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 S3 STRATEGIES OF PARTICIPATING REGIONS/COUNTRIES

DELIVERABLE 3.1.1.

Table of Contents

1. Introduction and activity summary 3
2. Strategic policy focus at regional/national level 4
2.1. Austria 4
2.2. Slovakia 5
2.3. Croatia 6
2.4. Italy 8
2.5. Germany 9
2.6. Poland 10
2.7. Hungary 13
3. Transnational policy analysis 14
3.1. Austria 14
3.2. Slovakia 16
3.3. Croatia 17
3.4. Italy 18
3.5. Germany 19
3.6. Poland 20
3.7. Hungary 21
4. Collection of support instruments and main challenges 22
5. SWOT ANALYSIS 3.1.1. 24
6. References 26

1. Introduction and activity summary

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. of creating Integrated strategic framework 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. Strategic policy focus at regional/national level

At the beginning of the CURIOST project, project partners recognized the specific context in which the project is embedded such as circular economy, sustainable product development, fostering innovations and transformations of SME and small midcaps, digitalization and support for development of regional ecosystems. Therefore, the project partners analysed strategies, policies and action plans on the topics of Smart Specialization Strategies, Circular Economy and Innovation relevant in their respective country or regions, which will provide status overview for the area of Central Europe. This chapter offers transnational aggregation of policies relevant to CURIOST project topic, as follows:

2.1. Austria

In Austria, some of relevant policies in the field are The Austrian Circular Economy Strategy, Lower Austrian Economic Strategy 2025 and Vision for Upper Austria 2030, containing targets and concrete measures in transformation focal points will be executed to reform the Austrian economy and society in a climate-neutral, circular economy by 2050. Industrial sectors that are relevant for the CURIOST project are analysed: plastics, packaging electrical and electronic devices in the context of mechatronics and mechanics.

- Regarding plastics and packaging industry, which is topic of many European policies, it is important to have in mind that Austria has a strong packaging industry and is a global leader in machine manufacturing for the plastics industry which means that innovations in this area can increase competitiveness of Austrian economy and support circular economy. In line with European regulations dealing with plastics and packaging, reducing packaging material and increasing the share that is reusable, as well as introducing sustainable design of plastic products, similar measures will be encouraged in Austria. Further on, federal standardisation of the packaging collection, separate collection of plastics and packaging will be introduced, with expansion and modernisation of sorting facilities. From 2025 Austria will introduce the deposit system for plastic bottles.
- Relevancy for electrical and electronic devices in the context of CURIOST project has emphasis on sustainable production and life cycle of the devices. To establish a future sustainable, resource- efficient industry Austria needs to focus on faster transfer to circular economy to achieve change in the market regarding production, use and recycling. Through this support, this strategy fosters innovation and technological development, driving innovation and creating new business opportunities.
- Construction and buildings: it aims to make buildings more durable through maintenance and renovation with emphasis on energy efficiency. Components

should be reusable and easier to recycle. Strategy recons using more recycled materials in construction and designing buildings that can be easily taken apart and reused.

Austrian national strategy for circular economy has identified industries and sectors that need concrete sets of measures for achieving standards of sustainability and circular economy. At national level it supports horizontal approach and relevant industrial sectors that are enabling competitiveness on national and international markets. Strategy aims to reduce resource consumption, while increasing resource productivity and circularity rate at the same time. Developed protocols of monitoring and evaluation are issuing progress reports on circular economy every two years. This way strategy aims to create regulatory environment that encourages and incentivizes circular economy practices such as eco-design regulations. Since such efforts for transitioning to circular economy are visible at national level, further analysis will show the efforts made at regional level in Lower and Upper Austria.

2.2. Slovakia

On national level, Slovakia has significant number of important policies brought for transformation to circular economy such as Vision SK RIS3 2021, RIS3 update. This strategy enhances the Slovak economy by increasing research and innovation capacity and building excellence in sectors with the greatest competitive advantage. Key focus areas or domains are:

- Domain 1: Innovative industry for 21st century which is highly relevant for Slovakian industry and production by encouraging innovations, research and development activities which would increase added value of production
- Domain 2: Mobility for 21st century
- Domain 3: Digital Transformation of Slovakia, Healthy Society, Healthy Food and Environment.

Slovakia's approach to sustainable development and circular economy is characterized by a strong focus on innovation, research, and digital transformation. The government's policies aim to create an ecosystem where sustainable practices are not just encouraged but are integral to the country's economic growth. By emphasizing the need for original innovations and increased R&D activities, Slovakia is positioning itself to become a leader in sustainable industrial practices. The S3 strategy for the Bratislava region identifies key priority areas such as digital technologies and IT, information and communication technologies, biotechnology, automotive, creative industries, circular economy and sustainable industrial practices.

The S3 strategy is implemented in the Bratislava Region to support innovative concepts. It aims to increase the competitiveness of the region by focusing on promoting innovation, research and development in areas that have a high potential for future growth and that can contribute to the transformation of industries in the region. The key areas are digital technologies, biotechnology, green technologies and creative industries, which are

focused on the development of new solutions and technologies. This includes innovative concepts in the field of artificial intelligence, renewable energy sources, or innovative materials and techniques. Regional and national action plans also include projects that address waste minimization, recycling and resource efficiency, areas where new approaches and technologies are needed. Traditional sectors such as the automotive industry also benefit from the S3 strategy, but even in these sectors, support is oriented towards innovation, such as the transition to electromobility or the development of intelligent transport systems. Digitalization is one of the key areas that Slovakia focuses on. The Bratislava Region, as a center of IT and technological innovation, has a high potential for digitalization in various sectors. Digitalization is at an advanced level in the Bratislava Region, with many businesses using digital technologies to optimize processes, improve products and services, and increase competitiveness. The IT sector is one of the leaders in digitalization at the national level, with many innovations coming from this region. Nevertheless, the implementation of digital technologies in traditional industries is still gradual and limited.

2.3. Croatia

Croatia's Smart Specialization Strategy (S3) plays a crucial role in the country's transition towards a circular economy and sustainable development. Introduced in 2016 and revised for the 2021-2027 period, S3 provides a framework for innovation-driven growth while addressing environmental challenges. This summary focuses on how the S3 and related policies support circular economy principles and sustainable development, particularly in the sectors of mechanics, plastics, packaging, and construction. The S3 strategy identifies several Thematic Priority Areas (TPAs), with "Energy and Sustainable Environment" emerging as a key focus. This TPA accounted for a third of all S3 projects implemented between 2016 and 2021, highlighting Croatia's commitment to fostering innovation in clean energy technologies and environmental sustainability. The strategy aims to develop smart energy systems that optimize the coordination of electricity, heat, and gas networks, promoting resource efficiency and reducing environmental impact.

For the sector specific strategies, the S3 strategy also addresses the plastics and packaging sectors through its alignment with the European strategy for plastics in the circular economy. Croatia is actively implementing measures to reduce plastic waste, increase recycling of plastic packaging, and enhance producer responsibility. These efforts are crucial for transitioning these sectors towards more sustainable practices and reducing their environmental footprint.

In the mechanics sector, which overlaps with areas like automotive and production machinery, the S3 strategy promotes innovation and sustainability through the development of competitiveness clusters. These clusters serve as important policy tools for smart specialization and strengthening national industries. They encourage collaboration between academia, research institutions, and businesses, fostering innovation in areas such as energy-efficient manufacturing processes and the development

of sustainable materials and products. The S3 strategy's implementation has faced some challenges, including delays in policy adoption and the slow establishment of sectoral governance bodies. These issues initially hindered the full utilization of European Structural and Investment Funds for research, development, and innovation. However, despite these setbacks, the strategy has initiated positive changes in Croatia's innovation system, especially among small and medium-sized enterprises (SMEs) who are supported, ensuring they have the resources needed to innovate and grow.

