

INTERREG V-B Adriatic-Ionian ADRION

CIRCLE

Circular Innovation and Resilient City Labs in the Adrion Region

Transnational Needs Analysis Report

May 2020

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0. Introduction

Transnational Needs Analysis Report was carried out in the context of ADRION CIRCLE project and contains an overall summary of the related Needs Analysis Reports developed by the project partners, under a common methodological protocol. This report identified common strengths and weaknesses in terms of needs of institutional/business environment, regulatory/funding framework, technological gaps, skill requirements regarding waste management models and circular economy.

The project partners' reports were carried out via analysis of other research projects, literature analysis, open surveys to key stakeholders and waste management practitioners. For this reason, a questionnaire addressed to the project stakeholders to provide feedback to this research. In particular, the participants were asked to express their understanding on Circular Economy principles and their knowledge on the solid waste management models applied in the study area, the current situation regarding the available financial instruments and the institutional regulatory framework, the waste diversion from landfill rates as well as the skills required for promoting and applying Circular Economy in waste management.

This questionnaire was addressed to several stakeholders from multiple market and public areas in order to enrich the feedback sources, as listed below:

Municipality of FORLÌ and Romagna Tech (IT): stakeholders located in the area of Forlì-Cesena province. Gli stakeholder contattati includevano alcune aziende che notoriamente lavorano su progetti di Economia Circolare (Dorelan, Formula Solidale, ecc.) e due grandi Associazioni di categoria che rappresentano centinaia di aziende del territorio (Confcooperative, CNA).

School center VELENJE (SI): stakeholders located in savinjska statistic region of Slovenia (Cohesion region Eastern Slovenia), including 3 municipalities (Velenje, Šoštanj and Šmartno ob Paki) and a waste management company contracted to cover the areas of those municipalities, non- government organisations for waste management.

RDA Northern PRIMORSKA (SI): stakeholders located in Kromberk, Nova Gorica including an utility company (Komunala Nova Gorica d.d.) that governs waste management services for 6 municipalities in the Goriška region.

REDEA (HR): stakeholders including Međimurje County as a unit of regional self-government, 2 waste management companies (the largest in the area) in Međimurje County (GKP Čakom Ltd Čakovec and PRE-KOM Ltd Prelog) and the University of Medjimurje in Čakovec.

Energo-Data (HR): stakeholders including 2 municipal waste management companies (Unikom d.o.o Osijek and Doroslav d.o.o Donji Miholjac).

ANATOLIKI SA (EL): stakeholders located in the Regional Unit of Thessaloniki, Central Macedonia including 2 Municipalities (Thermi and Kalamaria) and 3 Waste Management Systems for a) wood waste (ELDIA-Hellenic Waste Management) and b) construction and demolition waste (ANAKEM/Central Macedonia and ANABE/Northern Greece).

AEIPLOUS (EL): stakeholders located in the Region of Western Greece including regional authorities, 2 municipalities, 2 universities and numerous companies.

EKOFONDRS and Municipality of LAKTASI (BA): stakeholders located in Banja Luka Region in the cities of Banja Luka. Eight (8) waste collection companies and the company managing the regional landfill participated in the research.

FUTURA and RDA Banat (RS): stakeholders located in the city of Zrenjanin or national authorities including the Ministry of Environmental Protection, organisations and associations, municipality and universities.

Municipality of ULCINJ (ME): stakeholders located in the Municipality of Ulcinj including the local authorities and an utility company on waste management.

The feedback from the project stakeholders per partners' country and question, as well as the common perspectives and main conclusions derived from the answers are listed analytically below.

This report was prepared by the WP coordinator ANATOLIKI SA (PP7) in cooperation with AEIPLOUS (PP8) and represents the basis to build the joint CIRCLab model.

1. Circular Economy – Current Situation

1.1. Understanding and perceptions

ITALY

At the level of general public:

- The concept of Circular Economy (CE) is very little known, while its understanding is very vague.
- Usually, it is known that CE "has to do with waste" and is generally perceived as a good practice, but without a real understanding of its models, its implications and possible positive consequences.

Within the productive sector:

- Only those who have dedicated themselves to CE, both as a practice to be inserted in productive cycles already present, or as a productive model in itself, show a deeper knowledge.
- The above experts consider CE as a change of mentality: the value of products and materials is maintained for as long as possible; waste and resource use are minimised and resources maintained in the economy when a product has reached the end of its life cycle in order to use it several times and create value.
- CE model can create job opportunities, promote innovations that give a competitive advantage and a higher level of protection for people and the environment, while offering consumers more durable and innovative products that generate savings and improve quality of life.

SLOVENIA

Circular economy:

- Is based on the concept of a positive material cycle, which use waste as materials in new products.
- According to the concept of "loop closure" the waste can be turned into a material source, thus reducing the amount of waste transferred to landfill or incineration units.

In Slovenia:

- Consumption of substances per capita is equal to the EU average.
- In terms of resource and energy efficiency, indicators are below EU and carbon productivity is making slow progress.

- Transition to low carbon circular economy is a priority development direction for the whole economy.
- Economy depends on the import of raw materials, and Slovenian and local companies lag behind the EU average in implementing measures for the transition to a circular economy.
- Efficient use of raw materials and energy are interdependent, as strategies to increase material efficiency can contribute to reductions of energy consumption at least as much as energy efficiency measures.

CROATIA

Circular economy:

- Is an economic system aimed at eliminating or reducing waste and the continual use of resources.
- It is aimed at minimizing the use of new resource inputs into a product.
- Tries to mimic the nature itself, where every part has its (different) purpose in a given time.
- With CE we are trying to make all “waste” “food” for another process /product. Some waste is regenerative, like compost and some can be used as material for another product (metal, glass, paper, plastic, etc.).
- Is a regenerative approach with minimal impact on environment, while at the same time being a cost-effective alternative to the traditional linear economy.

Since Croatia joined EU, it had to adopt many regulations that are part of EU regulations that mandate the establishment of circular economy. There are numerous EU funding grants available for circular economy initiatives and there are also substantial penalties on EU level for failure to achieve circular economy goals, so many Croatian institutions have started circular economy initiatives.

GREECE

The project stakeholders:

- Are aware of CE principles, understand its advantages and believe that it is an alternative model of economy based on the principle of Sustainable Development considering waste as potential raw materials.
- Know that until today, the economy was based on the linear model “take – make – throw”.
- Understand that in a CE model useful materials derived from waste can be used as secondary materials in food and energy production, in infrastructure construction and other market sectors.
- Agree that CE model requires new ways of conceiving and designing products. Procedures, value chains, and even business models need to be designed from the beginning with the aim of rebuilding, reusing, repairing and reusing existing materials and products.
- Argue that in Greece, the adoption of policies promoting the transition to the circular economy is of urgent need and at the same time an opportunity for development.

This can be a catalyst for productive reconstruction and has a clear regional dimension. Greece has good potential for implementing this economic model because of:

- Available natural resources and secondary resources and waste
- Scientific potential and know-how
- primary sector with opportunities and needs to modernize and reduce production costs
- Low indicators on resource productivity as well as energy productivity (and energy efficiency).

By adopting CE principles, nature's resources and hence the environment are protected, the economy and society is reshaped in such a way that guarantees the wellbeing of its citizens through creating jobs and being a source of growth and innovation while protecting the environment.

BOSNIA AND HERZEGOVINA

The majority of the questionnaire's respondents:

- Are aware of circular economy concept and that it represents a system that integrates economy and waste management.
- Agree that the main goal of CE is waste reuse to develop new products and new value. CE is regenerative economy system that takes in consideration environmental protection, preservation of natural resources, reduction of waste deposited at the landfills, energy efficiency during manufacturing process and emphasizes in use of renewable energy sources.

Few respondents have stated that they are not familiar with the CE.

SERBIA

- The linear model of production is based on the TAKE - DEVICE - THROW model primarily driven by making profits without considering the negative impact on the environment and natural resources.
- Circular economy is a regenerative economic model with the positive effects on all types of capital: financial, human, social and natural.
- With the aims to regenerate devastated natural resources, retain raw materials in use and extend product life by applying an appropriate design, circular economy concept allows to products not to become waste and not to contribute at the end of their life pollution.
- CE should not be equated with waste management hierarchy because it starts primarily from a new way of thinking about use resource (6R process: Rethink, Refuse, Reduce, Reuse, Recycle, Replace). Waste prevention, eco-design, and recovery may contribute to net saving of 8% of annual turnover of EU companies, with simultaneous reduction of total annual emissions of GHGs by 2-4%.
- CE model in Serbia could generate 30,000 new job positions and increase competitiveness of domestic economy, especially in the recycling sector.

Serbian government proposed additions and amendments to three laws in the area of environmental protection, including additions and amendments to the Law on waste management which has been adopted by Serbian National Parliament in January 2016.

CE is based on three principles (the Ellen MacArthur Foundation CE system diagram):

- A. Design out waste and pollution
- B. Keep products and materials in use
- C. Regenerate natural systems

Serbia is implementing some initiatives to support the circular economy model, which are already listed in the "National Profile of Serbia 2018", as well as the Study on Achievements and Perspectives towards Green economy and sustainable growth.

The main activity toward CE is the 'Center for Cleaner Production of Serbia'¹ established in 2007, as part of the UNIDO/UNEP Global Network for More Efficient Use of Resources and Cleaner Production.

MONTENEGRO

Circular economy is an economic system focused on products that are used over and over and not thrown away. The circular model replaces the linear model of management. With Circular economy we try to achieve that in the future we lower the impact on environment and health of people. Also to lower the use of resources so that the product that is at the end of its lifetime can be used again.

ALBANIA

Circular economy:

- Aims to redefine growth, focusing on positive society-wide benefits.
- Entails gradually decoupling economic activity from the consumption of finite resources and designing waste out of the system.
- Is based on the three principles of Ellen MacArthur Foundation.

Common perspectives and main conclusions

- All research participants from the project partners' countries are aware of the concept of circular economy and its difference from linear economy. However, it seems that its understanding is vague.
- The majority of the participants believe that CE is related somehow to waste and is considered as a new alternative and environmentally friendly model of waste management.
- Fewer participants understand the value of waste and the process of reusing them when reach the end of their life cycle.
- There is a misunderstanding regarding CE, reuse and recycling, while only a few of the stakeholders know the basic principles of circular economy.
- Only the experts on CE show a deeper knowledge on this notion.
- It is generally well known that CE has been a priority lately for most of the EU countries which provide opportunities through numerous incentives to companies to adopt CE measures in order to achieve resource and energy efficiency. This could bring new job positions in the future

¹ <http://www.cpc-serbia.org>

- CE model can create job opportunities in all market sectors such as food production, sustainable tourism, construction and products design, while offering consumers more durable and innovative products generating savings and improve life quality.

1.2. Regulatory and funding frameworks

ITALY

At national level:

- The Budget Law for 2020 contains some first measures for the "Green new deal", with the establishment of a public investment fund to support innovative projects and investment programs with high environmental sustainability.
- Investment will be supported for the circular economy, as well as for the decarbonisation of the economy, urban regeneration, sustainable tourism, adaptation and mitigation of climate change risks.

The public policies to support the transition to a circular economy include:

- The redefinition of the Industry Plan with greater attention to environmental sustainability and explicitly finalised - as "Transition Plan 4.0" - to favor also green investments by companies in the CE.
- The expansion of the Revolving Fund for business support and research investments (FRI) whose resources may be allocated to support investment programs and operations in the areas of decarbonisation of the economy, circular economy, urban regeneration, sustainable tourism, adaptation and mitigation of climate change risks.
- The enactment by the MISE of the decree concerning the procedures for the disbursement of facilities related to innovative investments by small and medium-sized enterprises in less developed regions to facilitate their transition to the circular economy.

The "Growth" decree provided for a series of incentives to encourage both the reuse and recycling of packaging and the purchase of products for recycling and reuse.

In Italy:

- The update of the National Bioeconomy Strategy (2019) and its implementation programme was presented, in the light of the new "European Bioeconomy Strategy", which strongly emphasizes the need to orient all sectors of the bioeconomy towards circularity and environmental sustainability.
- A National Strategy/Action Plan for CE has not been adopted.
- Emilia- Romagna region, adopted (2015) the principles of CE: the management model outlined is in line with the European "waste hierarchy", which places prevention and recycling at the top of the priorities.
- The regional standard sets the achievement of important objectives by 2020, in some cases more ambitious than those proposed by the European Community; reduction of 20-25% of the per capita production of urban waste, separate collection at 73%, recycling of material at 70%. Other strategic objectives are the containment of the use of landfills and regional self-sufficiency for disposal.

SLOVENIA

In Slovenia:

- There is currently no regulatory funding framework for the circular economy.
- The Waste Directive sets out several environmental protection objectives, including the need to reuse and recycle waste materials (paper, metals, plastics and glass) from households and possibly from other sources, where waste streams are similar to those from households. Reuse or recycling should be increased to at least 50% of the total mass.
- An important challenge is the implementation of the Waste Management and the Waste Prevention Programmes, which already set systemic goals and measures until 2020 and 2030, which will have to be adjusted and harmonized with the new, professional and cost-effective EU waste legislation from 2018. This is aimed at a more ambitious implementation of priority waste management methods and higher recycling targets.
- Of the individual waste streams, the management of plastics, which will follow the EU Plastics Strategy, will be an important challenge. From the point of view of environmental pollution there is a special challenge of micro-plastics, which accumulate in the sea and can pass into the food chain through marine organisms.
- The Environmental Protection Act establishes the main principles, such as the principle of producer responsibility and the principle debit payments, under which the polluter is responsible for the elimination excessive pollution of the environment and its consequences, and it must also cover all the costs prescribed measures to prevent and reduce pollution and risks to the environment, environmental use and elimination consequences of environmental pollution.
- The Principles of sustainable development, integrity, cooperation, prevention and the caution are the basis for determination waste management obligations without adversely affecting the environment and human health and for compliance waste hierarchy.
- Public utility services for environmental protection are assigned to municipalities.
- The definition of waste has remained unchanged and transposed into national law: Waste is a substance or object that the holder discards, intends to discard or must discard. The Waste Regulation defines other terms, such as hazardous and non-hazardous waste.
- In order to prevent the diversion of shipments of waste from recycling facilities to municipal waste incinerators that achieve the required energy efficiency, the principle of self-productivity sufficiency and proximity to Directive 2008/98 / EC on waste extends to the recovery of such waste in such incinerators, even though they are considered as waste treatment plants.
- Municipal waste management falls under the original competence of municipalities. Consequently, there is also control of conduct over such waste within the competence of the supervisory bodies of municipalities, which is also determined by their ordinances in which among other things, there is an obligation to record and rehabilitate illegal landfills.
- Material productivity (one of the basic indicators of CE) increased faster in the period between 2007 and 2012 compared to the European Union as a whole. This is linked to reduced construction activity and consequently lower consumption of non-metallic minerals.
- Slovenia holds few natural resources directly used in industry and is highly dependent on import of material, however despite that Slovenian companies are less active as the EU average in terms of improving resource efficiency.

CROATIA

In terms of regulation within Međimurje County:

- Separate waste collection on a weekly base is established. Every household has at least two separate waste bins, one for general and one for compost material. Furthermore, paper, metal, glass, and electronic waste has to be properly disposed of in designated recycling yards.
- Companies have a stricter regulation, where they need to be able to prove the correct disposal of created waste.
- Funding framework is virtually non-existent. The only funding is through EU funds, but not in an amount that would be sufficient to make an impact.
- Most of the available funding is aimed at public companies or institutions, while initiatives are primarily coming from private companies.

An educational campaign on CE took place in 2015 and 2016 in Croatia on CE. The total of 8 years have passed since Law on waste management was implemented so it might be right time for comprehensive assessment of results and influence on promotion of CE goals.

GREECE

- A National Action Plan on Circular Economy was adopted in 2018 to set the country on a path towards the long-term adoption of circular economy principles.
- This Action Plan further supports Greece's economic strategy in its key quest to "Green" the economy in a way that creates jobs, especially for women and youth, and supports long-term equitable and inclusive growth based on resource efficiency, promotion of SMEs, innovation and investment in new technologies, and strengthening of the "social economy" potential. It includes certain sub-strategies including: i) Sustainable Resource Management, ii) Enhancing Circular Entrepreneurship and iii) Circular Consumption.

