Upskilling for Creative Circular ECOnomy(U-ECO)

MARKET RESEARCH ON ENTREPRENEURSHIP OPPORTUNITIES WITHIN A CIRCULAR ECONOMY

IO1-A1

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INTRODUCTION

The project U-Eco (Upskilling for Creative Circular ECOnomy) focuses on the transitional process from a Linear Economy to a Circular one. The project addresses the need for Circular Economy training that can boost employability and self-employment, as well as meet the demands of the new labor market. Led by SwIdeas in Sweden, the project brings together partners from Belgium (European Association of Development Agencies - EURADA), Spain (Engineering and Technical Consultancy - Bioazul and Training Development and Integration – DEFOIN), Romania (Center for Promoting Lifelong Learning – CPIP), and Poland (Association for the Regional Initiatives Development - ARID).
The first stage presents U-Eco's first intellectual output (I01); it reflects the design and application of a training strategy that analyzes the current state of development and implementation of Circular Economy (CE) in the partnering countries. IO1 creatively addresses the entrepreneurship process employing a circular approach and demonstrates its economic benefits. It also determines the appeal of the present and future market by understanding the evolving nature of business opportunities and threats, namely population fluctuation, urbanization, growing land, water, food and scarcity of energy, availability of raw materials, environmental pollution, to name a few. IO1 seeks to educate and inform entrepreneurs about the difference between linear and circular economy by highlighting the benefits of circular models, and underscoring the risks linear models pose to society.
To this end, the consortium has developed a market research report on entrepreneurship opportunities in each partner country and in the European Union (EU) as a whole. This research, which further identifies entrepreneurship opportunities within a CE framework, played a crucial role in establishing the foundation upon which the project can build and move forward to the next stages. The research also pinpoints the areas with the highest entrepreneurship potential in the upcoming decade; it sheds light on the current situation of each partner country, focusing on the incentives and obstacles that Small and Medium Enterprises (SMEs) face. Moreover, the research comprises an analysis of the potential, including technical, economic, environmental, and social benefits and risks; it also contains the regulatory and legislative obstacles that impede the transition from a linear to a circular economy.

The report encompasses the findings of the market research, which state comprehensive data, as well as reveal country-specific information. The report is divided into six sub-tasks:

- **A.1.1:** Identifying environmental, social, and economic problems linked to linear economy, which affect the survival of current businesses, and presenting possible alternatives.
- **A.1.2:** Comprehensive Market Study: market scope, market growth rate, costs structure, and market profitability within a CE framework with a focus on water, waste, energy, raw materials, food, and urban metabolism.
- **A.1.3:** Mapping the capacities of existing SMEs, determining their ability to act as service provides within the CE sector, and identifying their capacity gaps as well as their ability for market development.
- **A.1.4**: Identifying current restrictive rules and regulations with the CE framework.
- **A.1.5:** Elaborative and detailed SWOT analysis of identified business solutions, and assessment of investment opportunities.

A.1.6: Identifying the 5 main areas with entrepreneurship potential, and adequate business strategies to bridge the future gap between demand and U-ECO inspired entrepreneurial business solutions.

A.1.1.

IDENTIFYING ENVIRONMENTAL, SOCIAL, AND ECONOMIC PROBLEMS LINKED TO LINEAR ECONOMY WHICH AFFECT THE SURVIVAL OF CURRENT BUSINESSES, AND PRESENTING POSSIBLE ALTERNATIVES

Identifying Environmental, Social, and Economic Problems linked to Linear Economy

This study aims to obtain the information required to prepare for A.1.1: Identifying Environmental, Social, And Economic Problems Linked To Linear Economy, which Affect The Survival Of Current Businesses, and Presenting Possible Alternatives.

This analysis is divided into three thematic blocks:

- Environmental
- Social
- Economic

Environmental:

What are the most critical environmental problems caused by the Linear Economy? What possible alternatives are there in your country?

Social:

What are the social problems associated with Linear Economy in your country? What are the solutions and best practices available to deal with them?

Economic:

What problems does Linear Economy pose strictly from an economic perspective on both the short and long terms?

State of the Art Per Country

Poland

In Poland, the study has focused on the following themes:

- Sustainable Industrial Production
  - Industrial Waste
  - Extended Producer Responsibility
  - Environmental Footprint

- Sustainable Consumption
  - Municipal Waste
  - Food Waste
  - Education

- Bioeconomy
  - Key Actions to create conditions that foster the development of a Bioeconomy
  - Action to build local value chains and base for raw materials
  - Actions related to energy
  - Actions related to industry

- New Business Models

Environmental:

SUSTAINABLE INDUSTRIAL PRODUCTION

Industrial Waste
Problems:

- Lack of sufficient analysis regarding the capacity of increasing the economic use of combustion by-products (UPS).
- Lack of feasibility studies concerning the creation of a market platform for secondary raw materials.
- Lack of sufficient analysis relating to the feasibility and capacity of operating industrial waste heaps.

Alternatives:

- Analyzing compelling proposed legislative changes to increase the economic use of combustion by-products (UPS).
- Conducting a feasibility study to create a market platform for secondary raw materials.

- Analyzing the feasibility and capacity of operating industrial waste heaps.

Extended Producer Responsibility
Problems:

- Lack of classified and coherent regulations relating to the packaging, end-of-life vehicles, electrical waste and electronic equipment, tires, batteries, and accumulators.
- Lack of SWOT (strengths, weaknesses, opportunities, and threats) analysis of the extended producer responsibility.
- Lack of an information campaign relating to the benefits of extended producer responsibility for the corporate image.

Alternatives:

- Review applicable regulations related to packaging, end-of-life vehicles, electric waste, and electronic equipment, tires, batteries, and accumulators. Propose necessary changes to further the circular economy model within Polish legislation, and align national regulations with EU laws.
- Conduct SWOT (strengths, weaknesses, opportunities, and threats) analysis of how to monitor and report the extended producer responsibility. Develop proposals to eliminate irregularities.
- Organize and promote an information campaign on the benefits of extended producer responsibility for the corporate image.

Environmental Footprint
Problem:

- Modest development, and limited dissemination of information and education materials for businesses.

Alternative:

- Development and dissemination of information and education materials for businesses.

SUSTAINABLE CONSUMPTION

Municipal Waste
Problems:

- Lack of analysis relating to the effectiveness of existing regulations concerning municipal waste.
- Lack of cataloged municipal waste streams needed for effective waste management.

Alternatives:

- Analyzing the effectiveness of existing regulations concerning municipal waste.

- Prepare a proposal to regulate hazardous waste.
- Catalog municipal waste streams not yet recorded but which remain relevant and vital to managing waste.

Food Waste
Problems:

- Lack of consumer awareness relating to the prevention of food waste.
- Absence of an incentive program for entrepreneurs/ businesses involved in food waste prevention.
- Absence of statistical research on the scale, structure, and regulations regarding the food waste processes in Poland.

Alternatives:

- Raise consumer awareness regarding the prevention of food waste.
- Develop distribution mechanisms and appropriate handling procedures of “end of life” shelf products.
- Develop a system of incentives for entrepreneurs/ businesses involved in food waste prevention.
- Conduct regular statistical research on the scale, structure, and regulations regarding the food waste processes in Poland.

Education
Problems:

- Absence of analysis to assess the effectiveness of existing regulations applicable to municipal waste.
- Lack of cataloged municipal waste streams needed for effective waste management.

Alternatives:

- Analyze and assess the effectiveness of existing regulations applicable to municipal waste.
- Prepare a proposal to regulate hazardous waste.
- Catalog municipal waste streams not yet recorded but which remain relevant and vital to managing waste.

BIOECONOMY

Key Actions to Creating Conditions Conducive to the Development of a Bioeconomy
Problems:

- Absence of a collaborative platform that includes all ministers responsible for the sectors of Bioeconomy.

- Lack of regulations that define biomass.
- Lack of data relating to the biomass potential on the national level.

Alternatives:

- Create a collaborative platform that includes all ministers responsible for the sectors of bioeconomy and appoint a coordinator to facilitate international cooperation.
- Review all existing regulations related to the definition of biomass.
- Prepare a detailed analysis to identify biomass potential on the national level.
- Identify the priorities of research, development, and innovation (R&D&I) for the development of bioeconomy in Poland.

Actions Taken to Build Local Value Chains, and Raw Materials Base

Problems:

- Lack of data relating to soils with endangered biomass production potential.
- The difficulty of constructing local composting, and biogas plants to treat bio-waste and bio-based raw materials.
- Low identification of local value chains.
- The difficulties of developing local biorefineries.
- Lack of information campaign for farmers which aim to raise awareness and guide them towards establishing a circular economy.

Alternatives:

- Identify soils with endangered biomass production potential.
- Identify and eliminate the impediments to construct local composting, and biogas plants to treat bio-waste and bio-based raw materials.
- Identify local value chains.
- Conduct feasibility studies on building and developing local biorefineries.
- Launch an information campaign for farmers which aims to raise awareness and guide them towards establishing a circular economy.

Actions Taken in the Energy Sector

Problems:

- Lack of information relating to the cascading use of biomass.
- Undiscerning change of legislation regarding the construction of regional municipal sewage sludge drying facilities.
- Many obstacles impede the use of advanced biofuels in transport.

Alternatives:

- Promote the cascading use of biomass.
- Develop a legislative proposal and support system for the construction of regional municipal sewage sludge drying facilities.

- Analyze the impediments to the use of advanced biofuels in transport.

Actions Taken in the Industrial Sector

Problems:

- Lack of information relating to biomass products.
- Insufficient development of the standards and norms for bio-based products.

Alternatives:

- Launch an information campaign about biomass products.
- Develop standards and norms for bio-based products.
- Develop an information platform that reveals the current quantities, quality, location, and origin of biomass.
- Establish a working group in cooperation with business owners to formulate an understanding of bioeconomy, and create a cluster development following the B2B model, which takes into account the intersectoral and supra-regional policies.

NEW BUSINESS MODELS

Problems:

- High taxation impedes the competitiveness of enterprises.
- Lack of regulations overseeing and monitoring the joint use of the movable and immovable property.
- Limited support granted enterprises operating CE business models.
- Absence of clear guidelines regarding the growing role of the CE model within economic clusters with regard to the flow of raw materials and waste of particular industrial sectors.

Alternatives:

- Analyze the possibility of changing the system of taxation to enhance the competitiveness of enterprising operating based on CE business models.
- Draw up a legal proposal to regulate the sharing and joint use of the movable and immovable property.
- Draft proposals to change the public procurement law to generate demand for products and services produced based on CE business models.
- Develop a support system to help enterprises operating based on CE business models.
- Establish a systematic support tool for enterprises operating based on CE business models.
- Promote guidelines aiming to increase the role of CE model within economic clusters with regard to the flow of raw materials and waste of particular industrial sectors.

Social:

Problem:

- Currently, the biggest social challenge facing Poland is finding ways to encourage citizens to change their thoughts and perceptions. The country has implemented various social campaigns highlighting the necessity of segregating waste. Yet, a more comprehensive view of the problem remains essential. So far, the CE concept remains unknown to the public; people are only aware of waste segregating and plastic recycling. However, many are still not convinced of the value of such actions; they disregard the importance of waste separation and continue to dispose of all waste in one garbage. This resistance to separate waste can be traced back to the fact that the price of garbage has tripled after the new regulations were imposed. In this sense, the process and price heavily influence a society's willingness to embrace a new law.

Alternative:

- To ensure a successful transition to a circular economy, business leaders must be involved, encouraged to change their mindsets, and urged to embrace circularity as a valuable opportunity to grow their businesses. This step will serve as a continuation of the yearslong trend of companies bearing moral responsibility and actively addressing environmental and social issues. Companies need to set clear goals that can be communicated to and implemented by employees in order to be part of the circular economy. This entails altering attitudes across all organizational levels. Although circularity should be instilled in every single employee, it is the management who should set the course and define the goals of the entire organization.

Economic:

Problems:

- Make a circular economy economically rewarding. The "It is uneconomic for me" attitude still presents a real barrier, for these fears discourage the implementation of appropriate decisions and behaviors.
- Reach a compromise that bridges the gap between existing priority and new ideas. The claim that "I do not care, other priorities are more important to me", and prioritizing personal gains over the environment need to be challenged, subverted and replaced.

Alternatives:

- Well-targeted government policies are needed when external costs are not included in the price of products. These policies fall into two main categories: controlling measures, and marked-based regulations.
- As long as basic social needs are not met, state intervention remains necessary to tackle the problems of poverty: this affects many Poles. It is unrealistic to expect that

environmental needs will precede those of people belonging to the lowest tier of the Maslow hierarchy. This demonstrates that the circular economy will not become a reality until we manage to resolve society's social and economic problems.

CONCLUSIONS

Problems:

- Lack of awareness on various levels: consumers, entrepreneurs, and politicians.
- Lack of reliable studies and statistical data showcasing the benefits of CE.
- Lack of campaigns promoting CE.
- Absence of a legal framework encouraging CE.

Alternatives:

- Promote political policies that increase awareness among targeted groups aiming to establish a new social and entrepreneurial model based on the principles of CE.
- Launch awareness campaigns targeting stakeholders within CE.
- Create and develop a legal framework for CE.

Spain

Environmental:

Problems:

- Accumulation of waste absent a clear plan of how to reuse it.
- Overexploitation of non-renewable resources until they are depleted.
- Spain holds the 22nd rank based on the Global Ecological Footprint Network.
- Spain continues to consume more resources than it can produce; in fact, the country needed the resources of three similar countries to meet its own demands.
- The Commission proposes that the 2030 Climate and Energy Framework should fully implement the 2020 targets in addition to the following:
    - A 40% reduction below the 1990 limit of acceptable EU greenhouse gas emissions by 2030 is mandated. This can be achieved solely through domestically imposed measures, which include combined 43% emission reductions of the 2005 data disclosed by the Emissions Trading System (ETS), and implementation of national policies imposed by the Member States to cut the emissions of other sectors not part of ETS by 30%.
    - Limited awareness of the concept "Waste for the few becomes a resource for others".

Alternatives:

- Optimize the use of resources, materials, and products which aim to reduce waste.
- Recycle waste and benefit from recovered resources.
- Implement awareness measures to enhance the efficiency of using energy and materials.

Social:

Problems:

- Limited social awareness, and acceptance of ecological measures.
- Limited involvement in political and economic sectors.
- Lack of social awareness relating to the importance of preserving the environment. Limited number of environmental political parties with representation in government.
- Due to the higher unemployment rate in comparison to the rest of the EU countries, all measures aiming to regulate the free advance of industrialization are considered obstacles.
- Limited awareness of the concept “Waste for the few becomes a resource for others”.

Alternatives:

- The administration should provide more information.
- Conduct more explanatory actions and training to educate people about the circular economy.
- Raise awareness relating to the circular economy.

Economic:

Problems:

- Loss of jobs in highly polluting productive sectors.
- The economic crisis distorts how people perceive the circular economy; they regard it as an expensive and unproductive medium compared to the linear economy.
- Companies adopting European legislation.
- The strategic framework governing climate and energy between 2020-2030 [COM (2014) 15 final/ 2 of 28.1.2014.

Alternatives:

- Create jobs within the framework of the circular economy.
- Managing waste in Spain represents thousands of jobs.
- Waste for the few becomes resources for others.
- Creating products designed to be deconstructed.

- The circular economy is a paradigm of a futuristic model, for it manages to turn waste into raw materials. Moreover, this system can general local and non-transferable employment.

CONCLUSIONS

Problems:

- Overexploitation of renewable resources will lead to depletion.
- Political and economic sectors are refraining from participation.
- Absence of environmental awareness, and green parties in parliament.
- Economic resection leads many people to regard CE as expensive and unaffordable in comparison to the linear economy.

Alternatives:

- Conduct training and launch campaigns among all targeted groups.
- Promote the optimization of resources aiming to reduce waste.

Romania

In Romania, the study took into consideration the following themes:

- Waste
- Raw Materials
- Water Waste
- Energy
- Food

Environmental:

WASTE

Problems:

- Electrical and electronic equipment generates substantial waste represented by non-functional or unused appliances kept in households.
- Limited control over electrical and electronic equipment waste.
- Improper extraction of dangerous compounds (pollution).
- Use of large quantities of cheap accessible materials and energy that have a long term impact on the environment.

Alternatives:

- Drastically limit the quantity of waste that fails to reach the correct flows mainly because of the wrong consumer habits in Romania.

- Properly dispose of waste generated by electric and electronic equipment and infrastructural development.
- Understand and track waste streams through trusted tools such as surveys.
- Insert accurate POM data using 54-UNU-keys.

RAW MATERIALS

Problem:

- The means of extraction and the use of raw materials hugely impact the environment. They also increase energy consumption and CO_2 emissions.

Alternative:

- Smart use of raw materials can reduce CO_2 emissions (Green energy).

WATER WASTE

Problems:

- The resistance of local authorities to join regional public utilities, and of households to connect with newly installed sewerage networks are true challenges. Slow absorption of EU funds and the absence of concrete strategies for small rural agglomerations also represent real obstacles.
- There are around 4.5 million Romanians with no access to piped water within their homes. It is not expected that general access to piped water will be achieved before 2040, at best.
- There are more than 6 million Romanians with no flush toilets in their homes. Only 68.3% of the national population had access to toilets within their homes in 2016.

Alternatives:

- Impose measures such as waste prevention, eco-design, and reuse, which can save companies in the EU a total of 600 billion euros, an equivalent of 8% of annual turnover, and reduce total greenhouse gas emissions by 2-4%.
- Adapt to new demand patterns, new hydrological regimes (with climate change), and new regulatory requirements (environmental flows).
- Address the process of setting the annual budget.
- Consider these investments in parallel to opportunities to re-operationalize (retrofit) the old dams to new.
- Employ multi-purpose uses, beyond the original design, to adjust to new needs.
- Irrigation of high-value crops in consideration of climate change, the increasing risk of droughts, and the establishment of a semi-arid climate in the arable lands of the Lower Danube. This plan combines rehabilitation of the most viable existing perimeters by

employing efficient irrigation technologies in farms, with exit strategies for the many non-viable irrigation perimeters.

ENERGY

Problem:

- The country's factories, chemical plants, and electric power plants heavily depend on burning fossil fuels, which is a process that emits high levels of carbon dioxide and sulfur dioxide - a key component of acid rain.

Alternatives:

- Encourage investment in renewable energy, and clean energy such as solar, wind, and hydro energy sources.
- Promote the production of green energy for sustainable development (Green Certificate System Implementation).
- Develop an infrastructure to collect, store, and distribute excess food to those who need it most (Food Waste Combat Project).

FOOD

Problems:

- Food waste has environmental costs due to the additional consumption of resources (water, energy, etc.), which consequently leads to an increase of carbon emissions.
- Food waste significantly impacts the production of greenhouse gases, which generate two times more CO_2 than global air traffic.

