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Initial Foundations for the Transition to a Circular Economy

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Environment
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INŽENJERI ZAŠTITE ŽIVOTNE SREDINE

Environment Engineering Group

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This publication was compiled as part of the "Green Incubator" project, implemented by the Belgrade Open School, Young Researchers of Serbia and the Environment Engineering Group, with financial support from the European Union. The views and opinions expressed by the authors in this publication do not represent the official views of the European Union and are solely the responsibility of the authors.

Initial Foundations for the Transition to a Circular Economy

- Overview of an analysis of 40 cities and municipalities in the Republic of Serbia -

Contents:

1. Introduction

Wise people prepare for the coming changes and adapt gradually. The rest are waiting for change to slap them on the forehead.

The study "Initial foundations for the transition to a circular economy" is only the first step in understanding the challenges we face when we try to apply the circular economy model to a local self-government unit in Serbia in practice. The present study compiles the results we have obtained during almost three years of work in 40 local communities, wishing to draw attention to the challenges we identified and propose measures to solve them.

This study is one of the final products of the "Green Incubator" project, which, thanks to the support of the European Union, has been jointly implemented by the Belgrade Open School, Young Researchers of Serbia, and the Environment Engineering Group with the selfless help of other Coalition 27 members, external consultants and collaborators.

The goal of the "Green Incubator" is to strengthen the capacities of society, especially the civil sector, for active participation in the social changes required as part of Serbia's EU accession process in the fields of environmental protection and climate change.

As the circular economy is a relatively new business model, and the preparation of these studies at the local level is the first activity of its kind in Serbia, the methodology was modified after the first fifteen studies to obtain the best and most comprehensive overview possible from the available data.

Although the circular economy concerns other fields as well, not just waste, the accumulated problems in this area, as well as the timeframe the studies were being conducted and the limited available resources (data, human capacities, time...) were the reasons why they were primarily focused on the area of waste management without intending to treat other aspects of the circular economy as less important.

I would like to take this opportunity to thank everyone who contributed to the successful implementation of the "Green Incubator" project and created the necessary preconditions for our joint action in the direction of sustainable development and circular economy.

All the studies are available in electronic format on the Coalition 27 website www.koalicija27.org and the Environment Engineering Group's website www.activity4sustainability.org

Think globally, act locally!

MSc Igor Jezdimirović
President of the Executive Board
Environment Engineering Group

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2. What is the circular economy?

The current model of economic production and the behavioral pattern of human society summarized as “take - use - throw away” is not sustainable, and in contrast to it, a circular system, i.e., the circular economy, must be established, which will aim to redefine growth itself, focusing it on positive benefits for society.

The circular economy, as a model, is based on three principles:
- Product design and production processes that eliminate waste and pollution
- Long-term use of products and materials
- Regeneration of natural systems.

Product and production design that eliminates waste and pollution

The best way to solve the problem of waste is to design and plan products and production so that waste is not produced at all. The circular economy, through its design, tends to eliminate negative impacts on human health and natural ecosystems, leads to a reduction in greenhouse gas emissions, eliminates hazardous substances from the process, reduces water, land, and air pollution, as well as indirect pollution, e.g., by means of transport.

Long-term use of products and materials

In the circular economy, activities that preserve value are favored. This means that products and services provided according to the principles of the circular economy are long-term, suitable for reuse, redesign, and recycling. Thanks to this, they can value the energy, materials, and work invested in them more. Circular economy systems use natural materials, allowing for their transition between natural and technological systems.

Regeneration of natural systems

The circular economy avoids the use of non-renewable resources and works to preserve and exchange renewable resources, stimulating the return of nutrients to the soil, the use of renewable energy sources, water circulation within the system, and so on.

The circular economy is the path through which economic activity and success will be separated from the consumption of natural resources and the production of currently dominant waste. The circular economy is not only an economic activity but also a social change implying that success is based on managing to satisfy one’s needs in the long-term using the resources already available, eliminating the need to acquire new resources and generate waste.

Establishing such a business model requires a return to the beginning, i.e., to the drawing board, and rethinking the production model to include all acquired experience and knowledge, woven together with clear limitations based on the availability of materials and energy, and the requirement that what is produced be in use and function as long as possible. On a practical level, this would mean that the machine your grandfather bought could be used by your great-granddaughter with the same efficiency and success. Perhaps this seems like a utopia, but the engineering endeavors carried out with the aim of making products to last only as long as they are under warranty seemed impossible, and today this is the reality for all of us. We now have to correct the mistake with designs made to be short-lived and constantly require new products

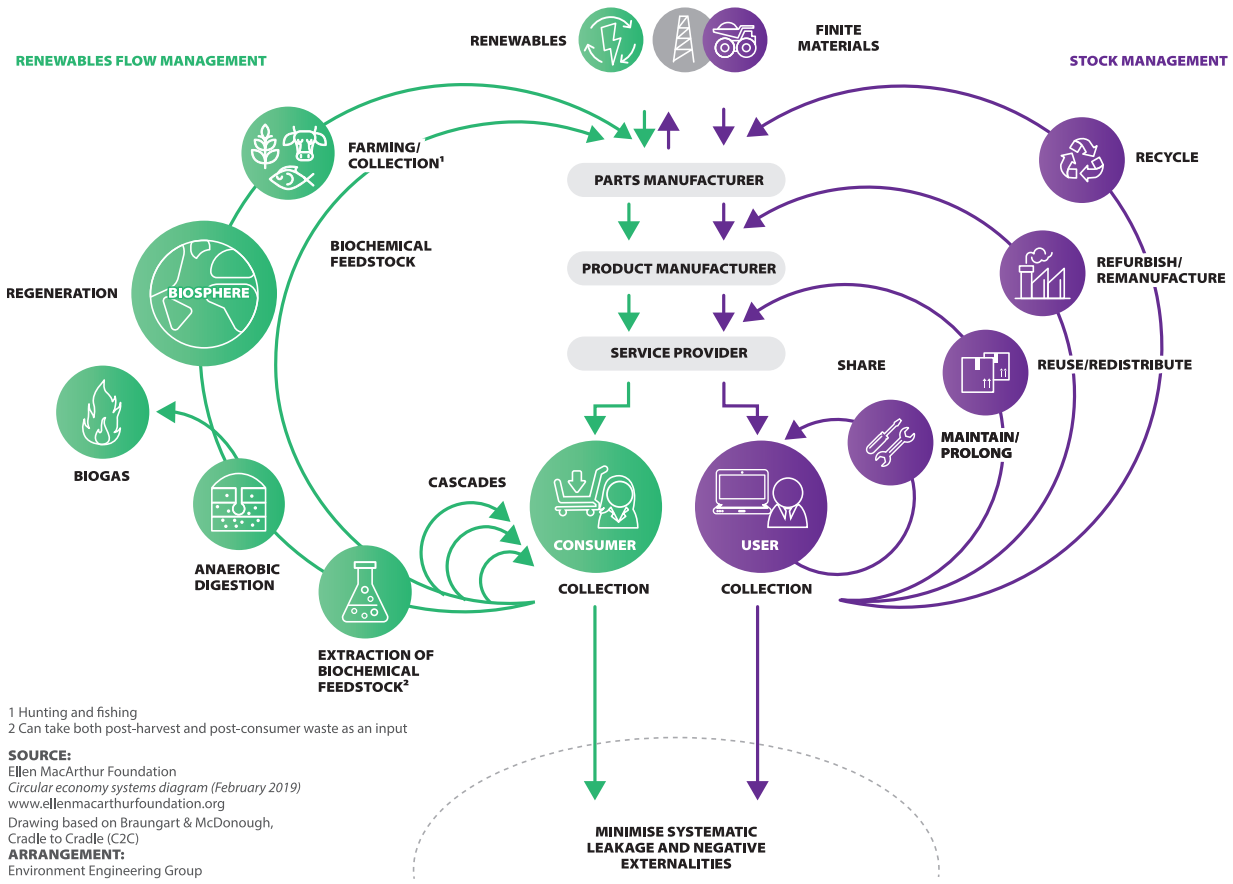
and ensure the long-term use of products and materials through smart design, reducing the generation of waste and giving natural ecosystems time to regenerate.

The concept of the circular economy builds economic activities in such a way as to have positive effects on the entire society. The circular economy recognizes the importance of effective business at all levels, from large to micro companies, from the organization to the individual, and from the global to the local level. The circular economy aims to create a resilient long-term system that generates economic opportunities while simultaneously providing social and environmental benefits.

Circulation of materials between the natural and technical systems

The human species owes its progress to its ability to observe and learn from nature. The circular economy system relies on the circulation of matter in nature and tries to integrate it into technological systems. Only nature is perfect, but it reached its perfection through a long series of trials and errors, constantly striving for minimal use of resources, and maximum usefulness for the entire ecosystem. In such ecosystems live only those who managed to adapt to the new circumstances and showed strength and determination to survive. It will be the same with the economy and technology: only those who are able to adapt and show the strength needed for change will survive.

Figure 1: Material circulation in the circular economy



1 Hunting and fishing
2 Can take both post-harvest and post-consumer waste as an input

SOURCE:
Ellen MacArthur Foundation
Circular economy systems diagram (February 2019)
www.ellenmacarthurfoundation.org
Drawing based on Braungart & McDonough, Cradle to Cradle (C2C)
ARRANGEMENT:
Environment Engineering Group

Circular economy at the individual level implies that each of us has a clear awareness that we can personally change society and change it with our every decision. If, as individuals, we start to think seriously and buy only what we need, preferring products that have returnable packaging or that can be used long-term, that are locally produced or produced in line with stringent environmental standards, we as consumers give a clear signal to companies which direction they must go in if they want to keep us as their users and clients. This is a significant step in changing most peoples' habits because understanding what we really need, instead of some product of advertising or social symbol, can significantly contribute to slowly adapting our way of life to new circumstances where resources are becoming scarce, and climate change is intensifying.

Technological development has made it possible for us to achieve a life model largely independent of the resources we receive from the other side. We can heat/cool, light, and supply our homes with electricity with the help of solar panels and heat pumps, giving our homes autonomy from various centralized systems, which most often cause intense pollution and use natural resources unsustainably.

By composting organic waste from our own households, we can produce the fertilizer needed to improve the quality of our gardens, while reducing the waste taken away and most often dumped into unsanitary landfills all over Serbia. By growing fruits and vegetables in our gardens or buying products from local farmers, we significantly reduce our impact on greenhouse gas emissions, as most produce is transported using fossil fuels. We also allow local production to survive and the local community to be more resilient to the coming changes, which, as we experienced during the COVID-19 pandemic, can easily stop or hinder international traffic and the movement of people and goods.

In some more developed countries, the concept of using and not owning has been in practice for a long time. For us today, it is unthinkable not to have a washing machine in our home, but for Swedes who live in collective housing, it is incomprehensible that everyone should have to buy a washing machine and find space for it in their homes. The buildings are designed to provide a room for washing and drying used by everyone, saving on the necessary living space, which shows that they are well organized as a society. Examples of the joint use of tools and devices are increasingly present in developed and organized societies, but such systems, in addition to significant benefits, entail individual responsibility - clear rules, a sense of ownership, and concern for common property and well-being. The circular economy tends to build trust between individuals and companies, promoting joint action and creating a synergistic effect of activities that are well planned and rely on each other.

The circular economy at the company/enterprise level can be viewed from two aspects - internal and external. From an internal point of view, any company that wants to apply the principles of the circular economy must take a good look at its work processes and try to achieve the greatest possible efficiency while consuming as few resources as possible, and producing as little waste as possible. If waste is generated, companies should find a way to put it to use.

Externally, every company should look at the possibilities offered by its environment and keep in mind the secret of nature that says: "one person's waste is another's treasure". Successful companies will look for partners who can reduce their resource consumption and offer a service instead of a product. They will look for partners who can create new value and new products out of unneeded materials. All this requires knowledge and reflection, connection and learning, which is available thanks to global communications. What is often missing is the time to think about

this and the will to adapt to the way of doing business and take advantage of the opportunities that the environment offers. An innovative approach and openness to research and trying new methods will play a key role here.

Changes are inevitable, and companies that are open to making the change from a linear to a circular business model can count on institutional and social support, because packages of measures to support these changes are already available, and citizens' awareness is changing. Recognizing the moment when changes have to be made is as important as the motivation to actually implement them.

When it comes to public companies, local self-governments and the state apparatus in general, in addition to the existing model of personnel rotation, will also have to demonstrate efficiency in doing their job and creating a business environment favorable for the development of circular business models based on long-term benefits for the whole society and on unambiguous data and numbers.

Practical examples of the circular economy model will provide the best insight into everything that can be achieved and tickle every entrepreneur's imagination. The following are just some examples, and the practical possibilities are limitless.

1. Circular supply models - these are business models where conventional raw materials are replaced by biodegradable, renewable, or recycled materials at the production design stage of the process. The bottom line is that the materials involved in the production should generate as little waste as possible. These business models are very similar to models of reusing resources, and the main difference is in the stage of the product life cycle in which raw materials are replaced (in these models, a new material is planned from the start as a raw material and the design of the production process is adapted to it). In the end, however, some waste is produced, which is further treated. The philosophy derived from these business models is defined as "cradle to cradle" or "from source to source".

2. Resource recovery models **-** predominantly, this concerns business models that produce secondary raw materials from waste and sell them to others for further production. These business models also include all businesses that replace traditional raw materials with waste used as a secondary raw material in existing production processes.

3. Product life extension models – the product is designed and manufactured *for long-term use* , and its life cycle is extended while still in production. Most often, these are machines, devices, and vehicles. In contrast to servicing business models, which extend the life of the product by repair, i.e. quality maintenance, the essence of these business models is to change the design of the production process (including the selection of raw materials) in order to extend the programmed life of the product.

4. Sharing economy models and services instead of sales - this includes all business models where the level of product use is increased through the exchange, rental, joint use, etc.

5. Product service system - business models for providing repair services that return the product to further use and extend its life.

3. Strategic and regulatory framework for implementing the circular economy from the European Union to the local level

Excessive and unsustainable resource consumption has created the need to adopt a systematic approach to solving this problem by applying the principles of sustainable development as an umbrella, holistic concept and paradigm that connects the economy, society and the environment. At the global level, there has been increasing talk for several years about the necessity of moving from a linear to a circular economy, and a large number of countries have already taken concrete steps towards fulfilling this goal. In 2015, the **UN Agenda 2030 for sustainable development**[1] was adopted, which requires that signatory countries mobilize all resources in order to eradicate poverty by 2030, fight against inequality, and find answers to climate change.

In addition to the 2030 Agenda, the most important global strategic document that should contribute to mitigating climate change is the **Paris Climate Agreement**[2] from 2015, in which the signatory countries committed themselves to make additional efforts to limit warming to 1.5° C above the pre-industrial period.

The circular economy can contribute to achieving the goals of international policies, especially the goals of sustainable development from the 2030 Agenda and climate goals from the Paris Agreement. Agenda 2030 defines 17 goals for sustainable development, several of which are directly related to the concept of circular economy: 6. Clean water and sanitation; 7. Affordable and clean energy; 9. Industry, innovation and infrastructure; 11. Sustainable cities and communities; 12. Responsible consumption and production; 13. Climate action. In addition, the circular economy contributes to the global climate change action plan through the active involvement of local and regional authorities and civil society organizations.

In order to create a sustainable society, the European Commission has passed a series of documents in recent years that include measures that will help encourage the transition of EU countries to a circular economy. In order to speed up the transition from a linear to a circular economy, in 2015 the EU adopted a document called **Closing the loop - An EU action plan for the Circular Economy**[3], with the aim of providing member countries with frameworks and guidelines on how to adapt their economy to the principles of a circular economy. The document recognizes the importance of national, regional, and local competent bodies for encouraging the circular economy by defining the regulatory framework and sending clear signals about the future direction of development. In May 2018, a package of circular economy directives was adopted, which prescribe new goals until 2035 in the area of waste management. This package consists of the following directives:

- Directive 2018/851 amending Directive 2008/98/EC on waste
- Directive 2018/852 amending Directive 94/62/EC on packaging and packaging waste
- Directive 2018/850 amending Directive 1993/31/EC on landfills
- Directive 2018/849 amending directives 2000/53/EC on waste vehicles, 2006/66/EC on batteries and accumulators and on waste batteries and accumulators and 2012/19/EU on waste electrical and electronic equipment.

1 UN 2030 Agenda for Sustainable Development, https://www.un.org/sustainabledevelopment/development-agenda/
2 Paris Agreement, https://ec.europa.eu/clima/policies/international/negotiations/paris_en
3 Closing the loop - An EU Action Plan for the Circular Economy, https://ec.europa.eu/transparency/documents-register/detail?ref=COM(2015)614

Concrete measures are defined to promote reuse and encourage industrial symbiosis; promote economic instruments; adopt calculation methods for recycling rates; economic incentives for putting "green" products on the market, etc. In addition, by 2024, the obligation to establish an extended producer responsibility program for all types of packaging is prescribed. The new rules stipulate that the amount of municipal waste that can be disposed of in landfills from 2035 must not exceed 10% of the total amount of municipal waste generated. Special attention is paid to the prevention of waste, including the prevention of food waste. Important provisions regarding the improvement of the quality of secondary raw materials and their use, the separate collection of hazardous waste from households, the collection of biological and textile waste, as well as the reuse of construction waste and demolition waste are introduced. In order to effectively implement the principles of the circular economy, the new legislation envisages a wider use of effective economic instruments and other measures as support for the hierarchy of waste management. The key elements brought about by the changes in the directives are:

- the common EU goal is to prepare for reuse and recycle 65% of municipal waste by mass by 2035;
- introducing primary selection for paper, metal, plastic and glass, no later than January 1, 2025, including textiles;
- establishing a construction waste classification system at least for wood, mineral fractions (concrete, brick, tiles and ceramics, stone), metal, glass, plastic and gypsum. (Directive 2008/98/EC prescribed targets for the preparation for reuse and recycling of non-hazardous construction waste of at least 70% of the mass of waste, which were to be reached by 2020. By the end of 2024, these targets will be considered and it is possible there will be a new proposal regarding targets for non-hazardous construction waste);
- the common EU goal for packaging waste recycling is at least 70% of the total packaging waste by mass by the end of 2030;
- the minimum goals by mass for recycling the following materials contained in packaging waste by the end of 2030 are: 55% plastic, 30% wood, 80% non-ferrous metals, 75% glass, 85% paper and cardboard;
- the common EU goal is to reduce the amount of landfilled municipal waste to 10% of the total amount (by mass) of generated municipal waste or less by 2035.