The Action Plan aims at:

- Incorporating ecological design criteria and product life cycle analysis, avoiding the introduction of hazardous substances into their production and facilitating the possibility of repairing and extending their life cycle.
- Effectively implementing of waste management hierarchy, promoting waste prevention and encouraging reuse and recycling.
- Developing handbooks for promoting Energy Efficiency in construction and production Processes.
- Promoting innovative forms of consumption such as digital market platforms.
- Promoting a rational consumption model, based on the transparency of information regarding the characteristics of goods and services, their life cycle and energy efficiency.
- Facilitating and creating channels for knowledge exchange between local/regional authorities, the scientific community and economic and social actors, in order to create synergies compatible with the transition to the circular model.
- Indicating the importance of the transition from linear to circular economy, raising public awareness.
- Recording and monitoring the implementation rates during the transition to circular economy.

The following funding frameworks were indicated by the participants:

1. The Hellenic Development Bank has prioritised the financing and promotion of Circular Economy measures at national level.
2. Waste Policy Regulation provides financial incentives to Municipalities achieving high rates of waste recycling, but also imposes fines for waste disposal in landfills.
3. The National Green Fund uses funds from its revenues to promote environmental activities.
4. Transnational European Projects aimed at promoting Circular Economy are desired.

RESEARCH AND INNOVATION SMART SPECIALIZATION STRATEGY (RIS3) OF WESTERN GREECE

The development planning of the programming period 2014-2020 is heavily based on the national and regional Research and Innovation Strategies for Smart Specialization (RIS3). The region's vision for the period 2014-2020 is to become a regional research and innovation pole for young scientists, researchers and businesses, utilizing its geographical position and the number of its innovative assets including its educational and research infrastructure.

The areas identified as priorities:

- Agri-food
- Tourism – Culture
- Microelectronics – Advanced Materials
- Information & Communication Technologies (horizontal)
- Energy applications (horizontal)

In order to meet its vision and to overcome the identified challenges the region, a specific strategic plan with four strategic priorities is proposed in the regional RIS3:

1. Strategic Priority 1 – Support of innovation, technological development and innovation in the technological, sectoral and intersectoral priority areas of the RIS3
2. Strategic Priority 2 – Improvement of the access to ICT, of their use and quality and of their utilization in the technological, sectoral and intersectoral priority areas of the RIS3
3. Strategic Priority 3 – Enhancement of businesses' competitiveness through restructuring, modernization and economic diversification of the regional economy towards the technological, sectoral and intersectoral priority areas of the RIS3
4. Strategic Priority 4 – Improvement of the region's attractiveness through the exploitation of its natural and cultural resources, its energy upgrade and the protection of the environment

The existing RIS3 does not make direct reference to CE – although it includes actions related to the protection of environment and the sustainable development and in this way, it is a background for developing CE.

The strategy of the Region for the support of the CE in the context of the new PP 2021-2027 as well as the National Rehabilitation Plan for the next five years is under elaboration. Its completion is expected to be completed by 2020.

BOSNIA AND HERZEGOVINA

- The majority of respondents are not aware of any regulatory and funding framework for support of the CE actions.
- Others have listed Law on Waste management of Republic of Srpska, Strategy for waste management 2017-2026 and Republic plan for waste management 2019-2029.
- Circular economy is not fully adopted by state or entity regulation and based on that any funding framework. In Entity Republic of Srpska, the amendment of the Law on waste management of Republic Srpska was adopted on July 2019.
- New terms such as reuse of products, green backyards, program of extended responsibility, recycling yard, waste management center and unregulated land field have been incorporated.
- The responsibility is set on the local self-government units (cities and municipalities). Duties are specified for: development of separate waste collection systems, arranging ways to collect all types of waste, identifying locations for recycling yards, green yards and landfills, including larger waste collection sites, covering the costs of cleaning and rehabilitation of wild dumps, organizing educational and public awareness raising campaigns on eco-friendly waste management, as well as organizing public cleaning activities.
- The product manufacturer is required to use technology and develop production in a manner that ensures rational use of natural resources, encourages reuse and product recycling, and promotes environmentally sustainable management of natural resources.
- Producer is obliged to introduce and use as much as possible returnable packaging that reduces the environmental burden, compared to disposable packaging, and producer is responsible for placing the product and packaging, containing materials and dangerous substances in quantities and / or concentrations, which could adversely affect human health and the environment.
- In Federation of Bosnia and Herzegovina, the Law on waste management is from 2009, and there is no term “circular economy”.

Regarding funding opportunities:

- The Environmental Protection and Energy Efficiency Fund of the Republic of Srpska has public calls for co-financing projects in area of environmental protection and specially development of integrated management of packaging waste.

SERBIA

- Serbia, as a UN member state and an EU candidate, is already committed to the concept of a circular economy.
- There is still no integrated approach, and the environmental policy framework needs to be strengthened and included in key elements of economic and sector policies.
- Serbia is implementing some initiatives that support the circular economy. A circular economy is the concept and process in which the value of products, materials and resources are maintained and waste generation is minimized.

MONTENEGRO

Montenegro strives to achieve the goals of CE and to adapt its economy to the EU policy goals in terms of decision making and implementation of new legislation in the field of waste management.

ALBANIA

- The Circulating Economy is not currently included in any regulation, as waste management regulations are in the process of being reviewed to approximate changes in legislation and the EU Waste Directive.
- In the National Strategy for Revised Waste Management, the Circular Economy is mentioned as a notion of integration.

Common perspectives and main conclusions

Based on the stakeholders' feedback the following can be concluded:

- Greece is the only among the project partners' countries, which has adopted and started implementing a National Action Plan on circular economy. The Action Plan on CE includes certain sub-strategies including: i) Sustainable Resource Management, ii) Enhancing Circular Entrepreneurship and iii) Circular Consumption.
- 2 countries (Italy and Slovenia), although not having adopted a National Strategy on CE, they have developed specific frameworks for waste prevention and recycling. These frameworks set standards and targets for waste reuse, recycling and recovery.
- The Nation framework of Italy is focused on Bioeconomy, while the National framework of Slovenia is focused on producer responsibility with a special attention to plastics and their waste. In Slovenia, municipalities became responsible for environmental protection acting as supervisory bodies.
- In Croatia, Bosnia and Herzegovina and Serbia, no National Strategy on CE exists. Yet, some sporadic systems for rational waste management are implemented in Croatia (focused on separate waste collection) and Bosnia and Herzegovina, whereas initiatives such as information campaigns on CE have been conducted in Croatia and Serbia.
- In Albania, no National Strategy or waste management framework exist.

1.3. Study areas

ITALY

The province of Forlì-Cesena:

- Has 395.530 inhabitants and produces 288,491 tons of municipal waste per year (2018 data).
- It's an area of high entrepreneurship with 97 active companies for every 1,000 inhabitants, a good added value per capita and a high quality of life.
- The main production specializations of the local entrepreneurial system are: agriculture (fruit and vegetables, agri-food, poultry, animal feed and wine), mechanics (tank manufacturing, food industry machinery and agricultural machinery), footwear and furniture (the latter located specifically in Forlì district).

SLOVENIA

City of Velenje:

- Is an industrial center (home appliances producer, coal mine, development and implementation of ecological and energy projects, reusable plastic kitchenware producer etc.).
- Grows into a regional center with developed trade and other administrative, educational and other activities (population: 45.705, Area: 197.3 km²).
- Produces 13.206 tons of waste per year (2018).
- Observed area has made a lot of effort in separating collected waste at its source. Mixed municipal waste contains more than 50% of packaging, textiles, bio-waste, construction waste and the like, which belong to other suitable containers.
- The percentage of plastic is high, up to 25%, which can mean that the plastic is partially contaminated or incorrectly sorted.
- Households that have committed to using their own composter and do not have a brown container for BIO waste sometimes incorrectly dispose of biological waste in black containers (for mixed waste), which is why the percentage is very high, up to 40% per sorting analysis.

In Slovenia, the municipality is required by law to provide a public service for the collection, transport and treatment of municipal waste, the disposal of residues after the processing or disposal of municipal waste.

CROATIA

Međimurje County:

- Is the northernmost County in the Republic of Croatia, established in 1992.
- With an area of 729.58 m² it is territorially the smallest county in the country, but with a population density of 155.99 inhabitants / km² it is one of the most densely populated counties. It has 113,804 inhabitants living in the 131 settlements, while the administrative area is divided into 3 cities and 22 municipalities.
- Its economy is based mainly on the manufacturing industry with developed activities of agriculture, trade and construction and it is export-oriented.
- Is characterized by a favorable geographical position and natural resources (fertile soil - agricultural development, gravel and sand - construction development, natural gas - energy development, the Mura and Drava River - hydropower potential).
- There are 45 business zones in operation with 3192 business entities operating, mostly in trade, followed by manufacturing and construction. There are 3134 small and micro companies, 51 medium-sized and 7 large companies operating in the County.
- Most goods and services from the County are exported to the EU market especially to Germany, Austria, Italy and Slovenia. Of the products in the county's exchange, by far the most represented are those of the processing industry, namely finished metal products and their parts, machines and devices, clothing and footwear, wood products and others.
- The coverage of the population by organised system for collection of municipal waste in Međimurje County is 99%.
- The quantities of municipal waste produced in the County, which are collected in the organization of local self-government units, are up to 24,233 tons. T

- The total amount of municipal waste produced in the County was 29,199 tons. The amount of waste per capita in the county was 257 kg / inhabitant. 14,110 tons of mixed municipal waste was produced in the County.
- In all local self-government units in the County, more than 1,474 tons of paper, 1,381 tons of plastics, 448 tons of glass, 205 tons of metal, 1,012 tons of bulky waste, 14 tons of textiles and 5,177 tons of biowaste were collected separately from municipal waste.

Cities of Osijek and Donji Miholjac:

- 2 municipalities out of 42 in Osijek-Baranja County.
- Waste production reached 115.000 tons of non-hazardous waste and 2.500 tons of hazardous waste collected in Osijek-Baranja County in 2018.
- All municipalities in the county have organized collection of waste and transport to the landfill operated by authorized municipal waste companies. Most of the waste is collected in plastic trash-bins and there is separate collection of recyclable waste such as metal, electrical waste, paper, glass, biowaste and similar.
- The total amount of waste produced in the county is 67000 tons or 221 kg per resident which is almost half of waste produced per resident in Croatia.
- All municipalities in the County transport their waste to the sanitary landfill. The County is planning together with Vukovar-Srijem County to construct single sanitary landfill for all municipalities in Waste management center Orlovanjak.
- The economy in the County is predominated by small and medium enterprises (SMEs). The single largest industry is processing industry followed by agriculture, trade and construction.

GREECE

Municipalities of Thermi and Kalamaria:

- Are considered pioneers in promoting rational waste management models in both regional and national level. Since 2007, they have been presenting the best waste recycling rates in the Regional Unit of Thessaloniki, implementing also circular economy projects.
- The population of the Municipality of Thermi is 53.201 citizens (HAS, 2011) and it covers an area of 382.106 km². The generated waste in 2018 reached 30.000 tons.
- The Municipality of Thermi is a suburban area of Thessaloniki where large infrastructures operate. Most of the municipality area is used for agriculture purpose, while significant part is occupied by military camps, university facilities, etc. Additionally, the largest Airport (Macedonia) in Northern Greece is located in the Municipality area. Intense commercial activity, retail trade and banks take place.
- The population of the Municipality of Kalamaria is 91.270 citizens (HAS, 2011) and it covers an area of 7.200 km².
- The Municipality area is mainly used for residency due to its proximity to Thessaloniki and the sea, the natural environment and the quality of life. Along with the rapid construction of residences, the area is determined by the concentration of important productive activities such as tourist in the coastal zone. Commercial and service enterprises are developed both in the historical center of the Municipality and in the coastal zone.
- Municipality of Kalamaria has never been an industrial area and only the sectors of commerce, services and leisure existed. Several business ventures, car and furniture

exhibitions, department stores and supermarkets for food and household equipment, as well as health services (private clinics and health centers), education and training centres prevailed in this area.

- A hospital, a sports centre and university units are located in the municipality of Kalamaria. Concerning waste production, public markets and catering companies, shops and facilities of public and municipal services have particular interest, due to the type and quantity of waste produced. The generated waste in 2018 reached 42.000 tons.

Region of Western Greece (RWG):

- Occupies the NW part of the Peloponnese and the Western tip of Central Greece, occupying a strategic position as the Western Gate of Greece to the Adriatic and Western Europe.
- Includes the prefectures of Etoloakarnania, Achaia and Ilia with its total area amounting to 11,318.1 km² and covering about 9% of the total area of the country.
- Regarding its lands, they are characterized as mountainous (43.6%) and semi-mountainous (23.4%), while only about 33% are lowland areas.
- Has extensive beaches in all three prefectures (Ionian Sea and the bays of Amvrakikos, Patraikos and Corinth).
- The population amounts to 659,470 people in 2018 (Eurostat, 2019) and constitutes about 6.3% of the country's population. The Region is the fourth most populous region in the country.
- The tertiary sector accounts for 76.7% of the regional gross value added, the secondary sector share is 12.7% and the primary sector is 10.6% (ELSTAT, 2019). In 2018, the region employed 218,000 of the country's workforce: the largest number of employees in the Region of Western Greece are concentrated in the tertiary sector 60.3%, 12.5% in the secondary sector and 27.1% in the primary sector (Eurostat, 2019).
- The Gross domestic product (GDP) growth has experienced negative rates since 2008 and has not since recovered from the peak of the economic crisis. In 2017, the region accounted for 4.5% (€8.2bn) of the national GDP, ranking in sixth place among the 13 Greek regions (Eurostat, 2019).
- Regarding the primary sector of RWG, agriculture (26.1% of employees), animal husbandry and fishing are the traditional sectors of economic activity.
- In the secondary sector, the most dynamic manufacturing sectors are found to be those of food, metallic products, followed by the construction of clothing, furniture, wood products and finally the construction of machinery.
- In the tertiary sector, the dominant sector in the Region, the most dynamic sectors are those of wholesale and retail trade (17.5% of employees), construction of buildings and specialized construction activities and catering.
- Is making great development in the areas of transport services, health services, education services, research and development with the existence of important educational and research institutions.
- Tourist activities are also of great importance but not as much as other Regions, despite the fact that it has comparative advantages in terms of climate and geographical location (placement in the archaeological triangle of Delphi - Olympia - Mycenae, rich natural and cultural beauty, etc.).
- Regarding the Cultural Sector, it has significant comparative advantages, which concern remarkable archeological and Byzantine sites, such as Ancient Olympia, the Venetian Castles, etc. The cultural capital of the Region is further strengthened with

the rich cultural infrastructure (museums, libraries, cultural centers, conference centers, etc.) as well as the intellectual and artistic activity (conferences, festivals, etc.).

- The port of Patras is until today the main gate of Greece to the Adriatic Sea and Western Europe. The port infrastructure can serve very large cargo ships as well as passenger ships. It provides modern service, while the wider port facilities include the marina of Patras.

BOSNIA AND HERZEGOVINA

Territory of 2 cities and 6 municipalities:

- In northern Republic of Srpska, entity of Bosnia and Herzegovina.
- City of Banja Luka and Gradiška.
- Municipalities of Laktaši, Kneževo, Čelinac, Prnjavor, Kotor Varoš and Srbac.
- These 8 administrative units are grouped in one regional center for waste management that dispose waste at one regional sanitary landfill “DEP-OT” Ramići (Banja Luka).
- The landfill Ramići has been working since 1976 but from 2003 the new company DEP-OT was formed by 8 local self-governments and reconstructed as a sanitary landfill with the support of World Bank and EU.
- Total number of residents in target area is 357.595.
- Total volume of disposed waste at the regional landfill (2019) was 122.890,95 tons of which 95.675,18 tons were mixed communal waste as single largest component.
- The economy is based on small and medium enterprises.
- The sectors with the biggest turnover are wholesale and retail trade followed by the manufacturing and construction. The agriculture traditionally represents significant part of the country's GDP.

SERBIA

Serbia:

- In the 2011-2017 period, a total of 2.15 million metric tons of waste was generated, of which 1.80 million metric tons, or 83.7%, was collected by municipal public utilities.
- The median daily amount of municipal waste landfilled per capita was 0.84 kg, and the annual figure was 0.30 metric tons. This does not include some 20% of generated municipal waste which ends up in illegal dump sites.
- The percentage of municipal waste recycled was about 3% in 2016, while the bulk of the generated waste ended up in landfills.
- The average amount of municipal waste per capita generated in the EU in 2017 was 487 kg, a slight increase from 486 kg a year earlier.
- In 2017, an average of 30% of waste was recycled, 17% composted, 28% incinerated, most of which was used for energy recovery, and 24% of municipal waste was landfilled.
- Only 257 kg out of 306 kg of waste per capita generated in 2017 was treated, of which as much as 256 kg ended up in landfills and 1 kg was used for obtaining secondary raw materials.
- Concerning packaging waste the recycling rate is estimated at about 35-40%.

