Bridging investment opportunities to achieve the resilient European food packaging value chain

Call: I3-2022-CAP2b

Action: I3-PJG

Grant Agreement No. 101132867

Work Package 2: Strengthen the connection between the penta-helix actors in the European food packaging ecosystem

Report on regional roadmaps in less developed regions

Work Package leader: CLIC innovation OY

T2.3 Food Packaging Roadmap leader: Natureef

History of changes

Issue date	Contributor	Comments	Release
27.09.2024	Natureef	Final report	V1

Table of content

Abbreviations

Abbreviation	Description
DRS	Deposit return scheme
EIA	Environmental Impact Assessment
EPR	Extended producer responsibility
EU	European Union
GDP	Gross Domestic Product
GMP	Good Manufacturing Practice
GPP	Green Public Procurement
MRF	Material recovery facility
OML	Overall Migration Limit
PPWD	Packaging and Packaging Waste Directive
PPWR	Regulation of the European Parliament and of the Council on packaging and packaging waste, amending Regulation (EU) 2019/1020 and Directive (EU) 2019/904, and repealing Directive 94/62/EC
PRO	Producer responsibility organisation
RDF	Refuse-Derived Fuel
RDI	Research, Development, Innovation
R&D	Research and Development
RII	Regional Innovation Index
RIS	Regional Innovation Scoreboard
SML	Specific Migration Limit
SML(T)	Total Specific Migration Limit
WFD	Waste Framework Directive

1. Introduction

The European legal framework on food and food packaging aims to ensure the safety and quality of food products while minimizing the negative environmental impact of processes, materials and products, including packaging applied in the various value chains. The European Union strives to ensure that all packaging placed on the market is recyclable. From January 1, 2030, all packaging should be designed for recycling. In the years 2030-2035, Member States should strive to ensure effective and efficient selective collection of packaging waste, sorting and recycling – recycling at scale should be ensured by 2035. From January 1, 2030, the PPWR regulation will require that all packaging contain a certain minimum amount of recycled material recovered from post-consumer plastic waste per unit of plastic packaging. In turn, logistics processes will require the use of reusable packaging. Entities using transport or commercial packaging for transporting products within the European Union, including via e-commerce, must ensure that at least 40 % of such packaging is reusable under a reuse system.

Changes in packaging affect filling and packaging technologies in the food industry, including the methods of filling packaging with food products and ensuring hygiene and food quality. In the food value chains, the original and most important role of packaging, i.e. ensuring food safety and quality, should be considered and preserved. This means that each new solution must be verified in the context of its application at the stage of production, filling, transport, use and end-of-lifecycle. Marketing and sales teams, both at the food manufacturer and retail levels, also need to be involved in these change processes. Because of the use of new packaging materials and the avoidance of certain materials (e.g. paper stickers with product information on plastic packaging), the need to consider new ways of communication with the consumer is necessary.

The transformation process in food packaging presents significant challenges that require cooperation of stakeholders on various levels. Firstly, a change in materials means the need for new machines and devices or different technological parameters at the stage of packaging production and filling the packaging with food products. Secondly, it is necessary to gain knowledge about the barrier properties and functionality of new mono-materials and innovative dyes to ensure food safety and quality in the life cycle of a given food product. Thirdly, packaging with lower material content may affect logistics processes.

Other issues concern ways to stock packed food products on pallets and in transport vehicles and ways to store and transport (including temperature and pressure) these products to ensure product integrity and limit losses. Fourthly, using new materials requires informing the public on how to separate packaging after use and the entities representing sorting and recycling installations on how to ensure that the recovered material is suitable for the food packaging supply chain.

The law imposes on producers the obligation to inform the public about various aspects related to both food products and packaging. In the coming years, it may turn out that information on packaging should be included, e.g. on the allergen content of the food product and its nutritional value, on the product's carbon footprint, on the amount of recyclates used in the packaging, or on the method of separating and collecting packaging after use. New labelling methods will appear, which are also intended to support the process of ensuring the quality of the final recovered product at the stage of sorting and recycling packaging. Therefore, it becomes important how to place all this information on packaging so that consumers can easily read it. Retail chains also have their own expectations regarding labelling to ensure full product quality control (product tracking techniques based on barcodes, QR codes and other signs). Proper labelling of packaging also helps at the sorting and recycling stage. First, vision technologies and other solutions based on data collection and processing will ensure greater transparency regarding individual packaging streams. This means that in the labelling and marking debate, a dialogue is crucial between all actors in the value chain to jointly establish clear criteria that are technologically and financially feasible, promoting collaboration and shared responsibility.

Entities operating Voivodeship in the value chains of food products in the West Pomeranian, Lithuania, Hungary, Latvia and Slovenia, must prepare to transform their activities towards a circular economy. They must not only meet legal requirements but also jointly find solutions for developing transparent systems for the circulation of packaging and its materials. This means, on the one hand, refusing or significantly limiting some packaging. On the other hand, designing packaging that can be recycled, some of which is suitable for repeated use. Considering these four principles of sustainable development, 5 action plans (road map for food packaging) were prepared.

2. The roadmap development methodology

1. The roadmap for West Pomeranian food packaging was prepared in June-August 2024, based on the outcomes of two regional workshops – in February 2024 (identification of regional stakeholders and main challenges) and in June 2024 (identification of initiatives and elaboration of actions). The roadmap was consulted in July 2024 with stakeholders. This roadmap identifies essential issues in the short, medium and long term, based on which entities, individually and within consortium, can undertake specific projects as part of transformation processes towards sustainable food packaging in the West-Pomeranian Voivodeship.

2. The roadmap for food packaging in Central and Western Lithuania was developed from July to August 2024, using a participatory approach that engaged various stakeholders from government, industry, and academia. Two key workshops were organized in March

2024 (identifying regional stakeholders and challenges) and August 2024 (discussing initiatives and action steps). The roadmap was further refined through consultations with stakeholders in September 2024. It outlines important actions that can be undertaken by individual entities and consortiums in the short, medium, and long terms, to support the transition towards sustainable food packaging within the Central and Western Lithuania.

3. The roadmap for food packaging in Hungary was prepared in the period June-September 2024, based on the outcomes of two regional workshops – in February 2024 (identification of regional stakeholders and main challenges) and in September 2024 (identification of initiatives and elaboration of actions). After the first workshop DBH InnoHub also prepared a "White Paper" on the Opportunities for Sustainable Food Packaging in Hungary, which was circulated among the stakeholders who participated at or registered for the February workshop. The current roadmap was consulted in September 2024 with stakeholders. This roadmap identifies important issues in the short, medium and long term, based on which entities, individually and within consortiums, can undertake specific projects as part of transformation processes towards sustainable food packaging in Hungary.

4. The road map for food packaging in Latvia was prepared in the period June-September 2024, based on the outcomes of two regional workshops **– in March 2024** (identification of regional stakeholders and main challenges) with 9 participants and **in June 2024** (identification of initiatives and elaboration of actions) with 27 participants. The road map was consulted in August 2024 with stakeholders in the second workshop and with Value4Pack consortium more developed regions from France and Sweden. This roadmap identifies important issues in the short, medium and long term, based on which entities, individually and within consortiums, can undertake specific projects as part of transformation processes towards sustainable food packaging in Latvia.

5. The road map for food packaging in Slovenia was prepared in the period August-September 2024, based on the outcomes of two regional workshops – in February 2024 (identification of regional stakeholders and main challenges) and in September 2024 (identification of initiatives and elaboration of actions). The road map was consulted in September 2024 with Clúster Alimentario de Galicia. This roadmap identifies important issues in the short, medium and long term, based on which entities, individually and within consortiums, can undertake specific projects as part of transformation processes towards sustainable food packaging in Slovenia.

3. Challenges and innovation gaps - priorities

The challenges and innovation gaps for regions have been defined by addressing 4R (Refuse, Reduce, Reuse, Recycle) based on the defined innovation gaps for each 5 less developed regions.

4. Industry-driven initiatives

Following the identified innovation gaps Industry**-driven initiatives have been specified for each of 5 less developed regions, by"**

1. Principle (4R: reduce, refuse, reuse, recycle);
2. Challenge (specific one for the principle);
3. Initiative (specific one for the challenge);
4. Stakeholders: (actors directly or indirectly involved or impacted by the initiative)
5. Time frame (Set of actions, minimum anticipated results, and main obstacles defined for
    - short term: 2024-2026;
    - medium-term: 2027-2026;
    - long-term: 2031-2035).

5. The Road Maps

Following the identified innovation gaps Industry**-driven initiatives have been specified for each 5 less developed regions.** As a result, all the industry drive initiatives have been presented in a table, for each less developed region.

6. Recommendation for actions

Finally, for all Road Maps specific recommendations have been presented, and consulted with key stakeholders in each region.

7. Appendix – full documents (Road Maps)

-Food Packaging Roadmap for West-Pomerania (PL);
-Food Packaging Roadmap for Central and Western Lithuania Region (LT);
-Food Packaging Roadmap Hungary (HU);
-Food Packaging Roadmap for Latvia;
-Food Packaging Roadmap for Slovenia (SL).

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Food Packaging Roadmap for West-Pomerania (PL)

Work Package leader: CLIC innovation OY

T2.3 Food Packaging Roadmap leader: Natureef

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History of changes

Issue date	Contributor	Comments	Release
01.08.2024	Natureef	Document consulted with regional stakeholders and the regional self-government in July 2024	V1
13.08.2024	Natureef	Revised version of initiatives	V2
27.09.2024	Natureef	Final version	V2.1

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Changes in packaging affect filling and packaging technologies in the food industry, including the methods of filling packaging with food products and ensuring hygiene and food quality. In the food value chains, the original and most important role of packaging, i.e. ensuring food safety and quality, should be considered and preserved. This means that each new solution must be verified in the context of its application at the stage of production, filling, transport, use and end-of-lifecycle. Marketing and sales teams, both at the food manufacturer and retail levels, also need to be involved in these change processes. Because of the use of new packaging materials and the avoidance of certain materials (e.g. paper stickers with product information on plastic packaging), the need to consider new ways of communication with the consumer is necessary.

The transformation process in food packaging presents significant challenges that require cooperation of stakeholders on various levels. Firstly, a change in materials means the need for new machines and devices or different technological parameters at the stage of packaging production and filling the packaging with food products. Secondly, it is necessary to gain knowledge about the barrier properties and functionality of new mono-materials and innovative dyes to ensure food safety and quality in the life cycle of a given food product. Thirdly, packaging with lower material content may affect logistics processes.

Other issues concern ways to stock packed food products on pallets and in transport vehicles and ways to store and transport (including temperature and pressure) these products to ensure product integrity and limit losses. Fourthly, using new materials requires informing the public on how to separate packaging after use and the entities representing sorting and recycling installations on how to ensure that the recovered material is suitable for the food packaging supply chain.

The law imposes on producers the obligation to inform the public about various aspects related to both food products and packaging. In the coming years, it may turn out that information on

packaging should be included, e.g. on the allergen content of the food product and its nutritional value, on the product's carbon footprint, on the amount of recyclates used in the packaging, or on the method of separating and collecting packaging after use. New labelling methods will appear, which are also intended to support the process of ensuring the quality of the final recovered product at the stage of sorting and recycling packaging. Therefore, it becomes important how to place all this information on packaging so that consumers can easily read it. Retail chains also have their own expectations regarding labelling to ensure full product quality control (product tracking techniques based on barcodes, QR codes and other signs). Proper labelling of packaging also helps at the sorting and recycling stage. First, vision technologies and other solutions based on data collection and processing will ensure greater transparency regarding individual packaging streams. This means that in the labelling and marking debate, a dialogue is crucial between all actors in the value chain to jointly establish clear criteria that are technologically and financially feasible, promoting collaboration and shared responsibility.

Entities operating in the value chains of food products and entities active in waste management in Poland, including in the West Pomeranian Voivodeship, must prepare to transform their activities towards a circular economy. They must not only meet legal requirements but also jointly find solutions for developing transparent systems for the circulation of packaging and its materials. This means, on the one hand, refusing or significantly limiting some packaging. On the other hand, designing packaging that can be recycled, some of which is suitable for repeated use. Considering these four principles of sustainable development, this action plan (road map for food packaging) was prepared for the West Pomeranian Voivodeship.

2. The roadmap development methodology

This roadmap for food packaging was prepared in June-August 2024, based on the outcomes of two regional workshops – in February 2024 (identification of regional stakeholders and main challenges) and in June 2024 (identification of initiatives and elaboration of actions). The roadmap was consulted in July 2024 with stakeholders. This roadmap identifies essential issues in the short, medium and long term, based on which entities, individually and within consortium, can undertake specific projects as part of transformation processes towards sustainable food packaging in the West-Pomeranian Voivodeship.

3. Challenges and innovation gaps - priorities

The West-Pomeranian Voivodeship is located in north-western Poland and is the fifth largest voivodeship, covering over 7% of the country's area and approximately 4.4% of the country's population. The voivodeship is known for its inland water resources, protected nature reserves and industrial and logistical activities in dedicated zones and ports near the Baltic Sea. Tourism also plays a vital role in the region's economy. The West-Pomeranian Voivodeship is the third largest agri-food exporter among Polish voivodeships. The share of agri-food exports in the region's total exports is approximately 20%. The smart specialization "chemical products for sustainable development" includes the policy of developing smart specialisations regarding food packaging. Particular attention is paid to, among others, new recycling methods and innovative packaging, including heat-shrink packaging technologies, innovative coating and printing technologies, and innovative foil and paper-cardboard packaging.

There are several thousand entities active in the food packaging value chain in the segment of paper packaging and plastic packaging, including entities dealing in: the production of materials, production of packaging, logistics, food processing, wholesale and retail sales, and services in the so-called HORECA, as well as collecting, sorting and recycling packaging waste. Many interactions between entities from the voivodeship and entities from other European regions characterizes this value chain. The main target markets are Germany, the Baltic countries and Scandinavian countries. Branches of international corporations operating in the region cooperate with large suppliers at a global level. International retail chains clearly set their requirements based on food processors consult their options with packaging suppliers (and/or material suppliers if they produce packaging themselves). Local food processors have yet to be made aware of the upcoming changes. They often stick to traditional packaging solutions, which only sometimes comply with the 4R principles: Refuse, Reduce, Re-use, Recycle.

Expenditures on research and development in enterprises in the food packaging value chain operating in the voivodeship are low. This is because there are many branches of international corporations operating in the region (research and development activities are carried out abroad), and Polish companies maintain a rather traditional packaging portfolio. Cooperation within innovative projects occurs mainly between packaging suppliers and food processors and, to a lesser extent, between companies and research organisations in Poland. Only a small group of enterprises has successfully applied for public funds in the last decade to implement innovative products or processes.

Industry associations try to support cooperation between entities, including its transformation processes related to packaging. These organisations include, among others: the Natureef Association, which brings together Polish leaders in the packaging, food processing and recycling sectors, supporting joint research and development projects and promoting sustainable packaging; HORECA - Hotel Cluster, which brings together entities from the hotel and catering services sector (including tourism and recreation services) and promotes the exchange of

experience and knowledge in improving the quality of services and promoting the region as an attractive tourist destination; the Polish Association of Fish Processors, which integrates companies from the fishing and seafood processing value chain.

Striving towards a circular economy in which we try, first, to avoid (refuse) packaging or limit the use of packaging materials and secondly to ensure appropriate processes and systems for packaging re-use and for recycling, specific challenges arise for stakeholders in West-Pomerania.

Refuse
Abandoning a material/product's function or offering the same capability and function in a substantially different material or product can make it redundant.
Main challenges for the region: • High costs of new packaging materials that allow the elimination of some packaging, while ensuring the durability and safety of the food product • Refusal of additional paper layers used in plastic packaging for marketing purposes

Reduce
Efficient packaging production through minimizing resources used and overall material consumption. In the light of the circular economy, this means reducing (excessive) packaging and packaging waste.
Main challenges for the region: • Technological challenges related to reducing and replacing materials and dyes with other solutions to reduce packaging • High price of new packaging (considering new materials allowing to reduce the amount of previously applied materials) • Ensuring the safety (shelf-life) and quality of the food product while reducing the thickness of packaging (barrier properties, functionality) • Adaptation of machines and devices to packaging with a reduced composition or a different material composition (filling process, packaging process, ensuring proper sealing of the packaging)

Re-use
Any act of reusing reusable packaging for the same purpose for which it was intended. Considering the circular economy, this means designing packaging for reuse and developing an appropriate system for returning, cleaning and reusing packaging.
Main challenges for the region: • Implementation of inexpensive and convenient services for the client/consumer related to reusable packaging (packaging as a service) • Implementation of an effective deposit system (friendly system for collecting and returning reusable packaging) and logistics for the collection and redistribution of reusable packaging • Ensuring food hygiene and safety in reusable packaging systems • Ensuring that reusable packaging does not enter inappropriate waste streams (e.g. non-reusable waste streams)

Recycle
A recovery process in which waste materials are reprocessed into products, materials or substances, either for their original or other purposes. High-quality recycling involves recycling packaging waste and using the recovered materials in the same way or for a similar use, with minimal loss of quantity, quality or functionality.
Main challenges for the region: • Seeking standardization of food packaging materials (as opposed to the high level of complexity of packaging materials currently used) • Providing affordable and qualitatively acceptable recyclable material enabling its reuse as recyclate in food packaging (including meeting food contact requirements) • Replacing plastic windows in cardboard packaging and paper bags with other solutions that can either be easily separated from the main packaging or incorporated into the paper waste stream • Providing coatings for marketing purposes that meet the criteria for barrier properties and do not limit the recyclability of the coated materials • Ensuring transparency in packaging waste streams so that operators of sorting facilities and operators of recycling facilities have adequate information from packaging and food processors regarding the expected quantities and types of packaging waste on the market • Developing a system based on cooperation between entities representing sorting installations and recycling installations in the region in the context of the national extended producer responsibility mechanism (ensuring the appropriate quantity and quality of packaging waste)

The Waste Management Plan for the West-Pomeranian Voivodeship for 2020-2026, with a perspective for 2027-2032, defines the waste management policy in the region. It draws attention to the lack of installations for processing certain waste fractions and the insufficient processing

capacity of installations for recycling packaging waste. The plan recognizes the difficulties in achieving an appropriate level of selective collection of packaging waste from households and the need to improve education and awareness of residents regarding the proper handling of packaging waste.

The plan's main objectives include increasing the share of waste recovery, in particular, recycling glass, metals, plastics, paper and cardboard, as well as recovering energy from waste following environmental protection requirements and reducing the amount of waste sent to landfills. Specific actions include: intensification of ecological education promoting proper waste management; supporting the implementation of economically and ecologically effective technologies for waste recovery and disposal, including technologies enabling recycling and recovery of energy contained in waste in the processes of its thermal transformation; identifying the infrastructure necessary to achieve compliance with EU directives in the field of municipal waste management, including the implementation of the hierarchy of waste management methods, achieving the required levels of preparation for reuse and recycling, and limiting the landfilling of biodegradable municipal waste. In terms of packaging related activities, the plan assumes the intensification of information and educational activities in the field of eco-design and further development of the system of selective collection, sorting and processing of packaging waste.

The above challenges will require joint initiatives from stakeholders operating in the food packaging value chains, food product value chains and entities active in waste management. These entities often conduct their activities within the framework of inter-sectoral and inter-regional networks, they must operate in accordance with the law at the level of the European Union and individual member states and following the expectations of their clients and final consumers. In addition, they must ensure that the implemented solutions meet qualitative, technical and financial criteria. Fluctuating prices on the materials market, the uncertainty of access to recyclates of an appropriate quality suitable for use in food packaging increases the costs of energy, logistic processes and employee remuneration, as well as an insufficiently developed system for collecting, sorting and recycling packaging waste in Poland, mean that entities must make difficult decisions regarding the transformation of their business model. An important aspect of this transformation process towards a circular economy is understanding the challenges as a basis for formulating joint industry initiatives.

4. Industry-driven initiatives

Principle	Refuse		
Challenge	**The high costs of new mono-material solutions prevent their introduction into the packaging offered.**		
Initiative	Introduce standardization of packaging materials to achieve scale of production and reduce the prices of these materials		
Stakeholders	Food packaging producers, food product manufacturers, entities operating in the logistics sector		
Time frame	**2024-2026**	**2027-2030**	**2031-2035**
Actions	• Identify groups of food products for which, by changing the materials used in the packaging, it will be possible to refuse some of the packaging • Identify materials that meet the safety and durability (quality) criteria of the selected food products • Develop sustainable packaging design concepts by eliminating some packaging • Build research and industrial consortiums • Prepare research and development projects	• Implement research and development projects • Evaluate the results of research and development projects • Start the production of selected standardized packaging materials • Support the concept of sustainable packaging design by eliminating certain packaging on a large scale in selected segments of the food industry	• Build industry agreements and consortiums among packaging producers and food product manufacturers around standardized packaging materials
Minimum anticipated results	• 5 groups of food products identified for which, thanks to changing the materials used in the packaging, it will be possible to refuse part of the packaging	• 3 research and development projects submitted to public support programs • 3 standardized packaging materials commercialized	• The scale of production of standardized packaging materials will translate into their competitive price - a reduction in the prices of these materials by at least 30%

Principle	Refuse		
Challenge	**The high costs of new mono-material solutions prevent their introduction into the packaging offered.**		
Initiative	Gain customer/consumer understanding of higher prices for some packaging containing new materials because of recyclability		
Stakeholders	Food packaging producers, food product manufacturers, industry associations, entities in the wholesale and retail segment		
Time frame	**2024-2026**	**2027-2030**	**2031-2035**
Actions		• Conduct feasibility studies to determine the impact of new materials on packaging prices • Prepare guides for packaging and food manufacturers on sustainable packaging design using new materials	• Build industry agreements and consortiums among packaging and food product manufacturers regarding the refusal of certain packaging • Prepare an information campaign addressed to the wider public regarding the policy of refusing certain packaging supported by packaging and food product manufacturers • Implement an information campaign in the West-Pomeranian Voivodeship
Minimum anticipated results		• 5 food product groups identified • Guide on sustainable packaging design using new materials	• Information campaign on the policy of refusing certain packaging implemented

Principle	Refuse		
Challenge	Refusing additional paper layers in plastic packaging for marketing purposes		
Initiative	**Raising awareness that plastic packaging with an additional paper layer for marketing proposes does not meet the requirements of PPWR.**		
Stakeholders	Food packaging producers, food product manufacturers, industry associations, marketing agencies, entities in the wholesale and retail segment		
Time frame	**2024-2026**	**2027-2030**	**2031-2035**
Actions	• Identify groups of food products packed in plastic packaging where additional paper packaging is used for marketing purposes • Identify suppliers of innovative printing solutions • Organize meetings promoting the use of new printing techniques	• Prepare research and development projects, pilot projects testing new printing techniques while eliminating additional paper packaging • Implement research and development projects, pilot projects testing new printing techniques while eliminating additional paper packaging • Retail chains introduce the requirement to offer selected food products in plastic packaging without additional paper packaging	• Prepare an information campaign addressed to the public regarding the policy of refusing paper packaging for certain products packaged in plastic, supported by retail chains • Implement an information campaign in the West-Pomeranian Voivodeship
Minimum anticipated results	• 5 food product manufacturers, 1 supplier of innovative solutions related to printing and 1 retail chain ready to cooperate	• 1 retail chain required offering selected food products in plastic packaging without additional paper packaging	• Information campaign regarding the policy of refusing packaging paper for some products packed in plastic packaging