Regarding construction sector, Croatia has made significant strides in incorporating circular economy principles. The strategy promotes green, modular construction with eco-friendly materials like stone and wood, supporting sustainable building practices. Devastating earthquakes prompted the government to prioritize the management of construction and demolition waste, with a 60% recovery rate for construction waste in 2020 and it is pushing for further improvements.

Looking ahead, the 2021-2027 S3 strategy aims to boost research and innovation activities that are crucial for regional development with emphasis on balanced territorial development. The strategy identifies five priority areas: Health and quality of life, Energy and sustainable environment, Transport and mobility, Security, and Food and bioeconomy. These areas are crucial for driving research and innovation activities that support equal regional development and the transition to a more sustainable and circular economy. Croatia has been actively implementing its S3 Strategy to support various industry sectors. Nevertheless, the previous Croatian Smart Specialization Strategy 2016–2020 had some challenges: complex intervention logic, limited integration, and broad objectives. The strategic objectives and instruments often addressed broad, horizontal issues rather than specific challenges within thematic and sub-thematic priority areas. The new strategy has been improved in terms of clarity, integration, and focus on specific challenges. As part of the programming of the Integrated Territorial Program 2021-2027, plans for the industrial transition of Pannonian, Northern, and Adriatic Croatia were drawn up with tailored support. Regarding the monitoring and evaluation, it includes activities such as data collection, preparation of annual reports, and the introduction of corrective measures when necessary. It also emphasizes the importance of transparency and accountability in the use of public funds. By examining the effectiveness of the program and other introduced interventions, the system will ensure proper identification of deficiencies and problems in implementation.

In conclusion, Croatia's S3 strategy, along with complementary policies and initiatives, provides a comprehensive framework for supporting the transition to a circular economy and sustainable product development. The focus on key sectors like energy, environment, construction, and digital technologies positions the country to make significant progress in sustainability and resource efficiency with additional focus to regional development, despite the encountered challenges in implementation.

2.4. Italy

Italy provides with analysis of S3 strategies in Piedmont region and on national level. Italy's Smart Specialisation Strategy (S3) for the Piedmont region is a significant enabler of the circular economy and sustainable product development. It includes various actions to support green technologies and solutions, such as initiatives in advanced materials for batteries and bioeconomy. The focus on green technologies and the transition to low-carbon economies underscores the strategy's commitment to sustainability. The strategy's alignment with broader European initiatives like the Green Deal further highlights its role in promoting sustainable development. In the Piedmont region, the S3 strategy is designed to address sector-specific needs while fostering broad collaboration and regional innovation. The strategy identifies key Systems of Innovation Priority (Sistemi Prioritari dell'Innovazione) which includes sectors like aerospace, mobility, and advanced manufacturing. These priorities align closely with the mechanics and mechatronics sector, where the region has a strong industrial base, particularly in automotive and smart manufacturing. The S3 strategy endorses both innovative concepts and the current state of the art by promoting projects that renew product and service offerings while also supporting existing high-tech industries. This dual approach helps balance immediate industrial needs with long-term innovation goals, ensuring comprehensive economic development. The focus on reskilling and upskilling further supports this by preparing the workforce for future technological advancements and industry shifts. The monitoring and implementation process of the S3 strategy is comprehensive, designed to foster continuous regional innovation. The governance framework involves regular monitoring and evaluation to ensure the strategy's objectives are met and to make necessary adjustments based on real-time data which ensures that S3 strategy is responsive to regional needs and enhances innovation capacity across the territory.

In summary, the S3 strategy for the Piedmont region is a multifaceted framework that addresses sector-specific needs, fosters broad collaboration, drives regional innovation, supports sustainable development, and aligns with other strategic initiatives to ensure comprehensive regional growth and sustainability.

The Mechanics & Mechatronics sector is highlighted within the context of the region's strong industrial capabilities. Key points include:

- Automotive and Manufacturing: The region has a significant presence in the automotive industry, which drives demand for advanced mechatronics solutions.
- Advanced Manufacturing: Emphasis is placed on the development and integration of smart manufacturing technologies, including robotics and automation systems that enhance production efficiency and product quality.
- Research and Development: The document underscores the importance of continuous R&D in mechatronics to maintain competitiveness and foster innovation within the sector.

Plastics

- The plastics sector is addressed primarily within the framework of sustainable and green chemistry initiatives:
- Green Chemistry: Efforts are directed towards developing bioplastics and sustainable plastic materials derived from renewable resources. This includes the conversion of biomass into plastics and other chemical products.
- Recycling and Circular Economy: Technologies for the separation, recycling, and re-utilization of plastic materials are a focal point, aimed at minimizing waste and promoting a circular economy approach.

Packaging

- The packaging sector is discussed in several contexts, particularly focusing on sustainability and innovation:
- Sustainable Materials: The development of eco-friendly packaging materials is a priority, with a focus on biodegradable and recyclable options.
- Smart Packaging: Innovations in packaging are geared towards enhancing product shelf life, reducing environmental impact, and incorporating smart features such as sensors and indicators for better product tracking and consumer interaction.

The S3 strategy in Italy and Piedmont specifically targets areas of regional excellence, for Piedmont is focus on sectors like automotive and aerospace. This approach helps ensure that investments and policy measures are effectively directed toward sectors where there is already a significant capacity for innovation and growth. National and regional strategies are crafted to be complementary, promoting synergies rather than contradictions, thereby enhancing their effectiveness in driving sustainable and innovative economic development.

2.5. Germany

The National Circular Economy Strategy (NKWS) is a cornerstone of Germany's approach to sustainability. This strategy, drafted in June 2024, sets ambitious goals to reduce primary raw material consumption and close material cycles. In short, the German circular economy strategy aligns with the European Union's Circular Economy Action Plan and supports the objectives of the German Sustainability Strategy. The German circular economy follows the guiding principle of preserving the value of raw materials and products for as long as possible, to use materials sparingly and keep them in circulation for as long as possible and ultimately to strengthen the resilience and innovative strength of Germany as an industrial location. A life cycle perspective is central to this - starting with product design, through production and consumption, logistics through to recycling, reparability and reuse. All stages of value creation are geared towards circularity. This guiding principle is in line with the Circular Economy Action Plan of the European Union (EU) and supports the goals of the German Sustainability Strategy (Deutsche Nachhaltigkeitsstrategie).

For sector specific measures in Construction & Building sectors, the federal government will implement binding guidelines and criteria on circularity in federal procurement, incorporating considerations of environmental impact. It will engage companies and associations in the building materials industry to discuss ways to increase the supply of recycled aggregates, particularly through higher-value utilization of construction waste and excavated soil. Additionally, the government will promote digital platforms for the collection and evaluation of used components. An implementation concept will be developed in collaboration with the construction industry.
For sector of plastics the strategy aims to increase the use of bio-based plastics and improve recycling rates, with only 35% of plastic waste currently recycled. The recycling of plastics is also made more difficult by the enormous variety of plastic types and combinations with a wide range of additives. Concrete measures in this sector are limiting the variety of materials for plastics, strengthening the proportion of recycled plastics, removing barriers to the use of recycled materials through standardization, optimized results for plastics and to research funding with emphasis on R&D projects. The strategy lists mechanics and mechatronics under digitalization rather than separately. There is an initiative for developers and designers jointly with stakeholders to develop standards for the effective use of digital tools for circular design especially as open-source solutions. Digital Product Passport initiative is publicly funded by national authorities and ministries. Funded projects support the introduction of product passports, low threshold offers and services are being developed for SMEs as part of specific funding program to develop Product Passport at early stage of EU regulation.
Bavarian Innovation Strategy, updated edition of RIS3 strategy, continuously scrutinizes and optimizes existing priorities through evidence-based monitoring, which is even more closely integrated into the governance structures of strategic innovation policy. This will make it possible to adapt Bavaria's innovation strategy to developments in research, the economy and society - as well as challenges such as the coronavirus pandemic - and ensure that funds continue to be used in a targeted manner to transform the economy in the long term. The topic “materials” is relevant for CURIOST project, especially the area “sustainable use of raw materials”: The growing demand for raw materials and energy makes the search for new answers regarding resource efficiency and the circular economy become increasingly important. Key topics here include design for recycling/disassembling of materials science. The sector mechatronic is addressed in the topic “digitalisation”: Bavaria has internationally recognized technological strengths in the fields of Industry 4.0, robotics and mechatronics.