The provisions of these directives have not yet been transposed into Serbian legislation.

In December 2019, the new Brussels administration presented the *Green Deal*[4] which was announced as the most ambitious package of measures allowing Europe to become the first climate-neutral continent by 2050.

With the Green Deal, the EU committed itself to meet the goals of the 2030 Agenda and the Paris Agreement. Taking into account that more than half of greenhouse gas emissions and more than 90% of biodiversity loss and water scarcity come from resource extraction and processing, the Climate Change Strategy was adopted. This strategy envisages the implementation of measures and activities aimed at: greater use of clean energy, increased use of reusable or recyclable packaging, reduction of waste generation, improvement of public transport, cleaner and healthier water, air and soil, production of healthier food, etc. Achieving the goals of the Green Deal requires a new industrial policy based on the circular economy. It proposes that the industry be modernized and new markets for climate-neutral and circular products be developed.

4 EU Green Deal, https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1588580774040&uri=CELEX:52019DC0640

The framework plan with key activities, which follow the Green Deal, foresees the adoption of several important strategic documents in 2020. Two documents foreseen by the Green Deal, key from the point of view of the circular economy, were presented in March 2020 - **A New Industrial Strategy for Europe**[5] and the **New Circular Economy Action Plan for a cleaner and more competitive Europe**[6]**.**

According to the new industrial strategy, the industry is key to the future development and well-being of Europe and has a leading role in achieving climate neutrality in Europe, through the transition to resource- and energy-efficient business models. The circular economy can strengthen the EU's industrial base and encourage establishing small and medium-sized enterprises. Increasing investment in research and innovation, building and improving infrastructure will contribute to the development of new production processes and the creation of new jobs.

The Circular Economy Action Plan presents a set of interrelated initiatives to establish a strong and coherent policy framework where sustainable products, services, and business models will become the standard, and consumption patterns will be transformed so that no waste is generated. The plan encourages the reduction and reuse of materials rather than recycling and sets out requirements to prevent hazardous products from being placed on the EU market. This plan includes 35 planned actions at the EU level, six of which are directly aimed at waste management, with an implementation deadline by the end of 2022. Special attention is paid to the sectors of textiles, construction, electronics, batteries and vehicles, packaging, food waste, and plastics. The Commission has proposed measures to ensure that all packaging in the EU can be reused or recycled by 2030. New business models, based on renting goods and services, require a change in consumption patterns that will be in line with sustainable development. To implement all of these changes, digitalisation is also very important, as it contributes to the optimization of production processes in order to save materials and energy, and also enables the monitoring of water and air pollution. The aim of the plan is for the circular economy to benefit citizens, regions and cities, to contribute to climate neutrality and to use the potential of research, innovation and digitalisation.

In addition to the Industrial Strategy and the Action Plan for the Circular Economy, and in accordance with the outline plan of the Green Deal, a separate **Green Agenda for the Western Balkans has been prepared for the countries of the Western Balkans**[7]. On November 10, 2020, Western Balkans countries' officials signed the Sofia Declaration on the Green Agenda for the Western Balkans as a new strategy for the growth of this region, which transitions from the traditional model to a sustainable economy. By signing the Sofia Declaration, the countries of the Western Balkans undertook to implement measures in the field of climate change and pollution prevention, energy development, transport and circular economy, as well as biodiversity development, sustainable agriculture and food production.

The contracting parties of the Green Agenda for the Western Balkans will implement actions in five key pillars: 1) climate, energy and mobility; **2) circular economy**; 3) reduction of pollution; 4) sustainable agriculture and food production and 5) biodiversity.

5 A New Industrial Strategy for Europe, https://ec.europa.eu/info/sites/info/files/communication-eu-industrial-strategy-march-2020_en.pdf
6 A new Circular Economy Action Plan For a cleaner and more competitive Europe, https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1583933814386&uri=COM:2020:98:FIN
7 Green Agenda for the Western Balkans, https://ec.europa.eu/neighbourhood-enlargement/sites/near/files/green_agenda_for_the_western_balkans_en.pdf

For the circular economy, it is important that the countries of the Western Balkans: create national strategic documents for the circular economy, taking into account the prevention of waste generation, the entire life cycle of products, modern waste management and waste recycling, reuse, repair and re-production; make further progress in building and maintaining waste management infrastructure for cities and regions; design and implement consumer-oriented initiatives to raise citizens' awareness of waste, primary waste selection and sustainable consumption; conclude and implement a regional agreement on the prevention of plastic pollution, including specifically dealing with the priority issue of waste in the seas; further implement smart specialization strategies – economic transformation agendas for sustainability based on national or regional priorities and directed towards innovation.

As a precursor to the Green Agenda for the Western Balkans, the Economic and Investment Plan designed to support the long-term green socio-economic recovery of the region and its economic convergence with the EU was adopted[8]. This plan envisages the allocation of nine billion euros from the EU budget in the period 2021-2027 for these purposes, in order to support economic convergence with the EU through investments and support competitiveness and growth, sustainable connectivity and digital transition.

As part of the EU accession negotiations, the Republic of Serbia accepted the Acquis Communautaire and undertook to transfer it into national legislation. When it comes to the circular economy, given the multidisciplinary nature of the topic, several public policy documents have been adopted in the last few years that will facilitate the transition from a linear to a circular economy in Serbia. **The national strategy for the sustainable use of natural resources and goods**[9], which was adopted in 2012, defined the framework for the sustainable use and protection of natural resources with the aim of supporting socio-economic development for ten years, even before the existence of the term circular economy. Among the twenty-five principles on which the Strategy is based are the principle of preserving natural values and the principle of rehabilitation and remediation.

In June 2019, the **Sustainable Urban Development Strategy until 2030 was adopted**[10]. The Strategy lists twelve priority topics, one of them being the circular economy. Measures for mitigating climate change by improving the quality of all environmental parameters, waste management systems and improving energy efficiency are also listed as measures for achieving the goals of urban development. In addition to these, other measures contribute to the circular economy, the most important of which are: improvement of air quality through the use of green infrastructure, roof greening, limited movement of individual motor vehicles in central urban areas; balancing the environmental capacity and the strain caused by activities in the economy, agriculture, tourism, energy, etc. This strategy defines the obligations of local self-governments related to the adoption of **local strategies of integral urban development - SIUR**, which are prepared in accordance with this strategy. Local strategies determine priority areas of intervention and priority projects of urban development. SIUR represents a framework for defining strategic projects with which local self-government units apply for funds from national, European and international funding sources. The adoption of these documents will also affect the development of circular communities, which are the goal of every society.

8 Economic and Investment Plan, https://ec.europa.eu/neighbourhood-enlargement/sites/near/files/communication_on_wb_economic_and_investment_plan_october_2020_en.pdf
9 National strategy for the sustainable use of natural resources and goods, https://www.pravno-informacioni-sistem.rs/SlGlasnikPortal/eli/rep/sgrs/vlada/strategija/2020/21/3
10 Sustainable Urban Development Strategy until 2030, https://www.pravno-informacioni-sistem.rs/SlGlasnikPortal/eli/rep/sgrs/vlada/strategija/2019/47/1/reg

The Industrial Policy Strategy of the Republic of Serbia for the period 2021-2030[11] adopted in March 2020 is also important for the development of the circular economy. One of the chapters is dedicated to the circular economy and the reduction of greenhouse gas emissions. The conclusions reached during the preparation of the Strategy are that industrial production is dominated by outdated technologies that intensively consume energy, generate large amounts of waste, and raw materials are used inefficiently. The lack of infrastructure for the treatment of industrial and other types of waste, insufficient purifiers for wastewater, insufficient utilization of the potential of renewable energy sources are just some of the recognized problems. In the Action Plan for the implementation of the strategy, which was adopted in April 2021, **the transformation of the industry from a linear to a circular model is defined as a special goal** through several measures that will be implemented in the next three years: promotion of the circular economy and education of businesses; encouraging investments in circular and low-carbon economy solutions as growth generators; encouraging more efficient use of material resources and energy efficiency in industrial processes.

The Strategy for smart specialization in the Republic of Serbia for the period from 2020 to 2027[12] is an important instrument for improving the innovation and research ecosystem in the Republic of Serbia. Through the process of creating this document, a number of priority areas were identified in which further investment is needed, namely: information and communication technologies; food of the future; machines and production processes of the future, and creative industries. The innovations encouraged by this strategy are crucial for the development of the circular economy.

The Program for the development of public procurement in the Republic of Serbia for the period 2019-2023[13] and the Action Plan for the implementation of the Program recognized the importance of promoting and encouraging the environmental and social aspect in public procurement.

At the initiative of the Ministry of Environmental Protection, an intersectoral working group composed of representatives of relevant ministries and institutions was formed, with the aim to help in defining the strategic framework for the circular economy. In May 2020, the **Roadmap for the circular economy in Serbia**[14] was presented, showing a way forward for the transition to a circular economy model that, in addition to profit, focuses on environmental protection and sustainable development. This document is the first of its kind in the region, and it was modeled after similar documents in EU countries (Slovenia, Finland, the Netherlands, etc.). The idea is for the Roadmap to initiate a dialogue between decision-makers, industry representatives, the academic sector and civil society, as well as to encourage the entire society to make systemic changes in the treatment of resources. The selected sectors, which are analyzed and presented in the document, are: the manufacturing industry; agriculture and food - surplus food and food waste; plastics and packaging; construction waste. In order to prepare a strategic framework for the circular economy, in 2020, the Ministry of Environmental Protection prepared an **ex-ante analysis of the effects of the circular economy**[15], in accordance with the Law on the Planning

11 Industrial policy strategy of the Republic of Serbia for the period 2021-2030., https://www.pravno-informacioni-sistem.rs/SlGlasnikPortal/eli/rep/sgrs/vlada/strategija/2020/35/1/reg
12 Strategy of smart specialization in the Republic of Serbia for the period from 2020 to 2027, ".Official Gazette of the RS", 21/2020
13 Program for the development of public procurement in the Republic of Serbia for the period 2019–2023., http://www.ujn.gov.rs/strategija/
14 Road map for the circular economy in Serbia, https://www.ekologija.gov.rs/sites/default/files/2021-01/mapa-puta-za-cirkullarnu-ekonomiju-u-srbiji.pdf
15 Ex-ante analysis of effects for the circular economy, https://www.ekologija.gov.rs/sites/default/files/2021-01/exante-analiza_efekata-za-oblast-circularne-ekonomije.pdf

System of the Republic of Serbia[16] and by-laws. The results of the aforementioned analysis showed that the area of the circular economy requires a special public policy document - the Circular Economy Program.

The Program for the development of the circular economy in the Republic of Serbia for the period 2022-2024 was drafted at the end of 2021, and its adoption is expected in 2022. This document will define measures and activities that will help implement the circular economy concept in Serbia for the 2022-2024 period.

The adoption of the low-carbon development strategy is expected in the coming period, while the **Waste Management Program 2022-2031[17] was adopted** in January 2022. The program establishes strategic goals in the field of waste management, which allow for the reduction of harmful effects on the environment and climate change, but also fulfill the prerequisites for the use of waste in a circular economy. Its goal is to minimize the impact of waste on the environment while increasing the efficiency of using resources based on the principles of the circular economy. In April 2022, the **Action Plan for the period 2022–2024 for the implementation of the Waste Management Program in the Republic of Serbia for the period from 2022 to 2031[18]** was adopted.

In addition to the aforementioned strategic framework in areas relevant to the circular economy, with the adoption of the Law on Climate Change ("Official Gazette of RS", No. 26/21), the Law on Amendments to the Law on Waste Management, which is expected to be adopted in 2022, and a set of laws in the field of energy: the Law on the Use of Renewable Energy Sources ("Official Gazette of the RS" 40/21) and the Law on Energy Efficiency and Rational Use of Energy ("Official Gazette of the RS", No. 26/21) will accelerate the "green" transition in our country.

In the process of transition, local self-government has a very important role. The role of local self-government, how it understands the potential of the circular economy, and what the recommendations are, is described in a document prepared by the Permanent Conference of Cities and Municipalities entitled **Analysis of the capacity of local self-government units for creating conditions for the transition to a circular economy[19]**. One of the conclusions of the Analysis is that 71.1% of survey participants stated that they are familiar with the concept of the circular economy, which is an excellent basis for the development of the circular economy at the local level. Local governments have the obligation to create and implement local waste management plans in accordance with the Law on Waste Management, so updating these plans represents an opportunity to expand them to other aspects of the circular economy. Given that there is no legal basis for the adoption of local circular economy plans, it is necessary to encourage the adoption of local roadmaps for the circular economy in the coming period, through education of decision-makers, businesses, civil sector associations, and the population at the local level.

16 Law on the Planning System of the Republic of Serbia, https://www.paragraf.rs/propisi/zakon-o-planskom-sistemu-republike-srbije.html
17 Waste management program in the Republic of Serbia for the period 2022-2031, https://www.pravno-informacioni-sistem.rs/SlGlasnikPortal/eli/rep/sgrs/vlada/drugiakt/2022/12/1
18 Action plan for the period 2022–2024. for the implementation of the Waste Management Program for the period 2022-2031, https://www.srbija.gov.rs/doku ment/45678/strategije-programi-planovi-.php
19 Analysis of the capacity of local self-government units for creating conditions for the transition to a circular economy, http://www.skgo.org/biblioteka/publikacije-analize-i-prog-dokumenta/zivotna-sredina-i-vanredne-situacije?thematic=25

4. Overview of the analysis of 40 cities and municipalities

The research that forms the basis for the studies on the potential of cities and municipalities for the transition to the circular economy was carried out in the period from April 2020 to April 2022, and was carried out by two research teams in cooperation with the team of the Environment Engineering Group. The initial methodology was modified in order to obtain, in selected segments and where possible, a more complete picture of the situation in each local self-government.

The first cycle of analyses covered 15 cities and municipalities: Aranđelovac, Bačka Palanka, Bački Petrovac, Bajina Bašta, Beočin, Čačak, Gornji Milanovac, Kosjerić, Kragujevac, Kraljevo, Raška, Stara Pazova, Subotica, Trstenik and Zrenjanin. The goal was to recognize the conditions, needs, and possible obstacles in the development and application of circular business models for small and medium-sized enterprises, entrepreneurs, and associations.For this purpose an analysis of the available data and qualitative research was carried out using the method of in-depth interviews with selected representatives of local governments, public utility companies, micro- and small and medium enterprises and entrepreneurs. Data was collected from various sources (database of companies and entrepreneurs, official statistical data and public records, international statistics, results of domestic research) on the essential characteristics of the socio-economic and institutional context, the waste management system, the development of entrepreneurship and socially responsible business in specific communities. The research team tried to draw attention to the connection of three major development concepts: socially responsible business, entrepreneurship and circular economy, taking the view that this approach has the potential to reduce the misunderstanding of these relatively new concepts and their interconnection into a logical whole, important for social development, avoid repeating mistakes or learning lessons already learned in parallel streams that do not communicate and create a synergistic effect for resource utilization.

In the second cycle, another 25 cities and municipalities were analyzed: Bečej, Bela Crkva, Bor, Despotovac, Irig, Krupanj, Leskovac, Niš, Novi Sad, Pančevo, Ruma, Šabac, Sombor, Srbobran, Sremska Mitrovica, Sremski Karlovci, Temerin, Titel, Ub, Valjevo, Vladimirci, Velika Plana, Vrbas, Vršac and Žabalj. The authors presented the concept of the circular economy and the strategic and regulatory framework for its implementation from the European to the local level. Starting from the fact that new circular economic models are not only an economic activity, but also a social change, and that long-term planning and finding interest for cooperation at the level of the entire community is necessary to create a stimulating environment, the two most significant aspects that have the potential to set the initial framework for transition have been singled out: the legal and institutional frameworks of specific local self-governments and their waste management systems. For each of the analyzed municipalities/cities, in addition to specific recommendations for the industrial, commercial and municipal waste management sectors, recommendations that may be significant for different actors - for decision-makers, small and medium-sized enterprises, entrepreneurs, organizations, associations or individuals seeking to practically apply circular economy models were also compiled.

Although the idea was to conduct the research in such a way that the sample included all 24 administrative districts[20], the non-transparency of the data and the situation on the ground did not allow for it, so the choice of cities and municipalities, which will be analyzed, was made based on availability, i.e., the ability of the members of the research team to establish contact with some of the actors of the waste management system in the local community. This was also the

20 According to the current Regulation on administrative districts, there are 29 of them in the Republic of Serbia, five of which are in the territory of Kosovo; https://www.pravno-informacioni-sistem.rs/SlGlasnikPortal/eli/rep/sgrs/vlada/uredba/2006/15/1

reason for modifying the initial methodology and shifting the focus of the analysis to segments for which information and data exist (or there is an obligation to record them) and which can provide a view of the initial framework for the transition.