Alternative:

- Establish a transparent system of information, education, and ongoing training. Promote measures for combating fraud in the field of agri-food integrity.

Social:

WASTE

Problem:

- Romanians keep electric waste at homes; unfortunately, a small part of this waste ends up in authorized recycling flows.

Alternative:

- Raising awareness and informing the Romanian public of the need to collect and recycle WEEE and DBA.

WASTE WATER

Problems:

- Around 2.5 million people, which constitute 12% of the national population- have no access to piped water, which has been reported to be self-supplied through unsafe, non-potable water sources. Many of the self-supplied households depend on shallow wells, which are subjected to potential faecal contaminations due to the underdeveloped sewerage networks and lack of appropriate sanitation across the country, especially in rural agglomerations.
- The WSS (Water Supply and Sanitation) access gap is primarily caused by poverty, especially in rural areas. The shortage is higher in rural as well as marginal urban areas, which tend to have a higher poverty level. In 2015, piped water coverage in rural areas stood at only 29% nationwide, as opposed to 94% in urban cities and towns.

Alternatives:

- Reduce the DEE share that contaminates the routes, which are caused by “negative habits”, including scrap iron, garbage cans.
- Develop an efficient collection infrastructure that is accessible to the people, and organize awareness campaigns to educate the consumers.
- Minimize the food risk to safeguard human life and health.

FOOD

Problem:

- Around 50% of Romanians spend an average of 40% of their monthly income on food. According to a study conducted and concluded by EPC Consultant de Mediu ‘for the local non-profit Asociatia MaiMultvERDE’, a quarter of the population lives under poverty lines and faces real difficulties procuring daily food.

Alternatives:

- Implement laws regulating food waste. These laws should compel companies to donate or sell fat lower prices food products that are about to expire. Food retail companies need to take serious measures to prevent food waste by implementing a process that starts with production, deposit, distribution, and sale; they should also transfer food products either by donating or selling them at reduced prices.
- Initiate and develop awareness campaigns to raise the consumers’ trust in Romanian food products (information campaigns, information dissemination).
- Promote social and communal responsibility by encouraging open and transparent partnerships between producers and consumers.
- Trigger and encourage the establishment of clusters and the development of partnerships.

Economic:

Problems:

- The recent rise of WSS (Water Supply and Sanitation) tariffs causes affordability concerns for low-income families. By 2016, the reported average WSS tariff nationwide had already reached 2.9% of average income and exceeded 5% of the income of low-income families.
- Romania is one of the most European Countries at risk of floods. Devastations caused by floods cost the Romanian economy an average of 140 million euros per year.
- The economics of irrigated agriculture drastically changed after Romania switched to the market economy.

Alternatives:

- Prioritization is crucial to face financial and institutional gaps. Wide-ranging steps should be gradually implemented to curb financial and institutional discrepancies. The remodeling and modernization of the financial framework of the water management sub-sectors should continue; the system has to move towards O&M, and investment costs recovery through tariffs by applying the "polluter pays" principle. For Romania to benefit from past experiences and lessons learned by other EU countries, peer-to-peer exchanges on specific priority topics should be encouraged.

CONCLUSIONS

Problems:

- Romania is one of the most European Countries at risk of floods. Devastations caused by floods cost the Romanian economy an average of 140 million euros per year.
- Around 50% of Romanians spend an average of 40% of their monthly income on food. According to a study conducted and concluded by EPC Consultant de Mediu 'for the local non-profit Asociatia MaiMultvERDE', a quarter of the population lives under poverty lines and faces real difficulties procuring daily food.
- There are around 4.5 million Romanians with no access to piped water within their homes. It is not expected that general access to piped water will be achieved before 2040, at best.
- There are more than 6 million Romanians with no flush toilets in their homes. Only 68.3% of the national population had access to toilets within their homes in 2016.
- The abovementioned demonstrates that economic development is pressing issues, and is considered an additional challenge to enable the incorporation of circular economy measures.
- As opposed to other countries where there is a gradual transition towards a circular economy system, Romania still lacks access to a series of essential services. Several basic needs need to be resolved before such an undertaking can start.

Alternative:

- Romania must face these fundamental problems before undertaking and adopting new CE strategies.

Belgium

Environmental:

Belgium's federal structure means that most environmental issues are considered regional competence. The three regions (Flanders, Wallonia, and Brussels Capital Region) have autonomous authority to deal with social-economic matters, such as zoning and planning, housing, agriculture, employment, and energy. The Federal Government along with the three regions share joint responsibility for the environment; so while the Federal Government is in charge of protecting and managing coastal waters, the region set policies for waste, green areas, forests, continental waters, and waterways in their respective regions. Besides, local authorities are also responsible for providing local services, including the collection, treatment, and distribution of drinking water and sewerage within their municipal land.

At the Federal level, the main challenges identified are:

AIR QUALITY

Problems:

- The air quality in Belgium is a continuous cause for concern, although the emissions of several air pollutants have significantly decreased over the past years. Private cars constitute 80% of road traffic volume. Planning strategies, including Low Emission Zones (LEZ), technical improvements of vehicles, and fiscal incentives, positively contributed to improving the situation.
- Committed to reducing greenhouse gases, federal and regional energy ministers signed an Energy Pact in December 2017, which defines the steps to realize the transition of the energy sector towards a low carbon society by 2050.

Alternatives:

- Reduce the volume of road traffic and congestion.
- Invest in more sustainable means of transport.
- Switch from electricity production to sustainable energy sources.
- Phase-out the use of fossil fuels for heating buildings.
- Increase the use of renewable energy sources for thermal applications in industry.
- Allocate a higher percent of the R&D budget to projects related to climate and energy.

WATER QUALITY

Problems:

- Some of the most significant challenges facing rivers are the dispersed agriculture sources, the deposition of the atmosphere, as well as point source pressures caused by urban wastewater. For groundwater, the most severe pressure stems from agriculture and industrial emissions.

Alternatives:

- Increase the effectiveness of measures implemented against pollution caused by manure and fertilizers in Wallonia.
- Consolidate efforts to reduce nutrients pollution in Flanders.
- Combat chemical pollution.

NATURE CONSERVATION

Problem:

- Belgium's relatively low coverage of Natura 2000 reflects its high population density, high urbanization level, and the extent of its land use, particularly in the central and northern parts of the country.

Alternatives:

- Reconnect natural areas, and accommodate nature in projects.
- Integrate green infrastructure in spatial planning.
- Increase access to green spaces.
- Grow wooded areas in agricultural landscapes (forest biodiversity).
- Implement Flemish and Walloon Green Deals.
- Develop and enhance agricultural management measures to protect species and habitats.
- Improve the implementation of the EU Timber Regulation to ensure regeneration and the sustainability of forests.

WASTE MANAGEMENT

Problems:

- Belgium is one of the top performers within the EU in managing waste. It had a 54% recycling rate of municipal waste in 2017 when the EU average stood at 45%. There is a discrepancy in the performance of the three regions; however, Brussels has the worst performance.
- Flanders and Wallonia both report that around 70% of their municipal waste is collected separately, whereas Brussels reports approximately 37%. Moreover, the

three regions have recently banned the use of lightweight plastic bags, and have installed a system that taxes incinerated waste and encouraged heat recovery from waste incineration.

- According to Eurostat, Belgium has the highest packaging recycling in Europe (80%).
- Flanders and Wallonia also have to face the problem of food waste. Both regions have dedicated plans to reduce food losses by 30% by 2025. Many cities are taking part in sustainable food initiatives. Brussels, the capital region, adopted the "Good Food - Towards a More Sustainable Food System" strategy in December 2015. This sets the target to a 30% reduction of food waste by 2020.

Alternatives:

- Turn waste into resources.
- Fully implement EU waste legislation: waste hierarchy, separate collection of waste, landfill diversion targets, etc.
- Reduce the generation of waste.
- Limit the recovery of energy from non-recyclable materials, and phase out landfilling of recyclable or recoverable waste.
- Prevent single-use plastics.
- Foster initiatives such as repairing and recycling cafes.
- Encourage applications like TooGoodToGo and Rekub, where products close to their expiration dates, are listed by shops to be sold to consumers.
- Support startups like Wonky, which produces dip sauces made out of "saved vegetables" that cannot be sold in markets because of their shape.
- Support initiatives such as CollectMet, which is a Brussels- based initiative tackling food waste by handing unsold fruits and vegetables of weekly market stalls to people with low income.
- Educate the public about composting.
- Encourage initiatives such as Red De Restjes, which is an initiative of the Flemish waste management company OVAM, with many recipes for cooking using leftovers.
- Support Thuisafgehaald.be, which is a platform that allows citizens to sell their fresh leftover meals to people around them.

Social:

Problems:

- Rise of health complications caused by pollution, such as respiratory problems which are increased because of vehicle emissions. Pollution has also become an increasing problem in the food chain (microplastics in fish, etc.).
- Belgium has yet to adopt the sharing economy mindset. People still care about owning their personal item X or Y.

Alternatives:

- Implement the Low Emission Zones in urban areas.
- Implement more fiscal incentives for alternative means of transport.
- Invest in more and better public transport.
- Raise awareness campaigns to educate the citizens about consumption behavior.
- Implement legislative measures to curb and control the use of harmful items and substances.
- Support legal measures that foster the functionality economy.

Economic:

Problems:

- Scarcity of resources and volatility of prices.
- Energy consumption measures are perceived as expensive, such as insulating houses.
- Disruptive business models, and a growing fear of affecting the labor market, which include loss of jobs, discrepancies between citizens with lower and higher education.

Alternatives:

- Prioritize renewables.
- Save the cost of resources.
- Utilize waste as a resource.
- Design for the future.
- Incorporate digital technologies
- Increase fiscal incentives to foster the return of these valuable measures by businesses and citizens.
- Green public procurement.
- Growing demand for services.
- Set policy measures for the Future of Work.
- Improve the educational system.

CONCLUSIONS

Problems:

- At the Federal level, the main identified challenge is Air Quality. In Belgium, Air Quality is an ongoing cause for concern, although the emissions of several air pollutants have significantly decreased over the past years. Private cars constitute 80% of road traffic volume.
- The use of water and agricultural waste are also serious issues that need to be addressed.

- Belgium's relatively low coverage of Natura 2000 reflects its high population density, high urbanization level, and the extent of its land use, particularly in the central and northern parts of the country.

Alternatives:

- Increase the effectiveness of measures implemented against pollution caused by manure and fertilizers in Wallonia.
- Consolidate efforts to reduce nutrients pollution in Flanders.
- Combat chemical pollution.
- Belgium's general situation is positive in terms of the challenges it faces to transition to a circular economy model.
- Belgium is one of the top performers within the EU in managing waste. It had a 54% recycling rate of municipal waste in 2017 when the EU average stood at 45%. There is a discrepancy in the performance of the three regions; however, Brussels has the worst performance.
- According to Eurostat, Belgium has the highest packaging recycling in Europe (80%).

Sweden

Environmental:

USE OF FOSSIL FUEL

Problem:

- The use of fossil fuels, including natural gas and products derived from petroleum such as coal and coke[1], is currently decreasing. Still, their use is extensive, especially in the iron and steel industry. In 2015, the consumption of fossil fuel energy was reported at 26.84%[2].

Alternatives:

- Increase the percentage of renewable energy. Cut the use of fossil fuel and substitute it with renewable energy sources such as wind, solar, or biofuels.
- In 2017, the Swedish Parliament adopted the framework of a climate policy that set the goal of making the Swedish climate neutral by 2045. Having a Fossil Free Sweden has encouraged different business sectors to compete[3] and draw up their roadmaps, highlighting how they will be fossil-free.

[1] Coke is a grey, hard, and porous fuel with a high carbon content and few impurities, made by heating coal or oil in the absence of air — a destructive distillation process.

[2] https://tradingeconomics.com/sweden/fossil-fuel-energy-consumption-percent-of-total-wb-data.html

[3] http://fossilfritt-sverige.se/wp-content/uploads/2018/02/roadmap_for_fossil_free_competitiveness_klar.pdf

Here are some examples of set goals and initiatives proposed:

- **The Aviation Industry**: all domestic flights will be fossil-free by 2030, and all flights taking off from Sweden will be fossil-free by 2045.
- **The Concrete Industry**: Will reach half the climate impact within 5 years. Climate-neutral concrete will be available on the market by 2030 and will be concrete climate neutral by 2045.
- **The Construction Industry:** In comparison to greenhouse gas emissions recorded in 2015, there will be a 50% reduction by 2030, a 75% reduction by 2040, and a 0% emissions by 2045.
- **The Food Retail Sector**: All plastic packaging will be recyclable by 2022. Plastic packages will be made of renewable or recycled raw material by 2030.
- **The Forest Sector:** There will be fossil-free industry operations by 2030. Fossil free vehicles will be used in forest industries and forestry by 2030. There is an increased production of biofuels based on forest raw material ranging between 1 TWh to 10 TWh per year.
- **The Mining and Mineral Industry**: Swedish mining industry aims to have the first fossil-free mine by 2035.
- Sweden has launched and placed a system known as “pant”, which has been giving money back to people who recycle plastic bottles since 1994, and to people who recycle aluminium cans since 1984. Each year, around 1.85 billion items are recycled; in 2017, 85% of bottles and cans were recycled.

PLASTIC POLLUTION

Problems:

- According to Naturvårdsverket, the Swedish Environmental Protection Agency, about half of the 212,500 tonnes of plastic that existed on the Swedish market in 2016 were recycled. The Agency also reported that Swedes use around 770 million plastic bags per year for supermarkets alone.
- In 2017, the marine litter/plastic collected on the beaches can be classified by type: 40% consumer waste, 40% fisheries, 11% industries, and 9% other sources.

Alternatives:

- Introduce innovations to reduce plastic waste.
- Prevent the unnecessary use of plastic.
- Reduce single-use and unnecessary plastics and packaging.

Sweden’s Best Practices:

- **Arla Foods**’ target is to reach 100% recyclable packaging by 2025[4].

[4] https://www.arla.com/sustainability/sustainable-packaging/

- **Löfbergs** was the first company to remove aluminium used in coffee packaging in Sweden in 1993. Now, the company aims to replace the oil-based plastic with a plant-based alternative. It hopes to replace all fossil plastic from their packaging by 2020[5]
- **IKEA** is committed to phasing out all single-use plastics from stores and restaurants by 2020[6].

FOOD WASTE

Problem:

- Sweden's food waste is around **2053000** tonnes per year. About **905000** tonnes are household food waste, **601327** tonnes are manufacturing food waste, while **547000** are the food waste of various factors[7]. Loss of food along the supply chain can be caused by overproduction, damage, lack of refrigeration, and market fluctuations.

Alternatives:

- Reducing food waste entails both educating society and creating the necessary infrastructure to facilitate the process, which include information policies and education programs, as well as the implementation of strict governmental regulations. The situation also relies heavily on the behavior of both consumers and companies. In this sense, changing consumer behavior and promoting fruitful collaboration between various industries in the food supply chain are crucial.
- The implementation of new technological solutions is another vital enabler to make this transformation into circular food systems, by innovating plant-based alternatives to meat.
- By 2020, Sweden's food waste target is to use 50% of food waste as natural fertilizers and 40% to generate energy.

Sweden's Best Practices:

- **ICA Gruppen** has adopted a new Group goal to reduce food waste; it calls for halving the food waste produced by warehouses and stores in Sweden and Baltic countries by 2025 (in comparison to the figures provided in 2016). To achieve this, smart purchasing algorithms, new circular products, as well as the use of tools and techniques to identify the food at risk of being wasted at an early stage, must be introduced [8].

[5] http://www.mynewsdesk.com/lofbergs/pressreleases/loefbergs-opts-for-environmentally-friendly-plastic-2126286

[6] https://www.ikea.com/ca/en/this-is-ikea/newsroom/ikea-to-phase-out-single-use-plastic-pub1b1cf73b

[7] Walter Leal Filho, Marina Kovaleva (2015) Food Waste and Sustainable Food Waste Management in the Baltic Sea Region. Environmental Science.

[8] https://www.icagruppen.se/en/archive/press-archive/2019/ica-to-cut-its-food-waste-in-half-by-2025/

- **Spill** Restaurant turns unsold food into lunches. The restaurant buys good quality food "waste" from wholesalers, quickly adapt their menu to what is available, create delicious meals, and sells them to the public[9].
- The Swedish city of **Malmö** has transformed from a decaying city into an eco-friendly hub. One of the initiatives operated within the Västra Hamnen (western harbor) district; it launched a system that employs vacuum suction to transport household waste into an underground central tank, where the waste is converted to biogas to fuel the city's public transportation[10].

WASTE PROBLEM

Problem:

- In 2016, Sweden generated 142 million tonnes of waste, of which 2.4 million tonnes were considered hazardous waste. This corresponds to 14.2 tonnes and 238 kilograms per person, respectively[11]. According to the Avfall Sverige, every Swede produced 473 kilograms of household waste in 2017, compared to 467 kilograms in 2016[12].

Alternatives:

- According to the Swedish Institute (SI), Sweden is currently aiming at promoting a zero-waste society[13]. The country wants to promote the efficient use of resources by maximizing the reuse of material and recycling. In 2016, 93% of glass, 47% of plastic (excluding PET), and 82% of paper around the country were recycled. The challenge remains in dealing with products that cannot be completely recycled or that are difficult to dispose of. To address this issue, a Swedish movement is emerging within a CE model to ensure that everything can be somehow reused. Moreover, initiatives, similar to the pant previously outlined, contribute to the recycling of products. In 2017, Sweden recycled 69% of all packaging.
- There are indications that Sweden is "running out of trash" because of its serious recycling initiatives and efforts to reduce waste. Now, Sweden recycles 99% of the waste, and the country has even started to import waste from other countries to keep operating its incinerators[14].
- Studies have indicated that in Sweden, recycling is encouraged both by economy and morality (Hage et al., 2009)[15]. For such actions and behaviors are as motivate by moral

[9] https://restaurangspill.se/

[10] http://www.ejinsight.com/20190712-what-we-can-learn-from-sweden-s-success-in-recycling/

[11] https://www.scb.se/contentassets/842cdb4c880247b28fad6fef853a0526/mi0305_2016a01_br_misambr1801.pdf

[12] https://www.avfallsverige.se/fileadmin/user_upload/Publikationer/Avfallshantering_2018_EN.pdf

[13] https://sweden.se/nature/the-swedish-recycling-revolution/

[14] http://www.ejinsight.com/20190712-what-we-can-learn-from-sweden-s-success-in-recycling/

[15] Hagge, Olle; Söderholm, Patrik; Berglund, Christer (2009) Norms and economic motivation in household recycling: empirical evidence from Sweden Resources, Conservation and Recycling, ISSN 0921-3449, E-ISSN 1879-0658, Vol. 53, no 3, p. 155-165

and social norms as they are by the convenience of the infrastructure installed by the government (Miliute-Plepiene et al., 2016)[16].