2.6. Poland

For Poland, specifically for Malopolska region, an analysis of Malopolska RIS (Regions Innovation Strategy), S3 (Smart Specializations Strategy) and Circular Economy Strategy is conducted. This analysis intended for the CURIOST project was performed based on the SWOT analyses of 3 strategic documents approved by the board of the Malopolska Region.

While strategy is very well integrated with national and European strategic documents it also covers a wide range of sectors, including Life Science, Sustainable Energy, ICT, Chemistry, and Creative Industries, ensuring a broad base for innovation. Despite that, certain challenges are also present, such as high dependency on European funding programs, uneven digitalization development level and infrastructural gaps.

Malopolska Smart Specialization strategy determines directions of the region's development. They support the collaboration of science and business which opens door for innovation.
Malopolska Smart Specializations are 7 areas that set strategic directions for the region's development. These are:

1. Life sciences (including health and quality of life, bioeconomy)
2. Sustainable energy
3. Information and communication technologies (including multimedia)
4. Chemistry
5. Electrical engineering and machinery industry
6. Production of metals and metal products as well as products from non-metallic mineral raw materials
7. Creative and leisure industries

None of the industries we focus on in the CURIOST project (mechanics and mechatronics, packaging, plastics and construction) are fully represented among the seven smart specializations of the Malopolska Region. Nevertheless, many elements included in the Smart Specializations of the Malopolska Region can be considered in the context of the industries selected for the CURIOST project. Positive aspects of the Specialization document are that it covers wide range of specializations, supporting interdisciplinarity and development of collaboration between various sectors of the economy, science, and administration, and supports bottom-up approach with increased engagement of local businesses and institutions. On the other hand, the document is very extensive and complex, which may hinder its understanding and assimilation by individuals not directly involved in innovative processes. Due to its complexity, the document may face practical implementation challenges, especially in small and medium-sized enterprises.

Circular Economy Strategy of Malopolska region suggests the undertaking of actions in the development of the Circular Economy Program. It develops a new approach to implementation of this policy. Supporting actions aimed at more economical use of resources and raw materials, understood more broadly, including issues such as decarbonization, promoting the idea of cooperation for social development, spreading the reuse of products, reusing water, heat, or promoting the sharing of goods and services, is one of the challenges for the region and a necessity for the Małopolska economy. Shifting the linear economy towards circular economy is embedded in the strategic plans of the European Union and Poland. One of the fundamental assumptions of Circular Economy is avoiding product waste, promoting environmentally friendly technical and organizational

solutions, saving and managing space, sharing, and increasingly using secondary raw materials. This requires supporting actions in the field of sustainable consumption and production; hence the presented actions and the Circular Economy Program are directed both to the residents of Małopolska and entrepreneurs, NGOs, scientists, and administration employees. The programme aims to reduce waste by promoting recycling, reusing and repair of products. The aim is to optimize the use of raw materials and energy, which is to lead to a reduction in the consumption of natural resources and reduction of greenhouse gas emissions. It supports the development of new technologies and innovative solutions that can contribute to the achievement of the objectives of the circular economy. This may include the development of new materials, production processes or waste management systems. The programme assumes cooperation between various sectors of the economy, including industry, public administration, non-governmental organisations and the local community. Such cooperation aims to create synergies and joint action for sustainable development.

The Regional Innovation Strategy of the Malopolska Region 2030 (RIS 2030) is a tool for implementing the Development Strategy of the Małopolska Region 2030 (SRWM 2030) in economy. The Innovation Strategy also integrates, in connection with the smart specializations of the region, selected activities in education, entrepreneurship, competitiveness, digitalization and circular economy, which are included in SRWM 2030. Regional Innovation Strategy 2030 is a document that describes in detail the Development Strategy of the Malopolska until 2030. It develops and implements one of the objectives of the main strategy: an innovative and competitive economy. The main goal of the Regional Innovation Strategy is to increase the level of innovation in the region by 2030. Regional Innovation Strategy 2030 also proposes a set of goals and actions to achieve them in the following areas:

- further building Innovation base, potential and image of the region
- strengthening innovation and supporting industrial transformation of enterprises
- building trust, communication and diffusion of knowledge in the innovation ecosystem

To conclude, the Regional innovation strategy (RIS) for the Małopolska Region 2030, Malopolska Smart Specialization Strategy (S3) and Circular Economy Program for Malopolska 2030 all include measures to support the growth and development of SMEs, including access to funding, training, and networking opportunities. The strategies place a strong emphasis on increasing investment in R&D activities. This includes both public and private sector investments and fostering partnerships between academia and industry to drive innovation. The strategies place a strong emphasis on promoting circular design and the development of sustainable products in all 4 sectors included in CURIOST project. Simultaneously, they encourage the adoption of circular economy principles in mechatronics, plastics, packaging and building and construction (retrofitting buildings). This includes promoting the use of recycled materials, designing products for longer life cycles, and facilitating the reuse and remanufacturing of products. Overall, the 3

strategies for the Małopolska Region 2030 aim to foster innovation and sustainability across these key sectors by providing support for research and development, facilitating collaboration between stakeholders, and promoting policies that encourage circular design and sustainable product development.

2.7. Hungary

The Hungarian Smart Specialization Strategy (S3) emphasizes sustainable product development across key sectors, including plastics, packaging, construction, and mechanics, with a focus on innovation and environmental responsibility. In the plastics and packaging industries, Hungary aims to reduce environmental impact by promoting the use of biodegradable materials and enhancing recycling processes. This approach is aligned with the EU's circular economy goals, targeting a reduction in single-use plastics and encouraging the development of eco-friendly alternatives. The strategy also encourages research and development in the creation of advanced, sustainable packaging solutions that reduce waste and carbon footprints throughout the product lifecycle. One of the main advantages of the Hungarian S3 strategy is that it meets the specific regional needs and addresses the most important issues. It includes a wide range of stakeholders: industry members, local governments and the academic representatives of universities were invited in the creation process of the strategy. Regional and international cooperation is encouraged by the strategy. The country has conducted comprehensive assessments to pinpoint key sectors where regions can excel, such as advanced manufacturing, agriculture, health, and information and communication technology.

In the construction and mechanical sectors, Hungary's S3 strategy supports the adoption of green technologies and sustainable materials to minimize the environmental impact of infrastructure and manufacturing projects. The strategy focuses on energy-efficient buildings, incorporating materials that lower energy consumption, as well as sustainable urban planning. In the mechanical industry, innovation is geared towards the production of energy-saving machinery and the optimization of industrial processes to reduce resource use. By integrating sustainability into these key sectors, Hungary aims to boost its competitiveness while addressing the global challenges of resource depletion and climate change. The scope of monitoring and implementation process is comprehensive that ensures the continuous tracking of progress. It includes regular data collection, adaptive management and regular evaluations to ensure that the strategy adapts to challenges and remains relevant. It not only supports existing industries but also focuses on innovation, promotes cluster development and enhances research and development activities. The S3 strategy prioritizes issues such as renewable energy, sustainable agriculture and waste management, thus it can be considered as enabler of circular economy and sustainable product development. It encourages especially the participants of the plastic industry to consider green technologies and to adopt to sustainable practices, to reduce waste and use the resources efficiently. It supports the creation of environmentally friendly materials and enhance recycling procedures; thus, it forces the

green transition. The strategy's measurable impact is tied to financial and legislative support (grants and incentives) as Hungarian companies highly depend on these.