Common perspectives and main conclusions

The study areas in the 8 project partners' countries include 1 Nation (Serbia), 2 provinces\Regions (Italy, Greece), 2 counties (Croatia and Bosnia and Herzegovina) and 5 municipalities (Slovenia, Croatia, Greece and Albania). The most common characteristics in the aforementioned areas concerning the economy sector are agriculture, trade and manufacturing. In particular:

- **Country:** The total waste generation per year in Serbia was 2,15 million tons in 2017. Only 257 kg out of 306 kg of waste per capita generated in 2017 was treated, of which as much as 256 kg ended up in landfills and 1 kg was used for obtaining secondary raw materials.
- **Province:** The province of Forlì-Cesena, Italy has 395.530 inhabitants and produces 288,491 tons of municipal waste per year (2018). The main production specialisations of the local entrepreneurial system are: agriculture, mechanics, footwear and furniture.
- **Region:** The Region of Western Greece, Greece with its total area amounting to 11,318.1 km² and covering about 9% of the total area of the country. Its population amounts to 659,470 people in 2018 and constitutes about 6.3% of the country's population. Agriculture, animal husbandry and fishing are the traditional sectors of economic activity in primary sector. In the secondary sector, the most dynamic manufacturing sectors are found to be those of food, metallic products, followed by the construction of clothing, furniture, wood products and finally the construction of machinery. In the tertiary sector, the most dynamic sectors are those of wholesale and retail trade, construction of buildings and specialised construction activities and catering. The Region is also making great development in the areas of transport services, health services, education services, research and development with the existence of important educational and research institutions.
- **County:** Međimurje County is the northernmost County in the Republic of Croatia. With an area of 729.58 m² and a population density of 155.99 inhabitants / km² it is one of the most densely populated counties. It has 113,804 inhabitants living in the 131 settlements, while the administrative area is divided into 3 cities and 22 municipalities. The County's economy is based mainly on the manufacturing industry with developed activities of agriculture, trade and construction and it is export-oriented. The amount of waste per capita in the county was 257 kg / inhabitant. 14,110 tons of mixed municipal waste was produced in the County.
- **County:** The study area in Bosnia and Herzegovina is defined as territory of two cities and 6 municipalities in northern Republic of Srpska. The total number of residents in the target area is 357.595. In 2019 total volume of disposed waste at the regional landfill was 122.890,95 tons of which 95.675,18 tons were mixed communal waste as single largest component. The economy is based on small and medium enterprises. The sectors with the biggest turnover are wholesale and retail trade followed by the manufacturing and construction. The agriculture traditionally represents significant part of the country's GDP.
- **Municipality:** The city of Velenje in Slovenia is an industrial center (home appliances producer, coal mine, development and implementation of ecological and energy projects, reusable plastic kitchenware producer etc.) and grows into a regional center with developed trade and other administrative, educational and other activities (population: 45.705, Area: 197.3 km²). The city of Velenje produces 13.206 tons of waste per year (2018).

- **Municipality:** Cities of Osijek and Donji Miholjac in Croatia are 2 municipalities out of 42 in Osijek-Baranja County. The production reached 115000 tons of non-hazardous waste and about 2500 tons of hazardous waste collected in Osijek-Baranja County in 2018. The total amount of waste produced in the county is 67000 tons or 221 kg per resident which is almost half of waste produced per resident in Croatia. The economy in the County is predominated by small and medium enterprises (SMEs). The single largest industry is processing industry followed by agriculture, trade and construction.
- **Municipality:** The population of the Municipality of Thermi, Greece is 53.201 citizens (HAS, 2011) and it covers an area of 382.106 km². The generated waste in 2018 reached 30.000 tons. Most of the municipality area is used for agriculture purpose, while significant part is occupied by military camps, university facilities, etc. Additionally, the largest Airport in Northern Greece is located in the Municipality area. Finally, intense commercial activity, retail trade and banks take place in the Municipality.
- **Municipality:** The population of the Municipality of Kalamaria, Greece is 91.270 citizens (HAS, 2011) and it covers an area of 7.200 km². The Municipality area is mainly used for residency due to its proximity to Thessaloniki and the sea, the natural environment and the quality of life. Along with the rapid construction of residences, the area is determined by the concentration of important productive activities such as tourist in the coastal zone. Thus, commercial and service enterprises are developed both in the historical center of the Municipality and in the coastal zone.

1.4. Waste management models

ITALY

The city of Forlì:

- Applies a "door to door" system for the collection of waste. The "door-to-door" provides for the home collection of the most common types of urban waste: dry non-recyclable, paper, plastic-cans, wet, vegetable. The glass is collected by road "bell" container.
- Each user is equipped with a basic kit of containers, characterized by a specific colour, which he manages personally: grey for dry non-recyclable, blue for paper, brown for damp, yellow for plastic cans, beige for vegetable.
- For SMES and Non-Domestic Utilities (it refer to spaces intended for the production and/or sale of goods or services and to all those premises not used as a civil dwelling) there is the door-to-door collection of plastic, paper, organic and dry non-recyclable fractions.
- In addition to door-to-door collection, it is possible to deliver different types of waste, in special collection centres. Among others: Bulky Mixed, Mowing and pruning, Wood, Cardboard paper, Glass, Plastic, Metal, Inert and Sanitary, Tyres, Cartridges and Toner, Vegetable Oils, all kind of WEEE, Car batteries, Fleece, Mineral Oils, Medicines, Pesticides

SLOVENIA

In Slovenia (down from national to local level):

- The European guidelines are followed and the common goal is waste prevention or reduction.
- In the generation and management of waste, the waste hierarchy is considered as a priority: waste prevention, preparation for reuse, recycling, other recovery operations (e.g. energy recovery) and disposal.
- For the purposes of waste prevention, including the re-use of products and the preparation for re-use, recycling and other methods of recovery of waste generated after the use of certain products, the producer's extended liability may be imposed on the manufacturer of such products.
- Waste management under the extended responsibility of the producer is currently established for the following mass waste streams: packaging, electrical and electronic equipment, portable batteries and accumulators, grave candles, plant protection products containing hazardous substances and medicines, and for used tires and vehicles.
- Waste separations and recycling areas (collection points for separate fractions) and collection points for separate waste collection are used in Slovenia. They are designed for a wider area of blocks or houses.

CROATIA

The most important regulation governing the issue of waste management in the Republic of Croatia is the Law on Sustainable Waste Management.

- All stakeholders in waste management, from the private to the public sector, citizens and companies are obliged to apply this regulation.
- This Law regulates the waste management system comprehensively and includes collection, transport, recovery, and disposal activities, including supervision of these procedures and supervision and measures carried out at post-waste disposal sites, and actions taken by the waste trader or intermediary, and guided by the principles of the economical, rational, purposeful and impartial way of waste management in order to ensure the highest possible economic value of the collected waste that is technically and economically justified.

The most important measures for achieving the above goals are:

- Purchase of equipment, vehicles and vessels for the separate collection of paper, metal, plastic, glass and textiles.
- Construction of facilities for separately sorting collected paper, metal, glass, plastic - sorting plant
- Construction of recycling yards
- Introduction of collection and collection of mixed and biodegradable municipal waste by quantity
- Strengthening the market for recyclable waste
- Construction of recycling yards.

In the context of CE, measures to strengthen the market for recyclable waste and measures to build recycling facilities play an important role. The applied waste management model is realised through waste management procedures which include waste collection procedures, emergency waste collection, preparation for reuse, preparation before recovery and disposal, recovery and disposal procedures, waste trading, mediation in waste management,

waste transportation, energy recovery of certain waste, waste collection in the recycling yard and temporary storage of own production waste.

The National Waste Management Plan:

- Contains a Waste Management Map (includes current waste management locations and the general schedule of future locations of waste management facilities).
- Stipulates that all local self-government units (municipalities and cities) in the territory of the Republic of Croatia are obliged to adopt a Waste Management Plan for their area and at least once a year prepare a Waste Management Report for their area and submit it to the regional self-government unit (county).
- Carrying out educational and informative activities related to waste management in its area is also one of the obligations of each local self-government unit (public forums, informative publications, specialized articles on TV, radio, web).
- A model of return compensation in the system as stimulating measure encourages the waste holder to hand over a certain waste to the seller of the type of product from which the corresponding waste is generated and to receive the prescribed amount of so-called "return compensation".

Although the County is a distinctly rural area with dense population and relatively uniform regional development, it is dominated by 3 cities - the city of Čakovec as its economic, administrative, cultural, social, political center, located in the center of the County; the town of Prelog as the initiator of the County in its eastern part and the town of Mursko Središće as an urban center in its northernmost part. The obligation of good waste management is realized through 3 main stakeholders, 3 established legal entities dealing with waste management, which together with the surrounding municipalities founded all 3 cities and are their owners.

Međimurje County in the entire Republic of Croatia records the highest rates of municipal waste recovery, above 40.5% while the city of Prelog and municipalities Donja Dubrava, Goričan, Donji Kraljevec, Belica and Strahoninec record above 50% of the rate of separately collected municipal waste.

Međimurje County has incorporated all legal regulations and guidelines for good waste management, through local self-government units into the County management system, which is recognized at the national level as one of the most successful.

In the City of Donji Miholjac:

- Waste collection and management is operated by the municipal waste company owned by the City.
- Waste collection is organized for 2300 households which represents 100% of users of the waste in the City.
- Waste are collected and transported to sanitary landfill. The total amount of waste collected is about 2200 tons.
- The amount of waste and all other parameters are monitored as required by Environmental Permit issued to the landfill. The price for garbage collection in Donji Miholjac is based on the volume of the waste container and on the number of waste collections.

In City of Osijek:

- Waste collection and management is operated by waste management company owned by the City of Osijek.

- Waste are collected by special vehicles and transported to the municipal sanitary landfill Lončarica Velika. There are 465000 households and 1500 others users (primarily commercial) that are included in waste collection system.
- More than 20000 tons of the waste was collected and deposited on Lončarica Velika in 2019. As already mentioned, and described, Unikom and City of Osijek have developed very advanced system of separated collection for recyclable waste which is one of more advanced in this part of Europe and even EU.

GREECE

In Greece, there has been progress in the sector of waste management, as the national and regional waste management plans have been adopted as described below. Moreover, the illegal landfills that are still operational or in need of rehabilitation have decreased over the years. However, the remaining landfills will be very difficult to close unless new facilities are built.

GREEK NATIONAL WASTE MANAGEMENT PLAN

On a national level, the Greek National Waste Management Plan is applied which:

- Sets out strategy, policy objectives and actions for waste management for the period 2014 -2020.
- Is an alternative model of modern and environmentally friendly waste management, with priority axes: a) decentralisation of activities at the level of municipalities whose role is upgraded, b) quality and quantitative reinforcement of recycling with emphasis on source sorting, the distinct sorting and processing of the organic fraction, the small scale of the processing and recovery units, the encouragement of social participation and c) ensuring the public profile of waste management.
- Is goal-oriented for 2020: per capita waste generated to be drastically reduced, preparation for reuse and recycling with a separate collection of recyclable - biowaste to be applied at 50 % of all municipal solid waste, energy recovery should be a complementary form of management, when the margins of any other type of recovery have been exhausted and landfilling should be the last option and be limited to less than 30% of all urban solid waste.

In particular:

- Municipal Solid Waste management:** The municipal authorities are responsible for their collection and transfer to landfill for final disposal.
- Packaging Waste Management:** The municipal authorities are responsible for their collection, storage and transfer to the recycling units.
- Construction and Demolition Waste Management:** Their collection and transfer take place either by the municipal authorities or by Systems for alternative Waste (AWMS). They are collected by the AWMS processing and recycling units and are subjected to R5 recovery work (Recycling / recovery of other inorganic materials) and R13 (Storage of waste pending submission to some of the R1 to R12 work). The secondary materials are intended for use in construction projects including asphalt products.

iv. Wood Waste Management: Wood waste are collected either by public or private services. They are subjected to wood crusher for producing wood chips used in cement production industries as a secondary fuel.

REGIONAL WASTE MANAGEMENT PLAN OF WESTERN GREECE

On a regional level, the Regional Waste Management Plan is applied which:

- Is a comprehensive management plan for the waste produced in a Region.
- Identifies the general guidelines for their management, in line with the guidelines of the National Waste Management Plan and Articles 22 (Management Plans) and 23 (for Waste Prevention).
- Indicates the appropriate measures that promote hierarchical and combined a) prevention, b) reuse, c) recycling, d) other types of recovery, such as energy recovery, and e) safe final disposal in the region.
- Supports Circular Economy.
- Has been revised and its main goal is to strengthen sorting at the source and the recycle of all types of waste produced in the Region of Western Greece, as well as to promote the prevention of waste generation.
- Is in full compliance with the existing institutional framework and the objectives set out in the National Waste Management Plan.

It covers four main categories of waste:

1. Urban waste
2. Industrial waste and waste of other activities
3. Excavation, construction and demolition waste
4. Agricultural waste.

BOSNIA AND HERZEGOVINA

In all target municipalities, the collective (integral) model of waste management is used:

- The utility companies collect waste from households and companies and deposit it on regional landfill.
- In some cases, there is partial separation at the place of origin but in small quantities.
- The public utility companies (except in Banja Luka where it is a private company) are in charge of collection of communal waste.
- Beside utility companies, the collection of separated recycle materials, mostly metal, paper and plastic are performed also by private companies independent from utility companies.
- Current model of waste management implies that the citizens are paying utility companies monthly fee for waste disposal that is constant and calculated based on the square meters of space and not on quantity of waste. This model has negative effect since citizens are not motivated to reduce or event to think about quantities of disposed waste.

- Model for private companies implies waste disposal fee to utility company based on quantity of waste but they are also obligated to pay some administrative fees on state and local administration that are not dependent on quantity of waste.

SERBIA

The waste management system in Serbia:

- Is based on waste collecting, transporting and landfilling. In this regard, Serbia is no different than other countries in Southeast Europe, where landfilling is still the predominant method.
- Is inadequate, particularly in rural areas. Collection is poorly organized; landfill is not subject to controls.

By EU comparison, organic waste as a proportion of total residual waste is high and the recycling rate is very low. As yet, the population shows little awareness of environmental issues. According to ASWA (Association of Serbian Waste Utility Companies) Serbia is currently recycling between 5 and 8% of municipal solid waste.

The cities most active in recycling are Novi Sad and Čačak (around 10%), but the biggest problem is that numerous towns and municipalities which do not recycle waste at all. Serbia is seeking EU membership and is currently working to align its legislation with that of the EU.

Modernisation of waste management by joining the transition towards a circular economy is a declared political objective. By 2030 Serbia plans to achieve the recycling target of 50% of total municipal solid waste.

Waste Management Strategy in Serbia includes:

- A. Establishment of the basic orientation of waste management for the following period, in consent with EU policy in this area and strategic determinations of the Republic of Serbia;
- B. Directs the activities of harmonization of legislation in the process of approximation of the EU legislation;
- C. Identifies the responsibilities for waste, the importance and role of ownership guidance capital;
- D. Sets targets for waste management for the short and long term;
- E. Determines measures and activities for achieving the set goals

Some of the key stakeholders connected to landfills in Serbia include: Ministry of Environment, SEPA (Serbian Environment Protection Agency), SeSWA (Serbian Solid Waste Association), local authorities and public and private waste management companies.

MONTENEGRO

The waste management model in Montenegro defines the development of the model by building-up and upgrading 4 regional centres for waste management based on the decision of the Government of Montenegro (from 2019) in the cities Bar, Podgorica, Niksic and Bijelo Polje.

Regional Centre Bar on the current location of the sanitary landfill 'MOZURA' waste disposal will be carried out for municipality of Herceg Novi, Budva, Tivat, Kotor, Bar and Ulcinj. Almost all of them are doing that now except Herceg Novi.

The current model in the Municipality of Ulcinj does not include any activities related to the CE. The activities that were planned with the Local plan for management of municipal waste and non-hazardous construction waste was not realised through the lack of financial resources for the period of 2016-2020 .

