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WP 4

TASK 4.2.6: OTHER SECTORS - OTHER COUNTRIES KNOWLEDGE TRANSFERRING

DELIVERABLE 4.2.6D

OTHER SECTORS - OTHER COUNTRIES KNOWLEDGE TRANSFERRING

TRANSFER PLAN SLOVENIA

OUTPUT 4.3.9

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COORDINATION: ART-ER with contributions of FIAB, FEDERSERV, ANIA

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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.

This Plan is structured in two parts, one referring to Agriculture, and the second one referring to food processing, focused on Slovenia.

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

Agriculture and agricultural holdings in Slovenia

According to the last structural survey of agriculture in 2016, **69,902 agricultural holdings** are engaged in agricultural activity in Slovenia, which is 4,744 less than in 2010, when the last agricultural census was conducted. They used slightly less than **480 thousand ha of utilized agricultural area (UAA)** in total, which is one percent more than in 2010 (Table 1). The **average** agricultural holding in Slovenia cultivates **6.9 ha of UAA** (6.6 ha in 2013). The improvement of size structure is due to further decrease in the number of agricultural holdings in the smallest size classes, while at the same time the number of agricultural holdings in larger size classes increased. The structure of UAA is still dominated by **permanent meadows and pastures**, which cover more than half of all areas (57%), followed by arable land (37%) and permanent crops (6%).

Livestock production remains the **most important agricultural activity**, with **80%** of all agricultural holdings engaged in this type of production. In 2016, 55,782 agricultural holdings were engaged in animal husbandry. The average number of livestock units (LSU) in these holdings is 7.5 LSU.

In 2016, around 2 % fewer people were employed on agricultural holdings than in 2013, with slightly improved labour productivity (16.7 annual working units/100 ha UAA). The age structure of the holders-managers remains unfavourable; the average age of the holder is 57 years (56 years in 2013). In year 2016, 69 % of agricultural holdings, which manage 75 % of UAA, were specialized in a specific crop or animal production.

In recent years, a **reduction of negative impacts of agriculture on the environment can be noticed**: the use of pesticides and mineral fertilizers is more rational, the share of legumes in crop rotation and the area of minor agricultural plant species are both increasing. Also, the agricultural area under **organic farming is increasing**; in 2018 to almost 48 thousand ha (10% of all UAA) with permanent grassland still predominant in the structure (81 %).

Economic factors of Agriculture in Slovenia: In 2018, agriculture in Slovenia, together with hunting, forestry and fisheries contributed **2.2% to total value added** and **7.2 % to total employment**. In real terms, the net value added in 2018 was higher by around 58 % and the factor income higher by around 22 %. At a significantly higher value of total output (around 1.3 billion EUR) and at the same time slightly higher intermediate consumption, the factor income in 2018 was approximately 538 million EUR or around 6,900 EUR per

annual working unit. The growth in income was mainly due to the pronounced increase in the volume of crop production (especially of fruit and grapes) at much less favourable terms of trade at the aggregate level. Nevertheless, the significance of agricultural sector for Slovenia is larger than it seems on first sight due to the multipurpose roles it fulfills in the rural area.

According to data from 2016, 66,675 agricultural holdings cultivated almost 177 thousand ha of **arable land** (Table 1). This is more than 5% more agricultural holdings and 4% more arable land than in 2010. On average, these holdings cultivated 2.6 ha of arable land, which is almost the same as in 2010.

In 2016, there were more than 60 thousand agricultural holdings in Slovenia with **permanent meadows and pastures** (86% of all agricultural holdings), which together cultivated more than 276 thousand ha of grassland (Table 1).

In 2016, almost 21 thousand agricultural holdings were engaged in **fruit and olive growing**, cultivating more than 11 thousand ha of permanent crops (Table 1). Intensive orchards were cultivated by slightly less than 2.6 thousand agricultural holdings, and extensive orchards by almost 18 thousand agricultural holdings. In 2016, 3.9 thousand ha of agricultural land were planted with intensive orchards. Extensive orchards covered just over 6.4 thousand hectares. Almost 1.9 thousand agricultural holdings were engaged in olive production, cultivating a little more than a thousand hectares of agricultural land.

In 2016, 23,000 agricultural holdings were engaged in **viticulture** in Slovenia, cultivating a total of just over 15,000 ha of vineyards (Table 1).