In conclusion, Hungary only has national strategies since regional or city-level strategies are unnecessary given the size and degree of economic development of the country. There are some sector-specific strategies currently under development that would provide the necessary guidance and substantial financial support to SMEs to make meaningful progress toward sustainability. The Hungarian S3 strategy promotes innovative concepts but also relies on the current system by trying to develop areas of deficiency. Regardless of the available theoretical strategies, in some cases there are delays in establishing governmental institutions to fulfil the described duties. Absent or frequently reorganized authorities hinder the execution of duties. By focusing on smart specialization, it encourages regions to develop niche areas of expertise, fostering cutting-edge innovation rather than simply maintaining the status quo. It has been particularly important for regions traditionally dependent on a few industries, helping to create new growth opportunities and reduce vulnerability to economic shocks.

3. Transnational policy analysis

Transnational policy analysis will include relevant strategies, policies and action plans; research and innovation strategies, digitalization, sector specific policies in partner countries and regions that are relevant in the context of CURIOST project. The goal is to provide transnational framework of policies that are compatible with above analysed S3 and circular economy strategies which serve as enablers of transition to circular economy in Central Europe. This transnational policy analysis provides insights on national and regional levels in seven partner countries in Central Europe.

3.1. Austria

Regarding Austrian regional transition to circular economy, the focus is on the regions of Lower and Upper Austria. The Economic strategy of Lower Austria focuses on creating solutions and innovations, especially encouraging innovative, high-quality production and products, digitalization and developments made to protect climate and environment. Objectives are set to transform Lower Austria as the region that can be a highly innovative business location supporting sustainable growth. Lower Austria is home to numerous manufacturing companies and innovative enterprises that create products and services. In the context of CURIOST project and in Lower Austrian economic strategy as well, intelligent and innovative, high-quality products are drivers of international competitiveness. To achieve all other objectives and goals, significant governmental support and restructuring will be necessary, especially for traditional companies and approaches. Technology and innovation programme will provide support for innovation labs, start-up indicators, programmes for networking and developing technologies.

Business development will provide advice and support for export and internationalization matters, while financing products support investments and innovation funding and modern financing products. Even though the implementation can be challenging and difficult to follow, the region of Lower Austria favours a horizontal industry policy approach over a sector-specific one, because the region is rich with enterprises in wide range of industries and business models.

The Upper Austrian Economic strategy UpperVISION2030 has a strong focus on technology driven innovation, with a rapid transfer of research results into business applications.

There are three main objectives, whereas only the first one directly refers to one of our 4 target sectors, namely Mechanics and Mechatronics:

- Efficient and sustainable industry and manufacturing; in that field, the reuse of components or their recyclability in terms of a holistic product life cycle by promoting recycling-compatible product design is tackled. Circular economy is not explicitly named, but the reduction of material consumption, and the cascading or coupled use of raw and residual materials can be considered as contribution to a circular economy as well. The sub-topic “efficient production processes” tackles all 4 CURIOST target sectors.
- Systems and technologies for people (it is not relevant for topic of CURIOST project)
- Connected and efficient mobility; Upper Austria has a strong automotive supplier industry, which is matching with the two CURIOST sectors Mechanics and Mechatronics and Plastics.

During the years many calls for funding have been published fostering innovation and digital transformation. Funding schemes for SME, coordinated by the Chamber of Commerce Upper Austria supported:

- Digital Starter (support for first digital transformation measures in SME)
- Consultancy “ÖKO-Plus” (assessment and advice reg. resource reduction, energy efficiency, production efficiency in SME)
- Circular Economy in the construction sector

To sum up, Mechanics and Mechatronics and Plastics are strong industries in Upper Austria and therefore the RIS3 focus on these sectors, while monitoring is done annually with reviewing implemented measures and related impact using defined indicators. Packaging can be seen as part of the plastics sector (other packaging materials play no role in Upper Austria). Focus is rising on construction sector and its transformation to circular economy. On national level, in 2023 the Austrian Government introduced a waste prevention plan (Bundes- Abfallwirtschaftsplan). This program aims to encourage companies as well as consumers to reduce or prevent waste that contaminates the environment. Around 90 regulations were introduced, which affect construction waste, food waste, re-use and prevention in companies, organisations and households. In general, the existing regulations and policies aiming at fostering circular economy in the plastic industry in Austria are focused on waste management and packaging management. The regulations highlight the importance of reducing and reusing plastics and extending the end-of-life phase of plastic resources and products.

The success of Austria's approach lies in its comprehensive integration of regional and national policies, supported by concrete action plans and monitoring systems. This coordinated effort has positioned Austria as a model for other EU member states in implementing circular economy principles across multiple sectors while maintaining economic competitiveness and innovation leadership.

3.2. Slovakia

For Slovakia and in Bratislava region, focus is on the plastics and packaging sectors. In the plastics and packaging sectors, which fall under the umbrella of innovative industry, Slovakia is pushing for a transformation in the production character of its industry. The government's strategy emphasizes the need for a high share of original innovations and research and development activities. This approach aims to significantly increase the added value of production and related services, potentially revolutionizing how plastics and packaging are produced and used in Slovakia. The Slovak government is placing a strong emphasis on digital transformation, as outlined in Slovakia's Digital Transformation Strategy 2030. This strategy focuses on innovative technologies such as artificial intelligence, the Internet of Things, and blockchain, which have the potential to drive sustainability and circularity in all four target sectors. The Intelligent Industry Action Plan of the Slovak Republic further supports these efforts by providing support for industrial, service, and trade enterprises. It aims to create better conditions for the implementation of digitization, innovative solutions and increasing competitiveness. To achieve the goals, activities such as reducing bureaucratic burdens, amending legislation, defining standards, changing educational programs and the labor market, and co-financing research are conducted. Further on, in Envirostrategy 2030, in each substantive area, the identification of problems and current targets is followed by framework measures to improve the current situation (e.g. increase fees, increase standards, improve awareness). Regional innovation policies are also aligned with broader European objectives within the framework of cohesion policy, which ensures better access to European funds and programs that can accelerate innovation development in the Bratislava region.

From the point of view of the four sectors of the CURIOST project, the most references are to the issue of recycling (waste management, waste sorting, its subsequent recovery, efficient use of energy from waste), green construction, insulation and repair of building cladding, installations of support for renewable energies, reduction of energy consumption). To conclude, from a circular economy perspective, the packaging situation in the Bratislava Region reflects a broader trend that includes both challenges (high consumption and production, insufficient recycling infrastructure, low recycling rates, lack of motivation for business) and opportunities related to the transition to sustainable and environmentally friendly solutions. The same applies for the plastics sector; it includes several challenges (insufficient recycling infrastructure, low sorting and recycling rates, lack of incentives for SMEs) and opportunities for improvement. As the most developed region of Slovakia, the Bratislava Region has significant potential for the

development of the circular economy, but this potential has not yet been fully exploited. Continued investment in recycling technologies, strengthening infrastructure and raising awareness among residents and businesses are key to a successful transition to a circular plastics economy.

