



Co-funded by the  
Erasmus+ Programme  
of the European Union

## PROJECT:

# ENHANCE SKILLS AND COMPETENCES TO BOOST ECOLOGICAL INNOVATION IN AUTOMOTIVE INDUSTRY

## DRIVEN

### Action plan: concept of circular economy applied in automotive industry

University of Belgrade  
Faculty of Mechanical Engineering



Circular economy © @European Union

## Contents

I. INTRODUCTION .....	3
II. NATIONAL POLICY FRAMEWORK AND OVERVIEW OF THE CURRENT STATE .....	5
III. PUBLIC AND EDUCATIONAL SYSTEM .....	7
IV. ANALYSIS OF OPTIONS FOR THE ACHIEVEMENT OF OBJECTIVES .....	8
4.1 Option 1.....	9
4.2 Option 2.....	10
4.3 Option 3.....	11
V. EDUCATION OF SPECIFIC GROUPS OF COMPANIES FOR THE APPLICATION OF THE CIRCULAR ECONOMY CONCEPT .....	11
VI. SUPPORT TO COMPANIES IN FINDING INCENTIVES AND FINANCIAL INSTRUMENTS.....	12
VII. ANALYSIS OF THE POTENTIAL FOR THE APPLICATION OF THE CIRCULAR ECONOMY MODEL IN CERTAIN FIELDS OF PROCESSING INDUSTRY AND SUPPORT TO SELECTED COMPANIES.....	14
VIII. ENCOURAGING COOPERATION BETWEEN SCIENTIFIC-RESEARCH ORGANIZATIONS AND COMPANIES IN THE FIELD OF INNOVATIONS AND PRODUCTION OPTIMIZATION .....	15
IX. RAISING AWARENESS AT INTERESTED PUBLIC AND EDUCATIONAL INSTITUTIONS ABOUT THE CIRCULAR ECONOMY CONCEPT .....	16
X. RECOMMENDATIONS.....	16

## I. INTRODUCTION

Circular economy is recognized as an important strategic concept for green transition of the Republic of Serbia, which in the recent years has been placed high on the list of priorities for the development of our society. Green transition is a process that includes economic, energy and investment transition based on sustainable use of resources and energy, reduction of negative environmental impacts, application of innovation and digital tools, knowledge, added value and greater competitiveness of the economy.

According to the INDUSTRIAL POLICY STRATEGY OF THE REPUBLIC OF SERBIA FROM 2021 TO 2030, a clear industrial policy is needed, both horizontal and vertical, to achieve growth aspirations, accompanied by a disciplined and supportive macroeconomic policy. Horizontal industrial policy addresses the issues of education, fostering innovation, digital transformation, investment, infrastructure, internationalization and circular economy, touching in all these areas upon the topic of building an enabling business environment for facilitated business doing by industrial players. Vertical industrial policies, aided by smart specialization, target traditional industrial sectors that can improve comparative advantage (based on the more favorable approach to production factors, like people, natural resources, access to finance and market vicinity), digitally transformed traditional sectors and players that can raise the value added level of products and services and newly established industrial sectors and players, creating sustainable competitive advantage based on disruptive innovation.

Regarding Circular economy and greenhouse gases emission reduction:

- It takes a clear strategic orientation of the state to transform the economic model in direction of circular economy and greenhouse gases emission reduction.
- Undeveloped awareness of industry representatives on the importance of environmental protection and fight against climate change in general. Particularly in regards to waste management issues, and opportunities to use waste as raw material in industrial processes.
- Through a range of regulatory amendments, EU places a special emphasis on conservation of material resources and energy efficiency improvement in industrial capacities, and overall introduction of the circular economy concept. National legislation needs to be harmonized with EU regulations in the area of circular economy and climate change.
- Lack of necessary institutional infrastructure (bylaws and administrative capacities) for implementation of already adopted legislative solutions to stimulate the process of economic transformation.
- Industrial production in the country is dominantly based on outdated technologies, regarded as major environmental polluters and emitters of greenhouse gases. These technologies are accompanied by increased energy consumption and waste generation per unit of products (with significant losses in material flows). Insufficient level of waste and waste water treatment by individual industrial entities has also been identified in the country.
- Insufficient utilization of renewable energy sources potential. Energy generation from renewable sources requires additional investments, thus making it more expensive

compared to the use of conventional fuels. Insufficient is also the use of energy from renewable sources by industrial entities in the country due to inadequate financial strength or low awareness.

