



Eco-innovation in Luxembourg

EIO Country Profile
2014-2015

Eco-Innovation Observatory

The Eco-Innovation Observatory functions as a platform for the structured collection and analysis of an extensive range of eco-innovation information, gathered from across the European Union and key economic regions around the globe, providing a much-needed integrated information source on eco-innovation for companies and innovation service providers, as well as providing a solid decision-making basis for policy development.

The Observatory approaches eco-innovation as a pervasive phenomenon present in all economic sectors and therefore relevant for all types of innovation, defining eco-innovation as:

“Eco-innovation is any innovation that reduces the use of natural resources and decreases the release of harmful substances across the whole life-cycle”.

To find out more, visit www.eco-innovation.eu and ec.europa.eu/environment/ecoap

Any views or opinions expressed in this report are solely those of the authors and do not necessarily reflect the position of the European Commission.

Eco-Innovation Observatory

Country Profile 2014-2015: Luxembourg

Coordinator of the work package: Technopolis Group Belgium

Acknowledgments

This document has been prepared with the support of the representatives of the Luxembourg state authorities, namely:

- Simone Polfer – Ministry of Economy, Directorate for Research and Innovation
- Christian Tock – Ministry of Economy, Directorate for Sustainable Technologies

A note to Readers

Any views or opinions expressed in this report are solely those of the authors and do not necessarily reflect the position of the European Union. A number of companies are presented as illustrative examples of eco-innovation in this report. The EIO does not endorse these companies and is not an exhaustive source of information on innovation at the company level.

This brief is available for download from
<https://ec.europa.eu/environment/ecoap/luxembourg>

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Summary

In 2015, eco-innovation and the circular economy are firmly on the agenda in Luxembourg and on the rise compared to previous years. The country is ranked third in the Eco-Innovation Scoreboard (Eco-IS), and continues its significant progress in this domain. In 2012 and 2013, Luxembourg was ranked 11th and seventh respectively.

This positive progression was initiated under the leadership of the Luxembourg Green Party, which has been part of the country's government since December 2013, and that of the Luxembourg Eco-Innovation Cluster. The latter works closely with the government on promoting the circular economy, a focus that has been reinforced since the election of its current president a few years ago.

The Secretary of State for Sustainable Development is also a member of the Green Party. The party is in charge of three ministries: the Ministry of Mobility, Spatial Planning and Infrastructure, the Ministry of Justice, and the Ministry for Environment and Climate. The Ministers of Mobility and Environment are part of a "super ministry" in charge of sustainable development policies and initiatives which is a significant step for Luxembourg in generating future support for promoting eco-innovation.

The most relevant eco-innovation trend over the past few years has been the focus of the government on the circular economy model as a way of diversifying the economic activities of the country and promoting competitiveness. This view was further reinforced with the publication in 2014 of a study by the Ministry of Economy assessing the benefits to be expected from a transition towards a more circular economy. In addition, in 2015, an inter-ministerial committee was created under the leadership of the State Secretary to bring together public actors and to increase crossover and consensus about the circular economy.

Other leading eco-innovation areas include the rational use of natural resources, material science, sustainable mobility, sustainable cities and corporate and social responsibility. The main eco-innovation drivers of the country include strong political support and commitment towards eco-innovation and sustainable development, and the recognised need to diversify the economy for economic growth and productivity.

In addition to the Eco-Innovation Cluster mentioned above, other key supported areas include mobility, sustainable cities and smart technologies.

Introduction

Luxembourg is a small and stable high-income economy and has historically featured solid growth, low inflation and low unemployment. The economic strength of Luxembourg relies on an economic model based on attractive fiscal rates and good infrastructure, which has enabled an economic transition from traditional industries to the services sector. Today, Luxembourg's economy is dominated by services, including banking, insurance, real estate and services to businesses. In 2015, the services sector represented 87.7% of the country's GDP, and 80% of its exports.

The economy is dependent on cross-border workers (primarily from Belgium, France, and Germany) for about 44% of its labour force. It should also be noted that 71% of the labour force does not have Luxembourg nationality. As a consequence, Luxembourg has experienced increased transport flows, mainly by road, and the population growth has put greater pressure on housing, public services and infrastructure.

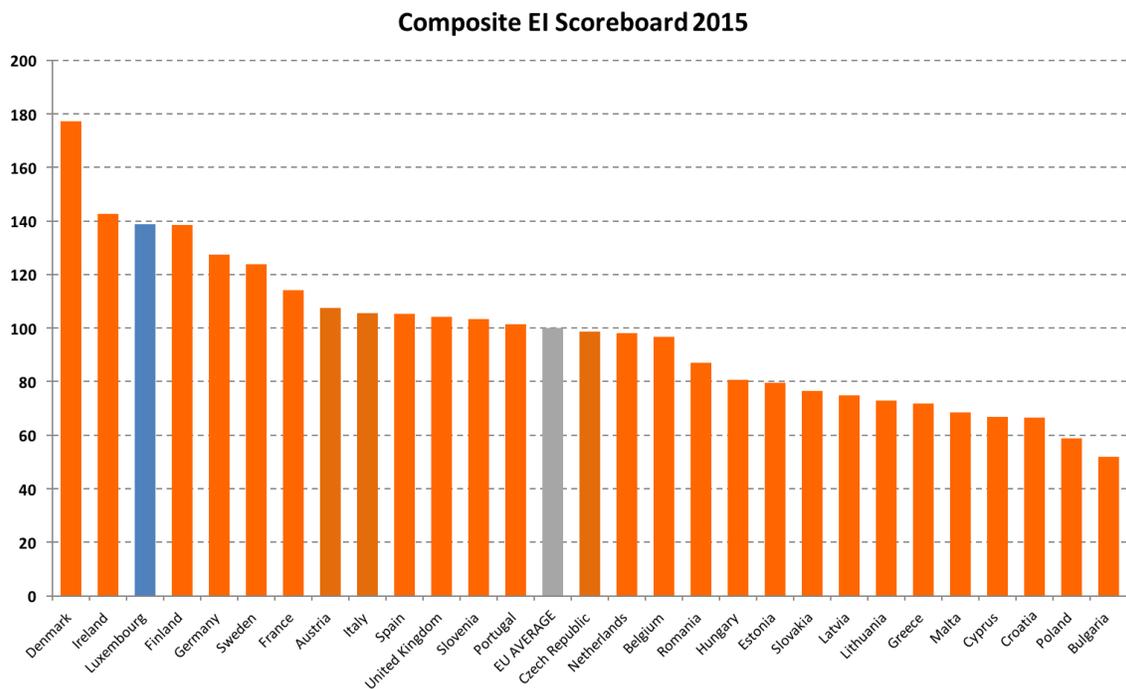
The country has little natural resources and imports most of its raw materials and energy sources. Consequently, its economy is particularly exposed to fluctuations in material prices and costs, putting pressure on the country's industry. As for most European Union countries, Luxembourg's industry is still suffering from the economic crisis, as well as increasing competition from emerging countries. In addition, high labour costs contribute to the slow decline of the country's industrial sector, and there is an increased number of unemployed people with no or low qualifications.