- In 2017, the Swedish government amended and reformed the tax system to enable people to have access to cheaper repairs of used items (the VAT rate to repair bicycles, clothes and went down from 25% to 12%).
- In 2017, 50% of household wasted was converted into energy. Sweden operates a system that burns waste in low-carbon incinerators aiming to generate energy to power buses and to supply heating systems. Currently, 20% of household electricity and heating are powered by energy generated from waste[17].

Social:

INTEGRATION OF IMMIGRANTS & UNEMPLOYMENT

Problem:

- Over the past few decades, the integration of refugees and immigrants has become a central priority to Sweden. In 2018, the inhabitants of Sweden were around 10 million, of which one-fifth belong to an immigrant community. Compared to Swedish born inhabitants, foreign-born persons are less often employed. According to the Labor Force Survey conducted by Statistics Sweden in 2018, the immigrant employment rate stood at 70.1%, while the native-born employment rate stood at 86.5% for people between the ages of 20 and 64. The employment rate for both native and foreign-born inhabitants has increased over the past ten years; still, the gap between the two groups remains unchanged.

Alternatives:

- **Introduce design integration and mentorship programs**.
- **Improve local coordination**. The most significant obstacle immigrants face is a lack of integration and effective coordination between local authorities. Therefore, enhancing coordination of work between public employment services, municipalities, vocational training provides, and social services should be taken into consideration.
- **Develop Enterprise.** Give practical guidance and support to immigrants to develop businesses, and enhance some of enterprises that start as “home industries”.
- **Consolidate social capital and networking**. Encourage solidarity and understanding between residents, for it is essential to ensure the social integration of immigrants and facilitate their access to the labor market.

[16] Jurate Miliute-Plepienea, Olle Hage, Andrius Plepys, Algirdas Reipas (2016) *What motivates households recycling behaviour in recycling schemes of different maturity? Lessons from Lithuania and Sweden* Resources, Conservation and Recycling 113 (2016) 40–52 https://doi.org/10.1016/j.resconrec.2016.05.008

[17] http://www.ejinsight.com/20190712-what-we-can-learn-from-sweden-s-success-in-recycling/

THE WIDENING EDUCATION GAP

Problem:

- According to the Swedish National Agency for Education, 90% of students of Swedish background have qualified for secondary studies in 2017, while 66% of students with foreign background managed the same feat. Conversely, in 2011, 72% of students with foreign background qualified for secondary education.

Alternatives:

- Focus on teachers, who present the central force for making a change within the education system.
- Adopt standardized curriculum to ensure that low-performing schools are held to the same standards as top-performing ones.
- Develop an innovative educational resource in the form of a platform to provide lifelong learning needs. This platform can be adapted to different groups of students and sectors for it should address diversity, and promotes innovation and integration through education and training such as training representatives in waste reuse/repair centers.

CONSUMPTION

Problem:

- According to the 2018 Consumption Report[18], Swedish households spent 1978 billion SEK in 2017. This marks a 2.3% increase compared to 2016, and a 22% increase compared to 2007. Between 2016 and 2017, the households' expenditure increased in all categories excluding alcohol and tobacco. The rate of repairing consumer's electronics, computers, furniture, shoes, and household appliances decreased in the period between 2008-2017. Second-hand shopping became less common in 2017 than in 2016. Swedish consumers have never reported a higher degree of life satisfaction than that of 2017.

Alternatives:

- In contrast to the country's consumption patterns, Sweden has a long history of educating its citizens to sort out garbage that dates back to the 1980s[19]. As a result, recycling has become an integral part of Swedish society to the extent that the country currently recycles around 99% of its waste[20]. Studies have shown that individuals

[18] https://gupea.ub.gu.se/handle/2077/58484

[19] http://www.ejinsight.com/20190712-what-we-can-learn-from-sweden-s-success-in-recycling/

[20] http://www.ejinsight.com/20190712-what-we-can-learn-from-sweden-s-success-in-recycling/

often-times behave environmentally friendly both due to economic incentives and social norms (Hage et al., 2009)[21].

- Product service systems offer products as services; these include pay per service unit, product renting or sharing, product lease or product pooling.
- Reusing products is a resourceful mechanism to render products more affordable than their new counterparts, and more economically accessible to many people. Reuse also reduces resource use and emissions linked to manufacturing.
- Repair of old items.

Economic:

Problem:

- Ever since 2006, the level and fluctuation of raw material prices have significantly increased. So, for instance, the average price of metals, which have remained stable throughout the 20th century, have increased by 176% between 2000-2014. This price fluctuation creates problems for diggers and buyers of raw materials, and pose greater risks to the global market, including Sweden.

Alternatives:

- To manage this instability, mindsets must shift and embrace a greener business model exemplified by the following:
- Design more durable products. Design products, which can be used for many years and even decades owing to the high quality of the raw materials.
- Remanufacture. Technical design, quality control, and testing play crucial roles in creating new products. Recycling requires 85% less energy consumption than creating new products, in addition, it reduces waste emission and demand for raw materials.

CRITICAL MATERIALS

Problems:

- A number of industries excessively use materials such as cobalt, indium, graphite, rare earth elements, among others, in their production. According to studies conducted by the University of York, 20% of raw materials currently in use will run out within the next 50 years, and 35% of them within 100 years[22].

Alternative:

[21] Hagge, Olle; Söderholm, Patrik; Berglund, Christer (2009) *Norms and economic motivation in household recycling: empirical evidence from Sweden* Resources, Conservation and Recycling, ISSN 0921-3449, E-ISSN 1879-0658, Vol. 53, no 3, p. 155-165

[22] https://www.pwc.com/hu/en/kiadvanyok/assets/pdf/Closing-the-loop-the-circular-economy.pdf

- This projection can be stopped by adopting a CE approach to the materials used in industrial production. So, for instance, recycling materials rather than using virgin raw material, substituting critical raw materials in low-carbon technologies, remanufacturing and replacing critical materials with other more abundant materials, can all serve to improve the situation. Abundant materials, including iron, nickel, and others, are cheaper, less susceptible to supply fluctuation, and are more environmentally friendly[23].

GROWING INCOME INEQUALITY

Problem:

- Since 1985, the income inequality among Swedes has been growing at a faster rate compared to any other OECD country. In 2012, the average income of the top 10% of earners was 6.3 times higher than those at the bottom 10%. According to Statistics Sweden, women have higher educational levels than men; however, they are paid less, and have lower incomes and lower pensions than men[24]. In Sweden, the average monthly salaries of women is less than 88% of men's- 95.5% less when differences of professions and sectors are taken into account (2016). Pay discrepancies are most obvious in the county councils, and are least obvious among blue-collar workers.

Alternatives:

- Create active labor market policies to increase employability, such as re-training plans.
- Government should sponsor job creation plans.
- Promote educational equality.
- Create more jobs by investing in infrastructure, develop renewable energy sources, renovate abandoned houses, and encourage other logical investments to restore and revitalize neighborhoods.

CONCLUSIONS

Problems:

- Plastic pollution: According to Naturvårdsverket, Swedes use 77 million plastic bags per year for supermarkets alone.
- Sweden's food waste is around **2053000** tonnes per year. About **905000** tonnes are household food waste, **601327** tonnes are manufacturing food waste, while **547000** are the food waste of various factors.
- Consumption: The Swedish households' expenditures increased in all categories.

Alternatives:

[23] https://www.ncbi.nlm.nih.gov/books/NBK97332/pdf/Bookshelf_NBK97332.pdf

[24] https://www.scb.se/contentassets/4550eaae793b46309da2aad796972cca/le0201_2017b18_br_x10br1801eng.pdf

- In 2017, the Swedish Parliament adopted the framework of a climate policy that set the goal of making the Swedish climate neutral by 2045.
- Having a Fossil Free Sweden has encouraged different business sectors to compete and draw up their roadmaps, highlighting how they will be fossil-free.
- The Aviation Industry: all domestic flights will be fossil-free by 2030, and all flights taking off from Sweden will be fossil-free by 2045.
- The Concrete Industry: Will reach half the climate impact within 5 years. Climate-neutral concrete will be available on the market by 2030 and will be concrete climate neutral by 2045.
- The Construction Industry: In comparison to greenhouse gas emissions recorded in 2015, there will be a 50% reduction by 2030, a 75% reduction by 2040, and a 0% emissions by 2045.

GENERAL CONCLUSIONS

First, by analyzing the social, political, and entrepreneurial of the five countries, we realized that there are very different realities in relation to the CE. The level of awareness of the benefits of adopting CE strategies drastically vary from one country to another, and reflects the diversity of Europe. This situation can be considered both as a problem and challenge that countries have to face, and benefit from this project as an initiative to improve conditions.

The measures and levels of environment protection widely vary among the five countries analyzed. The importance laid on environment protection also affects how people perceive the benefits associated with CE. In addition, there is no common legal framework among these countries that govern a CE, which explains the different levels of implementation of CE.

Based on the information gathered, the U-Eco Consortium realized that some countries enjoy a higher level of environmental consciousness and societal concern than other countries. Generally, we recognize that countries with high levels of economic development tend to display higher levels of environmental awareness compared to countries with low economic levels.

The consortium concluded that U-Eco represents a big opportunity to spread information and raise awareness of the circular economy. The project aims to enable the exchange of experiences among European countries along different levels, as well as encourage mutual learning and benefit. U-Eco potentially provides a positive opportunity to increase the number of new entrepreneurs transitioning from a linear to circular economy.

A.1.2.

COMPREHENSIVE MARKET STUDY: MARKET SCOPE, MARKET GROWTH RATE, COSTS STRUCTURE, AND MARKET PROFITABILITY WITHIN A CE FRAMEWORK WITH A FOCUS ON WATER, WASTE, ENERGY, RAW MATERIALS, FOOD, AND URBAN METABOLISM

Comprehensive Market Study

Competitiveness and Innovation

The circular economy offers ground-breaking, exciting innovations and engaging investment opportunities; the EU has a great chance to take advantage and benefit from them. **The circular economy enjoys the support of both the political and business sectors** since it promotes growth, employment, less dependency on resources, as well as positive health and environmental protection. It also provides a **systematic shift** that will change the current industrial scene, including product design, business modes, flow of resources, and value creation. It proposes a different industrial logic that, in the future, will guide investment in infrastructure and product of physical as well as digital products. This shift will give room for many **exciting, innovative opportunities** to grow and prosper, creating new market segments and companies.

The EU enjoys the unique combination of scale, integrated markets (notably through the single market), and political and economic institutions that can facilitate accelerated development of the circular economy. If successfully implemented, a transition to a circular economy will mean the rejuvenation of the EU economy for the next decades. It will provide the EU with new joint projects to rally around, which can strengthen the political unity of the EU and create a global industrial leadership at its core (*Achieving "Growth Within,"* 2017).

Some niches within the circular economy enjoy rapidly growing investments, such as R&D for electric vehicles and autonomous cars, as well as space sharing startups. The majority of circular opportunities, including care remanufacturing, car sharing, anaerobic digestion, organic farming, and the reuse of building materials, however, only constitute less than 10% of their respective markets. In comparison, conventional linear investments make up the remaining 90%. Waste management, which is considered the most 'traditional' circular investment sector with available public statistics, has seen low investment levels between 2009-2013 (the last year with available statistics). Some of the smaller circular enterprises, such as sharing cars and houses, are rapidly growing. Moreover, numerous successful policies can potentially lead to additional investment, such as creating an organic fertilizer market. These enterprises are considered exceptions to the more general pattern of underinvestment (*Achieving "Growth Within,"* 2017). Table 1 presents an overview of the available data regarding private investment in the EU with a focus on some selected countries.

The circular economy can potentially create more jobs and economic growth. Innovation and investment in the fields of eco-design, secondary raw materials, recycling processes, and industrial symbiosis are crucial to transitioning into a circular economy. Specific sectors of the circular economy, such as recycling, repair, and reuse, significantly contribute to local employment. The EU highly prioritizes, creating jobs and economic growth. The circular economy agenda, including recycling, repair, and reuse sectors, is expected to substantially contribute to realizing these goals. These jobs are particularly work-intensive, which contribute to local employment (*Monitoring Framework for Circular Economy*).

Table 1: Summary of Competitiveness and Innovation Data Available related to the Circular Economy in the EU (*Monitoring Framework for the Circular Economy, Eurostat*).

COMPETITIVENESS AND INNOVATION					
POLAND	**SPAIN**	**ROMANIA**	**BELGIUM**	**SWEDEN**	**EU**
PRIVATE INVESTMENTS, JOBS AND GROSS VALUE ADDED RELATED TO CIRCULAR ECONOMY SECTORS (CEI_CIE010)					
Gross investments in tangible goods - million euro (percentage of gross domestic product (GDP) at current prices)					
2013 – 678,1 (0,17%) 2017 – 762,4 (0,16%)	2013 – 794,6 (0,08%) 2017 – 1 184,9 (0,1%)	2013 – 292,2 (0,2%) 2017 – 387,8 (0,21%)	2013 – 619,6 (0,16%) 2017 – 660,4 (0,15%)	2013 – 502,8 (0,11%) 2017 – 484,6 (0,1%)	2013 – 14 599,3 (0,11%) 2017 – 18 447,7 (0,12%)
Value added at factor cost - million euro (percentage of gross domestic product (GDP)					
2013 – 4 232,4 (1,07%) 2017 – 5 199,7 (1,11%)	2013 – 10 794,9 (1,06%) 2017 – 12 303,9 (1,06%)	2013 – 974,1 (0,68%) 2017 – 1 485,2 (0,79%)	2013 – 2 705,6 (0,69%) 2017 – 3 041,7 (0,68%)	2013 – 4 909,4 (1,12%) 2017 – 4 220,2 (0,88%)	2013 – 132 668,5 (0,97%) 2017 – 154 790,1 (1%)
Persons employed – number (percentage of total employment)					
2013 – 339 962 (2,12%) 2017 – 359 286 (2,2%)	2013 – 339 142 (1,9%) 2017 – 395 980 (2,04%)	2013 – 135 906 (1,59%) 2017 – 133 062 (1,54%)	2013 – 51 303 (1,13%) 2017 – 52 079 (1,1%)	2013 – 72 877 (1,56%) 2017 – 79 015 (1,58%)	¢¢2013 – 3 817 468 (1,7%) 2017 – 3 985 720 (1,69%)
RECYCLING AND SECONDARY RAW MATERIALS PATENTS (CEI_CIE020)					
2005 – 12,42 2015 – 67,4	2005 – 21,87 2015 – 19,82	2005 – 1 2015 – 4,5	2005 – 3,02 2015 – 8,91	2005 – 3,8 2015 – 9,81	2005 – 302,81 2015 – 355,6

Circular Economy Indicators

Eurostat statistics can help us better understand the market scope of the CE. The *Monitoring Framework for Circular Economy* measures progress towards establishing a circular economy at both the national and EU levels, in the sectors of water, waste management, energy, raw materials, and urban metabolism. Table 2 demonstrates a summary of this data.

Table 2: Circular Economy Indicators in the EU (*Monitoring Framework for Circular Economy, Eurostat*).

Water

BELGIUM	POLAND	ROMANIA	SPAIN	SWEDEN	EU
Water Volume Available for USE[25]					
Water resources per capita (m3/person/year) : 2017 – 1,601; Renewable water	Water resources per capita (m3/person/year) : 2017 – 1,585; Renewable water	Water resources per capita (m3/person/year): 2017 – 10,773; Renewable water resources, total	Water resources per capita (m3/person/year): 2017 – 2,405;	Water resources per capita (m3/person/year) : 2017 – 17,556; Renewable water	The United Kingdom, Sweden, France and Germany had the highest amount of

[25] https://data.worldbank.org/indicator/ER.H2O.INTR.PC

resources, total (billion m3/year): 2017 – 18. The entire (100%) population of Belgium has access to a safe-drinking water source. Flemish region Total m3: 193.952.300 (2018) Brussels Capital region Total m3: 68.820.462 (2018) Walloon region Total m3: 216.900.000 (2016)	resources, total (billion m3/year): 2017 – 61. 1.7 % of the population of Poland (2015) don't have access to safe drinking water.	(billion m3/year): 2017 – 212. The entire (100%) population of Romania has access to a safe-drinking water source.	Renewable water resources, total (billion m3/year): 2017 – 112. The entire (100%) population of Spain has access to a safe-drinking water source.	resources, total (billion m3/year): 2017 – 174. The entire (100%) population of Sweden has access to a safe-drinking water source.	freshwater resources, with long-term annual averages ranging between 173 000 and 196 000 million m³. Among the EU Member States, the countries experiencing water stress are Poland, Czechia, Cyprus and Malta (where the lowest volume of water resources was recorded, at 177 m³ per person).

Volume of Water Used

Freshwater use in agriculture: - 2000 – 38,20 billion m3 - 2005 – 36,90 billion m3; - 2010 – 40,20 billion m3. Freshwater use in industry: - 2000 – 5,96 billion m3; - 2005 – 5,45 billion m3; - 2010 – 5,26 billion m3. Freshwater use for households and public services: - 2000 – 735,80 million m3; - 2005 – 730,40 million m3; - 2010 – 709,30 million m3. Flemish region: 100 l/day/inhabitant (2018) Walloon region: 90 l/day/inhabitant (2018)	Freshwater use in agriculture: - 2000 – 1,11 billion m3 - 2005 – 1,12 billion m3; - 2010 – 1,10 billion m3; - 2016 – 1,05 billion m3 (10%). Freshwater use in industry: - 1995 – 9,43 billion m3; - 2016 – 7,48 billion m3 (71%). Freshwater use for households and public services: - 1995 – 2,29 billion m3; - 2016 – 2,04 billion m3 (19%).	Freshwater use in agriculture: - 2000 – 1,19 billion m3 - 2005 – 1,10 billion m3; - 2010 – 1,09 billion m3; - 2016 – 1,24 billion m3 (20%). Freshwater use in industry: - 1995 – 7,43 billion m3; - 2005 – 6,17 billion m3; - 2010 – 4,34 billion m3. - 2016 – 4,08 billion m3 (64%). Freshwater use for households and public services: - 1995 – 2,05 billion m3; - 2010 – 1,05 billion m3; - 2016 – 1,05 billion m3 (16%).	Freshwater use in agriculture: - 2000 – 23,04 billion m3 - 2005 – 23,18 billion m3; - 2010 – 25,47 billion m3; - 2014 – 21,96 billion m3 (67%). Freshwater use in industry: - 2000 – 7,45 billion m3; - 2005 – 6,50 billion m3; - 2010 – 6,57 billion m3; - 2014 – 6,33 billion m3 (19%). Freshwater use for households and public services: - 2000 – 5,45 billion m3; - 2005 – 5,90 billion m3;	Freshwater use in agriculture: - 2000 - 135 million m3 - 2005 - 107 million m3; - 2010 - 98 million m3. Freshwater use in industry: - 2000 - 1,50 billion m3; - 2005 - 1,52 billion m3; - 2010 - 1,57 billion m3. Freshwater use for households and public services: - 2000 - 1,04 billion m3; - 2005 - 1 billion m3; - 2010 - 1,02 billion m3. In total 2,4 billion m3 of fresh water and 639 billion m3 of seawater used in 2015, 5 % less than in 2010. All sectors, except Other use, reduced the use of water, mostly agriculture (24 %	Among EU Member States, total abstraction of freshwater ranged between 43 million m³ in Malta (2017 data) and 31 300 million m³ in Spain (2016 data). Turkey recorded an even higher Total amount, namely 60 013 million m³. Between 2007 and 2017 the total volume of freshwater abstracted rose at its fastest pace in Turkey (+51 %), Denmark (+30 %) and Greece (+19 %). The largest decreases were recorded in Lithuania (-87 %) and Belgium (-36 %), in both cases due to a reduction of cooling water needs in electricity production.