Through municipal decisions related to selective waste disposal in the last two years we have created an institutional frame and conditions for implementing projects related to waste recycling.

ALBANIA

In the Municipality of Tirana, in the field of waste management, a system of waste separation at source has already introduced in order to recycle them, which in itself is an integral part of the Circular Economy.

Common perspectives and main conclusions

The models of waste management currently applied in most of the study areas are common. The conclusions that derived from the information provided are listed below:

- The vast majority of the project partners' countries implement waste separation at source, others in a wide range, others in small pilot areas.
- In most of the cases, municipalities have an updated role being the main responsible for managing their waste.
- The predominant method for waste management is the final disposal in sanitary landfills.
- All countries except for Italy and Slovenia use collection points for all types of waste.
- In Slovenia and in Italy specifically in the municipality of Forli implement door-to-door collection for all common types of waste.
- In Slovenia, the polluter pays responsibility is the main waste strategy.
- In Croatia, educational activities take place to motivate citizens to reuse and recycle their waste.
- In Bosnia and Herzegovina, Serbia and Albania partial waste separation in small quantities take place, while waste management strategy set waste collection targets.

1.5. Strategies to support Circular Economy

ITALY

With the regional law n.16 in 2015 Emilia-Romagna has adopted the principles of CE:

- The management model outlined is in line with the European "waste hierarchy", which places prevention and recycling at the top of the priorities.
- The focus is shifted to the upstream part of the supply chain and no longer to the terminal part, through the progressive reduction of waste not sent for recycling and the industrialization of recycling.

- The regional standard sets the achievement of important objectives by 2020, in some cases more ambitious than those proposed by the European Community; reduction of 20-25% of the per capita production of municipal waste, separate collection at 73%, recycling of material at 70%.
- Other strategic objectives are the containment of the use of landfills and regional self-sufficiency for disposal. The actions necessary to achieve these objectives will be implemented in accordance with the Regional Plan for Waste Management, launched by the Council and approved by the Legislative Assembly.
- It provides for some instruments such as the activation of a permanent coordination for by-products and the issuing of guidelines for municipal reuse centres.
- The supply chain agreements signed on a voluntary basis with the various stakeholders, primarily companies and associations, are particularly important.
- It provided an important instrument of participation, the "Permanent Forum for the circular economy" and activated by the Region through the participatory path "Close the circle" with the aim of promoting the culture of the circular economy and allow the various stakeholders to provide their contribution to regional action.
- The Forum, established by resolution no. 1422/2016, responds to the principles contained in the so-called "Circular Economy Package" proposed by the European Commission with the aim of supporting the transition of European businesses and consumers towards a more circular and strong economy, based on the sustainable use of resources. With this instrument the Region intends to promote its strategies and actions regarding the circular economy and to allow the collaboration of all the actors involved in the policy.

SLOVENIA

Circular economy is supported by the 'Strategy of development of Slovenia') which:

- Puts Low-carbon circular economy as one of its main objectives.
- Sets the goal values for the year 2030 compared to existing values in 2015 in Slovenia and EU average for material productivity, Proportion of renewable end-use resources energy and Emission productivity (GDP / GHG emissions gases).

According to Slovenian development strategy 2030 the strategies in the path towards circular economy are:

- Breaking the link between economic growth and the growth of resource use and GHG emissions, which it will be possible by educating and connecting different stakeholders for the transition to circular economy;
- Promoting innovation, the use of design and information and communication technologies to develop new business models and products for the efficient use of raw materials, energy and adapting to climate change;
- Replacing fossil fuels by promoting energy efficiency and the use of RES in all areas of use energy, coordinating interests in cross-cutting areas: water - food - energy - ecosystems;
- Ensuring that transport infrastructure and energy use support the transition to low-carbon CE and enable sustainable mobility, including through deployment new mobility concepts and increasing the share of public passenger transport;
- Using spatial planning to design low-carbon circular nodes economy and development solutions at regional and local level.

In 2018 Slovenian government published 'Kažipot prehoda v krožno gospodarstvo Slovenije' (Roadmap of transition into circular economy in Slovenia) which states a need for a systemic transition to CE and presents a concept circular triangle model. Each of the three corners has a core part that is a central driver of change towards CE. The triangle corners represent:

1. Circular Economy - from linear to circular models (business/companies)
2. Circular Change - the integrity of transition support policies (public sector)
3. Circular Culture - reflection on values and new narration (citizens)

Circular business models and associated value chains can be perfectly implemented in manufacturing (eco-design, the introduction of new materials, energy efficiency, the possibility of maintenance, repair, refurbishment and finally the recycling of products).

In Slovenia, there are some internationally established companies that are recognisable by the transition from linear to circular business models, as well as many smaller business entities that have become pioneers of circular solutions due to their innovation. Many of these are not known to the general public, so communicating good practices is extremely important to promote the circular transition and learn from those who have already entered the path of transition.

CROATIA

The transition to a circular economy as a replacement for a linear economy was accepted and determined by Croatia on the acceptance of the Waste Management Plan for the period 2017-2022:

- The Waste Management Plan, set provisions of the ten-year development strategy Europe 2020, which, proposes sustainable growth, the promotion of a resource-efficient, greener and more competitive economy.
- The consequence of applying this approach results in a CE, sustainable management of resources and longer life of materials and products.
- This model reduces the generation of waste, not only waste generated in production processes but systematically, throughout the life cycle of the product and its components.

Economic models that contribute to the sustainability of the waste management system and the transition to a circular economy in Croatia are waste disposal fees, fees for the management of special categories of waste, return fees and fees for the public service of municipal waste collection. These fees are used to achieve the objectives for the reduction of waste, increasing recycling and reducing waste disposal.

The Republic of Croatia has not yet developed a comprehensive system aimed at effectively reducing waste generation, although many guidelines and laws and regulations are introducing such an obligation. The lack of proper organisation of the waste prevention system as well as concrete indicators for monitoring the effectiveness of measures are recognized as key indicators.

Actions aimed at reducing waste generation and / or its reuse come primarily from certain groups or individuals, certain local governments and other public authorities, and primarily depend on the level of awareness of the local population and persons involved in the activities of such groups. Namely, the level of higher or lower awareness is visible regarding the territorial areas of the state, where some parts of the state have done a lot to reduce

waste, while in other parts of the country activities aimed at reducing waste are in the beginning or are negligible.

As it was mentioned before, waste management in Međimurje County is advanced compared to the rest of Croatia, some of its municipalities have already achieved the goal of 50% that Croatia must meet by 2020 and is progressing towards 70%, which is the goal that Croatia has by 2030. In the area of Međimurje County, 10 waste management sites have been built, including yard recycling (in addition, a mobile recycling yard is provided for each settlement in Međimurje County), recycling yards for construction waste, buildings for biodegradable waste - composting plants, building for sorting special categories of waste, reuse center. Every user (households, public sector, entrepreneurs etc.) in the county is included in the system of collection, removal and disposal of mixed municipal waste and has a container for mixed municipal waste. Many users are involved in the system of collection, disposal, treatment of biodegradable municipal waste and has a container or bag for biodegradable municipal waste. Also, in the area of the County at some locations there is a possibility of separate collection of textile waste and clothing.

Education and awareness-raising on the need for proper waste management is covered through various educational programs, but emphasis is placed on the importance of waste collection rather than waste prevention.

Economic measures related to the "polluter pays" principle, as well as measures of producer responsibility in product design and production, obligations to inform sellers and consumers about product properties and how to manipulate them after the end of their life, are some of the waste prevention measures that have come to life in practice.

Međimurje County is a good example of sustainable waste management compared to other parts of the country. Namely, it is the County that has adopted all the guidelines on +sustainable waste management implemented so far and is implementing activities aimed at reducing waste while developing models on the circular economy to raise awareness of the need to move from linear to circular economy and enable a painless transition. Although specific comprehensive strategies on the circular economy have not been adopted for either the country or Međimurje County, some waste prevention measures are already being implemented.

GREECE

The Partnership Agreement for the Development Framework 2014-2020 (PA 2014-2020) constitutes the main strategic plan for growth in Greece with the contribution of significant resources originating from the European Structural and Investment Funds of the European Union. Along with the sectoral programs, the PA 2014-2020 includes also 13 multi-sectoral and multi-funded Regional Operational Programmes (ROP).

The Regional Operational Program (ROP) of Central Macedonia for circular economy aims at:

- Transition of regional economy to a sustainable production model promoting competitiveness, extroversion, innovation, entrepreneurship and smart utilisation of Information and Communication Technologies (ICT).
- Protection and sustainable management of environment and natural resources ensuring the quality of life and the efficiency of the resources.
- Construction of transport infrastructure and networks for the promotion of the Region of Central Macedonia as a transport hub of utilising its centralized position in Southeastern Europe and the Eastern Mediterranean.

Supporting and strengthening mobility and upgrading the qualifications of human resources, dynamic treatment of unemployment and ensuring social cohesion.

The ROP of Western Greece 2014-2020 provides a thorough picture of the CE policy framework for the region. In more detail, the Programme aims to boost economic development and create job opportunities in Western Greece, while achieving the Europe 2020 targets for smart, sustainable and inclusive growth and the objectives set by the Regional Innovation Smart Specialization Strategy. In order to achieve these objectives, the Programme focuses on five Priority Axes (PA).

Priority Axe 01 (PA1): "Reinforcement of competitiveness, extroversion and transition to a quality entrepreneurship with focus on innovation and increase of national added value"

Priority Axe 02 (PA2): "Environmental protection - transition to an environmentally friendly economy": increasing energy efficiency in the business sector as well as for public and private buildings. The budget allocated is 157.6 million €. PA2 complies with the national Partnership Agreement for the Development Framework Thematic Objectives (TO) 4, 5 and 6 that work together to achieve this integrated transition to an environmentally friendly economy:

- TO 4: Supporting the transition to a low carbon dioxide economy in all areas
- TO 5: Promoting climate change adaptation, prevention and risk management
- TO 6: Preserving and protecting the environment and promoting resource efficiency (reuse, recycling or recovery of non-recyclable materials, etc.)

Priority Axe 03 (PA3): "Development, modernization and completion of transport infrastructures" (ERDF – 26.77% of the EU allocation): completing TEN-T, enhancing regional mobility, developing eco-friendly and low-carbon transport. It is expected that time-distance to urban centers and economic areas will be reduced by 9 minutes. Road safety is a priority.

Priority Axe 04 (PA4): "Development of human resources, promotion of social integration and fight against poverty and discrimination" (ESF – 16.62% of the EU allocation).

Priority Axe 05 (PA5): "Development, modernization and completion of social, health and educational infrastructures" (ERDF – 8.33% of the EU allocation).

The expected impact of the implementation of the Programme is:

- Support of more than 700 SMEs and cooperation of more than 32 enterprises with research institutions.
- Creation of 730 full time equivalent jobs.
- Improved water supply to additional 36,000 persons and wastewater treatment to additional 15,000 persons.
- Additional 350,000 tonnes of waste recycling capacity per year.
- Annual energy savings of 99 ktoe;
- Support of 138 social enterprises.
- Quality health and social care services should be provided respectively to 27,000 and 650 people living below the poverty threshold
- The population covered by improved health services should reach 200,000 people.

BOSNIA AND HERZEGOVINA

Respondents have stated that waste management model of collection separated recycle materials partly support CE activities. Collected recycle materials are used as raw materials in further production.

Base on collected information it can be concluded that the respondents mainly think about recycling when talking about circular economy while other components like reuse and reduction of waste generation and energy consumption is overlooked. Since circular economy has not been officially regulated at the state or entity level it is obvious that there is also lack of strategies to support circular economy actions.

SERBIA

Serbia is the first country in the Western Balkans region to draft the Roadmap for a Circular Economy, which aims to encourage society as a whole to change radically in relation to limited resources. In the coming period, a number of activities in this area are planned, including the development of Road Map 2.0 for the circular economy.

The purpose of the Roadmap is to encourage production through application of circular business models, to motivate industry to create new work posts and to advance doing business by detecting innovative, sustainable solutions on the market. This document is intended to instigate the society to systemic changes in thinking, culture and attitude vis-à-vis the resources, and also to encourage the decision-makers to commit politically to amend public policies and dialogues in the context of circular economy

- A. Involvement of private sector in supporting the CE agenda in sectors of plastics, textile and furniture, as well as food waste;
- B. Consultations with private companies in order to support implementation of circular economy agenda;
- C. Identify regulatory barriers that companies face in order to improve circularity of their business;
- D. identify areas of interest, opportunities, recognized successful initiatives, best practices and business models, innovative solutions;
- E. Develop CE roadmaps for three identified areas jointly with the private sector;
- F. Enable financing for transition towards CE through piloting the innovative finance mechanisms;
- G. Capacity building and trainings in the field of project development;
- H. Creating Circular Culture - changing behavior and creating circular mindset.

MONTENEGRO

The main objectives of the strategy adopted by Montenegro to support CE targeting to 2030 include:

1. Introduction of CE system in production and trade system of Montenegro aiming at improving reuse of products and materials.
2. Raising the level of segregation and separation of biodegradable waste.
3. Raising the level of segregation for recycling and disposal of construction waste.
4. Reducing the amount of waste for permanent disposal in landfill.

ALBANIA

Albania has adopted no strategy to promote circular economy.

Common perspectives and main conclusions

The strategies developed by the project partners' countries to support and promote circular economy are generally well organised except a few cases. More specifically:

- Italy, Slovenia, Croatia, Serbia and Greece have adopted the principles of CE through specific laws, initiatives and strategies.
- Bosnia and Herzegovina and Albania have not yet adopted strategies to promote CE.
- Emilia-Romagna region has adopted the principles of circular economy with a regional law in 2015 being in line with the European "waste hierarchy", which places prevention and recycling at the top of the priorities. The targets for 2020, are in some cases more ambitious than those proposed by the European Community.
- Emilia-Romagna region has also adopted an instrument for participation "Permanent Forum for the circular economy" provided activated through the participatory path "Close the circle" with the aim of promoting the culture of the circular economy and allow the various stakeholders to provide their contribution to regional action.
- In Slovenia, circular economy is supported by the Strategy of development of Slovenia setting Low-carbon circular economy as one of its main objectives. It sets specific targets concerning the proportion of renewable end-use resources energy and Emission productivity (GDP / GHG emissions gases).
- In Slovenia, the government published also a strategy which states a need for a systemic transition to a circular economy and presents a concept circular triangle model.
- In Croatia, the transition to a circular economy as a replacement for a linear economy was determined by the Republic of Croatia for the period 2017-2022. The Waste Management Plan of Croatia foresees a ten-year development strategy, which proposes sustainable growth, the promotion of a resource-efficient, greener and more competitive economy.
- Croatia has not yet developed a comprehensive system aimed at effectively reducing waste generation, although many guidelines and laws and regulations are introducing such an obligation. Initiatives to promote CE derive mainly from certain groups or individuals, certain local governments and other public authorities
- Particularly, in Međimurje County waste management system is advanced compared to the rest of Croatia, some of its municipalities have already achieved the goal of 50% that Croatia must meet by 2020 and is progressing towards 70%, which is the goal that Croatia has by 2030.
- In Greece, the Regional Operational Program (ROP) of Central Macedonia for circular economy aims at sustainable production and protection and sustainable management of environment and natural resources.
- The ROP of Western Greece 2014-2020 in Greece provides also a thorough picture of the CE policy framework for the region aiming at boosting economic development

and create job opportunities in Western Greece, while achieving the Europe 2020 targets for smart, sustainable and inclusive growth.

- In Bosnia and Herzegovina, Respondents the waste management model for separate waste collection partly support CE activities. Collected recycle materials are used as raw materials in further production. Since circular economy has not been officially regulated at the state or entity level it is obvious that there is also lack of strategies to support circular economy actions.
- In Montenegro the authorities aim at promoting waste reuse as well as separate collection of biodegradable and construction waste.
- Albania has developed no strategy for supporting circular economy.

1.6. Circular models and projects

ITALY

There are several circular economy projects active in the area. Several of them use agricultural or livestock waste to produce energy through bio-digestion. Others use livestock waste to produce pet food, feed or fertilizer.

There are companies that separate waste from local companies and produce reusable materials such as paper, cardboard and plastic that are then sold to other companies as secondary raw materials. One company reuses plastic to make pipes that are used in the footwear or fishing industry.