With the above in mind, eco-innovation is seen as a significant driver to stop the relative economic decline of the country and to reverse the trend, through adapting new business models, developing new skills and markets and increasing the competitiveness of Luxembourg companies.

1 | Eco-innovation performance

The analysis in this section is based on the EU-28 Eco-innovation scoreboard (Eco-IS) for the year 2015. Via its composite Eco-innovation index, produced by the Eco-Innovation Observatory (EIO), Eco-IS demonstrates the eco-innovation performance of a country compared with the EU average and with the EU top performers. Eco-IS is based on 16 indicators, aggregated into five components: eco-innovation inputs, activities and outputs, environmental and socio-economic outcomes.

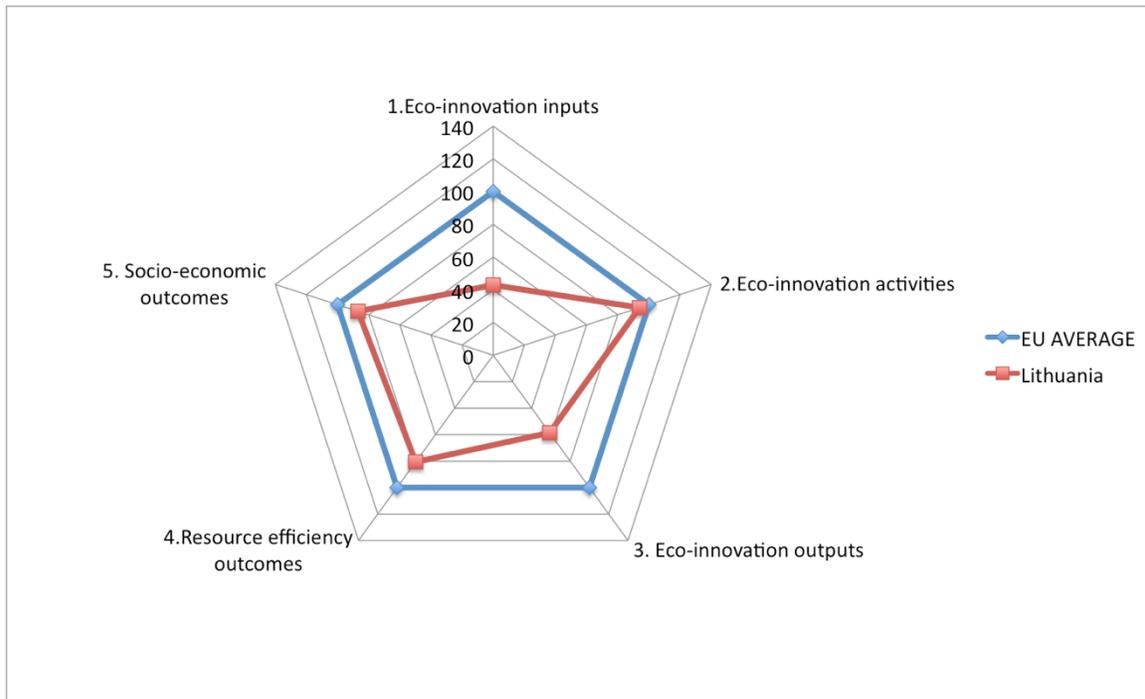
Figure 1 EU-28 Eco-Innovation Scoreboard 2015, composite index



Source: EIO, 2016

Luxembourg is ranked third in the Eco-IS 2015, which is a considerable progression compared to previous years – the country was ranked 11th in 2011 and seventh in 2013. Luxembourg performs above the EU average in resource efficiency outcomes and socio-economic outcomes. As in 2013, this performance is particularly driven by its top ranking in material productivity – on an equal footing with the Netherlands – and in exports of products from eco-industries – on an equal footing with Germany. Luxembourg also performs significantly above the EU average in eco-innovation outputs. In particular, it is ranked first for both eco-innovation-related publications and eco-innovation-related media coverage – on an equal footing with Finland and Italy respectively. Its performance is in line with the EU average in eco-innovation inputs, while in 2013 Luxembourg performed significantly above EU average in this category of indicators.

Figure 2 Components of the eco-innovation composite index for Luxembourg 2015



Source: EIO, 2016

Eco-innovation inputs

Luxembourg's performance in eco-innovation inputs is in line with EU average, with an average index of 103 against 100, positioning the country ninth in the EU. This result is driven by excellent performance in R&D personnel and researchers, which represents 2.06% of total employment in 2014. This puts Luxembourg just behind Denmark and Finland, with a share of 2.11%. The overall performance is also significantly lower than in 2013, when the country achieved a score of 142. Generally speaking, it should be noted that as a small country, Luxembourg often presents fluctuating values for a range of indicators, not only for eco-innovation inputs. A change in government budget outlays immediately impacts the country's scores and can partly explain observed changes from one year to another.

Eco-innovation activities

Luxembourg ranks 14th on this indicator, with a score of 115, above the EU average and significantly above its 2013 performance (score 87). The country's average score is significantly reduced by the low number of ISO 14001 registered organisations. With only 70 registered organisations, this is in absolute value the third weakest performance in the EU, with only Croatia and Malta scoring lower. However, compared to the population of the country, Luxembourg is ranked 20th, above France and Germany. ISO 14001 is mainly used in the construction sector in Luxembourg. When the government implements awareness-raising events, for example on the promotion of the ISO 14001 norm, it manages to reach all companies across Luxembourg, thanks to the small size of the country, and can more effectively encourage companies to commit to such initiatives. It is more difficult, however, to maintain this trend over

the years ahead. A reasonable assumption would be that firms interested in being certified would have already done so. Data regarding firms that have implemented innovation activities aiming to reduce material and energy input per unit of output have not changed since 2008. The country performs above EU average, however data is not available for a number of countries, such as Denmark, the United Kingdom and Spain.

Eco-innovation outputs

Luxembourg tops the ranking for eco-innovation outputs, with a score of 205, more than twice the EU average and significantly higher than in 2013, when it achieved a score of 121. The country is ranked first for both eco-innovation-related publications and for eco-innovation-related media coverage, on an equal footing with Finland in the first case and with Italy in the second. Although the absolute number of eco-innovation publications is among the lowest in the EU, Luxembourg is still the most active country when considering the number of inhabitants.