Table 1: Agricultural holdings by use of utilized agricultural area (UAA) in Slovenia in 2016 (Source: SURS)

Year 2016	No. of agricultural holdings	Land use area (ha)	Average no. of ha/agricultural holding
Agricultural holding with utilized agricultural area (UAA)	69,902	479,589	6.9
Agricultural holding with arable land	66,675	176,518	2.6
Agricultural holding with permanent orchards and olive groves	20,717	11,297	0.5
Agricultural holding with vineyards	23,041	15,241	0.7
Agricultural holding with permanent grassland	60,401	276,244	4.6

Horticulture in Slovenia: the self-sufficiency rate of vegetables stands at 34%, which indicates the small scale production of vegetables. Large quantities of fresh and processed vegetables are imported. Just a few professional growers produce market vegetables,

however production still takes place in plastic greenhouses only. In 2019, 2,826 hectares were intended for vegetable production, which was 81% of total area intended for market horticulture. Compared to 2016, main area increased by 54% and the number of producers by a quarter. An average horticultural producer produced vegetables on 1.8 hectares or 23% more than in 2016. Because due to successive sowing the same area was used several times, the production area intended for horticultural production was 3,488 hectares (SURS, 2020).

Agricultural enterprises in Slovenia

In total there are 302 agricultural enterprises in Slovenia, employing around 1,800 people in total. The added value of agricultural enterprises contributes to around 69 mio EUR or 38 thousand EUR per employee. The net revenues from sales are 189 mio EUR in the domestic market and 28,9 mio EUR in a foreign market. The share of sales in foreign markets is 15,3 % (Table 2).

Table 2: Data on agricultural enterprises in Slovenia (Source: GZS-ZKŽP)

Number of enterprises	302
Number of employees	1,791
Added value	68,997,883 €
Added value per employee	38,522 €
Net revenues from sales	189,215,407 €
Net sales revenue in a foreign market	28,928,025 €
Share of sales in foreign markets	15,3

The most important food producing chains in Slovenia are:

- dairy
- beef
- pig meet
- poultry meat
- eggs
- vegetable
- fruit.

Inorganic waste production in agriculture in Slovenia

The main sources of inorganic waste production in Slovenia are agricultural holdings and agricultural enterprises producing milk, fruit, wine, vegetables, crops, hop and animal feed (silage). The types of inorganic waste they produce can be divided into 3 groups:

1. Packaging waste
2. Hazardous waste from agriculture
3. Waste from agriculture

Packaging waste from agriculture is defined as properly emptied and cleaned packaging of plant protection products. Until the delivery to the collection point it must be kept on the farm, cleaned and dried in a closed plastic bag. Packaging waste is thus separated from other waste. Packaging waste can only be temporarily stored on the farm for up to 12 months. The prepared packaging waste is delivered free of charge to the collection point to authorized organizations for the collection of packaging waste, which have a signed contract with the concessionaires.

There are several types of **hazardous waste** generated in agriculture. All types of hazardous waste are subject to appropriate storage and separate sorting according to the nature of the hazardous waste. All hazardous waste must be disposed off to authorized organizations. Thus e.g. **synthetic oils** are considered to be stored in dedicated containers separately from other waste on the farm. Hazardous waste from agriculture are also residues from the use of **plant protection products** (PPPs), which the user could not use, or is expired or could not empty the packaging or packaging from PPPs that contained hazardous substances. Hazardous waste from PPPs is handed over free of charge to the distributor in the store where the PPP was purchased, unless the collection point of PPP waste or an authorized organization is no more than 5 km from the point of sale. The distributor must have a special place for waste PPPs or install a notice of the possibility of free delivery at the nearest collection point. At the request of the end user, the transferee of hazardous waste must issue a **certificate of acceptance of waste**. Slovenian Economic Interest Group on plant protection products (GIZ fitofarmacije) is in charge of collecting the statistical data on hazardous waste in agriculture. Hazardous waste from PPPs that cannot be disposed of immediately in a suitable manner is stored in special, covered, non-flammable and non-corrosive containers out of the reach of unauthorized persons for a maximum of 12 months.

Since we often encounter the problem of what to do with **inorganic waste in agriculture**, special attention must be put to foils from silage bales, foils from horticulture, foil covers and other repromaterial used in agricultural production. All the listed inorganic wastes are not considered as packaging waste but are still agricultural waste. They must be handed over to the collector or processor of this fraction. Farmers must ask the seller at the time of purchasing these materials whether he is authorized to accept waste or how to handle the generated waste. The usual practice in Slovenia is that this type of inorganic waste in agriculture is collected at special collection points, where they are properly treated or sold further to another collection point.

According to the statistical data on the collected amount of inorganic waste generated in agriculture (02.01.04), there was almost 330 thousand kg of inorganic waste produced in

agriculture in Slovenia in 2019 (Figure 1). In this case only the data for the 02.01.04 category of waste according to the EU list of waste is presented.

