Interreg CENTRAL EUROPE

Co-funded by the European Union

CURIOST

Circular design and development of Sustainable products in 4 key sectors in Central Europe

Version 1

DECEMBER 2024

ANALYSIS OF LATEST LEGAL + POLICY FRAMEWORK ON EU LEVEL

DELIVERABLE 3.1.2.

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1. INTRODUCTION

Project CURIOST is funded by INTERREG Central Europe Programme and aims at enabling SME and small mid-caps to exploit their potential in innovative sustainable product development and profit from matching business cases in the 4 key sectors which are highly relevant in partner regions:

- Mechanics and mechatronics
- Packaging
- Plastic
- Construction and building

CURIOST project integrates two-fold approach which aims to develop a comprehensive strategy targeting its uptake by minimum 140 SME and small midcaps, followed by transformation of this strategy into an action plan developed and adopted by policymakers to serve local businesses. Its main goal is to initiate the change in all sectors of the partner regions in Central Europe which will result in creating universal solution of matching business cases and will accelerate the green transition in the Central European economy.

Further on, project partners made research and analysis of national and European regulatory framework. The Strategic Framework provides overview of relevant European and national regulations, policy documents and S3 strategies for respective project regions and available targeted sectors (mechanics & mechatronics, plastic, packaging, construction and building), linked to the topic of the CURIOST project. It consists of aggregation of transnational policies and strategies for seven partner countries in the CURIOST Interreg Central Europe project and it shows the relevant current policy status towards circular economy and sustainable product development in area of Central Europe. Therefore, Activity 3.1. has two deliverables:

- D 3.1.1 Analysis of S3 strategy of the participating regions/countries (NUTS0/2)
- D 3.1.2 Analysis of latest legal + policy framework on EU level.

Activities A1.1 and A3.1 are the foundation for future CURIOST Action Plan which will be prepared in a manner of transnational cooperation between project partners. The CURIOST Action Plan will recommend key measures to support the uptake of sustainable product development solutions by SME and small midcaps in four targeted manufacturing sectors and will be addressing policy makers and governance institutions. This jointly developed action plan will have 'regional chapters' summarised for each partner region which will encompass strategic results and deliverables of A1.1 and A3.1. Such action plan will be project and communication objective which will serve to inform public policy on topic, to change the opinion of certain stakeholders and to raise public awareness on specific issues.

2. EUROPEAN REGULATORY FRAMEWORK

For integrated strategic framework it is important to provide short overview of regulations that are binding for all member states equally. Some of them we referred to in this document are:

Action plans:

- New Circular Economy Action Plan

Regulations:

- Eco-design for Sustainable Products Regulation Proposal
- European strategy for plastics in circular economy

Sector specific:

- Harmonised conditions for the marketing of construction products Regulation Proposal
- Packaging and packaging waste Regulation Proposal
- Regulation on machinery

2.1. New Circular Economy Action Plan[1]

New Circular Economy Action Plan brought by European Commission, provides a comprehensive overview of proposed measures and steps for easier transition to circular economy in European Union. New Circular Economy Action Plan proposed improvement measures for diverse types of industries, mentioned below are some important in the context of Interreg CURIOST project:

Packaging:

The Commission will propose mandatory essential requirements for packaging to be allowed on the EU market and consider other measures, with a focus on:

- reducing (over)packaging and packaging waste, including by setting targets and other waste prevention measures.
- developing design for re-use and recyclability of packaging, including considering restrictions on the use of some packaging materials for certain applications, where alternative reusable products or systems are possible, or consumer goods can be handled safely without packaging
- considering reducing the complexity of packaging materials, including the number of materials and polymers used.

Plastics:

[1] https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1583933814386&uri=COM:2020:98:FIN

Key goal of the European Commission is to reduce the presence of microplastics in the environment by taking the set of measures and establishing framework on use of plastics and added microplastics in all relevant stages of product lifecycle.
Furthermore, the Commission will address emerging sustainability challenges by developing a policy framework on:

- sourcing, labelling and use of bio-based plastics, based on assessing where the use of bio-based feedstock results in genuine environmental benefits, going beyond reduction in using fossil resources.
- use of biodegradable or compostable plastics, based on an assessment of the applications where such use can be beneficial to the environment, and of the criteria for such applications. It will aim to ensure that labelling a product as 'biodegradable' or 'compostable' does not mislead consumers to dispose of it in a way that causes plastic littering or pollution due to unsuitable environmental conditions or insufficient time for degradation.

Construction and building:
European Commission promotes measures to improve the durability and adaptability of built assets in line with the circular economy principles for buildings and developing digital logbooks for buildings, considering a revision of material recovery targets set in EU legislation for construction and demolition waste and its material-specific fractions and promoting initiatives to reduce soil sealing, rehabilitate abandoned or contaminated brownfields and increase the safe, sustainable and circular use of excavated soils.
For circular economy action plan providing a sustainable product policy framework is emphasized, which recons that consumers have information about repairability and durability of products.
Since mechanics and mechatronics is not listed as a separate sector in the document, the paragraph on Electronics and Information and Communication Technology will serve as a good example for the sector. Emphasis is on promoting longer product lifetimes, making electronics as a priority sector for implementing the "right to repair", with stronger restrictions of hazardous substances in electrical and electronic equipment.

2.2. European strategy for plastics in circular economy[2]

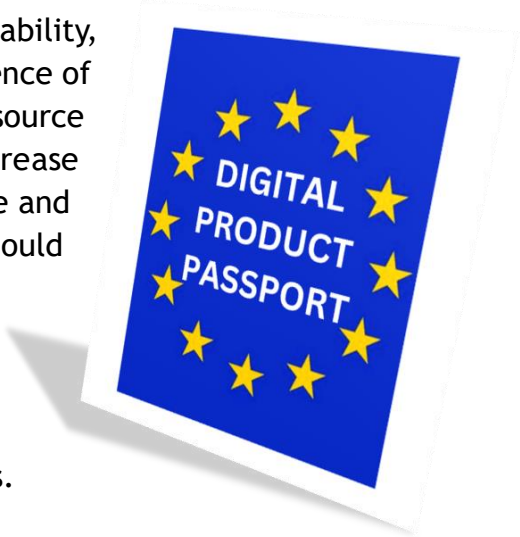
According to the strategy for plastic in circular economy, emphasis should be placed on smart, innovative and sustainable plastics industry, where design and production fully respect the needs of reuse, repair and recycle, brings growth and jobs to Europe while helping to cut EU´s greenhouse gas emissions and dependence on imported fossil fuels. By 2030, all plastics packaging placed on the EU market should be, either reusable or can be recycled in cost-effective manner. It has a goal to recycle more than half of plastics waste generated in Europe, while continuing to invest and modernize recycling capacities. That way recycled plastics can become valuable feedstock for industries, both at home and

[2] https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1516265440535&uri=COM:2018:28:FIN

abroad, while other industries such as chemical industry works closely with plastics recycles to help them find wider application for their outputs. In the European union, citizens, governments and industry support more sustainable and safer consumption and production patterns for plastics.

