

WP 4

TASK 4.2.6: OTHER SECTORS - OTHER COUNTRIES KNOWLEDGE TRANSFERRING

DELIVERABLE 4.2.6B

OTHER SECTORS - OTHER COUNTRIES KNOWLEDGE TRANSFERRING TRANSFER PLAN BOSNIA-HERZEGOVINA

OUTPUT 4.3.7

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01. Introduction

This transfer plan aims to illustrate key-drivers, inputs and actions to facilitate and enhance the transferability of REINWASTE approach to new Countries, which were not directly concerned by the pilot actions, and to other potential sectors.

The technology transfer within REINWASTE, illustrated in WP 4.1.Methodological document, is intended as a process steered by REINWASTE partners that generates a wider awareness and ownership of REINWASTE tested solutions towards the widest possible range of SME and companies within the identified agri-food chains, and opens up for the adaptation of these solutions to new value chains or countries.

Transfer strategy, within REINWASTE, aims to support companies in their innovation processes and encourage collaboration with the research system, favouring the exchange of know-how and the creation of networking and business opportunities between Research Institutions, both on the regional and international territory, both at the regional and at the international level.

The target Countries that are concerned by the transferability plans are Bosnia Herzegovina, Greece and Slovenia.

A pool of experts in agri-food waste reduction, treatment and circular economy have been engaged to develop the present Transfer Plan covering these aspects:

1. needs and main challenges in the framework of inorganic waste minimization in their own target Country, with regard both to primary sector and food processing;
2. recommended technology transfer actions to fill the gap and support the transition towards a minor use of inorganic waste across the agri-food supply chain;
3. most relevant actors to be concerned in the transferability / technology transfer actions.

The Plan is structured in two parts, one referring to Agriculture, and the second one referring to food processing, focused on Bosnia and Herzegovina.

Transfer Plan Bosnia and Herzegovina - Agriculture

01. Needs and main challenges in the framework of inorganic waste minimization in Bosnia Herzegovina - primary sector

The Bosnia and Herzegovina (BiH) with its institutional structure has been established in 1995 by the Dayton Peace Agreement. Bosnia and Herzegovina consists from the entities: the Federation of Bosnia and Herzegovina (FBiH) (FBiH is further divided into 13 cantons) and the Republic of Srpska (RS), and a special district of Brcko. In Constitution of Bosnia and Herzegovina most powers are given to the entity authorities. Agriculture is no exception, entities governments have adopted a set of laws, planning and strategic documents. Also, there are coordinating legislative documents on the level of Bosnia and Herzegovina but still there is a lack of many acts, including those that would regulate the production, trade and disposal of inorganic waste from the agriculture sector in Bosnia and Herzegovina. The legislative framework for measures to support agriculture and rural development in BiH consists of:

- At the level of Bosnia and Herzegovina: Law on Agriculture, Food and Rural Development of BiH (Article 5);
- At the level of the Republika Srpska: Law on Agriculture of the Republika Srpska and Law on Provision and Direction of Funds encouraging the development of agriculture and villages in the Republic of Srpska;
- At the level of the Federation of BiH: The Law on Agriculture of the Federation of BiH and the Law on Financial Support in Agriculture and Rural Development of the Federation of BiH;
- At the cantonal level in the Federation of BiH: cantonal regulations regarding support to agriculture and rural development;
- At the level of the Brcko District of BiH: Law on Incentives in Agricultural Production of BD BiH.

For co-ordination and implementation of these regulations are responsible:

- Ministry of Foreign Trade and Economic Relations of BiH - Office for Harmonization of Payment Systems in Agriculture, Food and Rural Development in BiH;
- Entity ministries of agriculture, entity ministries of finance;
- Cantonal ministries in charge of agriculture and of finance in FBiH;

- Department of Agriculture, Forestry and water management of the Brcko District of BiH, the Directorate for Finance of the Brcko District of BiH;
- Inspection administration of the entities, cantons and the Brcko District of BiH, each within its competence.

According to the report¹, agriculture in BiH is more than a primary economic sector in view of the strategic importance; it provides food security and employment rate (18 %), which primarily pertains to rural areas. Gross domestic product of primary activities of agriculture, forestry and fishing in 2018 amounted to 1.97 billion BAM and has a share of about 7% in the formation of GDP of BiH economy. Nominal growth of GDP of agriculture, forestry and fishing compared to the previous year was 12%. In the total employment, about 18% of the working age population was employed in agriculture. The area of used agricultural land amounted to 1,016,682 hectares, which is 51,310 hectares or 5% more than in the previous year. In the total trade of Bosnia and Herzegovina with foreign countries in 2019, the import of agricultural products has a share of about 16%, while the share of exports of agricultural products in total exports is only about 7%. In the balance of trade of agricultural and food products of BiH with foreign countries in 2019, the value of exports of 799 million KM, imports of 3 billion, and deficit of 2.4 billion KM was realized. Additional basic indicators of agriculture in BiH are the following:

- There is about 0.56 ha of agricultural land per capita, of which 0.36 ha of arable land and gardens;
- Arable land covers about 1,000,000 ha, of which about 47 % is unused;
- Agricultural land covers 2,572,000 ha, which is 50.3 % compared to the total land area;
- Only 0.65 % of agricultural land is irrigated;

Given that agriculture is an important segment of the economy in BiH, especially in rural areas, where 61 % of the population lives one can see some improvement in agriculture. However, there are a number of problems facing BiH in the field of agriculture, inadequate practices of sustainable development in agriculture (lack of subsidies for farmers, low level of awareness), the absence of laws on organic production in the FBiH and the BD, lack of agro-environmental data (e.g. consumption and composition of fertilizers, pesticides, nitrogen ratios, eco-efficiency, energy use, etc.), making it difficult to assess the real impact of agriculture on the environment, including biological diversity. The absence of laws, strategies and planning on regulating inorganic waste from agriculture is also present.

