



LUXEMBOURG AS A KNOWLEDGE CAPITAL AND TESTING GROUND FOR THE CIRCULAR ECONOMY

**Study finds circular economy
a “competitive imperative” for Luxembourg**



LE GOUVERNEMENT
DU GRAND-DUCHÉ DE LUXEMBOURG
Ministère de l'Économie



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The circular economy is already a competitive imperative for Luxembourg, according to a study commissioned by the Ministry of the Economy and steered by a committee composed of representatives from the Ministry of the Economy, the Ministry of Sustainable Development and Infrastructure and the Ecolnnovation Cluster. The study describes how Luxembourg is already leading the way to circularity in some industries, and has a further potential to diversify employment across traditional industries like construction, primary manufacturing, retailing and logistics as well as in advanced industries like ICT, robotics and 3D manufacturing.

The study, *Luxembourg as a Knowledge Capital and Testing Ground for the Circular Economy*, performed by the international institute EPEA with support from Returnity Partners and in consultation with more than 50 stakeholders in Luxembourg, will be used by the Ministry to proactively involve stakeholders in developing circular economy roadmaps. The study finds:

- The potential is substantial for using the circular economy to *further improve competitiveness, employment, cost savings and environmental impacts*. Circular economy knowledge and know-how are economic capital, exportable as services and based on scaling up existing models as well as testing new ones.
- Secondary raw materials are central to survival for leading Luxembourg industries. Those industries have substantial circular flows and business models to build on. For example, Luxembourg is already a testing ground for circularity know-how in everything from healthy interiors to steel renting and building materials substitution, with knowledge-based ICT and leasing industries driving circularity logistics and services.
- The circular economy starting position in Luxembourg is 'excellent' with capabilities and motivation in place. Luxembourg's exemplary society based on equity, cultural tolerance, economic stability & diversity, responsive government, manageable size and especially *quality* make the country a powerful testing ground for circularity.
- However, maximising the circularity potential depends on initiating pilot projects and an enabling framework in collaboration with industry and researchers, to accelerate the transition towards a diversified circular economy at scale.
- Luxembourg has a high interdependency with the Greater Region for circular materials flows as well as a high potential to improve economic benefits from those flows.

National Coordination and Near-to-Market Piloting

To achieve those outcomes it is foreseen to coordinate pilot projects across diverse economic sectors. Presently more than 25 forward-looking actions are proceeding across Luxembourg with potential to accelerate and benefit from circularity. Those are demanding national coordination.

To align those, an implementation working group is described by the study to begin prioritising policies, objectives, measurable goals and milestones ranging from immediate to 7 years. Potential pilot programmes to start in 2015 are in administrative services, construction, finance, government incentives, ICT, logistics, manufacturing, marketing, procurement, and R&D.

One objective of the working group is to clarify how government and business complement each other in each pilot project. For example government is well equipped with enabling tools by being a customer for circular initiatives or piloting innovative sectorial planning, while business is well equipped to test circular economy value propositions. Together business and government will

benefit economically from consistent messaging about the biological and technical cycles which are a basis for circular economy resources.

Potential Quick Wins

Potential quick wins for improving competitiveness include:

- Setting-up a CE working group and starting to fast-track implementation,
- Initiating national co-branding for circularity to improve sales of Luxembourg products,
- Launching a hands-on training pilot to improve skills for the un-employed,
- Optimising secondary raw materials sourcing to preserve industry competitiveness,
- Launching real-time software for valorising secondary raw materials.

In order to move from potential into actions, the opportunity is to harness and guide the clearly expressed enthusiasm of stakeholders so they take ownership and accelerate those actions.

Initiating Actions

As part of the consultation process more than 10 sectorial roadmaps describing draft circular economy objectives for sectors in Luxembourg will be reviewed with those stakeholders as part of a goal setting process. Instead of a 'one-size-fits-all' roadmap, the study sketches diverse roadmaps to suit diverse stakeholders.

The study is designed as a continuous working plan rather than a finished document. It will be further utilised by the Ministry of the Economy after feedback is received from stakeholders.

Motivation & Know-how High, but Circularity Awareness Low

Among stakeholders the study found high motivation to learn about circularity and a low level of knowledge about its basic principles. However the study also found Luxembourgers have high know-how in circularity-relevant fields. In that context, where circularity knowledge is low but motivation and know-how are high, the government has a brief opportunity to seize the initiative with powerful messages about how to harness Luxembourg's know-how to implement circularity.

If the present study is enacted those messages will be delivered through initiating actions based on a solid foundation of education & training, national branding and R&D. By leading and coordinating those, the government will provide the *enabling framework* for its stakeholders to implement a circular economy through innovative but practical lighthouse initiatives.