We will present the conducted research, where possible, by presenting the key points that were analyzed in the second cycle, namely: the socio-economic context, legal-institutional prerequisites for the transition to a circular economy, basic data on the municipal waste management system and basic data on the industrial waste management system and commercial waste.

4.1. Socio-economic context for the transition to a circular economy

The Republic of Serbia applied for membership in the European Union in December 2009, and was granted candidate status in March 2012. Two years later, the accession negotiations began - negotiations on the modalities, conditions and dynamics of accepting the legal acquis of the EU in the form in which they are in effect for other members of the Union. The EU acquis is divided into 35 chapters which are negotiated separately until the conditions under which the candidate country will harmonize its legislation with the EU legislation are agreed upon. In February 2020, a new methodology was adopted and the 35 negotiation chapters were grouped into six clusters. Serbia has opened two so far - cluster 1 "Fundamentals" and cluster 4 "Green agenda and sustainable connectivity".[21]

The aforementioned processes caused numerous and continuous changes in the institutional system in the past decade (an overview of the amended laws and regulations in the sectors that are important for the development of the circular economy is given in Chapter 3), so it was extremely difficult to create a framework in which to analyze the socio-economic context of a specific local community. In the Republic of Serbia, the main producer and disseminator of official statistical data, the responsible and expert authority, organizer and coordinator of the system of official statistics and the country's representative in the international statistical system is the Republic Statistical Office (RSO)[22], so the data used in the analyses are largely based on information from RSO databases.

Through the next four sub-chapters, for 40 analyzed cities and municipalities, we will present information we have singled out as significant for the first steps and/or improvement of already initiated processes of transition to circular economy models.

4.1.1. Basic data and population data

According to the data of the Republic Geodetic Institute[23], the territorial area of the Republic of Serbia is 88,499 km^2, of which the area of the region of Kosovo and Metohija is 10,910 km^2. The largest area is occupied by the City of Belgrade - 3,243 km^2, followed by the City of Kraljevo - 1,530 km^2, the City of Zrenjanin - 1,327 km^2, the City of Pirot - 1,232 km^2 and the City of Sombor - 1,216 km^2. The smallest territory is occupied by the two city municipalities of the City of Belgrade - Vračar (3 km^2) and Stari grad (5 km^2), then the municipality of Sremski Karlovci (51 km^2) and the municipality of Lapovo (55 km^2).

21 Portal "Pregovori o pregovorima" by the Belgrade Open School, https://eupregovori.bos.rs/hronologija-odnosa-srbije-i-eu.html
22 Law on Official Statistics, "Official Gazette of the Republic of Serbia" no. 104/2009
23 The publication of the Republic Statistical Office "Municipalities and Regions in the Republic of Serbia 2021", https://publikacije.stat.gov.rs/G2021/pdf/G202113048.pdf, was used to create this presentation.

The total number of settlements in the Republic of Serbia is 6,158; most being within the City of Belgrade - 157, the City of Leskovac - 144, the City of Prokuplje - 107, the City of Vranje - 105, the Municipality of Sjenica and the City of Kruševac - 101. Of the total number of settlements, 1,449 are in the region of Kosovo and Metohija. In accordance with the Law[24], the territorial organization of the Republic of Serbia consists of municipalities, cities and the City of Belgrade, as territorial units, and autonomous provinces, as a form of territorial autonomy. There are a total of 145 municipalities, 28 cities, plus the City of Belgrade, that is, there are a total of 174 territorial units; 29 of them are in the region of Kosovo and Metohija.

When it comes to the number of inhabitants, the last population census was conducted in 2011. In February 2020, the National Assembly of the Republic of Serbia adopted the Law on the Census of Population, Households and Apartments in 2021, however, due to the unfavorable epidemiological situation caused by the COVID-19 pandemic, the implementation was postponed; On April 7, 2021, the Law on Amendments to the Law on the Census of Population, Households and Apartments was adopted [25], which established that the field implementation of the census will be conducted from October 1 to 31, 2022. The Republic Statistical Office estimates the population for each post-census year, but since the results of the census are the only ones based on real data, they are used as the basis for drafting most public policy documents.

The total number of inhabitants of the Republic of Serbia in 2011, excluding the regions of Kosovo and Metohija[26] was 7,186,862, of which 48.69% were men (3,499,176) and 51.31% were women (3,687,686). The average age was 42.2; the average age of the male population was 40.9 years, while the average age of women was 43.6. Observed by municipalities and cities, the oldest population in 2011 was recorded in the municipalities of Crna Trava (53.7 years old), Gadžin Han (52.5) and Svrljig (50.6), while the municipality of Tutin had the lowest average age - 32.1.

Based on RSO estimates for 2020, the total number of inhabitants of the Republic of Serbia is 6,899,126 (without the region of Kosovo and Metohija). Most of them live in the city of Belgrade - 1,694,480, followed by the city of Novi Sad - 362,675 and the city of Niš - 254,723; the least in Crna Trava – 1,100 people. Only in four local self-government units (LGUs) was an increase in the number of inhabitants compared to the 2011 census: in the City of Belgrade from 1,659,440 to 1,694,480, in the City of Novi Sad from 341,625 to 362,675, in the City of Novi Pazar from 100,410 to 107,822 and in the municipality of Tutin from 31,155 to 32,010. In all other municipalities and cities, the number of inhabitants has decreased in the past decade.

According to the number of inhabitants per 1 km^2, the Belgrade municipality Vračar stands out, where 19,321 people live per 1 km^2. Outside of Belgrade, the highest population density was recorded in one of the five municipalities of the city of Niš - Medijana, where 8,452 people live per 1 km^2. The lowest population density is in Crna Trava - four people per 1 km^2, Trgovište, Bosilegrad and Medveđa - 12 people per 1 km^2.

Table 1 shows selected data for 16 cities and 24 municipalities, which were analyzed within the “Green Incubator” project.

24 Law on Territorial Organization of the Republic of Serbia, https://www.pravno-informacioni-sistem.rs/SlGlasnikPortal/eli/rep/sgrs/skupstina/zakon/2007/129/1/reg

25 Law on Amendments to the Law on the Census of Population, Households and Apartments, https://www.paragraf.rs/propisi/zakon-o-popisu-stanovnistva-domacinstava-i-stanova.html

26 In the publications of RSO, there is no data for the region of Kosovo and Metohija. As stated, “since 1999, the RZS does not have individual data for the AP of Kosovo and Metohija, so it is not included in the data for the Republic of Serbia (in total). The 2011 census was not conducted on the territory of AP Kosovo and Metohija.”

*Table 1: General data for 40 LGUs processed within the scope of the research (area, number of settlements, population)**

	City/Municipality	Surface area km²	Number of settle-ments	Number of inhabitants (2011 census)	Average age (in 2011)	Estimated number of inhabitants - June 30, 2020	Number of inhabitants per 1 km² (2020)
1	Aranđelovac	376	19	46,225	42.00	42,766	114
2	Bačka Palanka	590	14	55,528	42.4	51,264	87
3	Bački Petrovac	158	4	13,418	42.3	12,859	80
4	Bajina Bašta	673	36	13,418	43.3	23,859	35
5	Bečej	486	5	37,351	41.5	34,675	71
6	Bela Crkva	353	14	17,367	42.2	15,790	45
7	Beočin	184	8	15,726	40.8	14,905	81
8	City of Bor	856	14	48,615	42.3	43,983	51
9	City of Čačak	636	58	115,337	42.7	108,737	171
10	Despotovac	623	33	23,191	45.9	40,749	49
11	Gornji Milanovac	836	63	44,406	43.7	19,792	32
12	Irig	230	12	10,866	44.1	9,806	43
13	Kosjerić	358	27	12,090	45.5	10,462	29
14	City of Kragujevac	835	57	179,417	41.8	175,716	210
15	City of Kraljevo	1,530	92	125,488	42.3	115,921	76
16	Krupanj	342	23	17,295	42.9	15,079	44
17	City of Leskovac	1,025	144	144,206	42.1	132,764	130
18	City of Niš	596	71	260,237	41.9	254,723	427
19	City of Novi Sad	699	16	341,625	40.00	362,675	519
20	City of Pančevo	756	10	123,414	41.6	118,971	157
21	Raška	670	61	24,678	43.00	22,077	33
22	Ruma	582	17	54,339	42.7	50,966	88
23	City of Sombor	1,216	16	85,903	43.5	77,463	64
24	Srbobran	284	3	16,317	41.4	15,255	54
25	City of Sremska Mitrovica	762	26	79,940	42.2	74,609	98
26	Sremski Karlovci	51	1	8,750	42.2	8,265	162
27	Stara Pazova	350	9	65,792	41.00	64,677	185
28	City of Subotica	1,007	19	141,554	41.9	135,678	135
29	City of Šabac	797	52	114,884	41.7	109,340	137
30	Temerin	170	3	28,287	40.5	27,629	163
31	Titel	261	6	15,738	41.2	14,944	57
32	Trstenik	448	51	42,966	45.1	37,862	85
33	Ub	456	38	29,101	42.5	26,976	59
34	City of Valjevo	905	78	90,312	43.2	84,586	93
35	Vladimirci	338	29	17,462	44.5	15,307	45
36	Velika Plana	345	13	40,902	42.9	37,222	108
37	Vrbas	376	7	42,092	40.8	38,654	103
38	City of Vršac	800	24	52,026	41.9	48,514	61
39	City of Zrenjanin	1.327	22	123,362	42.2	114,679	86
40	Žabalj	400	4	26,134	39.7	24,852	62

* Source: Republic Statistical Office, publication “Municipalities and Regions in the Republic of Serbia 2021”, https://publikacije.stat.gov.rs/G2021/pdf/G202113048.pdf

4.1.2. Selected data on economic potentials

In accordance with the provisions of the Law on Regional Development[27], and according to the level of development, local self-government units (LGUs) in the Republic of Serbia are classified into four groups: Group I - level of development above the national average, Group II - level of development from 80% to 100% of the national average, Group III - level of development from 60% to 80% of the national average and Group IV consisting of local self-government units whose level of development is below 60% of the national average. Although the aforementioned Law prescribes that the competent ministry determines the level of development of LGUs once a year, according to the prescribed methodology, only the Regulation on establishing a comprehensive list of the development of regions and local self-government units[28] from 2014 is publicly available, according to which a total of 20 LGUs are classified into Group I, 34 into Group II , 47 into Group III and 44 into Group IV, as extremely underdeveloped LGUs.

Records on the degree of development of municipalities and cities and the number of companies and entrepreneurs registered on their territory are kept by the Serbian Business Registers Agency on a special website called "Incentive Maps"[29]. In December 2021, a total of 133,379 active companies and 286,312 active entrepreneurs were recorded on the territory of the Republic of Serbia. The largest number of companies was registered in the territory of the City of Belgrade - 62,935, where the largest number of entrepreneurs - 81,715 was recorded in the same period.

The Republic Statistical Office has launched a separate website that displays the Register of Industrial Zones in the Republic of Serbia[30] (without the territory of Kosovo and Metohija), and the available data was updated in November 2020. According to the information presented, the total number of industrial zones in this period was 374. One or more industrial zones were owned by 133 local governments; the industrial zones occupied a total area of 28,980 ha.

The last survey on the structure of agricultural holdings on the territory of the Republic of Serbia was conducted in 2018. Data on their number on the territory of each local self-government unit, as well as the number of registered individual farmers (for 2020), are available in the Republic Statistical Office publication "Municipalities and Regions in the Republic of Serbia 2021". The largest number of agricultural farms in 2018 was recorded in the city of Leskovac - 14,280 and the city of Kruševac - 11,867; the number of individual farmers in 2020 was the highest in the City of Šabac - 2,731 and the municipality of Bogatić - 1,977.

Of the 40 LGUs that were analyzed within the "Green Incubator" project, 13 were classified into Group I according to their development, 12 into Group II, 13 into Group III and two into Group IV. Three analyzed LGUs do not have industrial zones on their territories. The presentation of the extracted data is given in Table 2.

Table 2: Selected data in the economy and agriculture sector for 40 LGUs processed within the scope of the research (level of development, number of companies, number of entrepreneurs, number and area of industrial zones, number of agricultural holdings, number of individual farmers)

27 Law on Regional Development, https://www.pravno-informacioni-sistem.rs/SlGlasnikPortal/eli/rep/sgrs/skupstina/zakon/2009/51/1
28 Regulation on determining the unique list of development of regions and local self-government units, https://www.pravno-informacioni-sistem.rs/SlGlasnikPortal/eli/rep/sgrs/vlada/uredba/2014/104/1
29 The Serbian Business Registers Agency (SBRA), https://pretraga2.apr.gov.rs/APRMapePodsticaja/#; accessed on 05/20/2022.
30 Republic Statistical Office, https://app.powerbi.com/view?r=eyJrIjoiNDM0NTNmMmQtYWRhZC00ZDAwLWJlOWItOGJjNTA3NDYwZDQ1IiwidCI6ImJhZGViOWNiLWU4MjMtNDlmMy1iZWEyLTdiOTlkMjU4ZTA0YiIsImMiOjl9; accessed on 05/20/2022.

	City/Municipality	Level of development*	Number of companies (December 2021)*	Number of entrepreneurs (December 2021)*	Number of industrial zones**	Total area of industrial zones (in ha)**	Number of agricultural holdings (2018)***	Number of registered individual farmers (2020)***
1	Aranđelovac	II	480	1,886	1	15	5,292	296
2	Bačka Palanka	I	762	1,480	46	714	4,547	707
3	Bački Petrovac	II	241	351	3	328	1,540	318
4	Bajina Bašta	III	218	1,302	3	30	4,433	357
5	Bečej	II	338	967	1	437	1,908	509
6	Bela Crkva	III	134	525	1	14	1,796	257
7	Beočin	I	195	521	1	8	783	107
8	City of Bor	I	496	1,174	4	637	3,039	92
9	City of Čačak	I	1.887	5,420	3	45	10,602	605
10	Despotovac	III	150	642	2	50	3,107	470
11	Gornji Milanovac	II	480	1,987	3	99	5,270	454
12	Irig	III	167	475	1	43	1,067	124
13	Kosjerić	II	106	475	2	6	2,840	308
14	City of Kragujevac	I	2,026	8,175	5	748	8,201	849
15	City of Kraljevo	III	1,506	5,021	2	437	10,473	959
16	Krupanj	IV	112	739	1	3	4,006	565
17	City of Leskovac	III	1,079	4,369	11	638	14,280	1,428
18	City of Niš	I	3,643	10,171	4	306	7,113	81
19	City of Novi Sad	I	12,023	20,580	7	1,685	4,771	664
20	City of Pančevo	I	1,904	5,739	2	1,780	6,067	479
21	Raška	IV	262	1,043	3	50	3,722	83
22	Ruma	II	613	1.839	5	999	3,452	506
23	City of Sombor	II	1,064	2,408	1	480	8,080	1,130
24	Srbobran	III	136	587	18	148	1,481	324
25	City of Sremska Mitrovica	II	898	2,255	4	631	7,384	921
26	Sremski Karlovci	II	110	516	/	/	181	17
27	Stara Pazova	I	1,246	3,278	8	1,981	2,393	338
28	City of Subotica	I	3,394	4,220	2	74	6,548	1,289
29	City of Šabac	II	1,549	3,910	2	800	10,115	2,751
30	Temerin	II	393	1,253	/	/	1,367	209
31	Titel	III	93	546	2	39	1,940	227
32	Trstenik	III	386	1,428	1	6	5,775	1,029
33	Ub	III	297	1,089	1	164	5,023	1,481
34	City of Valjevo	I	1,315	4,474	1	35	8,275	1,596
35	Vladimirci	III	136	446	1	2	3,763	1,076
36	Velika Plana	III	394	1,512	13	410	4,704	341
37	Vrbas	I	502	1,231	2	140	2,661	220
38	City of Vršac	I	651	1,459	1	6	2,339	547
39	City of Zrenjanin	II	1,339	3,618	3	739	6,550	907
40	Žabalj	III	264	791	/	/	3,690	436

* Source: SBRA, https://pretraga2.apr.gov.rs/APRMapePodsticaja/#; accessed: 05/20/2022

** Source: Republic Statistical Office, https://app.powerbi.com/view?r=eyJrIjoiNDM0NTNmMmQtYWRhZC00ZDAwLWJ lOWItOGJjNTA3NDYwZDQ1IiwidCI6ImJhZGViOWNiLWU4MjMtNDlmMy1iZWEyLTdiOTlkMjU4ZTA0YiIsImMiOjl9; accessed: 05/20/2022

***Source: Republic Statistical Office, publication “Municipalities and Regions in the Republic of Serbia 2021”

4.1.3. Data on employment and earnings

Information on the number of employed and unemployed persons is available in the records of the Republic Statistical Office, the Serbian Business Registers Agency and the National Employment Service. In this overview, the number of employed and unemployed persons by municipalities and cities was taken from the website of the Serbian Business Registers Agency[31], where the most up-to-date data can be found. For the period from January 1 to December 31 2021, the total number of employed persons in the Republic of Serbia was 2,273,591, and the number of unemployed was 477,564; the largest number of employees was recorded in the City of Belgrade - 663,855 persons, where the largest number of unemployed can also be found - 59,059.

Data on the number of employed persons per 1,000 inhabitants of individual LGUs is only available in the records of the Republic Statistical Office[32]; although the reported numbers are indicative (both due to the the fact that the number of LGU residents is only an estimate for years after the official census, as well as due to deviations from the year being displayed), the authors consider them informative in the process of assessing the potential of municipalities/cities, so they are also used. On the territory of the Republic of Serbia, the highest number of employed persons per 1,000 inhabitants was recorded in the Belgrade municipality of Stari Grad - 467, and outside Belgrade in the City of Novi Sad - 369, the city of Užice - 368, the municipality of Sremski Karlovci - 366, the city of Valjevo - 363. The lowest ratio of those employed per 1,000 inhabitants is in the municipality of Preševo - 132, in the municipalities of Rača and Tutin - 151 and in the municipality of Bujanovac - 159.