Principle	Reduce		
Challenge	Technological challenges related to reducing and replacing materials and dyes with other solutions.		
Initiative	**Minimizing packaging weight and volume while ensuring its functionality and recyclability.**		
Stakeholders	Producers of packaging materials and dyes, producers of food packaging, food product manufacturers, entities from the research and development sector		
Time frame	**2024-2026**	**2027-2030**	**2031-2035**
Actions	• Identify groups of plastic packaging that will not meet the "recyclable" criteria and/or which will be excluded due to legal regulations (e.g. because they contain PFAS, because they contain dyes that are not suitable for recycling) • Identify food product manufacturers whose packaging does not meet legal requirements • Identify suppliers of packaging materials and dyes that meet future regulatory requirements • Organize information and training meetings on the packaging change path and standardize the preparation of safety data sheets	• Promote mono-material packaging using recyclable dyes • Prepare research and development projects related to reducing the amount and types of materials in plastic packaging • Implement research and development projects related to limiting the amount and types of materials in plastic packaging • Obtain appropriate certificates for reduced material packaging based on mono-materials and recyclable dyes	• Implement a system of laboratory control of materials and dyes and reduced material and dye packaging • Bring to market reduced material packaging that meets the 'recyclable' requirement • Develop research and development facilities for compliance testing of packaging with reduced material content that meets the "recyclable" requirement
Minimum anticipated results	• 20 food product manufacturers aware of the impact of legal requirements on their activities in the context of the packaging used	• 60% of food product manufacturers in the voivodeship ready to use packaging with reduced material content	• 100% of food product manufacturers in the voivodeship use packaging with a minimum content of materials

Principle	Reduce		
Challenge	High price of new packaging (however new materials allow to reduce the amount of originally used materials). Ensuring the safety (shelf life) and quality of the food product while reducing the thickness of the packaging (barrier properties, functionality)		
Initiative	**Striving for affordable packaging with a reduced amount of materials that ensures the safety and durability (quality) of the food product**		
Stakeholders	Producers of packaging materials, producers of food packaging, food product manufacturers		
Time frame	**2024-2026**	**2027-2030**	**2031-2035**
Actions	• Identify product groups for which reducing the amount of materials (layer thickness) in packaging is the greatest challenge in terms of product safety and durability (quality). • Organize cooperation between producers of identified product groups and entities from the research and development sector (information meetings, training) • Prepare guides on materials and related aspects to ensure the safety and durability of food products • Strengthen the research and development base in the field of research on the impact of new packaging solutions on the safety and durability of food products • Prepare research and development projects for packaging with reduced material content	• Implement research and development projects for packaging with reduced material content, including thermoplastic starch packaging • Obtain the necessary certificates to introduce packaging with reduced material content to the market that meets the safety and durability criteria of the food product • Support cooperation between material producers, packaging producers and food product producers to achieve the scale of production and sale of innovative packaging	• Promote good practices in the use of packaging with a reduced amount of materials that meet the safety and durability criteria of a food product • Support cooperation between material producers, packaging producers, food producers and entities from the research and development sector
Minimum anticipated results	• Recommendations for minimizing packaging for 5 groups of food products included in the guides for ensuring the safety and durability of food products • 5 research and development projects concerning minimization of the content of materials/prepared packaging	• 3 research and development projects implemented • 3 innovative packaging has been certified and implemented on the market	• 100% packaging with reduced material content that meets the safety and durability criteria of a food product

Principle	Reduce		
Challenge	Adapting machines and devices for packaging production with a slimmer composition or a different material composition (filling process, packaging process, ensuring proper sealing of the packaging)		
Initiative	**Development of new infrastructure (machines) or adaptation of existing ones to enable the production of new packaging in the new value chain. Efficient adaptation of filling and packaging processes in the food processing industry in connection with introducing food packaging with reduced material composition.**		
Stakeholders	Food packaging producers, food product manufacturers, producers of machines and equipment for the food processing industry, integrators		
Time frame	**2024-2026**	**2027-2030**	**2031-2035**
Actions	• Identify technological processes sensitive to changes in the composition of materials used in packaging • Identify groups of food products for which changing the composition of materials used in packaging may pose a significant challenge to the filling and packaging production processes • Organize meetings between packaging producers and machine manufacturers regarding the assessment of the impact of changing the composition of packaging materials on filling and packaging production processes • Prepare recommendations for packaging producers the need to adapt technological processes to new packaging • Prepare recommendations for food product manufacturers regarding the need to adapt technological processes to new packaging	• Organize training and promote good practices in the field of activities related to adapting filling and packaging processes to new packaging with changed material composition • Prepare research and development projects with the participation of packaging manufacturers, machine manufacturers and food product manufacturers aimed at developing innovative solutions for filling and packaging production processes • Support the process of transforming the machinery of food and packaging producers with public programs	
Minimum anticipated results	• 2 machine suppliers and 3 packaging producers involved in providing recommendations to food product manufacturers where new packaging can significantly affect the filling and packaging process - recommendations for 5 case studies	• 100 food product manufacturers participated in training • 2 research and development projects implemented in the field of innovative filling and packaging processes • 10 food product manufacturers implemented investment projects	

Principle	Re-use		
Challenge	Implementation of inexpensive and convenient for the customer/consumer services related to reusable packaging (packaging as a service)		
Initiative	**Testing and promoting the "packaging as a service" business model**		
Stakeholders	Food packaging producers, food product producers, IT solution providers, machine and equipment suppliers, entities further down the value chain		
Time frame	**2024-2026**	**2027-2030**	**2031-2035**
Actions	• Identify areas (e.g. HORECA, services for hospitals, care centers and schools, event industry) where it is possible to introduce closed loops for reusable packaging • Identify stakeholders who should be involved in a pilot project to introduce the "packaging as service" business model • Prepare a "packaging as a service" project (feasibility study, business plan)	• Implement a pilot project prepared for one area, within which the implementation of the "packaging as a service" business model will be tested. • Evaluate the results of the pilot project and (if positive) prepare packaging-as-a-service pilot projects for additional areas • Identify other areas where it will be possible to implement/replicate the "packaging as a service" business model in a cost-effective and convenient way	• Implement "packaging as a service" projects • Promote good practices • Expand the circle of engaged stakeholders in groups ensuring the closed loop of reusable packaging
Minimum anticipated results	• 1 pilot project developed (funding obtained) for one area that will test the implementation of the "packaging as a service" business model	• Business model demonstrated in at least 1 pilot project • 3 further areas identified within which it will be possible to conduct pilot projects	• 3 projects regarding "packaging as a service" in which at least 24 entities are involved

Principle	Re-use		
Challenge	Implementation of an effective deposit system (friendly collection and return system for reusable packaging) and logistics for the collection and redistribution of reusable packaging		
Initiative	**Creation of a returnable packaging system in HORECA (including in the catering and tourism segment)**		
Stakeholders	Food packaging producers, food product manufacturers, wholesale and retail trade entities, associations under the extended producer responsibility system, retail trade entities, entities in the HORECA		
Time frame	**2024-2026**	**2027-2030**	**2031-2035**
Actions	• Get acquainted with good practices regarding packaging return systems used in HORECA (Https://www.recircle.eu/europa/; www.relevo.app; https://xiclo.app) • Get familiarized with legal regulations adopted in Poland regarding the conditions for implementing deposit systems • Prepare the concept of a return system for reusable packaging in HORECA (catering and tourism) as part of cooperation between clusters in the region • Present the concept to stakeholders and build a consortium for a pilot project • Prepare a pilot project including: an information campaign, an application enabling the rental of containers and settlement of transactions, a set of containers, a procedure ensuring food safety and hygiene • Implement a pilot project	• Implement a pilot project • Evaluate the effects of the pilot project • Disseminate the results of the pilot project and involve other actors in this endeavor • Expand the scale of the project in HORECA	
Minimum anticipated results	• 1 pilot project on the development, testing and piloting of a reusable packaging return system in HORECA started	• 100 business entities from HORECA involved in a regional project of a reusable packaging return system	

Principle	Re-use		
Challenge	Implementation of an effective deposit system (friendly collection and return system for reusable packaging) and logistics for the collection and redistribution of reusable packaging		
Initiative	**Regional system of reusable packaging**		
Stakeholders	Food packaging producers, food product manufacturers, wholesale and retail trade entities, packaging recovery organization, associations under the extended producer responsibility system, retail trade entities, entities in the HORECA segment, Marshal's Office of the West Pomeranian Voivodeship, local government units		
Time frame	**2024-2026**	**2027-2030**	**2031-2035**
Actions	• Prepare an information campaign regarding the process and requirements of the deposit system in Poland addressed to entities that are obliged to join the deposit system • Involve stakeholders in the regional initiative to build a coherent return system for reusable packaging in the voivodeship • Develop a model of a return system that will ensure the greatest possible efficiency of packaging collection with the participation of stakeholders • Train and advise entities that are obliged to join the deposit system	• Carry out periodic assessment of the functioning of the deposit system in the voivodeship • Support cooperation between local government units and packaging recovery organizations (associations under the extended producer responsibility system) • Prepare information campaigns addressed to the public in order to improve the efficiency of collecting reusable packaging • Implement information campaigns addressed to the public to improve the efficiency of collecting reusable packaging	• Support the development of new packaging facilitating their repeated use under the deposit system (reducing the streams of packaging sent for recycling)
Minimum anticipated results	• >81% of single-use plastic beverage bottles with a capacity of up to 3 liters, metal cans with a capacity of up to 1 liter and reusable glass bottles with a capacity of up to 1.5 liters were selectively collected under the deposit system	• > 90% of single-use plastic beverage bottles with a capacity of up to 3 liters, metal cans with a capacity of up to 1 liter and reusable glass bottles with a capacity of up to 1.5 liters were selectively collected under the deposit system	

Principle	Re-use		
Challenge	Ensuring food hygiene and safety in reusable packaging systems Ensuring that reusable packaging does not enter inappropriate waste streams (e.g. non-reusable waste streams)		
Initiative	**Reusable Retail Packaging Initiative**		
Stakeholders	Food packaging producers, food product manufacturers, wholesale and retail entities, retail entities		
Time frame	**2024-2026**	**2027-2030**	**2031-2035**
Actions	• Identify an area where a closed loop food contact packaging system for repeated use can be introduced (e.g. bread packaging, fruit and vegetable packaging) • Assess the conditions based on the analysis of the packaging life cycle in terms of ensuring the required hygiene and food safety • Prepare a concept for a pilot project based on good practices • Present the pilot project to stakeholders • Prepare a pilot project regarding the use of reusable packaging for the selected product/products (e.g. bread, fruit, vegetables)	• Implement a pilot project regarding the use of reusable packaging for the selected product/products (e.g. bread, fruit, vegetables) • Include entities wishing to introduce the "packaging as a service" service • Organize information campaigns addressed to the public regarding the use of reusable packaging, including in the context of ensuring hygiene and food safety • Evaluate the pilot project and disseminate the results • Encourage other entities to join the regional project to achieve scale (profitability of the washing and logistics installations) • Prepare concepts for subsequent projects regarding the use of reusable packaging for the selected product/products	• Implement subsequent projects regarding the use of reusable packaging for the selected product/products • Gradual abandonment of single-use packaging in other areas of everyday life
Minimum anticipated results	• 1 pilot project on reusable packaging for the selected product prepared • 20 entities ready to join the pilot project	• 250 entities involved in the regional project on reusable packaging for at least 3 groups of food products	• 2,500 entities involved in the regional project on reusable packaging for various groups of food products

Principle	Recycle		
Challenge	Towards standardization of food packaging materials providing cost- and quality-acceptable recyclable material that meets food contact requirements)		
Initiative	**Regional partnership initiative for the development of safe packaging materials and plastic packaging for food contact**		
Stakeholders	Producers of recyclates, packaging materials, producers of food packaging, food product manufacturers, wholesale and retail trade entities, entities collecting, sorting and recycling packaging waste		
Time frame	**2024-2026**	**2027-2030**	**2031-2035**
Actions	• Provide food product manufacturers with access to up-to-date information on European legislation on food contact materials, in particular on recycled plastic materials and products intended for food contact • Convince food product manufacturers from key food product groups for the voivodeship to cooperate on the standardization of the packaging materials used • Conduct a feasibility study on the life cycle of plastic packaging materials, considering safe recycling processes and reuse of recyclates in food contact packaging • Prepare, in consultation with food product manufacturers, producers of plastic materials for packaging and packaging manufacturers, a catalog of selected food contact materials recommended for use in food contact packaging	• Agree with entities collecting, sorting and recycling packaging waste on processes ensuring safe recycling of selected plastic packaging fractions enabling the reuse of recovered materials for food contact packaging • Invest in technical infrastructure to ensure safe recycling of plastic food contact packaging • Conduct research and development projects regarding the use of recyclates in plastic packaging for contact with food • Organize training for food product manufacturers in the use of safe plastic materials and their recyclates for food contact	• Update the catalog of selected food contact materials recommended for use in food contact packaging • Organize training for food product manufacturers on the use of safe plastic materials and their recyclates for food contact • Organize information campaigns for the public regarding the use of recyclates in plastic packaging for food contact
Minimum anticipated results	• 50 food product manufacturers and 10 producers of food packaging included in the agreement on the standardization of	• 3 research and development projects carried out in the field of the use of recyclates in plastic packaging for contact with food	• 100 food product manufacturers using packaging of similar material containing recyclates for contact with food

	packaging materials for contact with food in key food product groups for the voivodeship	• 1 demonstration installation launched for recycling selected plastic fractions, providing clean recyclates (containing no biological and chemical impurities) suitable for use in packaging for contact with food	• 1 operational installation for recycling plastic packaging to produce recyclates for food contact

Principle	Recycle		
Challenge	Replacing plastic windows in cartons and paper bags with other solutions that can either be easily separated from the primary packaging or incorporated into the paper waste stream, entities collecting, sorting and recycling packaging waste		
Initiative	**Make paper and cardboard packaging windows recyclable in paper and cardboard packaging waste streams**		
Stakeholders	Producers of packaging materials, producers of food packaging, food product manufacturers, wholesale and retail trade entities, entities collecting, sorting and recycling packaging waste		
Time frame	**2024-2026**	**2027-2030**	**2031-2035**
Actions	• Review materials available on the market that can replace plastic windows in cardboard and paper packaging • Identify groups of food products for which solutions other than plastic windows can be proposed • Investigate the life cycle of paper and cardboard food packaging with windows other than traditional plastic ones in terms of selective collection, sorting and recycling of packaging • Agree with entities collecting, sorting and recycling paper and cardboard packaging waste on the process of taking over packaging with windows other than plastic • Prepare research and development projects regarding the replacement of plastic windows with windows made of another material • Implement research and development projects regarding the replacement of plastic windows with windows made of another material • Organize information campaigns for the wider public regarding the abandonment of windows in paper and	• Prepare, with the participation of retail chains, recommendations for food product manufacturers regarding replacing plastic windows in paper and cardboard packaging with other solutions • Prepare a demonstration project with the participation of packaging producers and food product manufacturers in the field of marking paper and cardboard packaging with windows for ease of recognition at the collection, sorting and recycling stage • Implement a demonstration project in the field of marking paper and cardboard packaging with windows for ease of recognition at the collection, sorting and recycling stage • Build consensus among food product manufacturers to introduce windows made of materials other than plastics into paper and cardboard packaging on a large scale, ensuring uniformity and transparency in the collection, sorting and recycling process	

	cardboard packaging by some food product producers		
Minimum anticipated results	• 3 groups of food products identified for which at least 12 food product manufacturers are ready to give up the plastic window or include a window made of another material in paper and cardboard packaging • 1 research and development project implemented regarding the use of a window made of a material other than plastic	• 1 demonstration project implemented which proves the possibility of using appropriate marking of paper and cardboard packaging with a window made of recyclable material within the waste streams of paper and cardboard packaging	•

Principle	Recycle		
Challenge	Accessibility of coatings that meet barrier properties criteria and do not limit the recyclability of coated materials		
Initiative	**Providing coatings that meet barrier properties criteria and do not limit the recyclability of coated materials**		
Stakeholders	Producers of packaging materials, producers of food packaging, producers of food products, wholesale and retail trade entities, entities collecting, sorting and recycling packaging waste		
Time frame	**2024-2026**	**2027-2030**	**2031-2035**
Actions	• Identify commercially available coatings that do not restrict the recyclability of coated packaging materials • Prepare research and development projects for selected food packaging in terms of assessing the behavior of coatings in terms of barrier properties and ease of printing) • Implement research and development projects for selected food packaging in terms of assessing the behavior of coatings in terms of barrier properties and ease of printing) • Organize information meetings for packaging producers and those collecting, sorting and recycling packaging waste regarding new coatings used in packaging	• Provide food product manufacturers and packaging producers with information on European implementing regulations defining the approach to the design of recyclable packaging • Prepare recommendations for different types of packaging regarding coatings that meet the barrier properties and recyclability criteria • Promote the use of recyclable coated materials among food manufacturers	
Minimum anticipated results	• 3 research and development projects on the use of new coatings, covering one type of food packaging each, started	• 20 food product manufacturers apply packaging coated with coatings that meet the criteria for barrier properties and are suitable for recycling	

Principle	Recycle		
Challenge	Ensuring transparency in packaging waste streams so that operators of sorting facilities and operators of recycling facilities have adequate information from packaging and food producers regarding the expected quantities and types of packaging waste on the market Developing a system based on cooperation between entities representing sorting and recycling installations in the region in the context of the national extended producer responsibility mechanism (ensuring the appropriate quantity and quality of packaging waste)		
Initiative	**Agreement for large-scale recycling and ensuring access to recyclates for food contact packaging**		
Stakeholders	Producers of packaging materials, producers of food packaging, food product manufacturers, wholesale and retail trade entities, entities collecting, sorting and recycling packaging waste, Marshal's Office of the West Pomeranian Voivodeship, local government units		
Time frame	**2024-2026**	**2027-2030**	**2031-2035**
Actions	• Analyze packaging waste streams in the West-Pomeranian Voivodeship and in neighboring voivodeships • Prepare a feasibility study for a recycling facility for specific fractions of food packaging waste • Create a consortium for the construction of an installation for recycling plastic packaging • Prepare an investment project considering legislative provisions regarding packaging recycling and the use of recycled materials in contact with food • Start the process of obtaining permits for the construction and operation of a plastic packaging recycling installation • Organize training for food product manufacturers and packaging producers regarding the	• Implement research and development projects regarding packaging minimization and the inclusion of recyclates in food packaging • Carry out the process of obtaining permits for the construction and operation of installations for recycling plastic packaging • Obtain funds for investment in a plastic packaging recycling installation • Agree on a regional (inter-province) agreement for large-scale recycling of food packaging and the provision of recyclates suitable for food contact packaging • Implement an investment project regarding installations	• Develop cooperation between regional/inter-provincial stakeholders in ensuring continuous streams of appropriate packaging waste to recycling installations • Develop cooperation between suppliers of recycled materials, packaging manufacturers and food product manufacturers in ensuring safe materials for contact with food

	requirements regarding the content of recyclates in packaging for contact with food and other packaging • Prepare research and development projects regarding packaging minimization and the inclusion of recyclates in food packaging	for recycling plastic packaging • Monitor legislative work on implementation regulations regarding large-scale recyclability assessment methodologies for individual packaging groups • Organize training and consultancy for producers of food products and packaging producers regarding the requirements for the content of recyclates in food contact packaging and other packaging	
Minimum anticipated results	• 1 investment project regarding a plastic packaging waste recycling installation prepared • 10 research and development projects regarding packaging minimization and the inclusion of recyclates in food packaging ready for implementation	• 1 investment project regarding a large-scale plastic packaging waste recycling installation implemented and the installation ready for launch • 5 research and development projects on packaging minimization and the inclusion of recyclates in food packaging implemented • 100 food product manufacturers and packaging producers trained in the use of recyclates in food packaging	• 300 food product manufacturers apply food packaging considering the minimum values of recyclates

5. The roadmap

Industry-driven initiatives	Minimum anticipated results		
	2024-2026	2027-2030	2031-2035
Refuse			
Introduction of standardization of packaging materials to achieve scale of production and reduce the prices of these materials	5 groups of food products identified for which, thanks to changing the materials used in the packaging, it will be possible to refuse part of the packaging	3 research and development projects submitted to public support programs 3 standardized packaging materials commercialized	The scale of production of standardized packaging materials will translate into their competitive price - a reduction in the prices of these materials by at least 30%
Gain customer/consumer understanding of higher prices for some packaging containing new materials because of recyclability		5 food product groups identified; Guide on sustainable packaging design using new materials	Information campaign on the policy of refusing certain packaging implemented
Promoting new techniques of communicating with customers/consumers on plastic packaging Raising awareness that plastic packaging with an additional paper layer for marketing proposes does not meet the requirements of PPWR	5 food product manufacturers, 1 supplier of innovative solutions related to printing and 1 retail chain ready to cooperate	1 retail chain required offering selected food products in plastic packaging without additional paper packaging	Information campaign regarding the policy of refusing packaging paper for some products packed in plastic packaging

Industry-driven initiatives	Minimum anticipated results		
	2024-2026	2027-2030	2031-2035
Reduce			
Implementation of new packaging with optimized (reduced) packaging weight and volume while ensuring its functionality and recyclability.	20 food product manufacturers aware of the impact of legal requirements on their activities in the context of the packaging used	60% of food product manufacturers in the voivodeship ready to use packaging with reduced material content	100% of food product manufacturers in the voivodeship use packaging with a minimum content of materials
Striving for affordable packaging with a reduced (optimized) amount of materials that ensures the safety and durability (quality) of the food product	Recommendations for minimizing packaging for 5 groups of food products included in the guides for ensuring the safety and durability of food products; 5 research and development projects concerning minimization of the content of materials/prepared packaging	3 research and development projects implemented; 3 innovative packaging has been certified and implemented on the market	100% packaging with reduced material content that meets the safety and durability criteria of a food product
Development of new infrastructure (machines) or adaptation of existing ones to enable the production of new packaging in the new value chain. Efficient adaptation of filling and packaging processes in the food processing industry in connection with introducing f packaging with reduced material composition.	2 machine suppliers and 3 packaging producers involved in providing recommendations to food product manufacturers where new packaging can significantly affect the filling and packaging process - recommendations for 5 case studies	100 food product manufacturers participated in training; 2 research and development projects implemented in the field of innovative filling and packaging processes; 10 food product manufacturers implemented investment projects	

Industry-driven initiatives	Minimum anticipated results		
	2024-2026	2027-2030	2031-2035
Re-use			
Testing and promoting the "packaging as a service" business model	1 pilot project developed (funding obtained) for one area that will test the implementation of the "packaging as a service" business model	Business model demonstrated in at least 1 pilot project; 3 further areas identified within which it will be possible to conduct pilot projects	3 projects regarding "packaging as a service" in which at least 24 entities are involved
Creation of a returnable packaging system in HORECA (including in the catering and tourism segment)	1 pilot project on the development, testing and piloting of a reusable packaging return system in HORECA started	100 business entities from HORECA involved in a regional project of a reusable packaging return system	
Regional system of reusable packaging	>81% of single-use plastic beverage bottles with a capacity of up to 3 liters, metal cans with a capacity of up to 1 liter and reusable glass bottles with a capacity of up to 1.5 liters were selectively collected under the deposit system	> 90% of single-use plastic beverage bottles with a capacity of up to 3 liters, metal cans with a capacity of up to 1 liter and reusable glass bottles with a capacity of up to 1.5 liters were selectively collected under the deposit system	
Reusable Retail Packaging Initiative	1 pilot project on reusable packaging for the selected product prepared; 20 entities ready to join the pilot project	250 entities involved in the regional project on reusable packaging for at least 3 groups of food products	2,500 entities involved in the regional project on reusable packaging for various groups of food products

Industry-driven initiatives	Minimum anticipated results		
	2024-2026	2027-2030	2031-2035
Recycle			
Regional partnership initiative for the development of safe packaging materials and plastic packaging for food contact	50 food product manufacturers and 10 producers of food packaging included in the agreement on the standardization of packaging materials for contact with food in key food product groups for the voivodeship	3 research and development projects carried out in the field of the use of recyclates in plastic packaging for contact with food; 1 demonstration installation launched for recycling selected plastic fractions, providing clean recyclates (containing no biological and chemical impurities) suitable for use in packaging for contact with food	100 food product manufacturers using packaging of similar material containing recyclates for contact with food; 1 operational installation for recycling plastic packaging for the production of recyclates for food contact
Make paper and cardboard packaging windows recyclable in paper and cardboard packaging waste streams	3 groups of food products identified for which at least 12 food product manufacturers are ready to give up the plastic window or include a window made of another material in paper and cardboard packaging 1 research and development project implemented regarding the use of a window made of a material other than plastic	1 demonstration project implemented which proves the possibility of using appropriate marking of paper and cardboard packaging with a window made of recyclable material within the waste streams of paper and cardboard packaging	

Industry-driven initiatives	Minimum anticipated results		
	2024-2026	2027-2030	2031-2035
Recycle			
Providing coatings that meet barrier properties criteria and do not limit the recyclability of coated materials	3 research and development projects on the use of new coatings, covering one type of food packaging- each started	20 food product manufacturers apply packaging coated with coatings that meet the criteria for barrier properties and are suitable for recycling	
Agreement for large-scale recycling and ensuring access to recyclates for food contact packaging	1 investment project regarding recycling installation for plastic packaging waste prepared; 10 research and development projects regarding packaging minimization and the inclusion of recyclates in food packaging ready for implementation	1 investment project regarding recycling installation for a large-scale plastic packaging waste implemented and the installation ready for launch; 5 research and development projects on packaging minimization and the inclusion of recyclates in food packaging implemented; 100 food product manufacturers and packaging producers trained in the use of recyclates in food packaging	300 food product manufacturers apply food packaging considering the minimum values of recyclates

6. Recommendations for action

The West-Pomeranian Voivodeship is characterized by a high share of the tourism sector and agri-food sector in the regional economy. These sectors, as well as the wholesale and retail sectors and the logistics and transport sectors, will face the challenge of transforming food packaging. Changes in European legislation and in the expectations of customers and end-consumers in the context of sustainable development force producers of packaging materials, packaging manufacturers, food product manufacturers, entities in the logistics sector and entities in the wholesale and retail trade, as well as entities in the HORECA sector, to take specific actions. related to minimizing the amount of packaging, increasing the amount of reusable packaging and ensuring that each packaging is recyclable.