2.3. Eco-design for sustainable product regulation[3]

Eco-design for sustainable products regulation is particularly important regulation in the context of CURIOST project and the topic of sustainable product development. Regulation should provide for the setting of new Eco-design requirements to improve product durability, reliability, repairability, upgradability, reusability and recyclability, refurbishment, address the presence of hazardous chemicals in products, increase the energy and resource efficiency, reduce the expected generation of waste and increase recycled content in products while ensuring their performance and safety. Practices associated with premature obsolescence should be addressed by Eco-design requirements.



Source: ConPlusUltra Illustration, 2024

This Regulation should enable the establishment of repairability or durability scores for products where such scores are deemed appropriate for the purpose of providing environmental benefits and clearer information for consumers. Regulation requires the issuing of digital product passport which will be valuable tool for making information available to all actors along the value chain. To that end, it is important that the digital product passport be user-friendly, and that the data contained therein be accurate, complete, and up to date. The digital product passport should, where necessary, be complemented by non-digital forms of transmitting information. Manufacturers of products will be responsible for following standards set by this regulation and regarding information and descriptions that enter the digital product passport. In the context of Eco-design regulation relevant provisions are establishing user-friendly websites where access to data included in digital product passport will be available. In further stages, the CE marking should indicate the product´s conformity with Regulation, which should apply to all products on the internal market. Green procurement gets more attention through implementing this Regulation. Most importantly, improvements will be visible for consumers and manufacturers, since it should be ensured that products do not become prematurely obsolete, that spare parts and information on repair are available for all products, as well as software and operating systems updates.

[3] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32024R1781&qid=1719580391746

2.4. Regulations for laying down harmonized conditions for the marketing of construction products[4] (the Construction Products Regulation or CPR)

The Construction Products Regulation ensures the smooth functioning of the single market and the free movement of construction products in the EU. It does so through harmonised technical specifications, which provide for a common technical language on how to test and communicate the performance of construction products (e.g. reaction to fire, thermal conductivity or sound insulation). The two general objectives of the Construction Products Regulation revision are to:

- achieve a well-functioning single market for construction products and to
- contribute to the objectives of the green and digital transition, particularly the modern, resource-efficient and competitive economy

Regulation should develop and apply assessment methods for calculation of the environmental sustainability of construction products. Important in the context of CURIOST project is providing 3D printing dataset, where 3D printing of construction products should have level of safety like one ensured for ordinary construction products. These objectives can rather be better achieved at Union level by establishing a harmonised assessment framework for the performance of construction products and certain product requirements for the protection of human health and safety and of the environment.

2.5. Regulation on packaging and packaging waste[5]

Packaging is also a key environmental concern. It is one of the main users of virgin materials (40% of plastics and 50% of paper used in the EU is destined for packaging) and accounts for 36 % of municipal solid waste. Data from Eurostat and market data reports show increased use of packaging design characteristics that may inhibit recycling. Packaging is 'unrecyclable' when it cannot be separately collected, or it poses challenges for state-of-the-art sorting and recycling processes in the EU. This regulation complements the Regulation (Ecodesign for Sustainable Products) to establish additional or more detailed requirements for packaging, particularly in relation to packaging minimisation when design or re-design of products can lead to environmentally less impactful packaging. In line with the Green Deal, the new Circular Economy Action Plan (CEAP) commits to reinforcing the essential requirements for packaging in view of making all packaging reusable or recyclable by 2030, and to consider other measures to reduce (over)packaging and packaging waste, drive design for reuse and recyclability of packaging, reduce the complexity of packaging materials and introduce requirements for recycled content in plastic packaging. Reducing negative environmental impacts of

[4] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A52022PC0144
[5] https://eur-lex.europa.eu/legal-content/en/TXT/?uri=CELEX:52022PC0677

packaging waste was supported by civil society and stakeholders as well. The specific objectives are:

- to reduce the generation of packaging waste
- to promote a circular economy for packaging in a cost-effective manner; and
- to promote the use of recycled content in packaging. There are three policy options for based on the external analysis and research:

Option 1 sets out measures to increase standardisation and establishes clearer essential requirements that tend to be pre-requisites for measures in other groups.
Option 2 sets mandatory targets for waste reduction, re-use for certain sectors and minimum recycled content in plastic packaging, requirements to ensure full recyclability by 2030 and harmonised product rules.
Option 3 sets higher mandatory targets than Option 2 and additional product requirements.
This Regulation should apply to all packaging placed on the market in the European Union and to all packaging waste, regardless of the type of packaging or the material used. Packaging should be designed, manufactured and commercialised in such a way as to allow for its reuse or high-quality recycling, and to minimise its impact on the environment during its entire life cycle and the life cycle of products, for which it was designed.

In relation to the different packaging materials, the lowest input of recycled materials is in plastic packaging. In order to address these concerns in the most appropriate manner, it is necessary to increase the uptake of recycled plastics, by establishing mandatory targets for recycled content in plastic packaging at different levels depending on the contact sensitivity of different plastic packaging applications and ensuring that the targets become binding by 2030. Waste prevention is the most efficient way to improve resource efficiency and to reduce the environmental impact of waste. It is important therefore that economic operators take appropriate measures to reduce the waste generation by eliminating excessive packaging and restrict the use of certain packaging formats, extending the life span of packaging, re-designing products so that no packaging or less packaging can be used, including bulk sales, and by shifting from single use packaging to reusable packaging. Producers should be able to exercise those obligations collectively, by means of producer responsibility organisations taking up the responsibility on their behalf. Economic operators who put noncompliant packaging on the market or who do not comply with their obligations should be subject to penalties to increase public trust in packaging placed on the market. It is therefore necessary that Member States lay down effective, proportionate and dissuasive penalties in national law for failure to comply with this regulation.

Thanks to this regulation the measures cover full life cycle of packaging, environmental sustainability and labelling, to allow its placing on the market, as well as for the extended producer responsibility, collection, treatment and recycling of packaging waste. This regulation contributes to the efficient functioning of the internal market by harmonising national measures on packaging and packaging waste in order to avoid obstacles to trade,

distortion and restriction of competition within the Union, while preventing or reducing the adverse impacts of packaging and packaging waste on the environment and human health, on the basis of a high level of environmental protection. Regulation does not affect just manufacturers and industry stakeholders, but also consumers and their habits.