The most up-to-date data on average earnings in municipalities and cities is available from the Republic Statistical Office[33]. In this display, the data for February 2022 is processed. The average net salary in the Republic of Serbia in this period was RSD 70,605.00; the highest recorded average net salary in LGUs is in the Belgrade municipality of Vračar and amounts to RSD 118,205.00, and outside Belgrade in the City of Novi Sad - RSD 84,378.00, the City of Bor - RSD 80,643.00, the Požarevac municipality of Kostolac - RSD 73,323.00. The lowest average net salary was recorded in the Bojnik municipality - RSD 48,536.00.

The presentation of data for the municipalities and cities included in the analysis is given in Table 3.

Table 3: Data on employment and earnings for 40 LGUs processed in the research

	City/Municipality	Number of employed persons*	Number of employed persons per 1000 inhabitants**	Number of unemployed persons*	Average net earnings RSD (February 2022) ***
1	Aranđelovac	13,768	314	3,584	61,100.00
2	Bačka Palanka	17,248	329	3,940	61,857.00
3	Bački Petrovac	4,269	334	359	58,061.00
4	Bajina Bašta	7,388	301	1,658	53,594.00
5	Bečej	9,725	274	1,728	58,863.00
6	Bela Crkva	3,530	221	1,823	57,492.00
7	Beočin	4,917	320	958	62,661.00

31 SBRA, https://pretraga2.apr.gov.rs/APRMapePodsticaja/#,; accessed on 05/20/2022.
32 Municipalities and regions in the Republic of Serbia in 2021, https://publikacije.stat.gov.rs/G2021/pdf/G202113048.pdf
33 Republic Statistical Office, https://data.stat.gov.rs/Home/Result/2403040103?languageCode=sr-Latn; accessed on 05/20/2022.

8	City of Bor	14,919	319	3,535	80,643.00
9	City of Čačak	37,802	340	4,782	59,962.00
10	Despotovac	4,821	242	1,571	54,887.00
11	Gornji Milanovac	13,794	333	1,246	61,444.00
12	Irig	2,897	288	895	58,236.00
13	Kosjerić	3,216	307	511	57,121.00
14	City of Kragujevac	58,869	324	15,197	67,638.00
15	City of Kraljevo	37,608	305	7,660	58,730.00
16	Krupanj	4,109	268	1,589	51,789.00
17	City of Leskovac	40,310	292	13,227	55,073.00
18	City of Niš	88,007	334	22,446	68,232.00
19	City of Novi Sad	138,452	369	12,970	84,378.00
20	City of Pančevo	40,079	327	5,939	69,955.00
21	Raška	6,904	302	1,718	53,860.00
22	Ruma	16,485	318	2,479	61,899.00
23	City of Sombor	22,346	285	5,159	61,899.00
24	Srbobran	4,520	294	1,457	54,280.00
25	City of Sremska Mitrovica	24,555	322	2,881	64,204.00
26	Sremski Karlovci	3,076	366	344	70,335.00
27	Stara Pazova	22,574	337	1,121	63,402.00
28	City of Subotica	44,750	327	4,113	63,087.00
29	City of Šabac	36,357	324	5,420	62,324.00
30	Temerin	9,786	346	1,294	60,239.00
31	Titel	4,407	300	698	55,106.00
32	Trstenik	10,577	271	3,724	51,905.00
33	Ub	7,985	291	1,018	60,640.00
34	City of Valjevo	30,887	363	4,405	61,891.00
35	Vladimirci	4,418	284	951	53,428.00
36	Velika Plana	10,495	272	2,309	56,891.00
37	Vrbas	12,754	322	3,622	58,299.00
38	City of Vršac	14,640	301	3,223	67,813.00
39	City of Zrenjanin	37,534	322	5,715	66,624.00
40	Žabalj	7,567	295	1,324	55,458.00

*Source: Serbian Business Registers Agency, https://pretraga2.apr.gov.rs/APRMapePodsticaja/#; accessed: 05/20/2022
**Source: Municipalities and regions in the Republic of Serbia in 2021, https://publikacije.stat.gov.rs/G2021/pdf/G202113048.pdf
***Source: Republic Statistical Office, https://data.stat.gov.rs/Home/Result/2403040103?languageCode=sr-Latn; accessed: 05/20/2022

4.1.4. Separated data - state administration and local self-government

According to the Law on Territorial Organization of the Republic of Serbia, the basic territorial unit of local self-government is the municipality. It is prescribed that a municipality should have at least 10,000 inhabitants, with the caveat that municipalities formed before the law came into force may have a smaller number. A city is a territorial unit with at least 100,000 inhabitants that can be divided into city municipalities.

Currently, apart from the City of Belgrade, which is a unique unit of territorial organization, four of the 28 cities have established municipalities (Niš, Užice, Požarevac, Vranje).

The Law on Local Self-Government[34] defines that municipalities and cities (except the City of Belgrade[35]) determine the number of councilors by statute, but no fewer than 19 or more than 75 (in municipalities) or 90 (in cities). Councilors are elected for four years. In the majority of LGUs in the Republic of Serbia, local elections were held in June 2020. The data listed in this presentation was taken from the publication "Municipalities and Regions in the Republic of Serbia 2021" and represent the situation as of August 31, 2021.

In order to present the socio-economic context of cities and municipalities as comprehensively as possible, data on the number of women elected to local assemblies was also selected. According to the provisions of the Law on Local Elections[36], at least 40% of members of the less represented gender must be included on electoral lists; Mandates are assigned to male and female councilors according to their order on the electoral list. A majority of women councilors may be found in the Trgovište Municipality Assembly - 52% and the Senta Municipality Assembly - 51.72%, while the least number of women councilors can be found in the municipalities of Medveđa and Ćićevac - 24%.

One of the indicators when evaluating the potential of a specific LGU may be the city/municipality budget. The Law on the Budget System[37] stipulates that budgets are determined by a Decision on the budget, which estimates income and receivables, and determines expenditures and expenses for one or three years, and which is passed by the local government assembly (municipality, city or City of Belgrade) by December 20 for the next year. Although the competent ministry provides instructions for preparing this Decision to the local authorities, a review of publicly available documents revealed that there are differences, and that not all LGU budgets in the Republic of Serbia are prepared using the same form. In this presentation, only data showing total revenues, total expenditures, and budget surplus or deficit are highlighted.

The presentation of data for the municipalities and cities included in the analysis is given in Table 4.

Table 4: Selected data on the number of councilors, participation of women in local assemblies, and city/municipal budgets for the 40 LGUs processed within the scope of the research

	City/Municipality	Number of councilors*	Participation of women	City/municipality budget** (2022)		
				Total income	Total expenditure	Surplus/deficit
1	Aranđelovac	41	12 (29.27%)	2,080,489,134.00	2,139,489,134.00	-59,000,000.00
2	Bačka Palanka	41	17 (41.46%)	1,863,940,102.00	1,868,748,873.00	-4,808,771.00
3	Bački Petrovac	25	9 (36.00%)	711,840,000.00	782,965,000.00	-71,125,000.00
4	Bajina Bašta	45	16 (35.56%)	1,100,493,300.00	1,438,322,260.00	-337,828,960.00
5	Bečej	36	14 (38.89%)	1,454,210,000.00	1,493,600,000.00	-39,390,000.00
6	Bela Crkva	33	16 (48.48%)	568,406,230.00	629,406,230.00	-61,000,000.00
7	Beočin	23	9 (39.13%)	1,059,700,000.00	1,155,000,000.00	-90,300,000.00
8	City of Bor	35	12 (34.29%)	3,672,534,205.00	3,764,549,072.00	-92,014,867.00
9	City of Čačak	75	28 (37.33%)	5,962,356,000.00	6,231,190,000.00	-268,834,000.00
10	Despotovac	31	10 (32.26%)	776,926,969.00	776,926,969.00	/

34 Law on Local Self-Government, https://www.pravno-informacioni-sistem.rs/SlGlasnikPortal/eli/rep/sgrs/skupstina/zakon/2007/129/2/reg
35 The position, competences and bodies of the City of Belgrade are determined by the Law on the Capital City, https://www.pravno-informacioni-sistem.rs/SlGlasnikPortal/eli/rep/sgrs/skupstina/zakon/2019/37/1
36 Law on Local Elections, https://www.paragraf.rs/propisi/zakon_o_lokalnim_izborima.html
37 Law on the Budget System, https://www.pravno-informacioni-sistem.rs/SlGlasnikPortal/eli/rep/sgrs/skupstina/zakon/2009/54/1/reg

11	Gornji Milanovac	49	18 (36.73%)	1,748,400,000.00	1,748,400,000.00	/
12	Irig	19	6 (31.58%)	540,499,700.00	625,373,944.00	-84,874,244.00
13	Kosjerić	27	10 (37.04%)	358,524,092.00	369,826,342.00	-11,302,250.00
14	City of Kragujevac	87	39 (44.83%)	9,559,000,000.00	9,559,000,000.00	/
15	City of Kraljevo	70	26 (37.14%)	4,289,917,110.00	4,871,244,379.17	-581,327,269.17
16	Krupanj	35	12 (34.29%)	593,877,072.00	696,706,203.00	-102,829,131.00
17	City of Leskovac	75	27 (36.00%)	4,636,002,000.00	4,994,002,000.00	-358,000,000.00
18	City of Niš	115	38 (33.04%)	11,423,135,124.00	11,413,961,744.00	9,173,380.00
19	City of Novi Sad	78	32 (41.03%)	32,544,656,000.00	35,444,870,768.48	-2,900,214,768.48
20	City of Pančevo	70	26 (37.14%)	5,663,352,858.00	6,363,260,775.00	-699,907,917.00
21	Raška	35	14 (40.00%)	1,605,416,845.00	1,770,957,745.00	-165,540,900.00
22	Ruma	43	19 (44.19%)	2,083,878,535.00	2,386,729,535.00	-302,851,000.00
23	Grad Sombor	61	24 (39.34%)	3,979,435,750.00	3,982,435,750.00	-3,000,000.00
24	Srbobran	28	9 (32.14%)	868,199,872.00	995,106,493.99	-126,906,621.00
25	City of Sremska Mitrovica	61	25 (40.98%)	3,421,974,000.00	3,400,616,000.00	21,358,000.00
26	Sremski Karlovci	25	8 (32.00%)	694,080,000.00	694,080,000.00	/
27	Stara Pazova	53	22 (41.51%)	3,529,850,000.00	3,543,981,000.00	-14,131,000.00
28	City of Subotica	67	24 (35.82%)	6,845,279,000.00	7,370,795,000.00	-525,516,000.00
29	City of Šabac	69	26 (37.68%)	4,747,566,080.00	5,198,772,030.00	-451,205,950.00
30	Temerin	33	12 (36.36%)	1,091,220,000.00	1,190,000,000.00	-98,780,000.00
31	Titel	25	8 (32.00%)	538,048,406.00	576,732,426.00	-38,684,020.00
32	Trstenik	49	19 (38.78%)	1,304,252,485.00	1,337,200,382.0	-32,947,897.00
33	Ub	30	10 (33.33%)	1,395,300,000.00	1,455,300,000.00	-60,000,000.00
34	City of Valjevo	51	20 (39.22%)	3,572,000,000.00	3,882,000,000.00	-310,000,000.00
35	Vladimirci	25	7 (28.00%)	571,753,821.00	581,607,679.00	-9,853,858.00
36	Velika Plana	39	14 (35.90%)	1,395,582,000.00	1,360,382,000.00	35,200,000.00
37	Vrbas	36	14 (38.89%)	1,760,014,323.00	1,792,348,930.00	-32,334,607.00
38	City of Vršac	45	16 (35.56%)	2,290,595,625.00	2,447,000,000.00	-156,404,375.00
39	City of Zrenjanin	67	28 (41.79%)	5,287,588,952.00	6,379,517,621.00	-1,091,928,669.00
40	Žabalj	21	8 (38.10%)	961,290,552.00	976,165,884.00	-14,875,332.00

* Source: Municipalities and cities in the Republic of Serbia 2021, data as of August 31, 2021.
** Sources: Official internet presentations of LGUs; accessed: 02/22/2022

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For some future comparative analysis of socio-economic contexts of communities, monitoring and reporting on progress in achieving the sustainable development goals carried out by the Republic Statistical Office can be significant. Namely, in 2015, the United Nations adopted the Sustainable Development Agenda - a strategy with a total of 17 goals that member states will strive to achieve by 2030. As stated in Chapter 3, six of them are directly related to the concept of the circular economy: 6. Clean water and sanitation; 7. Affordable and clean energy; 9. Industry, innovation and infrastructure; 11. Sustainable cities and communities; 12. Responsible consumption and production; 13. Climate action

Currently, out of a total of 247 indicators, 47%, or 117 of them, are monitored and displayed on a special website by the RSO[38]. The indicators are currently monitored for the entire territory of the Republic of Serbia. In accordance with one of the principles of the Agenda - "Leave no one out of development", which means not leaving out less developed and remote regions and rural

38 Republic Statistical Office, https://sdg.indikatori.rs/sr-latn/; accessed on 05/22/2022.

areas from development, a publication of the same name was published in January 2022[39], where the spatial aspects of sustainable development were analyzed and differences were presented by type of settlement and between regions of the Republic of Serbia. The authors believe that the display of data which is recorded and monitored, will be extended to local self-government units in the coming period.

4.2. Legal and institutional prerequisites for the transition to a circular economy

Pursuant to the Law on the Planning System[40], local self-governments are supposed to adopt development plans. The development plan of the local self-government unit is a long-term development planning document adopted for a period of at least seven years. These LGU plans contain an overview and analysis of the existing situation, a vision, i.e. the desired state, priority development goals, as well as an overview and brief description of appropriate measures which are further elaborated in public policy documents and the LGU's medium-term plan.

The 14 principles which this law requires to be respected when preparing and implementing planning documents, include the **principle of integrity and sustainable growth and development.**

This principle obliges the creators of public policies to take into account "the requirements of environmental protection, combating climate change, mitigating the effects of climate change and adapting to climate change, preventing excessive use of natural resources, increasing energy efficiency, using renewable energy sources, reducing GHG emissions, their effects on society, especially on local communities, their development and peculiarities, sensitive categories of the population, gender equality, as well as the fight against poverty" when drafting and implementing documents.

Local self-government units are also obliged to prepare annual reports on the implementation of the development plan according to the predetermined procedure prescribed for preparing reports on the implementation of the medium-term plan. These reports are supposed to be published on the website of the local self-government unit no later than 15 days from the day of adoption, after which the development plan may be amended, if necessary.

Given the importance of this document, when analyzing the 40 cities and municipalities and their public policy documents, which recognize the need for the development of a circular economy, the starting point were the development plans.

As the Law on the Planning System was adopted in 2018, in some local governments, development strategies and sustainable development strategies, public policy documents adopted by local self-government units before the adoption of the new Law on the Planning System are still valid, others are in the process of drafting and adopting new development plans, while some local governments have already implemented the procedures for drafting and adopting new planning documents in accordance with the Law on the Planning System.

39 "Leave no one out of development - Spatial aspects of sustainable development: differences by type of settlement and between regions", https://sdg.indikatori.rs/media/1586/srp_lnob3.pdf
40 Law on the Planning System of the Republic of Serbia, https://www.pravno-informacioni-sistem.rs/SlGlasnikPortal/eli/rep/sgrs/skupstina/zakon/2018/30/1/reg

Unlike earlier development strategies and sustainable development strategies, the plans adopted in accordance with the new Law contain less information about specific activities and the time frame for the implementation of the planned activities.

Although, according to the Law on the Planning System, the deadline for adopting local development plans was January 1, 2021, many covered local governments have yet to start drafting or adopting these planning documents. Those municipalities and cities that have adopted new development plans, in accordance with the Law, did not explicitly talk about the development of the circular economy. However, since it is only an umbrella document that is further elaborated by hierarchically lower public policy documents, there is a possibility that the development of the circular economy will find its place there.

The circular economy and activities aimed at its development appeared in only a few strategies still in effect.

One example of a strategic document that has recognized the importance of circular economy development was the Sustainable Development Strategy of the Municipality of **Bačka Palanka** for 2014-2020[41]. Another important priority in this strategy is the development of the "green" circular economy in the municipality. Within that priority, two goals were set - environmental protection and the improvement of the socio-economic status of the local population and the creation of conditions for the inclusive growth of the local community.

Bački Petrovac is also one of the local self-governments that has recognized the circular economy as one of the priorities in the development of the municipality in its Sustainable Development Strategy for the Municipality of Bački Petrovac 2014-2021. The municipality has set the development of a "green" economy model as its goal, by applying the concept of the circular economy - an economy without waste; encouraging cleaner production and the development of industrial ecology; promoting sustainable production and consumption; encouraging greater use of renewable energy sources.

This strategy went one step further in planning, so the following measures were defined in order to achieve these goals: developing the "green" economy model; applying the circular economy model (local economy based on the principle of "economy without waste"); encouraging cleaner production; market development of "green" products and services; development of marketable agricultural biomass; affirmation of "green" and social entrepreneurship; encouraging ecological/ economic forms of connection; developing a diversified rural economy.