The vision of the Voivodeship's development outlined in the Development Strategy of the West-Pomeranian Voivodeship until 2030 is a region with a modern and diversified economy that takes advantage of its geographical and environmental advantages, offering excellent living conditions for current and future residents. Taking into account the mission of the region – West-Pomerania, the leader of blue and green growth ensuring high quality of life for its inhabitants – instruments supporting innovation and research and development are being developed in the voivodeship, including providing enterprises with access to financing tools for innovative ventures, as well as supporting technology transfer, strengthening cooperation between the science and business sectors and the professionalization of services of business environment institutions. The Regional Innovation Strategy of the West Pomeranian Voivodeship 2030 directs the transformation of the voivodeship towards a smart region, developing its growth path on knowledge, where human capital and learning skills become the primary source for driving productivity. In the context of increasing the level of competitiveness of enterprises, special attention is paid to the processes of supporting the implementation of modern, including ecological, solutions in enterprises.

In respect to the above policies, the Marshal's Office of the West-Pomeranian voivodeship invites stakeholders operating in the value chains in the agri-food sector, wholesale and retail trade and in the HORECA sector to join the joint initiatives that have been outlined by the representatives of these sectors in this roadmap.

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Work Package 2: Strengthen the connection between the penta-helix actors in the European food packaging ecosystem

Food Packaging Roadmap for Central and Western Lithuania Region (LT)

Work Package leader: CLIC innovation OY

T2.3 Food Packaging Roadmap leader: Natureef

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Table of content

Abbreviations

Abbreviation	Description
CO2e	Carbon dioxide equivalent
CSR	Corporate Social Responsibility
DRS	Deposit return scheme
EIA	Environmental Impact Assessment
EPR	Extended producer responsibility
EU	European Union
FMCG	Fast-Moving Consumer Goods
GMP	Good Manufacturing Practice
GPP	Green Public Procurement
ISO	International Organization for Standardization
LCA	Life Cycle Assessment
MRF	Material recovery facility
OML	Overall Migration Limit
PPWD	Packaging and Packaging Waste Directive
PPWR	Regulation of the European Parliament and of the Council on packaging and packaging waste, amending Regulation (EU) 2019/1020 and Directive (EU) 2019/904, and repealing Directive 94/62/EC
PRO	Producer responsibility organisation
RDF	Refuse-Derived Fuel
RDI	Research, Development, Innovation
R&D	Research and Development
SMEs	Small and Medium-sized Enterprises
SML	Specific Migration Limit
SML(T)	Total Specific Migration Limit
WFD	Waste Framework Directive

1. Introduction

The food packaging industry is at a pivotal moment in its development as the European Union continues to refine its environmental and sustainability objectives. Packaging, which is essential for preserving food quality, extending shelf life, and ensuring safe distribution, has increasingly come under scrutiny for its environmental impact. The food packaging sector must now balance its traditional role of maintaining food safety and convenience with the urgent need to reduce waste, improve recyclability, and adopt more sustainable materials.

In Lithuania, the transition towards a sustainable food packaging ecosystem is both a challenge and an opportunity. As part of the European Union's broader Green Deal agenda, Lithuania is committed to meeting the ambitious sustainability goals set for 2030 and beyond. These include ensuring that all packaging placed on the market is reusable or recyclable and that the use of non-recyclable materials is significantly reduced. By 2030, Lithuania must also align its packaging processes with EU regulations that mandate the reduction of plastic waste and the incorporation of recycled materials in packaging.

Central and Western Lithuania, being an economic vibrant region with a strong presence in the food production and packaging sectors, plays a critical role in this transition. The region's food packaging industry serves both local and export markets, and its stakeholders, including manufacturers, suppliers, and policymakers, are key players in the shift towards sustainability. The development of this roadmap is a crucial step in guiding the region through this transition, identifying both the challenges that must be overcome and the opportunities for innovation and leadership within the European packaging value chain.

The roadmap presented here is not only a strategic document but also a call to action for all actors within the food packaging value chain in Central and Western Lithuania. By outlining clear priorities, identifying innovation gaps, and offering actionable recommendations, the roadmap aims to provide a structured approach for industry stakeholders to adopt sustainable practices. Moreover, it emphasizes the importance of collaboration between various actors, including local businesses, research institutions, government agencies, and consumers, in driving forward the agenda of sustainable food packaging.

This roadmap is the product of extensive consultations with regional stakeholders, carried out through workshops and discussions over the past year. In March 2024, the first regional workshop brought together representatives from various sectors to identify key stakeholders and define the region's major challenges in achieving sustainable food packaging. This was followed by a second workshop in August 2024, where stakeholders collaboratively identified potential initiatives and outlined concrete actions that could be undertaken to address these challenges. Finally, the roadmap was validated through a consultation process in September 2024, ensuring that it reflects the needs, capabilities, and aspirations of the region's food packaging ecosystem.

As Lithuania navigates its path towards sustainable development, the food packaging sector will need to innovate, adapt, and collaborate to meet the emerging regulatory requirements and consumer expectations. This roadmap aims to serve as a foundational guide for this process, providing clear direction on how Central and Western Lithuania can lead the way in adopting sustainable packaging solutions. By focusing on short-, medium-, and long-term priorities, the roadmap allows stakeholders to plan their investments, projects, and collaborations in a way that will ensure their competitiveness in the evolving European market.

In summary, the Food Packaging Roadmap for Central and Western Lithuania seeks to:

- Provide a comprehensive overview of the region's current food packaging challenges and innovation gaps.
- Highlight the key areas where sustainable packaging initiatives can make the most impact.
- Offer clear recommendations for industry stakeholders to take practical, measurable steps towards meeting the EU's 2030 sustainability targets.
- Foster collaboration between the private sector, public institutions, and academia to drive innovation in sustainable packaging.
- Prepare the region's food packaging industry to meet future EU regulatory requirements while maintaining economic growth and competitiveness.

This roadmap is intended not only as a strategic guide for current industry players but also as a platform for fostering ongoing dialogue and collaboration among stakeholders as new challenges and opportunities arise in the pursuit of sustainable food packaging.

2. The roadmap development methodology

This roadmap for food packaging in Central and Western Lithuania was developed from July to August 2024, using a participatory approach that engaged various stakeholders from government, industry, and academia. Two key workshops were organized in March 2024 (identifying regional stakeholders and challenges) and August 2024 (discussing initiatives and action steps).

The roadmap was further refined through consultations with stakeholders in September 2024. It outlines important actions that can be undertaken by individual entities and consortiums in the short, medium, and long terms, to support the transition towards sustainable food packaging within the Central and Western Lithuania

3. Challenges and innovation gaps - priorities

The food packaging industry in Central and Western Lithuania faces several interrelated challenges as it transitions towards sustainability. The sector, which is a significant contributor to the regional economy, is grappling with a variety of technological, regulatory, and behavioral obstacles. These challenges are particularly pressing given the increasing demand for sustainable packaging solutions, both from European Union legislation and from environmentally conscious consumers.

One of the foremost challenges is the reduction of excessive packaging, especially the widespread use of single-use plastics. The reliance on such materials not only increases the environmental footprint of food products but also contradicts the EU's goals of reducing plastic waste and promoting the circular economy. Businesses across the region are now required to rethink their packaging designs, materials, and processes to meet these stringent regulations. However, the shift away from traditional plastics to more sustainable alternatives, such as biodegradable or recyclable materials, presents several hurdles. The cost of these new materials is often higher, and there are technical challenges associated with integrating them into existing production lines without compromising food safety or quality.

Adopting new sustainable packaging materials requires significant investments, not only in the materials themselves but also in the machinery and processes needed to work with them. Many packaging producers and food processors in the region operate on thin margins, making the cost of adopting these new technologies a substantial barrier. Additionally, adapting existing equipment to handle these new materials, which often behave differently than conventional plastics, involves re-engineering processes, retraining staff, and ensuring that the final product still meets the high standards required for food packaging. The technical demands of using thinner or mono-material packaging, for example, often challenge the industry's ability to maintain the barrier properties that preserve food quality and extend shelf life.

Furthermore, while the shift to sustainable packaging is a critical goal, there is also a considerable innovation gap when it comes to designing packaging that can meet both sustainability and functional needs. Many of the materials currently available on the market do not yet fully satisfy the performance requirements of food packaging, particularly for products that need to be transported over long distances or stored for extended periods. For instance, the challenge of finding materials that are both recyclable and durable enough to protect food from spoilage remains a significant hurdle. This lack of readily available, cost-effective alternatives creates an innovation gap that must be addressed through research and development.

In addition to technological and material challenges, there is a growing recognition that consumer resistance to change plays a pivotal role in slowing down the adoption of sustainable packaging solutions. Consumers have grown accustomed to the convenience and familiarity of conventional packaging, and many are unaware of the environmental benefits of alternative solutions. This highlights the need for targeted educational campaigns aimed at increasing consumer awareness

and encouraging the adoption of sustainable packaging options. Without broad consumer support, even the most innovative packaging solutions will struggle to gain a foothold in the market. Manufacturers and retailers, therefore, need to work together to communicate the value of sustainable packaging and dispel any misconceptions, such as concerns over higher costs or perceived quality differences.

The region also faces structural challenges in its waste management systems. Currently, there is no unified system for sorting and recycling packaging waste at the municipal level. This lack of standardization makes it difficult to ensure that recyclable materials are properly separated and processed, reducing the overall efficiency of recycling efforts. Municipalities across Central and Western Lithuania need to agree on a common set of rules for waste sorting and invest in infrastructure that supports the recycling of food packaging materials. Without this systemic change, the region will continue to struggle with high levels of packaging waste, undermining efforts to create a circular economy.

Finally, the food packaging industry in Central and Western Lithuania suffers from a lack of collaboration between key stakeholders. While there are many companies working in the packaging and food production sectors, there is insufficient coordination between businesses, research institutions, and government agencies. This lack of collaboration limits the region's ability to innovate and implement large-scale sustainable packaging initiatives. It is essential that stakeholders come together to share knowledge, pool resources, and drive forward joint research and development projects. By fostering a more collaborative ecosystem, the region can address the innovation gap and accelerate the transition to sustainable food packaging.

Refuse
Make a material/product redundant by abandoning its function or offering the same capability and function in a substantially different material/product.
Main challenges for the region: • Lack of ideas and knowledge about how to refuse excessive packaging and optimize its use. • Eliminating plastic packaging for single-use products that are not essential, such as items that can be sold in bulk without individual packaging (e.g., fruits, vegetables, or bakery products).

Reduce
Efficient packaging production through minimizing resources used and overall material consumption. In the light of the circular economy, this means reducing (excessive) packaging and packaging waste.
Main challenges for the region: • Adapting new, more sustainable materials to production using existing equipment. • Technological challenges in reducing and replacing certain packaging materials and dyes to meet recyclability standards.

Re-use
Any act of reusing reusable packaging for the same purpose for which it was intended. In the light of the circular economy, this means designing packaging for reuse and developing an appropriate system for returning, cleaning and re-using packaging.
Main challenges for the region: • Chemical processing restrictions for food-contact materials and lack of solutions. • High costs of processing reusable packaging, increasing production costs.

Recycle
A recovery process in which waste materials are reprocessed into products, materials or substances, either for their original or other purposes. High-quality recycling involves recycling packaging waste and using the recovered materials in the same way or for a similar use, with minimal loss of quantity, quality or functionality.
• There is no unified system for sorting packaging at the municipal level. • Consumer resistance to new sustainable packaging solutions. • Absence of unified labeling for packaging across Europe. • Ensuring transparency in packaging waste streams to provide sorting and recycling. operators with sufficient information on packaging waste types and quantities.

In summary, the food packaging sector in Central and Western Lithuania faces a complex array of challenges. These include the high costs and technical difficulties associated with new packaging materials, the innovation gap in designing sustainable yet functional packaging, consumer resistance to change, and the fragmented state of municipal waste management. Addressing these challenges will require concerted efforts across multiple fronts, including increased collaboration, targeted investments in research and infrastructure, and proactive consumer education.

4. Industry-driven initiatives

Principle	Refuse		
Challenge	Lack of ideas and knowledge about how to refuse excessive packaging and optimize its use.		
Initiative	**Promote business education, foster collaboration between businesses and research institutions, and implement pilot projects aimed at reducing excessive packaging and optimizing packaging design.**		
Stakeholders	Food packaging producers, businesses, academic institutions, government agencies, end-users.		
Time frame	**2024-2026**	**2027-2030**	**2031-2035**
Actions	• Develop and launch educational programs on excessive packaging reduction. • Foster collaboration between businesses and academic institutions for pilot projects. • Initiate at least 3 pilot projects on refusing excessive packaging.	• Scale up successful pilot projects across the industry. • Implement best practices for packaging optimization across sectors. • Continue supporting business and research collaboration with new initiatives.	• Industry-wide adoption of optimal packaging solutions. • Regularly monitor and improve business practices related to packaging reduction. • Strengthen partnerships across the industry, business, and research sectors for ongoing innovation.
Minimum anticipated results	• At least 3 pilot projects launched, involving 5 companies collaborating with research institutions.	• 5 companies implement packaging optimization, with expanded 2 pilot projects across the sector.	• A 25% reduction in excessive packaging use across the Lithuanian food packaging sector.

Principle	Refuse		
Challenge	Eliminating plastic packaging for single-use products that are not essential, such as items that can be sold in bulk without individual packaging (e.g., fruits, vegetables, or bakery products).		
Initiative	**Encourage retailers and producers to eliminate unnecessary plastic packaging for single-use, non-essential items. Promote bulk selling options and reusable alternatives for customers.**		
Stakeholders	Retailers, food product manufacturers, packaging producers, consumer advocacy groups, environmental organizations.		
Time frame	**2024-2026**	**2027-2030**	**2031-2035**
Actions	• Identify categories of products that are unnecessarily packed in plastic. • Collaborate with retailers to introduce bulk-selling and reusable packaging alternatives. • Launch pilot programs in selected retail outlets to reduce plastic packaging for these items.	• Expand bulk-selling and plastic-free packaging initiatives across major retailers. • Introduce reusable packaging systems for customers, such as deposit-return systems for containers or bags. • Engage in public education campaigns to promote the benefits of reducing plastic packaging for single-use items.	• Full implementation of plastic-free alternatives for non-essential items in all major retail outlets. • Continue to monitor and improve reusable packaging systems. • Regularly update product categories that can be sold without plastic packaging.
Minimum anticipated results	• At least 5 retail outlets implement pilot programs for bulk-selling and reducing plastic packaging for non-essential items.	• Major retailers across Lithuania adopt bulk-selling systems for fruits, vegetables, and bakery items.	• A 50% reduction in the use of plastic packaging for single-use, non-essential products.

Principle	Reduce		
Challenge	Adapting new, more sustainable materials to production using existing equipment.		
Initiative	**Provide grants to businesses to test and adapt equipment for new sustainable materials. Involve researchers to help optimize production, and increase the supply of sustainable materials.**		
Stakeholders	Packaging producers, material suppliers, academic institutions, government agencies.		
Time frame	**2024-2026**	**2027-2030**	**2031-2035**
Actions	• Provide financial grants to businesses for testing new materials with existing equipment. • Engage researchers in the exploration and promotion of sustainable materials. • Initiate pilot projects focusing on adapting equipment to accommodate new materials.	• Expand grants to more businesses and ensure ongoing collaboration with researchers. • Increase the availability and accessibility of sustainable materials for packaging production. • Integrate sustainable material use across multiple sectors within the food packaging industry.	• Widespread use of sustainable materials in packaging. • Full-scale adaptation of production equipment for sustainable materials. • Ongoing research and innovation to improve sustainable material supply chains.
Minimum anticipated results	• 5 businesses receive grants, and pilot projects initiated.	• 20 businesses integrate sustainable materials. New packaging solutions introduced in 2 supply chains improve.	• 50% of businesses across the packaging sector use sustainable materials.

Principle	Reduce		
Challenge	Technological challenges in reducing and replacing certain packaging materials and dyes to meet recyclability standards.		
Initiative	**Implement new packaging solutions using materials and dyes that are both recyclable and meet future regulatory standards.**		
Stakeholders	Packaging material and dye producers, food product manufacturers, research and development entities.		
Time frame	**2024-2026**	**2027-2030**	**2031-2035**
Actions	• Identify packaging materials and dyes that will no longer meet regulatory standards. • Initiate research and development projects focused on recyclable materials and dyes. • Organize training sessions for food manufacturers on packaging changes.	• Scale up the production of mono-material packaging solutions. • Promote new packaging technologies that comply with upcoming regulations.	• Full industry-wide adoption of reduced material packaging. • Establish a laboratory system for regular testing and certification of packaging materials.
Minimum anticipated results	• 20 manufacturers aware of legal requirements and engaged in R&D projects.	• 60% of food manufacturers prepared to use recyclable packaging solutions.	• 100% of packaging manufacturers using mono-material, recyclable dyes.

Principle	Re-use		
Challenge	Chemical processing restrictions for food-contact materials and lack of solutions.		
Initiative	**Foster collaboration between research institutions and businesses to develop new technologies for reusable packaging, with a focus on food contact materials. Implement pilot projects to test new solutions.**		
Stakeholders	Packaging producers, food manufacturers, research institutions, regulatory agencies.		
Time frame	**2024-2026**	**2027-2030**	**2031-2035**
Actions	• Establish collaboration between research institutions and industry for pilot projects. • Begin pilot projects focused on reusable packaging for food-contact materials. • Identify and test alternative solutions to overcome chemical processing restrictions.	• Expand pilot projects to other sectors within the food packaging industry. • Develop standardized reusable packaging solutions for food contact materials. • Continue collaboration with research institutions to refine solutions and meet regulatory requirements.	• Full implementation of reusable packaging systems in the food sector. • Ensure ongoing compliance with chemical processing standards for food-contact materials. • Continue innovation and adaptation of reusable packaging technologies.
Minimum anticipated results	• 3 pilot projects initiated in collaboration with research institutions.	• Reusable packaging solutions implemented in 5 key sectors.	• 50% of businesses using reusable packaging for food-contact materials, reducing packaging waste by 20%.

Principle	Re-use		
Challenge	High costs of processing reusable packaging, increasing production costs		
Initiative	**Optimize and centralize the supply chain for reusable packaging to reduce costs. Provide grants to businesses and develop unified reusable packaging solutions across industries.**		
Stakeholders	Packaging producers, retailers, government agencies, waste management companies.		
Time frame	**2024-2026**	**2027-2030**	**2031-2035**
Actions	• Provide financial support and grants for businesses to implement reusable packaging systems. • Launch a pilot program to optimize and centralize the supply chain for reusable packaging. • Search for unified reusable packaging solutions.	• Scale up centralized reusable packaging systems to more sectors. • Standardize reusable packaging processes across sector. • Continue optimizing the supply chain for cost efficiency.	• Full-scale adoption of reusable packaging systems, reducing processing costs. • Further innovation and improvement of reusable packaging designs. • Ongoing monitoring and cost reduction strategies implemented.
Minimum anticipated results	• 3 pilot programs initiated, with 10 businesses engaged.	• 50% increase in the use of reusable packaging across sectors.	• 75% of businesses adopt reusable packaging systems, leading to a 25% cost reduction in packaging processing.

Principle	Recycle		
Challenge	There is no unified system for sorting packaging at the municipal level.		
Initiative	**Municipalities must agree on unified sorting rules, enforce national regulations, and invest in waste management facilities. Increase public awareness and ensure compliance with waste sorting rules.**		
Stakeholders	Municipalities, waste management companies, government agencies, packaging producers.		
Time frame	**2024-2026**	**2027-2030**	**2031-2035**
Actions	• Develop unified sorting rules for packaging at the municipal level. • Invest in recycling and waste management infrastructure. • Begin public and business awareness campaigns about the new waste sorting rules.	• Ensure that all municipalities comply with national sorting rules. • Expand infrastructure and improve waste sorting systems across municipalities. • Enforce regulations to ensure compliance and educate businesses and consumers.	• Full implementation of unified sorting systems in all municipalities. • Optimize waste sorting and recycling processes based on feedback and ongoing developments. • Continue public education to maintain proper waste sorting practices.
Minimum anticipated results	• 25% of municipalities implement unified sorting systems.	• 75% of municipalities comply with national sorting rules.	• 100% of municipalities adopt unified waste sorting systems, with 80% of packaging waste recycled.