2.6. Regulation on machinery[6]

Regulation (EU) 2023/1230 represents a significant step forward in machinery safety regulations within the European Union. This new regulation, set to replace the existing Machinery Directive 2006/42/EC on January 20, 2027, introduces a comprehensive framework designed to enhance safety standards, streamline compliance processes, and foster innovation in the machinery industry. One of the key changes brought about by the new regulation is the expansion of its scope. It now covers a wider range of machinery products, including those not previously included under the Machinery Directive. This expanded scope aims to address emerging technologies and ensure that all machinery placed on the EU market meets high safety standards. The new regulation also introduces a more stringent risk assessment process for manufacturers. This process requires a detailed evaluation of potential hazards associated with machinery, leading to the implementation of effective risk mitigation measures. Additionally, the regulation mandates the creation of comprehensive technical documentation, which serves as a valuable reference for both manufacturers and users. Conformity assessment procedures have been streamlined under the new regulation. Manufacturers will be required to demonstrate compliance with essential health and safety requirements through various means, including self-declaration, third-party conformity assessment, or a combination of both. This approach aims to reduce administrative burdens while ensuring that only safe machinery reaches the market. Market surveillance activities have also been strengthened under the new regulation. Competent authorities will be empowered to conduct more rigorous checks on machinery products to verify compliance with safety standards. This increased oversight will help to identify and address potential safety issues, ensuring that non-compliant machinery is removed from the market. For businesses operating within the EU, the new regulation presents both challenges and opportunities. While it imposes stricter requirements, it also provides a clear and harmonized regulatory framework that can facilitate international trade. Manufacturers, importers, and distributors will need to adapt their processes to comply with the new rules, but this investment in safety and compliance can also lead to long-term benefits.

In conclusion, Regulation (EU) 2023/1230 marks a significant milestone in machinery safety within the EU. By introducing a more comprehensive and rigorous regulatory framework, the EU aims to create a safer working environment and protect consumers from potential hazards. As the implementation date approaches, businesses should

[6] https://eur-lex.europa.eu/eli/reg/2023/1230/oj

proactively prepare for the changes and embrace the opportunities presented by this new era of machinery safety.

This chapter provided a detailed analysis of European regulations that are important for four sector CURIOST Interreg project is refers to. Since some of these regulations are relatively newly adopted in the legislative process, many member states did not yet implement them in their respective national legislations. Next chapter will provide us a cross-country analysis in seven partner countries on the project, of European directives that are already introduced into national legislations and their implementation.

3. Cross-country analysis of European directives implementation

In recent years, the European Union has taken significant strides in shaping corporate sustainability, environmental protection, and product safety through a series of directives and regulations. Project partners selected below listed directives for their national or regional analysis. Therefore, they stand out as the most relevant in the context of CURIOST project in Central European countries:

- The Corporate Sustainability Due Diligence Directive (CSDD)
- The Corporate Sustainability Reporting Directive (CSRD)
- The Reduction of the impact of certain plastic products on the environment
- Common rules on promoting the repair of goods
- Energy performance of buildings

3.1. Austria

As a member state, Austria has proactive approach in adapting these EU-level policies to its national context. It has actively incorporated EU´s Single Use of Plastics Directive (Einwegkunstoffrichtlinie) and amendments to Waste Management Act. This legislative action has led to significant changes in the Austrian market, including the banning of various single-use plastic products such as cutlery, plates, and straws. Innovation plays a crucial role in Austria's implementation of the Single Use of Plastics Directive. The government has established funding programs to support businesses in developing alternatives to single-use plastics, fostering a culture of innovation in sustainable packaging solutions which helps in achieving the directive's goals.
In the Upper Austrian waste management law, there is a guidance for waste prevention at events. Instead of single use table wares event organizers should make reusable ones, especially if there are more than 300 attendees. Instead of single use dishes, renewable materials such as carton, wood and paper should be used.
The European Regulation on Machinery proposed to replace the existing Machinery Directive that updates machinery safety in the digital age. Austria is in the process of

aligning its national machinery safety regulations with the proposed EU Machinery Regulation, including updates to its Machinery Safety ordinance (Maschinen-Sicherheitsverordnung). Focus of Austria's implementation efforts has been on addressing the new challenges posed by AI systems in machinery. Comprehensive guidelines for manufacturers on conducting risk assessments for machinery with AI components, ensuring that safety considerations keep pace with technological advancements and robust cybersecurity requirements into its machinery safety framework.
In the context of Common rules on promoting the repair of goods, it is important to mention Repair-bonus program, which represents a significant step toward extending the lifespan of electronic and electrical devices. This initiative demonstrates the government's practical approach to sustainability by offering citizens financial support for repairs. For fixing malfunctioning smartphone, laptop, or household appliance rather than replace it, the program covers half of the repair costs, up to €200 per repair. This substantial support has transformed the economic equation of repair versus replacement, making it financially attractive for consumers to choose the more sustainable option. In such way tax policies are improved, as well as consumer protection rights. In the context of digitalization, many digital platforms are being developed for enhancing efficiency and compliance, particularly in recognizing the digital future of corporate reporting, Austria is in the process of developing a digital platform to facilitate the submission and access of sustainability reports. Additionally, acknowledging the unique challenges faced by smaller companies, Austria has established support programs and simplified standards for SMEs, aiming to aiming to aid their compliance with CSRD requirements without imposing unnecessary burdens.

3.2. Slovakia

Slovakia has detected implementation challenges of directives related to packaging and plastics. In November 2022, the European Commission proposed a revision of Directive 94/62/EC of the European Parliament and of the Council on packaging and packaging waste to improve the prospects of achieving the goal set by the European Green Deal and the new Circular Economy Action Plan to make all packaging on the EU market reusable or recyclable in an economically achievable way by 2030. From 2030 onwards, recyclability will be based on design criteria for recycling that ensures the circular use of the resulting secondary raw materials of sufficient quality to replace primary raw materials. Based on an analysis by the Environmental Policy Institute (September 2023, updated April 2024), waste management in Slovakia continues to lag behind most EU countries. The lack of a long-term waste management strategy and a lack of data have led to a confusing situation. An example is the ban on landfilling untreated municipal waste, which has been postponed several times due to a lack of capacity for its processing. Packaging and plastics are represented in a positive light in this statistic, thanks to some of the measures taken.

Regarding plastics regulation in the Slovak Republic, several European regulations have been transposed into national legislation. Directive on the reduction of the impact of

certain plastic products on the environment was transposed to Slovak legislation with measures to reduce plastics:

- charging for plastic bags (since 2018)
- deposit of PET bottles (since 2022)
- ban on single use plastic packaging (since 2021)

Deposited beverage packaging in Slovakia reached 92% in the second year of operation, which showed that project that had positive environmental impact was extremely successful and well accepted in the population. In the area of plastics and packaging, the Bratislava Region has a similar policy to the rest of Slovakia, as environmental policies regarding plastics and packaging are managed at the national level, mainly through the Waste Act and European Union regulations. However, in the Bratislava Region, certain specifics are manifested due to dense urbanization and higher population concentration. Key points of plastics and packaging policy in the Bratislava Region are:

- Act No. 79/2015 Coll. on Waste: this Act regulates the management of packaging and plastic waste throughout Slovakia, including the Bratislava Region. It focuses on waste prevention, recovery and recycling. The Bratislava Region is a leader in the implementation of plastic waste and packaging collection through recycling programs
- Separate collection and recycling of plastics: separate collection of plastics is actively implemented in Bratislava, which is mandatory for all residents. In cooperation with city districts and waste companies, plastic packaging and other materials are collected for recovery and recycling. At the same time, the region supports educational activities to motivate residents to properly sort waste.
- Single use plastics and reducing their consumption: The Bratislava Region, in accordance with nationwide and European regulations (e.g. the EU Single-Use Plastics Directive), is working to reduce the consumption of single-use plastics.
- Promoting the circular economy: Circular economy projects are also supported in the Bratislava Region. The region invests in technologies and initiatives that enable the effective recovery of plastic waste and its reuse. Recycling and recovery centres in the region help process not only plastic waste from Bratislava, but also from the surrounding regions.
- Supporting local entrepreneurs and reducing plastic waste: local businesses are encouraged to use alternatives to plastic packaging and switch to eco-friendly packaging. For example, some restaurants and cafes in Bratislava have switched to using compostable or returnable packaging.