A company collects wine production waste to produce alcohol and tartaric acid for the pharmaceutical industry, and fertilizers for vineyards.

Another social company recovers old bicycles from which to recover reusable parts and materials, and create new bicycles.

A large mattress factory recovers old mattresses and uses waste materials to make upholstery for furniture or other items. In addition, in collaboration with a social cooperative and a school, it produces a line of other objects (like bags and purses) with the recovered fabrics.

SLOVENIA

Municipality of Velenje (MOV) started a more organised approach to circular economy as part of the USE-REUSE project (2010 –2014), co-financed by the European Social Fund and the Ministry of Labor, Family and Social Affairs, led by the Environmental Research Institute (ORZ). As part of the project, they obtained two qualified candidates for the establishment and management of the Velenje Reuse Center (Centre Ponovne Uporabe-CPU). In 2012, MOV helped establish the CPU Velenje with its own funds. It provided business premises and their maintenance, hired a public worker and enabled the purchase of initial equipment for the operation of the CPU.

The project Brokerage of Used Information and Communication Equipment - PIKO began in parallel with this project in December 2010, in Velenje, under the auspices of MOV and the Šaleški Committee for Assistance to Citizens, as a pilot activity of the CPU. With the help of the implementation of this pilot project, MOV provided socially endangered citizens with access to used information and communication equipment, and at the same time provided training and employment to unemployed persons. As part of this pilot project, which took place back in 2013, more than 300 computer kits were distributed.

In 2015, MOV started implementing the In My Back Yard (IMBY) project, which was funded by the European Union under the Operational Program Slovenia Croatia 2007-2013. The general objectives of the project were to improve the quality of life of the population and to protect nature and the environment. Its performance showed several measurable positive effects, so the next step was its upgrade.

The PlasticCircle project - Improving the packaging waste chain according to the circular economy model, co-financed by the European Union from the Horizon 2020 program, is currently very topical for MOV. The goal of the PlasticCircle project is to re-examine various stages for separate waste collection for further improvement of transport routes and sorting technologies. The overall goal of the project is to achieve resource substitution in the same value chain using an innovative approach at each project stage.

The project results are expected to support the achievement of the EU's targets of recycling 75% of packaging waste by 2030, and ultimately the results will lead to better waste management in general and a positive impact on the European economy, including the creation of new jobs. MOV acts in the project in the role of an associated partner.

The project focuses on raising the awareness of consumers and stakeholders in the chain e-device management by building an appropriate field network activities and legislative proposals to impact behavioral habits with electrical and electronic devices.

Through innovative tools such as a traveling repair shop, appliance delivery corners in re-use, online circular economy platform, co-organization garage sales and product rental shops and the establishment of preparation centers reusable appliances will divert as much of the e-waste from landfills and recycling centers.

CROATIA

Međimurje County, ensures the conditions for a gradual transition from a linear to a circular economy. The greatest emphasis and the greatest intensity are currently placed on waste sorting and recycling procedures. Consequently, the CE of Međimurje County is still in its infancy, it is not systematically developed, but the preconditions are being created for its comprehensive development. It is currently based on examples of good practice generated by individual stakeholders in waste management. For example:

- *Circular economy in textile* - collection of waste textiles in the area of the City of Čakovec is enabled through one of the green islands and additional dedicated containers in the public areas of the social cooperative *Humana Nova*. Humana Nova uses the collected textiles which would otherwise end up in a landfill, as a basic resource in the production of textile items and clothing. Within the Operational Program for Cross-Border Cooperation Slovenia-Croatia 2007-2013 (IPA SI-HR), the City of Čakovec has already implemented the project "Poroteks", which relates to the treatment of textile waste. One of the objectives of the project was to improve and raise environmental awareness among polluters and residents of the cross-border area, the management of textile waste for reuse (fashion accessories) and recycling (insulation boards) in the cross-border area; cross-border exchange of know-how in the field of reuse and recycling of waste material.
- *Circular economy in construction waste* - concerning construction waste, in the County there are authorized companies with a permit for construction waste management, for example- *Recycling yard for collection, storage and recovery of construction and non-hazardous waste "Mišić"*, trades for transport and services. In this recycling yard, construction waste is first stored, sorted, crushed in a crusher

and, if necessary, mixed to correct the granulomatous system, thus obtaining various materials suitable for reuse in construction, e.g. for embankments and pavement/road structures in civil engineering and building construction; for the reconstruction of field roads; as an aggregate for cement stabilization, etc.

- *Development of technology for the circular economy* – Tehnix Ltd. is a well-known company in Međimurje County that develops modern equipment for good waste management. The development of technology and its application in waste management, as well as the notion of municipal waste as a large economic resource, are the guidelines that guide the company. The company is based on the production of waste management equipment and high – tech specialized machines that are in the service of circular economy and that allow the reuse of products and put the waste back into operation and in life.

In Varaždin County, which is neighboring county to Međimurje, there is CITYCIRCLE project (2019-2022) in implementation, financed by Interreg Central Europe. The main objective of the project is to facilitate innovation and technology transfer and improve services and business models in peripheral cities. By providing these with tools and knowledge linked to the circular economy, the project will enable a new generation of innovative solutions in their urban ecosystems in a long-run.

In addition, City of Osijek is implementing the project E-waste. The goal of the project is to organize the collection of electronic waste to be removed from the streets as hazardous waste and to be recycled and reused.

The second project implemented in City of Osijek is collection of food waste from the open markets. The large share in total municipal waste in City of Osijek consists of biodegradable waste. Therefore, every open market was given in 2016 separate containers for biodegradable waste. The main goal of this project is to develop effective waste management system for biodegradable waste and increase awareness of user of benefits of separate collection of biodegradable waste.

GREECE

Management Systems for alternative Waste in Greece implementing circular models:

- Hellenic Recovery Recycling Corporation (HERRCO)
- Hellenic Waste Management – Wood Waste (ELDIA)
- Construction and Demolition Waste of Central Macedonia (ANAKEM)
- Construction and Demolition Waste of North Greece (ANABE)

European Projects on Circular Economy:

- SinCE-AFC Interreg Europe: Enhancing the Entrepreneurship of SMEs in Circular Economy of the Agri-Food Chain
- HIGHER Interreg Europe: Better policy instruments for high innovation projects in the European regions
- CESME Interreg Europe: Circular economy for SMEs
- BIOREGIO Interreg Europe: Region circular economy models and best available technologies for biological streams
- SYMBI Interreg Europe: Industrial Symbiosis for Regional Sustainable Growth and a Resource Efficient Circular Economy

The University of Patras and the Observatory of Urban and Regional Development - CIVICS, organized and held a Conference on Circular Economy in 2018 as a result of a joint effort to open a public debate in the region of Western Greece, regarding the transition to CE.

The conference was structured in three thematic sessions (*i. linking CE with production, ii. Organization & Systems of CE, iii. The role of Cities, Citizens and Policy for CE*) and a round table focusing on the transition to CE. Professors from academic institutions, researchers, industry representatives, social enterprises, environmental groups, local authorities, non-governmental organizations and many students and citizens attended the conference. From the cases presented, two of them are described below which introduced specific waste management practices converting by-products and waste into useful materials:

WASTE4THINK: MOVING TOWARDS LIFE CYCLE THINKING BY INTEGRATING ADVANCED WASTE MANAGEMENT SYSTEMS (Funded under: H2020-EU.3.5.4).

The main objective of Waste4Think is to move forward the current waste management practices into a circular economy motto demonstrating the value of integrating and validating 20 eco-innovative solutions that cover all the waste value chain. The solutions include technological and non-technological approaches. The benefits of these solutions will be enhanced by a holistic waste data management methodology, and will be demonstrated in 4 complementary urban areas in Europe. Integrating all these solutions it is able to construct a virtual smart city laying the foundations of the circular economy maximizing the expected results up to:

- An 8% reduction of waste generation
- A 10% reduction of GHG emissions
- 20% increment of waste sorting
- 10% savings in the management costs

PYRICE II -TECHNO-ECONOMICAL DESIGN AND PILOT PRODUCTION OF ADVANCED AND HIGH-ADDED VALUE MATERIALS FROM RICE HUSK ASH.

Rice husk ash (RHA) is the solid-state residue of the incineration of the rice husk; a process used for steam and energy production by EV.GE Pistiolas S.A. the largest Greek rice-industry. The main objectives of the project are: i) the development and pilot scale production of high-added value materials from RHA as well as ii) technology transfer and market analysis. The specific work programme implemented to achieve the above goals included market uptake, techno-economical design, pilot production of RHA-derivatives, optimization, communication, dissemination, and exploitation & business plan elaboration.

BENEFITS - Considerable gain: exploitation of RHA by-product, entry to a new market with substantial economic profit, and limitation of environmental pollution.

RESULTS

Environment: Significant protection from the disposal of a dangerous material as the RHA. 100% conversion of RHA to useful materials able to feed other industries (isolator producers, building materials producers, etc.) and thus an excellent example of industrial symbiosis. Lowering of buildings' environmental cost.

Company: AGRINO is expected to have considerable gain, because it may enter a new market with substantial economic profit, it will improve the quality of RHA by-product, and it will limit environmental pollution.

Innovation: The conversion of RHA into these advanced and high-added value materials comprises a front innovation and originality for rice-industry at an international level.

BOSNIA AND HERZEGOVINA

The project “Two buckets system” is currently implemented by utility company “Čistoća” in City of Banja Luka. The project represents testing phase for larger concept of introducing new model of waste collection in households. The sample of 229 households are equipped and should separate waste in different components. The model implies lower prices for waste disposal if household separate waste.

City of Gradiška is implementing project “Development of sustainable packaging waste management”. The objectives of the project are to contribute to environmental protection, increase awareness of all age groups in the community, improve the technical and infrastructural capacities of the City of Gradiška in the process of waste management, increase the number of preschool, school children and youth from urban and rural areas, involved in the process of sustainable waste management and influence children, young people and the wider local community to reduced disposal of mixed municipal waste.

SERBIA

1. ***The economy of sharing and providing services instead of buying the product itself (Sharing platforms)***. This business model is based on platforms for providing services of using and sharing products among consumers, regardless of whether they are legal or natural persons. This means that the consumer uses the product, but is not its owner, and therefore is not responsible for that product after its use. This well-known circular model is mainly applied in the automotive industry, tourism, rental of heavy machinery in construction. It is also used in energy, textile industry and in the production of electrical devices;
2. ***Economic model of reuse of utilized resources (Resource recovery)***. Technological innovations and processes enable the reuse of materials for the same or for other products, which contributes to a waste-free business. This model enables the company to reuse materials at the end of the product life cycle while eliminating “material leakage”, i.e. throwing away raw materials, and increasing economic efficiency through their return or conversion. This model is a particular advantage for companies that have large product plants.
3. ***Product’s life extension***. Repairs, alterations or redesigns of an existing product allow the product to be used longer. Extending product life allows companies to simultaneously extend the life cycle of products and materials, thus saving resources and energy and thus generating additional company revenue. This model is suitable for demanding industrial segments (industrial equipment) and companies that place products on the market, whose improved versions usually only partially generate additional benefits for consumers (electrical devices, primarily phones and tablets).
4. ***Product as a service***. This business model replaces the traditionally based concept of market business that links product ownership and use. In this business model, based on a lease agreement or on a cost basis, more consumers can use the products. Thus, the approach to the use of the product has been changed and the principle of product longevity is being realized in such a way that the product remains the property of the manufacturer.

MONTENEGRO

1. Operation of facilities for waste selection in Podgorica, Kotor, Tivat, Herceg Novi and Zabljak.
2. Construction of recycling facilities in Podgorica, Kotor, Herceg Novi and Mojkovac.

ALBANIA

The waste source separation model was initially performed in the ECOTIRANA area and later was extended into 4 other cleaning areas (Tirana 1, 2, 3 and 4).

Common perspectives and main conclusions

Numerous and multiple circular models have been applied in the project partners' countries both national and regional/municipal. Furthermore, several companies, mainly SMEs, have adopted such initiatives targeting to circular economy. In particular:

- The most common circular model applied both in regional level and in companies among the aforementioned countries is waste separation at source and the reuse of these waste.
- All types of waste can be reused in any level, including biowaste, textiles, packaging waste, agricultural and livestock waste, every day products, furniture, electrical and electronic equipment, hospital waste, food waste, construction waste and other waste.
- In Italy, energy, pet food and fertilizers are produced by managing agricultural and livestock waste. Local companies implement recyclable waste separation, while these waste are used as secondary raw materials by other companies. Alcohol and fertilizers are also produced from wine production waste. Parts from old bicycles are used for producing new bicycles, whereas upholstery for furniture is produced from old mattresses.
- In Slovenia, a reuse centre operates for the public with reused products after waste separation. Furthermore, refurbished computer kits are disseminated to the citizens and repair and rent shops extend the life of waste.
- In Croatia, textiles are used for producing new clothing and construction and demolition waste are used in the building sector. In addition, a composting programme is adopted, where biowaste are used for producing fertilizers.
- In Greece and specifically in the Regions of Central Macedonia and Western Greece, several EU co-funded projects are implemented on circular economy and industrial symbiosis including Horizon 2020 and Interreg Europe. Biowaste, nursery waste, expired food and rice husk are used for producing new products.
- In Bosnia and Herzegovina, separate waste collection is the most common waste management model, while packaging waste are the predominant ones. Awareness raising campaigns at regional level are also conducted to promote circular economy.
- In Serbia, several projects are implemented on products sharing and resource recovery. A common practice is also the use of products as a service.
- In Albania, waste separation at source is the most common waste collection model.

2. Needs Assessment

2.1. Proposed circular policies and strategies

ITALY

Suggestions for circular policies and strategies has as follows:

- Initially significant simplification of rules and procedures (mostly bureaucracy) necessary for the installation of systems for the Circular Economy (CE).
- Incentives to create an industry of recovery and reuse that has a size and strength to replace the conventional waste treatment plants.
- Awareness raising strategies and campaigns.
- Reinforcement of infrastructure and plant engineering aspects.
- Initiatives of industrial symbiosis should be supported, able to involve also micro and small enterprises.
- Important to direct the available resources in an effective way.

SLOVENIA

The goal is to reduce unnecessary costs and employ local companies and workers and this will contribute to local economy and reduce costs (both economical and environmental) of transport. For this to be possible, waste management must adapt to local circumstances. To fulfill the needs of local environment we need to:

- Provide own processed and disposal capacities (principle of self-sufficiency).
- Ensure appropriate controls of shipments of waste, including a certificate of completion of the recovery or disposal of the waste.
- Ensure a high level of protection of the environment and human health.
- Hazardous wastes: principles of the highest recovery locally, limit the transborder movement, prevent illegal shipments, ensure the final disposal and recovery.

In Slovenia, a wider discussion on extended responsibility would be needed, especially in the part concerning responsibilities of municipalities and the state (local and national government) and making use of the economies of scale in the field of waste management.

Locally, it is needed to streamline waste management flows throughout the whole cycle and put emphasis on closing the waste management chain and returning the usable waste into the circle of economy by means of re-use and re-cycling.

CROATIA

Suggestions for:

- Public awareness and policy on the importance of introducing the model of circular economy in the daily life and the economy. Separate waste collection education in schools and kindergartens.
- A circular economy mechanism must be established at the regional level, which includes public administration, economy and households. Amendments to the current regulations that would mandate separate collection of waste and its implementation.

- Financial instruments & policies that would force producers of waste to finance sustainable waste management. Mechanisms and grants for collected waste processing. Incentives for reuse of waste as raw material in production.
- Mandatory responsibility programs for manufacturers in order to produce more eco-friendly and reusable products.

GREECE

The proposed policies to promote CE are:

- Adoption of EU principles and directives: Adoption of the principles and actions of the European Green Agreement and the new European Action Plan for the CE 2020. Integration of EU Directives 2018/849 / EU, 2018/850, 2018/851, 2018/852 and 2018/853 into the National Institutional Framework. European Protocol for the Management of CDW.
- Particular streams/ actions. Guidelines for pre-demolition inspection. Ecological (green) contracts.
- Implementation and operation of ***selected sustainable clusters in the production sector of the Greek regions***. For this to be achieved, the following are required:
 - Close cooperation between the private sector, local government and relevant Ministries (development partners) and coordination of actions between development partners.
 - Investment in infrastructures, human resources, research and technology.
 - Support for creating sustainable networks.
 - Elimination of regulatory barriers and creation of appropriate motives.
 - Effective corporate and regional governance structure.
 - Collaboration with financial institutions for the combined usage of financial tools (contracted agriculture, financing value chain, crowdfunding, green bonds, green banking).
 - Use of ongoing funding resources and European programs.