Principle	Recycle		
Challenge	Consumer resistance to new sustainable packaging solutions.		
Initiative	**Direct involvement of manufacturers in consumer education and awareness campaigns. Collaborate with local governments and communities to promote sustainable packaging and combat greenwashing.**		
Stakeholders	Packaging producers, local governments, consumer advocacy groups, retailers.		
Time frame	**2024-2026**	**2027-2030**	**2031-2035**
Actions	• Launch public awareness campaigns led by manufacturers and local governments. • Educate consumers on the benefits of sustainable packaging. • Address misconceptions about sustainable packaging to reduce resistance.	• Expand campaigns to reach more communities and regions. • Work with retailers to promote sustainable packaging and combat greenwashing. • Offer incentives for consumers who choose sustainable packaging options.	• Achieve widespread consumer acceptance of sustainable packaging. • Ensure continuous engagement between manufacturers and consumers to address any concerns. • Monitor consumer trends and resistance to ensure ongoing education and acceptance.
Minimum anticipated results	• 3 major campaigns launched, with 20% of consumers engaged.	• 50% increase in consumer acceptance of sustainable packaging.	• 80% of consumers regularly choose sustainable packaging solutions.

Principle	Recycle		
Challenge	Absence of unified labeling for packaging across Europe		
Initiative	**Introduce a mandatory unified labeling system across the EU. The labeling must be designed to be recognized by waste sorting machines and adaptable to future needs.**		
Stakeholders	Packaging producers, European policymakers, waste management companies.		
Time frame	**2024-2026**	**2027-2030**	**2031-2035**
Actions	• Collaborate with European regulatory bodies to develop unified labeling standards. • Test the labeling system across multiple countries in Europe. • Invest in labeling technology for waste sorting systems.	• Expand the labeling system to be implemented across the EU. • Upgrade sorting systems to recognize the new labeling technology. • Continue collaboration to ensure uniform adoption of the labeling system.	• Full implementation of the labeling system across Europe. • Ensure all packaging is properly labeled for recyclability. • Ongoing refinement of labeling technology to meet future packaging needs.
Minimum anticipated results	• Pilot programs initiated in 3 EU countries (projects at EU level).	• 50% of EU countries adopt the unified labeling system.	• 90% of packaging in Europe is properly labeled, improving recyclability rates by 30%.

Principle	Recycle		
Challenge	Ensuring transparency in packaging waste streams to provide sorting and recycling operators with sufficient information on packaging waste types and quantities.		
Initiative	**Develop a regional partnership to establish a standardized system for packaging waste transparency, supporting large-scale recycling efforts.**		
Stakeholders	Packaging material producers, food packaging manufacturers, wholesalers, recyclers, local government agencies.		
Time frame	**2024-2026**	**2027-2030**	**2031-2035**
Actions	• Analyze packaging waste streams at the regional level. • Prepare a feasibility study for building a recycling facility dedicated to specific packaging fractions. • Establish a consortium to drive large-scale recycling projects.	• Secure necessary permits and funding for a new plastic packaging recycling facility. • Implement investment projects for large-scale recycling of packaging waste.	• Launch full operations of the recycling facility. • Ensure continuous packaging waste streams from regional sources and expand recycling capacity.
Minimum anticipated results	• Feasibility study and consortium for recycling facility established.	• Investment project launched, with permits and funding secured.	• A large-scale plastic recycling facility operational, with 300 food product manufacturers using packaging with recyclate content.

5. The roadmap

Industry-driven initiatives	Minimum anticipated results		
	2024-2026	2027-2030	2031-2035
Refuse			
Promote business education, foster collaboration between businesses and research institutions, and implement pilot projects aimed at reducing excessive packaging and optimizing packaging design.	At least 3 pilot projects launched, involving 5 companies collaborating with research institutions.	5 companies implement packaging optimization, with expanded 2 pilot projects across the sector.	A 25% reduction in excessive packaging use across the Lithuanian food packaging sector.
Encourage retailers and producers to eliminate unnecessary plastic packaging for single-use, non-essential items. Promote bulk selling options and reusable alternatives for customers.	At least 5 retail outlets implement pilot programs for bulk-selling and reducing plastic packaging for non-essential items.	Major retailers across Lithuania adopt bulk-selling systems for fruits, vegetables, and bakery items.	A 50% reduction in the use of plastic packaging for single-use, non-essential products.

Industry-driven initiatives	Minimum anticipated results		
	2024-2026	2027-2030	2031-2035
Reduce			
Provide grants to businesses to test and adapt equipment for new sustainable materials. Involve researchers to help optimize production, and increase the supply of sustainable materials.	5 businesses receive grants, and pilot projects initiated.	20 businesses integrate sustainable materials. New packaging solutions introduced in 2 supply chains improve.	50% of businesses across the packaging sector use sustainable materials.
Implement new packaging solutions using materials and dyes that are both recyclable and meet future regulatory standards.	20 manufacturers aware of legal requirements and engaged in R&D projects.	60% of food manufacturers prepared to use recyclable packaging solutions.	100% of packaging manufacturers using mono-material, recyclable dyes.

Industry-driven initiatives	Minimum anticipated results		
	2024-2026	2027-2030	2031-2035
Re-use			
Foster collaboration between research institutions and businesses to develop new technologies for reusable packaging, with a focus on food contact materials. Implement pilot projects to test new solutions.	3 pilot projects initiated in collaboration with research institutions.	Reusable packaging solutions implemented in 5 key sectors.	50% of businesses using reusable packaging for food-contact materials, reducing packaging waste by 20%.
Optimize and centralize the supply chain for reusable packaging to reduce costs. Provide grants to businesses and develop unified reusable packaging solutions across industries.	3 pilot programs initiated, with 10 businesses engaged.	50% increase in the use of reusable packaging across sectors.	75% of businesses adopt reusable packaging systems, leading to a 25% cost reduction in packaging processing.

Industry-driven initiatives	Minimum anticipated results		
	2024-2026	2027-2030	2031-2035
Recycle			
Municipalities must agree on unified sorting rules, enforce national regulations, and invest in waste management facilities. Increase public awareness and ensure compliance with waste sorting rules.	25% of municipalities implement unified sorting systems.	75% of municipalities comply with national sorting rules.	100% of municipalities adopt unified waste sorting systems, with 80% of packaging waste recycled.
Direct involvement of manufacturers in consumer education and awareness campaigns. Collaborate with local governments and communities to promote sustainable packaging and combat greenwashing.	3 major campaigns launched, with 20% of consumers engaged.	50% increase in consumer acceptance of sustainable packaging.	80% of consumers regularly choose sustainable packaging solutions.
Introduce a mandatory unified labeling system across the EU. The labeling must be designed to be recognized by waste sorting machines and adaptable to future needs.	Pilot programs initiated in 3 EU countries.	50% of EU countries adopt the unified labeling system.	90% of packaging in Europe is properly labeled, improving recyclability rates by 30%.
Develop a regional partnership to establish a standardized system for packaging waste transparency, supporting large-scale recycling efforts.	Feasibility study and consortium for recycling facility established.	Investment project launched, with permits and funding secured.	A large-scale plastic recycling facility operational, with 300 food product manufacturers using packaging with recyclate content.

6. Recommendations for action

To address the challenges and innovation gaps identified in the food packaging sector in Central and Western Lithuania, a number of targeted actions must be taken. These recommendations provide a structured approach to ensure that the region aligns with the European Union's sustainability goals while fostering economic growth and technological innovation.

First, it is essential to **promote cross-sector collaboration**. Cooperation between businesses, research institutions, and policymakers is crucial to drive innovation in sustainable packaging. This could be achieved through joint research projects, pilot initiatives, and the sharing of best practices aimed at reducing excessive packaging and optimizing design. By encouraging collaboration, the region can leverage its collective knowledge to accelerate the adoption of sustainable solutions.

Second, there is a need to **provide financial incentives** to businesses to support the transition to sustainable packaging. Grants and subsidies should be offered to companies willing to invest in new materials, technologies, and processes that reduce waste and promote recyclability. Public-private partnerships can be a key driver in mobilizing the necessary resources, ensuring that financial constraints do not hinder the move towards sustainability.

Educational and awareness campaigns also play a pivotal role in this transition. Both businesses and consumers must be made aware of the benefits of sustainable packaging. Public education campaigns should be launched to increase consumer understanding and acceptance of new packaging solutions, while businesses should be guided through training sessions on the best practices for implementing sustainable methods.

Investment in **waste management infrastructure** is another critical recommendation. Municipalities must improve recycling and waste sorting facilities to support the circular economy. A unified system for waste sorting, standardized across the region, will ensure that recyclable materials are properly processed, significantly reducing the environmental impact of packaging waste.

Furthermore, **regulatory support and compliance** are essential. The government should enforce strict regulations on packaging waste, coupled with clear guidelines for businesses to meet sustainability targets. Introducing mandatory recycling goals and holding businesses accountable through extended producer responsibility schemes will ensure that companies contribute actively to waste reduction.

Finally, **continuous innovation and technological development** must be at the heart of the region's strategy. Support for research and development initiatives that focus on designing packaging solutions that meet both sustainability and food safety standards is critical. This

should be coupled with regular monitoring and evaluation to track the progress of these initiatives and ensure continuous improvement.

In conclusion, the successful transformation of the food packaging sector in Central and Western Lithuania will depend on the region's ability to foster collaboration, provide financial and regulatory support, and drive innovation. By focusing on these key areas, the region can become a leader in sustainable packaging, setting a benchmark for others to follow. Through a concerted effort involving all stakeholders—from government and industry to consumers and waste management agencies—Central and Western Lithuania can pave the way for a more sustainable, efficient, and economically resilient food packaging ecosystem.

Funded by the European Union

Bridging investment opportunities to achieve the resilient European food packaging value chain

Call: I3-2022-CAP2b

Action: I3-PJG

Grant Agreement No. 101132867

Work Package 2: Strengthen the connection between the penta-helix actors in the European food packaging ecosystem

Food Packaging Roadmap Hungary (HU)

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History of changes

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Table of content

Abbreviations

Abbreviation	Description
DRS	Deposit return scheme
EIA	Environmental Impact Assessment
EPR	Extended producer responsibility
EU	European Union
GDP	Gross Domestic Product
GMP	Good Manufacturing Practice
GPP	Green Public Procurement
MRF	Material recovery facility
OML	Overall Migration Limit
PPWD	Packaging and Packaging Waste Directive
PPWR	Regulation of the European Parliament and of the Council on packaging and packaging waste, amending Regulation (EU) 2019/1020 and Directive (EU) 2019/904, and repealing Directive 94/62/EC
PRO	Producer responsibility organisation
RDF	Refuse-Derived Fuel
RDI	Research, Development, Innovation
R&D	Research and Development
RII	Regional Innovation Index
RIS	Regional Innovation Scoreboard
SML	Specific Migration Limit
SML(T)	Total Specific Migration Limit
WFD	Waste Framework Directive

1. Introduction

The EU's goal is that by 2030, all food packaging materials can be recycled or reused in an economically viable way, thereby promoting the realization of a circular food packaging value chain. In the Value4Pack project, which also supports the implementation of the National Intelligent Specialization Strategy (S3), OMNIPACK Packaging Cluster (legally represented by DBH InnoHub Ltd) represents the Hungarian food packaging sector. The aim of the project is to strengthen the relations between developed and less developed regions and to support the creation of innovation projects

The European legal framework on food and food packaging aims to ensure the safety and quality of food products, while minimizing the negative environmental impact of processes, materials and products, including packaging applied in the various value chains. The European Union strives to ensure that all packaging placed on the market is recyclable or reusable. From January 1, 2030, all packaging should be designed for recycling or reused. In the years 2030-2035, Member States should strive to ensure effective and efficient selective collection of packaging waste, sorting and recycling – recycling at scale should be ensured by 2035. Based on the last version of the proposal of PPWR (still not final yet) from January 1, 2030, plastic packaging will be required to contain a certain minimum amount of recycled material recovered from post-consumer plastic waste per unit of plastic packaging. In turn, industrial, logistics processes will require the use of reusable packaging. Entities using transport packaging or commercial packaging for transporting products within the European Union, including via e-commerce, must ensure that at least 40 % of such packaging is reusable under a re-use system.

Changes in packaging design affect filling and packaging technologies in the food industry, including methods of filling packaging with food products and aspects of ensuring hygiene and food quality and -safety. In the food value chains, the original and most important role of packaging, i.e. ensuring food safety and quality, should be considered and preserved. This means that each new solution must be verified in the context of its application at the stage of production, filling, transport, use and end-of-life-cycle. Marketing and sales teams, both at the food manufacturer and retail levels, also need to be involved in these change processes. Because of the use of new packaging materials and the avoidance of certain materials (e.g. paper stickers with product information on plastic packaging) new ways to communicate with consumers through packaging should be developed.

The transformation process in food packaging requires cooperation of stakeholders on various levels. Firstly, a change in materials means the need for new machines and devices or for different technological parameters at the stage of packaging production and filling the packaging with food products. Secondly, it is necessary to gain knowledge about the barrier properties and functionality of new mono-materials and innovative dyes in relation to ensuring food safety and

quality in the life cycle of a given food product. Thirdly, the use of packaging with lower material content may affect logistics processes.

Other issues concern ways to stock packed food products on pallets and in transport vehicles and ways to store and transport these products (including temperature and pressure) to ensure product integrity and limit losses. Fourthly, the use of new materials requires informing the public on how to separate packaging after use and the entities representing sorting and recycling installations on how to ensure that the ultimately recovered material is suitable for the food packaging supply chain.

The law imposes on producers the obligation to inform the public about various aspects related to both food products and packaging. Information on packaging must be included, e.g. on the allergen content of the food product and its nutritional value, on the product's carbon footprint, on the amount of recyclates used in the packaging, or on the method of separating and collecting packaging after use. New labelling methods will appear, which are also intended to support the process of ensuring the quality of the final recovered product at the stage of sorting and recycling packaging. Therefore, it becomes important how to place all this information on packaging so that consumers can easily read it. Retail chains also have their own expectations regarding labelling to ensure full product quality control (product tracking techniques based on barcodes, QR codes and other signs). Proper labelling of packaging also helps at the sorting and recycling stage. First, vision technologies and other solutions based on data collection and processing will ensure greater transparency regarding individual packaging streams. This means that in the labelling and marking debate, dialogue is needed between all actors in the value chain to jointly establish clear criteria that are technologically and financially feasible.

2. The roadmap development methodology

This roadmap for food packaging was prepared in the period June-September 2024, based on the outcomes of two regional workshops – in February 2024 (identification of regional stakeholders and main challenges) and in September 2024 (identification of initiatives and elaboration of actions). After the first workshop DBH InnoHub also prepared a "White Paper" on the Opportunities for Sustainable Food Packaging in Hungary, which was circulated among the stakeholders who participated at or registered for the February workshop.

The current roadmap was consulted in September 2024 with stakeholders. This roadmap identifies important issues in the short, medium and long term, based on which entities, individually and within consortiums, can undertake specific projects as part of transformation processes towards sustainable food packaging in Hungary.

Smart Specialisation Strategies (S3) allow regions and countries to better design and implement place-based, innovation-driven economic transformation agendas. In Hungary, S3 policies are handled on national level therefore there is no distinction among regions. That is why this roadmap focuses on all regions e.g. NUTS 2 regions HU31, HU32, HU33, HU21, HU22, HU23, HU12: less developed), HU11: more developed.

3. Challenges and innovation gaps - priorities

The Hungarian food industry continues to play a fundamental role in maintaining a safe domestic food supply. Thanks to Hungary's natural and economic geography, as well as its economic history, the food industry is not only for satisfying domestic needs but sells a significant proportion of its products on foreign markets.

The food industry is the second largest employment sector after the automotive industry. The government's competitiveness strategy outlines serious undertakings and broad plans to boost the industry.

The Hungarian government's sectoral vision for the period 2024-2030 includes:

- guaranteeing the country's security of supply, to which the industry contributes significantly in addition to trade policy instruments,
- increasing the digitalization level of food industry plants, using artificial intelligence,
- positioning the productivity of the food industry in the Europe's top half ranking.

All these aspects are connected to food packaging issues as well.

One strand of the priorities of the national S3 Strategy covers a range of activities and sectors that can be classified as circular economy. The circular economy aims to minimize waste, reduce resource use, and reduce environmental pressures, primarily by transforming the life cycle of products. It encompasses corporate activities such as sustainable design, whereby companies consider the entire life cycle of a product from the design stage, through the selection of its materials and function, and strive to reduce its environmental footprint. RDI activities related to circular economy should also address more sustainable packaging and storage.

The challenges hereby identified are the result of our first workshop organized in February where stakeholders represented various fields: national government, civil associations, investors, manufacturers of packaging materials, business support organizations. research organizations.

Challenges identified in sustainable packaging technologies in the "take-away" value chain

- **Legal Environment and Regulatory Obstacles:** The market introduction of sustainable packaging solutions in the take-away value chain, such as recyclable and biodegradable paper cups, is significantly hindered by the current regulatory framework. The system of extended producer responsibility represents an additional financial burden,
- **Technology and Innovation Challenges:** Refillable packaging and chemical recycling are important, but the industry's investment to support the transition between early and mature innovation phases is often lacking. Domestic startups and innovative solutions, although promising, often face barriers to market introduction. These barriers are mainly of financial origin: price sensitivity or lack of financial capacity,

- **Consumer Habits and Social Trends**: Consumer habits that have changed due to the COVID-19 pandemic and the higher costs of sustainable packaging materials hinder the market acceptance of greener alternatives. Convenience and cost-effectiveness continue to dominate consumer decision-making. As for consumer perception, there is a difference between what the consumer thinks is sustainable and what is really the most sustainable packaging for a certain food product.

- **Global and Local Market Dynamics:** Despite the good examples observed on international markets, cheap imported products for the Hungarian market and strict international competition make it difficult for local sustainable innovations to spread.

- **Infrastructure and Capacities:** Limited production of sustainable packaging materials and recycling capacities, especially with the growing demand for paper cups and other sustainable packaging materials, are a major challenge.

- **Regulatory and Control Challenges:** Issues related to the definition of plastic, compostability and recyclability standards, and the control of the composition of imported products present complex challenges to sustainable packaging solutions.

- **Knowledge and Competence Development:** The development of professional knowledge and competences required for the effective application of sustainable packaging technologies is of particular importance for the industry, especially in the field of waste sorting and recycling.

The workshop participants identified several possibilities:

- **Digital Innovation and Traceability:** Digital technologies, such as QR codes and artificial intelligence, provide opportunities for more efficient management of packaging information, including waste management instructions and data related to the consumption of products. In this way, both consumers and the authorities can get more accurate information, which can improve waste management and promote recycling.
- **EU Regulatory Framework and Tender Opportunities:** The regulatory framework developed by the European Union and various tender opportunities can provide support for the development and introduction of sustainable packaging technologies. The use of EU directives and subsidies can facilitate the green transition and stimulate innovation.
- **Growing Consumer Awareness:** Consumer awareness and demand for sustainable products is constantly growing. Companies that can communicate their sustainability efforts and green solutions can gain an advantage in the markets. The growing interest in sustainable packaging can open new market opportunities.
- **Technological Development and Innovation:** New technologies such as refillable and compostable packaging and chemical recycling processes offer new opportunities for the packaging industry. Technological progress enables the development of more efficient and sustainable packaging solutions.

- **Global Trends and International Cooperation:** Global sustainability trends and international cooperation can provide new opportunities for Hungarian companies. The adaptation of international good practices and cooperation with foreign partners can promote the development of domestic packaging solutions and the achievement of sustainability goals.
- **Research and Development and Education**: Support for educational programs and research and development projects is crucial in sustainable packaging technologies. Expanding knowledge and training professionals can contribute to the successful market introduction of sustainable innovations.
- **Development of Recycling Infrastructure:** Expanding and modernizing the recycling infrastructure enables more efficient processing and recycling of sustainable packaging materials. This development can help reduce waste and improve the environmental footprint

The white paper created upon the findings of the workshop, highlights innovation strategies and the steps necessary to achieve sustainability goals:

- **Integrating Digital Technologies**: Develop and implement digital tracking systems, such as QR codes, which provide consumers with information about product recycling and composting through packaging. This may include the creation of a central database that provides detailed guidance on how to manage different packaging materials.
- **Maximum Utilization of EU Subsidies**: Identify and apply for relevant subsidies and tender opportunities offered by the EU, which aim at the research, development and market introduction of sustainable packaging technologies. Organize workshops and information events for companies to increase their access to grants.
- **Increase Consumer Awareness and Commitment**: Launch education and information campaigns that demonstrate the benefits of sustainable packaging and encourage consumers to make informed purchases. Within the framework of these campaigns, let's present the sustainability efforts and pay special attention to the involvement of the younger generations.
- **Green Tax Systems**: Develop and implement differentiated taxation systems that provide a more favourable tax rate for sustainable packaging materials. This can encourage companies to switch to greener alternatives, while higher taxes on environmentally harmful materials can reduce the market share of non-sustainable packaging.
- **Grant and Tender Programs**: The government should create targeted grant and tender programs that specifically focus on the research, development and market introduction of sustainable packaging solutions. These programs can help overcome initial costs and accelerate the adoption of innovative packaging technologies.
- **Review of Regulatory Frameworks**: Conduct a comprehensive review of current regulatory frameworks to better support the use of sustainable packaging materials. This may include clarifying specifications for compostable and recyclable materials and modernizing recycling infrastructure and waste management procedures.
- **Harmonization of Legislation and Incentives**: Let's work to ensure that national legislation is in line with EU directives and goals, about the circular economy and

sustainable development. This can help domestic companies to adapt to the single market and promote the wider adoption of sustainable packaging solutions.

- **Support for Technological Developments and Research**: We encourage domestic companies and research institutes to develop new, innovative packaging solutions, such as refillable and compostable packaging. Let's support cross-sectoral collaborations and consortia to share knowledge and quickly introduce research results to the market.
- **International Cooperations and Benchmarking**: Look for opportunities for international cooperation and sharing of good practices. This may include the adaptation and introduction of successful foreign sustainable packaging solutions in the domestic market.
- **Educational Programs and Professional Training**: Develop and support professional training programs in the field of sustainable packaging technologies aimed at expanding the knowledge and competencies of current and future professionals.
- **Expanding Recycling Capacities**: Develop strategies and support investments to expand and modernize recycling infrastructure, with a particular focus on chemical recycling technologies. This can improve the efficiency of packaging waste management and reduce the environmental burden.

As a conclusion: based on the key findings of the workshop organized in the field of sustainable packaging technologies, the future of the packaging industry is closely related to the coordination of sustainability, innovation and consumer awareness. Efforts led by the OMNIPACK First Packaging Technology Cluster and industry collaborations are paramount in advancing the green transition, which is critical to environmental sustainability and social well-being.

An overview of the challenges and opportunities identified during the workshop highlighted those sustainable innovations that can bring not only environmental, but also economic and social benefits. The guidelines and strategies designated by OMNIPACK, and its partners offer concrete steps for the packaging industry to successfully adapt to constantly changing market and environmental expectations.

The development of government subsidies and regulatory frameworks, the stimulation of technological innovation, the increase of consumer awareness, and the strengthening of international cooperation are key factors for the successful implementation of a sustainable transition in packaging technology. The OMNIPACK First Packaging Technology Cluster can take a leading role in this process, connecting industry players, researchers, government decision-makers and consumers for a common goal.

The challenges of the decades ahead, although significant, also hold extraordinary opportunities for the widespread introduction of sustainable packaging solutions. These solutions can contribute to creating a more environmentally friendly and sustainable future that benefits not only present but also future generations.