02. - WASTES FROM AGRICULTURE, HORTICULTURE, AQUACULTURE, FORESTRY, HUNTING AND FISHING, FOOD PREPARATION AND PROCESSING

02.01. - wastes from agriculture, horticulture, aquaculture, forestry, hunting and fishing

02.01.04 - waste plastics (except packaging)

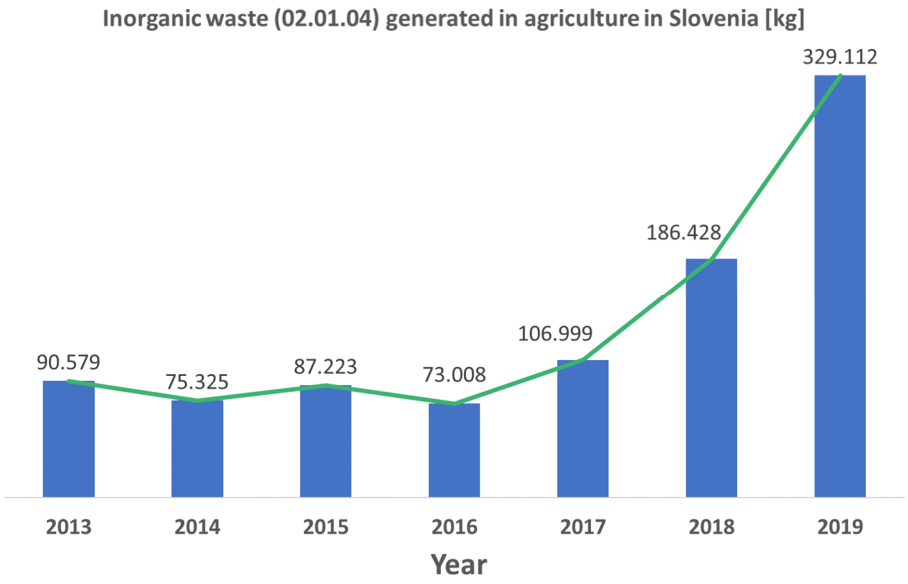

Figure 1: Inorganic waste produced in agriculture in Slovenia in the years 2013, 2014, 2015, 2016, 2017, 2018 and 2019 (Source: ARSO)

Further statistical analysis of collected data show that 10 agricultural enterprises generated in total 143,780 kg of inorganic waste (waste plastic, except packaging) in 2019. Meet producing and processing enterprise Perutnina Ptuj generated the most inorganic waste in 2014. They produced almost 56,000 kg of inorganic waste. The second largest producer of inorganic waste in agriculture is meat, crop and fruit producing company Panvita. In 2019 they produced 17,320 kg of inorganic waste in agriculture (Figure 2).

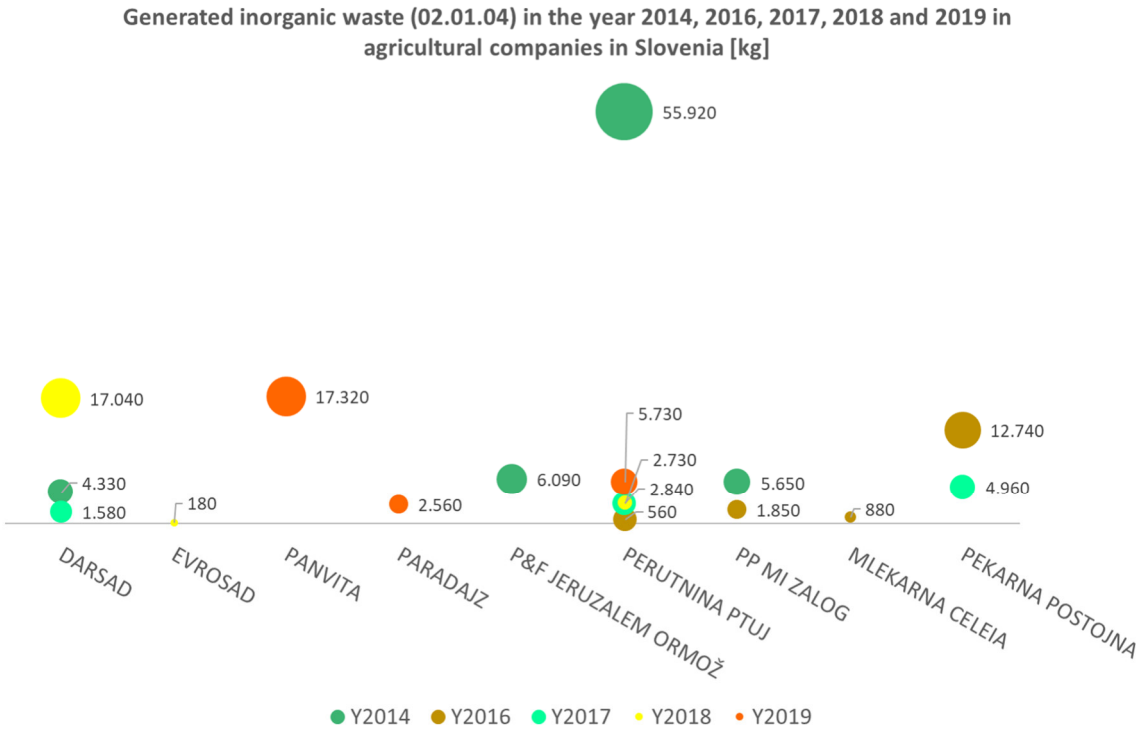

Figure 2: Inorganic waste produced in agricultural companies in Slovenia in the years 2014, 2016, 2017, 2018 and 2019 (Source: ARSO)

Inorganic hazardous waste production in agriculture in Slovenia

According to the statistical data of GIZ fitofarmacije, the collected amount of plastic bottles of plant protection products is somehow stable. In total there were 56 thousand kilograms plastic bottles of plant protection products used in agriculture collected in 2019.