Luxembourg also performs above the EU average for eco-innovation-related patents, despite only 13 such patents being registered in Luxembourg in 2012, compared to 251 in Austria the same year. Based on a calculation of absolute values compared to the size of the population, the two countries achieve results of the same order, and Austria is ranked only just before Luxembourg.

Resource efficiency outcomes

Luxembourg tops the ranking for resource efficiency outcomes, before the United Kingdom and the Netherlands, with an average score of 131, close to its 2013 score (129). Luxembourg is ranked first in material productivity at €3.29 of GDP per kilogramme of domestic material consumption (EUR/kg) compared to the EU average of 1.93 EUR/kg. Luxembourg performs in line with the EU average regarding energy productivity, with €8.61 of GDP per tonne of oil equivalent (EUR/toe), where the EU average is 8.34 EUR/toe. Its greenhouse gas (GHG) emissions intensity stands at 0.30 CO₂ equivalent per euro of GDP, lower than the EU average at 0.35 but higher than the best performers, Sweden and France (0.27). Finally, water productivity data has not changed since the last report, Luxembourg being ranked third after Ireland and the United Kingdom.

Socio-economic outcomes

Luxembourg again tops the ranking for socio-economic outcomes. The result is driven by exports of products from eco-industries. In 2014, they amounted to €147 million, translating into 0.99% of total exports, much like in Germany, compared to 0.67% on average in the EU. Employment in eco-industries was 0.37% of total employment across all companies, below the EU average at 2.52%. However, national data based on STATEC indicate that in 2012, 2.5% of people were employed in the environmental goods and services sector (Ministry of Economy, 2015). Revenue in eco-industries in 2014 was 0.39% of total revenue across all companies, below the EU average at 2.19%.

2 | Selected circular economy and eco-innovation areas and new trends

Efforts to promote eco-innovation and the circular economy in Luxembourg are mostly led by public-private partnerships and structured around the **Luxembourg Eco-Innovation Cluster**, **LuxInnovation** (the national agency for innovation and research), the **Ministry of Economy**, the **Ministry of Sustainable Development and Infrastructure** and the **INTERREG North West Europe (NEW) programme** that the latter promotes.

The **Eco-Innovation Cluster** gathers companies, research institutes and public organisations involved in the field of eco-technologies, with the objective of creating and developing new sustainable opportunities through collaborative R&D and innovation projects in the fields of the circular economy, eco-construction and eco-materials, renewable and alternative energies (biomass, biogas, photovoltaics, etc.), eco-design and eco-conception, and rational use of energy. Its activities also enable awareness-raising on the opportunities offered by the circular economy.

LuxInnovation accompanies companies and researchers in developing and the implementing innovative projects and supports the government in its innovation and R&D policies. It is a network of reference in the EU regarding R&D and innovation and represents the Luxembourg contact point for the European Horizon 2020 programme. Its main focus areas include eco-technologies, materials and production technologies.

The **INTERREG North West Europe programme** is a transnational European Territorial Cooperation Programme funded by the European Commission and involving Luxembourg, Ireland, the United-Kingdom, Belgium, Switzerland and parts of France, Germany and the Netherlands. The programme aims at reinforcing territorial cohesion across North West Europe regions by reducing discrepancies, promoting innovation, reducing CO₂ emissions and fostering an efficient use of resources and raw materials. It is run under the framework of the Europe 2020 strategy promoting smart, sustainable and inclusive growth¹.

Leading innovative areas in Luxembourg have been stable since 2013. However there has been a noticeable rise in attention given to the **circular economy** and related initiatives. Over the past few years, focus on the **circular economy** has been reinforced, in line with the government's commitment in December 2013 to further encourage the development of a circular economy in Luxembourg as a lever for competitiveness. The circular economy model is viewed as an opportunity for Luxembourg to diversify the economic activities of the country and to enhance companies' competitiveness. Luxembourg wants to position itself as the material hub and service provider with its bordering regions and beyond.

The Ministry of Economy, LuxInnovation and the Luxembourg Eco-Innovation Cluster closely work together on the promotion of a more circular economy. In 2015, LuxInnovation created a new support scheme – **"Fit4Circular"** – to help small and medium-sized enterprises (SMEs)

¹ For further information, please visit: <http://www.fonds-europeens.public.lu/fr/programmes/interreg/interreg-nwe-2014-2020/index.html>

transition towards a more circular economy (box 2.1). The President of the Eco-Innovation Cluster, Roman Poulles, heads the strategy of the cluster, focusing on the following themes: mobility, the circular economy, and sustainable cities and smart technologies. The strategy also sets specific goals for the period 2014-2020: creating 3,000 new jobs, partnering with 300 new companies, creating 1,000 business opportunities and 10 new strategic international partnerships. The cluster's 2015 flagship projects include 22 circular economy demonstration projects, such as an eco-business park, reverse logistics or extended life-cycle assessment (LCA). In 2015, the cluster also organised a **business challenge for teenagers** focussing on inventing a circular loop for everyday life products to raise their awareness (see box 2.2). In addition, the 2015 agenda encouraged international cooperation and good practices, with the visit to the Resource 2015 conference in London aimed at helping businesses take steps towards resource efficiency and the circular economy, as well as the visit to the "*Assises de l'économie circulaire*" in Paris seeking to develop a state-of-the-art circular economy in Europe.

The rational use of natural resources and material science are still strategic priorities in Luxembourg. Regarding material science, the focus areas include new advanced materials, bio-materials and materials for sustainable construction. Intelligent design, cradle-to-cradle and life-cycle analysis approaches are taken into consideration, with a view to achieving a reduced carbon footprint. With respect to the rational use of natural resources, the following sectors have been identified as being the most promising for Luxembourg's economy:

- Biomass conversion to energy by gasification and combustion technologies
- Sustainable mobility
- Energy storage and smart grid solutions
- Small-scale production units for energy generation.

In addition, the Government encourages companies to use less natural resources, to use them more efficiently and to invest more in clean technologies. To work towards this goal, a **learning factory** (box 2.3) has been set up by a public-private partnership for companies to learn how to improve their energy performance, productivity and organisation and to train their employees on green practices.

Low-carbon, sustainable mobility remains a key eco-innovation priority in Luxembourg and a promising sector to further develop the diversification and greening of the economy through the experimentation of new innovative solutions in a small and integrated environment. In October 2013, the Ministry of Economy and Foreign Trade and the Ministry of Sustainable Development and Infrastructures, together with Sales-Lentz and Volvo Buses, signed a Memorandum of Understanding (MoU) on the establishment of Luxembourg as a test arena for a sustainable public transport system. The MoU is based on the testing of Volvo's plug-in hybrid system for electric public transportation, which has been integrated into regular scheduled services since 2015. The centre is specialised in the training of bus operators, maintenance, safety and rescue personnel. It also works as an R&D centre and serves as a platform to develop new services in the field of vehicle, fleet and traffic management (Volvo Buses, 2013).