¹ Report in the Sector of Agriculture for BiH for 2019" (MoFTER, 2019)

Progress has been made with regard to legislation considering economic instruments for environmental protection through reduction of packaging waste, but their implementation is limited and often not compliant with efficiency and effectiveness principles, while policies to exploit Bosnia and Herzegovina's green economy potential are substantially lacking.

- The Federation of Bosnia and Herzegovina introduced special fees on plastic bags, packaging and electronic wastes. Regarding plastic bags and bottles, several measures have been introduced, such as a deposit-refund scheme for recycling, economic incentives for selected collection and fines and penalties in the event of non-compliance, but their use should be reinforced.
- Only one special fee is currently in force in the Republika Srpska: the fee on packaging, paid mainly by importers. The fee revenue goes mainly to the Environmental Protection and Energy Efficiency Fund, which uses it to co-finance projects mobilizing private sector financial resources.

Abode-mentioned fees are founded on the principle "polluter pays" and the principle of responsibility during the life cycle of packaging, reduction of the amount of packaging waste generated, reuse of packaging, recycling and other forms of reuse, and reduction of final disposal of packaging waste. They only apply for packaging waste and therefor are of importance for food processing sector and are not applied in agriculture sector.

In Bosnia and Herzegovina, a system has been put in place in 2001 for organic waste recycling in agriculture, but inorganic agricultural waste, including agricultural plastics, is treated as communal waste and no specific system for agriculture has been implemented till now. Current bad practices for managing these wastes in agriculture include on-farm burning, burial and stockpiling. These practices reflect the long-term exclusion of agricultural waste from the controlled waste regime. Farmers generally use the most practical and time-efficient methods available to them.

- Inclusion in household waste collection;
- Disposal of small waste items with the household waste is common;
- Transfer to waste contractors;
- Since agricultural waste is not a controlled waste at present, transfer to waste management contractors is limited, but it does occur where the waste has a value for recovery, for example scrap metal.

Farmers are responsible for the management and financing of their waste. Currently, there is no regulatory development that regulates a system of extended producer responsibility in the case of agricultural inorganic waste. Therefore, it would not be possible to require such a model for this waste. Thus, in this area, any initiative promoted by producers in this regard is voluntary. In addition, there is no information's about

selected waste streams in different regions or in the Bosnia and Herzegovina as a state regarding inorganic waste from agriculture. There is a need to strengthen capacity in all areas related to inorganic waste management from the agriculture at all levels.

In this connection, the main goal of the REINWASTE project, the identification of needs and the search for innovative products and solutions concerning the correct management and reduction of inorganic waste in 3 key sectors in 3 Mediterranean regions: the horticultural sector in Andalusia (Spain), the dairy sector in Emilia-Romagna (Italy) and the meat sector in the region Provence-Alpes-Côte d'Azur (France), should be utilized and transferred to the corresponding sectors in Bosnia and Herzegovina. Innovation and reproducibility of good practices in green development from EU are crucial in order to enable the development of appropriate agro-environmental policies and sustainable development of the agricultural sector of Bosnia and Herzegovina in the future.

At the beginning of 2018, the Council of Ministers of BiH adopted the **Strategic Plan for Rural Development of Bosnia and Herzegovina (2018-2021)**² - Framework Document, and then both houses of the Parliamentary Assembly of BiH. The adoption of this document created the conditions for the use of pre-accession funds of the European Union intended for agriculture and rural development in BiH in order to improve the sustainable development of rural areas.

02. Recommended technology transfer actions to fill the gaps and support the transition towards a minor use of inorganic waste across the agri-food supply chain, focus on the primary sector

The aspiration to EU membership is the main driver for improving and completing the strategic and legal environmental framework in the country. The waste framework directive 2008/98³, nowadays modified by Directive 2018/851⁴, established the competence of each Member State to establish different models of responsibility in waste management. To start synchronizing policies for agriculture and rural development in Bosnia and Herzegovina with the common agricultural policy of the European Union it is necessary to effectively implement the Strategic Plan for Rural Development of Bosnia and Herzegovina - Framework Document (2018-2021). In future, special focus on the

²http://www.mvteo.gov.ba/data/Home/Dokumenti/Poljoprivreda/Strategic_Plan_for_Rural_Development_of_BiH____Eng.pdf

³ <https://ec.europa.eu/environment/waste/framework/>

⁴ <https://www.eea.europa.eu/policy-documents/directive-eu-2018-851-of>

problem of inorganic agriculture waste must be seized by all stakeholders prior the moment legislative or strategic documents are adopted.

Re-use of waste can have significant financial and environmental benefits (although not always) and this option is potentially viable for a number of waste streams. However, the scope for increased re-use of waste on farms (that is beyond current practice) appears to be limited. Waste reduction provides the greatest overall benefits (reducing financial and environmental costs). This should therefore be at the heart of any strategy for inorganic agricultural waste management and development of circular economy⁵ defined as:

A circular economy is ‘where the value of products, materials and resources is maintained in the economy for as long as possible, **and the generation of waste minimised**’.

Reduction of inorganic waste at source REINWASTE project, aims to bring a tangible contribution, favouring the adoption of greener innovative concepts in the agriculture and food industry, with a special focus on SMEs. Through performing the testing innovative products and technologies in pilot actions as part of the REINWASTE project, in 30 production companies and industries for each sector in each country, provided the results with the most suitable advanced solutions to be introduced into their production chains to reduce inorganic waste. The specific objectives of the knowledge transfer of the project are:

- Bringing the concept of green innovation closer to SMEs in the horticultural, dairy and meat value chains.
- Filling the lack of knowledge on the technological solutions available in the producing and agri-food sector.
- Unifying the diversity and fragmentation of waste management procedures.

For instance, in the horticultural greenhouse sector, some bio-based materials can already be offered to substitute inorganic materials, such as biodegradable and compostable strings and clips for plant staking or biodegradable mulching plastic films.