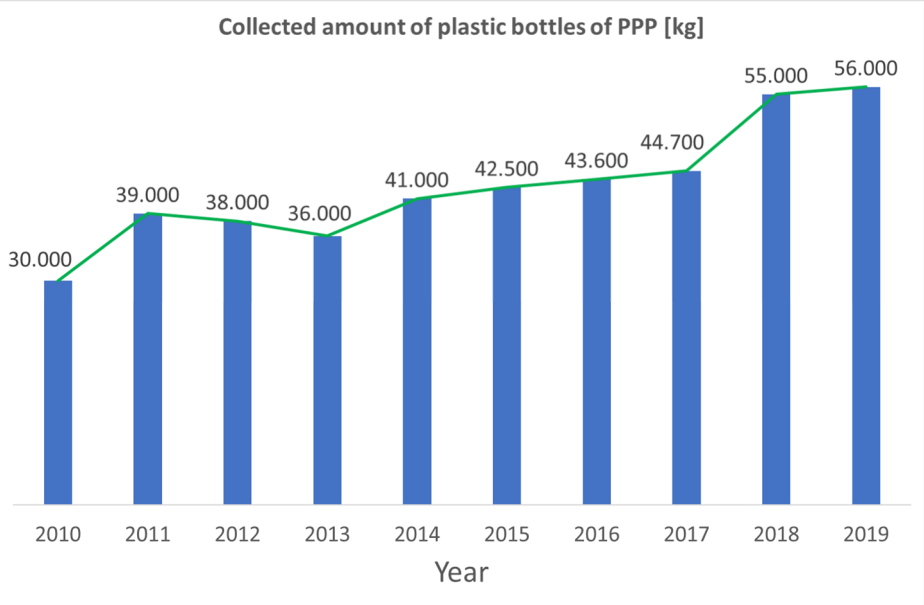

Figure 3: The amount of collected plastic bottles od plant protection products used in agriculture from 2010 until 2019 (Source: GIZ fitofaramcije).

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

1. Raising the awareness about inorganic waste in agriculture

- **SRIP HRANA 3.0(Action plan)**

The latest version of SRIP HRANA Action Plan covers key focus areas and goals, which were defined with representatives of agricultural and food companies, in cooperation with representatives of scientific research institutions.

Thus, the amended action plan focuses on two key focus areas:

- New Technologies and Materials and
- Sensory Research

The key focus are New technologies and materials includes:

- Circular economy; Adding value to by-products in agri-food and their use as a raw material in various industries, packaging as a raw material and reducing food waste are the foundation of the circular economy and thus also sustainable food production.

- Materials for the optimization in vegetable production; Optical filters to increase light absorption in smart greenhouses, nano foils, biodegradable foils, seed foils and double-layer transparent thermophilic foils and more are various advanced materials that can optimize the production of vegetables and some fruits even in the off-season.

- Innovative packaging; Many development opportunities are in the field of intelligent, active, ecological, edible or biodegradable packaging and various new packaging materials.

SRIP HRANA is a central national meeting point, intended for the connection and cooperation of ambitious and development-oriented stakeholders in the field of agriculture, food and related fields.

SRIP HRANA is therefore a central platform for strengthening research-development-innovation cooperation of stakeholders from various fields, which are directly or indirectly related to the operation and existence of the agri-food system. The emphasis is on systematic integration in order to achieve the objectives of the smart specialization strategy in the priority area of sustainable food production.

SRIP HRANA will continue to develop into a dynamic community of agricultural holdings, companies, associations, research and development institutions, investors and other stakeholders, whose attention will be focused on the targeted intensification of development and research activities for the needs of Slovenian agri-food sector.

- **EIT FOOD (workshops, summer schools)**

EIT Food is a European Knowledge and Innovation Community (KIC), which was set up to transform our food ecosystem. EIT Food is established by the European Institute for Innovation & Technology (EIT), an independent EU body set up in 2008 to drive innovation and entrepreneurship across Europe. Our Chamber is a Slovenian contact point of EIT FOOD. Every year we are organizing several workshops, lectures, summer schools and food competitions in order to spread the novelties in food sector.

- **GZS Innovation Prize**

Every year we organize the national competition on innovation. The best company is awarded for the most innovative solution. One of the nominees this year is also agricultural company Paradajz, with the plant bio based packaging solution, produced of tomato plant residues.