Further on, in the Slovak Republic, emphasis has increased in recent years on the introduction of common rules to support the repair of goods, which is related to the wider European context. Repairs are an important part of the transition from a linear to a circular economy that focuses on maximizing resource use and minimizing waste. In Slovakia, the implementation of these rules is governed by legislation that is gradually being adapted to EU directives and national initiatives. To protect consumers in the field

of repairs of goods, there are several legal regulations that regulate warranty conditions, liability for defects and the possibility of repairing products. The basic legal framework is enshrined in the Civil Code, specifically in Act No. 40/1964 Coll., and in the Consumer Protection Act No. 250/2007 Coll. These laws ensure that consumers have the right to have goods that break down within the warranty period repaired, either free of charge or at a fair price.
As part of the National Strategy for the Circular Economy, measures are being prepared to promote recycling, reduce the consumption of plastics and other single-use products, and at the same time emphasize repairs and renovations. The circular economy is seen as a key element in achieving sustainable development, as extending the life cycle of products reduces the burden on natural resources and the environment. The Slovak government is therefore taking measures to support small and medium-sized enterprises engaged in repairs and renovations, as well as to educate consumers about the importance of repairs and a longer lifespan of products. This policy is closely linked to European initiatives such as the European Green Deal and the European Circular Economy Action Plan, which support Member States in taking action to reduce waste production and promote sustainable solutions.

3.3. Croatia

Croatian implementation includes overview of directives in sectors of plastics, packaging and construction. Croatia incorporated main provisions of the Single Use of Plastics Directive into its national legislation through the Waste Management Act and a specific Regulation on Packaging and Waste Packaging, Single-Use Plastic Products, and Fishing Gear Containing Plastics (OG 137/23). As a result, several single-use plastic products are banned from being placed on the market in Croatia as of July 31, 2021, when the Waste Management Act became effective. These products include cotton bud sticks, various eating utensils, plates, straws, beverage stirrers, balloon sticks, and food and beverage containers made from expanded polystyrene (EPS), as well as products made from oxo-degradable plastic. Additionally, certain products such as sanitary pads, tampons, wet wipes, and tobacco products with filters must now carry specific labelling that conforms to the Commission Implementing Regulation (EU) 2020/2151. This regulation, which came into effect across the EU on July 3, 2021, dictates the labelling requirements for single-use plastic products to inform consumers about the plastic content and the environmental impact of improper disposal. This regulation is directly applicable in Croatia and does not require transposition into Croatian national law.

The fourth iteration Energy Performance of Buildings Directive (EPBD) aims to accelerate building renovations, reduce energy consumption, and promote renewable energy use in buildings, helping the EU achieve a net 55% reduction in greenhouse gas emissions by 2030 and climate neutrality by 2050. Buildings are significant in this transition, accounting for 40% of energy consumption and 36% of GHG emissions. The recast EPBD, effective from

May 28, 2024, includes goals such as ensuring all new buildings are zero-emission by 2030 and public sector buildings by 2028.
Key objectives include:

- Reducing average primary energy use of residential buildings by at least 16% by 2030 and 20-22% by 2035.
- Renovating 16% of the worst-performing non-residential buildings by 2030 and 26% by 2033.
- Deploying solar energy in all new residential buildings by 2030.
- Decarbonizing heating systems and phasing out fossil fuels.

To support implementation, the construction sector will need more skilled workers, and national building renovation plans should address existing barriers. Funding will come from national measures, EU structural funds, and European Investment Bank instruments. Croatia began implementing the EPBD in 2008, with the Ministry of Construction and Physical Planning (MCPP) and the Ministry of Economy responsible for different aspects. The Building Act (OG 153/2013, 20/2017, 39/2019, 125/2019) of 2013 set the legislative basis for the EPBD, and amendments in 2019 transposed most parts of the Directive (EU) 2018/844.

For sector specific policies in Croatia, it is important to mention construction and building, plastics and packaging in terms of waste management and mechanics and mechatronics. Therefore, Construction Products Regulation (CPR) Regulation (EU) No 305/2011 is transposed by Law on Construction Products which sets strict standards for safety, sustainability and performance, ensuring compliance with national and other EU regulations. Promoting recycled and recyclable materials, reducing waste and encouraging energy-efficient products, the law supports more sustainable building industry. Long Term Strategy for the Renovation of the National Building Stock by 2050 aims to support the renovation of residential and non-residential buildings to achieve high energy efficiency and decarbonization by 2050. It aligns with national and European plans for energy efficiency and climate change, providing a comprehensive roadmap for transforming Croatia´s building stock into an energy-efficient and sustainable sector by 2050.

Concerning the sectors of plastics and waste management, plastics sector is heavily regulated to ensure the transition to a circular economy, with a strong focus on waste reduction, recycling, and minimizing environmental impact. Of particular importance is the Waste Management Plan of the Republic of Croatia for the period 2023–2028, which includes the Waste Prevention Plan. Waste management is regulated by the Waste Management Act (Official Gazette No. 84/2021) and subordinate legislation. For example: The Regulation on Waste Management (Pravilnik o gospodarenju otpadom) is a key piece of legislation in Croatia that provides detailed guidelines and procedures for the management of waste across various sectors, including the plastics sector. By ensuring that plastic waste is properly separated at the source, the regulation facilitates the recycling and reuse of materials. One of the most significant aspects of the regulation for the plastics sector is the emphasis on Extended Producer Responsibility (EPR), that holds

producers accountable for the entire lifecycle of their products, including the post-consumer phase. Ther Regulation on the Register of Environmental Pollution establishes a comprehensive framework for the systematic tracking, reporting, and management of environmental pollution in Croatia. It mandates the creation of a national register that records emissions to air, water, and soil, as well as waste generation and disposal, covering a wide range of pollutants. The Regulation on Packaging and Waste Packaging (Pravilnik o ambalaži i otpadnoj ambalaži, published in the Official Gazette Nos. 88/15, 78/16, 116/17, 14/20, 144/20) is a key regulatory framework in Croatia that governs the management of packaging and packaging waste. This regulation aligns with European Union directives and aims to minimize the environmental impact of packaging by promoting recycling, reuse, and sustainable packaging practices.