- The country is significantly lagging behind in terms of waste, waste water and waste recycling management level. Lacking necessary waste management (waste collection, selection, storage and treatment) and waste water management infrastructure. Low rates of wood and plastics recycling, otherwise with high potential to be included in circular economy. Considerable loss of potentially valuable raw materials due to large waste quantities (including packaging waste) disposed every year outside the municipal waste management system (illegal dump sites).

The awareness of the importance of large planned investments in environmental protection and supporting circular economy activities in the future is present, but it calls for substantial technical assistance of the state to include private sector in this area; increasing subsidies and diversifying subsidized areas, facilitating access to other legal entities apart from those engaged in waste management. The sectors identified in the Republic of Serbia as those with the highest potential for application of the circular economy concept are processing industry (especially food industry), construction, wood processing industry, and primary agriculture.

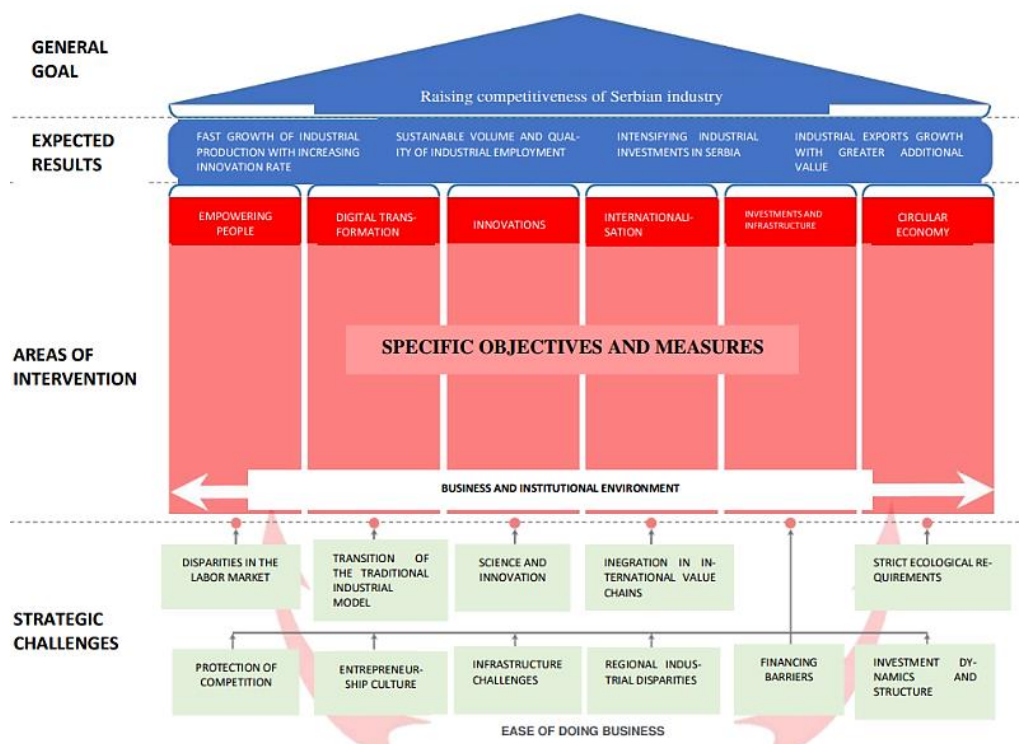


Fig. 1 Cascade link between the vision and new industrial policy strategy

According to the CIRCULAR ECONOMY DEVELOPMENT PROGRAMME IN THE REPUBLIC OF SERBIA 2022-2024, The Official Gazette of the Republic of Serbia, No. 30/18, a strategic framework for circular economy in the Republic of Serbia started to be defined in 2019 with the creation of the Ex-ante analysis of the effects of circular economy, which indicated that a separate policy document was needed for the field of circular economy.

## II. NATIONAL POLICY FRAMEWORK AND OVERVIEW OF THE CURRENT STATE

The Industrial Policy Strategy of the Republic of Serbia 2021-2030 (The Official Gazette of the Republic of Serbia, No. 35/20) aims to increase competitiveness of the industry. The Strategy, inter alia, states that due to the application of the linear economic model in the Republic of Serbia, there are significant losses in the flow of raw and other materials and products, resulting in irrational use of resources. One of the specific objectives (goal 5) refers to transformation of industry from a linear to a circular model. Manufacturing industry (especially food processing industry), construction, and primary agriculture have been identified as the sectors that have the greatest potential for applying the circular economy concept in the Republic of Serbia. In the Action Plan for the Implementation of the Strategy (The Official Gazette of the Republic of Serbia, No. 37/21), three measures (7 activities) 6 are defined within the framework of specific objective 5, which will be implemented in the next three years: 1. Promotion of circular economy and education of companies; 2. Encouraging investments in circular and low-carbon economy solutions as growth generators; 3. Encouraging more efficient use of material resources and energy efficiency in industrial processes.