3.3. Croatia

In Croatia, to complement the S3 strategy, Croatia has developed several other initiatives and plans that support the transition to a circular economy and sustainable development. The National Recovery and Resilience Plan 2021-2026 includes measures for green urban renewal, the development of green infrastructure, and circular management of buildings and spaces. It also supports the reduction of waste disposal through the construction of waste transfer stations and improvements in biowaste collection and treatment systems. In the realm of digitalization, which is crucial for enabling circular economy practices, Croatia has shown progress. According to the 2022 Digital Economy and Society Index (DESI), Croatia performed above the EU average in the “Integration of digital technology” dimension, ranking 14th among 27 EU countries. Croatian enterprises, particularly SMEs, are taking advantage of online commerce opportunities, with 29% of SMEs selling online (above the EU average of 18%). This digital integration enhances the capacity for sustainable product development and circular economy practices across various sectors and therefore, Croatia developed Digital Croatian Strategy 2032. Further on, Waste Management Plan for the Republic of Croatia 2023-2028 is important for transition to circular economy at national level, since waste management levels are still under European average. Financial support for these initiatives comes from multiple sources. Croatia benefits from the European Union's Cohesion Fund, which supports projects aimed at improving waste management and promoting circular economy practices. The National Recovery and Resilience Plan allocates 20.4% of its funds for the digital transformation of society, providing a significant lever for economic growth and sustainable development. Additionally, the World Bank provides technical assistance to help Croatia integrate circular economy principles into its waste management strategies. Compatible with the S3 strategy´s support in construction sector, the World Bank is supporting these efforts by assisting the Ministry in developing a five-year Circular Economy Action Plan for the construction sector (2022-2026). This plan aims to reduce waste generation, maximize the economic value of unavoidable waste, and minimize environmental impacts. It's designed to serve as a model for other sectors in Croatia, illustrating effective application of circular economy principles.

Despite these positive developments, challenges remain. The transition to a circular economy requires a shift in mindset and practices across all sectors of the economy. SMEs, which are crucial in driving innovation and adopting new technologies, face challenges such as a digital skills gap, regulatory complexity, and difficulties in accessing larger markets. Addressing these issues will be crucial for the successful implementation of circular economy principles across the focus sectors. While implementation challenges exist, the strategies in place demonstrate Croatia's commitment to aligning with EU goals

for a greener, more circular economy. The success of these efforts will depend on continued support for innovation, effective policy implementation, and the ability to overcome the challenges faced by businesses, particularly SMEs, in adopting new sustainable practices.

3.4. Italy

National and regional policies in Italy and in Piedmont region, act as enablers of change toward a sustainable, green, and circular economy. These strategies are designed to be interlinked rather than contradictory, supporting sectors such as green chemistry, advanced materials, and sustainable manufacturing. The national strategy is updated regularly to reflect global challenges like climate change, technological advancements, and geopolitical events, ensuring that it remains relevant and effective in promoting a circular economy. The transformation is not solely driven by SMEs and small midcaps but is supported by comprehensive policy measures. These measures include the development of secondary raw materials markets, fiscal tools, and regulatory frameworks to encourage eco-design, reuse, and recycling practices. leverages regional strengths to promote industrial symbiosis and sustainability. There is substantial financial and legislative support for sustainability and circular economy initiatives in both national and regional contexts. The Italian government has implemented tax incentives, subsidies, and grants to promote the use of recycled materials, sustainable product design, and industrial symbiosis. However, challenges remain, including the need for continuous investment in innovation, the alignment of regional and national priorities, and the effective dissemination of knowledge and best practices among SMEs. The development level of national and regional strategies regarding circular economy, digitalization, and innovation is advanced, with clear targets and measurable outcomes. Italian and regional strategies are increasingly tailored to address specific strengths of sectors:

Mechanics & Mechatronics

The field of "Smart Factory (Fabbrica Intelligente) is significantly integrated with various other specialization areas, including Mechanics and Mechatronics. This area involves automation and control systems, artificial intelligence, information systems, software engineering, industrial engineering, and robotics.

Plastics

Italy is noted for its production and recycling of plastics. In 2020, Italy consumed around 6.5 million tons of plastics, with a substantial portion used in packaging. Approximately 2.2 million tons of plastic packaging were consumed, with 48.7% being recycled and 44.6% used for energy recovery. However, Italy is still working to meet the EU's recycling target of 50% by 2025. Italy is a leader in producing compostable bioplastics, having established an Extended Producer Responsibility (EPR) system for organic recycling of such materials. This is expected to significantly contribute to the overall plastic recycling goals.

Packaging

The packaging sector, particularly plastic packaging, plays a critical role in Italy's economy. The country has implemented extensive measures to improve the collection, recycling, and reuse of plastic packaging. New technologies and systems are being developed for the efficient separation and recycling of plastics from other materials.

Italy has implemented several important measures to enhance the collection, recycling, and reuse of plastic packaging. The country operates through a well-regulated consortium system, with organisations like CONAI, COREPLA, and POLIECO playing key roles in managing plastic waste. CONAI coordinates efforts for all packaging materials, including plastic, while COREPLA focuses specifically on the collection and recycling of plastic packaging. POLIECO oversees the recycling of polyethylene (PE) materials outside of packaging. These consortia aim to meet ambitious recycling targets set by both national and European Union regulations. Technological advancements in Italy have been central to its recycling efforts. New systems like Ecostar's advanced screening technologies are used in plastic treatment plants to improve the separation and processing of plastic materials. This has contributed to a growing market for secondary raw materials derived from plastic waste. Italy's commitment to achieving a circular economy is also reinforced by policies such as Extended Producer Responsibility (EPR), which requires producers to finance the recycling and recovery of the packaging they introduce to the market. These efforts are supported by the National Recovery and Resilience Plan (which funds recycling initiatives and innovations in packaging waste management, contributing to both environmental sustainability and economic growth.

3.5. Germany

Germany, and particularly the Bavarian region, has been at the forefront of implementing policies to support the transformation towards a circular economy and sustainable product development. This analysis examines key national and regional strategies that are shaping the future of sustainability in Germany, with a focus on the sectors of mechanics and mechatronics, plastics, and construction and building.
Digital Plan Bavaria has 200 measures in seven fields of action. One of the topics “digital building” includes comprehensive introduction of the Building Information Modeling method and digital workplace for building construction. Another topic covered by Digital Plan Bavaria is “climate protection” with different projects and measures, e.g. The Future and the Bavarian Center for BlockChain aim to initiate joint projects based on blockchain technology, e.g. for the recycling of digital devices or electronic waste. Particular attention will be paid to the resource-saving use of blockchains.
Concerning Bavaria, as a German region, it has two more relevant strategies in the field which are Bavarian sustainability strategy and Bavarian bioeconomy strategy. Bavarian sustainability strategy was created on the foundations of UN´s SDGs and most important part for CURIOST project is SDG 12 “Sustainable consumption and production” which emphasizes further development of circular economy through efficient use of resources

and increased use of secondary raw materials, transition to sustainable and bio-based economy, reduction in the consumption of natural resources and raw materials (construction sector), reduction of packaging and packaging waste.

Bavarian Bioeconomy Strategy is one more of relevant strategies encompassing lot of important industrial sectors, also ones relevant in CURIOST project. For the sector of construction and building measures include renewable raw materials can also be used to produce insulating material, concrete additives can be made from biogenic raw materials and bio-based asphalt are being tested. Climate protection continues through building with wood, whereas Bavaria is above the national average for timber construction. For plastics innovations with bio-based chemicals and bio-based polymers can replace conventional solutions.