Brussels Capital region: 95 l/day/inhabitant (2018)			- 2010 – 5,31 billion m3; - 2014 – 4,55 billion m3 (14%). Fresh surface and groundwater used: 31,259.85 million m3 (2016). Volume of water supplied by the public supply network in 2016: 253 L/person/day.	lower). Manufacturing industry reduced freshwater use (14% lower) and increased seawater use (16% higher).	
Volume of Wastewater Treated (percentage of the population connected to a wastewater treatment plant)					
2010 – 74,98%; 2017 – 83,00%.	2010 – 64,40%; 2017 – 73,50%.	2010 - 22,7%; 2017 - 46, 5%.	2010 – 96,00%; 2014 – 96,30%. Volume of wastewater treated: 2016 - 12.949.076 m3/day	2010 – 86,00%; 2017 – 87,00%. Total urban wastewater treatment (plants): - 2010 - 1196,0; - 2012 - 1243,0.	The share of the population connected to at least secondary wastewater treatment plant even rose to above 95 % in 7 Member States (Germany, Latvia, Luxembourg, the Netherlands, Austria, Sweden and the United Kingdom), as well as Switzerland. At the other end of the range, less than one in two households were connected to at least secondary urban wastewater treatment plants in Malta, Romania and Croatia, while the same was also true in Iceland (2010 data), Albania, Serbia, Bosnia and Herzegovina, and Kosovo.
Percentage of Wastewater that has been Reused and Volume of Water Reused					
n/a	n/a	n/a	Volume of wastewater reused in 2016	n/a	At present, about 1 billion cubic metres of treated

			was 1.350.536 m3/day, distributed as follows: -Agriculture 61,2% -Industry 5,1% -Gardens 19,0% -Sewage and streets cleaning 1,6% Other uses 13,1%		urban wastewater is reused annually, which accounts for approximately 2.4% of the treated urban wastewater effluents and less than 0.5% of annual EU freshwater withdrawals. But the EU potential is much higher, estimated in the order of 6 billion cubic metres – six times the current volume.

Waste

BELGIUM	POLAND	ROMANIA	SPAIN	SWEDEN	EU
Recycling Rate of All Waste Excluding Major Mineral Waste (cel_wm010)					
2010 - 75% 2016 - 78%	2010 - 58% 2016 - 56%	2010 - 26% 2016 - 30%	2010 - 44% 2016 - 46%	2010 - 51% 2016 - 49%	2010 - 55% 2016 - 57%
Recycling Rate of Waste Packaging by Type of Packaging (cel_wm020)					
Overall packaging: 2010 – 79,8% 2016 – 81,9 % 2017 – 83,8% Plastic packaging: 2010 – 41,4% 2016 – 43,4% 2017 – 44,5% Wooden packaging: 2010 – 63,3% 2016 – 80,9% 2017 – 83,7%	Overall packaging: 2010 – 38,9% 2016 – 58 % 2017 – 56,7% Plastic packaging: 2010 – 20,1% 2016 – 46,9% 2017 – 34,6% Wooden packaging: 2010 – 21% 2016 – 40,8% 2017 – 32,4%	Overall packaging: 2010 – 43,4% 2016 – 60,4 % 2017 – n/a Plastic packaging: 2010 – 28,2% 2016 – 46,5% 2017 – n/a Wooden packaging: 2010 – 18,1% 2016 – 27,6% 2017 – n/a	Overall packaging: 2010 – 61,9% 2016 – 70,3 % 2017 – 68,5% Plastic packaging: 2010 – 29,2% 2016 – 45,5% 2017 – 47,9% Wooden packaging: 2010 – 55,7% 2016 – 76,1% 2017 – 65,7%	Overall packaging: 2010 – 69,2% 2016 – 68,2 % 2017 - 71,7% Plastic packaging: 2010 – 32,4% 2016 – 50,7% 2017 – 48,4% Wooden packaging: 2010 – 167,2% 2016 – 30,9% 2017 – 50,4%	Overall packaging: 2010 – 63,5% 2016 – 67,2 % 2017 - 67% Plastic packaging: 2010 – 32,5% 2016 – 42,4% 2017 – 41,9% Wooden packaging: 2010 – 38,8% 2016 – 39,8% 2017 – 40%
Recycling Rate of E-waste (cel_wm050)					
2010 – 30,4% 2016 – 38,3%	2010 – 17,7% 2016 – 38,9%	2010 – 12% 2016 - 25%	2010 – 14,7% 2016 – 37,8%	2010 – 55,3% 2016 - 55,4%	2010 – 27,8% 2016 – 41,4%
Recycling of Biowaste (cel_wm030)					
2010 – 97 kg per capita 2016 – 85 kg per capita 2017 - 81 kg per capita	2010 – 5 kg per capita 2016 – 21 kg per capita 2017 - 22 kg per capita	2010 – 32 kg per capita 2016 – 18 kg per capita 2017 - 18 kg per capita	2010 – 59 kg per capita 2016 – 72 kg per capita 2017 - 72 kg per capita	2010 – 60 kg per capita 2016 – 72 kg per capita 2017 - 70 kg per capita	2010 – 66 kg per capita 2016 – 80 kg per capita 2017 - 81 kg per capita
Recycling Rate of Construction and Demolition Waste					
2010 – 17% 2016 – 95%	2010 – 93% 2016 – 91%	2010 – 47% 2016 – 85%	2010 – 65% 2016 – 79%	2010 – 78% 2016 – 61%	2010 – n/a 2016 – 89%

Energy

BELGIUM	POLAND	ROMANIA	SPAIN	SWEDEN	EU
Total Energy Consumption					
2007- 57 Mtoe 2017- 55 Mtow	2007- 96 Mtoe 2017- 105 Mtoe	2007- 40 Mtoe 2017- 33 Mtoe	2007- 144 Mtoe 2017- 124 Mtoe	2007- 50 Mtoe 2017- 50 Mtoe	2007- 1701,58 Mtoe 2017- 1561,59 Mtoe
Renewable Energy Share in Gross Total Energy Consumption (T2020_31)					
2013 - 7,52% 2017 - 9,06% 2018 - 9,42%	2013 - 11,34% 2017 - 10,96% 2018 - 11,28%	2013 - 23,89% 2017 - 30,61 % 2018 - 30,32%	2013 - 15,32% 2017 - 17,65% 2018 - 17,41%	2013 - 50,8% 2017 - 54,20% 2018 - 54,64%	2013 - 15,38% 2017 - 17,48% 2018 - 17,99%
Renewable Energy Share in Gross Total Energy Consumption By Sector (SDG_07_40)					
Transport: 2013 – 5,01% 2017 – 6,58% 2018 – 6,64% Electricity: 2013 – 12,48% 2017 – 17,27% 2018 – 18,90% Heating and cooling: 2013 – 7,38% 2017 – 8,04% 2018 – 8,19%	Transport: 2013 – 6,59% 2017 – 4,20% 2018 – 5,63% Electricity: 2013 – 10,73% 2017 – 13,09% 2018 – 13,03% Heating and cooling: 2013 – 14,10% 2017 – 14,59% 2018 – 14,79%	Transport: 2013 – 5,68% 2017 – 6,56% 2018 – 6,34% Electricity: 2013 – 37,52% 2017 – 41,97% 2018 – 41,79% Heating and cooling: 2013 – 26,19% 2017 – 26,58% 2018 – 25,43%	Transport: 2013 – 0,95% 2017 – 5,79% 2018 – 6,94% Electricity: 2013 – 36,73% 2017 – 36,39% 2018 – 35,16% Heating and cooling: 2013 – 14,09% 2017 – 17,62% 2018 – 17,36%	Transport: 2013 – 15,32 % 2017 – 26,84% 2018 – 29,69 % Electricity: 2013 – 61,74 % 2017 – 65,91% 2018 – 66,23 % Heating and cooling: 2013 – 63,55 % 2017 – 65,53% 2018 – 65,85 %	Transport: 2013 – 5,51% 2017 – 7,13% 2018 – 8,01% Electricity: 2013 – 25,33% 2017 – 30,70% 2018 – 32,06% Heating and cooling: 2013 – 17,55% 2017 – 19,51% 2018 – 19,69%

Raw Materials

BELGIUM	POLAND	ROMANIA	SPAIN	SWEDEN	EU
EU Raw Material Self-Sufficiency					
n/a	n/a	n/a	n/a	n/a	36,4% in 2016
Recycled Materials Contribution to Demand for Raw Materials- End-of- Life Recycling Input Rates					
n/a	n/a	n/a	n/a	n/a	12,4% in 2016
Rate of Circular Materials Use					
2013 - 17,2% **2016 – 18,4%**	2013 - 11,8% 2016 – 10,2%	2013 - 2,5% 2016 – 1,7%	2013 - 8,9% 2016 – 8,2%	2013 - 7,3% 2016 - 7,1%	2013 - 11,6% 2016 – 11,9%
Trade in Recyclable Raw Materials					
Imports from non-EU countries: 2013 – 173,268 tonnes 2018 – 338,146 tonnes Exports to non-EU countries: 2013 – 3,331,349	Imports from non-EU countries: 2013 – 82,351 tonnes 2018 – 55,275 tonnes Exports to non-EU countries: 2013 – 391,787	Imports from non-EU countries: 2013 – 30,481 tonnes 2018 – 23,482 tonnes Exports to non-EU countries: 2013 – 1,778,586	Imports from non-EU countries: 2013 – 775,542 tonnes 2018 – 455,856 tonnes Exports to non-EU countries: 2013 – 985,682	Imports from non-EU countries: 2013 – 588,072 tonnes 2018 – 388,416 tonnes Exports to non-EU countries: 2013 – 814,761	Imports from non-EU countries: 2013 – 5,918,566 tonnes 2018 – 5,917,284 tonnes Exports to non-EU countries: 2013 – 32,148,656

tonnes 2018 – 3,822,215 tonnes Intra EU trade: 2013 – 6,104,802 tonnes 2018 – 6,188,429 tonnes	tonnes 2018 – 597,296 tonnes Intra EU trade: 2013 – 1,194,564 tonnes 2018 – 1,789,911 tonnes	tonnes 2018 – 729,739 tonnes Intra EU trade: 2013 – 128,229 tonnes 2018 – 392,061 tonnes	tonnes 2018 – 1,136,700 tonnes Intra EU trade: 2013 – 6,072,531 tonnes 2018 – 5,332,575 tonnes	tonnes 2018 – 1,049,613 tonnes Intra EU trade: 2013 – 749,178 tonnes 2018 – 899,589 tonnes	tonnes 2018 – 37,111,276 tonnes Intra EU trade: 2013 – 48,659,189 tonnes 2018 – 53,000,121 tonnes

Urban Metabolism and Urban Waste

BELGIUM	POLAND	ROMANIA	SPAIN	SWEDEN	EU
Municipal Waste Generation Per Capita					
2012 - 445 kg per capita 2016 - 419 kg per capita	2012 - 317 kg per capita 2016 - 307 kg per capita	2012 - 251 kg per capita 2016 - 261 kg per capita	2012 - 468 kg per capita 2016 - 463 kg per capita	2012 - 545 kg per capita 2016 - 447 kg per capita	2012 - 486 kg per capita 2016 - 487 kg per capita
Waste Generation Excluding Major Mineral Wastes Per GDP Unit					
2012 - 85 kg per 1000€ 2016 - 97 kg per 1000€	2012 - 62 kg per 1000€ 2016 - 62 kg per 1000€	2012 - 183 kg per 1000€ 2016 - 183 kg per 1000€	2012 - 178 kg per 1000€ 2016 - 140 kg per 1000€	2012 - 48 kg per 1000€ 2016 - 50 kg per 1000€	2012 - 67 kg per 1000€ 2016 - 65 kg per 1000€
Waste Generation Excluding Major Mineral Wastes Per Domestic Material Consumption					
2012 – 20,3% 2016 – 26,3%	2012 - 10,2% 2016 – 11,8%	2012 – 6,5% 2016 – 4,7%	2012 – 15,6% 2016 – 17,2%	2012 - 8,4 % 2016 - 9,1%	2012 – 12,9% 2016 – 13,5%
Food Waste					
n/a	n/a	n/a	n/a	n/a	2012 – 80 million tonnes 2016 – 80 million tonnes

Cost Structure and Market Profitability

According to Ellen MacArthur's report *Achieving Growth within (2017),* shifting towards a circular economy model will deliver better outcomes for the European economy and yield **annual benefits that can reach up to €1.8 trillion by 2030.** This report includes demonstrative benefit curves suggesting how various levels of the circular economy can reduce European use of resources and its economic effects. While the results rely on multiple assumptions and call for more research, pursuing opportunities that have already proven profitable or will likely be profitable within the next five years can reduce the European annual net resource spend by 2030 as much as 32%, which is around €0.6 trillion.

These benefits come hand in hand with a significant economic multiplier effect. Cash-costs benefits can reach up to €0.7 trillion, while external costs can decrease up to €0.5 trillion. This adds up to a total annual profit of €1.8 trillion by 2030, which represents twice the benefit of the current development path. The ongoing total costs of €7.2 trillion will decrease to €5.4 trillion (*Growth within, 2015*).

Although all EU countries share a similar economic plan, certain social and economic differences between them may shape the evolution of the circular economy in the future.

Below is a summary of the leading market characteristics of the studied countries.

Polish Market

Main Sectors	In Poland, agriculture employs 10.3% of the active population and constitutes around 2.8% of the GPD (World Bank, 2018). Poland farms more than 60% of its total land area, and is generally food self-sufficient. The main crops cultivated are rye, potatoes, beetroot, and wheat; the country also produces dairy products. Moreover, Poland breeds pigs and sheep in livestock farms. The country is relatively rich in natural resources; the main minerals produced are coal, sulphur, copper, lead, and zinc. According to the Polish Agricultural Market Agency (ARR), there are roughly 1.5 million small family farms of less than 9ha in the country. The industry sector constitutes 28.9% of the GDP and employs 31.1% of the workforce. The World Bank estimates the manufacturing industry value added amounted to 17.6% of the Polish GDP in 2017. The country's leading industrial sectors include machine manufacturing, telecommunication, environment, transport, construction, industrial food processing, and IT. Some of the traditional sectors are in decline, such as the steel and shipbuilding industries. The Polish automobile industry is mainly export-oriented and has highly resisted the effects of the economic crisis. The tertiary sector constitutes 58.1% of the GDP employing around 58.6% of the active population. The sector is currently booming, especially for the financial services, logistics, IT, and tourism sectors. This sector has seen impressive growth in recent years, with the number of tourists visiting Poland reaching a recorded figure of 18.3 million visitors in 2017 (+4.5% year-on-year, Polish Central Statistical Office).
Consumer Behavior	The organic food sector is growing increasingly important, as Poles are improving their lifestyles and taking more care of their health and well-being. So, for instance, Poles are moving away from packaged and processed products and are favoring fresh fruits and vegetables instead. Collaborative platforms, such as Uber, Mytaxi and AirBnB are very popular in major cities such as Warsaw and Krakow. (Consumer). Poland is currently in the preparation stage to implement a CE strategy. In September 2019, a government strategy project to implement the CE in Poland was prepared. Parallelly, government agencies have organized a series of meetings with potential customers of CE during which various examples and case studies of

	potential implementation in various sectors were discussed. So far, the most popular model was CE in plastic reuse which aims to decrease the production of plastic. Since the CE remains in the early stages of implementation, it is impossible to provide any concrete data related to costs and market profitability.

Spanish Market

Main Sectors	Agriculture constitutes around 2.6% of the Spanish GDP and employs 4% of the workforce (World Bank, 2017). The country is home to almost one million agricultural and livestock businesses, covering 30 million hectares of land. Spain is the world's largest producer of olive oil and the world's third largest producer of wine. The country is also one of the world's largest producers of oranges and strawberries. The main crops cultivated are wheat, sugar beet, barley, tomatoes, olives, citrus fruits, grapes, and cork. Livestock are also very important, especially pigs and cattle. The industrial sector constitutes around 21.6% of the GDP and employs 19.3% of the workforce. Manufacturing is the most important industry as it constitutes around 82% of total production. The most dominant industrial sectors are those of textiles, food processing, iron and steel, naval machines, and engineering. New sectors including the production of outsourced electronic components, information technology, and telecommunications have high growth potential. The tertiary sector constitutes 66.4% of the GDP and employs over 7.6% of the active population. The sector of Tourism is pivotal to the country's economy, as it represents Spain's main source of income since the country is the second most popular tourist destination in the world hosting around 82 million tourists per year. The banking sector is also very important; there are twelve banking groups including 59 private banks, 2 saving banks and 63 cooperative banks.
Consumer Behavior	Responsible consumption is developing in Spain. Four years ago only 30% of consumers said that they took environmental concerns into account; however, the number rose to 41% in 2018. More consumers look for responsible products; they check the quality and traceability. As for the second-hand market, which is quite considerable in Spain, it has been losing ground since 2018, particularly those of books and telephones. Collaborative economy platforms are developing in Spain; the Spanish Competition Authority (CNMC) has been very supportive.