2. Promoting innovation in agricultural companies through EIP

Through the operation of EIPs (European Innovation Partnerships) financed from the Rural Development Programe (Measure 16), the promotion of innovation in agricultural companies is promoted and encouraged. Currently we have more than 30 EIPs operating in Slovenia. Slovenian Ministry of Agriculture, Forestry and Food intends to further encourage EIP instrument in the next programming period.

- **EIP-AGRI focus groups**

EIP-AGRI Focus Groups bring together 20 experts, including farmers or foresters, advisers, researchers and agri-business representatives, to collect and summarise knowledge on best practices in a specific field, listing problems as well as opportunities. They take stock of the state of play in research and practice and highlight possible solutions to the problems identified. Based on this, the groups suggest and prioritise innovative actions. They identify ideas for applied research and for testing solutions in the field, and propose ways to disseminate good practices and inspire further action. Our Chamber is one of the members in EIP-AGRI focus group working in the field of reducing the plastic footprint in agriculture.

03. Most relevant actors to be concerned in the transferability / technology transfer actions

The key actors that are and should be involved in inorganic waste action in Slovenia are listed below. All of them represent the knowledge and innovation system in the agricultural sector, which is highly encouraged by the European Commission in the forthcoming financial period of new Common Agricultural Policy (CAP) after 2020. In particular articles 71, 72 and 113 of the new EU Act on financing new CAP (2021-2027) are a key part of an integrated approach supporting modernisation, innovation and knowledge flows in agricultural sector (Figure 4).

- Agricultural companies (PARADAJZ Ltd, Perutnina Ptuj Ltd.)
- Start ups (Evegreen)
- Research Institutions:
    - IHPS (The Slovenian Institute of Hop Research and Brewing)
    - KIS (Agricultural Institute of Slovenia)
    - ICP (Pulp and Paper Institute)
- Education and research institutions
    - Universities (Ljubljana, Maribor, Koper), faculties of agricultural, natural and chemical sciences
- Farmers Organizations:
    - KGZS (Chamber of Agriculture and Forestry of Slovenia) – Farmers' advisors
    - Cooperative Union of Slovenia
- CCIS-Chamber of Agricultural and Food Enterprises
- CCIS-Department for the Environmental Protection
- Ministries:
    - Ministry of Agriculture, Forestry and Food
    - Ministry of the Environment and Spatial Planning, Slovenian Environment Agency
    - Ministry of Economic Development and Technology
    - Ministry of Education, Science and Sport

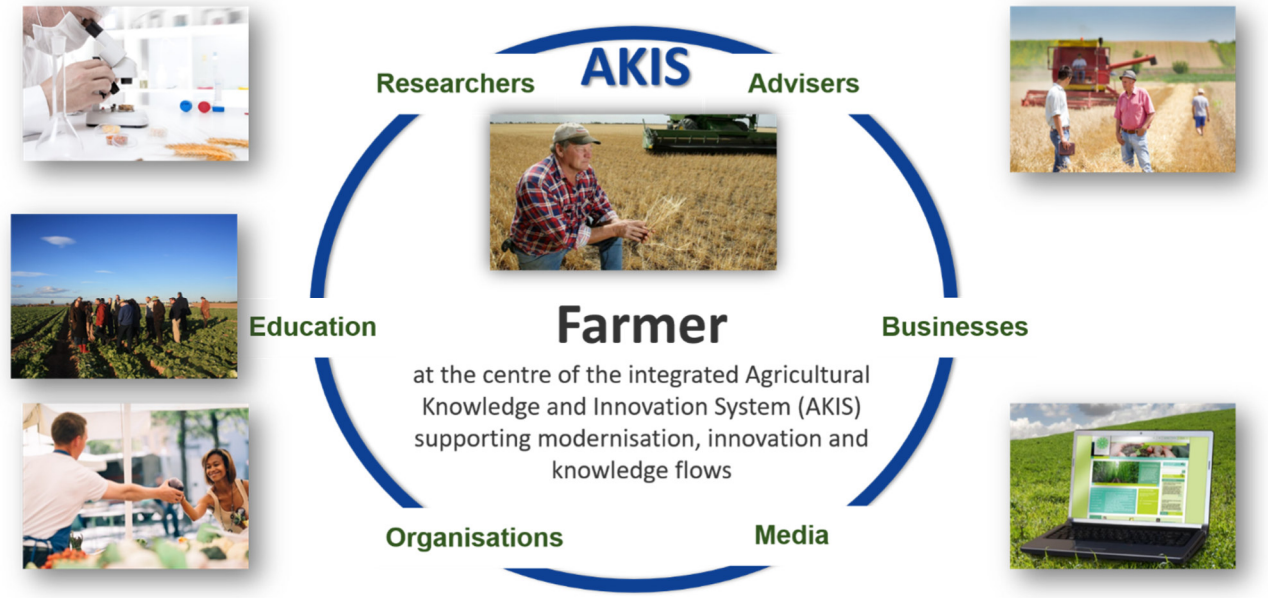

Figure 4: Agricultural knowledge and Innovation System in the new CAP (2021-2027) as seen by the European Commission.