Luxembourg considers itself as a "living laboratory" for smart mobility. Its small size enables it to experiment with new services for the mobility of people and goods (freight), using new clean technologies and the Internet of Things. Given the reliance of Luxembourg on foreign workers commuting to Luxembourg on a daily basis (estimated at around 170,000 per day), it is

important that commuting is comfortable and convenient in order for Luxembourg companies to remain attractive and to maintain the economic activity of the country. To work towards this objective, new train stations have been built. 1,400 km of bicycle paths and 850 electric charging points for cars will be developed by 2020. Charging points will notably be installed in company car parks. Users will be able to choose their electricity supplier through an online platform with the possibility to select green electricity suppliers. Finally, new tax abatements have been decided for 2016 to encourage people and companies to use more electric cars and bikes.

Sustainable cities and smart technologies are eco-innovation areas on the rise. In the last few years, projects have been developed to enlarge Luxembourg's technical competences, in order to foster renewable energy and energy storage and the rational use of natural resources (Eco-Innovation Cluster, 2014). In particular, households are being equipped with smart metering systems. By 2019, it is expected that more than 90% of households will benefit from this system for electricity and gas, and smart metering systems for water consumption will be added later as well. Those smart metering systems enable more precise measurement and monitoring of electricity and gas consumption and production, to the nearest quarter of an hour.

Corporate Social Responsibility (CSR) continues to be a priority that is actively promoted by the government and associations and adopted by an increased number of businesses in Luxembourg. Companies have a double incentive to commit to improve their CSR commitments. They consider CSR to lead to both improved brand image and economic benefits. Companies are accompanied in their commitment to reporting of environmental, social and societal impacts by several organisations such as IMS and INDR. IMS (Inspiring More Sustainability²) is an association encouraging companies to place CSR responsibility at the heart of their strategy. To work towards this aim, IMS carries out awareness-raising communication campaigns and training, animates a CSR network to engage stakeholders and foster innovation, and provides expertise to propose concrete solutions for companies to improve their environmental, social and societal impacts². The INDR (*Institut national pour le développement durable et la responsabilité sociale des entreprises* – National Institute for the sustainable development and social responsibility of businesses) was founded by the Union of Luxembourg Companies (*Union des Entreprises Luxembourgeoises* – UEL) to help companies be more competitive and sustainable³. The INDR promotes sustainability and offers an online platform where companies can share experience and best practices.

Fit 4 Circularity

Fit4Circularity is a new support scheme created in 2015 by LuxInnovation and targeting SMEs, following the Fit4Digital and Fit4Innovation initiatives.



Fit4Circularity is dedicated to helping SMEs that are willing to make a more substantial commitment to sustainable development practices and to implement a circular economy approach. The objectives are to limit the use of raw materials,

² IMS website: <http://imslux.lu/>

³ INDR website: <http://indr.lu/>

maximise the use of renewable sources, develop innovative products and services for sustainable growth, reduce energy consumption and increase recyclability.

LuxInnovation, the Innovation Agency of Luxembourg, along with external consultants, will help SMEs apply for the scheme and implement their projects. Expected results of the Fit4Circularity scheme are improved competitiveness and increased revenues for SMEs. Different kinds of projects can be eligible for support: technological innovation, organisational innovation and investment.

Key words: circular economy, competitiveness, innovation

Source : <http://en.luxinnovation.lu/News/Archives/Renforcer-sa-compétitivité-grâce-à-l'économie-circulaire>

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Innovation Camp for youth

This initiative was jointly organised on 12 November 2015 by the Eco-Innovation Cluster and the non-profit association, *Jonk Entrepreneuren Luxembourg*, which gathers school and business representatives to promote the entrepreneurial spirit within education in Luxembourg. The camp gathered teenagers aged 16 to 19 and was aimed at raising their awareness on the circular economy.



The business challenge that teenagers had to solve was the following: Each team was given an object of everyday life and had to imagine a second or a third life for them, taking them out of their linear life cycle and integrating them into a circular loop.

It is particularly important to implicate the youth in such initiatives in order to raise their awareness to the reality of finite resources and the necessity to change consumer behaviour, so that the new generation is more responsible towards the environment.

The first prize was won by a project reinventing headphones. The team imagined headphones made out of natural and recyclable materials and powered by the pulse of ears and piezoelectric fibres.

Key words: circular economy, circular loop, linear life cycle, consuming behaviour, finite resources.

(photo) Winners of the circular economy challenge

Source (incl. picture): <http://jonk-entrepreneuren.lu/2015/11/le-9e-innovation-camp-avec-le-cluster-ecoinnovation-leconomie-circulaire/>

Learning Factory



The Learning Factory was been set up in 2013-2014 by a joint venture including the Luxembourg Government, the Chamber of Commerce, the Fedil Business Federation of Luxembourg, ArcelorMittal, Schneider Electric, Enovos Creos,

Sudstrom and the city of Esch. This project represents an investment of more than €2 million.

The Learning Factory was established as an experimental and safe learning environment for businesses to learn how to improve their energy performance, productivity and organisation as well as the skills of their employees. The factory includes exercises related to the processes and equipment involved in making iced tea, since the preparation of this drink are similar to those found in many other factories. Employees in training can practice on a real production line with optimised tools and under the supervision of experienced trainers. After the training, they can more easily apply the methods and practices at their own facilities and processes to reduce energy consumption and operating costs.

Companies are interested in the Learning Factory because it enables them to achieve substantial economic and environmental benefits.

Although the initiative mainly targets industries, other companies and administrations are also welcome to use the factory since additional “lean-six-sigma” training sessions, a collaborative methodology to improve performance and remove waste, are offered to help companies from the services sector – such as banks or administrations – optimise their operations and reduce costs.

Key words: energy performance, productivity, economic and environmental benefits

Source: www.learningfactory.lu

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3 | Barriers and drivers to circular economy and eco-innovation in Luxembourg

The main drivers of eco-innovation in Luxembourg have not changed fundamentally since the last report. However a growing and distinct attention is paid to the circular economy concept compared to a few years ago and businesses are increasingly aware of the economic benefits entailed. Drivers for eco-innovation include the following:

- **Strong political support and commitment towards eco-innovation, sustainable development and the circular economy.** The government has the political will and commitment to make the country a global technology hub for eco-innovation. The objective is to develop and grow in niche markets. The entry of the Green Party into power in 2013 has given additional strength to this sustained effort, with increased opportunities for the expansion of the market for eco-innovations. Furthermore, the circular economy as such has clearly been on the agenda of the government since 2014, and will be at least until 2018, where previously sustainable development was tackled through innovative technologies.
- **Growing awareness from businesses of the economic benefits they can achieve from further commitment to a circular economy.** A strategic committee for a circular economy was set up within the government, working on promoting the concept and its economic and environmental benefits among businesses. Companies are increasingly aware that the circular economy brings concrete solutions to the volatility of energy and raw material prices and enables them to rely on a more stable business model that is beneficial to both their competitiveness and their environmental impact.
- **Strong and comprehensive set of national environmental and innovation laws.** These are largely based on European legislation and have been an effective tool for implementing relevant policies and a main driver for the promotion of eco-technologies and eco-innovation.
- **Economic diversification is a priority.** To lower its dependency on the financial sector, Luxembourg has strived to diversify its economy for years and strongly supports and develops sectors such as clean technologies. The country also wants to continue to promote new concepts such as the circular economy, as a way of increasing competitiveness. Sustainable development in general, and green technologies, eco-innovation and the circular economy in particular, are part of a national plan to diversify the national economy with new promising industries.