Criteria of selection would be:

- Comparative advantages of each area.
- Commitment and credibility of entrepreneurs.
- Readiness and management capacity of local and regional authorities.

One such selected case study in the region of Western Greece could be focusing in the agricultural sector and more specifically on **the sustainable cultivation of olive trees and integrated production and management of olive oil and by-products**. If this study case applies then no wastes will be produced; only main products and useful by-products for direct use or as raw materials for other industries. *A successful implementation of this selected study case will act as a best practice and good example to replicate in other clusters and thematic areas in the region.*

BOSNIA

Respondents have stated that following policies and strategies should be implemented:

- Education on importance of waste separation in preschool and school institutions.
- Amendment to current legislation that would define obligation to separate waste and ensure implementation of such laws.
- Strategy to support utility companies in implementation of CE system.
- Strategy for sustainable waste management in line with EU Directives with set goals for increase recycling and plans for the efficient use of all raw materials.
- Set policies that would make waste producers to pay fees that should be used for financing sustainable waste management.
- Set co-financing mechanism for development of facilities for processing of collected waste.

SERBIA

Serbia has launched the first Circular Economy Action Plan. The purpose of the Roadmap is to encourage production through the application of circular business models, to motivate industry to create new work posts and to advance doing business by detecting innovative, sustainable solutions on the market. The roadmap aims to:

- Provide information about the importance of the transition to a CE, i.e. about the new business models and competitiveness criteria. It elaborates on the opportunities for faster development of Serbia, offering solutions to problems such as management of secondary raw materials (including waste), needs for resource and energy independence, and environmental security.
- Identify the sectors in which the circular economy tools can be introduced more easily, but without underestimating the less developed sectors and traditional industries that will require more investments to transition to the new production models.
- Recognize the key actors of change whose synchronized, joint activities can contribute to a faster transition to a circular economy.

The suggested changes are:

- Take steps towards transition and public policy harmonization.
- Exploit the opportunities and overcome the barriers for circular economy implementation in Serbia.
- Improve identified priority sectors in Serbia —> manufacturing industry; agriculture and food; plastics and packaging; construction.
- Communication plan that contains measures to raise public awareness for CE.

MONTENEGRO

The policy of achieving goals for waste management in the period of 2021-2025 by recycling up to 30 % of waste.

ALBANIA

Strategies or policies may be included in function of the community culture and appropriate funding for:

- Increase the rate % of the separation, reuse and recycle of waste.
- Promotion, financing, or various facilities (reduction of the cleaning fee, for example) for businesses that apply the CE model.
- Integration of smart devices in different institutions to reuse different materials (paper for example).

Main common conclusions & suggestions

*Then main proposed **circular policies and strategies** among the majority of the partners are:*

- Adoption of EU principles and directives: Adoption of the principles and actions of the European Green Agreement and the new European Action Plan for the CE 2020. Integration of EU Directives 2018/849 / EU, 2018/850, 2018/851, 2018/852 and 2018/853 into the National Institutional Framework.
- Incentives to create an industry of recovery and reuse that has a size and strength to replace the classic waste treatment plants. Reinforcement of infrastructure and plant engineering aspects.
- A circular economy mechanism must be established at the regional level, which includes public administration, economy and households. Amendments to the current regulations that would mandate separate collection of waste and its implementation. Waste management must adapt to local circumstances.
- Implementation and operation of selected sustainable clusters in the production sector. A successful implementation of a selected study case will act as a best practice and good example to replicate in other clusters and thematic areas in the region. Recognize the key actors of change whose synchronized, joint activities can contribute to a faster transition to a circular economy.
- Financial instruments & policies that would force producers of waste to finance sustainable waste management. Mechanisms and grants for collected waste processing. Incentives for reuse of waste as raw material in production.

Specific technical suggestions are:

- Mandatory responsibility programs for manufacturers in order to produce more eco-friendly and reusable products.
- Initiatives of industrial symbiosis should be supported, able to involve also micro and small enterprises.
- Hazardous wastes: principles of the highest recovery locally, limit the transborder movement, prevent illegal shipments, ensure the final disposal and recovery.
- Particular streams/ actions. Guidelines for pre-demolition inspection. Ecological (green) contracts. European Protocol for the Management of CDW.
- Integration of smart devices in different institutions to reuse different materials (paper for example).

Suggested additional supporting measures are:

- Awareness raising strategies and campaigns. Separate waste collection education in schools and kindergartens.
- Initially significant simplification of rules and procedures (bureaucracy) necessary for the installation of systems for the CE.
- Strategy to support utility companies in implementation of CE system.
- Identify the sectors in which the CE tools can be introduced more easily, but without underestimating the less developed sectors and traditional industries that will require more investments to transition to the new production models.

2.2. Main needs and barriers of implementation

ITALY

The main barriers to the CE, including at territorial level, on which action is needed, remain:

- Inconsistent legislation. Lack of incentives, regulatory background still not well defined.
- Need for qualification of the economic system (training, research, technology transfer)
- Bureaucracy
- Market barriers: lack of a managerial approach, market value of recycled materials, willingness to pay for CE-based products
- Social barriers: awareness raising is needed to improve CE knowledge by the societal level

In general, the policies adopted so far have addressed the issue of the circular economy more from the point of view of rules and obligations and not knowing how to seize and exploit the opportunities in terms of business growth.

SLOVENIA

- No standard and continuous high level of waste management and long-term dependent on waste management companies. No longer have a direct influence on management policy and a very limited role in pricing policy, which they can minimally regulate within the standard of care.
- This leads to transnational movement of waste which prevents the policy of shortening the transport chain and localization of circle economy. It also increases dependency on external factors beyond local environments and national control.
- The main problems in local environment are the end part of the recycling chain, due to limited capacities for transforming specific waste into materials. The issue is currently partly solved by exporting waste but as was learnt from experience this can't be a long-term solution – this makes Slovenia dependent on changes in other countries regulations and policies.
- The main need is a sustainable business approach to the circular economy mentality.
- The need of self-sufficiency is required along with reducing the cost of certain materials.

- The use of materials that odd to be recycled

CROATIA

Needs:

- Awareness-raising about the benefits of the CE. Circularity as a prerequisite for climate neutrality.
- Encouraging the transition of CE through research, innovation and digitization.
- Financial side of the CE process. Circular procurement.
- Zero waste companies. Resource recovery - the process that enables the return of useful resources and materials. Extending product life.
- Sharing platform by interconnecting product users and encouraging sharing, access or ownership to increase usage.
- Product as a service which implies a shift away from ownership of the product and offers clients, paid access products, allowing enterprises to retain the benefits of productivity and ownership of circular resources resulting from increased use of the product.

GREECE

The needs for the promotion and implementation of CE at regional level include:

- Meet National and European targets for reducing waste generation, waste reuse and recycling.
- Creation of new business models for the implementation of CE.
- Creation of new business models for Environmental Protection and Climate Change mitigation.
- Connection between research centres and companies for developing technological solutions.
- Development of industrial symbiosis models - registration of enterprises/waste generators in regional level.

In order to move from the intention to the actual implementation of cases, a sustainable production cycle and management of products needs to be implemented. These needs are today's actual barriers and concern corporate & regional governance, production factors, regulatory environment and motives, and networks.

BOSNIA AND HERZEGOVINA

All suggested actions can be divided in three segments:

- The first one is related to improvement and adaptation of legislation.
- The second one is technical and the aim of its activities is to provide conditions for realization of measures like separation of waste and processing of sorted waste.
- The third segment is related to financial aspects of implementation of CE system and securing precondition for realization of any activity.

The specific actions to fulfil identified needs and overcome barriers are:

- To increase awareness on CE benefits, separation and waste disposal.
- To equip utility companies with adequate equipment and resources that will enable realization of CE system.
- Adopt appropriate legislation and secure efficient laws and bylaws that regulate ecology, environmental protection and utility activities including waste management.
- Introduction of laws such as “Eco design” and “Green public procurement”
- Secure incentives and benefits for households and private operators that are respecting principles of CE and conduct separation in line with selected waste collection activities.
- Provide a market for secondary raw materials.
- Secure appropriate financing.

SERBIA

The transition to a CE requires radical changes, innovations and measures in the system of production and consumption. Although the business sector is a leader in innovation and changes for the CE, according to reports and available data, the application of the CE is still based only on examples of good practice.

These challenges relate to practical barriers to the application of circular transition:

- Insufficient information and the need to acquire additional knowledge and skills about business models of CE.
- Availability of adequate financial resources and financial justification for the use of new technological processes.
- Creation and implementation of public policies and standards of CE.
- Availability of grants and subsidies for investments in CE.

In the regulatory sense, the implementation of the CE in Serbia requires a more layered and multisectoral connection of national public policies and regulations that would provide favorable conditions for new investments.

In the institutional sense - unified and powerless position of the executive representatives at the Parliament in the context of the circular economy. In addition, it is necessary to educate the representatives of the state administration about the new concept of production, as well as the need for improvement and simplification of certain administrative procedures for new investments.

Finance/investments - The CE package gives a clear signal to entrepreneurs that the EU is using all the tools at its disposal to transform its economy, paving the way for new business opportunities and raising competitiveness.

Sectoral measures have also been identified, as well as key activities that include:

- Development of quality standards for secondary raw materials in order to increase the confidence of operators in the single market;

- Measures in the Work Plan for Ecodesign to promote the greatest possible repair of waste products, increase their durability and the possibility of the highest degree of recycling, while increasing the energy efficiency of these products;
- Revised Fertilizer Regulation, in order to facilitate the identification of organic fertilizers as well as waste-based fertilizers in the EU single market and to support the role of biological nutrients;
- Plastics strategy in the Circular Economy, which deals with issues of recyclability, biodegradability, the presence of hazardous substances in plastics;
- A range of other water reuse activities including a legislative proposal on minimum requirements for waste water reuse.

MONTENEGRO

1. Promotion of green economy, sustainable tourism, environment protection.
2. The use of innovative technology in economy, also in energy, mining, forestry.
3. Financing the main projects for communal infrastructure through EU funds.

ALBANIA

- Knowledge and training
- Reference from successful applications
- The change of mentality for the transition from the linear economy to the circular one

Main common conclusions & suggestions

Then main identified barriers for the implementation of CE among the majority of the partners are:

- Inconsistent legislation. Lack of incentives, regulatory background still not well defined. Bureaucracy.
- Still various gaps in the economic system on training, research & development, technology transfer.
- Market barriers: lack of a managerial approach, market value of recycled materials, willingness to pay for CE-based products.
- Insufficient information and the need to acquire additional knowledge and skills about business models of CE.
- Transnational movement of waste which prevents the policy of shortening the transport chain and localization of circle economy. It also increases dependency on external factors beyond local environments and national control.
- Limited availability of adequate financial resources and financial justification for the use of new technological processes.

Then main identified needs for the implementation of CE and to overcome barriers are:

- Creation and implementation of public policies and standards of CE. The main need is a sustainable business approach to the circular economy mentality. Creation of new business models for the implementation of CE. Circular

procurement. Meet National and European targets for reducing waste generation, waste reuse and recycling.

- Availability of grants and subsidies for investments in CE. Secure incentives and benefits for households and private operators that are respecting principles of CE and conduct separation in line with selected waste collection activities.
- The change of mentality for the transition from the linear economy to the circular one: awareness raising is needed to improve CE knowledge by the societal level.
- Encouraging the transition of CE through research, innovation and digitization. Connection between research centres and companies for developing technological solutions.
- The need of self-sufficiency is required along with reducing the cost of certain materials.
- Reference from successful applications.
- To equip utility companies with adequate equipment and resources that will enable realization of CE system.

Several sectoral measures and activities are also suggested:

- Development of industrial symbiosis models - registration of enterprises/waste generators in regional level.
- Zero waste companies. Resource recovery - the process that enables the return of useful resources and materials. Extending product life.
- Sharing platform by interconnecting product users and encouraging sharing, access or ownership to increase usage.
- Product as a service which implies a shift away from ownership of the product and offers clients, paid access products, allowing enterprises to retain the benefits of productivity and ownership of circular resources resulting from increased use of the product.
- Development of quality standards for secondary raw materials in order to increase the confidence of operators in the single market. Provide a market for secondary raw materials.
- Measures in the Work Plan for Ecodesign to promote the greatest possible repair of waste products, increase their durability and the possibility of the highest degree of recycling, while increasing the energy efficiency of these products.
- Revised Fertilizer Regulation, in order to facilitate the identification of organic fertilizers as well as waste-based fertilizers in the EU single market and to support the role of biological nutrients.
- Plastics strategy in the CE, which deals with issues of recyclability, biodegradability, the presence of hazardous substances in plastics.
- A range of other water reuse activities including a legislative proposal on minimum requirements for waste water reuse.

2.3. Technological gaps

ITALY

- There is a large gap between the conceptualization of eco-innovation principles and their practical implementation. Among the causes of this difference there is certainly the absence of an adequate context able to support the practical application of eco-innovation in companies due to lack of skills, lack of financial support, etc.
- There is a difficulty in effectively implementing a more structured collaboration between companies and the research and innovation system, capable of fostering technological development within companies, especially smaller ones.
- No strong application of digital technologies that are key enabling factors that can support the implementation of CE strategies, systems and instruments. Data management, blockchain, 3d printing and modelling, augmented reality, artificial intelligence are existing and emerging technologies which can be adapted to CE paths in a wide range of sectors (for example: production of electronic equipment, food tracking and tracing, etc.)

SLOVENIA

- Lack of capacities for the end part of recycling. This is partly due to regulatory deficiencies but also due to physical limitations of waste recycling factories.
- Lack of efficient technologies to offer a high level of sorting or exploitation at the lowest environmental impact. The degree of introduction of innovative equipment and practices varies significantly from one territory to another.
- Risks connected to sanitary conditions of warehouses for waste and appropriate measures in case of fire.

CROATIA

- Lack of efficient technologies and machinery to offer a high level of sorting or exploitation at the lowest environmental impact. The degree of introduction of innovative equipment and practices varies significantly from one territory to another.
- Every recycled waste it is exported to other EU countries, and then on the other hand, items like mats for playgrounds (that are made from used tires) are imported.
- Science and technology are not debatable – anything can be recycled, but some technological solutions do not come cheap; on the other hand, whatever we take from the environment has to be paid. The solutions should be found for all stages – from production, through sustainable consumption, recycling, and finally handling of this waste.
- Lack of capacity and old equipment for collection of recyclable materials. Old vehicles and technical equipment in municipal waste companies. Lack of existence of recycling processing industry.
- Lack of transport for recyclable waste. Lack of collection sites for household waste.
- Lack of compost processing facility. Low secondary raw material price and black market

GREECE

The technological gaps preventing the promotion of CE are:

- Lack of central facilities for biowaste treatment.
- Lack of communication and cooperation mechanism between waste producer and user.
- Lack of cooperation between companies and research centers. There is a high need for transferring knowledge and technologies from the Academic and Research Institutions to enterprises, industry and the above networks, and this transfer has to be reinforced further by the appropriate actors and administration.
- Lack of specifications for the use of secondary materials in procurement and technical projects.

BOSNIA AND HERZEGOVINA

The main gaps identified are:

- Inadequate capacity and equipment in utility companies that would enable collection of recycling waste and organization of waste separation on site. Obsolete equipment and technical means.
- Lack of vehicles for collection of separated waste. Lack of containers for waste separation. Lack of recycling industry. Lack of collection centers for household waste. Lack of facilities for processing of collected waste.
- Low level of reimbursement from citizens. Low level of awareness among citizens.
- The current laws do not regulate this segment appropriately and with enough detail that is resulting in different implementation between local administrations.
- Low level of support to utility companies from the state and local administration that resulted in lack of space and equipment for realization of CE strategy.
- Lack of composting facility for disposal of organic waste.
- Low price for secondary raw materials and unstable market.

SERBIA

- Waste design** - is based on the principle that parts of the product are effective designed to fit into biological or technical materials and to be manufactured in this way to allow for future easy disassembly or recovery. Biological materials are non - toxic and can be easily returned to the biosphere, while technical materials are designed to be recycled, they can be used with minimal energy while maintaining high quality.
- Creating resilience through diversification** - emphasizes that modularity, versatility and adaptability characteristics that create the elasticity of the enterprise. The second principle aims to seek efficiency, to establish a balanced point where resilience and efficiency are interconnected.
- Reliance on renewable energy sources** - the company or plant should strive for renewable energy sources. In practice, relying on renewable energy sources is can only be achieved by reducing energy consumption.