Refuse
Make a material/product redundant by abandoning its function or offering the same capability and function in a substantially different material/product.
Main challenges for the region: • Market resistance to alternative packaging due to consumer preferences and habits • Regulatory barriers that may slow down the adoption of innovative, reduce packaging-intensive products

Reduce
Efficient packaging production through minimizing resources used and overall material consumption. In the light of the circular economy, this means reducing (excessive) packaging and packaging waste.
Main challenges for the region: • Difficulty in balancing packaging functionality with minimal material use • Economic and logistical challenges associated with redesigning packaging to use less material • Lack of incentives for companies to invest in reduction technologies or processes

Re-use
Any act of reusing reusable packaging for the same purpose for which it was intended. In the light of the circular economy, this means designing packaging for reuse and developing an appropriate system for returning, cleaning and re-using packaging.
Main challenges for the region: • Insufficient systems and logistics for the collection and redistribution of packaging • Health and safety concerns over the reuse of packaging in food industries • Cultural and behavioural barriers preventing consumer acceptance of reusable packaging

Recycle
A recovery process in which waste materials are reprocessed into products, materials or substances, either for their original or other purposes. High-quality recycling involves recycling packaging waste and using the recovered materials in the same way or for a similar use, with minimal loss of quantity, quality or functionality.
Main challenges for the region: • Inadequate sorting facilities and technology leading to low-quality recyclates • The complexity of food packaging materials that hinder recyclability • Limited market for recycled materials, particularly for those approved for food contact

According to the Hungarian Waste Management Plan 2021-2027 the medium-term strategic objective is that of the Hungarian waste management sector being one of the exemplary models of circular economy in Europe. During the transition to a circular economy, a model must be implemented in which, considering the life cycle of products, no waste should be generated that could not be applied back in the economy.

In order to increase Hungary's competitiveness, it is important that the Hungarian economy can exploit the potential of the waste management sector. By encouraging innovation, the new system of quality waste collection and processing should be built on the pillars of prevention, reuse and recycling ensuring at the same time a high level of environmental protection.
In Hungary, currently the hottest topic for packaging manufacturers is the recent introduction of the extended producer responsibility.

A significant part of both industrial and household waste unfortunately still does not return to the material cycle, in the absence of reuse or reprocessing, or energy recover. It represents a significant burden on nature, thereby endangering the future of all of us.
The European Union has determined in strict guidelines that as much of the waste generated in the member states as possible should be recycled, so that it enters the circular economy. MOHU participates in the implementation of this process, rethinking the role of waste - together with those who produce, treat or utilize it.
In the circular economic model, all non-renewable materials circulate in a closed circle. Ideally, in a circular economy, more than half of the generated waste is used and returned to industrial production as secondary raw material.

In accordance with the European Union's waste management guidelines, from July 2023, manufacturers and producers are responsible for the costs of the circular waste management of certain products in Hungary as well. This is called extended producer responsibility (EPR).
The basis of the EPR is that the waste management required at the end of the product's life cycle - i.e. collection, treatment, recycling and disposal - must be the responsibility and payment obligation of the manufacturers or the first domestic marketers. In principle, the manufacturer is responsible for the organization and financing of waste management, of which the first activity can be performed collectively by others instead. Accordingly, in Hungary, the MOHU organizes the manufacturer's obligations under the EPR from fees paid by the manufacturers.

4. Industry-driven initiatives

Principle	Refuse		
Challenge	Market resistance to alternative packaging due to consumer preferences and habits		
Initiative	**Developing/implementing new solution that guarantee the needs of the industry**		
Stakeholders	Food packaging producers, food product manufacturers, entities operating in the logistics sector, retailers		
Time frame	**2024-2026**	**2027-2030**	**2031-2035**
Actions	• Increase consumer awareness of the benefits of sustainable packaging. • Launch nationwide media campaigns (television, radio, online platforms) about eco-friendly packaging. • Introduce educational programs in schools and universities on sustainability, particularly the environmental impacts of packaging. • Place educational materials in stores and markets about environmentally friendly alternatives. • Define what is sustainable packaging in each sector.	• Reduce the costs of sustainable packaging. • Create government support programs for companies using sustainable packaging. • Introduce VAT reductions for products using reusable, recyclable and biodegradable packaging. • Establish an innovation fund for the development of the Hungarian packaging industry, with a focus on biodegradable and recyclable materials.	• Facilitate cooperation between universities, research institutions, and private companies to develop new materials. • Introduce a dedicated research fund to support developments aimed at reusable, recyclable and biodegradable packaging. • Expand and modernize the number of recycling centres. • Extend reusable packaging systems (e.g., glass and metal returnable containers) to all major retail chains.
Minimum anticipated results	• 30 percent of consumers choose sustainable packaging.	• Sustainable packaging made mandatory in certain industries.	• Widespread adoption of sustainable packaging.

Principle	Refuse		
Challenge	Regulatory barriers that may slow down the adoption of innovative, reduce packaging-intensive products		
Initiative	**Tackling regulatory barriers which may slow down the adoption of innovative products aimed at reducing packaging waste**		
Stakeholders	Food packaging producers, food product manufacturers, industry associations, entities in the wholesale and retail segment		
Time frame	**2024-2026**	**2027-2030**	**2031-2035**
Actions	• Survey of the current Hungarian packaging regulation and its obstacles to innovation. • Engage industry players and regulators to identify challenges.	• Launch pilot programs in selected industries (e.g. food, cosmetics industry), where the rejection of unnecessary packaging can be tested. Introduction of further reforms based on the test results. • Prepare guides for packaging and food manufacturers on sustainable packaging design using new materials.	• Build industry agreements and consortiums among packaging and food product manufacturers regarding the refusal of certain packaging. • Create a monitoring system that continuously evaluates the spread of packaging-free solutions on the Hungarian market. Prepare annual reports on changes and refining the regulation according to market needs.
Minimum anticipated results	• Specific regulatory limitations that hinder the spread of packaging-free and innovative solutions.	• Understand how packaging-free solutions work in different industries and refine regulations based on them.	• Information campaign on the policy of refusing certain packaging implemented. • Broad adaptation and improve regulation efficiency.

Principle	Reduce		
Challenge	Difficulty in balancing packaging functionality with minimal material use		
Initiative	Development of new materials		
Stakeholders	Producers of packaging materials and dyes, producers of food packaging, food product manufacturers, entities from the research and development sector		
Time frame	**2024-2026**	**2027-2030**	**2031-2035**
Actions	• Encourage collaboration between packaging manufacturers, universities and research institutes. • Launch experimental projects	• Update and harmonizing the regulatory framework for packaging with innovative materials and solutions that minimize material use but maintain product protection. • Introduce financial incentives and tax breaks for companies that achieve significant progress in reducing the use of packaging materials, without jeopardizing the functionality of the products.	• Introduce intelligent waste sorting systems to manage materials more efficiently. • Expand recycling capacities of innovative, bio-based and degradable materials and develop appropriate waste management systems.
Minimum anticipated results	• Packaging innovations developed and preparation for their wide application in industries.	• Industry standards that help reduce material usage without compromising packaging quality developed and implemented.	• longer-lasting, reusable solutions replacing single-use packaging and developed and promoted.

Principle	Reduce		
Challenge	Economic and logistical challenges associated with redesigning packaging to use less material		
Initiative	**Finding new design methodologies**		
Stakeholders	Producers of packaging materials, producers of food packaging, food product manufacturers		
Time frame	**2024-2026**	**2027-2030**	**2031-2035**
Actions	• Initiate government and industry studies to analyse the economic and logistical impacts of packaging redesign. • Collaborate with suppliers and material manufacturers to make innovative, lightweight, recyclable or biodegradable materials more accessible. • Develop new supplier networks to increase the flexibility of the logistics chain. • Provide government subsidies and tax incentives for the development of packaging technology. • Introduce new technologies such as 3D printing and design software that allow the use of less material.	• Implement research and development projects for packaging with reduced material content, including thermoplastic starch packaging • Provide government-backed redesign grants to help small and medium-sized businesses reduce the costs of packaging redesign. • Create common industry platforms where best practices and design solutions can be shared.	• Expand the recycling infrastructure to make it easier for material-reduced packaging to be recycled. • Introduce innovative waste sorting systems to optimize the use of materials. • Digitize of supply chains, which enables more efficient management and tracking of smaller, material-reduced packaging from production to consumers.
Minimum anticipated results	• Introduction of redesigned packaging to the market which meet the necessary standards and are economically viable.	• Reduced cost of redesigned packaging, especially for smaller companies, companies supported in reducing material use.	• Improved supply chain efficiency and greater flexibility for the widespread use of minimalist packaging.

Principle	Reduce		
Challenge	Lack of incentives for companies to invest in reduction technologies or processes		
Initiative	**Creating subsidy schemes for investing into reduction technology development, national co-financing of EU granting**		
Stakeholders	Food packaging producers, food product manufacturers, producers of machines and equipment for the food processing industry, integrators, ministries		
Time frame	**2024-2026**	**2027-2030**	**2031-2035**
Actions	• Identify technological processes for reduction. • Identify existing and expected EU funds (Horizon, Interreg, EFRO). • Provide preliminary information to potential applicants, raising awareness of planned subsidy schemes.	• Launch nationally funded calls. • Elaborate the conditions of co-financing Hungarian applicants for direct European calls (Horizon).	
Minimum anticipated results	• All available relevant European calls identified. • Informing potential applicants about the opportunities, at least 100 technology providers companies reached.	• At least 1 national call launched. • 10 packaging material /machinery manufacturers implemented investment via funds.	

Principle	Re-use		
Challenge	Insufficient systems and logistics for the collection and redistribution of packaging		
Initiative	**Systemic support for reusable packaging and the associated logistics infrastructure are currently limited**		
Stakeholders	Food packaging producers, food product producers, entities further down the value chain		
Time frame	**2024-2026**	**2027-2030**	**2031-2035**
Actions	• Conduct national surveys and studies that explore current systems for collection and redistribution of reusable packaging and identify gaps and opportunities. • Create a legal framework for a mandatory system of returnable packaging. Develop legislation to support take-back systems and encourage reusable packaging.	• Establish a network of collection points on a national level. • Provide government subsidies and tax incentives for companies that introduce reusable packaging systems.	• Introduce packaging waste quotas for large companies, which require a certain proportion of recovered and recycled or reusable packaging in production and sales. • MOHU
Minimum anticipated results	• Experimental solutions developed to encourage the recovery and reuse of packaging.	• Use of reusable packaging promoted by both companies and consumers with economic incentives.	• Increased public awareness of the use and benefits of reusable packaging systems, widespread participation.

Principle	Re-use		
Challenge	Health and safety concerns over the reuse of packaging in food industries		
Initiative	**Minimizing the health risks associated with the reuse of packaging**		
Stakeholders	Food packaging producers, food product manufacturers, wholesale and retail trade entities, associations under the extended producer responsibility system, retail trade entities		
Time frame	**2024-2026**	**2027-2030**	**2031-2035**
Actions	• Gather and create clear information about reusability and appropriate cleaning and disinfection procedures on reusable packaging. • Introduce new standards harmonized with the European Union for hygiene and safety requirements related to the reuse of packaging.	• Allocate innovation grants and introduce of new technologies. • Food safety authorities should carry out regular and strict checks on compliance with the regulations related to the reuse of food packaging.	• Implement digital tracking systems that allow the lifetime of packaging to be followed to minimize risks arising from reuse.
Minimum anticipated results	• Clear regulatory framework created supporting reuse without compromising food safety.	• Increased consumer awareness because of campaigns.	• Use of wide-ranging, safe and sustainable packaging. • Significant reduction of food industry risks due to reuse.

Principle	Recycle		
Challenge	Inadequate sorting facilities and technology leading to low-quality recyclates		
Initiative	**Upgrade sorting facilities and invest in modern recycling technologies to enhance the quality of recycled materials (recyclates)**		
Stakeholders	National Food Chain Safety Office (NÉBIH). National Waste Management Agency, Ministry for Innovation and Technology		
Time frame	**2024-2026**	**2027-2030**	**2031-2035**
Actions	• Launch campaigns to educate consumers about proper waste sorting at the household level to ensure high-quality input materials for recycling facilities. • Provide training programs for packaging manufacturers on the use of recyclates and the importance of ensuring food safety in packaging.	• Introduce policies that mandate higher recycling rates and support the use of recycled materials in food packaging. • Align Hungary's recycling efforts with EU circular economy goals, ensuring compliance with future regulations and contributing to Europe's waste reduction targets.	• Publish progress reports on key milestones, including upgrades in sorting facilities, advances in packaging materials, and the overall quality of recyclates used in food packaging.
Minimum anticipated results	• By 2026: 50% of existing sorting facilities upgraded.	• Appearance of the first recyclable and food-contact-safe plastic packaging prototypes.	• Commercial availability of safe and recyclable plastic packaging for food.

Principle	Recycle		
Challenge	The complexity of food packaging materials that hinder recyclability		
Initiative	**Encourage the use of mono-materials and easily recyclable alternatives to improve the recyclability of packaging waste**		
Stakeholders	Producers of packaging materials, producers of food packaging, food product manufacturers, wholesale and retail trade entities, entities collecting, sorting and recycling packaging waste		
Time frame	**2024-2026**	**2027-2030**	**2031-2035**
Actions	• Upgrade sorting facilities with modern technologies (such as optical sorters, AI systems, and robotic separation technologies) that can handle more complex packaging waste and separate recyclable materials more efficiently. • Expand Hungary's recycling infrastructure to accommodate the increasing volume of recyclable materials and improve the handling of complex packaging.	• Launch nationwide campaigns to raise awareness among consumers about proper waste sorting, recyclable packaging, and the environmental benefits of reducing the use of complex packaging materials. • Standardize labelling to clearly indicate which packaging materials are recyclable and provide guidance for consumers on how to dispose of packaging properly.	• Organize an information campaign for the public on how to segregate paper and cardboard packaging containing windows made of a material other than plastic • Promote among food product producers the abandonment of the window in paper and cardboard packaging and the use of a window made of a material other than plastic in paper and cardboard packaging.
Minimum anticipated results	• National guidelines and incentives for mono-material packaging established.	• 50% reduction in multi-layer and composite packaging on the market.	

Principle	Recycle		
Challenge	Limited market for recycled materials, particularly for those approved for food contact		
Initiative	**Creating market opportunities for recycled materials**		
Stakeholders	Producers of packaging materials, producers of food packaging, producers of food products, wholesale and retail trade entities, entities collecting, sorting and recycling packaging waste		
Time frame	**2024-2026**	**2027-2030**	**2031-2035**
Actions	• Collaborate with the European Food Safety Authority (EFSA) and national bodies like NÉBIH (National Food Chain Safety Office) to establish strict guidelines for food-contact approved recycled plastics. • Set up innovation hubs that focus on developing new techniques for producing food-grade recyclates, fostering collaboration between universities, research institutes, and industry players.	• Promote the use of recyclable coated materials among food manufacturers • Encourage collaboration with major brands and retailers to integrate recycled materials into their product packaging, particularly in the food and beverage sector. • Launch initiatives that incentivize the use of recycled materials in the packaging sector, such as tax breaks, subsidies, or preferential procurement policies for products using food-safe recyclates.	• Strengthen Hungary's EPR policies to require packaging producers and importers to increase the use of recycled materials in their products, particularly food-contact packaging.
Minimum anticipated results	• Mandatory recycled content requirements for food packaging introduced.	• 50% recycled content in food-contact packaging achieved.	

5. The roadmap

Industry-driven initiatives	Minimum anticipated results		
	2024-2026	2027-2030	2031-2035
Refuse			
Introduction of standardization of packaging materials to achieve scale of production and reduce the prices of these materials	30 percent of consumers choose sustainable packaging.	Sustainable packaging made mandatory in certain industries.	Widespread adoption of sustainable packaging.
Tackling regulatory barriers which may slow down the adoption of innovative products aimed at reducing packaging waste.	Specific regulatory limitations that hinder the spread of packaging-free and innovative solutions.	Understand how packaging-free solutions work in different industries and refine regulations based on them.	Information campaign on the policy of refusing certain packaging implemented. Broad adaptation and improve regulation efficiency insured.

Industry-driven initiatives	Minimum anticipated results		
	2024-2026	2027-2030	2031-2035
Reduce			
Finding the balance between packaging functionality and material reduction is difficult, especially in industries that require safety and product protection, such as food and pharmaceuticals.	Packaging innovations developed and preparation for their wide application in industries.	Industry standards that help reduce material usage without compromising packaging quality developed and implemented.	Longer-lasting, reusable solutions replacing single-use packaging and developed and promoted.
Redesigning packaging to use less material can involve significant economic and logistical obstacles. For companies, the redesign process can be expensive, and supply chain challenges related to reducing material use make the switch difficult.	Introduction of redesigned packaging to the market which meet the necessary standards and are economically viable.	Reduced cost of redesigned packaging, especially for smaller companies, companies supported in reducing material use.	Improved supply chain efficiency and greater flexibility for the widespread use of minimalist packaging.
Creating subsidy schemes for investing into reduction technology development, national co-financing of EU granting	All available relevant European calls identified. Informing potential applicants about the opportunities, at least 100 technology providers companies reached.	At least 1 national call launched 10 packaging material /machinery manufacturers implemented investment via funds.	

Industry-driven initiatives	Minimum anticipated results		
	2024-2026	2027-2030	2031-2035
Re-use			
Systemic support for reusable packaging and the associated logistics infrastructure are currently limited.	Experimental solutions developed to encourage the recovery and reuse of packaging.	Use of reusable packaging promoted by both companies and consumers with economic incentives.	Increased public awareness of the use and benefits of reusable packaging systems, widespread participation.
Minimizing the health risks associated with the reuse of packaging.	Clear regulatory framework created supporting reuse without compromising food safety.	Increased consumer awareness because of campaigns.	Use of wide-ranging, safe and sustainable packaging. Significant reduction of food industry risks due to reuse.

Industry-driven initiatives	Minimum anticipated results		
	2024-2026	2027-2030	2031-2035
Recycle			
Upgrade sorting facilities and invest in modern recycling technologies to enhance the quality of recycled materials (recyclates).	By 2026: 50% of existing sorting facilities upgraded.	Appearance of the first recyclable and food-contact-safe plastic packaging prototypes.	Commercial availability of safe and recyclable plastic packaging for food.
Encourage the use of mono-materials and easily recyclable alternatives to improve the recyclability of packaging waste.	National guidelines and incentives for mono-material packaging established.	50% reduction in multi-layer and composite packaging on the market.	
Creating market opportunities for recycled materials	Mandatory recycled content requirements for food packaging introduced.	50% recycled content in food-contact packaging achieved.	

6. Recommendations for action

Based on the key findings of the workshop organized in the field of sustainable packaging technologies, the future of the packaging industry is closely related to the coordination of sustainability, innovation and consumer awareness. Efforts led by the OMNIPACK First Packaging Technology Cluster and industry collaborations are paramount in advancing the green transition, which is critical to environmental sustainability and social well-being.

An overview of the challenges and opportunities identified during the workshop highlighted those sustainable innovations that can bring not only environmental, but also economic and social benefits. The guidelines and strategies designated by OMNIPACK, and its partners offer concrete steps for the packaging industry to successfully adapt to constantly changing market and environmental expectations.

The development of government subsidies and regulatory frameworks, the stimulation of technological innovation, the increase of consumer awareness, and the strengthening of international cooperation are key factors for the successful implementation of a sustainable transition in packaging technology. OMNIPACK First Packaging Technology Cluster can take a leading role in this process, connecting industry players, researchers, government decision-makers and consumers for a common goal.

It can be seen however that the national legal system is unpredictable, the role of a major stakeholder MOHU is not clear enough for the market players therefore determining concrete actions with well-specified timelines is a huge challenge.

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Bridging investment opportunities to achieve the resilient European food packaging value chain

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Work Package 2: Strengthen the connection between the penta-helix actors in the European food packaging ecosystem

Food Packaging Roadmap for Latvia

Work Package leader: CLIC innovation OY

T2.3 Food Packaging Roadmap leader: Natureef

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History of changes

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Table of content

Abbreviations

Abbreviation	Description
EC	European Commission
EU	European Union
EUR	Euro
LBTU	Latvian University of Life sciences and Technologies
NWMP	National waste management plan
PET	Polyethylene terephthalate
PPWD	Packaging and Packaging Waste Directive
PPWR	Regulation of the European Parliament and of the Council on packaging and packaging waste, amending Regulation (EU) 2019/1020 and Directive (EU) 2019/904, and repealing Directive 94/62/EC
R&D	Research and Development
VARAM	Ministry of Environmental Protection and Regional Development of the Republic of Latvia
WFD	Waste Framework Directive

1. Introduction

The European legal framework on food and food packaging aims to ensure the safety and quality of food products, while minimizing the negative environmental impact of processes, materials and products, including packaging applied in the various value chains. The European Union (EU) strives to ensure that all packaging placed on the market is recyclable. **From January 1, 2030, all packaging should be designed for recycling.** In the years 2030-2035, Member States should strive to ensure effective and efficient selective collection of packaging waste, sorting and recycling – recycling at scale should be ensured by 2035. **From January 1, 2030, plastic packaging will be required to contain a certain minimum amount of recycled material recovered from post-consumer plastic waste per unit of plastic packaging.** In turn, logistics processes will require the use of reusable packaging. Entities using transport packaging or commercial packaging for transporting products within the EU, including via e-commerce, must **ensure that at least 40 % of such packaging is reusable under a re-use system.**

Changes in packaging affect filling and packaging technologies in the food industry, including the methods of filling packaging with food products and aspects of ensuring hygiene and food quality. In the food value chains, the original and most important role of packaging, i.e. ensuring food safety and quality, should be considered and preserved. This means that each new solution must be verified in the context of its application at the stage of production, filling, transport, use and end-of-life cycle. Marketing and sales teams, both at the food manufacturer and retail levels, also need to be involved in these change processes. Because of the use of new packaging materials and the avoidance of certain materials (e.g. paper stickers with product information on plastic packaging) new ways to communicate with consumers through packaging should be developed.

The transformation process in food packaging requires cooperation of stakeholders on various levels. **Firstly**, a change in materials means the need for new machines and devices or for different technological parameters at the stage of packaging production and filling the packaging with food products. **Secondly**, it is necessary to gain knowledge about the barrier properties and functionality of new mono-materials and innovative dyes in relation to ensuring food safety and quality in the life cycle of a given food product. **Thirdly**, the use of packaging with lower material content may affect logistics processes. Other issues concern ways to stock packed food products on pallets and in transport vehicles and ways to store and transport these products (including temperature and pressure) to ensure product integrity and limit losses. **Fourthly**, the use of new materials requires informing the public on how to separate packaging after use and the entities representing sorting and recycling installations on how to ensure that the ultimately recovered material is suitable for the food packaging supply chain.

The law imposes on producers the obligation to inform the public about various aspects related to both food products and packaging. In the coming years, it may turn out that information on packaging should be included, e.g. on the allergen content of the food product and its nutritional value, on the product's carbon footprint, on the amount of recyclates used in the packaging, or on the method of separating and collecting packaging after use. New labelling methods will

appear, which are also intended to support the process of ensuring the quality of the final recovered product at the stage of sorting and recycling packaging. Therefore, it becomes important how to place all this information on packaging so that consumers can easily read it. Retail chains also have their own expectations regarding labelling to ensure full product quality control (product tracking techniques based on barcodes, QR codes and other signs). Proper labelling of packaging also helps at the sorting and recycling stage. First of all, vision technologies and other solutions based on data collection and processing will ensure greater transparency regarding individual packaging streams. This means that in the labelling and marking debate, dialogue is needed between all actors in the value chain to jointly establish clear criteria that are technologically and financially feasible.

Entities operating in the value chains of food products and entities active in waste management in Latvia, must prepare for the transformation of their activities towards a circular economy. They must not only individually meet legal requirements, but also jointly find solutions for the development of transparent systems for the circulation of packaging and its materials. This means, on the one hand, refusing or significantly limiting some packaging. On the other hand, designing packaging that can be recycled, some of which is suitable for repeated use. Considering these four principles of sustainable development, this action plan (road map for food packaging) was prepared for Latvian key stakeholders of food packaging value chain.