Analysis and Implications

Germany is also at the forefront and has taken a number of measures at national level that differ from EU legislation. One prominent example is the Supply Chain Duty of Care Act (Lieferkettenorgfaltspflichtengesetz). This law obliges larger companies to check their supply chains for human rights and environmental violations. Companies must ensure that no child labour, forced labour or environmental destruction takes place along their entire supply chain. German companies are under a lot of pressure when it comes to sustainability and legislation, but as with any challenge, there are also risk and opportunities.

To conclude, Germany, and particularly Bavaria, has established a robust policy framework to support the transition to a circular economy and sustainable product development. The combination of national strategies like the German Circular Economy Strategy and regional initiatives in Bavaria creates a comprehensive approach that addresses key sectors and leverages technological innovation. While these policies set ambitious goals and provide a clear direction, the true test will be in their implementation. The success of this transition will depend on the ability of businesses to innovate, the effectiveness of government support, and the willingness of consumers to embrace new products and practices. As these strategies continue to evolve, they are likely to serve as models for other regions and countries seeking to implement circular economy principles. The emphasis on digitalization, bioeconomy, and sector-specific approaches provides a blueprint for balancing environmental sustainability with economic growth and innovation. For German companies, the national approach to sustainability legislation is quite a challenge, but also a huge opportunity. They can position themselves as pioneers in sustainability, but they must also be careful not to collapse under the financial and bureaucratic requirements.

3.6. Poland

For Poland and Malopolska region, three of analysed strategies are covering variety of sectors which is crucial for economic transformation. Even though it emphasizes the principle of bottom-up approach, increasing the engagement of local business and

institutions, as well as clusters and innovation centres, due to its complexity, the document may face practical implementation challenges, especially in small and medium-sized enterprises. The iterative creation process allows the document to be flexible and adaptable to changing market and technological conditions, but changes in regional or European policy may affect the documents implementation. As mentioned in further analysis it should be pointed that implementation of strategies depends heavily on European and other external funding which may be subject to uncertainties. On the one hand, strong policy support at the regional, national and EU levels can provide a conducive environment for successful transformation to circular economy. On the other hand, resistance from business to adopt the new practices could slow down the transition.

3.7. Hungary

In Hungary the National Sustainable Construction Economy Strategy[1] endorses the efficient use of resources to reduce the construction industry's environmental impact. It focuses on the use of sustainable building materials, promotes innovative technologies and energy saving solutions. It encourages the development of sustainable building material and innovative technologies to reduce carbon emissions. The strategy addresses the importance of education and encourages collaboration between industry stakeholders, government and research institutions. Hungary 's Research, Development, and Innovation Strategy's[2] key development areas are technology development, scientific research connected with the close cooperation between universities and participants from the industry sector. The focus is, just like in the other strategies, on the innovation in environmental technologies and the use of renewable energy. The Hungarian National Energy and Climate Plan[3], aligning with the above-mentioned strategies, focuses on achieving energy security, reducing greenhouse gas emissions and increasing the use of renewable energy sources. It promotes energy efficiency, encouraging the adoption of green technologies, and fostering innovation in sustainable practices.

All these strategies are pointing in one direction, they are interlinked and have common goals, they force the transition to a greener economy and promotes practices to reduce environmental impact. But they operate at different levels and with varying degrees of specificity and outline detailed actions and targets only for key industries like automotive, agriculture, energy, and ICT. These plans are informed by national priorities and are designed to boost the competitiveness and innovation capacity of these sectors. These strategies support the transition to a greener economy with several methods and initiatives, often facilitating but occasionally hardening the opportunities of SMEs operating in the four key sectors. There are initiative steps taken by SMEs that are responding to foreign partners 'sustainability requirements and customer needs. While efforts are made to foster green innovation, there are still gaps in the ecosystem.

[1] https://www.oecd.org/content/dam/oecd/en/publications/reports/2023/04/towards-a-national-circular-economy-strategy-for-hungary_b9db4b7f/1178c379-en.pdf

[2] https://nkfih.gov.hu/english/research-development-innovation-strategy

[3] https://2010-2014.kormany.hu/download/7/d7/70000/Hungarian%20Energy%20Strategy%202030.pdf

Collaboration between academia, industry, and government should be stronger, and there is a need for more robust support networks for startups and SMEs in green sectors. The adoption of these new, sustainable technologies requires supportive infrastructure, such as renewable energy grids or recycling facilities. These necessary infrastructures are underdeveloped in most Hungarian regions, which poses a significant challenge to the green transition.

The Hungarian national strategies have been moderately developed. Although, they are available, they are also rather theoretical and too general, and do not contain quantifiable goals, exact timeframe for the implementation, as well as no tangible indicators. The National Smart Specialisation Strategy was written for the programming period 2021-27. The Strategies developed in the last 5 years have made substantial progress in promoting digitalization, with digital technologies being a cornerstone of the country's innovation strategy. The circular economy is gaining momentum, but its implementation is less advanced, with significant room for improvement in infrastructure and awareness. While there is notable support for early-stage innovation, scaling these innovations to market-ready products and services remains a challenge. This is often due to limited access to venture capital and market development resources. The aspects of the COVID pandemic were already considered, however the effects of the latest international economic events (Ukrainian-Russian war, energy crisis, economic effects of the sanctions against Russia) are not taken into account. The main challenges that need to be addressed include closing the digital divide, enhancing the circular economy infrastructure, and streamlining support mechanisms to make them more accessible and effective for all businesses, particularly SMEs.

4. Collection of support instruments and main challenges

With Smart Specialization Strategies, Innovation and Circular economy strategies, policies and action plans as well as analysis of related national or regional legislative documents, information were provided on support instruments for transformation to circular economy, but also to define main challenges. Support instruments that can be extracted from the analysis include national strategies on digitalization, sustainability, bioeconomy and sector specific strategies that are well aligned and compatible with S3, RIS3 strategies in most countries. S3 strategies support collaboration between different actors- academia, research institutions, SMEs and encourage forming clusters and innovation parks. In partner countries like Austria, Poland and Hungary emphasis is on horizontal approach in industry for transformation to circular economy, while Croatia, Italy, Slovakia and Germany have stronger sector specific approach, with defined sectors or priority areas that are stronger and the one´s needing the support to transform to sustainability practices. Countries differ on national/ regional development levels as well – while countries like Hungary currently have only national strategies with no regional focus, accordingly with economic development, Croatian, Austrian, German and Polish strategies

are tailored for providing stronger support to equal regional development. In case of Poland, regional strategies of Malopolska region provide comprehensive sets of measures and goals to transform the region to circular economy practices, with priority areas and specializations that contribute to development of the region. All measures and proposals require financial means to be successfully implemented- therefore almost all partner countries benefit from European funds intended for enhancing sustainability, innovations, green solutions and circular economy, as well as from National Recovery Resilience Plans for specific countries. To sum up, support instruments are highly developed through S3, RIS3, circular economy strategies and other relevant strategies, which means that countries and regions recognize the European Union´s guidance towards transformation to circular economy and sustainable development.

Main challenges that emerge from the analysis recon resistance of SMEs and small midcaps from implementing digital technologies and innovations in sustainable production because of strengths of traditional industries. Higher expenses and costs of implementing sustainability practices may hinder the ability to fully participate in transition. Even though many opportunities emerge, companies should be careful not to collapse under the financial and bureaucratic requirements. Other issues include delays in policy adoption and establishment of sectoral governance bodies which hinders the full utilization of funds and execution of implementation and monitoring measures. While certain countries have only national, horizontal approaches, the need arises for sector specific strategies to develop niche of expertise and innovation rather than maintaining status quo. Raising awareness and educational campaigns should get more attention because it is necessary to change corporate organizational cultures and mindsets which require time. For analysed sectors in the context of CURIOST project; plastics, packaging, construction and building, mechanics and mechatronics, main challenges include level sector development, infrastructural development, funding and support for transformation and external factors.