While the circular economy is gaining momentum within the government and industry, the downside is that funding is not always available for innovative projects due to a lack of understanding or commitment from banks. Barriers therefore include the following:

- **Lack of understanding from banks about economic models sustaining the circular economy.** A conference organised in 2015 at the European Investment Bank, on financing a transition towards a circular economy, showed that many banks have little understanding of economic models sustaining the circular economy. The financial sector

- therefore needs more pilot projects to be implemented in order to better understand the benefits and be more willing to grant credits to very innovative projects.
- **Stress on resources to balance economic growth and environmental protection.** Luxembourg enjoys a central and strategic location in the heart of the European Union. It plays an important role in the greater region, as it is the main economic engine with an important number of commuters and foreign residents. The interdependency of Luxembourg and its geographic neighbours is strong, putting pressure on the demand for housing, services and infrastructures, and to strong transport flows. This leads to rising energy demand, in particular for buildings and transport. All eco-innovations that have a broader impact or that require a holistic approach to development will have to be made in collaboration with the bordering regions, and material flows will need to be coordinated and optimised.
 - **Small national market for eco-innovations.** Luxembourg is a small country with few natural resources and it imports most of its raw materials and energy sources. Its economy is thus particularly exposed to fluctuations in material prices and costs, putting pressure on national industries. Nevertheless, because of the small size of the country and the framework conditions and policies in place, the local market is flexible, which makes the country an ideal place to test innovative R&D. Moreover, in order to make innovations expand, innovators need to look beyond the national borders.

4 | Policy landscape: towards circular economy in Luxembourg

The **Luxembourg Green Party** has been part of the country's government since December 2013. In addition to a member of the Green Party being Secretary of State for Sustainable Development, the Greens are in charge of three Ministries: the Ministry of Sustainable Development, Spatial Planning and Infrastructure; the Ministry of Justice; and the Ministry for Environment and Climate. The Ministers of Mobility and Environment are a part of a "super ministry" that covers sustainable development, which is important for Luxembourg in terms of generating support for eco-innovation.

The government pays particular attention on the **circular economy** model because of its desire to strengthen the competitiveness of the country. The aim of this model is two-fold: reducing the environmental impact of Luxembourg's industries and raising its competitiveness through innovative business models and cost reductions. The political support for such measures is strengthened by the Green Party, and a Ministry of Economy that has been awarded more competencies and responsibilities since the formation of the new government in late 2013.

In 2014, the Ministry of Economy, one of the main stakeholders involved in the Eco-Innovation Cluster, commissioned a study entitled "**Luxembourg as a Knowledge Capital and Testing Ground for the Circular Economy – National Roadmap for Positive Impacts. Tradition, Transition, Transformation**". The aim of this study was to investigate the current situation in Luxembourg, the economic potential of a circular economy and to develop a strategy to implement such a paradigm shift. The study found that a circular economy is a source of

competitive advantage, as it would lead to increased job opportunities (more than 2,200 jobs in the next three years), important cost-savings (€300 million to €1 billion per year) and less pressure on the environment. In addition, embracing a circular economy would increase the inflow of secondary raw materials that industries rely on, reinforcing their interdependency and substantially reducing waste production. Luxembourg is considered fertile ground for the testing of a circular economy, based on the country's values of "equity, cultural tolerance, economic stability, responsive government and manageable size" (EPEA, 2014).

In order to work towards a more circular economy and to reap its expected benefits, the government acknowledges that all relevant stakeholders must be united, in terms of coordinating their actions and sharing information. This was the rationale behind the establishment of the inter-ministerial committee "**Strategic group for a circular economy**", which was set up in 2015, led by the State Secretary Mrs Francine Cloeser.

Among these coordinated actions was the organisation of an international conference on the financing of a transition towards a circular economy in December 2015. It was held at the European Investment Bank (EIB) headquarters in the framework of the Luxembourg Presidency of the Council of the European Union from July to December 2015 and the **InnovFin Advisory programme**⁴ on financing the circular economy. The Presidency provided Luxembourg with the opportunity to engage in a partnership with the European Commission and the European Investment Bank, with the objectives of raising awareness among the business and financial communities, to assess future financing needs and to determine whether the existing financial instruments, in particular the InnovFin financial products, are fit to support the transition to a more circular economy. Conclusions and recommendations were published in a report entitled "**Assessment of access-to-finance conditions for projects supporting Circular Economy**". According to the study, transitioning to a circular economy is imperative, but must be done in a systemic and integrated way to be effective, notably taking into account the regulatory landscape, and the need to build intelligence, share information and raise awareness. This could be done, for example, by creating a platform gathering stakeholders from business and financial communities and providing technical and investment advice to help promising projects materialise. The study also found that market forces alone could create a circular economy, but only slowly and with potentially high opportunity costs. Therefore, public intervention and support are crucial. Regarding financing, the European Investment Bank provides financial support through loans to firms, yet more needs to be done, especially for SMEs. Likewise, InnovFin can support projects that entail "technological innovation", but projects based on innovative organisation or business models, for example, are currently outside its scope. Eligibility criteria thus need to be expanded.

With regard to businesses, the government has developed a trademark – the **SuperDrecksKëscht** (see box on following page) – in order to incentivise businesses to better manage their waste, rationalise their resource consumption and transition towards a more circular model. The SuperDrecksKëscht is a particularly effective vehicle for the government to deliver its messages to the private sphere, given the popularity and respect it holds from businesses.