For the mechanics and mechatronics sector relevant policies include REACH Regulation (Regulation (EC) No 1907/2006); REACH (Registration, Evaluation, Authorisation, and Restriction of Chemicals) which regulates the use of chemical substances in the EU. It is particularly relevant for the mechanics and mechatronics sector, where various chemicals are used in manufacturing processes and product development. Another relevant directive is Industrial and Livestock Rearing Emissions Directive (IED 2.0) - Directive 2024/1785. For the mechanics and mechatronics sector, IED 2.0 introduces more stringent environmental requirements, particularly for companies involved in the production of machinery and equipment used in industrial and agricultural processes. Manufacturers will need to ensure that their products support compliance with these new standards, which may involve the development of more energy-efficient and low-emission technologies.
To conclude, several national regulations influence the sectors in Croatia to align with the European Union´s broader goals of sustainable product development and the circular economy. Key regulations are: Environmental Protection Act, Waste Management Act, Energy Efficiency Act, Law on Chemicals (Zakon o kemikalijama), Law on Construction Products, Low carbon development strategy of the Republic of Croatia.

3.4. Italy

Italy and national implementation of directives shows another member state with proactive approach in legislative implementation. Starting with Reduction of the Impact of Certain Plastic Products on the Environment (Directive (EU) 2019/904). Italy transposed this directive through Legislative Decree No. 196/2021, which introduces restrictions on the use of single-use plastics and mandates producers to cover the costs of waste management, awareness campaigns, and data collection. This directive significantly impacts the Italian plastics and packaging sectors by driving a shift towards biodegradable materials and encouraging innovation in product design to reduce plastic use. Companies are required to adapt their production processes to comply with these regulations, potentially leading to increased costs but also opportunities for growth in sustainable products.

Common Rules on Promoting the Repair of Goods (Proposal 2023/0155 (COD)) aims to promote the repair of goods as a part of the circular economy, reducing waste and extending the lifespan of products. It includes provisions for ensuring that consumers have access to repair services and spare parts. Italian Considerations recon National Repair Initiatives: While this directive is still a proposal at the EU level, Italy has been proactive in encouraging repair and reuse through various national initiatives and regional programs. For instance, the Italian Ministry of Environment has supported repair initiatives as part of broader circular economy strategies.
Concerning Corporate Sustainability Reporting (Directive 2022/2464) Italy had already implemented similar requirements under Legislative Decree No. 254/2016, which aligned with the previous Non-Financial Reporting Directive. With the adoption of the CSRD, Italy will need to update its legislation to meet the new, more stringent requirements. The CSRD significantly impacts large Italian corporations, requiring them to enhance transparency and integrate sustainability into their business strategies. This will affect sectors such as mechatronics, where companies must report on their environmental impact, supply chain sustainability, and efforts to reduce carbon footprints.
Corporate Sustainability Due Diligence (Proposal 2022/0071 (COD)) on Italian Considerations of National Due Diligence Framework: While the proposal is still under discussion, Italy has been developing frameworks to support corporate responsibility and sustainability. This includes the implementation of voluntary guidelines and codes of conduct that align with the EU's broader goals. Therefore, future impact will be: Once adopted, this directive will require Italian companies to enhance their due diligence processes, particularly in sectors with complex supply chains such as mechatronics and plastics. This will necessitate stronger internal controls and possibly lead to increased costs associated with compliance.

The European Union (EU) has implemented several policies and regulations to promote sustainable product development and the transformation to a circular economy, which are particularly relevant to the Piedmont region in sectors such as Mechanics & Mechatronics, packaging, and plastics. The combination of EU policies and regional strategies provides a comprehensive framework for supporting sustainable product development, circular economy transformation, and innovation in the Piedmont region's targeted sectors. These policies guide the region towards greater sustainability and competitiveness, particularly in the mechatronics, plastics, and packaging industries. Some of most relevant policies are connected to: EU Green Deal and Circular Economy Action Plan, EU Taxonomy for Sustainable Activities, ESPR Regulation, Waste Framework Directive, EU´s Plastic Strategy and support for innovations. Other national and regional strategies that support EU policies are:

- National Strategy for Sustainable Development (Strategia Nazionale per lo Sviluppo Sostenibile (2022)): This national strategy aligns with the EU’s sustainability goals and emphasizes the importance of integrating sustainable practices into industrial

processes. For Piedmont, this strategy supports the region's focus on circular economy practices in key industries.

- National Smart Specialization Strategy (Strategia Nazionale di Specializzazione Intelligente): This strategy aligns with EU strategies by focusing on innovation and competitiveness in strategic sectors. For Piedmont, this includes supporting innovation in mechatronics and plastics, particularly in the development of sustainable and circular economy technologies.

3.5. Germany

Within CURIOST, the key sectors of Germany, Bavaria are oriented to mechanics and mechatronics, plastics and construction and building. The following policies are based on EU legislation and are relevant for the project CURIOST. It is also indicated for which sector the policies are relevant.

Supply Chain Act (Lieferkettengesetz[7]) is the German Supply Chain Due Diligence Act (Supply Chain Act) which regulates corporate responsibility for compliance with human rights in global supply chains. This includes, for example, protection against child labour, the right to fair wages and environmental protection. People in the supply chains, companies and consumers all benefit from fair globalization. The law initially came into force in 2023 for companies with at least 3,000 employees, and from 2024 it will apply to companies with at least 1,000 employees in Germany. First, companies must identify, assess and prioritize the risks in their supply chains. Based on the results, a policy statement is published, and measures are taken to prevent or minimize violations of human rights and damage to the environment. The law sets out which preventive and remedial measures are necessary. Other obligations include the establishment of complaint channels for people in the supply chain and regular reporting on supply chain management. Despite considerable resistance, particularly from parts of the German government, the EU member states agreed on an EU-wide directive on supply chain law (Corporate Sustainability Due Diligence Directive; CSDDD) on March 15, 2024. As soon as the directive for a European supply chain law is adopted, the governments of the respective countries are required to transpose it into national law. Existing supply chain laws, such as the German Supply Chain Due Diligence Act must then be adapted to the content of the directive[8] Supply Chain Act is relevant for all sectors.

Ordinance banning single-use plastics (Einwegkunststoffverbotsverordnung/ EWKVerbotsV)[9] is relevant for sector of plastics. The ordinance is the first step towards implementing Directive (EU) 2019/904 on the reduction of the impact of certain plastic products on the environment (Single-Use Plastics Directive). The directive provides for numerous measures to reduce the consumption of certain single-use plastic products, limit

[7] source: BMAS (1)
[8] source: wifor
[9] source: BMUV

the careless disposal of these products in the environment and improve the management of plastic as a resource. The Regulation implements Articles 5 and 14 of the Directive. Article 5 requires EU Member States to ban the placing on the market of certain single-use plastic products listed in Part B of the Annex to the Directive (cotton buds, cutlery, plates, straws, stirrers and balloon sticks made of plastic, as well as to-go food containers, beverage cups and containers made of expanded polystyrene (also known as polystyrene)) and, in general, products made of oxo-degradable plastic. In addition, Article 14 of the Directive requires EU Member States to adopt provisions on penalties for the bans. The regulation implements the provisions one-to-one. Following referral to the German Bundestag and approval by the Bundesrat, the ordinance came into force on July 3, 2021.