Basis for Supporting European Union Circular Economy Approach?

The findings are especially relevant for the European Commission's recently announced plans for re-working and re-tableting its circular economy package in mid-2015. The Luxembourg study provides a basis for a new look at the circular economy based on positive economic impacts instead of regulatory restrictions or minimising negative impacts.

OTHER STUDY FINDINGS

"Ultimately materials re-use might drive the Greater Region".

Interviewee for Luxembourg CE Study

Present Situation and Circularity Benefits for Luxembourg

The study found the circular economy already provides benefits for Luxembourg at the level of economic systems, products, materials and basic ingredients.

Circularity activities support 7,000 – 15,000 jobs driving more than €1 billion in economic activities in Luxembourg primarily in manufacturing but also buildings, retailing and other areas. Companies whose activities revolve around circular materials include large manufacturers: ArcelorMittal, Eurofoil, Guardian Industries, Norsk, Tarkett & Tontarelli. Circular operating methods are used by business parks like Ecoparc Windhof and building equipment leasing & sharing like Floop2 and Loxam. Luxembourg leads Europe in automotive leasing intensity and is starting car sharing. Automotive suppliers have a returnable packaging network for components. Retailers like Oikopolis, Pall Center and Cactus have local product & supplier networks. Resource productivity management institutions like SDK, Valorlux & Ecotrel have successfully improved resource collection and valorisation and are driving awareness in the broader public.

Luxembourg, the Greater Region & Benelux enjoy a proportionately large share of circularity-designed products and systems compared to most of Europe; more than 100 products certified for circularity cycles are offered by outlets in the Greater Region and at least 15 customer supplier communities are in the Benelux and near-Germany. The proportionately large share of circular activities in the Benelux derives from two catalysts; a survival imperative created by dependence on secondary raw materials, and frontrunner activities using the cradle-to-cradle innovation approach. Those products and systems still require optimising but meanwhile they are driving millions of tonnes of circular resource flows for manufacturers in Luxembourg, as well as millions of Euros in savings for city governments like Venlo in The Netherlands, and materials and energy savings for logistics equipment companies like VanDerLande.

Despite those advantages, Luxembourg is still predominantly a linear economy. It is running out of local construction materials like stones for drainage, aggregate for roads, and perhaps sand for high quality concrete. Those scarcities are warning signs. As well, statistics are often unavailable or not presented in the right framework to accurately estimate the economic and employment aspects of circularity in Luxembourg or the Greater Region. For example, there is no reliable estimate on the size of Luxembourg's materials bank represented by buildings, logistics, and power generating and transmission infrastructure, but it is certainly in the hundreds of millions of tonnes representing tens of billions of Euros.

Using diverse sources the study found among the largest human-generated materials flows in Luxembourg are:

- Logistics: 50 million tonnes per year transported through hubs.
- Excavation, inert waste: ~ 10 million tonnes per year. In the CE it might be considered an asset.
- CO2 emissions: ~ 6,2 - 10 million tonnes per year (IEA stats vary) but skewed by 'tank tourism'.
- Fossil Fuel combustion: ~3,7 million tonnes per year.
- Steel & Aluminium from recycled sources: ~2,1 million tonnes per year.
- Waste exports: 800,000 tonnes per year.
- Incineration: 120,000 tonnes per year.

However, quantities alone do not determine positive or negative impacts. The list adjusted for impacts like e.g. materials quality/integrity, reducing dependence on externalities, might look quite different. Criteria and methods for ranking and improving those impacts are described in the study.

Potential Circularity Benefits

The opportunity is to adapt successful circularity models to improve materials quality by improving resource productivity.

Accelerating circular economic practices in Luxembourg at scale is estimated with the potential to generate €300 million to €1 billion EUR annual net-material cost savings in the medium term and more than 2.200 jobs in the next 3 years, if robustly applied in the construction, automotive, manufacturing, financial, logistics, R&D, and administrative sectors. Improved resource productivity will strengthen Luxembourg's resilience and jobs *especially in the high-unemployed youth category*.

Potential Big Wins for Luxembourg cut across traditional, transitional and transformational sectors. Traditional: Reverse logistics, construction value improvement, retailing gains & optimising scrap and cullet streams. Transitional: capturing new value streams with reverse logistics, designs for disassembly, phosphate re-use, & positively defined biobased ingredients and materials. Transformational: Near-shoring with transformative technologies like ICT-based 3D additive manufacturing and systematic introduction of performance-based usage models. Gains are largely but not entirely in the B2B segments; for example, primary & secondary manufacturing, agriculture, construction, finance. Exceptions include B2C retailing and ICT for sharing websites.