The main objective of document is to provide legacy and sustainability of the alternatives tested in REINWASTE across the different agriculture sectors in the Bosnia and Herzegovina in order to carry out transfer and information actions for farmers about solutions for the reduction of inorganic waste, for example about the technical benefits and costs of alternative materials to conventional plastics (thin plastics, raffia, paper clips, etc.). This can be done through, for example, guidelines on good practices for the prevention and management of inorganic waste. A great importance will be given also to networking activities to ensure the transferability and replicability of the project results. Networking

⁵ European Commission 2015

activities will include national and international events and are addressed to the different categories of stakeholders to facilitate cooperation, to transfer knowledge and to share data. They are expected to function as catalyser for the replication of the obtained results within Bosnia and Herzegovina.

Mobilize all stakeholders at policy and institutional level prior the moment legislative or strategic documents are adopted.

Provide political decision makers with information about the studied alternatives in REINWASTE and the potential and social demand for its multiple functions. This would allow the design of efficient strategies. REINWASTE project results will support decision-making (policy makers) in the context of innovation of this project in which all actors have been involved (farmers, suppliers, various experts, technology centres, officials, policy makers, etc.). Certain priorities must be emphasized, proposed priorities for Bosnia and Herzegovina are as follows:

- Ensure that the inorganic agriculture waste streams are integrated into future planning documents;
- Share knowledge and information on the integration of inorganic agriculture waste into sectoral policies and legislation;
- Establish schemes of training and in-service training covering inorganic agriculture waste issues for civil servants in sectoral ministries;
- Promote an integrated waste approach to the regulatory and compliance assurance instruments which will recognize inorganic agriculture waste;
- Assess social, economic and health impacts from inorganic agriculture waste pollution and make results available;

All above-mentioned priorities will lead to results at policy and institutional level which are in accordance with the REINWASTE project objective through the following processes:

- **Integration of related strategies:** All government levels and various agencies, in Bosnia and Herzegovina dealing with strategies for waste management, agriculture and rural development should co-ordinate their efforts to identify common objectives and the best means to facilitate progress.
- **Emphasis on inorganic waste reduction:** continuous efforts should be made to identify and encourage opportunities to reduce inorganic waste through improved product design and farming practices.
- **Agreed role of on-farm management options:** a code of practice covering on farm options for inorganic waste management should be established (recognising the time needed to establish waste collection infrastructure), and further R&D should be conducted.

Effective communication: a comprehensive communication strategy will be developed (to raise awareness and motivate all stakeholders).

Consideration should be given to the diversity of farms in the Bosnia and Herzegovina as well as the time needed to develop infrastructure and change attitudes. Implementation of the practical communication campaigns for the reduction of inorganic agricultural waste should be conducted at regional level to take account of local differences. Inorganic agricultural waste management should be integrated into existing decision-making frameworks, for example the waste planning system and regional strategies. In the longer-term, key performance indicators for inorganic agricultural waste management should be integrated into the existing systems. Recommended communication priorities towards a minor use of inorganic waste and the legacy and sustainability of the project across the agricultural supply chains of Bosnia and Herzegovina are:

- Contribute to the awareness of farmers by associating agriculture associations with higher education;
- Promoting collaboration between the different actors (private companies, farmers, public sector, distributors, consumers, etc.);
- Promoting agreements between suppliers and farmers to encourage the use of these solutions by farmers;
- Develop education and training programs for sector stakeholders;
- Working with distribution chains in joint campaigns to look for joint solutions and raise consumer awareness;
- Improve communication to farmers and economic organizations (agricultural cooperatives, traders, distributors) to multiply REINWASTE actions;
- Transferring REINWASTE results through the producer's associations to their members.

All above-mentioned priorities will lead to communication results which are in accordance with the REINWASTE project objective through the following processes:

- Develop the network of actors and new collaborations by breaking down the barriers between institutions and companies;
- Support to identify and promote innovative, economically and environmentally sustainable waste reduction solutions through R&D to reduce inorganic waste;
- Reducing waste by improving farm management practices.
- Communicating information to farmers.
- Communicating information through the supply chain.
- Providing advice and support to government, farmers and other stakeholders.

03. Most relevant actors to be concerned in the transferability / technology transfer actions, focus on the primary sector

The involvement, interaction and effective engagement of all the stakeholders in the waste value chain, who are sensitive to inorganic waste matter REINWASTE project, will make it possible to approach the issue of waste from a multi-stakeholder point of view, which will guarantee an integrative approach to the transferability. Knowledge developed in REINWASTE project will permit stakeholders to choose the best solutions to eliminate, substitute, recover or recycle these wastes.

The engagement of stakeholders that cover the entire agriculture value chain and close collaboration among many different partners will lead to the goal of the REINWASTE project replicability and transferability to multiply the impact of the results to replicate and transfer its findings after its end, in order to reach a wider audience in Bosnia and Hercegovina and provides evidence that the transition towards a circular economy makes sense from both an ecological and economic perspective. Transfer aims to support mutually beneficial collaborations between universities, businesses and the public sector. Moreover, specifically targeted training sessions and materials will be addressed to stakeholders to ensure the application of the Project tools and approaches. The recommendations learned from REINWASTE project concerning inorganic waste management can be useful for stakeholders including:

- Policy actors,
- Farmers,
- Academic community,
- Consumers.

Policy actors

At policy and institutional level, because it will provide political decision makers with information about the studied alternatives in REINWASTE and the potential and social demand for its multiple functions. This would allow the design of efficient public and private strategies to take full advantage of this potential and optimally satisfy all the stakeholders' demands to achieve more sustainable economic, environmental and social agricultural production.

Farmers

The role and contribution of farmers and their communities is central to any successful waste reduction effort in agriculture. However, their relationship to other actors depends greatly on their existing level of development. A major neglected capacity of farmers and farming communities is that of innovation and technology dissemination. The potential for investment in this area is enormous and should be central in efforts of REINWASTE project technology transfer. The capacity of farmers to accumulate savings and to finance development is also frequently under-rated. This is true both at individual and community level, even in areas of severe poverty and apply for Bosnia and Herzegovina as well. Reduction of social distance between farmers and project results must be of utmost importance for project sustainability in a long run. Action-oriented farmers should be identified and involved in implementing parts of the project results as a feasibility proof.