Building Energy Act (Gebäudeenergiegesetz, GEG)[10] is based on the European Energy Performance of Buildings Directive (EPBD) and is relevant for sector construction and building. The GEG integrates requirements from the EPBD into German law. It combines regulations on energy saving, the use of renewable energies and the energy requirements for buildings. It´s aim is to implement the so-called 65% renewable energy target is intended to initiate the switch to climate-friendly heating systems and thus reduce dependence on fossil fuels. The aim is that, in future, new heating systems will only be installed if they generate at least 65% of the heat provided using renewable energies. The new GEG requirements for renewable heating have been in force since January 1, 2024, gradually initiating the switch to a climate-friendly heat supply that is predictable, cost-effective and stable in the medium to long term. By 2045, the use of fossil fuels for heating in buildings will be phased out. From this date at the latest, all heating systems must be powered entirely by renewable energies.

“Right to Repair” (Reparaturgesetz)[11] is currently a draft of a repair law to ensure the availability of spare parts and repair instructions: No repair without spare parts. The law will oblige manufacturers to provide free and transparent repair information for consumers and professionally competent repairers. In addition, manufacturers must keep spare parts for products in stock for at least ten years and make them available within 14 days at a reasonable price so that the repair is also financially worthwhile compared to a new purchase. The law is due to be presented in 2024. Repair bonus in Germany[12] is a publicly funded support program to prevent electronic waste. It is intended to create financial incentives to make repairs to electrical devices cheaper and more desirable for consumers. In line with the motto “Repairing instead of throwing away”, there is currently a regionally limited subsidy for the repair of notebooks, smartphones, tablets, washing machines, dishwashers and other defective electrical appliances. Reimbursement of part of the repair costs incurred can be applied for after the repair has been completed. The aim of this promotion, which was first successfully launched in Austria, is to increase the lifespan of household appliances, which helps to reduce waste, protect the environment

[10] Source: BMWSB
[11] source: BMUV
[12] source: Wertgarantie

and strengthen local repair businesses. The funds for this come from the state. The bonus is currently paid in Thuringia and Saxony. The Bavarian repair bonus was unfortunately rejected in 2022. However, consumer advocates are calling for a nationwide subsidy. In conclusion, the repair law is relevant for the sector Mechanics & Mechatronics.

3.6. Poland

For Poland, analysis of four regulations and directives that have already been implemented or will soon be enacted in the Polish legal system, one for each industry in following order:

- Mechanics and Mechatronics
- Packaging
- Plastics
- Buildings and Construction

For the sector of mechanics and mechatronics, the most relevant document is Regulation (EU) 2023/1230 of the European Parliament and of the Council of 14 June 2023 on machinery and repealing Directive 2006/42/EC of the European Parliament and of the Council and Council Directive 73/361/EEC.
The European Union has also indicated the need to ensure a higher level of protection for workers and consumers. Since production automation requires a complex planning process, the new regulation places greater emphasis on machine safety at the design stage. Another reason for introducing changes is to encourage machine manufacturers to introduce innovations. Increasing the competitiveness of European machine manufacturers on the global market is very important for the entire industrial sector. Unfortunately, the Machinery Directive did not keep up with progress, which caused difficulties in implementing appropriate safeguards in machines. Manufacturers are obliged to ensure that their machines meet all safety and health requirements. The new Regulation (EU) 2023/1230 is a major challenge for the machinery sector, but also an opportunity to improve the quality and competitiveness of products. In order to prepare for the new regulations, manufacturers and users of machinery should familiarise themselves with the content of the directive and check whether their machines meet the new requirements. Level of responsibility also lies on importers and distributors which are responsible for ensuring that machines placed on the market meet the requirements of Regulation. If necessary, appropriate measures should be taken, such as adapting the design, changing the labelling or updating the documentation. In addition, it is necessary to monitor legal and technical developments and use available sources of information and support. Therefore, all participants in the supply chain must cooperate with market surveillance authorities and the products must comply with the regulation. In the event of non-compliance corrective actions are expected, such as withdrawing the products or modifying them. To conclude, the revision of the Machinery Directive is an important step towards ensuring a high level of safety and health protection for machinery users and supporting the development and competitiveness of the machinery sector in the EU. This

revision also aims to facilitate adaptation to changing market and technological conditions and promote sustainable development and digital transformation. At the same time, the new directive will pose a challenge for economic operators who will have to adapt to the new requirements and incur additional costs related to conformity assessment, technical documentation, marking and product updates.

For the sector of packaging, it is important to review Act of 13 July 2023 amending the Act on the management of packaging and packaging waste and certain other acts implemented in Poland and national legislation. Purpose of the Act was to implement the provisions of Directive 2019/904 into Polish legal system. The so-called Plastics Directive (SUP Directive), within the scope of the obligation of the Member State contained in Article 9 paragraph 1 of that Directive to ensure the selective collection of packaging waste generated from single use plastic bottles for beverages with a capacity of up to 3 l (including their caps and lids) at the level of 77% in 2025 and 90% in 2029. The basic duties of the entity representing under the deposit system will include:

- selective collection of packaging and packaging waste in order to achieve the required levels of selective collection.
- collection of packaging and packaging waste from retail and wholesale trade units and other points collecting packaging and packaging waste covered by the deposit system.
- transport of packaging to the entity introducing products in beverage packaging or directly introducing products in beverage packaging and packaging waste to a waste processing plant.
- settlement of deposits with retail and wholesale trade entities and other points collecting packaging and packaging waste covered by the deposit system, in particular financing of deposit payments for the end user.
- financing of the costs of collecting packaging and packaging waste by the entrepreneur running a retail
- wholesale trade entity and another point collecting packaging and packaging waste covered by the deposit system.

Deposit system will be introduced and support selective collection of waste with many legal provisions regarding legal entities providing deposit services, financial contributions and financing the costs of depositing packaging waste. Disregarding provisions of this Act is subject to penalties and sanctions. To conclude, the SUP Act still leaves many doubts regarding interpretation. The first and most important step for an entrepreneur will be to determine whether these provisions apply to them at all, and only then which obligations they will have to fulfil, as well as uncertainty about the final amount of the deposit which makes preparation in advance difficult.

For the sector of plastics in Poland, relevant is Directive (EU) 2019/904 of the European Parliament and of the Council of 5 June 2019 on the reduction of the impact of certain plastic products on the environment (Single Use Plastics). The Act introduces several systemic changes aimed at reducing the amount of waste generated from plastic

products or those containing plastics and their impact on the natural environment (considering the aquatic environment and human health). Every entrepreneur whose activity in any way (e.g. production, intra-Community acquisition/delivery and import/export, use for business, sale) is related to the use of single-use plastics should analyse whether and how the new obligations apply to them. The most important changes introduced by the amendment concerning single-use plastic products: reductions in the use of plastics (beverage cups, lids, covers, food containers), prohibition on placing on the market (cotton buds, cutlery, plates, straws, containers made of expanded polystyrene), labelling, financing the costs associated with the management of waste, raising environmental awareness. The amendment to the Act, even though work on it has been underway for a long time, means that many entrepreneurs will have to introduce changes to their activities and incur additional fees, and in the case of some obligations, it may prove problematic to implement, e.g. in the context of the obligation to ensure selective collection of bottles. Effective implementation and clear communication will be key to overcoming resistance and ensuring that the benefits of the directive are fully realized. There must be a balance between companies producing plastics and other actors vocalizing the prevention of the use of plastics for real solutions for plastic pollution.