Potentially Big Wins from circularity worldwide are projected at 1 trillion USD worth of resource revalorisation, but also 8 trillion USD projected economic activity from renewable energy which requires materials in order to scale up. How much of that might Luxembourg capture? Up to €3 trillion resides in Luxembourg financial institutions for potential investing and value capture.

R&D and The Greater Region

Improving the quality of materials and other resources is a natural launching pad for Luxembourg because 51% of its public R&D funding to companies already goes into materials, its industries rely on secondary raw materials, and co-operation with the Greater Region on materials is good.

The potential is to leverage The Greater Region as a Circular R&D Community for Materials Quality & Resource Productivity. Consider consolidating efforts around the EU Smart Specialisation programme with a Smart Specialty for *Materials Quality and Resource Productivity*. In materials R&D the Greater Region is already a partner with Luxembourg. An example is the InterMatGR consortium of universities working on materials research. Potential focus areas for materials R&D co-operation include:

- Biobased additives and composites designed for circular cycles,
- Designs for disassembly including robotic-aided disassembly,
- 3D additive manufacturing & de-manufacturing,
- Adapting Life Cycle Assessment to measure positive impacts
- Joint progress in revalorization processing (e.g. concrete recycling)

Wallonie in particular but not exclusively has good circularity partnership potential due to the earlier EU Presidency of Belgium, which promoted circularity. Wallonie has great potential as a Luxembourg partner in areas like reverse metallurgy, wood construction, and textiles re-use.

Strengths

Excellent geographic location and multi-cultural capacities with extremely high share of transit volume. Excellent R&D and piloting capabilities across wide spectrum of CE-relevant topics, from material intensive applications (i.e. construction, agriculture, heavy industry) to high-end service provisioning. Diversified economy encapsulated in a focused geographic location with strong personal and professional ties to effect cross-sectorial change with a government with clear commitment to guide economic development according to strategic objectives.

Weaknesses

Limited awareness about CE-opportunity in business community. Potential for confusion about circularity theory and practice. For some fractions sub-scale volumes (e.g. for own re-valorization activities of Municipal Solid Waste) and limited value chain coverage (i.e. only R&D or logistics handling, but not many vertical integration activities). Lack of economic indicators, statistics and LCA scoping parameters to measure progress. Investments locked up in linear processes. Absent decision-makers in some but not all industries.

Overall, the CE fits extremely well to Luxembourg's S.W.O.T profile because it will favour locally available subsystems and play to the specific strengths of Luxembourg. So a fantastic opportunity.

Getting Started

A solid set of opportunities has been identified for every sector investigated in the present study. The objective now is to initiate actions and accelerate implementation by empowering private and public sector stakeholders. The consultation process has already been started when the study performed 50+ interviews to collect and brainstorm ideas for the specific stakeholders. Especially the study focused on where it might be feasible to get buy-in for the following ambition levels:

- **Incremental traditional improvements**, e.g. further improvement on collection and reuse rates.
- **Transition technologies** as a bridge from the present to the future, e.g. stepping up the design for disassembly and connecting value streams with reverse logistics.
- **Transformative technologies & systems** to stay competitive, e.g. concerted investment in additive manufacturing focusing on circularity.

Circular Supplier Communities in construction, recycling, and retailing are effective mechanisms for stakeholders to accelerate circularity by improving value and quality by transforming materials into services. Profitable examples are working today in & near Luxembourg and are available to be scaled up.

Roadmaps for Supporting a Resilient and Diversified Society

The circular economy is an innovation platform where everything becomes a resource for something else in restorative biological and technical cycles to generate positive economic, social and ecological impacts.

A circular economy based on quality and positive impacts is regenerative by design and promises to de-couple economic growth from linear resource consumption. It is already producing substantial economic benefits, competitive advantage and a mechanism to build resilience in times of volatility, while contributing to employment, generating social capital and driving positive environmental impacts. Luxembourg has the opportunity to participate in and lead the accelerated transition towards a circular economy by becoming its Knowledge Capital and testing ground. The findings of this study confirm the potential for Luxembourg as well as the enthusiasm and capability of its private and public sector proponents.

More information including the study highlights can be downloaded under the following link:

http://www.eco.public.lu/salle_de_presse/com_presse_et_art_actu/2015/02/09_circeco/index.html

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The preceding Synopsis summarises results of a study on the inventory and potential for the circular economy for Luxembourg, performed during 2014 for the Ministry of the Economy of the Grand Duchy of Luxembourg by EPEA Internationale Umweltforschung GmbH in association with Returnity Partners.