Academic community

It is about the transfer of tangible and intellectual property, expertise, learning and skills between the research community and the non-academic community. The benefits of knowledge transfer - in other words, the exploitation of research - go beyond simple financial return. The benefit also lies in a number of other, less tangible, benefits for research institutions, for industry and for society as a whole, such as helping research institutions focus their research on the wider needs of society and industry

Consumers

Dissemination of REINWASTE project results to the consumers will increase social knowledge and understanding of sustainable alternatives for inorganic waste management in agricultural sector Through promoting consumer awareness of the non-consumption of plastic packaging, such as through reuse and recycling, can lead to shared responsibility of the economic and environmental models. Secondly, the consideration of their demands in the political planning will improve its legitimacy and efficiency.

Transfer Plan *Bosnia and Herzegovina (BiH) - Food Processing*

04. Needs and main challenges in the framework of inorganic waste minimization in BiH, with regard to food processing

The institutional structure of Bosnia and Herzegovina (BiH) was established by the 1995 Dayton Peace Agreement, which gave the most powers to the entities: the Federation of Bosnia and Herzegovina (the Federation) and the Republic of Srpska (RS), plus a special district of Brčko. Although the entity authorities have enacted a set of environmental laws, federal planning and strategic documents, there is a lack of a large number of acts, including one that would regulate the production, trade and disposal of inorganic waste from the food sector in BiH.

Although Bosnia and Herzegovina (BiH), ie the Republic of Srpska do not yet have the obligation to implement the goals from the European directives concerning the field of waste management, the set requirements and EU standards should be gradually incorporated into the BiH legislation related to this area. By harmonizing the laws and bylaws, in accordance with the EU acquis, the foundations will be laid for the establishment of an appropriate system of waste management and circular economy throughout the territory of BiH in accordance with the principles of Reinwaste approach, sustainable development and environmental protection.

The structural arrangement of BiH is shown in the following figure:

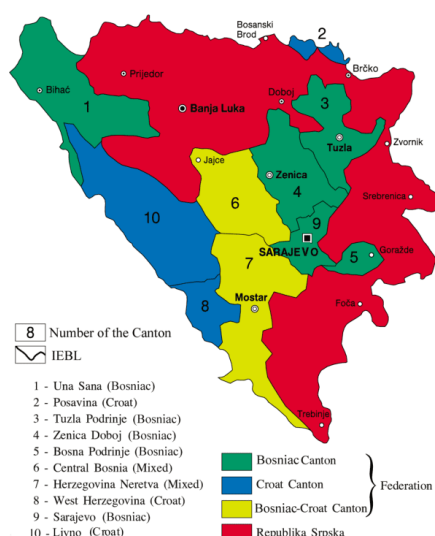


Figure 1. The internal arrangement of Bosnia and Herzegovina⁶

Bosnia and Herzegovina has natural resources and conditions that create a superior environment for agricultural production, including the availability of labor, land and other natural resources, as well as a favorable climate. Enormous agricultural potentials have only been partially exploited despite significant human and natural resources. Strong development and constant increase in production that characterize BH, the agricultural sector is well below its real potential and expected results. Most food products are imported, especially wheat, meat products, dairy products and fruit juices.

Insufficient financial resources needed to modernize the entire agricultural production (replacement of obsolete technology and equipment, improvement of the existing infrastructure of the agricultural sector, etc.) is one of the most important limiting factors for faster development of this sector. The production of milk and meat is a strategic sector of agriculture and certainly the most important branch of livestock production in Bosnia and Herzegovina⁷.

- Dairy industry

The dairy sector is considered a strategic agricultural sector in BiH and relies on livestock, sheep, and goats. Milk production is the most common form of agricultural production, taking into account the fact that about 100,000 agricultural households keep cows. Of that number, about 33,000 households produce milk for commercial purposes. There are about 35 dairies in Bosnia and Herzegovina with an installed processing capacity of about 420 million. liters per year, which represents a capacity utilization of 55%. In addition to registered dairies, there are a number of small family dairies, but they are exclusively focused on the immediate local market. The structure in the field of milk processing has not changed significantly for many years, where liquid products predominate, most of which are dominated by pasteurized and UHT milk with about 56%, yogurt, sour cream, fermented products with about 20%, cheese with 21% and other dairy products with 3%. Today, a number of autochthonous cheeses are produced in BiH, such as Livno cheese, Vlašić cheese, bellows cheese, fatty, boiled and lean cheese, and other types of cheese. The number of dairy cows in BiH ranges from about 290 to 310,000 thousand heads, of which in the FBiH is about 50.5%, RS 48.6% and BD BiH 0.9%.

The current structure of milk processing is unfavorable for the development of exports, as it limits it to the regional market. Also, this structure of milk processing cannot encourage the development of primary milk production in the long run. In neighboring countries and the EU, the structure of milk processing is more favorable in favor of

⁶ <https://reliefweb.int/map/bosnia-and-herzegovina/federation-bosnia-and-herzegovina>

⁷ ANNUAL REPORT in the field of agriculture, food and rural development for Bosnia and Herzegovina for 2015.

sustainable global products. Considering the share in the total milk processing, the most unfavorable trends were recorded in yogurt and long-lasting cheeses. Milk powder and butter do not have a significant share in the total production of dairy products and are organized mainly as a by-product or in resolving surplus milk. In 2020, the production of dairy spreads increased by 23 percent, and lactic acid beverages by 22 percent and the production of semi-hard and hard cheese decreased by 14 percent.

The predominant orientation of most dairies in BiH are short-term consumer products. In 27 dairies (82%) the basic production program contains basic short-term dairy products (yogurt, sour cream, cottage cheese). The cheese production program is mainly oriented towards three groups of cheeses: fresh, brined white, and semi-hard / hard cheeses. Only five dairies are predominantly focused on the production of durable cheeses (semi-hard, hard and brined cheeses). The range of durable cheeses is narrow and contains 5-7 types of cheese. Processed, blue, refined semi-hard and similar cheeses are not represented in the production program of domestic dairies, although they significantly participate in the import of cheese in BiH, which indicates that there is a suitable market for these products.