Another municipality that has clearly defined its goals and directed them towards the development of the circular economy in its strategic documents is the municipality of **Trstenik**. In the Sustainable Development Strategy of the Municipality of Trstenik 2010-2020[42], which has expired, a set of relevant measures was planned, namely: the development of the green economy; development of the agricultural biomass market; affirmation of integrated production of food and energy *in situ* ; encouragement of public and private research and innovation needed for the development of technologies, systems and business models that will accelerate the transition to a low-carbon, resource-efficient, safe and sustainable economy and eco-industry; encouraging public and private demand for ecologically sustainable products (products with a "life cycle" with minimal

41 Sustainable development strategy of the municipality of Bačka Palanka 2014–2020. , https://www.paragraf.rs/opstinska-glasila/backa_palanka/backa-palanka_pdf/backa_palanka-06-2016.pdf
42 Sustainable development strategy of the municipality of Trstenik 2010-2020. , http://www.trstenik.rs/images/stories/vesti/slor.pdf

impact on the environment); implementation of the concept of "green" public procurement; full application of hierarchy in waste management and the principles of the circular economy (in which the output of one economic cycle is always the input of another economic cycle); encouraging cleaner production; improvement of "green" cooperatives; development of "green" infrastructure.

With support to small and medium-sized enterprises, entrepreneurship and employment being of great importance for the development of new circular business models, the local self-governments included in this research also paid attention to this segment and to local public policies governing these areas.

The general conclusion is that municipalities mostly recognize the importance of developing small and medium-sized enterprises in their strategic documents, though not all of them do. There are also few initiatives by local governments to support MSSP, whose operations would be based on the principles of the circular economy, except investments for the use of renewable energy sources for producing electricity.

When it comes to **young people**, strategic documents generally recognize the importance of environmental protection and improving the employability of young people, as special areas within which planned measures are developed. However, there are few local governments that have recognized concrete activities related to the circular economy and the development of youth entrepreneurship in their strategic documents.

A good example can be found in the **city of Leskovac**, which adopted the Strategy for the Improvement of the Position of Youth in the City of Leskovac for the period 2021-2025[43]. This document foresees several important activities for the development of youth entrepreneurship: raising the capacities of young people for effective management of entrepreneurship; active implementation of education and free training through career guidance and counseling; continuous promotion of entrepreneurship through examples of good practice of young entrepreneurs and modern forms of employment; forming a base of successful young entrepreneurs providing mentoring support to young people for modern forms of self-employment.

In the Republic of Serbia, the regulatory framework for the circular economy at the local level is still in the development phase, and there are several entities that should play an important role in that transition.

The Chamber of Commerce of Serbia founded the Center for the Circular Economy, whose role in this process is primarily defined as informing, educating and preparing the economic environment for the transformation of the linear economy to a circular one. The Center provides professional and advisory assistance to business entities in representing and protecting the interests of the economy, in monitoring the circular economy package in the European Commission and organizing informative and expert meetings.

The Autonomus Province of Vojvodina has also established a specialized body made up of experts in the field of waste management and economics, whose goal is the development of a circular economy. In 2019, **the Chamber of Commerce of Vojvodina** established the Council for the

43 Strategy for improving the position of young people in the city of Leskovac for the period 2021-2025. http://kzm.gradleskovac.org/images/dokumenta/strategija-za-mlade-leskovac/strategija-unapredjenja-polozaja-mladih-grada-leskovaca-2021 -2025.pdf

Circular Economy with the aim of carrying out activities to raise awareness and responsibility in the management of industrial, municipal and other waste, the reuse of raw materials and the development and application of regulations in this area in the AP of Vojvodina.

The Development Agency of Serbia can play a significant role in the transformation of the economy from linear to circular. This agency of the Government of the Republic of Serbia was established in order to carry out activities aimed at encouraging and realizing direct investments, promoting and increasing exports, developing and improving the competitiveness of business entities in the field of economy and regional development. A total of 16 regional development agencies operate within the Development Agency of Serbia.

4.3. Analysis of the municipal waste management system

The law[44] defines waste management as "the implementation of prescribed measures for dealing with waste, comprising collection, transport, storage, treatment, i.e. reuse and disposal of waste, including supervision of these activities, maintenance of waste management facilities after closure, and activities undertaken by traders and mediators". Waste management is a common interest activity which should be carried out in a way that ensures the least risk of endangering the life and health of people and the environment.

For each type of waste (municipal, commercial and industrial) and classification according to its hazardous characteristics, there is a corresponding legal regulation that prescribes the activities related to managing it in more detail. The aforementioned law defines the following entities as responsible for waste management: the Republic of Serbia, the autonomous province, local self-government units, the Environmental Protection Agency, expert organizations for waste testing, non-governmental organizations, including consumer organizations and other authorities and organizations.

In the past decade, there has been no significant improvement in this area. At the beginning of the implementation of the Waste Management Strategy[45] in 2010, the analysis of the existing situation stated that, according to estimates, around 60% of municipal waste is collected in an organized manner in the Republic of Serbia, predominantly in urban areas, and that in our country "there is no systematically organized separate collection, sorting and recycling of waste", although primary selection (separation of paper, glass and metal into specially marked containers) is prescribed by law. In the new program[46], adopted in February 2022, the competent ministry confirmed that over ten years of implementation, "the goals set by the Strategy have not been fully achieved, primarily in the field of organized waste collection, the rate of primary separation of waste and recycling, infrastructure construction and preventing waste disposal to unsanitary landfills and dumps, the application of economic instruments and the establishment of a sustainable financing system for waste management"[47]. This time, in the section assessing the current situation[48], the percentage of organized municipal waste collection is not even mentioned; the assessment in the sector

44 Law on Waste Management, http://www.pravno-informacioni-sistem.rs/SlGlasnikPortal/eli/rep/sgrs/skupstina/zakon/2009/36/14/reg
45 Waste management strategy for the period 2010–2019., https://www.pravno-informacioni-sistem.rs/SlGlasnikPortal/reg/viewAct/011043b3-7cee-4488-ba2c-e95f95271713
46 In accordance with the Law on the planning system, which was adopted in 2018
47 Waste management program in the Republic of Serbia for the period 2022-2031, https://www.pravno-informacioni-sistem.rs/SlGlasnikPortal/eli/rep/sgrs/vlada/drugiakt/2022/12/1
48 Ibid; section 3.2.2. Existing system for municipal waste collection

of primary separation is completely identical to twelve years ago: “There is no systematically organized separate collection, sorting and recycling of the communal waste in the Republic of Serbia.” Although primary separation in the Republic of Serbia is required by law and provides for the separation of plastic, paper, glass and metal in specially marked containers, the separate collection does not work in practice, except sporadically in some local governments.”

In the following sections, we will present the prerequisites for implementing circular economy models in the municipal waste management system, the responsibilities of local self-government units in this system, how the potential of the municipal waste management system was analyzed within the “Green Incubator” project, as well as data and estimates of individual segments of the system, which were obtained through analyses for specific local self-government units (LGUs).

Since this section focuses on municipal waste, it is important to note that the current law defines municipal waste as: “household waste, as well as other waste that, due to its nature or composition, is similar to household waste”.

4.3.1. Municipal solid waste and circular economy

The essence of the circular economy is reflected in household behavior and self-sustainability. Starting from the individual, it includes the whole society and is very easily connected with the basic elements of modern waste management (reduction and reuse, repair and modification, repurposing, multiple use, finding new value, recycling, etc).

As a key prerequisite for establishing a circular economy in the management of municipal solid waste (MSW), it is necessary to understand and deeply synergize all elements that make up the system. One of the actors responsible for bringing about change, in addition to the local self-government unit, are the municipal solid waste management operators. The work of the MSW operator must meet all the criteria of providing a public service, but also market and economic values, first of all:

- transparency in business,
- sustainable business practices,
- quantification of the amount and composition of MSW (as well as its key fractions)
- continuous research into options for using key fractions of MSW and the application of adequate models.

The following can be singled out as the basic tools for the successful implementation of a sustainable MSW management system and the transition to a circular economy:

- service availability - the service must be provided and available to everyone in a volume and quality that will encourage responsible behavior;
- incentive/disincentive - all activities to change behavior and get people to accept the concept of the circular economy should be stimulated;
- application, control and analysis - all measures should be applied continuously, controlled without exception and analyzed in their entirety and in detail;
- punitive measures - any deviation from the measures must be adequately sanctioned, without exceptions;
- education - all system participants must be continuously informed, educated and involved in every step.

4.3.2. Competences of local self-government

Local self-government units have the legal obligation to manage solid municipal waste in their territory, in accordance with the Law on Waste Management. LGUs are obliged to provide all conditions for compliance with the legal framework and fulfill the conditions for responsible MSW management from its creation to its permanent disposal. They are obliged to ensure the collection and transportation of MSW, introduce primary and secondary selection into fractions, ensure the collection and removal of bulky waste as well as inert construction waste from households in their territory.

The obligation of LGUs is to adequately provide for the separation and collection of household hazardous waste, such as spent batteries and accumulators, electrical and electronic waste, hazardous packaging waste, etc. It is important to point out that the further management of this waste until its final or permanent disposal is not part of the responsibilities of LGUs, but is dealt with by specialized companies, operators with valid and adequate permits issued by competent authorities, who perform further waste management operations.

Medical and pharmaceutical waste is a category that does not formally fall under the competence of LGUs, however, it is in everyone's interest that LGUs participate in the management of pharmaceutical waste, considering the number of users of pharmaceutical products, as well as the real danger of it being found in mixed waste originating from households.

As for the waste generated by legal entities (and entrepreneurs) on the territory of LGUs, which is similar in composition to waste from households, LGUs are obliged to ensure the management of these waste streams as well.

Finally, regarding industrial and commercial, and especially hazardous waste, LGUs do not have legal obligations to manage these waste streams, as they are the subject of special contracts between generators of these types of waste and operators who have all the necessary capacities and permits to manage them. LGUs are entrusted with inspection and supervision tasks or issuing permits for the management of certain types of non-hazardous waste, but this does not imply the obligation to ensure management. In practice, however, it has been shown that a large part of industrial and especially commercial non-hazardous waste ends up mixed with MSW.

In any case, MSW is by far the largest waste stream, the management of which (collection, transport, sorting, treatment and permanent disposal) falls entirely within the jurisdiction of LGUs, which generally entrust these tasks to local public utility companies (PUC) or private companies, if LGUs and PUCs do not have the capacity to perform this activity, through different contracting models, such as direct contracts as well as more current models such as public-private partnership and concessions (PPP).

In order to achieve the best possible economic and operational effect, LGUs, in accordance with previously adopted strategies (National waste management strategy with the program of approximation to the EU for the period 2003-2008 and the Waste Management Strategy for the period 2010-2019)[49] come together to form waste management regions. This way, economies of scale are achieved and this directly affects the volume and quality of the service, with elements of

49 National waste management strategy with the program of approximation to the EU for the period 2003–2008. (The document is no longer valid and is not available in full text at the official presentations of state bodies; http://zelenibiznis.unecopn.org/medjunadroni_propisi/Strategija_upravljanja_otpadom_2003.pdf) and Waste Management Strategy for the period 2010-2019 (https://www.pravno-informacioni-sistem.rs/SlGlasnikPortal/reg/viewAct/011043b3-7cee-4488-ba2c-e95f95271713)

the circular economy, the quantification of all streams and the management of key performance indicators of the system being simplified.

In line with the recently adopted Waste Management Program in the Republic of Serbia for the period 2022-2031[50] the state opted to continue with the development of the regional system, allocating significant financial resources for it. As stated in the document, regional waste management companies have been established in 13 out of a total of 26 planned regions, and intermunicipal agreements have been signed for 12, but the companies have not yet been established. Regional centers are organized "through public-private partnerships, public utilities or publicly owned limited liability companies."

An overview of regions, regional sanitary landfills and regional companies is given in Table 5.

Table 5: Selected data on waste management regions for 40 LGUs processed in the research

	Region*	Covered municipalities/ cities*	Regional sanitary landfill built?*	Regionalno preduzeće koje upravlja deponijom**	Form of owner-ship**	Company founder(s)**
1	Sremska Mitrovica	Bogatić, Ruma, Sremska Mitrovica, Šabac, Šid	Yes - Regional sanitary landfill "Jarak"	JKP*** Regional Landfill "Srem-Mačva" (2011)	Public	City of Sremska Mitrovica and City of Šabac
2	Pančevo	Kovin, Kovačica, Opovo, Pančevo	Yes - Regional sanitary landfill Pančevo	JKP "Hygiene"	Public	City of Pančevo
3	Inđija	Inđija, Irig, Pećinci, Sremski Karlovci, Stara Pazova	No	JP "Ingrin" (2010)	Public	Municipality of Inđija
4	Užice	Arilje, Bajina Bašta, Čačak, Čajetina, Ivanjica, Kosjerić, Lucani, Požega, Uzice	Yes - Regional sanitary landfill "Duboko"	JKP Regional Center for Waste Management "Duboko" (2005)	Public	City of Čačak, Municipality of Bajina Bašta, Municipality of Lučani, Municipality of Arilje, Municipality of Ivanjica, Municipality of Kosjerić, Municipality of Požega, Municipality of Užice, Municipality of Čajetina
5	Pirot	Babušnica, Bela Palanka, Dimitrovgrad, Pirot	Yes - Regional sanitary landfill "Muntina padina"	JKP "Regionalna deponija Pirot" (2012)	Public	City of Pirot, Municipality of Babušnica, Municipality of Bela Palanka, Municipality of Dimitrovgrad,
6	Kikinda	Ada, Bečej, Kikinda, Nova Crnja, Novi Bečej	Yes - Kikinda Regional Sanitary Landfill	FCC Kikinda doo (2007)	Public-private	FCC Eko doo Belgrade, FCC Environment CEE GmbH Austria, City of Kikinda

50 Waste management program in the Republic of Serbia for the period 2022-2031, "Official gazette of the Republic of Serbia" no. 12/2022, https://www.pravno-informacioni-sistem.rs/SlGlasnikPortal/eli/rep/sgrs/vlada/drugiakt/2022/12/1

7	Lapovo	Despotovac, Lapovo, Rača, Svilajnac	Yes - Regional sanitary landfill "Vrbak" Lapovo	FCC Vrbak doo Lapovo (2007)	Public-private	Sanitary landfill management company Vrbak doo Lapovo (2006 - Municipality of Batočina, Municipality of Despotovac, Municipality of Lapovo, Municipality of Rača, Municipality of Velika Plana) [1], FCC Eko doo Belgrade, FCC Environment CEE GmbH Austria
8	Jagodina	Ćuprija, Jagodina, Paraćin, Smederevska Palanka, Velika Plana	Yes - Regional sanitary landfill "Gigoš"	"PWW Deponija" doo Jagodina (2008)	Private	PWW doo Niš (The founder of PWW doo Niš is the Austrian company PWW Holding GmbH)
9	Leskovac	Bojnik, Crna Trava, Lebane, Leskovac, Medveđa, Bladičin Han, Vlasotince	Yes - Regional Sanitary Landfill "Željkovac - Landfill Two"	"PWW Deponija dva" doo Leskovac (2008)	Private	PWW doo Niš (The founder of PWW doo Niš is the Austrian company PWW Holding GmbH)
10	Subotica	Bačka Topola, Čoka, Kanjiža, Mali Iđoš, Novi Kneževac, Senta, Subotica	Yes - Subotica regional sanitary landfill	"Regionalna deponija" doo Subotica (2007)	Public	City of Subotica, Municipality of Bačka Topola, Municipality of Čoka, Municipality of Kanjiža, Municipality of Mali Iđoš, Municipality of Novi Kneževac, Municipality of Senta
11	Valjevo	Barajevo, Koceljeva, Lajkovac, Lazarevac, Ljig, Mionica, Obrenovac, Osečina, Ub, Valjevo, Vladimirci, Krupanj, Loznica, Mali Zvornik, Ljubovija	No	Regional center for waste management Eko-Tamnava doo Ub (2012)	Public	City of Belgrade - municipalities of Barajevo, Lazarevac Obrenovac, City of Valjevo, Municipality of Koceljeva, Municipality of Lajkovac, Municipality of Ljig, Municipality of Mionica, Municipality of Osečina, Municipality of Ub, Municipality of Vladimirci
12	Zrenjanin	Sečanj, Titel, Žitište, Zrenjanin	No			
13	Nova Varoš	Nova Varoš, Priboj, Prijepolje, Sjenica	No	"Regionalna deponija Banjica" doo Nova Varoš (2013)	Public	Municipality of Nova Varoš, Municipality of Priboj, Municipality of Prijepolje, Municipality of Sjenica
14	Vranje	Bosilegrad, Bujanovac, Prešeno, Surdulica, Trgovište, Vranje	No			

[#]According to the data of the Serbian Business Registers Agency, the Company is still registered, but the last business report is the Statement of Inactivity for the year 2020.