Innovative companies are also financially supported by the **Luxembourg Future Fund**. The fund was set up in 2015 by the Luxembourg Government, the European Investment Fund (EIF) and

⁴ InnovFin Advisory programme, website of the European Investment Bank:
<http://www.eib.org/products/advising/innovfin-advisory/index.htm?lang=en>

the *Société Nationale de Crédit et d'Investissement* (SNCI). A total of €150 million – with €30 million coming from the EIF and €120 million from the SNCI – will be deployed over a five-year period. The goal of this fund is to support the diversification and the sustainable development of the Luxembourg economy, attracting – directly or indirectly – entrepreneurial activities to Luxembourg that are in an early start-up phase, development or growth phase, or activities that support innovation in general. The main target sectors of the fund are information and communication technologies (ICT), cleantech and other technologies, with the exception of health technologies, which already has a dedicated fund. The Luxembourg Future Fund is geared towards European SME companies, and is managed by the experts of the European Investment Fund who also hold a minority stake in the Fund.

The circular economy is also fostered by the government through the development of **economic activity zones and 'eco-neighbourhoods' based on circular principles**. These zones promote low-carbon mobility, industrial symbiosis and collaborative consumption (equipment, machinery, cars, facilities, nurseries, resources, electricity supply, with purchase agreements at a preferential rate, etc.). The demonstrator city Wiltz (see box below) and the eco-park Windhof⁵, set up in 2011, are successful examples of this policy. The government's **fiscal reform** of February 2016 will also encourage sustainable mobility with a specific tax rebate as of 2017⁶.

Finally, the Government's policies and efforts to promote a greener and more circular economy are showcased on its website LetzGreen (see box below).

SuperDrecksKëscht

The SuperDrecksKëscht is a trademark developed by the Luxembourg government to manage waste. Actions and campaigns are carried out by the Ministry of Sustainable Development and Infrastructure, the Chamber of Trade and the Chamber of Commerce, under a state mandate to develop innovative services to businesses and citizens. It is based on the EU waste hierarchy strategy, which prioritises prevention, then reuse and recycling, over waste disposal such as landfill.



The SuperDrecksKëscht encourages sustainable consumption through the provision of guidelines with information on purchasing eco-products or using cleaning products in an environmental friendly way. It also organises the collection and ecological recycling of batteries and chargers. In addition, the SuperDrecksKëscht favours reverse consumption. This entails taking back consumer goods, as well as reverse production. Substances are stored in a warehouse before they undergo a second sorting process and special treatments to achieve a higher recycling rate.

The SuperDrecksKëscht was recognised by the European Commission and awarded the "best practice" label in the field of natural resources preservation and climate protection. It is also ISO 14001 (norm for environment management) and ISO 14024 (quality label) certified. Its

⁵ Ecoparc Windhof website: <http://www.ecoparc.lu/>

⁶ Ministère des Finances, February 2016, "*Réforme fiscale: impôt allégé et plus équitable des ménages, réduction de la charge fiscale pour les entreprises*", available at : http://www.mf.public.lu/actualites/2016/02/reforme_fiscale_290216/index.html

concept has also been exported to Norway and Switzerland.

Given SuperDrecksKëscht's wide popularity, with more than 4,000 members, the government works with it to promote a circular economy among businesses.

Key words: waste management, reverse consumption, reverse production, recycling.

Source: <https://www.sdk.lu/index.php/en/>

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Wiltz to become circular economy hotspot

On 13 October 2015, the Minister of Economy announced its intention to turn the city of Wiltz into a circular economy hotspot, with several pilot projects being launched to demonstrate their potential and to inspire other actors in the adoption of the circular economy principles. The idea is to build on existing opportunities and to develop a know-how that would then enable new innovative projects to develop.

While unveiling the project, the Minister of the Economy, Mrs Francine Closener, announced that the approach adopted was both bottom-up and top-down, in order to support private innovative initiatives and local authorities willing to implement circular economy projects.

The main initiative at Wiltz is the rehabilitation of industrial sites to be replaced by a residential complex on a 28-hectare surface. Other projects include:

- the opening of a "Repair Café" and a "fab lab" (including a 3D printer);
- the construction of a positive-energy building, including six dwelling units, made of completely reusable materials;
- the integration in 2016-2017 of a course on circular economy in the future university of Wiltz in the fields of architecture and design;
- the integration of circular economy principles in the city's Salzbaach economic zone.

Key words: circular economy, repair café, fab lab, 3D printing, positive-energy building

Source: <http://letzgreen.lu/wiltz-become-circular-economy-hotspot>

LetzGreen – Luxembourg is Green

LetzGreen is a website created by the Minister of Economy to raise awareness, to share best practices regarding clean technologies, energy efficiency, green buildings and the circular economy, and to promote a greener economy.



“LetzGreen is Luxembourg’s project to promote the clean technologies sector to become one of the principal pillars of the economy. With a special focus on circular economy, Luxembourg aims to remain competitive by providing affordable energy to industry while further developing a thriving renewables sector. The government is focused on providing an attractive economic environment for entrepreneurs to generate profits whilst cutting pollution, waste and energy use.

The government’s priorities for the emerging clean technologies sector are primarily energy efficiency and green buildings. These will be emphasised by linking energy policy with economic diversification policy, focusing research on the rational use of natural resources and innovative materials. To do this, the government continues to actively support the development of Luxembourg’s existing companies, encouraging their export activities by putting Luxembourg on the map for clean technologies. It will also maintain a favourable business environment by keeping VAT rates, corporate tax, and labour costs at competitive levels.”

Key words: clean technologies, energy efficiency, green building, circular economy, competitiveness

Source: <http://letzgreen.lu>

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ANNEX: Policy measures addressing circular economy and eco-innovations in Luxembourg

	Group of policy measures	Type of policy measure	Specific measure Please provide reference to or brief summary of specific measures (national, regional)	Focus of policy measure (tick if relevant)					
				Circular economy	Generic focus on eco-innovation	Resource efficiency improvement	Energy efficiency improvement	Reduction of emissions incl. CO2	Other relevant areas (e.g. renewable energy, etc)
SUPPLY SIDE FOCUS	Equity/business support	Publicly co-funded venture capital funds	<p>Legal framework for venture capital and private equity companies (SICAR). The law offers a flexible legal framework for private equity and venture capital companies.</p> <p>The non-profit organisation “Luxembourg Private Equity & Venture Capital Association” (www.lpea.lu) offers a good insight on how the Luxembourg market is structured.</p> <p>Structures with a European reach, such as for example Oraxys (www.oraxys.com), have their offices in Luxembourg and specialise in investments in clean-technologies and public health and energy.</p>		X				
		Public guarantee funds	<p>The “Luxembourg Future Fund” initiative</p> <p>The Luxembourg State Bank “Société Nationale de Crédit et d’Investissement” (SNCI – www.snci.lu) is a public-law banking institution specialised in medium- and long-term financing of Luxembourg-based companies. SNCI’s financing instruments are investments in fixed assets, innovations and exports.</p>		X				
	Support for R&D in public sector and industry	R&D funding	<p>The Luxembourg Law on Promotion of Research, Development and Innovation, of 5 June 2009, based on Commission Regulation (EC) No. 800/2008 of 6 August 2008 declaring certain categories of aid compatible with the common market in application of Articles 87 and 88 of the Treaty (General block exemption Regulation) and the R&D&I Guidelines by the EU Commission (2006/C 323/01), has been prolonged till end of 2014 and will be rewritten in order to be in line with the upcoming new EU regulation on State Aid.</p>		X				