Romanian Market

Main Sectors	Romania has a labor workforce of 8.7 million people out of its 19.5 million population. This number has been decreasing, however, over the last decade due to the massive migration of Romanian workers to Western European countries. Agriculture constitutes 4.4.% of the GDP and employs 22.3% of the country's active population. The primary resources and agricultural production are cereals, sugar beets, and potatoes. Still, the output remains very low in comparison to the country's potential capacity, for more than 58% of the land is agricultural. About 25% of the country is covered by forests, especially around Transylvania, where the logging industry is fastly developing. Romania has a limited energy dependency of 23% thanks to coal, oil, gas, and uranium. The industrial sector constitutes 30.7% of the country's GDP and employs 28.5% of the active population. Thanks to cheap labor, industries are diverse and competitive. Historically, manufacturing companies and the industrial sector represented the backbone of the Romanian economy. Therefore, foreign direct investors are involved in heavy industry (metallurgy, steel), manufacturing of vehicle parts, building, and construction, as well as petroleum refining and textiles. Romanian economy mainly centers on the services sector, which constitutes 56.1% of the GDP and employs nearly 47% of the nations' workforce. Tourism, in particular, is boomed with around 11 million tourists recorded in 2017. The technology sector has also grown immensely in recent years due to the emergence of a highly-qualified workforce whose cost is lower than the European average. Romania's ICT sector constituted 6.2% of the GDP in 2017, compared to 5.5% in 2016; it is expected to increase to constitute 12% of the GDP by 2025. As we speak, this sector employs 150 thousand people and is expected to employ around 230-250 thousand by 2025.
Consumer Behavior	Since the economic crisis, Romanian consumers have remained cautious and adopted a responsible and moderate behavior. Consumers are not devoted to a single brand; however, product availability and acceptable price/quality ratio, are factors that influence user consumption. Consumers are ready to pay highly for brands and quality products. Recent trends of the urban retail market indicate a clear preference for fresh, branded, attractively packaged products. The concept of after-sales customer service is still developing, but Romanian consumers are increasingly sensitive to the quality of after-sales services in making their purchasing decisions.

Belgian Market

Main Sectors	With a labor force of 5.3 million, out of its 11.4 million population, Belgium's central geographic location and highly developed transportation network have helped develop a well-diversified economy, with a broad mix of transport, services, manufacturing, and high-tech. Belgium is 100% reliant on foreign sources of fossil fuel; the planned closure of its seven nuclear plants by 2025 will increase its dependency on foreign energy. Agriculture constitutes a small amount of the national GDP around 0.62% of the Belgian economy; the country mainly cultivates sugar beets, vegetables and fruits, meat and milk, and employs 1.3% of the active population. 29% of the land is used for agriculture. The industrial sector constitutes 19.8% of the GDP and employs 21.3% of the workforce. There are significant discrepancies between the three Belgian regions. While Flanders has succeeded in developing the second largest petrochemical industry in the world, Wallonia is at the middle of restructuring, following the closure of its collieries and a large number of steel plants. Brussels, on the other hand, distinguishes itself in the fields of telecommunications, software development, pharmaceutical, and automobiles industries. The Belgian economy is largely oriented towards services. The tertiary sector constitutes 68.8% of the GDP and employs 77.4% of the active population. Brussels, the hub of several European institutions, numerous diplomatic representations, and different interest groups, has primarily based its economy on services.
Consumer Behavior	Environmental awareness is very present in Belgium. Products branded as organic, sustainable, local, traceable, fresh, vegan, etc. are becoming more and more popular. The food scandals that have taken place in Europe and the growing interest in health are some of the main reasons behind the success of organic products. The second-hand market is developing, and 61% of exchanges are made between individuals. However, this market has seen a slight decrease in 2018. Collaborative platforms are widely operating in Belgium, especially in large cities, with companies such as Uber, Airbnb, Blablacar, Deliveroo, etc. running.

Swedish Market

Main Sectors	Agriculture constitutes 1.1% of the GDP and employs 1.83% (down from 1.87% a year earlier) of the workforce. The main agricultural products are grains (particularly oats, wheat, barley, and rye),

	potatoes, other root crops, vegetables, and fruits, as well as dairy products, meat, and wood. While production exceeds domestic consumption, a significant amount of food needs to be imported due to the lack of crop variety. Sweden's agricultural exports nearly match its imports, with the agricultural trade deficit falling to SEK 7 million (EUR 660,000) in 2017 (Statistics Sweden) according to the latest available data. The country has a wealth of natural resources: forests, iron, lead, copper, zinc, and hydroelectric energy. The industrial sector constitutes 22.1% of the GDP and employs nearly 18% of the workforce. It is dominated by groups such as Volvo, Saab, Ericsson, ABB, AstraZeneca, Electrolux, Ikea, and H&M, among others. Sweden's main manufacturing activities are wood processing, paper, electronic equipment, industrial food processing, pharmaceutical products, etc. The new sectors of technology and biotechnology are of significant importance to the economy. The tertiary sector, dominated by telecommunications and IT equipment, employs 80.2% of the active workforce and constitutes 65.2% of the GDP.
Consumer Behavior	Sweden is among the leading countries that value healthy consumption. The demand for fresh, eco-friendly, and health-friendly products that transparently disclose their ingredients are on the rise. For the beauty sector, the demand for natural products and the consumption of organic products are growing. Regarding supply, the market grew by 9.3% in 2017, reaching 28 billion SEK. However, it is slowing down compared to the double-digit growth of previous years. The second-hand market is expanding both on the internet and in stores, as customers are increasingly attracted to the circular economy and the associated benefits to the environment. In 2016, 15% of the population used collaborative platforms such as Airbnb, Uber, etc. The cities of Stockholm, Gothenburg, Malmö, and Umeå will become test cities for the national sharing economy program. The most common platforms allow you to share cars, clothes, games, and even housing.

A.1.3

MAPPING THE CAPACITIES OF EXISTING SMES, DETERMINING THEIR ABILITY TO ACT AS SERVICE PROVIDES WITHIN THE CE SECTOR, AND IDENTIFYING THEIR CAPACITY GAPS AS WELL AS THEIR ABILITY FOR MARKET DEVELOPMENT

Main Findings of Mapping The Capacities of Existing SMEs

The limitations of linear economy for SMEs

Potential Limitations named by Partner Organizations:

- Lack of information and markets whenever the level of available supply does not meet the needs and demands.
- Use of linear product design. Circular product design alternatives remain misunderstood and barely integrated.
- Modest incorporation of smart resource management.
- Dominance of linear consumption mindset. Consumers need to shift from a linear to a circular mindset.
- Unfavorable government intervention. There is a lack of governmental support to correct market failures and draft new legislation to stop the development of the CE.
- Imbalance between environmental protection and economic development.
- Limited capacities that can enable the growth of potential green solutions. Most of the regular business models depend on adding value to a particular product (i.e., assembling bicycles from various parts). In contrast, in a circular economy, the focus lies on maintaining value (i.e., remanufacturing bicycles)[26].
- Business models depend on new products and the growth of sales. Companies depend on short product life cycles and maximizing sales that result in landfilling, incineration, and export of waste products.
- Using non-renewable resources. Companies supply primary resources that will become scarce or non-renewable for their operations when non-renewable resources are currently reaching their limits.
- Failing to collaborate and achieve synergies. Companies are unwilling to engage in collaboration with new partners and suppliers, which leads to wasteful use of resources.
- Failing to innovate and adapt to new technologies. Companies are not evolving to meet the latest market conditions; therefore, current business models are threatened by technology-based models and the changing consumer demand for more sustainable products.

[26] https://ec.europa.eu/environment/sme/pdf/Training%20materials_English.pdf

The Role and Characteristics of SMEs Operating within the CE Framework in the Partnering Countries

SMEs - Basic Figures

According to the European Commission, "small and medium-sized enterprises (SMEs) are the backbone of Europe's economy. They represent 99% of all businesses in the EU. In the past five years, they have created around 85% of new jobs and provided two thirds of the total private sector employment in the EU. The European Commission considers SMEs and entrepreneurship as key to "ensuring economic growth, innovation, job creation, and social integration in the EU"[27]. As a result, SMEs play a key role in paving the road to establish a circular economy.

The table below shows the number of SMEs, number of SMEs' employees, and value added to the partner organization countries between 2008-2016. The data covers the non-financial business economy that includes the industry, construction, distributive trades and services.

Table 3: Number of SMEs, number of SMEs' employees, and value added to the partner organization countries between 2008-2016.

Country	Number of SMEs	Share of SMEs (%)	Number of SMEs' employees	Share of employees (%)	Value Added (billion Euro)	Share of Value Added (billion Euro %)
Poland	1,729,223	99,8	6,125.825	67,1	119,5	52,9
Spain	2,787,483	99,9	8,768,635	71,9	315	61,3
Romania	485,757	99,7	2,691,484	65,8	40,8	52,7
Belgium	604,643	99,8	1,944,928	68,8	142,3	63,3
Sweden	739,624	99,9	2,184,295	65,2	142	61,2

Source: Small Business Act for Europe (SBA)[28].

[27] https://ec.europa.eu/growth/smes_en

[28] https://ec.europa.eu/growth/smes/business-friendly-environment/performance-review/

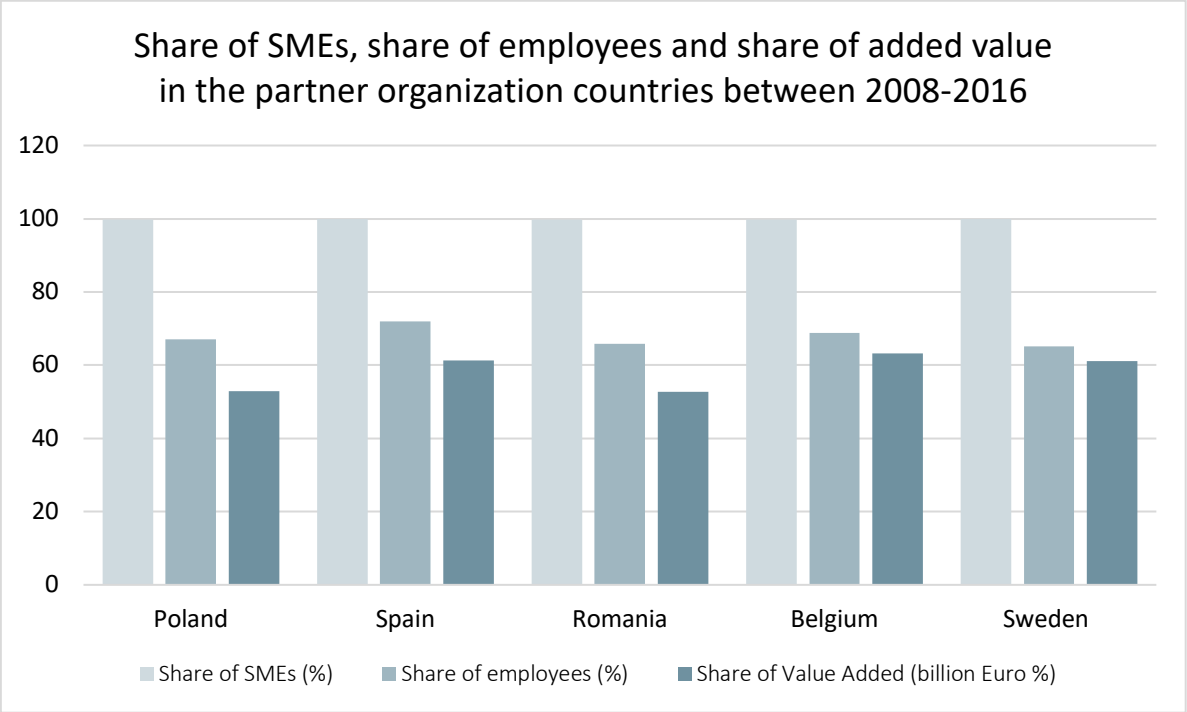

Figure 1. Share of SMEs (expressed in %), share of employees (expressed in %) and share of added value (expressed in billion Euro %) in the partner organization countries between 2008-2016. *Source: Small Business Act for Europe (SBA)*[29].

Poland

According to the Small Businesses Act (SBA) fact sheets, during 2014-2018, two sectors - the construction and the wholesale and retail sectors - generated significant value-added growth for SMEs in Poland. The construction sector exceeded the performance of large firms. Currently, mainly medium-sized and large enterprises are dealing with CE. SMEs that operate within the CE framework are primarily represented by companies that recover precious metals from used electronics and electrical devices or companies that recycle plastic bottles. In Poland, some farms also contribute to the CE by using various components to produce electricity and health in small biogas plants.

Spain

According to the SBA fact sheets, the wholesale and retail sector has generated the most significant value-added growth in Spain. Between 2014 and 2018, SMEs increased value-added by 23,4%. The Spanish government's Retail Trade Competitiveness Plan, whose primary goal is to increase the competitiveness of SMEs by promoting e-commerce, has made this growth happen. In 2017, the e-commerce trade volume amounted to more than 30

[29] https://ec.europa.eu/growth/smes/business-friendly-environment/performance-review/

million Euros, which is 92.8% more since 2014. Data from 2018 shows that 81.4% of Spanish companies are part of the services sector, and around 22,4% of those are into trade activities. The construction sector has the most significant number of companies and has recorded the highest growth rate in recent years. This sector was the fastest-growing sector during 2014-2018, which constituted 47.3%, in terms of value-added.

Romania

According to the SBA fact sheets, the transportation and storage SMEs' value-added substantially increased by 53.1% between 2014-2018. During the same period, the manufacturing sector also recorded significant growth of value-added. This sector grew by 26.0% and in 2018 generated 19.6% of all SMEs value-added in Romania.

Belgium

According to SBA fact sheets, between 2014 and 2018, the wholesale and retail trade SMEs' value-added increased by 10.3%. In 2018, this sector generated 23.4% to overall SME value-added.
Information and Communication sector SME value-added increased by 28.5% between 2014 and 2018.
Belgian SMEs, which are active in the CE, can be divided into 5 categories:

1. Circular input: relying on renewable energy and bio-based biodegradable or recyclable raw materials raw material in production. Use fewer materials, dematerialize, or virtualize. Buy circular.
2. Recover raw materials. Recovering raw materials and/or energy from discarded products or auxiliary flows, often from a different circuit than one's own.
3. Extend working life. Extend the functional life cycle of products with repair, upgrade, and resale. Calculate the second and third life of products during the design phase. Choose a modular design, parts that can be removed, or parts that can be easily repaired.
4. Share platforms. Enable more intensive use of shared use/access or ownership.
5. Products as services. Offer access to a product while maintaining its ownership to enjoy all the benefits of a closed circuit.

Sweden

According to the SBA fact sheets, the construction sector recorded the highest value-added growth, with a 21.8% increase.

The information and communication technology sector also recorded an increase between 2014 and 2018; employment increased by 12.8%. The Swedish government supported digital transformation by implementing several digital strategies and formulating ambitious policy goals.

Skills and Innovation

According to the SBA fact sheets, the performance of **Poland** and **Romania** in terms of skills and innovation is considered the weakest when compared to EU countries, and fall far below the EU average. Romania's innovation rate, however, started to increase in 2015. **Spain** is in line with the EU average for skills and innovation; however, the percentage of innovative SMEs collaborating with others and the percentage of SMEs innovating in-house have continued to decline since 2014. **Belgium** ranks second in terms of skills and innovation; the percentage of SMEs selling and purchasing online have increased in recent years. According to some indicators, including SMEs innovating in-house, however, the collaboration and introduction of products and innovative processes have shown a slight decline. **Sweden's** skills and innovation indicators remain above the EU average; according to the European Innovation Scoreboard 2019, Sweden is an Innovation Leader.

The chart below provides more detailed information.

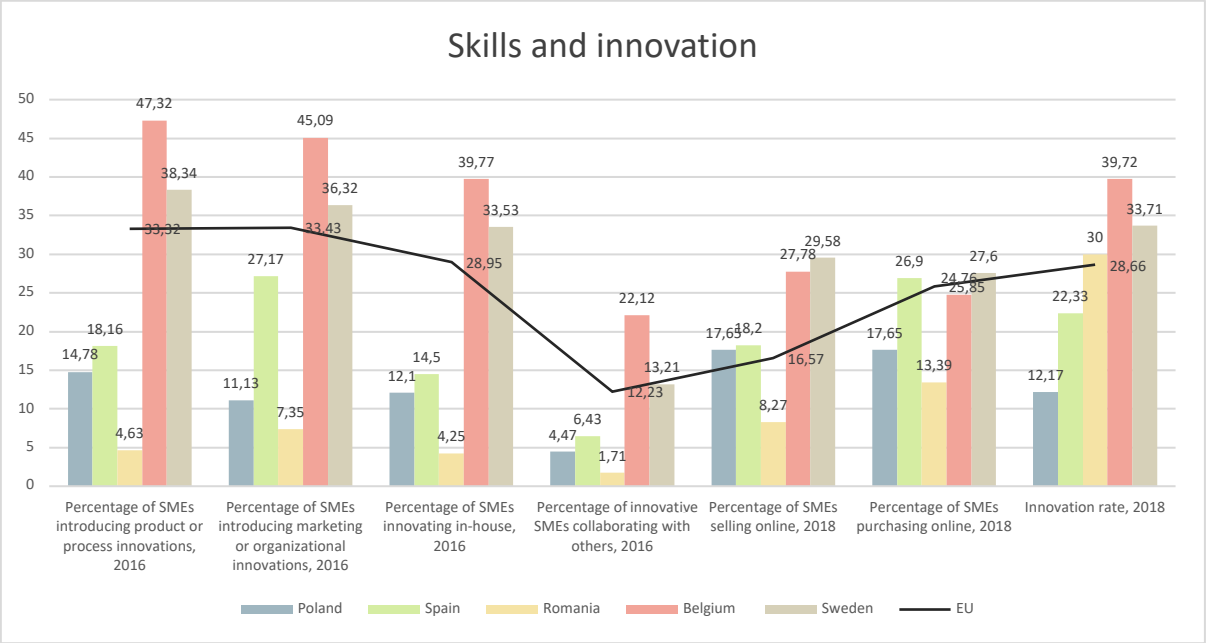

Figure 2. Performances of each partner organization country in terms of skills and innovation. The numbers on top of the columns represent the percentage. From the left, the first block shows the percentage of SMEs introducing product or process innovations in each partner organization country in 2016. The second block shows the percentage of SMEs introducing marketing or organizational innovations in each partner organization country in 2016. The third block shows the percentage of SMEs innovating in-house in each partner organization country in 2016. The fourth block shows the percentage of innovative SMEs collaborating with others in each

partner organization country in 2016. The fifth block shows the percentage of SMEs selling online in each partner organization country in 2018. The sixth block shows the percentage of SMEs purchasing online in each partner organization country in 2018. The seventh block shows the innovation rate in each partner organization country in 2018. *Source: Small Business Act for Europe (SBA).*

Environment

According to the SBA fact sheets, **Poland's** indicators in terms of environment are above the EU average. **Spain's** and **Romania's** indicators continue to rank below the EU average. Although Spain has the lowest percentage of SMEs that have benefited from public support measures for their resource-efficiency actions, the country has the second highest percentage of SMEs which have taken resource-efficiency measures. In **Romania**, the case is totally different; SMEs that have benefited from public support measures are the highest among the EU member states; yet, the SMEs that have taken resource-efficiency measures are among the lowest. **Belgium** is in line with the EU average for the environment. Since 2008, several measures have been introduced in order to increase energy efficiency and use of renewable energies for SMEs. Sweden's indicators are also above average. The percentage of SMEs offering green products or services is the highest among EU countries, which account for 39%.