15	Beograd	Čukarica, Grocka, Mladenovac, Novi Beograd, Palilula, Rakovica, Savski venac, Sopot, Stari grad, Surčin, Voždovac, Vračar, Zemun, Zvezdara	Yes - Vinča Regional Sanitary Landfill	"Beo Čista Energija" doo Belgrade (2017)	Private	I-Environment investments Limited Great Britain, Marquerite Waste Serbia S.a.r.l Luxembourg, SUEZ Groupe SAS France
16	Novi Sad	Bačka Palanka, Bački Petrovac, Beočin, Novi Sad, Srbobran, Temerin, Vrbas, Žabalj	No			
17	Niš	Aleksinac, Gadžin Han, Kuršumlija, Doljevac, Žitoradja, Merošina, Niš, Prokuplje, Ražanj, Sokobanja, Svrljig	No			
18	Sombor	Apatin, Bač, Kula, Odžaci, Sombor	No			
19	Vršac	Alibunar, Bela Crkva, Plandište, Vršac	No			
20	Zaječar	Boljevac, Bor, Kladovo, Knjaževac, Majdanpek, Negotin, Zaječar	No			
21	Smederevo	Golubac, Smederevo, Veliko Gradište	No			
22	Kragujevac	Aranđelovac, Batočina, Gornji Milanovac, Knić, Kragujevac, Topola, Rekovac	No			
23	Kraljevo	Kraljevo, Vrnjačka Banja, Trstenik	No			
24	Raška	Novi Pazar, Raška, Tutin	No			
25	Kruševac	Aleksandrovac, Brus, Ćićevac, Kruševac, Varvarin, Blace	No			
26	Požarevac	Kučevo, Malo Crniće, Petrovac, Požarevac, Žabari, Žagubica	No			

*Source: Waste management program in the Republic of Serbia for the period 2022-2031r, "Official gazette of the Republic of Serbia" no. 12/2022

** Only the total number of companies and the possible form of ownership are listed in the Program; the data shown in Table 5 is combined on the basis of publicly available data and data from the records of the Serbian Business Registers Agency; accessed on: 05/22/2022

***T/N: Abbreviations denoting public utility companies are not standardized, and have been left in Serbian. The rough translations are as follows: JKP: javno komunalno preduzeće – public communal company; JP: javno preduzeće – public company; KP: komunalno preduzeće – communal company; KJP: komunalno javno preduzeće – communal public company; DOO: društvo sa ograničenom odgovornošću – limited liability company.

On February 4, 2022, the National Assembly of the Republic of Serbia adopted the Law on Confirming the Loan Agreement for the Solid Waste Program in Serbia between the Republic of Serbia and the European Bank for Reconstruction and Development[51]. The amount in question is 75 million euros. Part 1 of the project involves the construction or expansion of a regional waste management system in the "solid waste region" of Kalenić, Sombor, Duboko and Nova Varoš, as well as "engagement of appropriate qualified consultants to assist in the supervision of works and appropriate studies, designs and technical assistance", while Part 2 of the Project includes the construction of a regional waste management system in the "solid waste region" of Pirot, Požarevac, Inđija and Sremska Mitrovica, a multi-regional primary sorting system within the existing solid waste regions and, as in Part 1, the engagement of appropriate consultants. It was also stated that Part 1 is expected to be completed by December 31, 2027.

The regional system was created in 2003. The number of regional landfills/centers in the national network was reduced from the original 29 to 26, while 10 of them (38.46%) were built and put into operation over 19 years.

In accordance with the Law on Waste Management, local self-government units adopt a local waste management plan (LWMP), provide conditions and monitor implementation, and, in accordance with the strategy and agreements they have signed, jointly adopt a regional waste management plan (RWMP). According to current legal regulations, the validity of both LWMP and RWMP is ten years.

A data presentation for municipalities and cities included in the project is given in Table 6.

Table 6: Selected data on local and regional waste management plans for 40 LGUs processed within the scope of the research

	City/Municipality	LWMP Created/not created or expired/in the process of being created			RWMP Created/not created or expired/in the process of being created		
		Created	Not created/ Expired	In the process of being made	Created	Not created/ Expired	In the process of being made
1	Aranđelovac	+				+	
2	Bačka Palanka			+	+		
3	Bački Petrovac			+	+		
4	Bajina Bašta	+				+	
5	Bečej			+		+	
6	Bela Crkva		+			+	
7	Beočin		+		+		
8	City of Bor		+		+		
9	City of Čačak		+			+	
10	Despotovac		+			+	
11	Gornji Milanovac		+			+	

51 Law on Confirmation of the Agreement on the Solid Waste Program Loan in Serbia, between the Republic of Serbia and the European Bank for Reconstruction and Development, http://www.parlament.gov.rs/upload/archive/files/lat/pdf/predlozi_zakona/2021/2504 -21%20-%20Lat..pdf

12	Irig	+				+	
13	Kosjerić		+			+	
14	City of Kragujevac	+				+	
15	City of Kraljevo	+				+	
16	Krupanj		+			+	
17	City of Leskovac			+		+	
18	City of Niš		+			+	
19	City of Novi Sad			+	+		
20	City of Pančevo		+			+	
21	Raška		+			+	
22	Ruma		+			+	
23	City of Sombor	+				+	
24	Srbobran			+	+		
25	City of Sremska Mitrovica		+			+	
26	Sremski Karlovci		+			+	
27	Stara Pazova		+			+	
28	City of Subotica	+			+		
29	City of Šabac		+			+	
30	Temerin		+		+		
31	Titel		+			+	
32	Trstenik		+			+	
33	Ub		+		+		
34	City of Valjevo		+			+	
35	Vladimirci	+			+		
36	Velika Plana		+			+	
37	Vrbas		+			+	
38	City of Vršac		+			+	
39	City of Zrenjanin		+			+	
40	Žabalj				+		

Of the 40 analyzed cities and municipalities, a valid regional waste management plan exists in 11 of them (27.5% of the analyzed LGUs), while a local plan was developed by only eight of them (20% of the analyzed LGUs).

The Environmental Protection Agency, as an entity designated by law to maintain a database on waste management, has a special page[52] on its official website where LWMPs and RWMPs are available. Unfortunately, the information on this page is not up-to-date and complete, and most of the plans listed on it have expired. That is why it is not possible to determine an accurate overview of the situation regarding the prepared LWMPs and RWMPs on the territory of the Republic of Serbia, nor the purpose of this page.

52 Environmental Protection Agency, http://www.sepa.gov.rs/index.php?menu=20180&id=20060&akcija=ShowAll

4.3.3. Methodologies used in conducting analyses

As already mentioned, the analysis of 40 cities and municipalities was carried out in two cycles - the survey of the first 15 LGUs was carried out from April 2020 to February 2021, and the second cycle of 25 LGUs from March 2021 to April 2022.

The initial methodology was based on the then-current public policy documents - the term circular economy was officially introduced for the first time in the program of the Government of the Republic of Serbia in 2017, in which it was planned that the environmental protection development program would take place in accordance with the principles of the new concept, and in 2020, the Ministry of Environmental Protection created the "Circular Economy Roadmap", "the first document that will initiate a dialogue between decision-makers, industry representatives, the academic sector and civil society, in order to define future steps and a time frame for the transition from a linear to a circular economy". The research team collected data by analyzing available documents and qualitative research, which was conducted using the method of in-depth interviews with selected representatives of local government, public utility companies, micro, small and medium-sized companies and entrepreneurs. When it comes to waste management, the researchers looked at the situation in the specific municipality/city, observing the unified system with separate recommendations that, in relation to each individual local self-government, sometimes but not necessarily, also related to the municipal waste management system.

By evaluating the situation on the ground and the volume of information collected through this approach, the initial methodology was modified and supplemented before the beginning of the second cycle. The need to analyze the industrial and commercial waste management system separately from the municipal waste management system was identified. Namely, the legal regulations and the actors in these two systems differ significantly, so it was concluded that a more accurate overview of the situation could be obtained by analyzing them separately. In the second cycle, engaged experts investigated the municipal waste management system by looking at available public policy documents, programs, reports, and other documents of the companies entrusted by the LGU with performing these activities, as well as with the help of a specially prepared questionnaire.

In the next two sections, an overview of the extracted data will be given, which in the second cycle of studies were combined within the chapters "Analysis of Solid Municipal Waste Management" and "Analysis of Recyclable Waste Management". Wherever possible, the data was supplemented for the 15 municipalities that were prepared according to the initial methodology for the purposes of this publication.

4.3.4. Review of data on the conducted analyses of municipal solid waste management

The Report on Waste Management in the Republic of Serbia[53], as well as the national annual Report on the State of the Environment[54], a special part of which is dedicated to waste management, is prepared by the Environmental Protection Agency. In the comparative review for the period from 2011 to 2020, it was stated that the total amount of waste produced in the Republic of Serbia

53 Waste management in the Republic of Serbia in the period 2011–2020, http://www.sepa.gov.rs/download/UprajvanjeOtpadomRS_2011_2020.pdf
54 Report on the State of the Environment in the Republic of Serbia 2020, http://www.sepa.gov.rs/download/Izvestaj_2020.pdf

in 2020 was 12,495,392 tonnes[55], of which 12,427,520 tonnes were non-hazardous waste and 67,872 tonnes were hazardous. The total annual amount of produced waste per inhabitant in 2020 was 1.8 tonnes (in 2011, the amount was 1.2 tonnes).

When it comes to municipal waste, the report on the composition and quantities is prepared on the basis of data submitted to the Agency by public utility companies or other companies that have a contract with LGUs for performing waste management activities. As stated in the report, an assessment of the composition and amount of waste was made for LGUs that did not fulfill their obligations. For 2020, reports were submitted by 102 LGUs, or local companies.[56]

At the level of the Republic of Serbia, the indicators recorded and monitored by the Agency in the municipal waste sector are shown in Table 7[57].

*Table 7: Indicators related to municipal waste**

	in 2017	in 2018	in 2019	2020**
Total amount of municipal waste generated (mil. t)	2.71	2.77	2.80	2.92
Recycled fractions of municipal waste (mil. t)	0.283	0.330	0.334	0.343
Exported municipal waste fractions (mil. t)	0.098	0.096	0.109	0.114
Amount of collected and deposited waste (mil. t)	2.33	2.34	2.36	2.46
Average scope of waste collection (%)	83.7	87.2	86.2	86.4
Average daily amount of municipal waste per inhabitant (kg)	1.07	1.10	1.11	1.15
Degree of municipal waste recycling	14.1	15.4	15.8	15.7

*Source: Report on the State of the Environment in the Republic of Serbia 2020, http://www.sepa.gov.rs/download/Izvestaj_2020.pdf

**The Report states that the estimates are based on the number of inhabitants in 2019

It should be noted that the total amount of municipal waste generated in the past three years has been continuously increasing.

It is interesting to point out the fact that the value of the average daily amount of municipal waste per inhabitant, expressed in kilograms, is 1.17 kg in the Waste Management Program, although, as stated, the data source used is the Agency's report "Waste Management in the Republic of Serbia in the period 2011 -2020 year", where this value is 1.15 kg.

55 The stated total amount does not include waste from group 01 - Waste generated in research, excavation from mines or quarries and physical and chemical treatment; this data is recorded by another state institution - the Republic Statistical Office. According to RSO data (Eco-bulletin 2020, https://publikacije.stat.gov.rs/G2021/Pdf/G20215676.pdf), the total amount of generated waste in 2020 in the Republic of Serbia is 58,857,220 tonnes. The Agency did not explain what the obstacle is to including the data from the RSO in the annual report it prepares.

56 The challenge posed by some segments of analysis within this project can be illustrated by the example of the number of LGUs that submitted an annual report. Namely, in two documents prepared by the same institution - the Environmental Protection Agency, different data is given: in the Report on the State of the Environment in the Republic of Serbia in 2020, it is stated that reports were submitted 102 LGUs, and according to the report "Waste Management in the Republic Serbia in the period 2011–2020", for the same year, 103 LGUs have submitted reports.

57 Report on the State of the Environment in the Republic of Serbia 2020, http://www.sepa.gov.rs/download/Izvestaj_2020.pdf

The analysis of solid municipal waste management for 25 municipalities and cities included in the second cycle, carried out for the purposes of creating studies within the "Green Incubator" project, included research, collection and processing of available data on public utilities or other companies to which LGUs have entrusted municipal waste management, coverage by the MSW management service for the population and legal entities (for municipal waste generated by legal entities), billing model, information on the quantities and composition of the collected MSW, and more.

The collected data, supplemented wherever possible for LGUs that were analyzed in the first cycle, are presented in Table 8.

*Table 8: Selected data on the municipal waste management system for 40 LGUs processed within the scope of the research**

	City/ Municipality	To whom did the LGU entrust municipal waste management?	MSW management service coverage		Collection of data on quantities of MSW		
			Population	Legal entities	Is there a scale?	Measurement or assessment?	Has the report for 2021 been submitted to the Agency?**
1	Aranđelovac	JKP "Bukulja" Aranđelovac	About 64%	-***	No	Assessment	Yes
2	Bačka Palanka	KP "Komunalprojekt" Bačka Palanka	100%	About 50%	No	Assessment	Yes
3	Bački Petrovac	JKP "Progres" Bački Petrovac, JKP "Komunalac" Maglić and DOO "Gloakvalis" Gložan	100%	About 75%	No	Assessment	No
4	Bajina Bašta	JKP "12. September" Bajina Bašta	100%	-	-	-	No
5	Bečej	DOO "Potisje" Bečej	83.5%	75.1%	By request	Partial measurement	Yes
6	Bela Crkva	JKP "Belocrkvanski komunalac" Bela Crkva	65%	About 43%	By request	Measurement	Yes
7	Beočin	JKP "Beočin"	About 94%	About 70%	No	Assessment	Yes
8	City of Bor	JKP "3. October" Bor	72.61%	-	-	-	Yes
9	City of Čačak	JKP "Komunalac" Čačak	-	-	-	-	Yes
10	Despotovac	DOO "FCC Vrbak" Lapovo	80%	-	Yes	Measurement	Yes
11	Gornji Milanovac	JKP "Gornji Milanovac" Gornji Milanovac	-	-	-	-	Yes
12	Irig	JP "Komunalac" Irig	About 90%	About 41%	No	Assessment	No

13	Kosjerić	JKP "Elan" Kosjerić	-	-	-	-	No
14	City of Kragujevac	JKP "Čistoća" Kragujevac	-	-	Yes	Measurement	Yes
15	City of Kraljevo	JKP "Čistoća" Kraljevo	About 64%	-	-	Assessment	Yes
16	Krupanj	JKP "1. Maj" Krupanj	About 30%	About 30%	-	Assessment	No
17	City of Leskovac	DOO "PWW Leskovac"	91%	48%	-	Assessment	Yes
18	City of Niš	JKP "Mediana"	About 100%	About 100%	Yes	Measurement	Yes
19	City of Novi Sad	JKP "Čistoća"	100%	About 57%	Yes	Measurement	Yes
20	City of Pančevo	JKP "Higijena" Pančevo	100%	-	Yes	Assessment	Yes
		Local JKP Banatski Brestovac, Banatsko Novo Selo, Glogonj, Kačarevo, Omoljica and Jabuka	-	-	-	Assessment	-
21	Raška	JKP "Raška" Raška	-	-	-	-	No
22	Ruma	JP "Komunalac" Ruma	100%	About 54%	No	Assessment	Yes
23	City of Sombor	JKP "Čistoća" Sombor	100%	100%	No	Assessment	Yes
24	Srbobran	JKP "Graditelj" Srbobran	100%	45%	No	Assessment	No
25	City of Sremska Mitrovica	JKP "Komunalije" Sremska Mitrovica	-	-	-	-	Yes
26	Sremski Karlovci	JKP "Belilo" Sremski Karlovci	100%	About 69%	No	Assessment	No
27	Stara Pazova	JP "Čistoća" Stara Pazova	-	-	-	-	No
28	City of Subotica	JKP "Čistoća i zelenilo" Subotica	52%	-	Yes	Measurement	Yes
29	City of Šabac	JKP "Stari Grad"	100%	-	No	Assessment	Yes
30	Temerin	JKP "Temerin"	100%	About 55%	No	Assessment	Yes
31	Titel	JKP "Komunalac" and DOO "Izvor"	100%	32%	No	Assessment	No
32	Trstenik	JKP "Komstan" Trstenik	-	-	-	-	Yes
33	Ub	KJP "Đunis" Ub	75%	75%	Yes	Assessment	No
34	City of Valjevo	JKP "Vidrak" Valjevo	80%	100%	Yes	Assessment	Yes
35	Vladimirci	JKP "Izvor" Vladimirci	25%	25%	No	Assessment	No

36	Velika Plana	WW doo Niš - Velika Plana branch	About 80%	About 50%	Yes	Measurement	Yes
37	Vrbas	JKP "Komunalac" Vrbas	About 93%	Less than 50%	No	Assessment	Yes
38	City of Vršac	JKP "2. October" Vršac	95.46%	95.46%	-	-	Yes
39	City of Zrenjanin	JKP "Čistoća i zelenilo" Zrenjanin	100%	About 50%	-	-	No
40	Žabalj	JKP "Čistoća" Žabalj	About 90%	About 40%	No	Assessment	Yes

* Sources of data: Questionnaires prepared for the purposes of conducting research and publicly available data on official internet presentations and in documents of the mentioned companies; accessed: 05/24/2022

** Data source: The website of the Environmental Protection Agency for the KOM1 report, https://www.nriz.sepa.gov.rs/DostavlovjePodataka/KOM1opstinedostavanje.aspx; accessed on 05/25/2022.

***In order to make the table more transparent, where the data was not publicly available, the mark "-" was placed.

The presented data confirm the information and analyses available in the RWMP and LWMP, first of all, that in the majority of local self-governments in hilly and mountainous areas, remote villages are not covered by the service of collecting and transporting MSW, due to the inaccessibility of the terrain. A significant difference is noticeable in the coverage of the service of collection and removal of MSW in the category of legal entities. The authors assume that it is a matter of not being up-to-date and/or insufficient capacity of local companies entrusted with municipal waste management, since the records of active legal entities are kept in the Serbian Business Registers Agency and are publicly available.

In the prepared and available RWMPs, it is stated that in the majority of LGUs where waste is still disposed of in unsanitary landfills - dumps, there are no truck scales for measuring the quantities of MSW, and that the data, if reported anywhere, is based on estimates (most often by volume/carrying capacity of the garbage trucks used to transport the collected MSW to the landfill). It is for this reason that the authors made the decision not to include data on quantities in the presentation, since the stated data in the studies are largely based on estimates that are often older than 10 years and do not reflect the current situation.