Group of policy measures	Type of policy measure	Specific measure Please provide reference to or brief summary of specific measures (national, regional)	Focus of policy measure (tick if relevant)					
			Circular economy	Generic focus on eco-innovation	Resource efficiency improvement	Energy efficiency improvement	Reduction of emissions incl. CO2	Other relevant areas (e.g. renewable energy, etc)
		<p>Innovation loan provided by the “Société Nationale de Crédit et d’investissement” (SNCI) is an instrument aimed at co-financing expenditures of R&D projects involving the launch of a new product or service or the development of new manufacturing or commercialisation processes. The innovation loan is an additional instrument to the R&D incentive scheme of the Ministry of Economy and Foreign Trade.</p> <p>Financial support of the Ministry of Higher Education and Research provides funds to R&D projects in public organisations. The priority of the programme is to support public organisations in their R&D projects.</p> <p>R&D incentive scheme of the Ministry of Economy and Foreign Trade (RDI Law of 5 June 2009). The objective of the scheme is to co-finance investments of general economic interest in R&D sought by private-sector businesses and research centres to stimulate the development of R&D activities within these organisations. The beneficiaries are industrial undertakings, service providers with a key impact on economic development, and private-sector research centres. It takes the form of an outright grant. Co-financing covers fundamental research (up to 100%), applied research (up to 80%) and pre-competitive development (up to 60%) depending on the size of the company and whether the company is collaborating with a research institute or not.</p>		X				
				X				
				X				
	Collaborative grants	<p>ERA-Net ECO-Innovaera. It funds transnational and multidisciplinary R&D projects considering social, environmental, market and technological issues.</p> <p>FNR CORE Thematic Programme. The aim of the programme is to foster scientific quality in areas of socio-economic relevance. There are five relevance themes for funding. Two are of particular relevance for eco-innovation: sustainable resource management; and new functional and intelligent materials and surfaces, and new sensing applications. The calls for proposals are addressed to public institutions, Luxembourg administrations, and public establishments authorised to undertake R&D activities or technology transfer in their respective fields of activity.</p>	X	X				X
				X				
	R&D infrastructure	The Luxembourg University Campus in Esch-Belval. The government has		X				X

Group of policy measures	Type of policy measure	Specific measure Please provide reference to or brief summary of specific measures (national, regional)	Focus of policy measure (tick if relevant)					
			Circular economy	Generic focus on eco-innovation	Resource efficiency improvement	Energy efficiency improvement	Reduction of emissions incl. CO2	Other relevant areas (e.g. renewable energy, etc)
		<p>invested more than €1 billion in this campus. It is built on former industrial grounds where the government had to tackle the challenge of decontamination of partially polluted grounds. A study was commissioned by the Fonds-Belval to investigate the potential for renewable energy in the urban context at Esch-Belval.</p> <p>The two main public research centres, Gabriel Lippman (www.lippmann.lu) and Tudor (www.tudor.lu), are being merged into a single Luxembourg Institute of Science and Technology allowing synergies between departments focusing on eco-innovations.</p>		X				
Fiscal measures	Tax incentives for R&D and start-ups	Comprehensive support for start-ups and development is provided by the “ Business Portail ” (www.guichet.lu)		X				
	Tax incentives for R&D personnel							
Education, training and mobility	Tailored training courses for companies, entrepreneurs	Training classes are organised by the “ Institut national pour le développement de la formation professionnelle continue ” (http://www.infpc.lu/INFPC/Article/Accueil/fr) the Chamber of Crafts (www.cdm.lu) and the Luxembourg School for Commerce (LSC – http://www.lsc.lu/)		X				
	Advise/consulting for start-ups, companies, entrepreneurs	Technoport – enterprise and innovation centre. The Luxembourg government created the centre in order to diversify the range of support services on offer to innovative businesses in Luxembourg. The mission of Technoport is to support promoters of innovative projects at the idea stage and to provide ongoing assistance up to the start-up phase; as well as to provide temporary accommodation for domestic and foreign businesses at the development stage seeking a temporary foothold in Luxembourg. (See: www.technoport.lu)		X				

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			Circular economy	Generic focus on eco-innovation	Resource efficiency improvement	Energy efficiency improvement	Reduction of emissions incl. CO2	Other relevant areas (e.g. renewable energy, etc)
		<p>Within the Technoport, a fab lab has been put into place in order to offer companies an open prototyping platform where knowledge sharing is essential. Tools such as 3D printers, CNC milling machines, a laser cutter or a vinyl cutter, as well as technical and logistical assistance, are available to facilitate invention. But equal emphasis is put on fostering a multidisciplinary and intergenerational dynamic between start-ups, artists, designers, architects, engineers, hobbyists, researchers, students and so on.</p> <p>The Luxembourg Government recently launched the “Learning Factory” (www.learningfactory.lu), turning resource productivity and lean operations into competitive advantage.</p>		X				
	Placement schemes for students	<p>Since Luxembourg is a multicultural country with nearly 50% of inhabitants being of foreign nationality, and nearly 70% of the workforce being foreign, multiple universities, research institutions, companies and public institutions promote placement schemes for students abroad and in Luxembourg.</p>		X				
	Support for R&D workers recruitments	<p>ATTRACT Programme. The aim of the programme is to build on the excellence, dynamism and creativity of research in Luxembourg by attracting young researchers with a high level of ability in science or technology and proven experience in a professional research context. The fields of research targeted are those prioritised by public-sector research bodies in Luxembourg. The programme is designed for researchers not yet established in Luxembourg. It offers researchers the opportunity to set up a research team within a public-sector research institution in Luxembourg.</p> <p>National Research Training Grant Scheme. The scheme supports PhD and postdoctoral research training in Luxembourg and abroad. It aims at developing human resources in priority research areas in the country. The National Research Fund (FNR) manages the scheme. Grants are awarded for a period of between 3 and 4 years.</p>		X				
				X				