- **Meat production sector**

The meat processing sector is one of the most important and developed food sectors in Bosnia and Herzegovina. Meat processing is performed according to EU standards, and the quality is evidenced by exports to international markets. There are about 20 companies operating in Bosnia and Herzegovina that process between 5 and 30 tons of meat per day into various meat products such as semi-permanent and permanent meat products, such as boiled or dried sausages, pate, cold cuts, salami, etc. Annually, this production is over 18,000 tons. Fresh meat production in Bosnia and Herzegovina decreased, due to the destruction of livestock during the war, and poor investment in development after the war. Poultry production has experienced a very rapid boom in recent years, whose products are marketed locally and abroad.

According to the type of animals in BiH, meat is divided into:

- livestock meat - meat of cattle (including buffaloes), pigs, sheep, goats, ungulates (horses, donkeys, mules and mules) and rabbits,
- poultry meat - meat of chickens, turkey geese, ducks, guinea fowl and domestic pigeons,
- game meat - meat of rabbits, wild boar, chamois, deer, roe deer, bear, reed (partridge), quail, wild geese, ducks, pigeons, turtledoves and pheasants.

These types of meat are placed on the market in carcasses, halves, quarters or basic parts, which must be characteristic of a certain type of meat in appearance, color, structure, consistency and other sensory properties.

On the BiH market, meat products are most often classified into eight groups of processed products:

- minced meat,
- sausages,
- canned meat,
- ready frozen meals,
- cured meat products,
- bacon,
- animal fats,
- other meat products.

Regardless of the difficulties, the only branches of the food industry that export more than they import are the dairy industry (milk and sour cream) with an import coverage of 108.64 percent, and other prepared or canned meat products (coverage 248.66 percent).

According to estimates of the composition of emitted waste from the food sector in BiH, the percentage of recyclable waste components (packaging and other secondary raw materials) in the total emitted waste is approximately 40%. The amount of separately collected and threatened secondary raw materials, including packaging for 2017 is around 2.4% of the recyclable component of waste in the total collected waste. The plan envisages reaching the goal of 37% of the stated potential of packaging waste only in 2029⁸.

Most of the waste emitted by the food industry in BiH refers to packaging waste used in product packaging. Packaging waste is any packaging or packaging material that cannot be used for its original purposes, except for residues of materials generated in the production of packaging (production residues) that are not considered as packaging waste.

Packaging and packaging waste management is performed in accordance with the Law and Regulation on Packaging and Packaging Waste Management ("Official Gazette of Republic of Srpska", No. 58/18) and the Rulebook on Packaging and Packaging Waste Management ("Official Gazette of the Federation of BiH"). number: 88/11, 28/13, 8/16, 54/16, 103/16 and 84/17) which implies the division of responsibilities of all economic entities in accordance with the principle of "polluter pays" and the principle of responsibility during the life cycle of packaging, reduction of the amount of packaging waste generated, reuse of packaging, recycling and other forms of reuse, and reduction of final disposal of packaging waste.

A legal entity (food processor) or entrepreneur who places a packaged product on the market is obliged to ensure the prescribed management of packaging waste through the

⁸ Strategic plan of rural development of Bosnia and Herzegovina (2018-2021)

operator in accordance with the Law on Waste Management and bylaws. If the packaging that becomes packaging waste after use is not disposed of through the operator, the legal entity or entrepreneur is obliged to pay a fee for that packaging which contaminates the environment with packaging waste.

The calculation of the fee for packaging waste is performed according to the formula and established general and specific objectives and coefficients of the fee for reuse and recycling of packaging waste for its calculation, which is prescribed by the Law on Waste Management. The coefficients of compensation for reuse and recycling of packaging waste as well as the objectives of packaging waste, shown in Table 1, are defined by the Law and may change depending on the economic instruments that affect the establishment of packaging waste management system.

Table 1. General and specific goals of packaging waste management in BiH⁹

GENERAL GOAL	
Reuse and recycle %	35
SPECIFIC GOAL	
Type of packaging material	Minimum amount of packaging material to be recycled (%)
Paper	34
Plastic	20
Metal	12
Glass	10
Wood	12

The collected fee is distributed to the account of the Environmental Protection Fund of the Republic of Srpska (FZZSEE RS) and the Environmental Protection Fund of the Federation of BiH (FZO FBiH) and is used for the management of packaging and packaging waste. The share of packaging from the food industry in the total emission of packaging materials on the territory of BiH is around 70%, of which 90% of the issued plastic packaging is of fossil origin.

The amount of packaging waste is estimated at around 70% of the total amount of recyclable materials, and according to projections it will increase to 203,000 tons in 2025. The amount of generated plastic packaging waste in BiH ranges from 11.8 to 13.4 kilograms per capita per year. The share of plastic packaging waste in the total amount of packaging

⁹ Republic waste management plan in the Republic of Srpska, 2019.

waste is about 26%. Within that 26 percent of plastic packaging waste, the share of PET is 13.2 percent, and other plastics 12.8 percent.

The circular economy is the antithesis of the current principal of the linear economy, which is characterized by uncontrolled exploitation of natural resources and material flow. The circular economy is based on the assumption of maximum utilization of resources (production and use), in order to extend the life of the product, through reuse or recycling, and to ultimately use cycle product or service returns to the production process, to create new value, which is an instrument for achieving the goals of sustainable development¹⁰.

05. Recommended technology transfer actions to fill the gaps and support the transition towards a minor use of inorganic waste across the agri-food supply chain, focus on food processing

Bosnia and Herzegovina is the most polluted country in the region in terms of the amount of discarded plastic in nature. The adopted environmental laws and strategies have clearly prescribed the general goals, responsibilities and penal provisions in the field of environmental protection, and their adoption has acquired all the preconditions for the protection and management of the environment.