The chart below provides more detailed information.

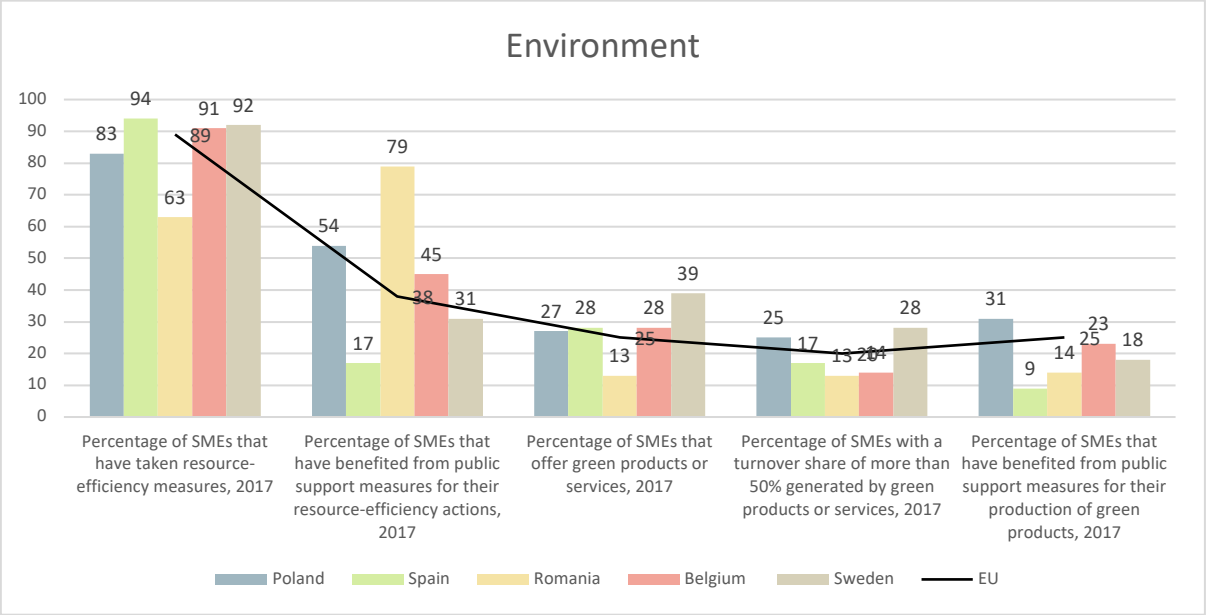

Figure 3. Indicators in terms of environment for each partner organization country. The numbers on top of the columns represent the percentage. From the left, the first block shows the percentage of SMEs that have taken resource-efficiency in each partner organization country in 2017. The second block shows the percentage of SMEs that have benefited from public support measures for their resource-efficiency actions in each partner organization country in 2017. The third block shows the percentage of SMEs that offer green products or services in each partner organization country in 2017. The fourth block shows the percentage of innovative SMEs collaborating with others in each partner organization country in 2016. The fifth block shows the percentage of SMEs with a turnover share of more than 50% generated by green products or services in each partner organization country in 2017. The sixth block shows the percentage of SMEs that have benefited from public

support measures for their production of green products in each partner organization country in 2017. *Source: Small Business Act for Europe (SBA).*

THE BENEFITS OF CIRCULAR ECONOMY FOR SMES

Potential benefits of transitioning into a circular economy:

- **Economic Growth** in a global economic framework. Emerging circular activities drive higher revenues and reduce the cost of production due to the use of more efficient resources. In developing a circular economy, it is estimated that the European GDP, for instance, can grow up to 11% by 2030, and up to 27% by 2050, when compared to the respective percentages of 4% and 15% that will be achieved if the current development scenario is maintained.
- **The European Commission** offers **funding, advisory, and help services** for SMEs operating within the CE framework.
- **Profitability**: the reduction, reuse, and recycling of materials allow significant savings in the production processes. Circularity can also offer new profit opportunities by lowering costs, increasing the security of raw materials supplies, tightening chain cooperating, and robust supply chains.
- **Public Aid and Tax Incentives** for circular goods and services.
- **Reputation**: Due to the increasing consumer awareness, corporate social responsibility has become an integral part of business models; adopting a circular economy is also a way of strengthening a company's reputation. Increased number of customers and improved brand image are related to sustainable behavior.
- **Optimized Customer Relations:** the circular economy offers new business models and opportunities to retain customers. There are apparent differences between product delivery and services, for rental and leasing models create long-term relationships between customers and suppliers due to the contact maintained throughout the life of a particular product. When suppliers remain responsible for product delivery, interim service, and maintenance, repair and excellent communication will contribute not only to customer satisfaction but also to customer loyalty, which ensures that customers will continue to buy products even after contracts expire.
- **Competitiveness:** circular economy models expand the use of innovative technologies and processes, which allow them to outperform the competition.
- **Net Material Cost Savings**: Adopting circular setups in relevant manufacturing sectors can yield net material cost savings that reach up to USD 340 -630 billion per year in the EU alone[30].

[30] https://www.ellenmacarthurfoundation.org/assets/downloads/publications/Ellen-MacArthur-Foundation-Towards-the-Circular-Economy-vol.1.pdf

- **Value Creation/ Innovation**: the circular model presents a mechanism to rethink the current development model, which has proven to be a robust driving framework capable of generating creative, innovative, and sustainable solutions.
- **Potential Employment Benefits:** new production models, especially those that use advanced technologies, digitalization, and automation, are destined to generate highly specialized jobs.
- **Stabilize and Improve Supply Chain Security**: circular economy ensures that companies use fewer new raw materials and depend more on recycled raw materials. It also guarantees that the value of raw materials is maximized over their entire life cycle. Consequently, entrepreneurs will incur relatively lower material costs, which means that prices and availability of materials do not threaten the stability of the business models.
- **Reduce the Effect of the Basic Raw Materials Fluctuating Prices:** when the supply of certain raw materials is high, the cost of raw materials increases. Therefore, it is necessary to wisely use raw materials, for it can help in reducing costs, give room to product innovation and knowledge infrastructure, and open up new earning opportunities.
- **Reduced Environmental Pressures and Impacts**: once companies adopt the strategies and practices of the circular economy, they can reduce the environmental footprint of their products and services, and thereby differentiate themselves from their competitors.
- **Growing Demand for Services**: circular economy creates a demand for new services presenting employees and entrepreneurs with opportunities. According to the Ellen MacArthur Foundation, these new jobs and services are: (1) reserved logistics companies that collect, transport, repair and redistribute products after use in order to be reintroduced into the market; (2) marketers and sales platforms that facilitate longer product life and higher utilization rates; (3) experts in remanufacturing and product repair, who facilitate the reuse and repair.

THE BARRIERS THAT COMPANIES MUST OVERCOME WHEN PLANNING TO OPERATE WITHIN A CE FRAMEWORK

The European Commission monitors and assesses the performance of SMEs annually. According to the publication, "SMEs, resource efficiency and green markets"[31], SMEs that have taken at least one resource efficiency action were asked about the barriers they had to overcome to become more resource efficient. **Complex administrative and legal procedures** ranked as the most difficult challenges faced by SMEs. 32% of surveyed SMEs in Spain and

[31] https://ec.europa.eu/commfrontoffice/publicopinion/index.cfm/survey/getsurveydetail/instruments/flash/surveyky/2151

Romania named **the cost of environmental actions** as a challenge. While 31% of Polish and 30% of Spanish SMEs reported difficulties in **adopting environmental legislation in their companies**. **Lack of specific environmental expertise** was recognized as a barrier in Poland (28%), and Spain (32%). All partner organization countries named **technical requirements of legislations were not updated**. 28% of Polish SMEs found it **challenging to choose the right resource efficiency actions**. Lack of demand for resource-efficient products or services and lack of supply of required materials, parts, products, or services were the two biggest difficulties for Spanish SMEs (25% and 22% respectively). The chart below provides more details.

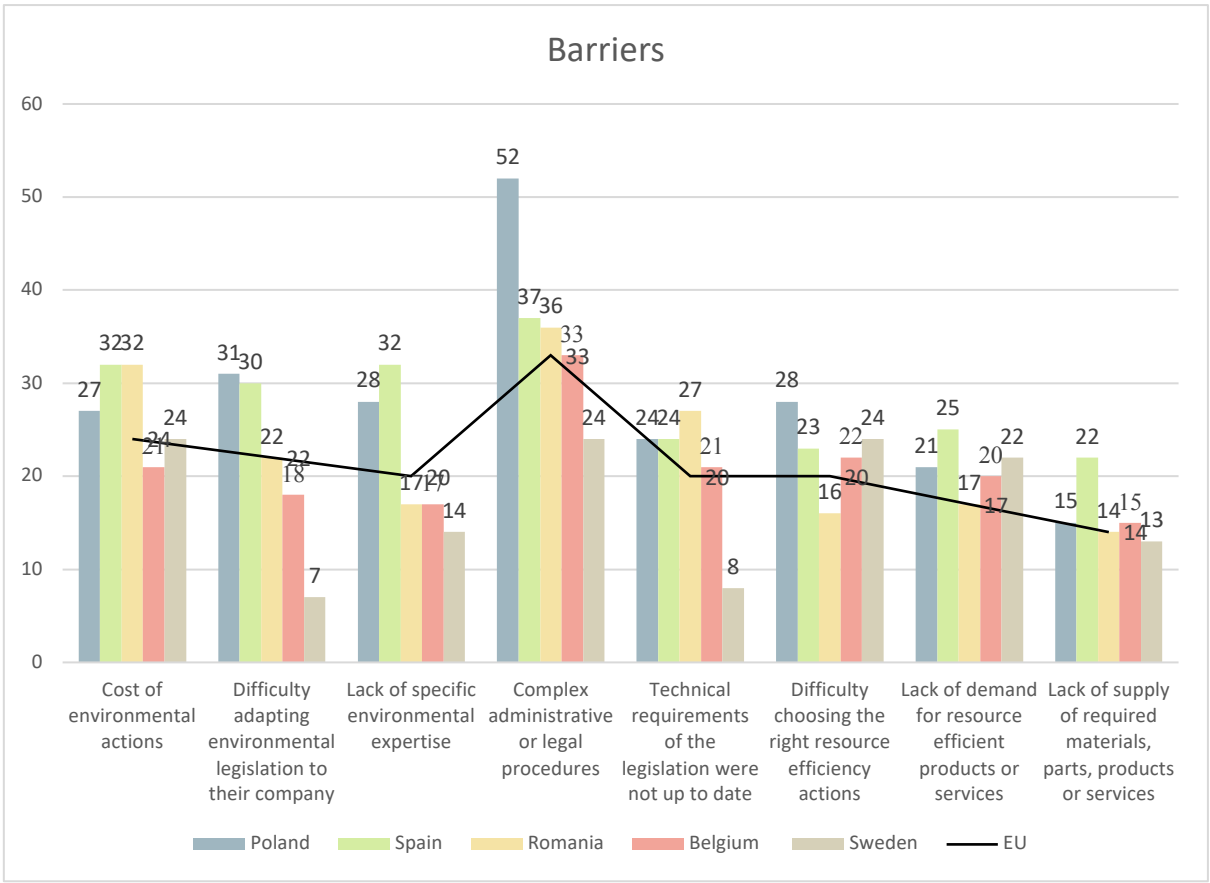

Figure 4. Barriers that the SMEs had to overcome become more resource efficient according to the publication, "SMEs, resource efficiency and green markets"[32]. The numbers on top of the columns represent the percentage. From the left, the first block represents how much the cost of environmental actions represented a barrier for each partner organization country. The second block represents how much the difficulty of adapting the environmental legislation to their company represented a barrier for each partner organization country. The second block represents how much the difficulty of adapting the environmental legislation to their company represented a barrier for each partner organization country. The third block represents how much the lack of specific environmental expertise represented a barrier for each partner organization country. The fourth block represents how much complex administrative or legal procedures represented a barrier for each partner organization country. The fifth block represents how much the technical requirements of legislations that were not updated represented a barrier for each partner organization country. The sixth block represents how much the difficulty of choosing the right resource efficiency actions represented a barrier for each partner organization country. The seventh block represents how much the lack of demand for resource-efficient products or services represented a barrier for each partner organization country. The eight block represents how much the lack of

[32] https://ec.europa.eu/commfrontoffice/publicopinion/index.cfm/survey/getsurveydetail/instruments/flash/surveyky/2151

supply of required materials, parts, products, or services represented a barrier for each partner organization country. *Source: SMEs, Resource Efficiency and Green Markets.*

SMEs face other barriers, including:

- **Consumer Behavior**: It is still quite challenging to change consumer behavior towards products and used components. According to the publication 'The Nordic market for circular economy. Attitudes, Behaviours & Business Opportunities", consumers are still rather adverse when it comes to sharing activities or renting items to others. Consumers remain uninformed about the benefits of organic products, which prevents them from actively contributing to the consumption choices that can lead to the change of the production model.
- **Lack of Harmonization in the Implementation of the Various Policy Frameworks and Taxation Systems**. There should be a strong political will, and a developed unburdensome regulatory framework, as well as an elimination of all excessive public bureaucratization. Besides, there is a high risk that companies will not comply with environmental regulations due to the lack of awareness of the proper procedures and difficulty of cooperation between the public and the private.
- **Lack of adequate infrastructure and support of suppliers networks, which are not involved in sustainable activities**.
- **Innovation Policies do not always create opportunities** to implement **sustainable business models**, that are as circular or green.
- **High Initial Transformation Costs**
- **Lack of a Secondary Supporting Raw Material Market**.
- Lack of Information: Information and awareness campaigns play a pivotal role in such situations. Creating opportunities can start activities in international markets.
- Inadequate Technical Expertise and Standards generate problems such as those caused by the lack of certificates of recognition and product harmonization.

HOW CAN NEW OPPORTUNITIES MAKE THE BUSINESS MODEL MORE CIRCULAR?

SMEs can significantly contribute to developing a sustainable economy through the gradual integration of the principles of the circular economy with their own business models. More circular business models are associated with significant (technological and organizational) innovation and employment potential such as those of the recycling sector; they are also associated with reduced liabilities and firms' warranty costs for the long-lasting, healthier, environmentally friendly products. These models can be divided into four categories with

emphasis on design, use, recovery and organization. The reuse of materials can be cost saving, allowing service models to deliver new business propositions and revenues.[33]

Circular Economy Potential Business Models

Technology and Internet of Things (IoT): IoT allowed the circular economy to develop at a much faster pace. So, for instance, IoT provides easy access to information enabling consumers to directly access data and information that is geographically distant in real time and allowing products to be tracked and secured.

Communication: IoT will improve communication between devices, make interactions more transparent, and reduce inefficiencies, which will allow companies to produce faster and with higher quality.

Cost Savings and Productivity: the use of IoT will help reduce costs and energy, as well as help people, perform their daily routines. So, for instance, fast communication between electronic devices will render business systems more efficient and productive.

Automation: Automation of daily activities and business processes can lead to improving the quality of services.

In-store Shops: This is a concept where one retailer sublets premises to another retailer. So, for instance, a business operating through physical stores can have departments for reparation, rental, or second-hand. This concept can be very valuable, for it can boost the value of the brand together with increasing customer engagement, especially for those of them who find difficulties in locating these kinds of options.

Products as Services/ Platform Sharing Model: Instead of selling products, companies can offer products as services. Product Service Systems include, pay per service unit, product renting or sharing, product lease, and product pooling (most common car-pooling). Companies that adopt this business model can forge closer relations with their customers and can rely more on their loyalty to the company. This model also helps reduce waste and use of energy for the company and can reduce prices for customers, who are expected to pay just for the time, or use of the product.

Membership and Bonus Programs for Customers: To interest customers in circular products and services, companies should implement incentive programs and reward systems, whereby customers can collect points and reap some benefits. For example, H&M has a take-back scheme, which allows customers to swap their old clothes for a voucher; customers receive a 5 Euro voucher to use for the next purchase of 25 Eur or more.

Focus on the Business Models of Remanufacturing, Refurbishing, and Repair (resource recovery model): This model focuses on prolonging the shelf-life of products. This model promises to have economic, environmental, and social benefits, for it lowers the cost of

[33] https://ec.europa.eu/environment/sme/pdf/Training%20materials_English.pdf

production, reduces the consumption of energy and materials, and creates jobs. Customers will also receive lower prices, high-quality products with a longer warranty.

Business Models Based on the Circular Economy Framework

Poland

- **EcoBean** transforms leftover coffee grounds into clean energy products.
- **Zero brine** recovers valuable resources from saline wastewater in the Polish mining industry.

Spain

- **Wool4build** produces natural insulating sheep wool for sustainable construction; it is manufactured and marketed by the Lederval Business Group.
- **Ecoalf** presents the first generation of fashion products made from recycled materials. It is the only Spanish fashion brand that has the B Corp certificate; this confirms that the company is a member of a global community of companies that seek to maximize their positive impact on society.
- **Tallers Esférica** manufactures eyeglass frames from crushed plastic bottle caps**.**
- **Sheedo** designs a planted seed paper, which contains seeds from cotton waste used in the textile industry.
- **Arifieltros** manufactures Geo Panel, which is an insulating panel; 85% of its components are regenerated textile waste.
- **Aquapionners** develops solutions for sustainable urban agriculture, using landless indoor farming technology.
- **Dehesa el Milagro** is a farm that is committed to a sustainable production system. It respects the natural biological cycles of the soil, preserves the fertility of the land, and stops desertification.
- **iUrban** uses old telephone booths to create Wi-Fi and mobile recharge spaces.
- **Second-hand market** in Wallapop, Percentile and Chicfy.
- **Floow2** is a B2B platform for the exchange of unused machinery.
- **Alma de Blues** creates furniture by combining new and recycled materials.

Romania

- **Banca de Alimente Cluj** has a simple organizational model that is inspired by the well-established food bank system. Excess food is collected from supermarkets and restaurants in a specialized van for food transport, which is then stored in logistic centers, distributed to local social charities, or processed as daily meals for people in homeless shelters.
- **Green Group Holding** transforms waste into resources.
- **SG Genesis-Biotech SRL** turns waste into energy by co-generation using biomass.

- **ecoHORNET** develops multi-system burners with ecological combustion procedures to create pyrolysis gas, oil, and biochar.