As stated in the previous chapter, in 2020, 102 LGUs submitted an annual report on municipal waste (KOM1) to the Environmental Protection Agency (70% of the total of 145 LGUs, excluding the region of Kosovo and Metohija). Of the 40 municipalities and cities included in this analysis, 27 of them, or 67.5%, submitted the report for 2021.

The Law on Waste Management, which was adopted in 2009, introduced the "polluter pays" principle in this area - "the polluter must bear the full costs of the consequences of their activities." The costs of generation, treatment, i.e. reuse and disposal of waste must be included in the price of the product". When it comes to municipal waste, the application of this principle would mean that the municipal waste management service is calculated/paid in relation to the amount of generated waste. Although simple models based on compliance with this requirement are available in the practice of European Union countries, very few LGUs in the Republic of Serbia have decided to apply them. The most common calculation model is still the calculation per square meter of residential or commercial space.

Information on the calculation model for waste management services in the municipalities and cities included in the research (where data were available) is presented in Table 9.

*Table 9: Selected data on municipal waste management fees for 40 LGUs processed within the scope of the research**

Models for fee calculation for municipal waste management						
	City/ Municipality	Billing model for individuals/ households		Note	Billing model for legal entities	Note
		Collective housing	Individual housing			
1	Aranđelovac	m^2	m^2	/	-**	/
2	Bačka Palanka	per household	per household	/	-	/
3	Bački Petrovac	per container	per container	JKP "Progres"	per container	JKP "Progres"
		per household member	per household member	JKP "Komunalac"	flat rate	JKP "Komunalac"
		per household	per household	DOO "Gloakvalis"	flat rate	DOO "Gloakvalis"
4	Bajina Bašta	per dish	per dish	/	per dish	/
5	Bečej	per container volume	per container volume	/	m^2	/
6	Bela Crkva	m^2	m^2	/	m^2	/
7	Beočin	per household member	per household member	/	m^2	/
8	City of Bor	per household member	per household member	/	m^2	/
9	City of Čačak	m^2	m^2	flat, according to surface	m^2	flat, according to the surface
10	Despotovac	per household member	per household member	/	flat rate, m^2 , m^3	/
11	Gornji Milanovac	m^2	m^2	/	m^2	/
12	Irig	per household member	per household member	/	m^2	flat, according to surface
13	Kosjerić	m^2	m^2	/	m^2	/
14	City of Kragujevac	m^2	m^2	/	m^2	/
15	City of Kraljevo	m^2	m^2	/	m^2	by categories and zones
16	Krupanj	m^2	m^2	/	m^2	/
17	City of Leskovac	per household member	per household member	/	m^2	/
18	City of Niš	m^2	m^2	/	m^2	/

19	City of Novi Sad	per household member	per household member	/	m^2	flat, according to the surface
20	City of Pančevo	m^2	m^2	/	m^2	JKP "Higijena"
		-	-	/	-	JKP in populated areas
21	Raška	m^2	m^2	/	m^2	/
22	Ruma	m^2	per household	/	m^2	/
23	City of Sombor	m^2	per household	/	m^2	/
24	Srbobran	per household member	per household member	/	m^2	/
25	City of Sremska Mitrovica	m^2	m^2	/	m^2	/
26	Sremski Karlovci	per household member	per household member	/	m^2	flat, according to the surface
27	Stara Pazova	m^2	m^2	/	m^2	/
28	City of Subotica	m^2	per household	/	per bag and per m^2	/
29	City of Šabac	m^2	m^2	/	m^2	/
30	Temerin	per household member	per household member	/	flat rate	/
31	Titel	flat rate	flat rate	JKP "Komunalac"	m^2	individual categories per container
		per household member	per household member	DOO "Izvor"		
32	Trstenik	per household member	per household	/	m^2	by groups
33	Ub	m^2	m^2	/	m^2	/
34	City of Valjevo	m^2	m^2	/	m^2	/
35	Vladimirci	m^2	m^2	/	m^2	/
36	Velika Plana	per household member	per household member	for four or more members - flat rate	m^2	certain categories flat rate
37	Vrbas	according to the volume of the bin or the number of bags	according to the volume of the bin or the number of bags	/	according to the volume of the bin, container or number of bags	/
38	City of Vršac	m^2	m^2	/	m^2	/
39	City of Zrenjanin	m^2	m^2	/	m^2	/
40	Žabalj	flat rate	flat rate	/	flat rate	/

*Sources of data: Questionnaires created for the purposes of conducting research and publicly available data on official internet presentations and in documents of the companies in question; accessed: 05/24/2022

**In order to make the table more transparent, where the data was not publicly available, the mark "-" was placed.

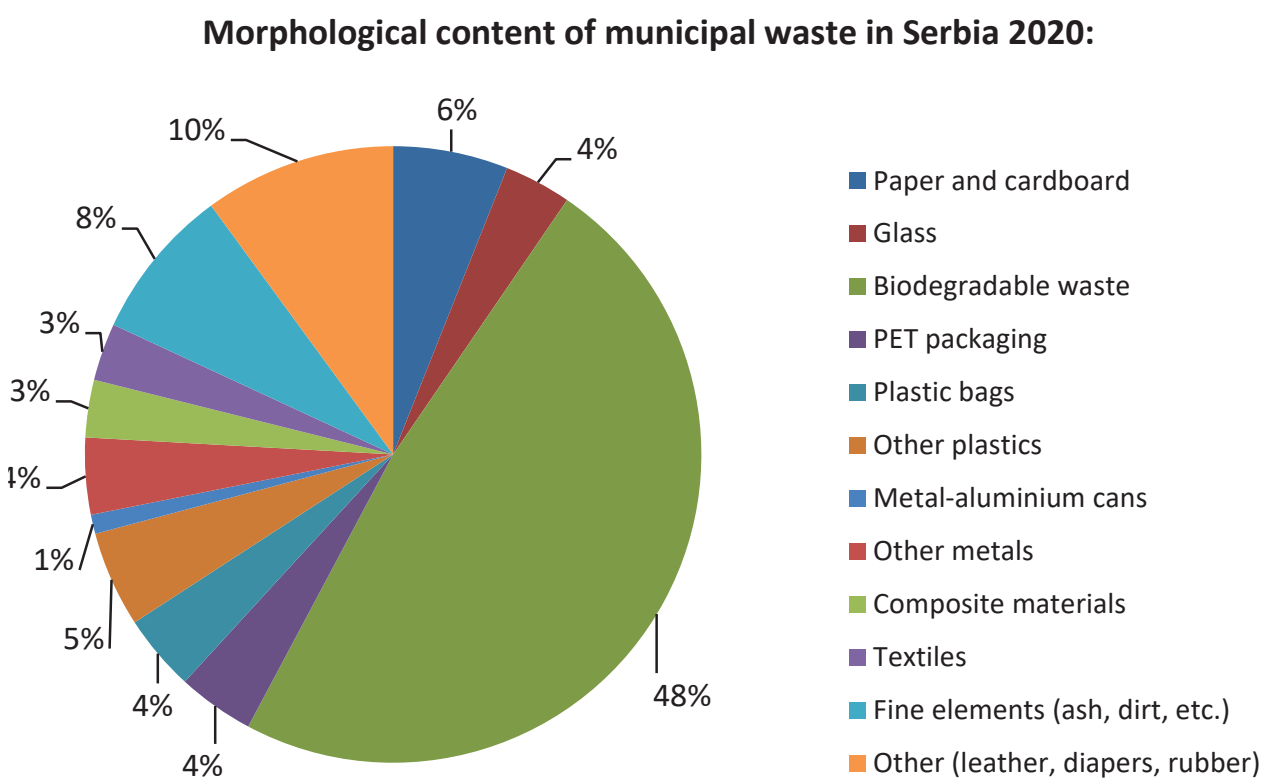
Of the 40 municipalities and cities included in the research, only four (10%) use a model for calculating fees for municipal waste management formed according to the amount of garbage generated, that is, in accordance with the "polluter pays" principle.

The Program[58], as the latest public policy document in this area, also clarifies that fees should be formed in accordance with the "pay what you throw away" rule, as an application of the "polluter pays" principle. This way, households and legal entities would be able to "influence the amount of money they pay for municipal waste removal services for as much waste as they generate." If they separate waste at the point of origin, compost etc, they can demand smaller waste fees".

4.3.5. Review of data on the conducted analyses of recyclable waste management

According to the official data of the Environmental Protection Agency[59], listed in the Report on the State of the Environment in the Republic of Serbia in 2020, the morphological composition of municipal waste in the Republic of Serbia in 2020 was as follows:

Figure 2: Morphological composition of municipal waste in the Republic of Serbia, 2020 ("Report on the State of the Environment in the Republic of Serbia 2020")

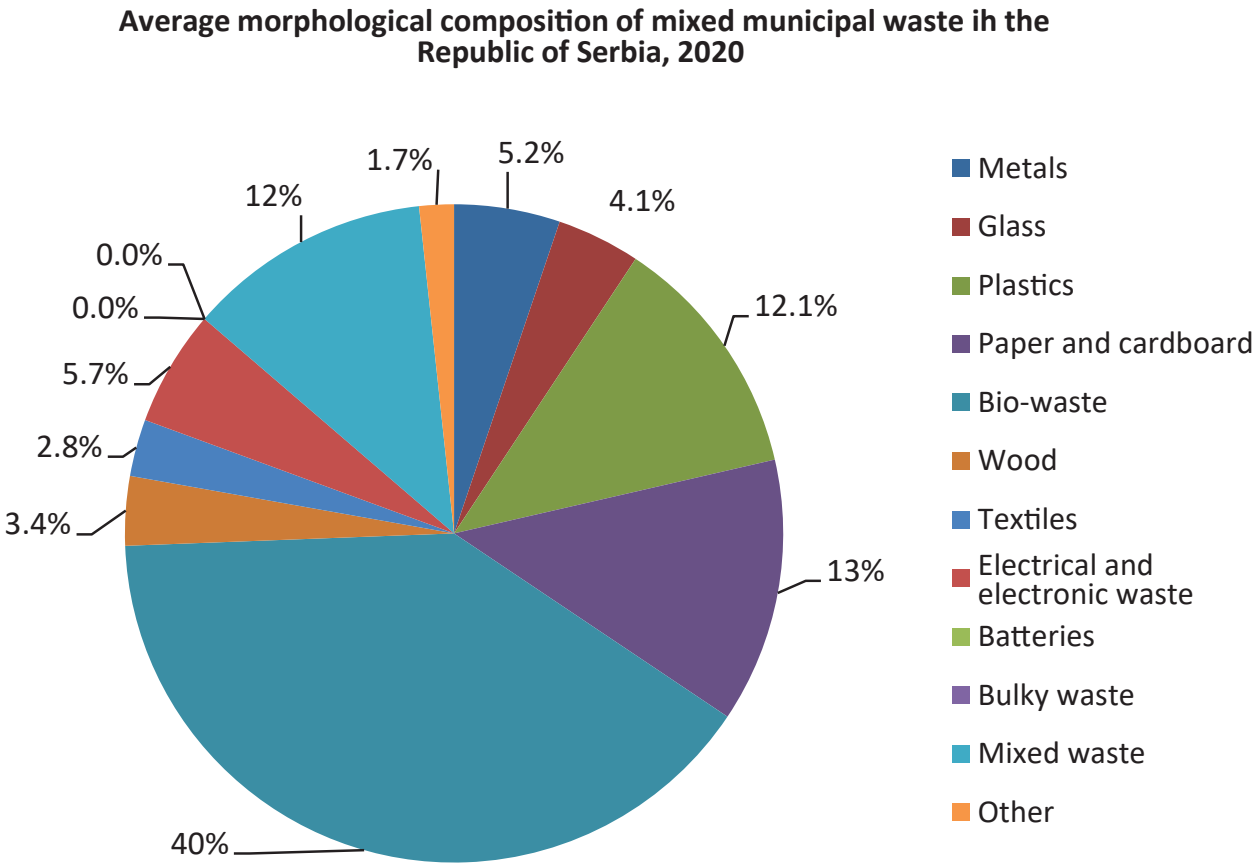


58 Waste Management Program in the Republic of Serbia for the period 2022-2031, "Official gazette of the Republic of Serbia" no. 12/2022, https://www.pravno-informacioni-sistem.rs/SlGlasnikPortal/eli/rep/sgrs/vlada/drugiakt/2022/12/1
59 Report on the state of the environment in the Republic of Serbia in 2020, http://www.sepa.gov.rs/download/Izvestaj_2020.pdf

Biodegradable waste is the biggest component of municipal waste with 48%, followed by paper and cardboard 6%, other plastics 5%, fine elements (ash, soil, etc.) 8%, other (leather, diapers, rubber) 10%.

Unfortunately, the Ministry of Environmental Protection, as the competent state body, has created quite a bit of confusion in the previously mentioned latest public policy document in this area - the Waste Management Program in the Republic of Serbia for the period 2022-2031. Although the presentation of the current situation relies on data collected by the Environmental Protection Agency[60], the methodology and provisions of the decisions that will only be applied starting on January 1, 2023, were used for certain calculations. In particular, it is not completely clear why the average morphological composition of mixed municipal waste in the Republic of Serbia in 2020 was presented completely differently than in the official report.

Figure 3: Average morphological composition of mixed municipal waste in the Republic of Serbia, 2020 ("Waste Management Program in the Republic of Serbia for the period 2022-2031")



60 The Environmental Protection Agency is a body within the Ministry of Environmental Protection with the capacity of a legal entity; http://www.sepa.gov.rs/index.php?menu=100&id=4&akcija=showAll

Table 10: Average morphological composition of mixed municipal waste in the Republic of Serbia, 2020 ("Waste Management Program in the Republic of Serbia for the period 2022-2031")

Fractions of communal waste	Amount of mixed municipal waste	Amount of separately collected waste	Total amount of municipal waste (t)	Share in total municipal waste (%)
Metals	105,994	47,853	153,848	5.2
Glass	98,599	22,238	120,838	4.1
Plastic	300,728	55,293	356,021	12.1
Paper and cardboard	152,829	229,973	382,802	13.0
Bio-waste	1,168,401	11,469	1,179,870	40.0
Wood	71,484	27,945	99,429	3.4
Textiles	81,344	61	81,405	2.8
Electronic and electrical waste	105,994	60,704	166,698	5.7
Batteries	49	21	70	0.002
Bulky waste	937	422	1,359	0.0
Mixed waste	354,957	0	354,957	12.0
Other	23,664	26,536	50,199	1.7
Total	2,464,981	482,515	2,947,496	100

It can be noted that the share of waste from electrical and electronic products, batteries, bulky waste, and wood is separated.

The above table also contains information on the amount of separately collected waste by fraction. According to this data, 16.37% of municipal waste is collected separately in the Republic of Serbia.

As we stated in the previous sections, according to the official assessment of the situation, in our country "there is no systematically organized separate collection and recycling of municipal waste". During the implementation of the research within the "Green Incubator" project, most often in direct contact with actors from the analyzed LGUs, information was obtained that in the past two decades there were attempts in a large number of cities and municipalities to introduce primary waste selection. Although some LWMPs and RWMPs state the reasons why these systems did not endure, the authors did not find any research that dealt with this topic and could provide valid answers.

According to the information collected from representatives of public utility companies/public companies/companies, as well as a review of their official internet presentations, data on primary waste selection in the municipalities and cities included in the research is given in Table 11.

*Table 11: Selected data on the system of primary municipal waste selection for 40 LGUs processed as part of the research**

	City/Municipality	Has primary waste selection been introduced in the territory of the LGU? (yes/partially/no)	Fraction/s collected separately
1	Aranđelovac	Partially	Glass, plastic, paper
2	Bačka Palanka	Partially	PET
3	Bački Petrovac	Partially	PET, paper, cardboard, glass, foils, cans
4	Bajina Bašta	Partially	"Dry" and "wet" fraction
5	Bečej	Partially	
6	Bela Crkva	Partially	PET
7	Beočin	Partially	PET
8	City of Bor	Partially	PET
9	City of Čačak	Yes	"Dry" and "wet" fraction
10	Despotovac	Partially	"Dry" and "wet" fraction
11	Gornji Milanovac	Partially	PET, paper
12	Irig	No	
13	Kosjerić	No	
14	City of Kragujevac	Yes	PET, glass, metal,
15	paper and cardboard	ne	
16	City of Kraljevo	No	
17	City of Leskovac	Partially	Paper, plastic
18	City of Niš	Partially	
19	City of Novi Sad	Partially	"Dry" and "wet" fraction, glass
20	City of Pančevo	Partially	
21	Raška	No	
22	Ruma	No	
23	City of Sombor	Partially	Glass

24	Srbobran	No	
25	City of Sremska Mitrovica	Partially	PET, paper, cardboard, glass
26	Sremski Karlovci	No	
27	Stara Pazova	No	
28	City of Subotica	No	
29	City of Šabac	No	
30	Temerin	Partially	PET
31	Titel	No	
32	Trstenik	Partially	PET
33	Ub	No	
34	City of Valjevo	Partially	"Dry" and "wet" fraction, paper, cardboard, metal, plastic, PET packaging, metal packaging
35	Vladimirci	No	
36	Velika Plana	Partially	PET, paper
37	Vrbas	Partially	PET
38	City of Vršac	No	
39	City of Zrenjanin	No	
40	Žabalj	Partially	PET

*Sources of data: Questionnaires created for the purposes of conducting research and publicly available data on official internet presentations and in the documents of the companies in question; accessed: 05/24/2022

This analysis confirmed the official assessments on the separate collection of municipal waste, which were presented in the Program.