High consumption rates of plastics and plastics packaging that end in landfills, due to underdeveloped infrastructure for waste collection and recycling which results in large proportion of waste not being recycled. Biggest obstacles refer to low recycling rates of plastic packaging because of combination of several materials, contamination with food and substances. Sector of construction and building is gaining ever more attention in countries where it is highly developed such as Austria or Germany, with testing usage of recycled construction materials in building process, but it expands to other countries such as Poland which offers innovative solutions for construction sectors or establishing good practices of construction waste management in Croatia.

To conclude, national/regional policies and strategies established a good path forward for transition to circular economy and sustainability, while the real implementation of proposed measures and goals lacks behind due to implementation challenges. Such challenges can be resolved with concrete policy instruments, raising awareness and sufficient funding. Differences exist among partner countries, in their level of

preparedness for transformation to circular economy and sustainable development, but a common striving forward by improving national policy framework is visible.

5. Swot analysis 3.1.1.

Based on partners contributions and analysis of regional/national S3 strategies and other relevant national or regional policies, we created one SWOT Analysis Table 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.

	HELPFUL	HARMFUL
INTERNAL FACTORS	STRENGTHS	WEAKNESSES
	Well-defined targeted sectors for transformation to circular economy, concerning in four targeted sectors; plastics, packaging, construction and building, mechanics and mechatronics (depending on the regional/national needs). > AT, HR, IT, SK, HU	Infrastructural gaps, digitalization challenges - uneven regional/ national development hindering innovation activities, different regional/national priorities. > SK, PL, HR
	National/ regional strategies are well aligned with European framework, following the path of comprehensive approach to circular economy. > AT, HR, PL, IT	Transformation and innovations cannot be equally implemented on regional levels, depending on local governments and developed sectors. > AT, PL, HR, IT, HU

	Encouraging transformation of entire industry through horizontal approach. > AT, PL, DE	Presence of obsolete means of production and companies not willing to transform to sustainability and circular economy. > AT, SK, HR, IT
	Funding opportunities on national level for companies, offering possibilities to learn and to adapt to sustainable production and circular economy. > AT, SK, PL, HR, DE	Costs emerging from transformation to new means of production, small and medium sized enterprises face administrative and financial obstacles in implementing green solutions. > AT, SK, PL, HR, DE, HU
	Presence of research institutions, universities, technology parks and clusters, strengthening science-industry linkage. > SK, PL, HR, IT, HU	Lack of skilled workers/ labour force necessary for the transition to the circular economy and sustainable production. > PL, HR, IT, HU
	Financial Incentives: There are various financial incentives in place to support recycling activities and the use of secondary raw materials, making them competitive with virgin materials. Tax incentives and subsidies are provided to encourage eco-friendly practices. > PL, HR, IT, DE, AT	<u>Sector specific:</u> Complex and changing regulations can slow down project approvals and increase costs in construction sector. > HR Insufficient structural capacities for recycling and processing waste especially plastics. > SK, IT
EXTERNAL FACTORS	OPPORTUNITIES	THREATHS
	Becoming regional leader and role-model for adapting to circular economy. > AT, PL, IT, DE	Too much legislation for complying makes it difficult for companies and interested actors to adapt to and have sufficient financial and human resources

		> AT, PL, SK, HR, IT, DE, HU
	National/ regional transformation follows the trends in European Union´s market, making the sustainability and climate neutral goals reachable for all. > AT, HR, IT, DE	Monitoring and implementation instruments are focused on goals and visions, and not on real indicators of transformation (bottom-up approach). > AT, SK, PL, HR
	Introduction of new skilled workforce in engineering and technical fields. > PL, HR, DE, HU	Insufficient financial support mainly for SMEs and small midcaps, difficult to achieve the government/EU financial support. > SK, PL, HR, DE, HU
	Involving EU funding and government incentives for innovation with reducing regulatory barriers to innovation. > PL, HR, AT, SK, IT	

6. References

Austria:

1. *Bundesministerium Klimaschutz, Umwelt, Energie, Mobilität, Innovation und Technologie* . (2022-2024). Retrieved from The Austrian Circular Economy Strategy : https://www.bmk.gv.at/themen/klima_umwelt/abfall/Kreislaufwirtschaft/strategie.html
2. *Bundesministerium Klimaschutz, Umwelt, Energie, Moblität, Innovation und Technologie*. (2023). Retrieved from Bundes Abfallwirtschaftsplan (BAWP) 2023: https://www.bmk.gv.at/themen/klima_umwelt/abfall/aws/bundes_awp/bawp2023.html
3. *Bundesministerium Klimaschutz, Umwelt, Energie, Moblität, Innovation und Technologie*. (2024). Retrieved from Aktionsplan Mikroplastic 2022- 2025: https://www.bmk.gv.at/themen/klima_umwelt/kunststoffe/mikroplastik.html

4. *Land Niederösterreich*. (2023). Retrieved from WIrtschaftsstratehie Niederösterreich 2025: https://www.noe.gv.at/noe/Wirtschaft-Tourismus-Technologie/Wirtschaftsstrategie_Niederoesterreich_neu_2025.html
5. *Umweltbundesamt*. (2024). Retrieved from Dashboard zur Abfallwirtschaft : https://www.umweltbundesamt.at/abfall/dashboard
6. *UpperVision 2030*. (2024). Retrieved from Die OÖ. Wirtschafts- und Forschungsstrategie : https://www.uppervision.at/programmbuecher

Slovakia:

1. https://vaia.gov.sk/sk/strategia-inteligentnej-specializacie-ris3-2/
2. https://vaia.gov.sk/wp-content/uploads/2022/12/Strategia-vyskumu-a-inovacii-pre-inteligentnu-specializaciu.pdf (https://vaia.gov.sk/wp-content/uploads/2023/11/Research-and-Innovation-Strategy-for-Smart-Specialisation-of-the-Slovak-Republic-2021-2027.pdf)
3. https://vaia.gov.sk/wp-content/uploads/2023/07/Suhrnna-sprava-z-procesu-EDP.pdf (https://vaia.gov.sk/wp-content/uploads/2023/11/Summary-Report-of-the-EDP-to-the-Strategy.pdf)
4. https://vaia.gov.sk/wp-content/uploads/2024/03/Metodicke-usmernenie-k-posudzovaniu-suladu-s-SK-RIS3-2021.pdf
5. https://vaia.gov.sk/wp-content/uploads/2024/03/RTDI-in-Slovakia-AS-IS-report.pdf
6. https://vaia.gov.sk/wp-content/uploads/2024/03/RTDI-in-Slovakia-TO-BE-report.pdf
7. https://vaia.gov.sk/wp-content/uploads/2024/03/RIS3-Casova-os_final.pdf
8. https://mirri.gov.sk/wp-content/uploads/2023/10/Navrh-Narodneho-investicneho-planu-SR-na-roky-2018---2030-pilotna-verzia.pdf
9. https://mirri.gov.sk/wp-content/uploads/2019/06/Strategia-digitalnej-transformacie-Slovenska-2030.pdf (https://mirri.gov.sk/wp-content/uploads/2019/10/SDT-English-Version-FINAL.pdf)
10. https://mirri.gov.sk/wp-content/uploads/2019/07/Akcny-plan-DTS_2019-2022.pdf
11. https://mirri.gov.sk/wp-content/uploads/2020/03/Dielo2-Manual.pdf
12. https://www.mhsr.sk/inovacie/strategie-a-politiky/akcny-plan-inteligentneho-priemyslu-sr (https://www.mhsr.sk/uploads/files/8U6RKSS5.pdf?csrt=8165564678832895094)
13. https://www.mhsr.sk/uploads/files/T3H3k8da.pdf?csrt=8165564678832895094
14. https://www.mhsr.sk/uploads/files/qhOxjph7.pdf?csrt=8165564678832895094
15. https://www.mhsr.sk/uploads/files/FfGXGFcp.pdf?csrt=8165564678832895094
16. https://www.zelenehospodarstvo.sk
17. https://www.minzp.sk/spravy/2019/november/platforma-obehove-slovensko-chce-prispiet-k-zmene-nasho-ekonomickeho-modelu.html
18. https://www.minzp.sk/iep/strategicke-materialy/envirostrategia-2030.html
19. https://www.minzp.sk/files/iep/publikacia_zelensie-slovensko-sj_web.pdf (https://www.minzp.sk/files/iep/publikacia_zelensie-slovensko-aj_web.pdf)
20. https://www.enviroportal.sk/odpady/obehove-hospodarstvo
21. https://www.zelenehospodarstvo.sk/uploads/oth-document/Obehove-Slovensko-brozura-6437ade11fb9c.pdf
22. https://bratislava.sk/zivotne-prostredie-a-vystavba/zivotne-prostredie/odpady/obehove-hospodarstvo