Group of policy measures	Type of policy measure	Specific measure Please provide reference to or brief summary of specific measures (national, regional)	Focus of policy measure (tick if relevant)					
			Circular economy	Generic focus on eco-innovation	Resource efficiency improvement	Energy efficiency improvement	Reduction of emissions incl. CO2	Other relevant areas (e.g. renewable energy, etc)
Networks and partnerships	Competence centres, clusters, science-technology parks	The Eco-Innovation Cluster www.ecoinnovation.lu is part of the Clusters Programme launched by the Ministry of Economy and Foreign Trade in 2002. It is an active network that supports actors of the clean-technologies sector in Luxembourg with the goal of creating and developing new and sustainable business opportunities through collaborative R&D and innovation projects. It is one of the key elements of the Eco-technologies Action Plan of Luxembourg, launched in February 2009. The cluster covers many different areas, such as: eco-construction and eco-materials; eco-design and eco-conception; the rational use of energy; and renewable energies. It has a special focus towards concepts based on the “circular economy”, “smart mobility” and sustainable construction.	X	X	X	X	X	X
	Technology platforms and innovation networks	The National Agency for Innovation “Luxinnovation” (www.luxinnovation.lu) offers a wide range of integrated and personalised services, which are based on a sectoral approach and provided free of charge to businesses of any size, as well as innovative start-ups and public research organisations. It coordinates the Luxembourg Cluster Initiative (www.clusters.lu) and helps companies understand the European and National State Aid Regimes. The public research institutes also offer technology platforms (www.lippmann.lu , www.tudor.lu , www.uni.lu , www.ceps.lu , www.crp-sante.lu).	X	X	X	X	X	X
		The “ Centre virtuel de la Connaissance sur l’Europe ” (http://www.cvce.eu/), the “ Centre d’études européennes Robert Schuman ” (http://www.cere.public.lu/fr/index.html), and the “ Institut d’Études européennes et internationales ” (http://www.ieis.lu/) are different platforms offering important services to the general public in Luxembourg and abroad.		X				
		The Luxembourg Foresight Exercise was a participative process undertaken by the Luxembourg “ <i>Fonds national de la recherche</i> ” (FNR) in 2006-2007. The Foresight Exercise aimed at identifying national research priorities in the public sector with socio-economic interest for Luxembourg		X				

	Group of policy measures	Type of policy measure	Specific measure Please provide reference to or brief summary of specific measures (national, regional)	Focus of policy measure (tick if relevant)					
				Circular economy	Generic focus on eco-innovation	Resource efficiency improvement	Energy efficiency improvement	Reduction of emissions incl. CO2	Other relevant areas (e.g. renewable energy, etc)
			society. It was based on a close involvement of stakeholders from the research community, society, and the economy of Luxembourg, as well as a number of international experts.						
			The Ministry of Economy runs the “ <i>Observatoire de la Compétitivité</i> ” http://www.odc.public.lu/ delivering on a regular basis the most recent figures on the competitiveness of the Luxembourg economy in comparison with other countries. The national statistics portal www.statec.lu is also a very open and transparent portal where information of all sectors and topics are freely accessible to companies and people.		X				
DEMAND SIDE FOCUS	Regulations and standards	Regulations, targets, cap & trade schemes	The Air Quality Plan for Luxembourg City. The main objective is to restrict exceeding the nitrogen oxide (NOx) limits in the city centre of Luxembourg. Some of the measures proposed include an accelerated renewal of the city bus fleet, the creation of a tramway, and the prohibition of trucks in certain critical sectors of the city.				X	X	
	Public procurement	“Green” public procurement of goods and services			X				
		R&D procurement							
		Pre-commercial procurement							

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			Circular economy	Generic focus on eco-innovation	Resource efficiency improvement	Energy efficiency improvement	Reduction of emissions incl. CO2	Other relevant areas (e.g. renewable energy, etc)
Technology Transfer	Advisory support for technology adopters	This task is mainly covered by the public research institutions such as www.tudor.lu and www.lippmann.lu and special departments such as www.veille.lu or www.brevet.lu , a web portal dedicated to intellectual property and technology watch.						
	Financial or fiscal support for technology adopters (e.g. grants for purchasing new technology)	<p>Aid for environmental protection and the rational use of energy in artisanal and commercial SMEs. The subsidy aims to encourage and support the investment in environmental protection and the rational use of natural resources. It finances all investments that allow SMEs to meet EU environmental standards for a period of three years from the adoption of these standards; all other investments directed to produce energy savings, renewable energies, or the combined production of energy and heat; and all expenses incurred by SMEs when using external consulting with the objective of making progress in the field of environmental protection and the rational use of natural resources.</p> <p>Aid for investment in environmental protection and the rational use of natural resources. Same as above, but focusing on all types of enterprises. It concerns all investments in the field of environmental technologies or environmentally friendly processes (compliance with EU norms, investments in energy savings, co-generation of renewable energy sources, energy production from renewable energies, and environmental studies).</p>			X	X		X
Support of private demand	Tax incentives for consumers (e.g. for purchasing environmentally efficient products)							
	Demand subsidies (e.g. eco-vouchers, consumer subsidies)	<p>PRIME CAR-e. As part of the promotion of cars with low CO₂ emissions the Luxembourg government offers the buyer of a new car (registered in Luxembourg) a subsidy related to the amount of CO₂ emissions of €750, €1,500 or €3,000.</p> <p>PRIME CAR-e plus. Financial subsidy for individuals and enterprises to</p>					X	
							X	

Group of policy measures	Type of policy measure	Specific measure <i>Please provide reference to or brief summary of specific measures (national, regional)</i>	Focus of policy measure (tick if relevant)					
			Circular economy	Generic focus on eco-innovation	Resource efficiency improvement	Energy efficiency improvement	Reduction of emissions incl. CO2	Other relevant areas (e.g. renewable energy, etc)
		<p>purchase a low CO₂ emissions car associated with the substitution of an old car of more than 10 years. The amount of the subsidy depends on the CO₂ emissions of the new car, and can be of €1,500 or €1,750.</p> <p>PRIME Cool. Financial grants of between €100 and €150 for the promotion of electrical appliances and refrigerators at low energy consumption (A++)</p> <p>PRIME House. Financial grants for individuals targeting energy saving measures and the use of renewable energies in the housing sector. The grants can reach €15,000 for low energy houses, or up to €40,000 for passive houses with technical equipment such as heating pumps and solar and thermal installations. Grants are also available for encouraging clean energies in exiting buildings older than 10 years, where the potential energy savings are particularly important. The scheme also encourages the use of solar and thermal heating pumps, boilers that run on pellets and wood chips, and the replacement of low-efficiency boilers.</p>			X	X		X
	Awareness raising and information provision							

About the Eco-Innovation Observatory (EIO)

The Eco-Innovation Observatory (EIO) is the initiative financed by the European Commission's Directorate-General for the Environment. The Observatory is developing an integrated information source and a series of analyses on eco-innovation trends and markets, targeting business, innovation service providers, policy makers as well as researchers and analysts.

Visit EIO and DG ENV Eco-innovation Action Plan (EcoAP) website and register to get access to more information and to access all EIO reports, briefs and databases.

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