Belgium

- **HNST** manufactures radically unique denim made of recycled denim fibers.
- **Re-Generation Bvba** resolves the complexity of recycling by using dissolvable threads. Zipper and buttons render garment recycling complicated, for removing such items calls for manual assistance making the process both costly and time consuming; therefore, the company makes a kind of thread that simply dissolves at high temperatures. This thread simplifies the repairing and recycling processes.
- **Le Boentje Cafe**: Two Brussels entrepreneurs have set up the first circular coffee waste that is waste-free; this project shows how zero waste can become a reality and inspires consumers to change their lifestyle. Working only with local suppliers, carefully considering purchases and selecting second-hand furniture and decor, the cafe has been successfully running as well as totally avoiding use of packaging, and setting up closed loops for its supply chains.
- **ISATIÓ -Beyond the fabric-** beautifully crafts what otherwise will go to waste. The Brussels SME, founded by a Barcelonian designer, collects unused textile cloth that would otherwise go to waste and uses it to create unique designer clothes.
- **Elak Electronics** sells its products online, and still it has not used any packaging since 2017. Elak is a family-run electronics store in Brussels, which has adopted a circular approach to its e-commerce activities from the onset. When they set up its web store, the owners immediately realized that they will be receiving and sending a lot of packages; so in order to reduce the amount of packages, they decided to reuse all packaging supplies they have to send their products.

Sweden

- **Re:newcell** dissolves natural fibers into biodegradable pulp. Re:newcell's technology dissolves used cotton and other natural fibers and makes a new biodegradable raw material, re:newcell pulp. It can be transformed into textile fiber, or added to the textile production cycle to meet industry specifications. This creative addition provides the missing link that can transform the way fashion is produced and consumed; it can finally be a never ending loop.
- **Klättermusen AB** makes outdoor clothes and backpacks using recycled polyamide and polyester.
- **Karma** provides surplus food to consumers at a lower price. Karma is a Swedish startup founded in Stockholm. The app connects surplus food from restaurants, cafes and grocery stores to consumers for a lower price. As a result, users eat great food at a lower cost and businesses receive an additional revenue stream, while reducing food waste.

- **ShareWear** showed 340,000 consumers how fashion can be borrowed, not only bought. ShareWear, which is a part of the Swedish Democreativity initiative, was launched to promote sustainable ways to be fashionable. A ready-to-share collection of Swedish fashion items allows consumers to borrow unique clothes- only if they agree to share it forward.
- **Veolia** turns coffee by-product into green energy.
- **SPILL** (Waste) is a restaurant in Malmö that transforms perfectly good food waste into a fantastic lunch menu that varies from day to day for obvious reasons.

THE CAPACITY OF SMES WITHIN A LINEAR ECONOMY, CAPACITY GAPS, AND POTENTIAL WITHIN A CIRCULAR ECONOMY

BY IMPLEMENTING DESK RESEARCH LIST

The Current Capacity of Existing SMEs within the Linear Economy	The Capacity Gaps of these SMEs within the Linear Economy	The Capacity Potential of these SMEs for Market Development within the Circular Economy
Innovation	The Linear Economy allows limited innovations. In exchange for commodities, technical standards present the greatest difficulties; problems arise from the lack of certificates of recognition and product harmonization.	CE allows new comprehensive possibilities and space for innovation.
Working within the linear economy forces business to disengage from other providers.	Hard and difficult cooperation.	Better harmonious relations and collaboration with suppliers and partners.
Serious environmental pollution	Waste problems, and protection system issues.	Reuse of waste products will reduce problems and lower prices.
Own Inventories	Failure to innovate or adapt	Long term financial benefits
Businesses are independent from other suppliers.	Failure to collaborate.	Forge relationships with partners, suppliers and customers.
It is easier to standardize processes, when you operate alone.	Trying to engage new clients and customers is very time consuming.	Reaches out to more customers.
Existing customer base.	No opportunity to resell to customers, or even reuse waste generated by the business.	Promotes innovation.
Low production costs.	Supplier dependency.	Lower the cost of raw material and input components, especially in case there are any restrictions on the availability of particular materials.
Increased sales.	Vulnerability to price fluctuation of raw materials in the international market.	Lower climate impact.
Experience operations in many industries.	Vulnerability to the growing scarcity of raw materials on	Working with recycled materials reduced the risk of

	which production depends.	mining and extracting materials.
Competitive costs of raw materials.	Vulnerability to the growing scarcity of raw materials and increasing prices.	Due to the scarcity of raw materials, there is a growing need to recycle and reuse discarded products and materials.
Consumerism as a mindset, and lack of consumer awareness of circular economy.	SMEs and companies need to think long term, and adopt long-term strategies when engaging and accelerating actions. Consumer behavior change is generational and does not happen overnight.	Increasing customer demand for affordable and sustainable products.
Small firms are more influenced by regulators and local authorities, and are more inclined to improve their environmental performance than larger companies.	Lack of government support and effective legislation.	Creating coherent strategies and measures to consolidate the cooperation between the government and companies (tax facilitation for companies).
Unbalanced demand and supply, frequent price fluctuations, and the scale and speed of growing demand.	A gap between the availability and demand of sustainable resource.	Adopting a circular economy can help companies get ahead of upcoming policy, regulations, pricing of externalities and potential shifts in taxation models[34]. By closely engaging customers and inquiring about the exact use and function of products.
The views of SMEs' owners about "green business" and CE models are quite discrepant.[35]	Although there is considerable heterogeneity among SMEs across different sectors, their responses and capacities to take up a 'green solution', are usually similar in terms of organisational and management regime. The manager is usually the owner of the company and thus has significant power on	Access to finance and suitable sources of funding could be essential for SMEs seeking to improve their sustainability performance. Rethinking the model from linear to circular, it allows to SMEs to retain as much value as possible from resources, products, parts and materials to create a system that

[34] http://docs.wbcsd.org/2017/06/CEO_Guide_to_CE.pdf

[35] The Circular Economy: Barriers and Opportunities for SMEs, Authors Vasileios Rizos, Arno Behrens, Terri Kafyeke, Martin, Hirschnitz-Garbers and Anastasia Ioannou*, CEPS Working Document No. 412 / September 2015

	the strategic decisions of the firm. As such, some SME managers may have a positive attitude towards green business, while others may not.[36] Poor capacity to make a shift in the way business is done from quantity (selling as many products as possible) to quality (creating a business model around a product's longevity and closing resource cycles). [37]	allows for long life, optimal reuse, refurbishment, remanufacturing and recycling – as opposed to a model which can be characterized as: "take-make-dispose.[38]
Most of the regular business models are based on adding value to a particular product (i.e. by assembling bicycles from various parts). They do not think of retaining access of end product, or of its parts and materials[39]. This is due to SMEs' capacities to adopt green business models depend on the financial resources to establish and manage a recycling scheme collection and recycling of waste.	There are "hidden" costs that businesses need to overcome to make environmental improvements such as time and human resources. SMEs face difficulties in obtaining collateral or guarantees required by banks that often consider financing SMEs a risky business.	CE offers SMEs business opportunities to increase their resource efficiency, and opens up new markets.

[36] The Circular Economy: Barriers and Opportunities for SMEs, Authors Vasileios Rizos, Arno Behrens, Terri Kafyeke, Martin, Hirschnitz-Garbers and Anastasia Ioannou*, CEPS Working Document No. 412 / September 2015

[37] https://ec.europa.eu/environment/sme/pdf/Training%20materials_English.pdf

[38] https://ec.europa.eu/environment/sme/pdf/Training%20materials_English.pdf

[39] https://ec.europa.eu/environment/sme/pdf/Training%20materials_English.pdf

A.1.4

IDENTIFYING THE CURRENT RESTRICTIVE RULES AND REGULATIONS WITH THE CE FRAMEWORK

Country Specific Restrictive Government Rules and Regulations

Poland

Barriers:

- **Lack of funds and difficult access to the capital**- SMEs face difficulties when they attempt to invest in eco-innovative technologies due to its high cost.
- **Insufficient R&D** and inadequate involvement and participation of educational institutions to enhance innovation.
- **Companies unawareness** of the benefits of CE as a result of implementing sustainable and innovative solutions.
- **Customers unawareness** of the benefits of CE. SMEs can change their attitudes and start implementing eco-innovations, but so far, customers have not been considering environmental benefits when purchasing.
- **Public Procurement Law and Practices** do not focus on innovation, but rather on the price as a dominant selection criterion.
- **Linear economy business models have the edge over businesses using secondary materials**. It is very challenging for companies operating within a CE framework to compete cost-effectively, provided that the secondary recycled raw materials are expensive. This has proven disadvantageous in public procurement, where price still plays a determinant role.

Circular Economy Initiatives and Policies:

- VAT reduction around 8% decrease in minor repair services, including mending and alteration of bicycles, shoes and leather goods.
- The 2030 Polish National Development Strategy names eco-innovation as a possible area of emerging specialization for the country, placing it in the context of energy efficiency, renewable, and clean energy generation (NDS 2012:75).
- "Dynamic Poland," The Strategy for innovation and Efficient Economy, embraces the objectives of eco-innovation, including increasing resource efficiency in production and services, and adjusting regulatory and financial frameworks to address the needs of the innovative and efficient economy (Dynamic Poland 2014).
- In January 2016, the Polish government established the "Council for Innovation" and "Interdepartmental Working Team for Innovation" to coordinate innovation policies that the government has placed.
- In 2015, there was an Act to support innovation. This legal Act aims to eliminate barriers that restrict innovation within Polish law.
- The central pillar of the Polish environmental protection financing system is the National Fund for Environmental Protection and Water Management.

Spain

Barriers:

- **Lack of governmental support and encouragement** in funding, training, effective tax policies, etc.
- **Lack of regulations** that mandate the substitution of **harmful substances**, and **promote eco-design** aimed at saving resources and energy.
- **Lack of environmental awareness among supplies and customers**
- **Lack of consumer awareness** as to the origins of resources used in manufacturing products, as well as psychological barriers for some consumers to perceive remanufactured products as low-quality products.
- **The consumption of products with programmed obsolescence.**
- **Consumer mentality is based on proprietary models**.
- **Unawareness of the benefits** of CE among many SMEs- SMEs believe that operating in CE will be very costly.
- **The cost of new "green" innovation** and business models is one of the principal impediments to SMEs adopting sustainability practices.
- **Lack of economic incentives** for producers to market greener products and support recovery and recycling plan.
- **Technological and infrastructure barriers** - technical skills, which are not currently present in the workforce, are needed.

Circular Economy Initiatives and Policies:

- Draft of the Spanish Strategy for Circular Economy 2030 (Ministry of Agriculture and Fisheries, Food and Environment, and Ministry of Economy, Industry, and Competitiveness).
- Proposed Draft of Law on Climate Change and Energy Transition (Ministry for Ecological Transition).
- Spanish Bioeconomy Strategy Horizon 2030 (Spanish Government).
- The Action Plan for the Implementation of the 2030 Agenda Towards a Spanish Strategy for Sustainable Development (Spanish Government). Circular Economy is included as a "political lever" to accelerate the implementation of the Development Goals Sustainable (SDG).
- Local Circular Economy Strategy Model (FEMP). Axis of circularity, with transversal policies: Development and implementation of new technologies, sustainable and socially public procurement responsibility, and transparency and shared governance Spanish Urban Agenda (Ministry of Development).
- State Plan for Waste Management Framework (PEMAR) 2016-2022.

Romania

Barriers:

- **The uncertain political landscape**, taxing regulatory framework, and lack of clear definition of terms in the legislation.
- **Financial weakness,** inefficient government administration of legal regulations (i.e., permits, notices, and reports), ineffective legal framework, and inadequate allocation of governmental funds to cope with the large investment needs.
- **Lack of adequate waste management infrastructure** and limited E-tool and data accuracy regarding waste collection.
- **High risk of companies non complying with environmental regulations** due to lack of awareness of proper procedures.
- **Difficulty of establishing cooperation between the public and private sectors.**
- **Low-quality waste** - Romania's recycling industry is facing two serious problems: the quantity of waste needed for processing is insufficient, and the quality of the designs is affected by the way waste is collected.
- **High risk due to the price volatility of raw materials.**
- **Lack of education campaigns** for the general public.

Circular Economy Initiatives and Policies:

- National Strategy on Waste Management 2014-2020.
- "The Green House" program supports households replacing outdated heating systems by purchasing new heating systems that use renewable energy.
- The "Rabia"/ car-scrapping program funded the replacement of polluting cars with new cars with better environmental effect.
- Implementing legislative amendments for packaging and management of packaging waste.
- The National Plan for RDI 2015-2020 foresees prioritised funding of bio-economy, energy, and environment, as well as eco-nanotechnologies and advanced materials.

Belgium

Barriers:

- **Fragmented administrative policies**, and diverse measures installed by every region. There is a lack of harmony between the legislations and legislative measures mandated by the three regions. This discrepancy results in different outcomes and different levels of competitiveness between enterprises.
- **Enterprises lack the willingness to innovate and collaborate**.
- **Low environmental taxation**, which means people are not really motivated to switch to eco-innovation SMEs.

- **SMEs lack technology and technological skills needed in the CE** to facilitate disassembling certain products in order to retrieve useful components.
- **Limited information about the raw materials used**, which limits the possibilities of recycling.
- **Expensive repair parts**, lack of appropriate repair methods, or products designed without reuse potential.
- **Increase of operation costs for selective waste collection** partly caused by new initiatives handling litter.
- **Complex products on the market**, and lack of transparency.
- **Financial barriers - lack of banks' financial support**, and insurance for products needed for the purposes of CE.

Circular Economy Initiatives and Policies:

- On the federal level, Belgium has an action plan with 21 measures to foster CE. These measures mainly focus on encouraging recycling and repairing products, as well as informing consumers. The Federal Office for Economics is also establishing a specific legal framework, e.g. a set of measures to reduce "planned obsolescence".
- Brussels Capital Region has established a Regional Plan for Circular Economy. It aims at translating environmental goals into economic opportunities. The 111 measures are structured around 4 pillars: construction, resources and waste, logistics and retail.
- Flanders Circular, implemented by OVAM, is a partnership of governmental bodies, companies, civil society, experts and academia. This partnership is the driving force behind CE in Flanders.
- In Wallonia, CE measures are formulated in the Marshall 4.0 Plan. CE is one of the five pillars of this plan that mainly aims at energy transition. The Agency for Enterprise and Innovation (AEI) coordinates the measures for CE in the Region and helps companies innovate, e.g. by providing funding of up to 10 000 € for CE projects in Walloon enterprises.

Sweden

Barriers:

- **High taxes**.
- **Consumption of fossil fuel**, high competitiveness related to use of fossil fuels versus the high cost of more sustainable and circular alternatives.
- **High private consumption of new goods,** the current economic system makes buying new goods more affordable than fixing or buying used goods.
- **Linear design**, products are designed today in ways that often makes dismantling and reusing their parts very difficult.
- **A number of barriers including remanufacturing, consumers' perception, technology** and **operations management.**

- **The Food Chain and Food Waste**, throughout the food supply chain including production, transportation, commercialization, and finally consumption, there is a lot of food waste.
- **Lack of information and transparency** is one of the main obstacles impeding consumers from encouraging companies to actively shift towards more sustainable options.

Circular Economy Initiatives and Policies:

- The Fossil-Free Sweden Initiative was launched in accordance with the Swedish government which aimed at making Sweden one of the world's first fossil-free welfare states.
- Climate and Energy Coaches: During the period between 2016-2019, municipalities could apply for help covering the cost of special coaches, who provided targeted advisory services to small and medium-sized enterprises to increase energy efficiency, reduce greenhouse gas emission in an attempt to boost a company's competitiveness and open new opportunities for growth at reduced costs.
- In 2016, the government launched five innovation partnership programs to mobilize society, including public actors, business and academia, to create new, innovative solutions to prompt competitiveness, sustainable development, and creation of jobs.
- The government has been allocating SEK 5 million per year since 2018, to support a delegation for a circular economy to stimulate the transition to a resource-efficient and circular economy.
- In 2016, the government launched a National Strategy for Sustainable Consumption. This strategy focuses on "what the State can do, together with municipalities, the business sector and civil society, to make it easier for consumers to act sustainably".
- To encourage the recycling of goods, the Government proposes a reduction in the VAT rate from 25 % to 12% for repairing bicycles, shoes, leather goods, clothing and household linen.
- Food Strategy - this is a platform that directs the Swedish Food Policy until 2030 to create stability and ensure a long-term plan that includes the whole food supply chain.

European Union

Barriers:

- There is a **clear difference between national legislations regarding economic incentives to recycling**. There should be a unified pant system in Europe that will allow cans and plastic bottles to be recycled in all its member stats.
- There is a **clear difference between national legislations regarding rules of recycling**. Therefore, there should be a unified recycling system implemented throughout the EU.
- There is a **clear difference between national legislations regarding patterns of recycling**. Raise awareness of the origin and enforce definitions for the recyclability of electronic products.

- There is a **clear difference between "best before" legislations, and inconsistent "best before" legislations** in the member states that set incentives for disposing food instead of redistributing it supported by Vat legislations for donated food.
- **Global material flow**, meaning importing products from countries with different legislations regarding emissions, raises consumers' awareness of the impact of products on the local and global spheres, and on the need to reduce consumption.

Circular Economy Initiatives and Policies:

- Europe 2020 strategy Smart, Sustainable Growth and Integrator Emblematic Initiative: "Roadmap to an efficient Europe in the Use of Resources".
- Seventh Environment Action Program (VII WFP) to convert the EU into a low carbon economy, with efficient use of resources, ecological as well as competitive.
- Circular Economy Action Plan. Measures for Circula Economy 2015 and 2018. Fifty-four actions cover the entire cycle; these measures tackle issues of plastics, waste, chemicals, materials critical premiums, and a monitoring framework.
- Paris Agreement on Climate Change (COP 21. 2015).
- The 2030 Agenda for Sustainable Development (2015) - the 17 Sustainable Development Goals (SDGs) - SDG 12 ensure the sustainability of consumption and production modes.
- The New World Urban Agenda (UN-Habitat 2016).

A.1.5

ELABORATIVE AND DETAILED SWOT ANALYSIS OF IDENTIFIED BUSINESS SOLUTIONS, AND ASSESSMENT OF INVESTMENT OPPORTUNITIES WITHIN A CIRCULAR ECONOMY

Detailed SWOT Analysis of the Identified Business Solutions

S STRENGTHS

TECHNICAL

- Increased number of investments in new technology to maintain competitiveness and develop new business methods.
- State-of-the-art technologies and production lines used in the fields of food, pharmaceutical and cosmetics industries.
- Advanced science and R&D workforce, well developed biotechnology research base.

ENVIRONMENTAL

- Waste reduction.
- Improved ecosystems.
- Resource efficiency. Reducing unnecessary waste increases economic benefits as it reduces loss of material and energy consumption.
- Reduction of CO_2 emissions.
- Higher material recovery rate.
- Reduction of food waste.
- Recycling different materials to manufacture new products.
- Wide range and availability of biomass sources.
- High interest and capacity to develop bioeconomy.
- Financially supporting bioeconomy R&D&I project.
- Designing processes to reduce extraction of resources and waste production in order to lessen environmental impacts.