The Entity Ministries, responsible for environmental protection, should as soon as possible initiate the procedure of adopting harmonized regulations with EU legislation, the consistent application of which would systematically and in the long run solve the problem of plastic waste pollution. In addition to these, it is necessary to include the ministries of trade and other competent institutions that treat plastic as a product and can affect the course of its life from its inception to its disposal.

In the direction of finding the optimal solution in BiH, and on the basis of environmental protection, but also the protection of food producers who are also employers for a large number of citizens, it is necessary to define an optimal model for solving the problem of plastic packaging pollution, which will be feasible and compromise of all stakeholders (ministries, environmental associations, producers). This model is provided by solutions within the REINWASTE approach and positive European practice.

The most feasible solution applied by Reinwaste has been material substitution by bio-based materials. A better understanding in terms of environmental, technological and

¹⁰ Waste Management Strategy in Republika Srpska, 2015.

economic aspects on the necessary solutions for proper end-of-life management of compostable materials is needed to avoid that post-consumption treatment becomes the limiting factor for their adoption. The recycling of plastic is the best solution in terms of closing the loop and therefore in the term of the circular economy. With an LCA approach, bio-based substitution should be considered only in view of a totally biodegradable/compostable material. However, the recycling chain for these materials is still totally absent and the disposal itself is more expensive, without considering the low stage of development of innovation on end-of-life transformation processes.

5.1. Objectives and measures according to REINWASTE to prevent the generation of inorganic waste from Food processing in BiH

5.1.1. General objectives of inorganic waste prevention in the context of the REINWASTE approach

- reasonable use and conservation of resources with the use of biodegradable materials,
- reduction of the total amount of inorganic waste emitted from the food industry,
- reduction of emissions of non-degradable materials into the environment,
- reducing hazards to human health and the environment.

5.1.2. Measures to prevent the generation of inorganic waste from Food processing according to the REINWASTE approach

Measure 1. Reuse of materials, recycling of non-degradable materials (prevention of generation and accumulation of packaging waste).

Directives 94/62 / EC and 2004/12 / EC, in addition to the harmonization of national legislation, focus on the prevention of packaging waste, reuse of packaging and recycling and recovery of packaging waste, which is in line with the REINWASTE recommendations.

Prevention, through reuse, creates more new jobs than through recycling or waste disposal, saves energy and raw materials, reduces disposal costs as well as greenhouse gas emissions.

In order for measure 1 to come to life, it is necessary to:

- introduce incentives in the form of fees for the use of composite and biodegradable materials and reduction of the fee for recycling materials,
- define the conditions that such material must possess,
- contribute through tax relief to the development of goods without packaging and goods with reusable packaging,

- stimulation of consumers through appropriate compensation for the return of primary packaging,
- to support projects for the prevention of the generation of packaging waste,
- conducting educational campaigns on reducing the use of non-degradable packaging waste,
- establish a register, which would contain data on the types and quantities of biodegradable and non-degradable polymeric materials used.

Measure 2. Prevention of generation of special streams of non-degradable waste

Given the growth of population standards, as well as the development of the food industry, there is a significant increase in the number of products that after use become special streams of non-biodegradable waste. It is necessary to establish a sustainable management system for special waste streams. In addition to the collection, temporary storage and delivery to authorized recyclers, the following measures are recommended:

- establish specific targets for the recycling of non-degradable polymer waste,
- encourage producer responsibility in the waste food chain in order to strive for the use of compostable materials, make products more durable, and provide for the possibility of recovery,
- raising public awareness of behavior change related to the disposal and collection of packaging waste (campaigns),
- increase the level of recycling of recyclable waste from the food industry in BiH.

Indicators for evaluating efficiency: increasing the use of biodegradable polymers, reducing the generated biodegradable waste, collected quantities of returnable packaging, reducing the amount of total generated packaging, conducted a number of campaigns.

Measure 3. Subsidies for the introduction of new/clean technologies characterized by a small amount of waste emissions

The term clean technology (Cleantech) was introduced by the Commission of the European Union and describes protection measures taken in various industries to reduce and eliminate waste and pollution at source. These measures cover a wide range of products, processes and services, with the aim of reducing pollution and using limited resources.

To achieve this measure, the support of institutions is necessary, through subsidies for the introduction of advanced production technologies with small amounts of waste and ensuring the use of all available components of used raw materials. It is necessary to create a register of companies that decide to use clean technologies.

Indicators for efficiency assessment: number of subsidies, register of companies introducing clean technologies.

Measure 4. Eco-label on packaging (Eco-design)

Encourage the inclusion of environmental aspects in the design of food products, which allow consumers to identify products that meet environmental criteria, including performance criteria and restrictions on the use of hazardous substances in packaging materials, providing consumers with information on preventing the generation of waste at the time of purchase of a food product. Features of food products with eco design are:

- longevity,
- reusability,
- low material consumption,
- higher consumption of propulsion aids and
- low content of hazardous substances.

Efficiency indicators: number of products and companies that have eco-design on products, number of re-uses.

Measure 5. Promotion of environmental protection systems (EMAS and ISO 14001) in Food processing

In the European Union, there are two accepted environmental protection systems, namely the EMAS regulation and the ISO 14001 standard. Both of these systems aim to provide an efficient tool to manage the organization's environmental impacts.

The EMAS regulation defines a somewhat wider area than the ISO 14001 standard, which actually means that an organization that meets the requirements of the EMAS regulation simultaneously meets the requirements of the ISO 14001 standard. laws. It also enables better use of energy, water and other resources, as well as a reduction in total costs. In order to implement this measure, it is necessary to encourage economic entities to certify, which achieves, among other things, an advantage over the competition. The EMAS logo is a visual tool developed with the aim of highlighting the commitment of the organization (business entity) to improve environmental impact indicators, as well as informing clients and the public in establishing an environmental management system in accordance with EMAS requirements. Figure2 gives an appearance of the logo EMAS and ISO 14001 certified.