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

About the Slovenian food industry

Food industry in Slovenia is represented by 755 food companies with 14.125 employees (data 2018)[1]. Net income of Slovenian food industry is of 2,2 billion EUR. The number of food companies grow each year. In 2018 there were 22 food companies more compared to the previous year. 78% of these companies are of micro size, 16% are small companies, 4% medium sized companies and only 2% are big companies. Nevertheless, these big companies employ 53 % of all employees in food industry, make 64 % od added value, make 63 % of net income and 72 % of sales on foreign markets.

We can split the Slovenian food industry into 10 main sectors. The main percentage of the food companies are from the bakery sector and pasta (45 %). There are some others important sectors, that do represent the Slovenian food industry, i.e. meat sector and beverages sector. Food companies show good results also on foreign markets. In the last five years, there was an increase in net sales revenues of 35 %. Export orientation is of 28,6 % (2018). Milk production is represented by 40 % of export orientation.

SKD (Standard Classification of Activities) is 10.5 - Dairy sector				
	2019	Index 19/18	2018	Index 18/17
Number of companies	32	100	32	103
Number of employees	1 581	103	1 530	109
Net income (million EUR)	373.6	105	354.7	104
% sales on foreign markets	42.1	104	40.4	104
Added value/employee (EUR)	46 754	107	43 391	102

[1] *https://www.gzs.si/zbornica_kmetijskih_in_zivilskih_podjetij/vsebina/O-nas/Analiza-panoge*

Net profit/loss (million EUR)	13.4	125	10.7	128

Source: AJPES

Background

Waste management in EU is covered by several strategies and directives. The most important ones being a European Strategy for Plastics, Directive 2008/98/EC on waste, Directive 94/62/EC on packaging and packaging waste and the newest one Directive (EU) 2019/904 on the reduction of the impact of certain plastic products on the environment (so called SUP Directive). Aims and goals of this documents are focused on product design for multiple uses and recycling, increase of recycled material used within new products, implementation of the system of extended producer responsibility (already implemented in Slovenia) and introduction of more successful systems of separated waste collection. Based on Petcore Europe data (2018)[2], in 2017 only 58 % of PET beverages bottles were separately collected in Europe. Separate collection rates vary between European countries.

The SUP Directive should be implemented in national law by 3 July 2021. The directive sets common targets. By 2025 Member States should collect separately 77 mass % of waste plastic beverages bottles of three (3) litres or less put on the market on a yearly basis. By 2029 the mass % should be 90 %. Additionally, each Member State should assure for the PET bottles to contain min 25 % of recycled plastic material by 2025. By 2030 all plastic bottles should contain 30 % of recycled plastic material.

Within the current system of plastic bottles collection, there is a high possibility of material contamination and mixing with products of non-food use. This has an important impact on the quality of recycled material and the possibility of reuse for production of new packaging to be used within the food industry is disabled.

As there is a growing concern in Europe about the use of plastic materials, it is consequently that national governments try to implement different measures in order to achieve common targets. The pollution of marine environment with SUP products became obvious with the implementation of The Marine Strategy Framework Directive. Slovenia has no regular monitoring program for current situation of marine environment pollution. Beverages plastic bottles are on 3rd place of main waste, found on Slovenian coast, collected within the period 2013-2020 (European Environment Agency, 2020)[3].

[2] *Petcore Europe, 2018. 2017 survey on European PET Recycle Industry - 58.2 % of pet bottles collected: https://www.petcore-europe.org/news-events/202-2017-survey-on-european-pet-recycle-industry-58-2-of-pet-bottles-collected.html*

[3] *EEA, 2020. Marine LitterWatch data viewer. European Environment Agency:*

Analysis of waste plastic management in Slovenian Food Industry

The latest study[4] was conducted by experts from the Chamber of Commerce and Industry of Slovenia–Chamber of Agricultural and Food Enterprises and CCIS-Environment Protection Department, together with external experts. The aim of the study was to identify beverages bottles quantities being put on the Slovenian market and the main stakeholders within the management cycle. Thus, within the study we analysed the operation of producers, packagers, collectors and waste beverages plastic bottles processors. Study purpose was focused also on the state-of-the-art, how close we are in Slovenia in the context of achieving the targets of waste beverages plastic bottles separate collection. These targets are set by the Directive (EU) 2019/904 on the reduction of the impact of certain plastic products on the environment (SUP Directive).