23. https://www.sazp.sk/zivotne-prostredie/environmentalne-manazerstvo/udrzate-na-spotreba-a-vyroba-scp/udrzate-na-spotreba-a-vyroba-vo-vseobecnosti/akcny-plan-eu-pre-obehove-hospodarstvo
24. https://bratislavskykraj.sk/regionalny-rozvoj/strategie/phrsr-2021-2027/
25. https://cdn-api.bratislava.sk/strapi-homepage/upload/SECAP_akcny_plan_pre_udrzatelnu_energetiku_a_klimu_29_4_2024_pages_63e1bdc9ca.pdf
26. https://www.economy.gov.sk/top/akcny-plan-rozvoja-elektromobility-schvaleny-vladou-predstavuje-vyznamny-milnik-planu-obnovy-a-odolnosti-sr
27. https://bratislavskykraj.sk/wp-content/uploads/2020/05/inovacna_strategia_bsk_2014-2020.pdf

Croatia:

1. https://hamagbicro.hr/wp-content/uploads/2024/01/Peto-izvjesce-S3-16-22.pdf
2. https://mingo.gov.hr/UserDocsImages/slike/Vijesti/2022/S3%20do%202029%20Tekst%20VRH%202023%2012%2013.pdf
3. World Bank Supports Croatia in Improving Waste Management and Transition to a Circular Economy
   World Bank Supports Croatia in Improving Waste Management and Transition to a Circular Economy
4. https://blogs.worldbank.org/hr/europeandcentralasia/novi-pogled-na-otpad-kako-kruzno-gospodarstvo-hrvatskoj-moze-pomoci-izgraditi
5. https://www.consilium.europa.eu/hr/policies/circular-economy/
6. https://ec.europa.eu/information_society/newsroom/image/document/2019-32/country_report_-_croatia_-_final_2019_0D322BB5-BE8C-5F95-DE6B8E3E507F5B86_61230.pdf
7. Industrijska-tranzicija-hrvatskih-regija_KT.pdf (gov.hr)
8. Analiticki izvjestaj 4.2. komponente.pdf (gov.hr)
9. Vlada Republike Hrvatske | Nacionalni plan oporavka i otpornosti 2021.-2026. - Dokumenti (gov.hr)

Italy:

1. Regione Piemonte. (2021). S3 Regione Piemonte 2021-2027: Strategia di specializzazione intelligente per la ricerca e l'innovazione. Regione Piemonte.
2. Ministero della Transizione Ecologica. (2022). Strategia nazionale per l'economia circolare. Ministero della Transizione Ecologica.
3. Ministero della Transizione Ecologica. (2022). Strategia nazionale per lo sviluppo sostenibile. Ministero della Transizione Ecologica.
4. Ministero dello Sviluppo Economico, Ministero dell'Istruzione, dell'Università e della Ricerca. (2022). Strategia nazionale di specializzazione intelligente (SNSI) 2022. Ministero dello Sviluppo Economico, Ministero dell'Istruzione, dell'Università e della Ricerca.

Germany:[4]

[4] The findings presented here are based on interviews, discussions at conferences, and information from trade media (VDI, Manager magazines, Deutsche BauZeitschrift, Rehau Magazine, Building & Automation, ChemieXtra, etc.). There are no quotable statements. The discussion partners are all C-level managers (CEO, CTO, COO, etc.). There were about 25 discussions that took place in a non-formal setting. The extract from these discussions and the summary have been included in this document to the best of our knowledge.

1. BMUV (2024) Nationale Kreislaufwirtschaftsstrategie, Entwurf; https://www.bmuv.de/fileadmin/Daten_BMU/Download_PDF/Abfallwirtschaft/nkws_entwurf_bf.pdf
2. STMD (2023) Digitalplan Bayern; https://digitalplan.bayern; https://digitalplan.bayern/bayern/de/home/info/id/16
3. Bayerische Staatregierung, STMUV (2022) Bayerische Nachhaltigkeitsstrategie; https://www.nachhaltigkeit.bayern.de/doc/bayerische_nachhaltigkeitsstrategie_2022_bf.pdf
4. STMWI (2022) Bayerische Innovationsstrategie; https://www.stmwi.bayern.de/fileadmin/user_upload/stmwi/publikationen/pdf/2022-02-28_Innovationsland_Bayern.pdf
5. STMWI (2023) Bayerische Bioökonomiestrategie; https://www.stmwi.bayern.de/wirtschaft/wirtschaftspolitik/biooekonomie/

Poland:

1. Regional innovation strategy of the Małopolska Region 2030 https://innowacyjna.malopolska.pl/wp-content/uploads/2021/12/Regional-Innovation-Strategy-of-the-**Malopolska-Region-2030.pdf**

2. Malopolska smart specialization strategy (S3) https://www.businessinmalopolska.com/uploads/pdf/publication/malopolskie-inteligentne-specjalizacje-przewodnik-en.pdf

3. CIRCULAR ECONOMY PROGRAM for Malopolska 2030

zacznik_do_Uchway_ZWM_Nr_1852_23_03102023_Program_GOZ.pdf

Hungary:

1. The Hungarian Smart Specialization Strategy (S3)

https://nkfih.gov.hu/english/national-smart-specialisation-strategy/s3-2021-2027

2. Hungary‘s Research, Development, and Innovation Strategy’s

https://nkfih.gov.hu/english/research-development-innovation-strategy

3. The National Sustainable Construction Economy Strategy

https://www.oecd.org/content/dam/oecd/en/publications/reports/2023/04/towards-a-national-circular-economy-strategy-for-hungary_b9db4b7f/1178c379-en.pdf

4. Hungary‘s Research, Development, and Innovation Strategy’s

https://nkfih.gov.hu/english/research-development-innovation-strategy

5. Hungarian National Energy and Climate Plan

https://2010-2014.kormany.hu/download/7/d7/70000/Hungarian%20Energy%20Strategy%202030.pdf

Interreg CENTRAL EUROPE

Co-funded by the European Union

CURIOST

DISCOVER MORE ABOUT THE PROJECT AND GET IN CONTACT

@CURIOST INTERREG CENTRAL EUROPE

interreg-central.eu/projects/curiost/.eu

This publication has been developed within the CURIOST project, supported by the Interreg CENTRAL EUROPE Programme with co-financing from the European Union. Its content is the sole responsibility of the authors and the project partnership and does not necessarily reflect the views or positions of the Interreg CENTRAL EUROPE Programme, its programme bodies or the European Union. Neither the programme authorities nor the European Union can be held responsible for any use that may be made of the information contained herein.