W WEAKNESSSES

TECHNICAL

- Lack of competence in CE, for example, lack of expert calibers in the digital sector.
- Inadequate support from EU and local governments (for example, in fields like bioeconomy).
- Insufficient technologies that can support the transition into CE.
- Insufficient skills. Continued investment in circular product design.
- Current products are not designed for circular business models. Products are difficult to assemble, repair, refurbish, and remanufacture; these characteristics render such products difficult to reuse.
- Redesigning existing products is extremely challenging; it takes a lot of effort in order to reuse, repair or recycle their parts.

ENVIRONMENTAL

- Weaknesses in policy coherence across different levels (i.e., bioenergy and waste policies).
- Few biorefineries with high operational flexibility.
- Insufficient use of bioprocesses, and limited application of modern technologies.
- Low utilization of renewable biological resources for production of materials, packaging, fuels and energy.

ECONOMIC
• Creates more jobs. • Has a higher entrepreneurial potential. • Involvement of government and regional authorities in supporting CE model implementations. • Opens up new revenue opportunities. The change in demand over supply chain can generate new sales and profits. • Improves the company's reputation and becomes better perceived by the public. • Collaboration between industries can increase business opportunities once good business network are established. • Adapting to a circular economy may eventually become mandatory in the future; therefore, starting this process early will definitely give a competitive advantage.
SOCIAL
• Improved health and wellbeing of citizens. • Reduced social inequality.
O OPPORTUNITIES
TECHNICAL
• Encourage product and process innovation. Meet the growing need for research and development (R&D) of subjects including digitalization, electromobility, virtual reality, 3D printing, new materials, and the redesign of existing products. • Develop new biobased products. • Inspiring technological innovation will unlock new possibilities of interaction between companies and customers. • Technology will facilitate processes including assessing the life cycle of materials and products to measure their circularity. • The new CE regulatory framework will guide and spread awareness about the emerging opportunities in the EU and EU countries.

ECONOMIC
• Low level of cooperation between local producers and suppliers. • Market uncertainties: would it pay off to invest in CE, or does it have an unclear future. • High cost and risk to restructure business and transition from a linear business model to a circular one. • Vulnerable due to the interdependency of different industries and supply chains. • Products life cycle assessment is difficult since they take up a lot of time and resources which burden small and medium enterprises. • Using secondary materials can cause unexpected quality concerns.
SOCIAL
• Low public awareness of biological resources' applications and recoverability.
T THREATS
TECHNICAL
• Lack of both horizontal and vertical coordination of policies and practices. Legislations can slow down the transition to CE. • Lack of strategic planning tools needed for the decision making process, as well as the implementation of solutions to achieve the interoperability of data systems within public institutions. • Shortage and difficulties in accessing funds. • Bureaucracy and inflexibility of public authorities. • Absence of experience and expertise in CE context. • Continuous need for innovation. • Insufficient incentives to build sustainable integrated supply chains.

• Encourage research and development projects to provide technical solutions for different types of waste management to optimize consumption of resources (i.e., extraction of precious materials from electric appliances, mobile phones, and tablets, etc.). • Develop regional bioeconomy and bio-economical strategies bioeconomy. • Reduce dependency on fossil fuels. • Adapt to a new context of growing scarcity of raw materials. • Conservation of biodiversity, and development of resource bases. • Development of biorefineries. Growing opportunities to use bioprocesses. • Financing opportunities will be associated with good environmental practices. • Promoting Circular Economy means companies are trying their best to limit global warming, mitigate climate change, and increase their own resilience at the same time.	• Difficulty organizing takeback logistics. • Lack of coherent cross-sectoral bio-economical mindset and strategies. • Legal barriers and uncertainty that impede and delay the implementation of new processes. • Lack of established standards of CE in different industries, which make it difficult for companies to assess their progress in relation to other businesses. There will be a transitional phase until the national and European strategies for Circular Economy are well established within societies. • Resource scarcity.
ENVIRONMENTAL	**ENVIRONMENTAL**
• Developing regional bioeconomy and strategies regarding bioeconomy. • Less dependency on fossil fuels. • Adaptation to a new context characterized by an increased scarcity of raw materials, which is becoming the leading inevitable adapting process • Conservation of biodiversity, further development of resource based management. • Development of biorefineries, and increased opportunities for using bioprocesses. • Financing opportunities should be associated to the implementation of good environmental practices. • Going circular means that companies can do their part to limit global warming and mitigate climate change, and increase their own resilience at the same time.	• Lack of coherent cross-sectoral thinking in regards to bioeconomy. • Legal barriers and uncertainty might create difficulties and delay the implementation of new processes. • Lack of stablished standards for circular economy in the different industries will make it difficult for companies to measure their progress and to compare it with others. There will be a transition phase until the national and European strategies for Circular Economy practices will be well known and used amongst the societies. • Resource scarcity.
ECONOMIC	**ECONOMIC**
• Developing cooperation among local	• CE business models can have high transaction

producers, integrate supply chains using collaborative agreements.
- Creating conditions for the development of urban symbiosis.
- Elevated reputation of businesses that operated within CE.
- Creating new models of consumption based on collaborative economic and service economy solutions.
- Reduce, Reuse, Recycle to reduce overall business costs.
- Benefit from long-term saving using green design and resource efficiency.
- Participate in market competitiveness by leading the circular economy by attracting customers and future employees.
- Growing demand for car-sharing.
- Increased demand for online stores.
- Developing new sustainable macro-regional strategies.
- Growing entrepreneurship and sustainable start-ups, as well as internationalization of SMEs.
- Circular economy specialization is expected to grow, transforming the market and creating new jobs.
- Increased resilience against external shocks.
- Initiating national, regional, and local online platforms for trade by involving different stakeholders.

costs; so, for instance, developing and producing new recycled products can be cost highly, which may lessen or end demand for new products.
- Growing market competition. Green marketing is becoming an influential card to the extent that some companies are relying on it to make more profits, and not because they necessarily care about addressing environmental issues.
- Decreasing sales rate of new products are due to the increased sales of repaired, reconditioned and remanufactured products.
- High volatility and sudden shifts in global market trends.
- Unpredictability of volume of returned products at the beginning can prove difficult to plan and financially forecast.
- High costs linked to takeback of product.
- Severely fragmented value chains and cost-driven competition present real difficulties.
- Volatility of raw material costs.
- Lack of infrastructure.

SOCIAL

- Encouraging social consciousness to increase public interest in sustainability and environmental issues, as well as high quality products.
- Sustainable livelihoods.
- Initiating public-private partnerships to identify solutions for common problems.

SOCIAL

- Limited consumer acceptance; more people are still owning and buying rather than leasing.
- Lack of consumers' awareness; there is a need to educate people about sustainable and responsible consumption to wipe out any negative associations they may have regarding reused or re-valorized material's quality.
- Aging of the farmer population. New farming technologies are introduced by younger generations of farmers.

Investment Opportunities for Identified Business within a CE Framework Per Country

POLAND

- Manufacturing Sector;
- Transportation sector and Road Construction;
- Food Processing;
- IT Hardware Sector;
- Mining Industry;
- Packaging Sector.

SPAIN

- Eco-design;
- Industrial Symbiosis;
- Sharing Economy (selling services instead of products);
- Reverse Logistics;
- Remanufacturing.

SWEDEN

- From Product-to-Service Model;
- Remanufacturing, Refurbishment and Repair Services;
- Transportation and Automotive Sector;
- Biomass and Food Sector;
- Internet Based Services.

BELGIUM

- Sharing Economy;
- Eco-design;
- Bank and Insurance Products Fit for CE.

ROMANIA

- Electronic Waste Trading Platforms / Information Technology Sector;
- Development of Thematic Clusters for the CE;
- Rural Development for Macro-Regions;
- Renewable Energy;
- Transportation Sector and Road Construction;
- Designing Smart and Green Products;
- Using Energy Labeling;
- Food Processing;
- Strengthening the Guarantees Offered to Consumers who purchase Online Goods;
- Use of Advanced Manufacturing Facilities that generate Cleaner Production.

A.1.6

IDENTIFYING THE 5 MAIN AREAS WITH ENTREPRENEURSHIP POTENTIAL, AND ADEQUATE BUSINESS STRATEGIES TO BRIDGE THE FUTURE GAP BETWEEN DEMAND AND U-ECO INSPIRED ENTREPRENEURIAL BUSINESS SOLUTIONS

Identifying the 5 Main Areas with Entrepreneurship Potential

Country Specific Information on Entrepreneurship Potential

- **Which areas have the highest market growth potential within the CE?**	Poland	• Agriculture • Production • Mining • Energetics • Construction (architecture) • Transport
	Spain	• Critical Raw Material
	Romania	• Food Sector • Sustainable Energy Development: compost, sludge material • New Technologies • Agriculture, Forestry and Fishing[40]
	Belgium	• Raw Materials • Production • Logistics • Retail
	Sweden[41]	• E-Commerce • Beauty Sector • Biomass and Food • Manufacturing • Plastics • Consumer Goods • Construction and Housing • Transport • Fashion Industry
Which areas show a balance between offer and demand?	Poland	• Production
	Spain	• Plastics
	Romania	
	Belgium	• Raw Materials • Logistics • Production
	Sweden	• Fashion Industry • Food • Digital Sector/ IT & Telecom Industries • Construction and Housing

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Which areas have more potential to create profitable business opportunities in a CE framework?	Poland	• Production • Service Sector (especially in construction) • ICT SMEs
	Spain	• Biomass and Bio-based Products • Food waste • Water Treatment
	Romania	• Waste Management Sector • Energy Sector • Agricultural and Fisheries Sector[42] • Green Fiber Recycling • Glass Recycling establishment of glass collection schemes • Food Processing to generate biogas • Cooperatives promoting and selling local products with biodegradable or reusable packaging.
	Belgium	• Production • Logistics • Retails
	Sweden	• Transport • Packaging and Recycling • Food • Digitalization and Robotics • Construction
Which areas produce the biggest volume of waste materials?	Poland	• Mining and Quarrying • Manufacturing • Energy Sector • Construction and Demolition • Household
	Spain	• Construction and Demolition • Textiles
	Romania	• Construction and Demolition • Plastics (recycling rate was 1% in 2016)[43] • Waste of Mining and Quarrying, as well as minerals' physical and chemical treatment[44] • Municipal Waste • Food Waste • Wastes from Parks and Gardens
	Belgium	• Logistics • Retail
	Sweden	• Mining • Construction and Demolition • Households

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		• Waste from water treatment and disposal and materials recovery • Service activities • Energy and Infrastructure
Which identified areas have a bigger impact on society by transitioning into a CE?	Poland	• Waste produced in factories mainly using coal
	Spain	• Biomass and bio-based products: agriculture and food industries
	Romania	• Waste collection and sanitation • Social Entrepreneurship • Water management system access to utilities (in rural areas)
	Belgium	• Raw Materials • Retail
	Sweden	• Packaging • Transport • Consumer goods • Electronic and electrical equipment • Digitalization
Which identified areas have a bigger impact on climate change adaptation, and mitigation by transitioning into a CE?	Poland	• Energy
	Spain	• Reduce the amount of biomass going to landfill • Water availability • Increasing the efficiency of agricultural processes
	Romania	• Waste collection and sanitation • Plastics • Biomass resources and energy production • Agriculture, forestry, and fishing
	Belgium	• Raw Materials • Logistics
	Sweden	• Food • Textiles • Electric and electronic equipment (EEE) • Building, construction and demolition • Furniture • Packaging • Transport

Main Priority Areas with Entrepreneurship Potential

Country Specific Information

Poland	Spain	Romania	Belgium	Sweden
Agriculture Industry Services Construction (Buildings) ICT	Biomass and Bio-based Products (forests and agricultural activities) Water Treatment and Reuse Food Waste Plastics and Other secondary Materials Construction and Demolition	Renewable Energy Food Waste Plastics and Other secondary Materials Construction and Demolition Disposal of Electronic and Electrical Equipment Digitalization and Online Platforms	Circular Input Production Raw Materials Recovery Extension of Working Life (Eco-design) Sharing Platforms Product as a Service	Food and Biomass Transport Textiles Disposal of Electronic and Electrical Equipment Digitalization

Food and Biomass (Agriculture, Forest, Food and Energy)

Biomass and bio-based products have great sustainable growth potential. They provide multiple solutions, including nutrient recovery, innovative materials, and the production of renewable energy. Biomass can be extracted from various sources such as agriculture, forests, food waste, or water treatment, among others. Capitalizing on the opportunities closed systems, biorefineries, domestic animal production side streams, and field biomass offer can generate new businesses. By-products, streams, and wastes of the food industry can be converted into added-value food ingredients and bioactive products, bio-chemical, bio-materials (packaging), and biofuels[45].

In Spain, agricultural activities make a large amount of **biomass and bio-based products** available that generally would go to waste. Recovering their value would add extra economic

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benefits to agriculture, help rural communities preserve their traditional lifestyles, and promote sustainable food production.

The **forest** industry often **replaces products based on fossil material,** with products based on renewable raw materials, which are recyclable and biodegradable. The **Energy** needed for production is mainly based on tree residues; chemical industries use other by-products. **Textile fibers** are also produced and can provide alternatives to replace fossil fuels[46].
Sweden, for instance, has extensive expertise in **bioenergy**, which is the country's leading energy source accounting for 36% of total energy consumption. Moreover, the food sector has set a national strategy to change its supply chain[47] and used food waste to produce energy. However, despite the Swedish national food strategy to improve its supply chain, concrete action and sector-wide cooperation are still lacking.
In Romania, agriculture, forestry, and fishing represent a sector that constitutes 4.4% of the GDP and contributes 0.7 pp to the country's economic growth after it has seen an 18.3% volume increase in 2017[48]. Agriculture and distribution of organic products have great potential, especially with the improvement of performance evaluation systems and the emergence of local distribution markets.

Plastics, Secondary Materials, and Innovation

Plastics is one of the growing sectors due to its increasing volume of waste and recycling rate. Plastics and secondary materials are key priorities in the EU action plan to implement Circular Economy[49]. Efforts are made to maximize the recovery of these materials. Plastics, in particular, are generally related to the packaging sector, which is directly connected to **societal and individual perceptions**, as well as **efforts to promote sustainability** and circularity, and recycling.
Packaging and recycling sectors are relying on innovative methods in an attempt to use more sustainable and non-toxic raw materials. This is particularly important within the food sector, where new, biodegradable, thinking and/or lighter packaging materials can be fully reused, recycled or recovered as energy sources hoping to reduce the environmental footprint of the food industry and contribute to food safety and shelf-life, preserve taste and boost the competitiveness of the food and packaging industries.
Sweden has a long, successful, and efficient history of **recycling** (99% of all household waste is recycled). Thus, the active organizations' expertise within this field can be easily hypothesized and used in other sectors[50]. Moreover, the Swedish government is tightening its national policies regarding plastics and is pushing it through the EU as well. In total, 53% of plastic materials are recycled; however, primarily due to the incineration of plastics, only 15% of its original value is retained.

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In Spain, the society has recently become more concerned about environmental issues related to marine littering demanding better waste management and a recycling system. In this context, solutions to use recycled materials will probably be well received in the market. The recovery of critical raw material is an area that will become increasingly important as the demand for certain materials will soon be challenging to meet.

Digitalization, Sharing Platforms, and Services

In Sweden, the **whole digital sector** is relatively young yet quickly developing. According to the Almega publication[51], there will be a shortage in the digital sector. Within a five-year perspective, we can expect an increased need for at least 70,000 people by 2022. **Digitalization** increased the interaction with customers and members of the public, which is placing new demands on operating companies, and opening new opportunities for entirely new business models.
Sharing platforms tend to enable more intensive use of products; shared use offers access to products while maintaining ownership and enjoying all the benefits of a closed circuit. As such, these platforms are likely to play an essential role in developing new business models.
Digitalization will create new **jobs**, which are more likely to emerge in Sweden if the society and the business sector as quick to make the necessary transitions[52].

Water Treatment and Reuse

Water treatment and reuse address **water scarcity** while simultaneously **recovering valuable resources** needed in a circular model. Both water and sewage sludge can be reused. Sewage sludge can be used both in agriculture and in energy recovery.
Water reuse contributes to the broader water sector, which is one of the key components of the EU **eco-industrial landscape**. The world water market is rapidly growing; it is estimated to reach €1 trillion by 2020. Therefore, water reuse presents significant potential in terms of **creating green jobs in water-related industries**. It is estimated that a 1% increase in the rate of water industry growth in Europe can create up to 20,000 new jobs[53].
The primary **sewage sludge** treatment method varies within the EU. Currently, it is used as fertilizer for agriculture (Ireland, 79% of total dry mass, 2017), composting (Estonia 84%, 2016), incineration (the Netherlands, 98%, 2016), and the landfill (Malta, 100%, 2017)[54].
In Romania, the highest expenditure for environmental protection was recorded in waste management by specialized producers, accounting for 77.5% of its total spending. The largest investments in environmental protection were recorded in wastewater management, constituting 78.0% of total investments. In rural areas, water management system access is still needed.

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Construction and Demolition

Construction and demolition are two of the most significant sources of **waste** in Europe. Many of the materials are recyclable or can be reused; however, reuse and recycling rates currently widely vary across the EU. Construction and demolition waste fall under a mandatory target according to the Waste Framework Directive (2008/98/EC), Article 11.2.
In an attempt to bring these materials back into the economy and preserve their value as much as possible, there is a focus on architectural designs, construction materials, selective demolition of buildings to allow the separation of recoverable fractions and hazardous materials, and quality assurance schemes to build up trust in recycled materials[55].
Eco-design, in this sector with increasing use of more sustainable and innovative materials, is slowly developing. Modern building techniques enable an increase in building using **wood**. There are significant CO2 savings to be made when using timber in the construction of houses and other buildings, in terms of CHC emissions, embodied energy, and energy efficiency. Products made of wood have an eco-efficient life cycle. At the end of their life cycle, they can, in most cases, be recycled, thus extending the carbon storage effect, and/ or can be used as carbon-neutral fuel in cascade use substituting fossil fuel.
In Sweden, the **construction and housing** sector is responsible for the majority of waste, of which only 50% is recycled[56]. Most Swedish construction companies are still exploring how to shift their business models to become circular; it is clear that they are willing to transition and change. The Swedish sector has a long history and a good reputation in using sustainable and bio-based materials. So, although the concept of CE might not be fully integrated yet in their business models, there still is a great foundation to build on to succeed.

Other Cross-Cutting Opportunities

- Renewable energy;
- Manufacturing;
- Fashion industry and textiles;
- Transport.

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