The study was based on available data monitoring and the analysis of responses to the questionnaire, received from main stakeholders. We estimate that in 2019 around 319 million of plastic bottles for beverages (milk and milk products included) were put on the Slovenian market. Consequently, around 10 014 tonnes of waste plastic bottles occurred. More than 99 % of these plastic bottles are made of PET material. Depending on the plastic bottles quantity, being put on the Slovenian market, the percentage of PET plastic bottles being materially recycled is 50 to 81 % (in average 65 %). These data are a first estimation of waste beverages plastic bottles separate collection share in relation to SUP Directive.

It is important to mention that three sectors were covered by the recent study – beverages sector, dairy sector and craft breweries. Thus, we finally dispose with data about the quantities of plastic bottles being put on the market and the data of the level of separate collection of this plastic bottles. SUP directive definitions were used, especially in relation to the understanding, what a beverage is. Beverages relates not only to soft drinks, juices, bottled water, beer, wine, but also to milk products. As REINWASTE project focus on three sectors (horticulture, dairy, meat), we will expose within this paper below the data representing the Slovenian dairy sector.

https://www.eea.europa.eu/themes/water/europes-seas-and-coasts/assessments/marine-litterwatch/data-and-results/marine-litterwatch-data-viewer (8. 11. 2020)

[4] *CCIS-CAFE, 2020. Analysis of waste plastic packaging management: Analysis of waste plastic bottles management.*

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

Plastic bottles in Slovenian dairy sector

In 2019 main Slovenian dairy companies put on the market about 13 million litres of milk and milk products, packaged in more than 18 million of plastic bottles. Within these quantities we considered milk products in liquid condition not depending on how the net quantity is being expressed on the label (g or kg; ml or l). We assume from the responses that labelling is not unified, the same product can be labelled with the first or the second option.

More than a half (51 %) are 1-litre plastic bottles, followed by 0.5 litre (32 %) and 0.25 litre (15 %). The higher share (68 %) was used for the yoghurts (around 12 million), less than 4 million (20 %) for milk and around 2 million (12 %) for other milk products (kefir, whey etc.).

Combined packaging is the most used to package milk and milk products (more than 90 %). Less than 10 % of milk products quantities are packaged within plastic bottles, less than 0.1 % in glass.

The plastic bottles used within the dairy sector are mainly from PET (more than 95 %). HDPE is used in smaller quantities (less than 5 %). Dairy companies mainly buy already made plastic bottles within Slovenian market, but also from other EU markets.

More than 80 % of plastic bottles, within which milk and milk products are packed, are of white colour. Less than 20 % of plastic bottles are transparent.

The average weight of plastic bottle is 31.3 g, with the cap and label. 0.5-litre plastic bottle weight is 25.1-27.6 g. 1-litre plastic bottle weight is 30.4-43.3 (cap and label included). Cap are mainly made of HDPE, while labels are of PET and PP, but also paper.

For specific products, plastic bottles from recycled materials (25 % rPET) are already being used. Although this is not that common as within the beverages sector, where plastic bottles from recycled materials are more common. Only around 12 % of PET bottles are made of 25 % rPET material.

Research activities are mainly oriented towards reduce of plastic bottles weight and gradual implementation of rPET material. This depends a lot from the rPET availability on the market and the capacities of plastic bottles producers. Dairy companies allow the possibility to introduce other materials.
Dairy companies do not collect back the waste plastic bottles. They do so through authorized companies that deal with waste packaging management. Till now, they don't have experience with the DRS (Deposit Return System). From foreign markets several request for transparent plastic bottles are detected.

Recommendations and possible solutions

Regardless of good infrastructure for separate collection of municipal waste, we stress out the deficiencies of the current collection system in Slovenia. This is mainly bad quality of separate collected mixed municipal waste packaging, as within this waste main quantities of plastic bottles can be found. We note that there is a need of better and more detailed data collection about the packaging, put on the Slovenian market, but also about waste beverages plastic bottles fractions, collected and put for further processing. This is the basis if we want to monitor the implementation of SUP Directive on national level and achieve the collection and recycling material content targets. In order to reach the targets, we need to separately collect more waste beverages plastic bottles and they need to be of better quality, in order to be suitable for the recycling process and the recycled material to be appropriate for further use in food contact materials.

There are several proposals about possibilities to strengthen the collaboration among stakeholders, upgrade of the legislation in the context of plastic bottles, being put on the market recording and about the improvement of reporting system on waste packaging management. We also stress out the initiative to set an independent body to regularly follow the waste packaging flows or to set the supervision system for waste packaging quantitative flows. There is a need to continue the dialog with the Ministry of Environment and Spatial Planning of Slovenia, as well as with all interested parties for new legislative documents preparation and implementation of SUP Directive into the Slovenian national law. We further recommend an additional discussion and communication among stakeholders about the possibilities to improve and upgrade the current system of municipal waste collection, separate collection of plastic bottles and/or deposit return system for plastic bottles introduction in Slovenia.

