rapidly on the fast growing European and international markets of products having a high environmental performance.

5.7 Administrative simplification.

Within the action plan focus will be put on improving the various administrative procedures. The development of environmental technologies crosses in fact in large parts innovative projects that should be supported to facilitate and accelerate the process.

5.8 Training

In the action plan, initial and continuous training, in the field of environment will be identified. The training needs of companies will also be identified in order to enable businesses to expand their activities in the area of eco-technologies.

Complementary training will be offered to fill the gaps of existing training devices, given the scope of skills and expertise needed to develop the activities of companies in the sector of eco-technologies.

¹⁹ COM(2008) 397 final – Communication de la Commission au Parlement Européen, au Conseil, au Comité économique et social européen et au Comité des Régions – "Plan d'action pour une consommation et une production durables et pour une politique industrielle durable" – du 16.7.08.

²⁰ COM(2008) 397 final – Communication de la Commission au Parlement Européen, au Conseil, au Comité économique et social européen et au Comité des Régions – "Plan d'action pour une consommation et une production durables et pour une politique industrielle durable" – du 16.7.08.

6. Governance, monitoring and evaluation of the Action Plan.

6.1 Steering and monitoring of the action plan

The Ministry of Economy and Foreign Trade will be in charge of the coordination of the "Eco-technology" Action Plan. An interministerial group, responsible for monitoring the implementation of the Action Plan, will be established.

This group will be composed of representatives from the Ministry of Economy and Foreign Trade, the Ministry for Sustainable Development, the Ministry of Middle Classes, the Ministry of Higher Education and Research, and the Ministry of Agriculture Viticulture and Rural Development.

During 2009, one or two working seminars will be organized in order to ensure that proposals and suggestions of all stakeholders will be considered. In addition, working groups will be formed according to the various projects.

The "Eco-Technology" action plan marks the start of a promotion process of environmental technologies in Luxembourg and the establishment of this business field as a vehicle for sustainable growth.

6.2 Resources to manage the action plan.

In order to finance certain actions adopted in the "Eco-technology" Action Plan, a budget will be established.

For the year 2009 necessary resources to start the ECODEV cluster will be made available by Luxinnovation.

The initial phase of the "Eco-technology" Action Plan will require the availability of funds in order to continue the use of external experts, as well as for the organization of seminars aiming at developing and detailing the actions to be taken.

6.3 Indicators for monitoring and evaluation of the action plan.

Indicators for monitoring and evaluation will be defined in conjunction with the double objective of the action plan. This means, on the one hand to measure the impact of the plan in terms of adoption of environmental technologies by different sectors of the economy (demand from enterprises, public markets, household demand ...) and, on the other hand to measure its impact on development and performance of companies working in the supply of eco-technologies (eco-enterprises) in the domestic and international market.

For each of these two components, methodologies will be developed in collaboration with the STATEC, including the data being collected through the integration of specific questions in existing surveys and, where possible, through the satellites accounts of the environment - material flows, life cycle analysis, etc.. - yet to be developed in Luxembourg.