Transition to a circular economy requires fundamental changes in the way production activities are planned and implemented, i.e., the way products are planned, designed, made and used. Also, it requires a change in the way society relates to needs and emphasizes new values of products and services, such as resource conservation and environmental protection. To achieve circularity in the economy, it is necessary to develop adequate business models based on innovations, which will meet future demands of consumers and users of services on the domestic and international market, such as the application of circular product design, extended product life, product reuse and repair, the possibility of material recycling, etc. Such business models must primarily enable companies to achieve their primary goal – profit generation and increased competitiveness. On the other hand, further development of infrastructure and the functioning of local communities should be harmonized with the principles of circular economy. Something like this requires a multidisciplinary approach and cooperation of decision-makers, companies, scientific research organizations and civil society organizations at a new, higher level, as well as the exchange of reliable information, in order to better identify the potential and challenges along the way and find adequate solutions. It is accordingly necessary to look at the current state of the economy and society in the Republic of Serbia in order to define priority measures and activities that will pave the way for the adoption of circular economy principles, and lay the foundations for the development of a sustainable and competitive national economy based on that concept.

Although there is a tendency to increase awareness of the need for sustainable and responsible business in the Republic of Serbia, a significant number of companies are focused on economic and financial results in order to survive on the market, regardless of the negative impact on the environment and inefficient consumption of natural resources. The use of new technologies is still in its early age and is difficult to implement due to the small or limited capacity of the economy to bear the burden of change. Despite the fact that legal framework allows the introduction of circular economy principles and there is interest in business

improvement and openness to change, awareness and knowledge about the principles, advantages and benefits of circular economy, is low.

A comparison of the number of employees in different industries indicates that the processing industry is dominant, and the wholesale and retail trade is slightly less so. A significantly smaller number of employees are in other activities, of which state administration and mandatory social insurance, education, health and social protection, transport and storage, construction, professional, scientific, innovative and technical activities and administrative and auxiliary service activities can be distinguished (Figure 2). Also, the largest share in the total turnover is achieved by wholesale and retail trade and repair of motor vehicles (37.3%), and a slightly smaller one by the processing industry (30.9%).