For construction and building as a sector in Poland the revised Energy Performance of Buildings Directive – EPBD (EU/ 2024/ 1275) is important for implementation. Some of the most important tools introduced by the EPBD to achieve ambitious climate goals include:

- zero-emission construction of new buildings
- obligation to take action to improve the energy performance of a building during each so-called “major renovation”
- promotion of electricity generation using photovoltaic panels mounted on roofs
- introduction of so-called “renovation passports”
- promotion of solutions for the development of infrastructure for the needs of sustainable mobility
- new rules for preparing energy performance certificates for buildings (introduction of classes A to G)
- creation of one-stop-shops for energy performance of buildings.

The above review of the requirements of the new EPBD directive shows that it contains a number of regulations of a different nature, the primary purpose of which is to rationalise energy consumption in buildings. In addition to regulations shaping energy standards for buildings and stimulating and obliging them to improve, there are requirements for providing information on energy efficiency, as well as solutions supporting the process of improving energy efficiency. The regulations described vary depending on the type of buildings, technical systems they contain, their size and ownership status. The new directive does not contain any provisions that would result in the deprivation or restriction of ownership rights. In addition, there are no provisions

in it that would make the possibility of selling or renting a building dependent on its energy efficiency. Minimum requirements regarding energy performance have been in force for new buildings for several decades and are tightened with progress in construction and user requirements. The level of energy efficiency of a building is disclosed at the stage of its sale, similarly to the case of energy-consuming devices.

3.7. Hungary

The European Union implemented several policies that are important in Hungary's green transition. Policies like the Single-Use Plastics Directive[13] and Construction Products Regulation[14] help drive eco-friendly innovation, reduce waste, and foster sustainability across Hungary's industries.

The Hungarian counterpart of the European directive (EU) 2019/904[15] known as Reduction of the impact of certain plastic products on the environment is the 301/2021. (VI. 1.) governmental regulation[16] about extended producer responsibility, prohibition of single-use plastic products, promoting alternative resources for plastics and reduction targets and reporting obligations. This regulation aligns with broader EU objectives to reduce plastic waste and promote sustainable practices across various sectors.

Regarding packaging sector and based on Eurostat data[17], Hungary faces serious challenges with packaging waste. Hungarian households generate packaging waste above the European average while the recycling proportion stays way bellow it. Most of the packaging material used is paper, plastic and glass. Plastic packaging is the biggest problem, as its recycling rate remains low. There is an urgent need for centralized and coordinated actions and effective regulations from the government to reach the European standards and to be able to reduce the use of single-use packaging. In Hungary, 3.2 billion bottles, cans, and glass containers are circulated annually, that is 333 items per person. A new deposit return system (DRS) introduced by MOHU (Hungarian Waste Management Organization) in 2024 has already collected and processed 300 million of these items, with daily returns averaging six million pieces. The system incentivizes recycling by offering 50 HUF per returned piece, which can be redeemed as cash, coupons, or charitable donations. MOHU aims to reach a 90% return rate by 2027, inspired by Slovakia's 70% and the Baltic countries' 90% rates

Inappropriate (too short or postponed) deadlines for implementing new rules and regulations is reducing the impact of the measures and hindering the success of the regulations.

[13] https://environment.ec.europa.eu/topics/plastics/single-use-plastics_en
[14] https://single-market-economy.ec.europa.eu/sectors/construction/construction-products-regulation-cpr_en
[15] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=OJ:L_202401275
[16] https://njt.hu/jogszabaly/2021-301-20-22
[17] https://njt.hu/jogszabaly/2021-301-20-22

Both EU directives on Corporate Sustainability Reporting[18] and Corporate Sustainability Due Diligence[19] have no Hungarian equivalent, they apply directly in Hungary, thus Hungarian companies must report in accordance with EU regulations. Hungarian companies with foreign parent companies, as part of their supply chain are already aware of these regulations and show efforts to comply with them, but this cannot be said about Hungarian SMEs. They lack adequate knowledge of the rules, and they face difficulties in attempting to comply with them thus awareness raising among them would be essential in order to reach the goals.

The EU 2024/1275 regulation[20] or Energy performance of buildings is a key element in the EU's efforts in promoting circular economy as it fosters the environmental performance of all buildings. It describes standards for energy efficiency, waste reduction and for the use of resources and requires assessment regarding the sustainability of the buildings from the building to the demolishing stage. Its main concern is the use of environmentally friendly materials and solutions. As it is mandatory the Hungarian regulations align with this EU regulation. The 191/2009 Government Decree Act on Energy Efficiency[21] regulates energy performance and emphasizes the use of sustainable building materials, and waste reduction throughout the complete construction lifecycle. It mandates stricter controls on environmental impacts, focusing on resource efficiency, recycling of construction materials, and reducing emissions. Hungary's implementation includes minimum energy performance requirements, inspections of HVAC systems and financial incentives to support compliance with the regulations and to promote sustainable building practices. Despite of the achieved progress, the building industry and the regulations face many challenges. All Hungarian buildings must have an Energy Performance Certificate that is also used in the conclusion of purchase contracts. It is important to mention, that the Hungarian legal environment allows procurement entities to consider green criteria into their purchasing processes, however they are only obligatory in the public catering and road transport sectors. This situation highlights the importance of the commitment of officials towards green economy.

Packaging and Packaging Waste Directive[22]: Hungary, like other EU Member States, must comply with this directive, which imposes recycling quotas and waste reduction targets on packaging materials, encouraging innovation in the packaging industry.

EU Innovation Fund[23]: This funding program supports research and development in sustainable technologies and practices in Hungary, particularly in mechanics, construction, and materials science.

[18] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52022PC0071
[19] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32022L2464
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Through these policies, Hungary is encouraged to embrace sustainable product development and move towards a more resource-efficient, low-carbon economy.

4. Conclusion of cross country analysis

For the purpose of providing European policies framework and current status of implementation, analysis is divided in two parts. The first part encompasses regulations, action plans and strategies that are accepted on the European level and the cross-country analysis provides analysis of relevant directives and their implementation in national legislations. Since some of the regulations are recently adopted and transition period for implementation is still ongoing, this framework will be regularly updated during the duration of CURIOST project with relevant information.