- D. **System thinking** - is the ability to understand how parts of a system affect each other as a whole. Including consideration of the elements in his infrastructure, environment and social contexts, as well as understanding stock flows.
- E. **Waste is a resource** - a material without any or small value and has no more purpose, it can be resource for some other processes or in some other system. Depending on the composition of the waste, it can be exploited through biological symbiosis or industrial symbiosis.
- F. **Cascading system of thinking** - creating value for biological materials lies in opportunities to extract additional value from products and materials with the application of cascade system, i.e. to create the material as a by-product from one production process represents a raw material for other production processes.
- G. **Think local** - organizations, projects and communities as natural ecosystems are affected their local environment. In order to take advantage of local opportunities, it is necessary increase local participation and adapt to the needs of the environment.
- H. **Focus on performance** - the goal is to create synergy through profitable exploitation of the three basic elements: creating value, jobs and reducing resource consumption through sales performance instead of goods.

MONTENEGRO

- Not developed communal infrastructure, technological equipment.
- Insufficient capacity for selective waste disposal and insufficient activity for raising awareness.
- Strengthening of staff capacity .

ALBANIA

- Machinery can be integrated to throw recyclable waste in exchange for coins.
- The mobility of waste transport vehicles can be optimized to reduce pollution and save fuel.
- Establishment of local centers for recyclable waste collection.

Main common conclusions & suggestions

The main identified technological gaps that are preventing realization of CE activities in the frame of current waste management practices are:

- There is a large gap between the conceptualization of eco-innovation principles and their practical implementation (lack of skills, lack of financial support, etc.).
- There is a difficulty in effectively implementing a more structured collaboration between companies and the research and innovation system, capable of fostering technological development within companies, especially smaller ones.
- No strong application of digital technologies that are key enabling factors that can support the implementation of CE strategies, systems and instruments.
- Lack of capacities for the end part of recycling. This is partly due to regulatory deficiencies but also due to physical limitations of waste recycling factories.
- Lack of efficient technologies to offer a high level of sorting or exploitation at the lowest environmental impact.

- Science and technology are not debatable – anything can be recycled, but some technological solutions do not come cheap.
- Lack of capacity and old equipment for collection of recyclable materials. Old vehicles and technical equipment in municipal waste companies. Lack of existence of recycling processing industry.
- Lack of transport for recyclable waste. Lack of collection sites for household waste.
- Inadequate capacity and equipment in utility companies that would enable collection of recycling waste and organization of waste separation on site. Obsolete equipment and technical means.
- Low level of support to utility companies from the state and local administration that resulted in lack of space and equipment for realization of CE strategy.

Sectoral technological gaps/ lacks:

- Lack of central facilities for biowaste treatment.
- Low price for secondary raw materials and unstable market. Lack of specifications for the use of secondary materials in procurement and technical projects
- Machinery can be integrated to throw recyclable waste in exchange for coins.
- Establishment of local centers for recyclable waste collection.

2.4. Skill requirements

ITALY

Skills for CE can be divided into Horizontal and Vertical skills:

- As for horizontal skills we can consider the need for managerial skills able to plan and perform strategies based on CE principles (sustainability management, for instance), data analytics and digital skills. Equally important is knowledge of the laws and rules at all levels: of the European Union, national and local.
- Concerning vertical skills, they depend on the specific sectors where CE can be applied: skills on renewable energies, recycling, food and electronic waste management, are all important technical areas where investment should be made to.

An analysis of the main sources of investigation on the issues of CE and eco-innovation in companies reveals some macro-trends:

- A lack of attention to the issue of human capital and skills, both in terms of actions implemented by companies and in terms of perceived needs and barriers.
- A "robustness" of companies with respect to technical aspects, witnessed by the adoption of analysis tools, eco-innovation actions/instruments, waste management, circular design and circular economy tools.
- A great sensitivity of companies towards aspects of the economic context, both as needs and perceived barriers.

It is therefore evident the need to promote training courses at all levels to develop functional professional figures to accompany companies in the adoption of CE courses. A strategic role for this purpose could be carried out by the Trade Associations, also exploiting some training tools such as the Joint Interprofessional Funds.

Moreover, a closer connection between the University system and enterprises could be encouraged in order to develop training paths oriented to the development of skills functional to the CE, such as:

- product life cycle analysis;
- efficient management of resources in production processes;
- the industrial symbiosis;
- consumer choices;
- the durability of products;
- innovative forms of consumption;
- efficient waste management;
- secondary raw materials;
- the closing of cycles.

SLOVENIA

CE can offer employment for people with specific skills:

- from design to IT for bigger operations
- to smaller scale repair in the re-use centers.

CE demands high diversity of knowledge fields and vertical diversification requiring upskilling and on-the-job training and work experience.

- Compliance with the Regulation on packaging waste (bags) as little packaging production as possible
- use of biodegradable materials
- use of materials suitable for recycling
- society must set environmental goals regardless of price
- society must set environmental goals regardless of price

CROATIA

This means a complete change in the existing economic system and innovations, not only in technology, but in organisation, society, funding methods and policies.

Today we can say that the whole concept of CE offers multiple job opportunities for creators, engineers and basically for every person that's interested in making difference in waste management. Due to that, for developing some models that can make a difference in waste management, it is crucial to connect academic bodies, institutes, research centre and developers. In development of a new innovative public models, local coordinators play key role in develop public strategies because new model should interface with the local culture, land use type, economic base, climatic condition, existing urbanization level and institutional arrangements.

So, basically, each produced product, primarily must be designed in a way that suits the consumer, because, only then the whole concept of circular economy will be accepted. If consumer doesn't like a particular product, or is unable to use it, it will not be useful to him regardless of its value as a circular product or product with „added value“. It is necessary to change consumer's perceptions and behaviours towards the circular products and services involved and here a big role play nothing more than education. Developers, designers and engineers can stimulate unique benefits or take away specific barriers and concerns.

The main skill requirement is to raise awareness among cozens and entrepreneurs on importance of separate waste collection and development of CE activities. The other skill requirements that our respondents identified are:

- development of incentives for citizens through cost reduction
- education or employment of waste management experts.

GREECE

The required qualifications and skills for implementing circular waste management models are:

- University degree in Environmental Engineering or Environmental Science, Chemical Engineering, in Mechanical Engineering with postgraduate in Waste Management, in Agriculture with postgraduate in Waste Management or Industrial Design.

The required skills of technical staff working in waste management facilities are:

- Experience in the operation of Biological Treatment Facilities or of facilities in Chemical Industry

The following skill requirements are essential for enterprises:

- Company's mission: change from "profitability" to "desired developmental footprint" (technological, social, environmental, etc.).
- Analysis of value chain stages and the effects of adding sustainable development goals into the value chain. Determine business goals and measurable viability indicators per stage.
- Selection of actions / projects / investments that comply with the company's mission, improve results and maximize the company's developmental footprint.
- Design and implementation of a new intermediate-term business strategy in cooperation with the employees.
- Adaptation/selection of Corporate social responsibility actions in the new business strategy.
- Communication, mobilization and information of development partners (suppliers, customers, investors, local authorities, ministries, networks, chambers, etc.) and cooperation for effective involvement, regulatory modifications, accompanying works.
- Monitoring and measurement of results (KPI - Key Performance Indicators).
- Reforming and improvement of strategy.

BOSNIA AND HERZEGOVINA

The main skill requirements that is pointed out by the majority of respondents is the ability to raise awareness of citizens and private operators on importance of waste separation and realization of CE activities. Other skill requirement listed by respondents are:

- Providing benefits for citizens through reduction of costs or introduction of model where the cost depends on quantity of waste.
- Education or employment of experts in sustainable waste management.
- Skills related to providing technical conditions for introduction of waste selection and sorting.

SERBIA

- Standardization of production by introducing ISO standards (14001, 9001, OSHAS 18000, 30000, 30001 ...), but also by introducing other "sustainable" and "environmentally friendly" standards and certificates;
- Transition from the classic process and processing industry to an innovative industry with a far higher value of final products;
- Raising social awareness;
- Establishing stronger ties with international companies moving towards sustainable business and that implement a CE;
- Establishing links with world development partners and networks of organizations such as the UN and the EU;
- Introduction of the concept of sustainable development as a milestone for opening new markets, including: Waste management, Renewable energy sources, Return logistics, Service activities, The knowledge economy, High state infrastructure projects, Projects of industrial symbiosis and establishment of eco-industrial parks, Organized overhaul, repair and remanufacturing systems, Waste and pollution treatment, Increasing the employment rate, New technologies, "Green" innovations, "Green" entrepreneurship based on CE.
- Education of experts for the latest forms of business and social activities;
- Reduction of negative effects on the environment, conservation of natural resources (including minerals, metals, other materials, water and air) and biodiversity;
- Modernization of industrial plants, which would be with proper coordination supported by large investors in new technologies; creating conditions for "cleaner production";
- Improving the model of taxes and duties on waste (plastics, cardboard and paper, metals, glass, etc.) in industry and households (including household and bio-waste), which would lead to an increase in the eco-fund for the further development of green innovations;
- Opening new markets abroad for marketing products and services (eng. value and knowledge export);
- Creating a knowledge economy and enabling orientation towards a green economy.

MONTENEGRO

- Professional training of staff in charge for making waste management plans.
- Education of teaching staff, especially in elementary and high schools by presenting them content and obligation from the EU directive related to CE.

ALBANIA

Have in-depth knowledge on waste management, basic economic knowledge and information technology.

Main common conclusions & suggestions

The main general (horizontal) skill requirements for a successful transformation to CE as reported by the majority of the partners are:

- Managerial skills able to plan and perform strategies based on CE principles (sustainability management, for instance), data analytics and digital skills. Equally important is knowledge of the laws and rules at all levels: of the European Union, national and local.
- Important skill requirement is to raise awareness among citizens and entrepreneurs on importance of separate waste collection and development of CE activities.
- Appropriate skills for staff in companies for the adoption of analysis tools, eco-innovation actions/instruments, waste management, circular design and circular economy tools.
- A closer connection between the University system and enterprises could be encouraged in order to develop necessary training paths oriented to the development of skills functional to the CE, such as: product life cycle analysis, efficient management of resources in production processes, the industrial symbiosis, consumer choices, the durability of products, innovative forms of consumption, efficient waste management, secondary raw materials, the closing of cycles.
- The required qualifications and skills for implementing circular waste management models are, at least: University degree in Environmental Engineering or Environmental Science, Chemical Engineering, in Mechanical Engineering with postgraduate in Waste Management, in Agriculture with postgraduate in Waste Management or Industrial Design, IT experts in relevant applications.
- The required skills of technical staff working in waste management facilities are, at least: Experience in the operation of Biological Treatment Facilities or of facilities in Chemical Industry up to smaller scale repair in the re-use centers.
- Introduction in the training and education centers of the following courses is required: Waste management, Renewable energy sources, Return logistics, Service activities, The knowledge economy, High state infrastructure projects, Projects of industrial symbiosis and establishment of eco-industrial parks, Organized overhaul, repair and remanufacturing systems, Waste and pollution treatment, Increasing the employment rate, New technologies, "Green" innovations, "Green" entrepreneurship based on CE.
- Separately skills on standardization of production are required by introducing ISO standards (14001, 9001, OSHAS 18000, 30000, 30001 ...), but also by introducing other "sustainable" and "environmentally friendly" standards and certificates.

The main sectoral (vertical) skill requirements for a successful transformation to CE as reported by the majority of the partners are:

- Skills on renewable energies, recycling, food and electronic waste management, agricultural wastes, industrial wastes, are all crucial technical areas where investment should be made.
- Skills related to providing technical conditions for introduction of waste selection and sorting.
- Exploitation and re-feeding waste streams after sorting or treatment.

3. Circular Economy and Recycling

ITALY

URBAN WASTE (2019) - City of Forlì 2018		
	Waste collection (kg)	Waste recycling (%)
Indifferentiated	14.665.394	?
Verde	5.152.545	65%
Organic	12.602.288	53%
Paper	8.447.579	64%
Plastic	1.157.015	23%
Glass	4.169.192	84%
Metals	139.460	64%
Legno	1.824.746	90%
WEEE	564.002	?
CDW	837.602	?
Bulky	1.118.034	?

NOT-URBAN WASTE (2017) tons in the Forlì-Cesena Province area	
	Total waste collected
Agriculture, forestry and fishing	17.281
Extraction of minerals from quarries and mines	48.993
Manufacturing activities	100.794
sewerage, waste management and remediation activities	286.116
Constructions	2.362
repair of motor vehicles and motorcycles	33.366
Transport and storage	1.034
accommodation and food services	72
Information and communication services	92
Financial and insurance activities	6

Professional, scientific and technical activities	446
Rental, travel agencies, business support services	1.474
Health and social care	853
Artistic, sports, entertainment and fun activities	88

SLOVENIA

In 2018, the population of Slovenia produced an average of 495 kg of municipal waste, 17 kg more than in 2017. In 2018, almost 8.4 million tons of waste were generated in Slovenia, of which 59% was construction waste.

The amount of construction waste is the main reason why the total amount of waste generated in Slovenia increased by almost 36% compared to the previous year. There was 1,025,000 tons of municipal waste (or 12% of all waste generated in Slovenia), of which 71% was collected separately.

Electronic waste:

PUP Saubermacher and company ZEOS had in 2015 set up two collectors for waste electrical and electronic equipment in Velenje (as first in Slovenia). The container collects: vacuum cleaners, irons, toasters, alarm clocks, scales, hair dryers, shavers, tablets, laptops, calculators, telephones, mobile phones, small radios, video cameras, small musical instruments, power tools, toys, outdoor equipment time and sports, batteries. Removal is carried out every three months.

Textile waste:

From April 2014 PUP Saubermacher separately collects textile waste (men's, women's and children's clothing, house textiles - sheets, blankets, towels, tablecloths, bedding etc., bags, hats, scarves, gloves, caps, belts) in Velenje, Šoštanj and Šmartno ob Paki.

Discarded textile materials or clothing are used in the following ways:

- 60% is used for re-use,
- 15% are used as wipes,
- 15% used in the textile, paper and automotive industries (storage shelves, mats ...),
- 10% is waste and ends up in landfills or incinerated.

In 2018, waste was treated in Slovenia according to the following management procedures:

Slightly more than 726,000 tons or almost 71% of municipal waste generated in Slovenia was collected separately. As in the previous year, in 2018 they were collected separately in the largest share in the Gorenjska statistical region (78%) and the least in the Koroška statistical region (55%). In the Osrednjeslovenska statistical region, 74% of municipal waste generated in this region was collected separately.

Nearly 8 million tons of waste have been recovered through final recovery operations, with just over 349,000 tons of waste disposed of. 42% more waste was recycled than in 2017; mainly a larger amount of construction waste was processed (more of this waste than in the previous year was used mainly for landfilling).

The amount of waste disposed of was 10% lower than in 2017. 157,000 tons of all types of waste were disposed of in landfills, which is a good percentage less than in the previous year. 92% of this waste was disposed of in municipal landfills, 4% in industrial landfills and also 4% in hazardous waste landfills.

Disposed waste mainly consisted of mixed municipal waste and residues from mechanical biological treatment of waste (54% in total), followed by construction waste (16%) and waste from the production and processing of pulp and paper (11%). Other types of waste were disposed of in smaller quantities.

Imports as well as exports of waste increased in volume compared to 2017; imports by 5%, exports by 6%. In 2018, most of the imported and exported waste was metal waste (56% was imported and 44% was exported).

Recycling rate of waste refers to the volume of recycled waste in the country in an individual year, divided by the volume of all waste submitted for treatment in the same year. Level of waste disposal is defined as the volume of waste disposed of in the country in an individual year, divided by the volume of all waste submitted for management in the same year.

Both indicators refer to waste that has been recycled or disposed of in the country, which means that the quantities of imported waste are excluded, and the quantities of exported waste are added.

CROATIA

The economic sector in the Republic of Croatia is one of the largest producers of waste. From the aspect of the circular economy, there are very few statistics that indicate the specific categories of waste generated by companies and their share in the circular economy, both at the state level and even more so at the regional level.