2. The roadmap development methodology

This road map for food packaging was prepared in the period June-September 2024, based on the outcomes of two regional workshops – **in March 2024** (identification of regional stakeholders and main challenges) with 9 participants and **in June 2024** (identification of initiatives and elaboration of actions) with 27 participants. The road map was consulted in August 2024 with stakeholders in the second workshop and with Value4Pack consortium more developed regions from France and Sweden. This roadmap identifies important issues in the short, medium and long term, based on which entities, individually and within consortiums, can undertake specific projects as part of transformation processes towards sustainable food packaging in Latvia.

3. Challenges and innovation gaps – priorities

Latvia possesses a unique geographical location on the shore of the Baltic Sea and at the center of the Baltic countries. For centuries, this has placed Latvia squarely at an important crossroad of international commerce. Population of Latvia at the beginning of 2024 – 1,87 million.

According to the latest data compiled by the State Environmental Service for the year 2022, more than 41,000 tons of plastic packaging are placed on the Latvian market annually, while less than half of them are recycled – approximately 19,000 tons. As found out in the research conducted by the Latvian University of Life sciences and Technologies (LBTU) in Latvia **40% of the packaging of goods found on store shelves is multi-layered**, thus reducing the possibility of them being recycled.

The same research shows that product packaging is often created without thinking about its recycling and packaging material is used more than needed, as well as a variety of packaging materials are used for packaging one product unit. For example, for the **7% products on the store shelves the packaging volume is too large and not filled enough**, but for a further part, the secondary packaging is only a marketing booster and is not related to ensuring the functionality of the product.

Product manufacturers, when choosing packaging for their product, often provide inadequate or non-conform information about the composition of the packaging or recyclability, namely, packaging materials are often marked with letters and symbols of illegible size or the packaging shows an incorrect, inaccurate representation of the material label. Of course, there are also excellent examples with high quality of labelling of the product. Also, there are often too many colours, large print areas, etc. on the packages, which make it difficult to perceive the essential information, as well as the further processing of the packages.

The possibilities of packaging and product manufacturers and packers to change the diverse multi-layer material packaging to mono-material packaging is and will be a challenging process, as various aspects must be considered. In addition, the actors involved in the packaging ecosystem have different understandings of which packaging is or is not recyclable.

The essential task of the packaging is not only to contain the product, but also to ensure the product's quality, safety and extend the shelf life as much as possible, but no less important factor is the packaging sustainability and recyclability. Looking at the research data, it can be seen that the manufacturers' understanding of this is different. It is not only influenced by the diverse range of materials available on the market, but also by the costs, packaging technology options, ease of use, product validity. Changes in deadlines, which in some cases may be encountered when choosing an alternative type of material for production. However, there are nuances to be considered – for example, the volume of the package, which can already be reduced and adjusted

to the size or volume of the product, the dimensions of the labels and printing areas, as well as uniform labelling use for specific types of packaging materials.

During the LBTU research, approximately 5,000 packages were analysed and the results show that among the range of materials used, PET bottles for soft drinks have the greatest uniformity, while sweets (especially in small packages), chips and chocolates have the greatest variety of materials. **In most cases, when changing multilayer packaging materials with barrier properties to recyclable packaging materials with an equivalent effect, costs for manufacturers would increase by approximately 30%.** Therefore, most manufacturers are in no hurry to apply more environmentally friendly and easily recyclable product packaging.

In the coming years, the EU directives set high requirements for recycling plastic packaging and reducing the volume of landfilled waste. In addition, the European Commission (EC) in its warning report – which was also received by Latvia among a total of 13-member states – points out the risks of not fulfilling the aforementioned requirements. Looking at the research data, there are nuances that should be considered at the regulatory level – uniform conditions should be created that would promote a faster transition to the production and use of recyclable packaging.[1]

It has already been reported that the EU member states must achieve ambitious targets for the recycling of plastic packaging in the coming years: by **2025, they must be able to recycle 50%** of the total amount placed on the market, while by **2035 – already 65%.** Although Latvia has exceeded the 40% recycling threshold compared to the EU average (23%), there is still a lot of plastic packaging on store shelves that is not suitable for recycling. As a result, Latvia annually pays a tax to the EU for unprocessed plastic packaging, which was more than 15 million euros in 2023.

In order to look for solutions to improve the recyclability of packaging investment in secondary recycling is needed.[2]

The National Waste Management Plan 2021-2028[3] is important in order to achieve the EU's common waste recycling goals for the year. The implementation of the measures provided for in it will promote and improve the system of separate collection of waste in municipalities, the processing capacity of household waste and biodegradable waste will increase.[4]

There are several thousand entities active in the food packaging value chain in the segment of paper packaging and plastic packaging, including entities dealing in: production of materials, production of packaging, logistics, food processing, wholesale and retail sales, and services in HORECA, as well as collecting, sorting and recycling packaging waste. Representatives of these

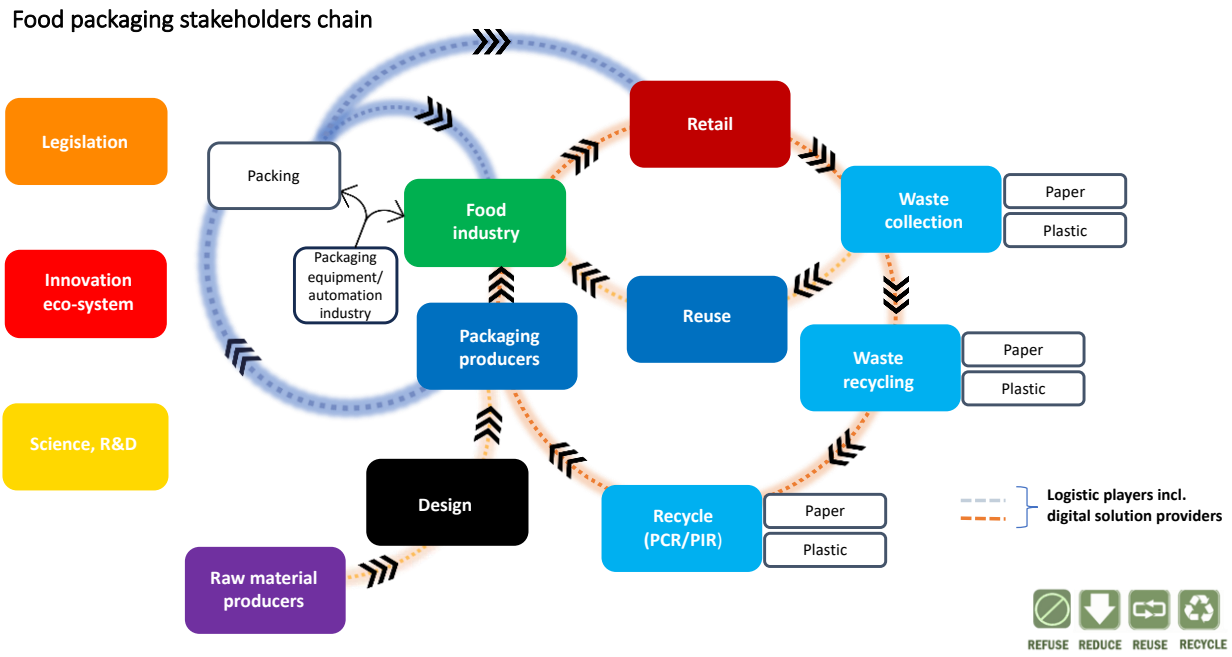
[1] https://www.delfi.lv/54915812/dzivo-zalak/56128308/petijums-latvija-pieejamie-iepakojumi-ir-gruti-parstradajami

[2] https://lvportals.lv/norises/353206-latviju-bridina-par-riskiem-nesasniegt-merkraditajus-sadzives-atkritumu-parstrade-2025-gada-2023

[3] https://likumi.lv/ta/id/320476-par-atkritumu-apsaimniekosanas-valsts-planu-20212028-gadam

[4] https://lvportals.lv/norises/353206-latviju-bridina-par-riskiem-nesasniegt-merkraditajus-sadzives-atkritumu-parstrade-2025-gada-2023

stakeholders from the food packaging value chain have been engaged in the roadmap elaboration process.



Refuse
Refuse unneeded types of packaging and create one standard for packaging type and material in all EU. Implement a restriction for colour usage in packaging design.
Main challenges for the region: • Refuse unneeded types and materials of packaging and unneeded colour usage in packaging design. • Refusing unneeded packaging for selling/marketing purposes.

Reduce
Reduce the amount of unprocessed packaging in short and long term: 1) short term: reduce even a gram of non-recyclable material in today's packaging. Start with research to reduce the amount of packaging where it does not affect the shelf life of the products, nor does it require changing equipment, as it can be done with relatively few resources. 2) In the long term – investment in packaging equipment and technology change.

Plastic reduction: reduce the variety of plastic (currently around 200+ types of plastic) and focus on plastic recycling rather than colour and shape.
Main challenges for the region: • Reduce the amount of unprocessed packaging in short and long term. • Reduce the amount of unprocessed packaging. • Reduce the variety of plastic (currently around 200+) packaging types and focus on plastic recycling rather than extension of colour and shape (for selling and marketing purposes). • Food packaging production challenge set: • Food packaging production changes from technological and practical perspective; • Ensuring the safety, shelf-life and quality of the food product while changing the packaging; • Adaptation of machines and devices to packaging production; • Price increase for food packaging production. • Impact on the environment in order to understand the real impact of the changing packaging or using other solutions.

Re-use
Encourage and educate packaging value chain actors to replace disposable packaging with re-usable packaging. Collaborate with start-up ecosystem to generate ideas and implement them.
Main challenges for the region: • Better solution for reusable food packaging.

Recycle
Incomplete recycling system that does not allow implement recycle principle to full potential. A recovery process in which waste materials are reprocessed into products, materials or substances, either for their original or other purposes. High-quality recycling involves recycling packaging waste and using the recovered materials in the same way or for a similar use, with minimal loss of quantity, quality or functionality.
Main challenges for the region: • Best available solutions nowadays for food packaging recycling. • Standardization of pictograms for sorting containers and same pictogram implementation for the food packaging. • Product manufacturers misleading with the information related to recycling on the product packaging. • Society education about recycling.

4. Industry-driven initiatives

Principle	**1.Refuse (reduce)**		
Challenge	Refuse unneeded types and materials of packaging and unneeded colour usage in packaging design.		
Initiative	**Introduction of standardization of packaging types, material and colouring in EU.**		
Stakeholders	Food packaging producers, food product manufacturers and designers, entities operating in the logistics sector, legislators, industry associations.		
Time frame	**2024-2026**	**2027-2030**	**2031-2035**
Actions	• Prepare methodology and conduct research on initiative "Introduction of standardization of packaging types, material and colouring" together with related food packaging value chain key representatives and legislators in EU. • Research contains following information: – Collected information on current and planned EU legislation related to standardization of packaging types, material and colouring; – Existing researches and activities done, outcomes and the results in EU related to this topic; • Identify groups of food products where reduction of packaging material, packaging still meets the safety and durability requirements as a pilot project.	• Continue implementation of the Action plan by reaching 5% engaging food production and packaging production companies in EU.	• Continue implementation of the research action plan by reaching 10% engaged food production and packaging production companies in EU.

	• Develop new/changed sustainable packaging design concepts for those product groups; • Calculate costs related to introduction of new/changed packaging vs current packaging production costs considering impact on the environment aspect etc. • Calculate the impact on the environment. • Based on the results of research and pilot project, develop the Action plan Introduction of standardization of packaging types, material and colouring. • Prepare needed changes of legislation in EU level based on this initiative. • Start implementation of the plan.		
Minimum anticipated results	• Research "Introduction of standardization of packaging types, material and colouring" completed. • Based on the results of research and pilot project, Action plan for Introduction of standardization of packaging types, material and colouring and start implementation of the plan developed and started to be implemented.	• Implementation of the Action plan is continuing and 0,1% engaged food production and packaging production companies in EU is reached.	• Implementation of the Action plan by reaching 5% engaged food production and packaging production companies in EU is reached.

Principle	2.Refuse		
Challenge	Refusing unneeded packaging for selling/marketing purposes.		
Initiative	**Pilot project of changing packaging from unneeded packaging to minimalistic packaging and test selling results.**		
Stakeholders	Pure Chocolate, chocolate confectionary producer, Laima (Orkla) confectionary producer or Taste Caps, confectionary producer		
Time frame	2024-2026	2027-2030	2031-2035
Actions	• Approach Pure Chocolate, Laima (Orkla) or Taste Caps! confectionary producers to agree on collaboration on the pilot project; • If companies disagree, find another confectionary producer; • Create design for the packaging that use minimalistic packaging vs existing one; • Implement experimental pilot project, selling same product in different packaging and compare results in the same period of time, for example October 2024 vs October 2023; • Evaluate the results. • If results are positive, prepare informative material that could be distributed to food production companies as a good example and encourage them to use it.	• Prepare research on testing new techniques eliminating additional paper packaging; • Implement research on testing new techniques eliminating additional paper packaging; • Provide results to key stakeholders (retailers, food producers, packaging producers) that could use them to implement similar activities.	• Motivate related stakeholders in Latvia with informative campaign to use evidenced results from conducted research and experimental pilot project for implementation similar activities.
Minimum anticipated results	• At least 1 experimental pilot project implemented and results analysed.	• At least 1 retail chain techniques eliminating additional paper packaging to their products implemented.	• Informative campaign to use evidenced results from conducted research and experimental pilot project for implementation similar activities organized.

Principle	3.Reduce		
Challenge	Reduce the amount of unprocessed packaging in short and long term.		
Initiative	**Short term – reduce even a gram of non-recyclable material in today's packaging. Start with research to first reduce the amount of packaging where it does not affect the shelf life of the products, nor does it require changing equipment, as it can be done with relatively few resources.** **Long term – investments / investment in packaging equipment and technology change.**		
Stakeholders	Food packaging producers, food product manufacturers, industry associations, entities in the wholesale and retail segment		
Time frame	**2024-2026**	**2027-2030**	**2031-2035**
Actions	• Research on packaging impact on product quality and shelf life finding the ways where with relatively few resources packaging can be changed from disposable to recyclable. Can be part of research "Introduction of standardization of packaging types, material and colouring" • Identify 5 food products and companies that are willing to participate in pilot; • Implementation of a pilot project with at least 5 packaging examples.	• Use research results and pilot project examples to educate at least 10 food production and packaging companies. • Find scheme and funding that could be used in order to popularise the positive example (EU project, local project, collaboration with chambers of commerce's, changing local legislation etc.). • Find investment opportunities for packaging companies in order to change packaging equipment and implemented for at least 5% from the packaging market.	• Use research results and pilot project examples to educate at least 5% of food production and packaging market. • Find an investment opportunity for packaging companies in order to change packaging equipment and implemented for at least 15% from the packaging market.
Minimum anticipated results	• Research on packaging impact on product quality and shelf life finding the ways where with relatively few resources packaging can be changed from disposable to recyclable done. Can be part of research "Introduction of	• Research results and pilot project examples to educate at least 5 food production and packaging companies done. • Scheme and funding that could be used in order to popularise the positive example (EU project,	• Research results and pilot project examples to educate at least 2% of food production and packaging market is used. • Investment opportunities for packaging companies in order to change packaging

	standardization of packaging types, material and colouring" • Pilot project with at least 3 packaging examples done.	local project, collaboration with chambers of commerce's, changing local legislation etc.) is found. • Investment opportunities for packaging companies in order to change packaging equipment is found and implemented for at least 2% of the packaging market.	equipment is found and implemented for at least 5% of the packaging market.

Principle	4.Reduce		
Challenge	Reduce the amount of unprocessed packaging.		
Initiative	**Combine the knowledge of innovative packaging to reduce the amount of unprocessed packaging.**		
Stakeholders	Food packaging producers, food product manufacturers, industry associations, entities in the wholesale and retail segment, R&D, startup ecosystem, government.		
Time frame	2024-2026	2027-2030	2031-2035
Actions	• Identify food packaging product groups with the largest challenges related to recyclability. • Identify 5-10 food product owners who are willing to participate in this initiative. • Identify R&D and innovation actors who have a solution or can provide a solution to a different challenge related to packaging recyclability. • Identify solutions worldwide that have or partly solved identified issues with packaging recyclability. • Organise working group-knowledge exchange online session/s or a trip to identified foreign solution provider to gain the knowledge. • Create working group once per 6 months between R&D and start-up ecosystem actors to identify solutions for the challenging products inhouse or using gained external experience knowledge.	• Organise working group meetings every 6 months. Working group consisting of representatives of: – 30 R&D; – 20 start-up ecosystems; – 5 food product owners; – 20 foreign knowledge owners. • Implement solutions created by working group in changing packaging and improving packaging from not recyclable to recyclable. • Organise at least 2 foreign knowledge exchange meetings. • Organise at least 1 foreign knowledge exchange trip. • Organise a hackathon involving identified working group and foreign actors to find a solution for the challenged products. • Constantly update a list of products, based on information gained in working groups and sessions with foreign actors.	• Organise working group meetings every 6 months. Working group consisting of representatives of: – 60 R&D; – 40 start-up ecosystems; – 15 product owners; – 40 foreign knowledge owners. • Working group works on the same basic principles, but constantly improving, providing improved services to product owners. • Implement at least 20 solutions created by working group in changing packaging and improving packaging from not recyclable to recyclable.

	• Provide solutions to product owners and implement it. • Find financial support to support this initiative.		
Minimum anticipated results	• Identified 3-5 food product owners who is willing to participate in this initiative. • Working group with R&D and start-up ecosystem actors identified and at least 2 working groups has happened. • Identified at least 2 foreign examples for knowledge exchange and knowledge exchange session or trip happened. • Results of activities above analysed and used for improvement of the following meetings/sessions. • Financial support to support this initiative is found.	• Local Latvian working group continue happening once every 6 months. • At least 2 solutions provided by working group implemented in product owners packaging changing and improving package from not recyclable to recyclable. • At least 2 foreign knowledge exchange meetings happened. • At least 1 foreign knowledge exchange trip happened.	• At least 10 provided solutions by working group implemented in packaging change and improving packaging from not recyclable to recyclable.

Principle	5.Reduce		
Challenge	Reduce the amount of unprocessed packaging.		
Initiative	**Create one platform to combine knowledge on how to reduce the amount of unprocessed packaging.**		
Stakeholders	Food packaging producers, food product manufacturers, industry associations, entities in the wholesale and retail segment, R&D, startup ecosystem, government.		
Time frame	2024-2026	2027-2030	2031-2035
Actions	• Research on the idea viability and market need. • Finding the finance for the project. • Create a local platform /marketplace that registers information on: - challenging food packaging; - packaging that need solution; - food packaging solution ideas/implemented solutions; - food packaging chain representative scheme for Latvia. • Platform to be used for finding solutions to food packaging needs locally and help find collaboration partners. • Create first MVP pilot project. • Promote platform on the regional level.	• Develop the platform regionally (Latvia) and implement at least 50 collaboration projects. • Develop the platform in EU level and implement at least 10 pilot projects.	• Platform is developed and formed as a key platform in EU that is used by majority of the users from food packaging value chain. • New features and services of the platform are being developed and improved constantly.
Minimum anticipated results	• Research on the idea viability and market need done. • If positive result, finance for the project found. • Platform and number of critical mass active users registered.	• Development of the platform regionally (Latvia) and implementation of at least 10 collaboration projects done. • Development the platform in EU level and implementation at least 5 pilot projects done.	• Platform keeps developing in EU that is used by majority of the users from food packaging value chain.

Principle	6.Reduce		
Challenge	Reduce the variety of plastic (currently around 200+) packaging types and focus on plastic recycling rather than extension of colour and shape (for selling and marketing purposes).		
Initiative	**Reduce plastic packaging types from 200+ by at least 15%.**		
Stakeholders	Food packaging producers, food product manufacturers, industry associations, entities in the wholesale and retail segment, government.		
Time frame	**2024-2026**	**2027-2030**	**2031-2035**
Actions	• Conduct research on plastic packaging that can be used as a guidance tool for business and elaborates data on: – Types of plastic used nowadays in the market; – Environmentally friendly types of plastic that can be used to replace existing plastic packaging. – Calculator for calculating the total amount per year of plastic reduced by reducing plastic of packaging and other valuable information. • Implement of regional tax reduction system that supports plastic packaging reduction and using more environmentally friendly plastics. • Implement plastic reduction scheme in regional level where research, tax reduction and other motivational activities are implemented in order to reach goal – reduce 200+ plastic packaging types by at least 15%. (local market). • Find a funding and implementation team for this initiative.	• Find investment for packaging production equipment and technology change. • Standardize plastic packaging production. • Reduce plastic packaging type 200+ by at least 40% (local market).	• Find additional investment to implemented packaging changes in order to reduce plastic packaging type 200+ by at least 20%.
Minimum anticipated results	• Research on plastic packaging that can be used as a guidance tool for business done. • Funding and implementation team for this initiative found.	• Plastic packaging type 200+ reduced by at least 20% (local market).	• Plastic packaging type 200+ reduce by at least 5% (local market) done.

Principle	7.Reduce		
Challenge	Food packaging production challenge set: • Food packaging production changes from technological and practical perspective; • Ensuring the safety, shelf-life and quality of the food product while changing the packaging; • Adaptation of machines and devices to packaging production; • Price increase for food packaging production.		
Initiative	**Implementation of new packaging by reducing types of plastic, multi layers, colors, and increasing packaging recyclability (further – improved packaging) by solving packaging production challenges.**		
Stakeholders	Producers of packaging materials, producers of food packaging, food product manufacturers, R&D, startups, government.		
Time frame	**2024-2026**	**2027-2030**	**2031-2035**
Actions	• Identify food packaging production companies in Latvia. • Identify open and collaborative food product manufacturers whose packaging need/can be improved. • Identity a group of R&D and start-up industry representatives that can support this initiative with innovative ideas on food product packaging. • Identify representatives of legislation regulatory bodies. • Organise a workshop to improve packaging as a pilot project. • Calculate expenses for improved packaging production vs existing packaging production. • Find funding for packaging improvement. • Use data for conducting educational and promotional material of improved packaging.	• On governmental level find financial support scheme to support food packaging producers to improve packaging. • Implement financial support scheme and improve packaging to 15-20% of the packaging market.	• Implement financial support scheme and improve packaging to 20-30% of the packaging market.
Minimum anticipated results	• Groups of key stakeholders identified, workshop organised and educational and promotional material of improved packaging created.	• On governmental level financial support scheme to support food packaging producers to improve packaging found.	• Financial support scheme implemented and packaging improved to 7-10% of the packaging market.

		• Financial support scheme implemented and packaging improved to 5-7% of the packaging market.	

Principle	**8.Reduce**		
Challenge	Impact on the environment in order to understand the real impact of the changing packaging or using other solutions.		
Initiative	**Calculation of impact on the environment in order to understand the real impact of the changing packaging or using other solutions.**		
Stakeholders	Producers of packaging materials, producers of food packaging, food product manufacturers		
Time frame	**2024-2026**	**2027-2030**	**2031-2035**
Actions	• Identify impact on the environment calculation existing tools in the market. • Choose the most convenient and simple tool that could be applied to different products and do easy and fast calculations. • Apply and use the tool for previously refined initiatives in order to re-evaluate real impact of the initiative.	• Develop/improve the tool of needed and apply it in more projects and activities.	• Additional actions created if there is a need.
Minimum anticipated results	• Impact on the environment calculation existing tools identified and best 3 versions tested. • Results from the test evaluated and applied to the previously defined initiatives.	• Development and improvement plan for the tool is created.	• Additional actions created if there is a need.