European union developed Circular Economy Action Plan and other relevant regulations to support transition towards circular economy and sustainable practices. Since great majority of companies across the entire European Union are SMEs and small midcaps, obligations are highly relevant for them to accordingly adjust their business models. Regulations analysed above are not just important for producers, but for consumers as well. Consumers are far more protected by creating better and longer living products, living in energy efficient housing, creating possibilities for innovation and living in a healthier environment. Certain challenges are encountered when imported products and distributors from non-EU countries are avoiding compliance with given policies. It can lead to market disturbances, endanger domestic production and consumer protection.
For cross country analysis, it is important to emphasize that member state accepted the provisions of European directives and implemented them into their national legislation through relevant domestic legislation frame. Sometimes the implementation depends on level of the relevant sector development, infrastructure or external factors which limits influence of proposed policies. The analysis showed that in the partner countries there are different levels of implementation regarding plastics and packaging. While some countries are just about to introduce the deposit system for single use beverage packaging, such as Austria, Poland or Italy, other countries like Croatia, Slovakia and Germany already have systems established and successfully operating. Differences among countries on the matter are about level of development of waste management infrastructures, responsibility of legal entities who should conduct the collection, willingness of producers to adjust the pricing and amount of compensation for depositing. Introduced deposit system in Slovakia or Croatia showed high rates of depositing and recycling single used plastic containers (up to 90% in Slovakia) with positive environmental impact and awareness raising.
For the CSDD and CRD directives, certain member states have already developed instruments of support for enterprises. For example, Austria or Italy have developed digital tools while national frameworks and legislation are prepared to support companies in sectors with complex supply chain (mechatronics or plastics). Goal is to make process

easier with internal controls, stringent reporting and to assess the sustainability performance of companies more effectively. Countries like Hungary and Croatia (for CRD) do not have national equivalent which means companies should follow EU directives. Unfortunately, that can cause difficulties for domestic companies and compliance procedures due to lack of clear guidance. Such examples of already developed instruments could be used as a role model for countries that are still adapting and developing processes for implementing the legislation.

Same applies for Common rules on promoting the repair of goods. Well established system in Austria and some parts of Germany, is awaiting implementation in reviewed member states, where national governments are required to promote repairs through repair vouchers or repair spaces.

For the construction sector and possibilities of using recycled materials in the construction processes, Energy performance of buildings directive is highly relevant. Even though it proposes universal solutions, implementation depends on specific needs of each country. While Poland or Austria have already started renovation wave, developing one stop shops for energy performance of buildings, other countries are trying to find a right path to implement the directive into national legislation. Success of implementation depends on country specific context, such as level of development of construction sector, infrastructural circumstances concerning new construction or renovation, skilled work force and external factors such as earthquakes in Croatia which produced issues of construction waste management.

To conclude, in the observed area of Central Europe, we can see many differences in partner countries regarding level of development of certain sectors or following and implementing EU regulations. It is important to note that there is a foundation for mutual cooperation, role modelling and uptake of good practices among partner countries and beyond.

5. Swot analysis 3.1.2.

Based on partners contributions and analysis of European regulations and directives, one SWOT Analysis Table was created, that reflects the transnational character of integrated strategic framework. It presents statements that emerged as relevant in individual countries analysis and underneath are countries/ regions to which the statement is applicable to.

Swot analysis	HELPFUL	HARMFUL
	STRENGTHS	WEAKNESSES

Internal factors	Providing useful policy framework for market transformation to circular economy. > SK; HR; IT; HU; AT	Relevancy of documents (strategies, action plans) depending on MS accepting proposed measures/ national and regional levels. > SK; PL; HR
	Protection of consumers with creating better and longer living products, making the change possible for all actors involved. > HU; AT	Slow implementation and monitoring: implementation measures of regulations that are binding for MS are hard to monitor. > SK; PL; HR; IT
	Access to EU funding possibilities: support from EU programmes and funds for SMEs and small midcaps for transformation processes and projects in circular economy. > SK; HR; IT; AT	Complexity of EU regulations and the need for continuous compliance can be burdensome for business, requiring administrative efforts and resources. > SK; PL; HR; IT; HU MS adapting to legislation according to their own interests and needs. > PL; HR; HU Economic uncertainty and prioritization of other issues (global and regional economic fluctuations, lack of green investment). > SK; HR; IT; AT
	Sector specific: Existing infrastructure for waste management and recycling, innovations in the targeted sectors, environmental benefits: SK; PL; HR; ITEnhancing safety standards for machinery, addressing risks such as AI, which benefit users, workers and manufacturers with unified internal market. > PL; DE Introduction of deposit system incentivizes consumers to reduce plastic and packaging pollution. > AT, PL, SK	Sector specific Operational challenges for management of deposit system which can affect effectiveness. > PL; IT Strict regulations can cause a competitive disadvantage for EU countries in the global market. > PL; HR; IT; DE Financial burdens of changing to zero-emission buildings, administrative complexity for construction sector. > PL; DE; IT

	OPPORTUNITIES	THREATS
External factors	becoming global leader in circular economy, sustainable production, net-zero emissions, achieving climate neutrality. > PL; HR; AT	number of imported products and distributors from non-EU countries that are avoiding compliance with policies. > SK; PL; IT; DE; HU MS adapting to legislation according to their own interests and needs. > PL; HR
	<u>Creating competitive market:</u> Innovative, strong market, new jobs with skilled workers, sustainable production and healthier environment. > SK; PL; HR; IT; DE; AT	<u>Competitiveness issues</u>: Insufficient development of facilitators, such as digitalization for following policy standards on the member states level which make it difficult for particular countries to cope with. > HR; HU
	Increasing environmental awareness, growing public pressure from different actors (governments, private sector, academia, NGOs). > SK; PL; HR; DE; HU; AT	<u>Regulatory changes</u>: Economic uncertainty and prioritization of other issues (global and regional economic fluctuations, lack of green investment). > SK; HR; IT; AT
	<u>Sector specific:</u> Encouraging innovation in the machinery sector by supporting the development of safer, more efficient and tech. advanced machinery, including AI. > PL; DE; IT Public awareness about importance of recycling, collaboration between various stakeholders, new market for recycled materials. > PL; DE; SK	<u>Sector specific</u> Operational challenges for management of deposit system which can affect effectiveness. > PL; IT Strict regulations can cause a competitive disadvantage for EU countries in the global market. > PL; HR; IT; DE Financial burdens of changing to zero-emission buildings,

	Improving energy performance of buildings, encouraging renewable energy use, contributing to energy security, unifying construction market across the EU. > PL; DE	administrative complexity for construction sector. > PL; DE; IT

6. Strategic recommendations

Strategic recommendations that support sustainable and circular product development are listed, but not limited to:

1. Identifying the status of sectors development level and needs in particular regions and countries
   - > Harmonised policy frameworks
   - > Sector specific strategies as templates
   - > Best practices templates for replication actions
2. Share good practices and knowledge
   - > Awareness raising campaigns, organising info-days, webinars
   - > Strengthening digital skills
   - > Exchange of experiences, peer learning
3. Coordinated Pilot Actions and Demonstrations
   - > Sector- specific actions for strengthening targeted sectors
   - > Supporting innovations, development of practical solutions
4. Regional cooperation
   - > Support for development of clusters (European, regional, national)
   - > Involvement of different stakeholders – academia, SMEs, Small Midcaps, governments

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