Technology transfer initiatives

Important technology transfer initiatives to raise awareness are:

- collaborative research (being in place already, need to be accelerated, spread and exploited);

- development of demo pilot projects (public call in 2018 attracted a lot of companies, 73 million EUR for 32 projects from different sectors)
- B2B meetings between experts and companies (fully implemented, very known and promoted among different RRI and companies)
- interaction within technological platforms (very important; in 2017 Slovenian technology platform Food for life was upgraded to SRIP HRANA, more info below)
- participation in dedicated events (national, European, global)
- study visits abroad (to other countries, to learn and to transfer)

About SRIP HRANA

SRIP HRANA[5] is a long-term Strategic Research and Innovation partnership for Sustainable Food Production. Since 2017, it has developed into a dynamic community of agriculture holdings, companies, cooperatives, research institutions, investors and other interested parties, whose main interests are focused on improvement of research and development activities in the companies for the purpose of agri-food sector development.

SRIP HRANA is the main national contact point for companies and research institutions to promote networking and cooperation of ambitious and development-oriented parties in the area of agriculture, food science technology, as well as nutrition and other related areas. It is a successor of national technology platform Food for Life. Within the Slovenian Strategy of Smart Specialisation, it was recognised to be the main network of experts to transfer best practices, to identify the needs and to find solutions for agri-food companies on a global level.

The mission of SRIP HRANA is individual growth and development of our members, as well as the growth and development of the agri-food sector and consequently the entire Slovenian economy. The main activities of SRIP HRANA focus on all-around support of interested parties, which have investment potential and are oriented towards development and breakthrough of the agri-food sector.

SRIP HRANA aims to arise developmental orientation of all potential production and processing food value chains. Furthermore, it aims to form modern and sustainable operations of chains, which will ensure uninterrupted supply of high-quality food products on the domestic market as well as a developmental breakthrough on the global market. A primary interest of SRIP HRANA is progress /growth /evolution /development of those in the agricultural chain who exploit the natural and structural features while ensuring the supply of products to their population. Unlike other economic activities, it is necessary to

[5] *https://www.gzs.si/srip-hrana/*

provide solid and development-oriented chains in the area of food production and processing, which also provides economically rational shares in ensuring food security.

From the dairy sector point of view and in line with the most important topics from the environment and sustainability strategy, dairy companies did achieve a big step towards collaboration and finding possible solutions. In 2018 a vertical sectorial value chain was established. Different dairy companies signed the so-called Memorandum. The initiative is coming from the sector, while it is expected that collaboration with several research institutions, cooperatives, universities, companies from other sectors will be in the foreground. We do expect in the forthcoming months that environmental topics like packaging will be the main one for discussion and action. Besides the dairy sector, other 4 sectors did the same (meat sector, cereal sector, fruit sector, beer sector). The aim is the same, collaboration and technology transfer on several areas of interest, which are mainly related to environment and sustainability.

03. Most relevant actors to be concerned in the transferability / technology transfer actions

Global advantage of SRIP HRANA is its vast array of partners. We believe that introduced partnerships ensure a critical mass of competences and capacity. The partnership associates:

- Three organizations operating in the field of agriculture and food:

Chamber of Commerce and Industry of Slovenia - Chamber of Agricultural and Food Enterprises (over 200 agricultural and food enterprises)

Chamber of Agriculture and Forestry of Slovenia (over 1.400 agricultural holdings)

Cooperative Association of Slovenia (64 cooperatives)

- The largest three Slovenian universities:

The University of Ljubljana (17 actively involved faculties)

The University of Maribor (5 actively involved faculties)

The University of Primorska (1 actively involved faculty)

- Four most important research institutions:

Jozef Stefan Institute

National Institute of Biology

National Institute of Chemistry

Agricultural Institute of Slovenia

- Six other important organizations operating in the area of agriculture, food, nutrition and food technology:

Consortium of Biotechnical schools of Slovenia, Scientific Research Centre Bistra Ptuj, NUTRIS, Scientific Research Centre Koper and Slovenian Institute of Hop Research and Brewing, IOS.

Management of inorganic waste within the Slovenian food industry needs full support of the government. First because there are common targets set in EU and national legislative documents, second, because the tools and the measures should be aligned with other strategic areas. They must derive from strategic documents as well, but need to be studied as appropriate based on state-of-the-art. The latest CCIS-CAFE study shows a good practice, as the Ministry of Environment and Spatial Planning is waiting for these results before it will prepare the legal document for the SUP directive implementation on national level.

Waste plastic bottles management can be improved in order to achieve the targets within SUP Directive if several stakeholders will be ready for collaboration and sharing data. Retailers, companies dealing with waste packaging management, public waste collection bodies, material producers, food companies etc. To not forget the final consumer.

Within SRIP HRANA we already established the relation to other strategic research and innovation partnership. In the context of packaging and waste the two most important are SRIP MATPRO (dealing with the development of new packaging materials) and SRIP KROŽNO GOSPODARSTVO (dealing with circular economy principle and actions). Within these two sectors companies can look for the most suitable solution providers.