Figure 2. Overview of the EMAS and ISO 14001 logo

Efficiency indicators: number of certified business entities.

Measure 6. Public Awareness Campaign

The most effective way to raise public awareness and the Food processing sector is certainly to be involved in decision-making processes as well as a targeted campaign in which citizens and industry are explained in an acceptable way the far-reaching consequences of irresponsible behavior and waste reduction.

Informing through the media, organizing forums and round tables (B2B), joint cleaning actions, educating students in schools is a way to bring citizens closer to the problem of waste generation and ways of prevention.

The campaign must include the education of citizens of all ages, educational and professional profiles, educational institutions, system institutions and the non-governmental sector, as well as the food processing sector.

Efficiency indicators: reduction of total biodegradable waste generated (in tons), number of likes on social networks, number of ads broadcast, number of school visits.

Measure 7. Elimination of single-use plastics in food packaging

Plastics have a devastating impact on the environment and it is necessary to prevent and reduce the impact of certain plastic products on the environment.

As part of the package on the circular economy, EU Directive 2019/904 on reducing the impact of certain plastic products on the environment was adopted, and from 2021, a ban on certain disposable plastic products will be introduced for all EU member states. This applies to products such as ear sticks, straws, balloon holders, cutlery, food containers, expanded polystyrene cups, oxo-degradable plastic. This directive also includes a fee for the cleaning and disposal of cigarette butts by the tobacco industry (in accordance with the "polluter pays" principle), the collection of beverage bottles.

On certain products, it is necessary to introduce mandatory clear and standardized labels on the method of disposal, the negative impact of the product on the environment and whether there is plastic in the product.

Indicators for efficiency assessment: reduction of consumption of food containers, larger quantities of collected plastic bottles, establishment of a system for collecting, reduction of water pollution by plastic, reduction of CO2 emissions, economic benefits for consumers.

Measure 8. Composting

Composting achieves the separation of biodegradable waste from other waste, and free obtaining of organic fertilizer, which achieves savings when buying fertilizer. Composting can reduce the amount of waste that is disposed of by almost 30%, and contributes to reducing the bio-emissions of glass gases generated in landfills as well as during transport.

Anyone can compost, and it is necessary to inform and encourage the food industry and citizens to compost at home, and this is possible through information and educational workshops, the media, as well as by subsidizing the purchase of industrial and home composters.

Efficiency indicators: reduction of biowaste, increase in the number of stakeholders who compost waste, increased number of composters.

Measure 9. “Green” public procurement

By establishing its own public procurement policies and including environmental protection criteria (eco-design products, durability, smaller packaging, reusability), the food sector can clearly focus its responsibilities on reducing waste, which directly affects the quantities waste disposal. Through public procurement propositions, define the criteria for participation, with additional evaluation of “green initiatives”. Develop guidelines for the assessment of protection criteria.

Efficiency indicators: reduction of total generated non-biodegradable waste, biodegradable waste, paper and cardboard, adopted guidelines, increase in the number of green procurements.

5.2. Recommendations in the context of REINWASTE good practice

The existing legal requirements are a good starting point for the implementation of the extended liability system of food producers in BiH. The results achieved so far in the implementation of separate collection and sorting of inorganic waste are not satisfactory, and the current recycling rates are far below the rates achieved in other European

countries. FBiH and RS face similar problems, and the authorities are aware of the need to take corrective action.

The food industry in both entities is socially responsible for the burden on the environment and significant additional efforts are needed to develop appropriate separate collection systems and establish modern infrastructure for waste sorting and treatment. Waste management issues, and in particular recycling and separate collection, should become a real priority for local authorities.

Gaining public support for the implementation of a waste separation system at source and the participation of a significant number of food companies in various recycling initiatives will require the allocation of larger funds for comprehensive information and awareness-raising programs. Dialogue between all actors, including industry, entity authorities, municipalities and waste management companies, is crucial for the successful implementation of legal requirements. Progress will only be possible if all actors work together to achieve common goals in meeting the transfer of good practice under REINWASTE.

Since the food industry is strongly linked to the public service, transparency is a primary condition in the implementation of the REINWASTE transfer plan. Transparency is needed to the extent that entity/state authorities can control the proper implementation of such a system, and producers and consumers can make informed decisions. Furthermore, significant progress in packaging waste management will not be possible without a general improvement in municipal waste management practices in the country.

Future amendments to legal provisions in the context of the implementation of REINWASTE good practice should focus on:

- Achieving full transposition of the provisions of the EU Packaging Waste Directive,
- Better definition of food producers responsibilities and interrelationships with system operators in establishing the necessary infrastructure for separate collection and sorting,
- Revision of current documentation and reporting requirements,
- Revision of targets for recycling and utilization of packaging waste,
- Optimization of requirements and existing procedures for submitting applications, issuing and revoking licenses to system operators,
- Possible revision of the procedures for calculating and paying fees for packaging placed on the market,
- Revision of the format and scope of annual reports submitted by the food processor,
- Consideration of the possibility of introducing an audit of the annual reports of the system operator and checking the quantities of the packaging reported by individual business entities,

- Establish transparent and fair mechanisms for the distribution of responsibilities between several food processors operating at the entity level,
- Establishment of appropriate mechanisms for implementation of legal requirements.

06. Most relevant actors to be concerned in the transferability / technology transfer actions focusing on food processing

6.1. State level of BiH

Ministry of Foreign Trade and Economic Relations of BiH (MoFTER) is the national focal point for all environmental conventions that BiH has signed and ratified. Article 9 Law on Ministries and Other Administrative Bodies of BiH (Official Gazette of BiH, No. 5/03, 42/03, 26/04, 42/04, 45/06, 88/07, 35/09, 59/09 and 103) Prescribes that the MoFTER is responsible for: defining policy, basic principles, coordinating activities and harmonizing the plans of entity authorities and institutions at the international level in the fields of agriculture, food processing, energy, environmental protection, development and use of natural resources and tourism.