When it comes to further handling of certain fractions of municipal waste, the Program states, among other things that:

- the network for separate waste collection is not sufficiently developed in relation to the existing capacities for recycling,[61]
- The Republic of Serbia does not have the necessary infrastructure to reduce the disposal of biodegradable waste in landfills,
- the system of separate collection of packaging waste from households is currently not adequately established and most of it is included in mixed municipal waste.

61 Waste management program in the Republic of Serbia for the period 2022-2031 - section 3.2.3. Existing infrastructure for municipal waste treatment and disposal

The Republic of Serbia has set a general goal in the field of waste management by 2031, "to develop a sustainable waste management system for the purpose of preserving resources and reducing negative impacts on the environment, human health and the degradation of space." In addition to this, four specific goals were set, the first of which directly relates to the topic covered in this analysis - "The municipal waste management system is improved through an increased recycling rate, reduction of biodegradable waste disposal in landfills and the reduction of waste disposal in unsanitary landfills."

To achieve this special goal, the state proposes to:

- increase the degree of municipal waste recycling to a total of 25% by mass by 2025 and 35% by 2030,
- increase the rate of preparation for reuse and recycling of municipal waste to a minimum of 55% by weight by the end of 2025 and a minimum of 60% by weight by the end of 2030,
- reduce the disposal of biodegradable waste in landfills by 2028, to 75% of the total amount of biodegradable waste created in 2008,
- establish separate collection for paper, metal, plastic, glass and textiles by the end of 2029,
- increase the rate of bio-waste recycling to 20% by 2025 and 40% by 2029,
- increase the rate of paper and cardboard recycling to 25% by 2025 and 35% by 2029,
- reduce waste disposal in unsanitary landfills to 0% by 2034.[62]

The separate collection of recyclable material will be provided for by introducing "a system of (at least) two bins - one for mixed waste and another for recyclable waste." As stated in the Program, the system will be gradually improved through separate collection of glass, paper and cardboard , as well as separate collection of municipal biowaste starting with the collection of "green" waste.

62 Ibid. - section 5.2. Specific objectives

4.4. Analysis of industrial and commercial waste management systems

Generation and collection of recyclable waste takes place for the most part in the field of business and commercial activities and represents a system of taking waste paper, plastic, metal, glass and wood and further processing them in the recycling process. Collection is carried out through branched networks of small and medium-sized enterprises and large companies' units that deal with recycling.

The challenges that arise in the operation of facilities registered for the collection and treatment of waste entail predefined problems present in the entire territory of Serbia and entail limitations to collection activities exclusively to materials that are unique in composition and absolutely recyclable in a basic processes, which requires working with the following types and subtypes of materials:

- **Paper:**
  cardboard
  chromo cardboard
  white paper
  newspapers/magazines, natron
- **Plastic:**
  PET drinking bottles
  HDPE - canisters, barrels, haberdashery made of hard plastic, etc.
  LDPE – plastic films made of one type of plastic
  PP - various plastic accessories, crates, pallets, etc.
  PS – various plastic accessories, household appliances, etc.
- **Glass:**
  packaging glass
- **Metal:**
  all kinds of metals
- **Wood:**
  wood pallets
- **EE waste**
- **Organic waste originating from the agricultural and food industry**
- **Rubber:**
  Car tyres
  Various types of waste rubber.

The generation and collection of non-hazardous waste that cannot be recycled, which has the status of industrial waste, holds potential for market development in the field of collecting and treating waste for energy purposes.

These types of waste include the most common types, such as:

- Multi-layer materials, combination:
  Different types of plastic
  Paper and plastic
  Plastic and aluminum such as food packaging, bags of coffee, chips, ice cream, etc.

- Non-recyclable paper, such as:
  Cardboard sleeves
  Natron bags (with or without plastic film), e.g. from powdery materials such as flour, sugar, cement, etc.
  Labels, thermal paper
  Barrels, protective corners, labels, etc.
- Different types of contaminated plastic packaging:
  Plastic bags of livestock and pet feed
  PET bottles of edible oils, cosmetic products and frosted yogurt bottles
  Plastic packaging contaminated with non-hazardous materials
  Printed and colored foils
  ABS, PS, PC, PS, extruded PET and OPP components and products
- Waste textiles, haberdashery, footwear, etc.
- Waste and residues from the production and processing of wooden and plastic materials of all kinds.

Generators of non-hazardous waste that cannot be recycled are found in almost all types of industry, especially in the food and confectionery, textile, construction and processing industries. The quantities generated are constant, because they are generated as waste from regular production activities, as scrap, or as packaging that occurs when raw materials are consumed in production. When managing quantities of this type of waste, generators face a problem due to the impossibility of handing over or selling such quantities together with regularly generated quantities of recyclable waste that have a certain market value and are sold by generators to collectors/recyclers.

For this type of waste, it is often impossible to find an operator who will take it over without additional costs for the waste generator. Generators often resort to disposing of such waste by putting it in municipal waste volumes, by subcontracting it to a landfill or by mixing it with recyclable waste volumes, which leads to a reduction in the value of the recyclable waste they sell and often to a refusal to take on such volumes.

Generators are aware of their legal obligations, and the need to deal with these types of waste becomes more pronounced when taking into account the frequent factor of the necessary traceability of waste streams and evidence of the destruction of quantities bearing logos, brands and other trademarks.

Article 6 of the Law on Waste Management[63], adopted in 2009, defines the hierarchy of waste management as a basic principle. The waste management hierarchy represents the order of priorities in the practice of waste management and is applied as a priority order in waste prevention and management, regulations and policies:

- prevention;
- preparation for reuse;
- recycling;
- other reuse operations (reuse for energy, etc.);
- storage.

63 The Law on Waste Management, http://www.pravno-informacioni-sistem.rs/SlGlasnikPortal/eli/rep/sgrs/skupstina/zakon/2009/36/14/reg

In terms of compliance with the basic principle of the Law on Waste Management, the prescribed steps in the waste disposal process are often skipped and the only possible solution is sought, regardless of whether the sequence is followed or not.

According to the provisions of the Law on Waste Management, the waste generator is, among other things, obliged to:

- ensure the implementation of the principles of the waste management hierarchy;
- obtain a report on waste testing and renew it in case of a change in technology, a change in the origin of raw materials, other activities that would change the nature of the waste, and keep the report for at least five years;
- collect generated waste separately and sort it according to the need for future treatment;
- store waste in a way that does not affect human health and the environment and ensure that there is no mixing of different types of waste, as well as no mixing of waste with water;
- hand over waste to an entity authorized to perform waste management activities;
- keep records of waste generated, handed over or disposed of.

The quantities generated range from a few tonnes per year to several hundred tonnes per year, and represent a demanding logistical undertaking in terms of selection, treatment and storage at the place of origin, i.e. at the location of the generator, and in the very logistics of taking over, transporting and final disposal through co-incineration in cement plants or depositing at sanitary landfills with permits to accept industrial waste.

The entire process entails significant costs for the waste generator, ranging from RSD 6/kg to RSD 120/kg, all depending on the type of material, quantity, packaging/transportation method and location of the generator and final waste disposal. Due to quantities, generators often have problems with the long-term storage of this type of waste due to a lack of capacity, in terms of space and equipment. The provision of this type of service is limited to generators that have large amounts of waste and to generators that, due to the rules protecting their products, are prepared to bear the high costs of waste material collection and disposal. The vast majority of generators are left without an adequate, permanent and economically acceptable service for the disposal of this type of waste.

Recyclable quantities of waste from generators are taken over by authorized operators who have permits for the collection/transportation and storage/treatment of non-hazardous waste, and who specialize in the collection and pretreatment (sorting and baling) of paper, plastic, wood and/or metal waste. These companies are technically equipped to take over and transport small and medium capacities and are able to take over quantities on demand, even on a daily basis. They represent the most suitable solution for the needs of waste generators for the collection of recyclable quantities and quantities of non-hazardous waste that cannot be recycled and are suitable for energy utilization. Such companies are currently unable to accept large amounts of non-hazardous non-recyclable waste for the following reasons:

- Providing this service is not profitable, because the material has no market value,
- they do not have a solution for the final disposal of the quantities taken from the generator,
- they cannot guarantee the transparent and traceable stream of waste that generators require.

The range of market prices of waste as a secondary raw material in 2021 is given in Table 12.

*Table 12: Range of market prices of waste as secondary raw materials in 2021**

	Price		
	At the level of waste generation [RSD/t]	At the level delivered for recycling [RSD/t]	Average fees of WM system operators [RSD/t]
Paper/Cardboard			
Paper/cardboard	3,000	9,400	6,000
Composite packaging	-	2,500	n/a
Plastic			
PET			
Colorless	25,000	35,000	6,000
Mix	15,000	27,000	6,000
Other plastic			6,000
Foil (colorless)	15,000	25,000	6,000
Foil (colored)	-	-	6,000
Hard plastic	15,000	29,000	6,000
Glass			
White	-	5,000	11,000
Green and brown	-	5,000	11,000
Mixed	-	5,000	11,000
Metal			
Aluminum cans	65,000	106,000	3,000
Fe cans and other	10,000	23,000	3,000
Wood			
Pallets	2,000	5,000	3,000
Other	-	-	3,000
EE waste			
Small appliances	5,000	10,000	
Large appliances	20,000	30,000	

*Source: Data collected from a representative sample of companies that deal with the collection and pretreatment of these types of waste, which cover more than 60% of the market for secondary raw materials and waste management services, their purchase prices by source and sales prices, as well as received and contracted fees from system operators of packaging waste management for 2021

Taking all of the above into account, it can be concluded that when it comes to industrial and commercial waste, the recyclable portion of waste already contributes to a large extent to the establishment of a circular economy, while there is a lot of room for development when it comes to waste that is not suitable for recycling and which, above all, must be handled by figuring out ways to reduce its generation or ensure its transformation into recyclable waste.

During the second cycle of research, which covered 25 cities and municipalities, waste management operators in the private sector answered the question: "Do the following challenges represent obstacles for the development of the waste management system in your local self-government unit." The analysis of the answers is given in Table 13.

Table 13: Graphic presentation of answers to the question: "Do the following challenges represent obstacles for the development of the waste management system in your local self-government unit"

		Yes	No	Partially
1	Informal waste collectors	37%	43%	20%
2	Bad economic conditions on the market for secondary raw materials	78.36%	2.32%	19.32%
3	Failure to develop the system of primary and/or secondary separation of communal waste	20%	53%	27%
4	Lack of local self-government support and support in the development and establishment of development projects	27%	51%	22%
5	Lack of support from local self-government in terms of legislation and application of regulations	41%	40%	19%
6	Insufficient knowledge about the methods and technologies of waste reuse and recycling	46%	38%	16%
7	Reluctance of waste generators to bear the real costs of waste management	81.36%	7%	11.64%
8	Insufficient awareness of the legal obligations of waste generators (businesses and population)	58.68%	21%	20.32%

As evident from the answers received, the unwillingness of the generator to bear the real costs of waste management and the insufficient value of the waste itself represent key obstacles for the development of the waste management system in the local community.

From the point of view of the circular economy, both of these obstacles can be overcome through the application of the principles of the circular economy. Waste should be considered before being created, with the ambition that, if it must be created, it should be of such quality and quantity that it can be placed on the market or used as an input raw material for some other process.

When it comes to the reluctance of waste generators to bear the real costs of waste management, the application of penal provisions for non-compliance with proper waste management is key here. Any waste generator that disposes of waste in an inadequate manner or does not dispose of it as intended, transfers the costs of waste management and environmental pollution to all citizens of Serbia. The cost of waste management must be included in the price of the product in its realistic range, and thus ensure that the waste is adequately disposed of without harming human health and the environment. Only when these costs are included in the real cost of products and

services, will businesses have a clear motive to see the opportunities that the circular economy provides and make efforts to reduce these costs. Investments to reduce the generation of waste and improve the design of products, processes and services in this direction represent a long-term investment that must not be delayed, one which businesses should see as an advantage their service or product offers. Such “green” products and services must be clearly labeled and also presented to clients and consumers.

5. Conclusions and recommendations

The task of the research covering 40 municipalities and cities, which was carried out as part of the "Green Incubator" project, was to analyze and present the initial prerequisites in separate local self-government units for the transition from a linear to a circular economy.

The methodology used was based on the position that new circular models are not only an economic activity, but also a social change, and that in order to create a stimulating environment for a successful transition from a linear to a circular economy, long-term planning and finding interest in cooperation at the level of the entire community is necessary.

Apart from the set of specific conclusions and recommendations that the authors have singled out for each specific municipality/city and that can be found in individual studies, here we provide conclusions that go beyond the framework of an individual local community and can be viewed as universal.

First of all, the research carried out in LGUs confirmed that, in the long term, the most important potential benefits and opportunities that the circular economy brings are the following:

- for small and medium enterprises and entrepreneurs:
- cheaper raw materials, more secure supply of resources, the possibility of business expansion to the European Union market, less negative impact of production/business processes on the environment, the possibility of higher profits;
- for public utilities in the municipal waste management sector:
- reduction of the amount of generated waste, improvement of the services they provide, less negative impact of business processes on the environment;
- for the recycling economy:
- better quality raw materials, greater value of waste, greater quantities of collected secondary raw materials, less negative impact of production/business processes on the environment;
- for local self-government units:
- reduction in the amount of generated waste and lower costs for maintaining the municipal waste management system, better environmental conditions in their territories;
- for citizens:
- better quality products and services, better satisfaction of personal and social needs, better environmental conditions, better quality of life.

The circular economy in the Republic of Serbia is just starting its growth, and the main actors of its development can be small and medium-sized companies that have production and service activities, because the transition to this model can, as we have stated, provide them with safer resources and reduce costs in the long term. Additionally, entering the EU market requires fulfilling environmental protection criteria, which in practice can also be achieved through the introduction of the circular economy model. Establishing a circular economy model will ensure that materials suitable for reuse are seen as raw materials for new products instead of being sent for recycling. This will additionally contribute to the protection of the environment and the preservation of natural resources, but it will also create preconditions for innovative approaches and new products and services. Operating according to circular economy models also leads to a reduction in greenhouse gas emissions, which will be one of the basic prerequisites for placing products and services on the EU market in the near future.

During the analysis process, research teams observed that the current situation is characterized by an absence of transparent data on the amounts and types of waste that is collected, transported, treated and deposited, as well as that regulations in the field of waste management are not fully implemented.

As guidelines for overcoming existing obstacles to the introduction of circular business models for individual social actors who have the opportunity to take key steps, we have singled out the following recommendations:

- Ensure full coverage of municipal waste collection services for all natural and legal persons on the territory of the municipality/city (actor: local self-government unit);
- Provide the infrastructure (truck scales, etc.) needed to clearly determine the amount of municipal waste collected in each local self-government unit (actors: local self-government unit, company entrusted with municipal waste management);
- Ensure compliance with regulations in the field of waste management in order to obtain the correct morphological composition of the generated waste and make that data transparent and open (actor: Ministry of Environmental Protection - Environmental Protection Agency);
- Establish a functional system for the primary selection of municipal waste and local treatment in order to reduce the quantities that are disposed of at landfills, and increase the quantities from which useful substances and energy can be obtained (actors: local self-government unit, the company entrusted with the activity of municipal waste management);
- Define responsibilities and a functional system for the separate collection of hazardous waste and special waste streams on the territory of the local self-government unit (actors: Ministry of Environmental Protection, other competent ministries);
- Introduce long-term incentive measures for legal entities operating in accordance with the principles of the circular economy (actors: local self-government unit, autonomous province, Republic of Serbia);
- Cover part of the costs incurred by legal entities during the process of transition from a linear to a circular economy (actors: local self-government unit, autonomous province, Republic of Serbia);
- Encourage and support the cooperation of businesses and the scientific research community in order to improve the production process and provide services in the direction of the circular economy (actors: local self-government unit, autonomous province, competent ministries);
- Ensure compliance with regulations in the field of waste management (actors: competent inspection services);
- Ensure compliance with the “polluter pays” and “extended responsibility principles” in order to realistically include the costs of waste management and environmental pollution in the price of products and services and prevent the transfer of these costs to citizens (actor: Ministry of Environmental Protection);
- Ensure clear visibility of positive examples in the circular economy and their advantages through the introduction and expansion of the scope of “green” public procurement in the state sector (actors: competent ministries, Chamber of Commerce of Serbia, Chamber of Commerce of Vojvodina);
- Support the active involvement of civil society organizations and the media in promoting the circular economy and positive examples (actors: local self-government units, autonomous province, relevant ministries);
- Provide educational programs for representatives of all three sectors about the circular economy and the advantages it offers (actors: local self-government unit, autonomous province, competent ministries, Serbian Chamber of Commerce, Vojvodina Chamber of Commerce, civil society organizations).

Initial Foundations for the Transition to a Circular Economy

Overview of an analysis of 40 cities and municipalities in the Republic of Serbia

Publisher:
"Environment Engineering Group"
Đorđa Rajkovića 13a 21000 Novi Sad
www.activity4sustainability.org

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Translation:
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Design:
DK Design

Printing house:
SD Grafik

Circulation:
100

Novi Sad, 2022.

ISBN-978-86-87145-12-2

CIP - Каталогизација у публикацији
Библиотеке Матице српске, Нови Сад

338.1:502.131.1(497.11)

INITIAL foundations for the transition to a circular economy : overview of an analysis of 40 cities and municipalities in the Republic of Serbia / [editor Igor Jezdimirović ; authors Igor Jezdimirović ... [et al.] ; translation Nemanja Georgijević]. - Novi Sad : Environment Engineering Group, 2022 (Gornji Milanovac : SD grafik). - 59 str. : ilustr. ; 30 cm

Tiraž 100.

ISBN 978-86-87145-12-2

1. Jezdimirović, Igor, 1982- [аутор] [уредник]
а) Циркуларна економија -- Србија

COBISS.SR-ID 77500169