Principle	9.Re-use		
Challenge	Better solution for reusable food packaging		
Initiative	**Research on existing startup, hackathon, product developer, students developed new ideas on how to transfer from disposable to reusable system, using reusable packaging.**		
Stakeholders	Food packaging producers, food product producers, entities further down the value chain		
Time frame	2024-2026	2027-2030	2031-2035
Actions	• Conduct research in EU scale identifying the best solutions for reusable food packaging already introduced and tested in the market that should be developed further and solutions that didn't work or wasn't developed any further (for example after the hackathon, team didn't work on the great idea). • Analyse both categories and evaluate next steps for 15-20 most promising solutions. • Apply the solutions for 15-20 volunteering companies for a test/pilot. • Sell the best 5-10 solutions in collaboration with the team behind the invention, using pilot project evidence to potential users and clients in Latvia. • Find the team and funding to implement activities above.	• Analyse both categories and evaluate next steps for additional 20-30 most promising solutions. • Apply the solutions for 20-30 volunteering companies for test/pilot. • Sell the best 5-10 solutions in collaboration with the team behind the invention, using pilot project evidence to potential users and clients in Latvia and Baltics. • Find the team and funding to implement activities above.	• Sell best solitons from the previous activities beyond Baltics, at least 2 solutions in the EU. • Find the team and funding to implement activities above.
Minimum anticipated results	• Research identifying the best solutions for reusable food packaging already introduced and tested in the market that should be developed further and solutions that didn't work or wasn't developed any further done and analyze of 5-10 on best solutions available done. • Applying the solutions for 5-7 volunteering companies for a test/pilot done. • 3-5 solutions in Latvia sold. • The team and funding to implement activities found.	• Analytics of 7-12 on best solutions available done. • Application of the solutions for 10-15 volunteering companies for a test/pilot. • 5-7 solutions in Latvia and Baltics sold. • The team and funding to implement activities found.	• Best solitons from the previous activities beyond Baltics, at least 1 solution in the EU sold. • The team and funding to implement activities above found.

Principle	10.Recycle		
Challenge	Best available solutions nowadays for food packaging recycling		
Initiative	**Research on existing startup, hackathon, product developer, students developed new ideas on best solutions of food packaging recycling.**		
Stakeholders	Food packaging producers, food product manufacturers, startup representatives, R&D sector, innovation sector.		
Time frame	**2024-2026**	**2027-2030**	**2031-2035**
Actions	• Conduct research in EU scale identifying the best solutions for recycling of a food packaging already introduced and tested in the market that should be developed further and solutions that didn't work or wasn't developed any further (for example after the hackathon, team didn't work on the great idea). • Analyse both categories and evaluate next steps for 15-20 most promising solutions. • Apply the solutions for 15-20 volunteering companies for a test/pilot. • Sell the best 5-10 solutions in collaboration with the team behind the invention, using pilot project evidence to potential users and clients in Latvia. • Find the team and funding to implement activities above.	• Analyse both categories and evaluate next steps for additional 20-30 most promising solutions. • Apply the solutions for 20-30 volunteering companies for a test/pilot. • Sell the best 10-15 solutions in collaboration with the team behind the invention, using pilot project evidence to potential users and clients in Latvia and Baltics. • Find the team and funding to implement activities above.	• Sell the best solitons from the previous activities beyond Baltics, at least 2 solutions in the EU. • Find the team and funding to implement activities above.
Minimum anticipated results	• Research on identifying the best solutions for recycling of a food packaging already introduced and tested in the market that should be developed further and solutions that didn't work or wasn't developed any further done and analyze of 5-10 on best solutions available done. • Applying solutions for 5-7 volunteering companies for a test/pilot done. • 3-5 solutions in Latvia sold. • The team and funding to implement activities found.	• Analytics of 7-12 on best solutions available done. • Application of the solutions for 10-15 volunteering companies for a test/pilot done. • 5-7 solutions in Latvia and Baltics sold. • The team and funding to implement activities found.	• Best solitons from the previous activities selling beyond Baltics, at least 1 solution in the EU sold. • The team and funding to implement activities above found.

Principle	11.Recycle		
Challenge	Standardization of pictograms for sorting containers and same pictogram implementation for the food packaging.		
Initiative	**Standardization of pictograms for sorting containers and same pictogram implementation for the food packaging in Latvia, then in EU.**		
Stakeholders	Producers of packaging materials, producers of food packaging, food product manufacturers, wholesale and retail trade entities, entities collecting, sorting and recycling packaging waste		
Time frame	2024-2026	2027-2030	2031-2035
Actions	• Collect information on standardization of waste collection and food marking in EU level. • According to this information, conduct research on waste and waste collection situation in Latvia and up-to-date information on European legislation related to food packaging and waste of food packaging. • Conduct research on existing pictograms or pictures sorting containers use. Now in every Latvia region they differ. • Conduct research on the best practices used for the pictograms or pictures in EU. Currently Denmark could be one of the countries to learn from. And choose the best solution. • Create a working group from Latvian legislators, all Latvian waste collectors, designers to agree on the plan to implement standardized marking pictograms for sorting containers in Latvia. • Implement the pilot. • Adjust Latvian legislation system of the standardization of the waste collection. • Implement the plan.	• Conduct research on food packaging marking. • Provide food product manufacturers with access to up-to-date information on European legislation on food materials. • Create a working group from Latvian legislators, Latvian food producers, Latvian packaging producers and designers to agree on the plan to implement standardized marking for food products in Latvia. • Implement the pilot. • Adjust Latvian legislation system of the standardization of the food marking. • Implement the plan.	• Adjust and improve the implemented actions according the needs.

Minimum anticipated results	• Collection of information of standardization of waste collection and food marking in EU level done. • Research on waste and waste collection situation in Latvia and up-to-date information on European legislation related to food packaging and waste of food packaging done. • Research on existing pictograms or pictures sorting containers use done. • Research on the best practices used for the pictograms or pictures in EU conducted. Currently Denmark could be one of the countries to learn from. And choose the best solution. • A working group from Latvian legislators, all Latvian waste collectors, designers to agree on the plan to implement standardized marking pictograms for sorting containers in Latvia created. • Pilot is implemented and results analysed.	• Research on food packaging and marking conducted. • Food product manufacturers provided with access to up-to-date information on European legislation on food materials. • A working group from Latvian legislators, Latvian food producers, Latvian packaging producers and designers to agree on the plan to implement standardized marking for food products in Latvia created. • Pilot is implemented and results analysed.	• Actions adjusted and improved according the needs.

Principle	12.Recycle		
Challenge	Product manufacturers misleading with the information related to recycling on the product packaging.		
Initiative	**Implementation of a Digital passport of food packaging.**		
Stakeholders	Producers of packaging materials, producers of food packaging, producers of food products, wholesale and retail trade entities, entities collecting, sorting and recycling packaging waste		
Time frame	2024-2026	2027-2030	2031-2035
Actions	• Collect information on intention of Digital passport initiative in EU. • Based on the results, in collaboration with key food packaging chain stakeholders, create a plan for implementation of Digital passport system in Latvia. • Identify 2-5 packaging producers and 2-5 food producers to implement pilot project of Digital passport. • Analyse the results. • Improve Digital passport system.	• Implement Digital passport for at least 50% of Latvian packaging producers and 50% of food producers.	• Implement Digital passport for at least 80% of Latvian packaging producers and 80% of food producers.
Minimum anticipated results	• Collecting information on intention of Digital passport initiative in EU done. • Based on the results, in collaboration with key food packaging chain stakeholders, plan for implementation of Digital passport system in Latvia done. • 1-3 packaging producers and 1-3 food producers to implement pilot project of Digital passport identified. • Pilot implemented, results analysed.	• Digital passport implemented for at least 5% of Latvian packaging producers and 5% of food producers.	• Digital passport implemented for at least 20% of Latvian packaging producers and 20% of food producers.

Principle	13.Recycle		
Challenge	Society education about recycling.		
Initiative	**Educational campaign of productive recycling.**		
Stakeholders	Producers of packaging materials, producers of food packaging, producers of food products, wholesale and retail trade entities, entities collecting, sorting and recycling packaging waste		
Time frame	**2024-2026**	**2027-2030**	**2031-2035**
Actions	• Collect information of existing informative and educational campaigns for the society in Latvia in previous 5 years' time and analyse the results. • Create the working group from relevant food packaging value chain representatives. • Based on the results, together with working group create an informative and educational campaign plan for 2024-2026 with identified KPIs. • Improve the approach of the plan, based on the results. • Implement the improved version of the plan. • Find funding for activities above.	• Based on the results from 2024-2026, together with working group create an informative and educational campaign plan for 2027-2030 with identified KPIs. • Improve the approach of the plan, based on the results. • Implement the improved version of the plan. • Find funding for activities above.	• Based on the results from 2027-2030, together with working group create an informative and educational campaign plan for 2031-2053 with identified KPIs. • Improve the approach of the plan, based on the results. • Implement the improved version of the plan. • Find funding for activities above.
Minimum anticipated results	• Information of informative and educational campaigns organised in Latvia in the previous 5 years collected and impact analysed. • A working group of food packaging value chain representatives created. • Informative and educational campaign plan for 2024-2026 and KPIs created. • Approach of the plan, based on the results improved. • Improved version of the plan implemented. • Funding for activities above found.	• Informative and educational campaign plan for 2027-2030 with identified KPIs created. • Approach of the plan, based on the results improved. • Improved version of the plan implemented. • Funding for activities above found.	• Informative and educational campaign plan for 2031-2035 with identified KPIs created. • Approach of the plan, based on the results improved. • Improved version of the plan implemented. • Funding for activities above found.

5. The roadmap

Industry-driven initiatives	Minimum anticipated results		
	2024-2026	2027-2030	2031-2035
Refuse			
1. Introduction of standardization of packaging types, material and colouring in EU.	Research "Introduction of standardization of packaging types, material and colouring" completed. Based on the results of research and pilot project, Action plan for Introduction of standardization of packaging types, material and colouring and start implementation of the plan developed and started to be implemented.	Implementation of the Action plan is continuing and 0,1% engaged food production and packaging production companies in EU is reached.	Implementation of the Action plan by reaching 5% engaged food production and packaging production companies in EU is reached.
2. Pilot project of changing packaging from unneeded packaging to minimalistic packaging and test selling results	At least 1 experimental pilot project implemented and results analyzed.	At least 1 retail chain techniques eliminating additional paper packaging to their products implemented.	Informative campaign to use evidenced results from conducted research and experimental pilot project for implementation similar activities organized.

Industry-driven initiatives	Minimum anticipated results		
	2024-2026	2027-2030	2031-2035
Reduce			
3. **Short term** – reduce even a gram of non-recyclable material in today's packaging. Start with research to first reduce the amount of packaging where it does not affect the shelf life of the products, nor does it require changing equipment, as it can be done with relatively few resources. **Long term** – investment in packaging equipment and technology change.	Research on packaging impact on product quality and shelf life finding the ways where with relatively few resources packaging can be changed from disposable to recyclable done. Can be part of research "Introduction of standardization of packaging types, material and colouring" Pilot project with at least 3 packaging examples done.	Research results and pilot project examples to educate at least 5 food production and packaging companies done. Scheme and funding that could be used in order to popularise the positive example (EU project, local project, collaboration with chambers of commerce's, changing local legislation etc.) is found. Investment opportunities for packaging companies in order to change packaging equipment is found and implemented for at least 2% of the packaging market.	Research results and pilot project examples to educate at least 2% of food production and packaging market is used. Investment opportunities for packaging companies in order to change packaging equipment is found and implemented for at least 5% of the packaging market.
4. Combine the knowledge of innovative packaging to reduce the amount of unprocessed packaging.	Identified 3-5 food product owners who is willing to participate in this initiative. Working group with R&D and start-up ecosystem actors identified and at least 2 working groups has happened. Identified at least 2 foreign examples for knowledge exchange and knowledge	Local Latvian working group continue happening once every 6 months. At least 2 solutions provided by working group implemented in product owners packaging changing and improving package from not recyclable to recyclable.	At least 10 provided solutions by working group implemented in packaging change and improving packaging from not recyclable to recyclable.

Industry-driven initiatives	Minimum anticipated results		
	2024-2026	2027-2030	2031-2035
Reduce			
	exchange session or trip happened. Results of activities above analysed and used for improvement of the following meetings/sessions. Financial support to support this initiative is found.	At least 2 foreign knowledge exchange meetings happened. At least 1 foreign knowledge exchange trip happened.	
5. Create one platform to combine knowledge on how to reduce the amount of unprocessed packaging	Research on the idea viability and market need done. If positive result, finance for the project found. Platform and number of critical mass active users registered.	Development of the platform regionally (Latvia) and implementation of at least 10 collaboration projects done. Development the platform in EU level and implementation at least 5 pilot projects done.	Platform keeps developing in EU that is used by majority of the users from food packaging value chain.
6. Reduce plastic packaging types from 200+ by at least 15%.	Research on plastic packaging that can be used as a guidance tool for business done. Funding and implementation team for this initiative found.	Plastic packaging type 200+ reduced by at least 20% (local market).	Plastic packaging type 200+ reduce by at least 5% (local market) done.
7. Implementation of new packaging by reducing types of plastic, multi layers, colours, and increasing packaging recyclability by solving	Groups of key stakeholders identified, workshop organized and educational and promotional material of improved packaging created.	On governmental level financial support scheme to support food packaging producers to improve packaging found. Financial support scheme implemented and packaging	Financial support scheme implemented and packaging improved to 7-10% of the packaging market.

Industry-driven initiatives	Minimum anticipated results		
	2024-2026	2027-2030	2031-2035
Reduce			
packaging production challenges.		improved to 5-7% of the packaging market.	
8. Calculation of impact on the environment in order to understand the real impact of the changing packaging or using other solutions.	Impact on the environment calculation existing tools identified and best 3 versions tested. Results from the test evaluated and applied to the previously defined initiatives.	Development and improvement plan for the tool is created.	Additional actions created if there is a need.

Industry-driven initiatives	Minimum anticipated results		
	2024-2026	2027-2030	2031-2035
Re-use			
9. Research on existing start-up, hackathon, product developer, students developed new ideas on how to transfer from disposable to reusable system, using reusable packaging.	Research identifying the best solutions for reusable food packaging already introduced and tested in the market that should be developed further and solutions that didn't work or wasn't developed any further done and analyze of 5-10 on best solutions available done. Applying the solutions for 5-7 volunteering companies for a test/pilot done. 3-5 solutions in Latvia sold. The team and funding to implement activities	Analytics of 7-12 on best solutions available done. Application of the solutions for 10-15 volunteering companies for a test/pilot. 5-7 solutions in Latvia and Baltics sold. The team and funding to implement activities found.	Best solutions from the previous activities beyond Baltics, at least 1 solution in the EU sold. The team and funding to implement activities above found.

Industry-driven initiatives	Minimum anticipated results		
	2024-2026	2027-2030	2031-2035
Recycle			
10. Research on existing start-up, hackathon, product developer, students developed new ideas on best solutions of food packaging recycling	Research on identifying the best solutions for recycling of a food packaging already introduced and tested in the market that should be developed further and solutions that didn't work or wasn't developed any further done and analyze of 5-10 on best solutions available done. Applying solutions for 5-7 volunteering companies for a test/pilot done. 3-5 solutions in Latvia sold. The team and funding to implement activities found.	Analytics of 7-12 on best solutions available done. Application of the solutions for 10-15 volunteering companies for a test/pilot done. 5-7 solutions in Latvia and Baltics sold. The team and funding to implement activities found.	Best solutions from the previous activities selling beyond Baltics, at least 1 solution in the EU sold. The team and funding to implement activities above found.
11. Standardization of pictograms for sorting containers and same pictogram implementation for the food packaging in Latvia, then in EU.	Collection of information of standardization of waste collection and food marking in EU level done. Research on waste and waste collection situation in Latvia and up-to-date information on European legislation related to food packaging and waste of food packaging done.	Research on food packaging and marking conducted. Food product manufacturers provided with access to up-to-date information on European legislation on food materials. A working group from Latvian legislators, Latvian food producers, Latvian packaging producers and designers to agree on the plan to implement	Actions adjusted and improved according the needs.

Industry-driven initiatives	Minimum anticipated results		
	2024-2026	2027-2030	2031-2035
Recycle			
	Research on existing pictograms or pictures sorting containers use is done. Research on the best practices used for the pictograms or pictures in EU conducted. Currently Denmark could be one of the countries to learn from. And choose the best solution. A working group from Latvian legislators, all Latvian waste collectors, designers to agree on the plan to implement standardized marking pictograms for sorting containers in Latvia created. Pilot is implemented and results analysed.	standardized marking for food products in Latvia created. Pilot is implemented and results analysed.	
12. Implementation of a Digital passport of food packaging	Collecting information on intention of Digital passport initiative in EU done. Based on the results, in collaboration with key food packaging chain stakeholders, plan for implementation of	Digital passport implemented for at least 5% of Latvian packaging producers and 5% of food producers.	Digital passport implemented for at least 20% of Latvian packaging producers and 20% of food producers.

Industry-driven initiatives	Minimum anticipated results		
	2024-2026	2027-2030	2031-2035
Recycle			
	Digital passport system in Latvia done. 1-3 packaging producers and 1-3 food producers to implement pilot project of Digital passport identified. Pilot implemented; results analysed.		
13. Educational campaign of productive recycling	Information of informative and educational campaigns organised in Latvia in the previous 5 years collected and impact analysed. A working group from relevant food packaging value chain representatives created. Informative and educational campaign plan for 2024-2026 and KPIs created. Approach of the plan, based on the results improved. Improved version of the plan implemented. Funding for activities above found.	Informative and educational campaign plan for 2027-2030 with identified KPIs created. Approach of the plan, based on the results improved. Improved version of the plan implemented. Funding for activities above found.	Informative and educational campaign plan for 2031-2035 with identified KPIs created. Approach of the plan, based on the results improved. Improved version of the plan implemented. Funding for activities above found.

6. Recommendations for action

Enhancing recycling rates and reducing the use of plastics and unrecyclable waste are critical components in addressing the pressing environmental concerns we face today. One of the key areas that require immediate attention is food packaging. The impact of food packaging on waste generation is significant, necessitating a strategic approach to minimize its negative effects on the environment.

Achieving meaningful change in this domain hinges on collaboration among all actors involved in the food value chain. Without a united effort, it becomes increasingly difficult to achieve our sustainability goals. The Latvian Food Cluster, through Value4Pack project, has taken a proactive approach by creating a comprehensive roadmap. This strategic guide for stakeholders delineates clear and actionable steps aimed at improving recyclability, significantly reducing the use of plastics, and minimizing the generation of unrecyclable waste to the bare minimum.

The roadmap serves as a vital tool for fostering collaboration among manufacturers of food and packaging, retailers, startup industry, legislators, R&D and end users. By promoting a shared understanding of the challenges and opportunities within the packaging sector, we can collectively work towards common goals. Through the implementation of these targeted actions, Latvia has the potential to improve its recycling statistics dramatically, thereby contributing to a more sustainable future.

Moreover, by leveraging the collaborative efforts of all stakeholders in the food packaging value chain, Latvia positions itself at the forefront of environmental stewardship. It is not just about regulatory compliance; it is about cultivating a culture of sustainability that resonates throughout the entire food production and packaging industry. In this way, we can ensure that the efforts to minimize waste and enhance recyclability ripple through society, leading toward a greener and more sustainable Latvia for future generations. The time to act is now, and collaboration is our most powerful tool.

Funded by the European Union

Bridging investment opportunities to achieve the resilient European food packaging value chain

Call: I3-2022-CAP2b

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Work Package 2: Strengthen the connection between the penta-helix actors in the European food packaging ecosystem

Food Packaging Roadmap for Slovenia (SL)

Work Package leader: CLIC innovation OY

T2.3 Food Packaging Roadmap leader: Natureef

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History of changes

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Table of content

Abbreviations

Abbreviation	Description
CCIS-CAFE	Chamber of Commerce and Industry of Slovenia - Chamber of Agricultural and Food Enterprises
DRS	Deposit return scheme/system
SUP	Single-use plastic
SWOT	Strengths, Weaknesses, Opportunities, and Threats
EU	European Union
FCM	Food contact materials
4R	Recycle, re-use, refuse, reduce
LCA	Life-cycle assessment
NEPN	National Energy and Climate Plan of the Republic of Slovenia
NUTS	Nomenclature of Territorial Units for Statistics
R&D	Research and Development
SRIP FOOD	Strategic Research and Innovation partnership for Sustainable Food Production

1. Introduction

Slovenia generated 8.4 million tonnes of waste of all types in 2019, more than half of which was generated in the service sector activities (almost 5.1 million tonnes or 60%), one third in manufacturing (almost 2.7 million tonnes or 32 per cent) and less than one tenth in households (almost 641,000 tonnes or 8 per cent). The calculation of the structural indicators found that in 2019, out of the 1,052,255 tonnes generated municipal waste, 867,072 tonnes were treated, of which 758,811 tonnes (87.5 %) were treated recovered and 108 261 tonnes (12.5 %) disposed of. In total, 59.2% of the generated municipal waste was recycled (Waste management and waste prevention programme of the republic of Slovenia 2022). Interestingly, the number of recycling facilities has even decreased from 456 to 270 between 2020 and 2022. The adoption of Council Decision (EU, Euratom) 2020/2052 of 14 December 2020 on the system of the European Union's own resources introduced the payment from non-recyclable plastic packaging. In December 2021, Slovenia made its first retrospective payment for non-recyclable plastic packaging waste for the whole period from 1 January 2021, amounting to 10,338,860 €.

Legislation is in place, with main focus on: reducing plastic packaging/banning certain single-use products, increasing the use of recycled packaging, developing new, more sustainable packaging materials. The major problem in Slovenia is the lack of collecting, sorting and recycling infrastructure. In Slovenia there isn't any recycling facility of proper scale for plastics, paper and metal. There aren't any glass recycling facilities eighter. Glass waste is exported to be recycled. There is also a lack of new generation packaging materials for certain food groups. That is why, it will be difficult to meet all the legally required targets in such short time. New packaging solutions will entail changes in production and packaging lines, which will require considerable financial investments. The whole process will have to be adapted to the new/changed packaging materials, which will take a lot of time and resources.

Slovenia is a small market. Food producers purchase some packaging materials in Slovenia, but the majority of packaging is sourced in other countries. Which means that they are manly dependent on producers in other countries for how they will comply with legislative requirements. In the future, there will be an increasing need for collaboration between R&D institutions and packaging manufacturers (and also producers of raw materials for packaging) in the direction of developing new packaging materials, as well as between manufacturers of packaging materials and food producers, to ensure that packaging meets all requirements for certain food products. Since Slovenia is a small market, food companies usually buy smaller amounts of packaging materials and packaging companies don't always see the profit to meet their specific needs regarding packaging for food products. So good collaboration and finding a common path that is acceptable for both sides is very important.

Food packaging has special requirements. It is important that the packaging is suitable for food contact, which can be a problem with recycled materials. It must also retain all the properties of

the product and maintain a certain shelf life. Special attention is needed when optimising packaging, as the new packaging must still adequately protect the product (including during transport). The introduction of new packaging materials will also need to be properly communicated to consumers and they will have to be educated on the correct disposal of the new materials, and the waste collecting system will probably need to be changed/adapted....