6.2. Entity level-Federation of BiH (FBiH)

Key institutional stakeholders include the Federal Ministry of Environment and Tourism (FMOiT), the FBiH Environmental Protection Fund (HIF), the Federal Administration for Inspection Affairs (FUZIP), the Federal Bureau of Statistics, the cantonal ministries of environment and municipalities. Each canton in the FBiH adopts its own law on waste management activities.

Supervision over the application of legislation in the field of packaging waste management is carried out by environmental inspectors and market inspectors of the Administration for Inspection Affairs. The FBiH Government, by its decision, established a Coordination Body for Monitoring the Implementation of the packaging waste management.

One representative from each of the following institutions participates in the work of the Coordination Body¹¹:

- FBiH Environmental Protection Fund

¹¹ Analysis of the system of extended liability of producers in Bosnia and Herzegovina for packaging, packaging waste and EE waste, 2017.

- Federal Administration for Inspection Affairs
- System operators licensed by the Federal Ministry of Environment and Tourism
- Federal Ministry of Environment and Tourism.

The Inter-Entity Environmental Body monitors the state of packaging waste management in the packaging waste management system, coordinates activities between the Entities and the Brčko District and consolidates reports on the quantities of packaging placed on the market of Bosnia and Herzegovina.

In addition to the above comments, the following key shortcomings have been identified in the bylaw regulating packaging waste:

- There are no provisions on cantonal or municipal administrations and their obligations regarding packaging waste management.
- There is no precise division of responsibilities for organizing separate collection and recycling in case more than one system operator operates on the market.
- There are practically no penal provisions in the Ordinance, given that the general reference to Articles 52 and 53 of the Law on Waste Management (LWM) makes offenses unclear, difficult to prove and difficult to enforce.
- The form for the annual report on packaging and packaging waste set out in Annex II of LWM has been significantly improved in the amendments. Nevertheless, it is recommended that the form contain additional information on:
 - types of packaging: primary, secondary, transport
 - specific materials - for example, PET, LDPE, PP, etc., and not general categories (plastics)
 - define cardboard beverage boxes as a separate category and not include them in the general category of a composite packaging.
- The annual report is not subject to audit by an independent auditor.
- The system operator should be legally responsible for providing information on behalf of system payers.

6.3. Entity level - Republic of Srpska (RS)

In the Ministry of Planning, Construction and Ecology of the Republic of Srpska (MPGE), activities related to waste management, including the issuance of waste management permits, are the responsibility of the Department of Environmental Protection. The Department of Environmental Protection is responsible, inter alia, for drafting laws and bylaws in the field of environmental protection; establishing contacts and coordination with international and domestic stakeholders and organizations in the field of environmental protection, as well as participation in the implementation of projects financed by international financial organizations in the field of environmental protection.

Similar to the FBiH, the competencies of municipalities in the RS are regulated by the Law on Communal Activities (Official Gazette of the RS, No. 124/11 and 100/17) and the Law on Local Self-Government (Official Gazette of the RS, No. 97/16). Local authorities are responsible, inter alia, for regulating and ensuring the provision of utilities (including waste management). Local self-government units (municipal authorities) organize waste management. Municipalities adopt Decisions on communal activities which regulate the provision of communal services on their territory (including waste collection and disposal from the food industry).

3.3.1. Fund for Environmental Protection and Energy Efficiency of the Republic of Srpska

The Fund for Environmental Protection and Energy Efficiency of the RS performs the following tasks related to:

- collecting fees for the management of special waste streams,
- providing waste collection and treatment services and coordination of waste management system actors, unless otherwise regulated by a special regulation,
- collecting information,
- managing and updating the waste management database,
- monitoring and updating data on quantities of waste, including secondary raw materials, distributing and making such data available electronically,
- reporting on waste management to MPGE and the National Assembly of RS,
- financing the preparation, implementation and development of programs, projects and similar activities in the field of preservation, sustainable use, protection and improvement of the environment, energy efficiency and the use of renewable energy sources in accordance with special regulations,
- other jobs determined by special regulations.

6.4. Inter-entity cooperation in the context of the REINWASTE transfer plan

According to the existing institutional arrangements, packaging waste management is organized at the entity level. The existence of two independent systems operating in a relatively small market in the country is not an optimal solution as it leads to high administrative costs for system operators in FBiH and RS. In Belgium, a country with a similar administrative system, there is one country-wide packaging waste scheme.

Establishing a single scheme for REINWASTE technology transfer in the field of inorganic waste management in both entities is not possible and realistic according to the existing institutional and legal framework.

However, there are certain basic preconditions for the implementation of a unified approach in FBiH and RS:

- Waste management laws and packaging waste regulations adopted in the FBiH and RS have many similar elements.
- Entity-level authorities and environmental funds have a similar structure and function and there is good communication between these institutions.
- The existing inter-entity environmental body may have an administrative role to coordinate the implementation approach.

A possible approach to system harmonization could be as follows:

- to issue a permit to one system operator for the establishment of a packaging waste management system in both entities, or
- that system operators authorized in both entities coordinate their activities on the basis of a cooperation agreement.

If a unified approach is applied in REINWASTE transfer phase implementation, it will allow (manufacturers and importers) to have a single point of contact in BiH regardless of the place of registration or core business in the country.

07. Overall conclusions

The present document represents the REINWASTE Transferability Plan for Bosnia and Herzegovina to the agricultural sector and food processing sectors, which is one of the main results of the transfer actions of the project and aims at bringing the results obtained with in REINWASTE project into practical use in Bosnia and Herzegovina. Probably the most important message that can be drawn from this document is the great potential for reducing inorganic agricultural waste that resides in the adoption of sustainable practices. The ultimate goal is to provide recommendations to policy makers and sectoral

operators to continue the actions initiated in the REINWASTE project for the reduction of inorganic waste, thus addressing the next steps to be taken in the context of Bosnia and Herzegovina to promote development of circular economy and enhance innovation in SMEs.