Nevertheless, some data have been processed and made publicly available. Data from 2017 show that the biggest producers of waste in Croatia are the service sector and the construction sector, each with a portion of 17%. After that comes the processing industry with a portion of 12% and waste collection, treatment, disposal and recovery activities with a portion of 11%. The remaining business activities comprise 12%.

GREECE

Greece disposes most of its municipal waste in landfills (80%, vs EU average of 24%), with only 19% being recycled (EU average 46%). The landfill rate has decreased modestly, and the recycling rate has slightly increased. According to the Commission's 2018 'early warning report', Greece is at risk of not meeting the 2020 municipal waste recycling target of 50%.

NATIONAL LEVEL:

	Recycling rate of municipal waste % (2017)
EU28	46.5%
Greece	18.9%

Source: Eurostat

	Recycling rate of overall packaging % (2017)
EU28	67%
Greece	68.6%

	Recycling rate of plastic packaging % (2017)
EU28	41.9%
Greece	41.46%

	Recycling rate of wooden packaging % (2017)
EU28	40.3%
Greece	20.4%

	Recycling rate of e-waste % (2017)
EU28	39.4%
Greece	32.9%

	Recycling of biowaste % (2017)
EU28	82%
Greece	21%

	Recovery rate of construction and demolition waste % (2016)
EU28	89%
Greece	88%

Source: Eurostat

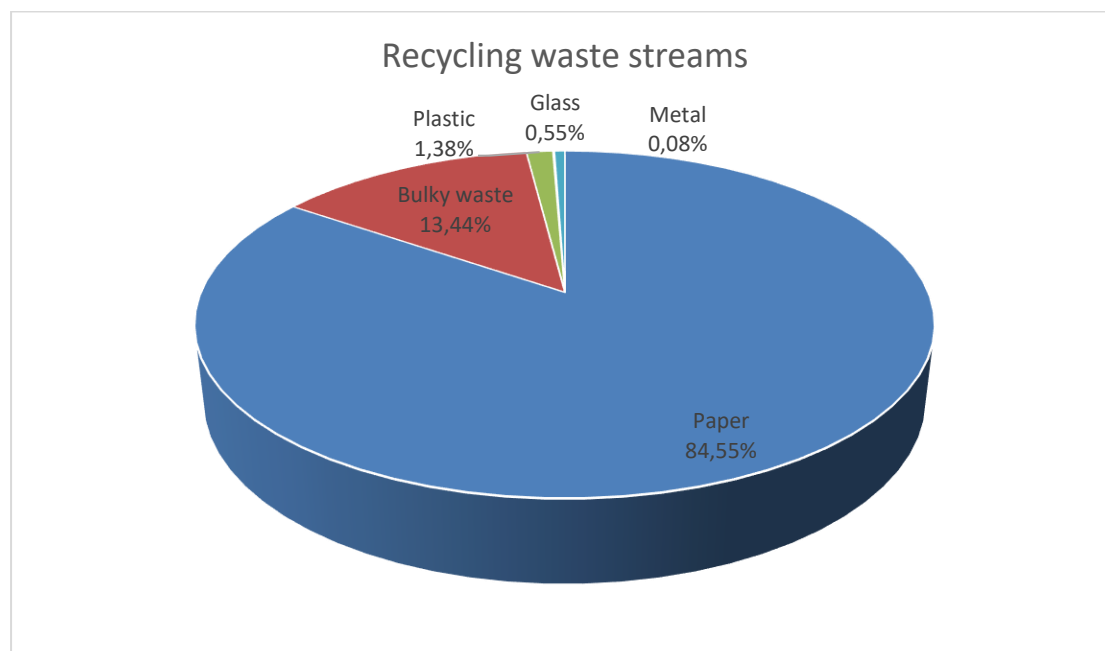
The recycling - exploitation rates per waste category in the Region of Central Macedonia are presented in Table 3:

Table 3. Recycling - exploitation rates per waste category in the Region of Central Macedonia.

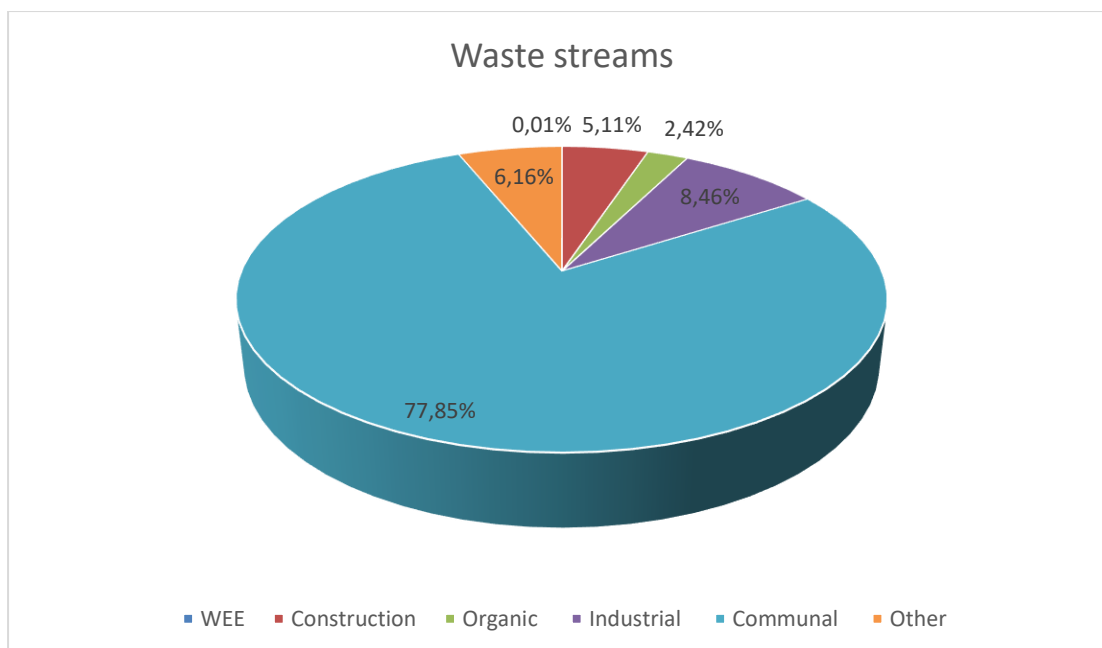
Type of waste	(%)
Mixed Packaging	12
Biowaste	<10
Mixed construction and demolition waste	95
Wood Waste	100

BOSNIA AND HERZEGOVINA

The respondents provided information on quantities of recycling quantities as well as overall waste quantity streams. It is important to mention that the majority of respondents for recycling quantities provided estimated data because the official is lacking. Based on estimation just 0,96% from collected communal waste is recycled.



The above chart presents percentage of recycling waste per categories from entire quantity of recycled waste. The data are based on collected information from all utility companies in target area. Other types of waste were not presented in data.



The above chart presents participation of waste components in total collected waste in target area. It is obvious that the Communal waste is dominant component in total disposed waste with almost 78% participation. Other presented components are in order Industrial waste with 8,46%, Other with 6,16%, Construction with 5,11% and Organic waste with 2,42% participation in total disposed waste. The component of Waste Electrical and Electronic Equipment is negligible with participation of only 0,01% in total collected waste.

SERBIA

In Serbia, only 257 kg out of 306 kg of waste per capita generated in 2017 was treated, of which as much as 256 kg ended up in landfills and 1 kg was used for obtaining secondary raw materials. The situation is better when it comes to packaging waste. The current packaging waste recycling rate is estimated at about 35-40%, which is still much lower than the rates seen in comparable countries, and particularly compared with the standards the EU is striving for (65% in all members states by 2025).

ALBANIA

National level

Waste	Rate (%)
Paper	5.37
Organic	47.63
Bulky	1.43
WEEE	0.31

4. References

SLOVENIA

1. Zakon o varstvu okolja (Environmental Protection Act), Uradni list RS, št. 41/ 2004 ter spremembe in dopolnitve
2. Statistični urad Republike Slovenije (SURS): <https://www.stat.si/StatWeb/>
3. Poročilo o izvajanju lokalne gospodarske javne službe zbiranja in prevoza komunalnih odpadkov in koncesije gradnje področnega centra za ravnanje z odpadki v Mestni občini Velenje, Občini Šoštanj in Občini Šmartno ob Paki za leto 2019 (Report on the implementation of the local economic public service of collection and transport of municipal waste and the concession for the construction of a regional center for waste management in the Municipality of Velenje, the Municipality of Šoštanj and the Municipality of Šmartno ob Paki for 2019), POP Saubermacher d.o.o., Velenje, 2020
4. Tehnični pravilnik o ravnanju s komunalnimi odpadki v Mestni občini Velenje, Občini Šoštanj in Občini Šmartno ob Paki (Technical rules on municipal waste management in the Municipality of Velenje, the Municipality of Šoštanj and the Municipality of Šmartno ob Paki), Velenje, 2018
5. Kažipot prehoda v krožno gospodarstvo Slovenije, Ministrstvo za okolje in prostor RS, Ljubljana, 2018
6. ARSO; Agencija Republike Slovenije za Okolje (Slovenian Environment Agency), <http://kazalci.arso.gov.si/>
7. Vpliv dostopnosti in volumna nameščenih zabojnikov na snovne tokove znotraj klasifikacijskih števil komunalnih odpadkov na območju MO Velenje (The impact of the availability and volume of containers mounted on material flows within the classification numbers of municipal waste in the area of the City municipality Velenje), Britovšek M., Centrih Ocepek A., doc. dr. Drev D., 2016
8. Strategija razvoja Slovenije 2030, Služba Vlade Republike Slovenije za razvoj in evropsko kohezijsko politiko, Ljubljana, 2017
9. NACIONALNI PROGRAM VARSTVA OKOLJA s programom ukrepov do 2030, Ljubljana, July 2019 (predlog)
10. Flash Eurobarometer 456: SMEs, resource efficiency and green markets (https://data.europa.eu/euodp/en/data/dataset/S2151_456_ENG)
11. Odpadki in emisije v sistemu krožnega gospodarstva, Zveza ekoloških gibanj Slovenije, Lipič K., Ljubljana, 2017
12. Priročnik za ravnanje s komunalnimi odpadki, Ministrstvo za okolje in prostor, Ljubljana, 2001
13. PROGRAM RAVNANJA Z ODPADKI and PROGRAM PREPREČEVANJA ODPADKOV REPUBLIKE SLOVENIJE, Vlada Republike Slovenije, 30. 6. 2016

CROATIA

1. Act on Sustainable Waste Management of the Republic of Croatia
2. Waste Management Plan of the Republic of Croatia 2017-2022
3. Waste management Plan of City Čakovec and Prelog and municipalities Donja Dubrava, Goričan, Donji Kraljevec, Belica and Strahoninec
4. Ministry of Environmental Protection and Energetics - <https://mzoe.gov.hr/>

5. Croatian Environment and Nature Agency - <http://www.haop.hr/>
6. The Environmental Protection and Energy Efficiency Fund- <http://www.fzoeu.hr/>
7. Međimurje County Report on the Waste Management Plan in Međimurje County for 2018
8. Cooperative Humana Nova Čakovec - <http://www.humananova.org/hr/home/>
9. Tehnix Ltd Donji Kraljevec - <https://tehnix.hr/>
10. Europe 2020 strategy
11. CityCircle project - <https://www.interreg-central.eu/Content.Node/CITYCIRCLE.html>
12. Guidelines for re-use in the Republic of Croatia - http://www.fzoeu.hr/docs/_v28.pdf
13. EU Circular Economy Action Plan - <https://ec.europa.eu/environment/circular-economy/>
14. Croatia: State Institute of Statistics, Census 2011
15. Osijek-Baranja County: State of waste management report, 2018

GREECE

1. https://circulareconomy.europa.eu/platform/sites/default/files/national_circular_economy_strategy.pdf
2. https://ec.europa.eu/environment/eir/pdf/report_el_en.pdf
3. <http://www.opengov.gr/minenv/wp-content/uploads/downloads/2015/06/paragogikhsanasygkrothsh.pdf>
4. <https://www.pde.gov.gr/gr/enimerosi/perifereiakos-sxediasmos-diaxeirisis-apobliton-perifereias-dytikis-elladas.html>
5. <https://www.espa.gr/el/pages/staticOPWesternGreece.aspx>
6. <https://ec.europa.eu/growth/tools-databases/regional-innovation-monitor/base-profile/region-dytiki-ellada>
7. <http://dytikiellada.gr/en/smart-specialisation-strategy-ris3/>
8. <https://ec.europa.eu/environment/eco-innovation/projects/en/projects/pyrice-ii>
9. <https://waste4think.eu/>
10. <https://www.pelopevents.gr/7o-anaptiksiako-Synedrio>
11. <http://dytikiellada.gr/%CF%80%CE%B1%CF%81%CE%BF%CF%85%CF%83%CE%AF%CE%B1%CF%83%CE%B7-%CE%B5%CF%80%CE%B9%CF%87%CE%B5%CE%B9%CF%81%CE%B7%CF%83%CE%B9%CE%B1%CE%BA%CE%BF%CF%8D-%CF%80%CF%81%CE%BF%CE%B3%CF%81%CE%AC%CE%BC%CE%BC%CE%B1/>
12. <https://ec.europa.eu/eurostat>
13. <https://www.statistics.gr/>
14. https://www.lawspot.gr/sites/default/files/annex_files/other/ethniko-sxedio-prolipsis-dim-apovliton.pdf
15. <http://www.opengov.gr/minenv/?p=6644>
16. -Greek National Strategy for Circular Economy (2018) Ministry of Environment and Energy
17. Regional Operational Programme, 2014 – 2020, Region of Central Macedonia

BOSNIA

1. Census of population, households and dwellings in Republic of Srpska in 2013, Republic of Srpska Institute for Statistics, 2017
2. Statistical Bulletin Environment, Republic of Srpska Institute for Statistics, 2019
3. Waste quantities 2019, Dep-Ot Regional Landfill Banja Luka, 2019

4. Environmental approximation strategy of Bosnia and Herzegovina EAS-BiH, Ministry of Foreign Trade and Economic Relations, 2017

SERBIA

1. Communication from the Commission to the European Parliament, The European Council, The Council, The European Economic and Social Committee and the Committee of the Regions, Brussels (2019). European Green Deal, (COM 2019) 640 Final
2. Ellen MacArthur Foundation (2019): Completing the picture how the circular economy tackles climate change, <https://www.ellenmacarthurfoundation.org/publications/completing-the-picture-climate-change>
3. European Commission (2019). Accelerating the transition to the circular economy, doi: 10.2777/983129
4. European Economic and Social Committee Final Report (2019): Circular economy strategies and roadmaps in Europe Identifying synergies and the potential for cooperation and alliance building, doi:10.2864/886410
5. United Nation of Environment Programme UNEP (2019): Emission Gap Report
6. Program Ujedinjenih nacija za razvoj (UNDP) (2019): Smernice za sprečavanje i smanjenje nastajanja otpada od hrane i unapređenje sistema doniranja hrane. CIRKULARNA EKONOMIJA 61 Izveštaj izrađen u okviru projekta „Platforma cirkularne ekonomije za održivi razvoj Srbije“
7. Program Ujedinjenih nacija za razvoj (UNDP) (2019): Interesovanje privatnog sektora za ulaganja u cirkularnu ekonomiju – identifikovani poslovni slučajevi za cirkularnu ekonomiju u Srbiji. Izveštaj sa studijama poslovnih slučajeva izrađena u okviru projekta „Platforma cirkularne ekonomije za održivi razvoj Srbije“
8. Aničić D., Nestorović O., Miletić V., 2019, Mogućnosti i ograničenja koncepta cirkularne ekonomije u Srbiji, Cirkularna ekonomija - prilika za održivi razvoj, Zrenjanin, str. 183-190.
9. OSCE Srbija (2017), Cirkularana ekonomija kao razvojna šansa Srbije, Organization for Security and Co-operation in Europe, str.16,30-33
10. Ellen MacArthur Foundation (2013) Towards the Circular Economy (2) – Opportunities for the consumer goods sector
11. Ellen MacArthur Foundation (2012) Towards the Circular Economy (1) – Economic and business rationale for an accelerated transition

<https://www.ekologija.gov.rs>

<http://www.sepa.gov.rs>

<http://cirkularnaekonomija.org>

<http://ambassadors-env.com>

<https://www.ellenmacarthurfoundation.org>

<http://www.osce.org/mission-to-serbia>