We are facing major changes in the future for food packaging materials. Achieving the legislative requirements will require a lot of hard work, coordination, cooperation and listening on the policy side. This action plan (roadmap for food packaging) prepared for Slovenia is a supportive tool for this change process.

2. The roadmap development methodology

This road map for food packaging was prepared in the period August-September 2024, based on the outcomes of two regional workshops – in February 2024 (identification of regional stakeholders and main challenges) and in September 2024 (identification of initiatives and elaboration of actions). The road map was consulted in September 2024 with Clúster Alimentario de Galicia. This roadmap identifies important issues in the short, medium and long term, based on which entities, individually and within consortiums, can undertake specific projects as part of transformation processes towards sustainable food packaging in Slovenia.

3. Challenges and innovation gaps - priorities

Slovenia is composed of The Western and Eastern Cohesion Region. The Western Slovenia Cohesion Region is one of 281 NUTS 2 regions in Europe, uniting four Slovenian development regions: the Osrednjeslovenska, Gorenjska, Goriška and Obalno-Kraško regions, covering 47,6% of the country's population. It is a place of many intersections: a meeting point of the Alpine, Dinaric-Mountain and Mediterranean worlds, a meeting point of internationally important transport routes with access to the sea, a meeting point of diverse cultures and languages, etc. It is characterised by a great diversity in a small area, especially a high landscape diversity and biodiversity. In addition to its excellent geostrategic location, one of its greatest comparative advantages in the European context is its high level of natural preservation. Companies within Zahodna Slovenija (NUTS SI04) are making moderate investments to R&D activities to develop new food packaging products and innovations. The Eastern Slovenia Cohesion Region is covering 52,4 % of the country's population and lies at the crossroads of the Alps, the Pannonian Plain and the Dinaric Mountains, is also one of NUTS 2 regions in Europe. As a result, it is very diverse in terms of landscape: the north-western Alpine part falls to the east into the wine-growing hills at the edge of the Pannonian Plain, and to the south into the karst Dinaric Mountains. Companies within Vzhodna Slovenija (NUTS SI03) are overall making low investments to R&D activities to develop new food packaging products and innovations.

Slovenian Smart Specialisation Strategy (S4) sets out national strategic development priorities and niches that are supported on the ground by a comprehensive, focused and tailored policy mix. By implementing S4, Slovenia has rolled out an entirely new model of development and innovation cooperation between key stakeholders and has significantly improved its integration in the European and global development and innovation networks, thematic platforms and consortia. The topic food packaging is in line with the Smart Specialization Strategy objectives since one of the 9 priority domains is sustainable food production. The legal basis for more sustainable food packaging is the Slovenian "Decree on Packaging and Packaging Waste." (https://pisrs.si/pregledPredpisa?id=URED8057). Its objective is to minimize the environmental consequences of packaging and packaging waste, guarantee the smooth operation of the internal market, prevent trade barriers, distortions, and competition limitations. Additionally, it aims to promote the transition towards a circular economy by setting forth regulations and requirements regarding the production, reuse, collection, and recovery of packaging.

One of the biggest problems in Slovenia is the lack of infrastructure regarding collecting, sorting and recycling waste packaging. In Slovenia, separate waste collection has been regulated since 1978, when the Municipal Waste Disposal Act was adopted. This law stipulated that municipal waste must be separated into paper, glass and plastic. In Slovenia, there are several waste management companies, holding an environmental permit from Article 41 of the Packaging and Packaging Waste Regulation (Official Journal of the Republic of Slovenia No 54/21, 208/21, 44/22 - ZVO-2 and 120/22) pursuant to Article 154 of the Environmental Protection Act (Official Journal

of the RS, No 44/22, 18/23 - ZDU-1O, 78/23 - ZUNPEOVE and 23/24): SLOPAK d.o.o., INTERZERO d.o.o., SUROVINA d.o.o., DINOS d.d., RECIKEL d.o.o., EMBAKOM d.o.o., TISA d.o.o. However, the problem is that the collected waste is usually too dirty and cannot be recycled. In both regions there is only a small number of recycling facilities. There are however some materials that are recycled but at a very limited scale (examples are paper, plastic and metal). Most of the packaging materials collected by waste management services are recycled outside of the country (for example in Italy).

Food companies in Slovenia mainly use traditional packaging for their products. Innovative ideas for more sustainable food packaging are mainly generated in different projects and are more or less feasible in practice. Some examples of this projects include OpenLOOP project, Design of novel (nano)material properties & Applications, LEAP. Linkages and knowledge sharing are mainly between packaging material producers and food companies, but there is a lack of linkages with R&D institutions.

Different associations try to support cooperation between entities, including in transformation processes related to packaging. These organisations include, among others: The Chamber of Agriculture and Forestry of Slovenia, The Chamber of Agricultural and Food Enterprises, Economic interest association of the meat industry in Slovenia, the Tourism and Hospitality Chamber of Slovenia, Chemical Industry Association, Association of the Paper and Paper Converting Industry, Metal Industry Association. They organise various seminars, workshops and other events for their members to strengthen their competences in different fields.

Refuse
Make a material/product redundant by abandoning its function or offering the same capability and function in a substantially different material/product.
Main challenges for the region: • Removing packaging should not compromise the shelf-life and safety of the food product.

Reduce
Efficient packaging production through minimizing resources used and overall material consumption. In the light of the circular economy, this means reducing (excessive) packaging and packaging waste.
Main challenges for the region: • Ensuring food safety and shelf life amidst material substitution and packaging changes. • A lack of access to new materials, that meet the food packaging quality and safety requirements. • The price of the new packaging, compared to the previous version.

Recycle
A recovery process in which waste materials are reprocessed into products, materials or substances, either for their original or other purposes. High-quality recycling involves recycling packaging waste and using the recovered materials in the same way or for a similar use, with minimal loss of quantity, quality or functionality.
Main challenges for the region: • The complexity of food packaging materials that hinder recyclability. • Setting up platforms for purifying recycled materials. • A lack of unified system for collecting and sorting packaging waste into different types. • Setting up platforms for purifying recycled materials.

An RDI roadmap related to food packaging technology development has not yet been prepared, neither on regional level nor on national level. However, there is a renewed Slovenian Smart Specialisation Strategy - from S4 to S5 (in Slovenian language only). There is also the Strategic Research and Innovation partnership for Sustainable Food Production (SRIP FOOD). It doesn't cover food packaging directly but indirectly packaging is related to the pillar Optimization of agri-food supply chains. The 4th faze of SRIP FOOD is implemented from November 2023 in line with the defined focus areas. The Action Plan is under preparation and is expected to be ready by the end of September 2024. There is also a Strategic Research and Innovation partnership for Development of Materials as Products that also doesn't cover food packaging directly.

To our knowledge there aren't any specific roadmaps developed for food packaging but there is a Roadmap towards the circular economy in Slovenia that also addresses food packaging to a lesser extent. There are also some roadmaps developed by companies (example is Atlantic Droga Kolinska d.o.o. for Zahodna Slovenija and Paradajz d.o.o. for Vzhodna Slovenija).

In 2020 the Government has adopted the Integrated National Energy and Climate Plan of the Republic of Slovenia (NEPN) in accordance with the European Regulation on the Governance of the Energy Union and Climate Action that also focuses on improving the system for waste management collection with the timeframe 2020-2030. The improvement of the infrastructure in these areas is also mentioned as one of the main recommendations for interregional value chain cooperation.

Another important document is Waste management and waste prevention programme of the republic of Slovenia 2022. In accordance with Directive 2008/98/EC, the Waste Management Programme, on the basis of an analysis of the existing waste management situation, sets out the measures needed to improve the environmentally sound preparation for re-use, recycling, recovery and disposal of waste throughout Slovenia.

This programme includes, among others:

- the type, quantity and origin of waste generated in Slovenia, waste likely to be shipped out of Slovenia or into Slovenia, and an assessment of the development of future waste streams;
- the existing main waste disposal and recovery facilities, including any special arrangements for waste oils, hazardous wastes, wastes containing significant quantities of critical raw materials or waste streams waste streams regulated by specific Union legislation;
- an assessment of existing waste collection systems, including materials collected separately, territorially the coverage of separate collection and measures to improve it, an assessment of any derogations granted in accordance with Article 10(3) of Directive 2008/98/EC, and an assessment of the need for new collection schemes;
- information on the location criteria for determining the location and capacity of future disposal facilities or, where appropriate, major waste recovery facilities.

4. Industry-driven initiatives

Principle	Refuse		
Challenge	Removing packaging should not compromise the shelf-life and safety of the food product		
Initiative	**Education of food business operators (retailers) and final consumers in food shops without packaging**		
Stakeholders	Food companies, inspectors, retailers, consumers.		
Time frame	**2024-2026**	**2027-2030**	**2031-2035**
Actions	• Overview of the current situation (market analysis). • Identifying good/bad practices. • Draft of food safety guidelines for bringing own packaging to buy food in shops without packaging.	• Final version of the guidelines. • Promoting the guidelines.	• Promoting the guidelines.
Minimum anticipated results	• Draft of food safety guidelines for bringing own packaging to buy food in shops without packaging.	• Final version of the guidelines. • The guidelines tested with at least 10 consumers.	• The guidelines tested and feedback collected from at least 20 consumers.
Main obstacles	• Disinterest of stakeholders. • Coordination. • Costs.	• Costs.	• Ignorance in the side of general public and FBOs.

Principle	Reduce		
Challenge	Ensuring food safety and shelf life amidst material substitution and packaging changes		
Initiative	**Cooperation between packaging producers, food producers and R&D institutions**		
Stakeholders	R&D institutions and faculties, packaging producers, food companies, suppliers of packaging equipment		
Time frame	**2024-2026**	**2027-2030**	**2031-2035**
Actions	• Overview of the current situation/needs. • Identification of possibility of material reduction for certain food groups and different technologies. • Checking implementation options. • Organizing regular meetings for exchange of information between food producers by different food categories and R&D institutions.	• Joint projects. • Cooperation and knowledge sharing between different stakeholders on new packaging materials. • Realization/ implementation.	• Validation and improvements where needed.
Minimum anticipated results	• More knowledge, implemented market analysis.	• Developed and tested (on the equipment) new packaging materials (at least 2-3 projects). • Confirmed functionally, food safety and shelf-life of food products (validation of shelf-life, migration tests, packaging materials strength tests…).	• Analysis of the response to usability, relevance of products (at least on 2-3 products).
Main obstacles	• Finances. • Too little information about potential cooperation. • Proactivity of all stakeholders.	• Time. • Development of new analytic methods, equipment for new materials and new purposes. • Results sharing.	• Cooperation with stakeholders. • Results sharing.

Principle	Reduce		
Challenge	A lack of access to new materials, that meet the food packaging quality and safety requirements		
Initiative	**Establishing a platform of food packaging materials and their suitability for exact food products**		
Stakeholders	Packaging producers, buyers/companies that uses packaging materials, Administration for Food Safety, Veterinary Sector and Plant Protection, R&D institutions, analytical laboratories (like National Laboratory for Health, Environment and Food)		
Time frame	**2024-2026**	**2027-2030**	**2031-2035**
Actions	• Market analysis (existing situation). • Creating draft of database with information about food packaging and needs of food industry (supply and demand). • Defining of general parameters (composition, purpose, physical-chemical characteristics…).	• Implementing the public system in the form of e.g. Online app. • Filling the data in the database.	• Open access to database. • Promotion of the tool to potential users. • Monitoring of the system and improvements if needed.
Minimum anticipated results	• Designed draft of the application.	• At least pilot case with limited amount of data.	• At least pilot case with limited amount of data. • The tool efficiency tested with at least five companies.
Main obstacles	• Access to data, willingness to provide data on the side of packaging producers. • Finances. • Coordination of the project (if it would be mandatory, it would be easier).	• Cooperation between competitors. • Finances.	• Each supplier and buyer can update their data/is responsible for the correctness of data.

Principle	Reduce		
Challenge	The price of the new packaging, compared to the previous version		
Initiative	**Subsidies for the development of new materials, subsidy to cover the difference between the cost of old and new materials**		
Stakeholders	Ministry of the Environment, Climate and Energy, packaging producers, R&D institutions, users of packaging, whole supply chain		
Time frame	**2024-2026**	**2027-2030**	**2031-2035**
Actions	• Price structure for existing and innovated packaging material (market analysis: an overview of prices and price differences of traditional and innovative packaging materials). • Estimation of the price difference between old and new packaging material. • To ensure sources of funding. • To define needs and expectations of end users/buyers (food companies/final consumer).	• Presentation of the results to the national government. • Finding sources of funding. • Each new product should have the possibility of a subsidy.	• Pilot case execution for one example (one food product or one food packaging material).
Minimum anticipated results	• At least price structure for 2 food products or two packaging materials. • Meeting on government level on the topic to ensure sources of fundings. • Two questionnaires, one for food companies and one for final consumers.	• Meeting with the respective ministry to present the ideas and to search for possibilities of fundings. • Suggestions of funding for each new product.	• Pilot case execution for one example (one food product or one food packaging material).
Main obstacles	• Lack of political readiness to implement actions. • Different interest lobbies.	• Lack of political readiness to implement actions. • Different interest lobbies. • Delay in implementing a call for tenders.	• Lack of political readiness to implement actions. • Different interest lobbies.

Principle	Recycle		
Challenge	The complexity of food packaging materials that hinder recyclability		
Initiative	**Development of single-layer multifunctional materials with good barrier and bioactive properties**		
Stakeholders	Food companies, that produce specific segment of food products, R&D institutions, packaging materials producers (FCM and transport packaging), producers of raw materials for FCM packaging materials, producers of packaging machinery and others.		
Time frame	**2024-2026**	**2027-2030**	**2031-2035**
Actions	• Connecting different stakeholders. • Identifying single-layer materials (already developed or in development). • Identifying barriers and bioactive abilities and stability of the materials. • Identifying packaging volume requirements for different food groups. • Identifying barrier options for different food groups. • Monitoring legislation. • Preparing an overview of the existing materials and their properties. • In-vitro testing.	• Trial implementation of developed material on industry scale. • Testing on products and packaging lines. • Modification of materials and machinery for production. • Patent protection. • Knowledge/practice sharing within the country and abroad (according to material properties and volumes).	• Implementation of materials in food companies. • Legislation confirmed. • Easy recyclable. • Better model for collecting such waste packaging.
Minimum anticipated results	• Market analysis on materials and properties implemented. • Results of in-vitro testing (at least 2-3 cases).	• Results of testing on the products (1-2).	• Trial of selling the products.
Main obstacles	• Different stakeholder interests. • Different political interests. • Lack of central coordination of research projects with the same topic. • Lack of cooperation between experts, lack of sharing research results.	• The need for new, improved packaging machines. • Lack of financial resources/costs. • Finding the right interested parties.	• The need for new, improved packaging machines. • Lack of financial resources.

Principle	Recycle		
Challenge	Setting up platforms for purifying recycled materials		
Initiative	**Deposit return system (DRS) for SUP materials (plastic bottles, cans)**		
Stakeholders	Beverage producers, retailers, consumers, ministry (Ministry of the Environment, Climate and Energy).		
Time frame	**2024-2026**	**2027-2030**	**2031-2035**
Actions	• Preparation and adoption of the law. • Preparation of the business model. • Raising consumer awareness. • Finding sources of funding, • SWOT analyses.	• Implementing the system. • Preparing and releasing consumer campaign.	• Monitoring of the system and improvements/ upgrades, if necessary. • Analysis of environmental objectives. • Additional motivation. • Overview of new, existing infrastructure. • Introducing improvements where necessary.
Minimum anticipated results	• Entity/person in charge of the DRS chosen • Motivated consumer. • Financial construction for the DRS prepared/secured. • Statistical analyses of consumer habits.	• Higher proportion of selected clean packaging for bottles.	• A functioning, transparent DRS. • Achieved (or almost achieved) objectives regarding % of collected waste plastic bottles (77% of waste beverage bottles needs to be collected by 2025, rising to 90% by 2029).
Main obstacles	• Finances. • Longevity of procedures. • Motivation of stakeholders. • Labelling of packaging. • Different interests of different stakeholders.	• Abuses of the system. • Lobbies. • Un-motivated consumers. • More expensive products for consumers. • Infrastructural problems, placement of machines for returning packaging materials.	• Keeping motivated. • Financial incentives.

Principle	Recycle		
Challenge	A lack of unified system for collecting and sorting packaging waste into different types		
Initiative	**The need for more recycling and sorting facilities**		
Stakeholders	Stakeholders in the technology field, packaging waste management companies and sorting facilities, food producers and packaging producers, legislator, recycling facilities.		
Time frame	**2024-2026**	**2027-2030**	**2031-2035**
Actions	• Standardizing definitions in legislation and defining objectives with deadlines at the national level. • Publicly available data on recycling (which facilities recycles and what kind of material…). • Identifying needs/ capacities in the sorting facilities. • Designing system along the entire recycling chain.	• Implementation at municipality level. • Searching the right location and technologies for sorting and recycling. • Financial motivation/EU and state finances. • The parallel development of legislation (you need infrastructure, that can support legislative demands).	• To reach the highest possible % of circular economy on packaging. • Monitoring and possible improvements/ada ptations of the system.
Minimum anticipated results	• Cooperation with legislator. • A set of initiatives to harmonize legislation prepared.	• Project presentation to different municipalities, following the EU projects. • Cooperation with the regional government when defining the suitable location for sorting and recycling facilities. • Suitable locations/consent, involvement of the local community, financial motivation.	• Improvements/ adaptations of the system, if needed.
Main obstacles	• Lobbies. • Slowness of the system. • Existing technologies and their requirements. • The interests of capital. • Infrastructure. • Lack of education.	• Politics/interests. • Financial resources/subsidies. • Local initiatives against building sorting facilities.	• Determining who is the main coordinator of the system.

Principle	Recycle		
Challenge	Setting up platforms for purifying recycled materials		
Initiative	**Raising consumer awareness of the importance of recycling packaging**		
Stakeholders	Stakeholders in technology, children/young people, adults/country, elderly people/intergenerational, consumers of packaging		
Time frame	**2024-2026**	**2027-2030**	**2031-2035**
Actions	• From recommended information to active awareness-raising and actual implementation. • Linking through ambassadors as project examples. • Legislation/supervision. • Raising awareness among young generations.	• Additional content in the educational institution's curriculum. • A broader awareness-raising campaign for the active population. • Connecting elderly generations, implementing, setting up awareness-raising centers.	• To live sustainable as responsible individuals.
Minimum anticipated results	• 1 promotional campaign for general public prepared. • Simple and informative materials for educational institutions prepared (for 3 kindergartens, 2 schools and 1 home for elderly people). • Ambassadors defined.	• Expansion of the activities to more regions (3). • One awareness-raising center established.	• TV advertisements/ shows.
Main obstacles	• Pro-activeness of shareholders. • Finances. • Lack of competent staff to implement projects. • Loss of motivation-long term results.	• Lack of motivation. • Finances.	• Lack of motivation/inertia. • Finances.

5. The roadmap

Industry-driven initiatives	Minimum anticipated results		
	2024-2026	2027-2030	2031-2035
Refuse			
Education of food business operators (retailers) and final consumers in food shops without packaging	Draft of food safety guidelines for bringing own packaging to buy food in shops without packaging.	Final version of the guidelines. The guidelines tested with at least 10 consumers.	The guidelines tested and feedback collected from at least 20 consumers.

Industry-driven initiatives	Minimum anticipated results		
	2024-2026	2027-2030	2031-2035
Reduce			
Cooperation between packaging producers, food producers and R&D institutions	More knowledge, implemented market analysis.	Developed and tested (on the equipment) new packaging materials (at least 2-3 projects). Confirmed functionally, food safety and shelf-life of food products (validation of shelf-life, migration tests, packaging materials strength tests…).	Analysis of the response to usability, relevance of products (at least on 2-3 products).
Establishing a platform of food packaging materials and their suitability for exact food products	Designed draft of the application.	At least pilot case with limited amount of data.	At least pilot case with limited amount of data. The tool efficiency tested with at least five companies.
Subsidies for the development of new materials, subsidy to cover the difference between the cost of old and new materials	At least price structure for 2 food products or two packaging materials. Meeting on government level on the topic to ensure sources of fundings. Two questionnaires, one for food companies and one for final consumers.	Meeting with the respective ministry to present the ideas and to search for possibilities of fundings. Suggestions of funding for each new product.	Pilot case execution for one example (one food product or one food packaging material).

Industry-driven initiatives	Minimum anticipated results		
	2024-2026	2027-2030	2031-2035
Recycle			
Development of single-layer multifunctional materials with good barrier and bioactive properties	Market analysis on materials and properties implemented. Results of in-vitro testing (at least 2-3 cases).	Results of testing on the products (1-2).	Trial of selling the products.
Deposit return system (DRS) for SUP materials (plastic bottles, cans)	Entity/person in charge of the DRS chosen Motivated consumer. Financial construction for the DRS prepared/secured. Statistical analyses of consumer habits.	Higher proportion of selected clean packaging for bottles.	A functioning, transparent DRS. Achieved (or almost achieved) objectives regarding % of collected waste plastic bottles (77% of waste beverage bottles needs to be collected by 2025, rising to 90% by 2029).
The need for more recycling and sorting facilities	Cooperation with legislator. A set of initiatives to harmonize legislation prepared.	Project presentation to different municipalities, following the EU projects. Cooperation with the regional government when defining the suitable location for sorting and recycling facilities. Suitable locations/consent, involvement of the local community, financial motivation.	Improvements/ adaptations of the system, if needed.

Industry-driven initiatives	Minimum anticipated results		
	2024-2026	2027-2030	2031-2035
Recycle			
Raising consumer awareness of the importance of recycling packaging	1 promotional campaign for general public prepared. Simple and informative materials for educational institutions prepared (for 3 kindergartens, 2 schools and 1 home for elderly people). Ambassadors defined.	Expansion of the activities to more regions (3). One awareness-raising center established.	TV advertisements/ shows.

6. Recommendations for action

For Slovenia, all the targets are linked to the SUP and food packaging regulation and are very ambitious in terms of the timeline. Slovenia is very small, with a population of only 2 million, and therefore has difficulties in developing innovative packaging materials linked to the 4Rs objectives and their applicability in practice. The costs of using such innovative packaging can also be high, and so can the price of the final food products. Another important aspect to consider is whether consumers will be willing to pay a higher price for such products.

Slovenia has virtually no recycling infrastructure and most packaging waste is collected and sold to neighbouring countries. Negotiations are currently underway to implement a deposit system for PET bottles.

The opportunities we see for Slovenia are more related to more efficient collection of packaging waste and investing in infrastructure to enable the recovery of packaging waste using 4R technology. In particular, the methodology for calculating appropriate LCA analyses for each food group should be standardised.

The Chamber of Commerce and Industry of Slovenia - Chamber of Agricultural and Food Enterprises (CCIS-CAFE) acts as the coordinator of the SRIP FOOD. The SRIP FOOD partnership is the centre of a platform for strengthening R&D and innovation cooperation between stakeholders from different fields directly or indirectly related to the functioning and existence of the agri-food system and sustainable food production. A new action plan is currently under preparation, which will also cover the area of food packaging, more specifically the optimisation of packaging of agricultural products, food and beverages: development of new and alternative packaging materials, smart and functional packaging, reduction of packaging volumes, reduction of the use of composite materials, ensuring circularity by improving recycling and introducing a deposit system, controlling the safety of packaging leachates, etc. CCIS-CAFE is also part of a cross-regional partnership under the Smart Specialisation Thematic Platform on Agri-Food "Food Packaging", which aims to set up a European cooperation structure of four hubs in the field of food packaging.