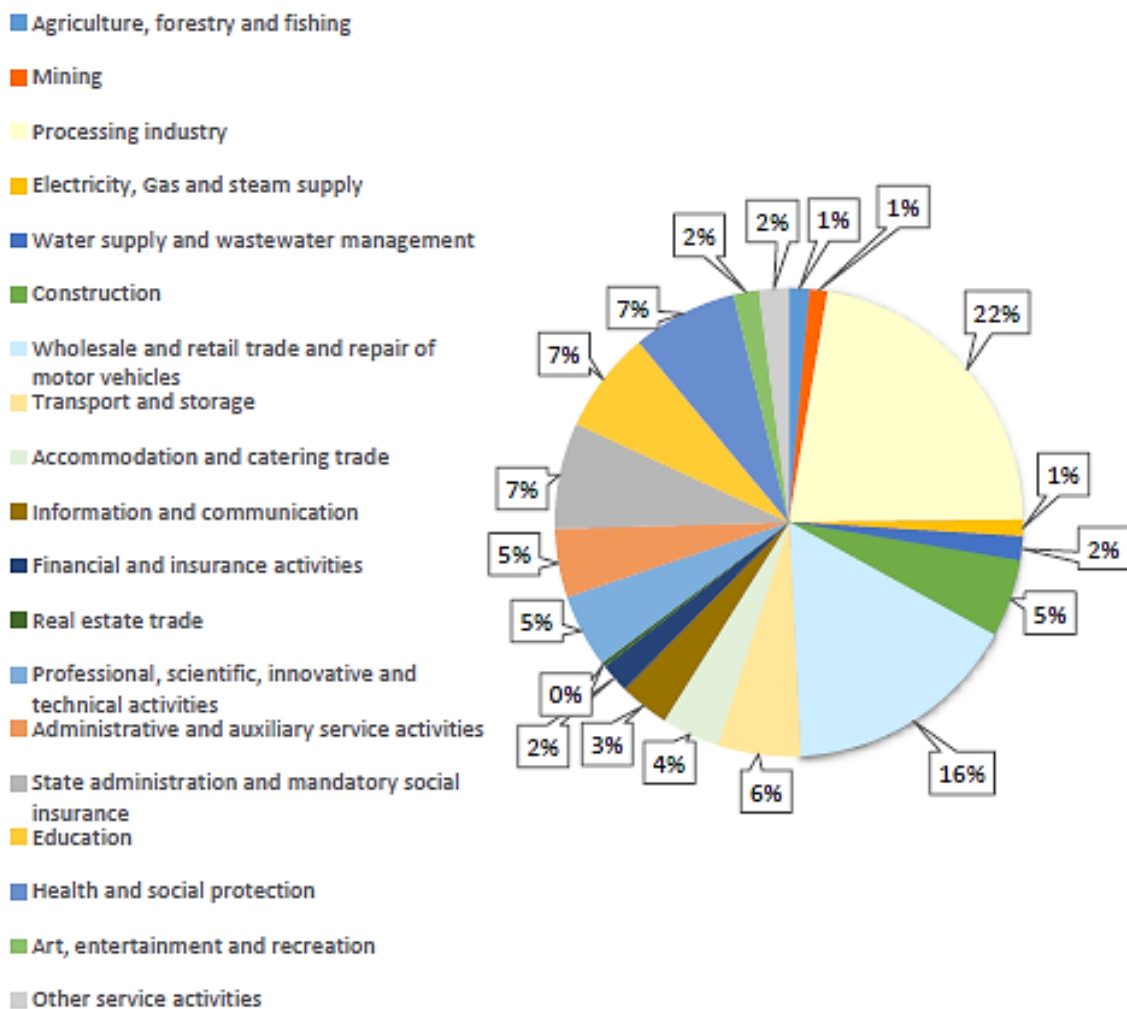


Fig. 2 Employment per business activity in 2020

Numerous problems defined by the previous Strategy and Policy of Industrial Development of the Republic of Serbia are still present today, such as: irrational use of resources, application of outdated technologies, low energy efficiency, high level of waste generation per unit of finished product, insufficient use of secondary raw materials and raw materials from the recycling process, as well as inadequate industrial waste management. A large number of industrial plants are generally in poor technical condition.

The lack of facilities and equipment for pollution reduction (e.g. waste water treatment facilities, electrostatic precipitators and flue gas desulphurization facilities) results in the emission of pollutants into the air, water and soil, generation of significant quantities of waste and inadequate disposal, i.e., negative impact on human health and environment.

Waste management is a key element of circular economy, but not only in terms of recycling, but above all the prevention of waste generation through the design of products according to the principles of circular economy, which saves materials, extends the life of products and designs modular products. In order to implement the process of transition from a linear to a circular economy, it is necessary to organize the waste management system through changes to the legal framework, analysis of fiscal policy in this field (fees and subsidies), establishment of a system for exchanging waste data between companies, raising awareness about the prevention of the generation of waste through all structures of society.

Data on waste management in the Republic of Serbia are collected in accordance with the Law on Waste Management and the Law on Packaging and Packaging Waste, which prescribe the obligations of submitting data/reporting to the Environmental Protection Agency (hereinafter referred to as: the Agency), including all types of waste except for wastes that are exempted from the application of the aforementioned laws. Based on the collected data, the Agency prepares relevant reports that were the basis for assessing the situation in the field of waste management.

### III. PUBLIC AND EDUCATIONAL SYSTEM

Although circular economy has recently become a current topic among some representatives of the professional public, the awareness of the general public about the importance of circularity and the advantages that circular economy brings is at a low level. Media announcements on the topic of circular economy are very rare and there is a lack of information on this topic in the public space, and successively the interest of the population in circular processes. In the general public, the need to preserve the environment is recognized to a significant extent, but not the fact that the transition to a circular economy can significantly contribute to the achievement of that goal, as well as that the further progress of society as a whole depends to a significant extent on the achievement of the goals of sustainable development. Consumer habits, value system, way of thinking and understanding are still based on linear consumption and there is a lack of awareness that every individual can contribute to the introduction of circular economy by making changes to their daily routine. There is a lack of a systematic approach to raising awareness among the interested public (including the population, the media, representatives of civil society organizations and consumer associations, etc.) that would provide clear information about the principles of circular economy and the advantages that its introduction brings to the relevant target groups, as well as to society as a whole. Bearing in mind that the transition to a circular economy requires radical changes, not only in the economy but also in consumer habits, the development of circular awareness among the general public could encourage this process. In doing so, the differences between the target groups within the general public should be taken into account and the way in which relevant information is communicated to them should be adapted to suit their interests, education and age.

In the current educational system of the Republic of Serbia, at all levels of education, the topics related to the reduction of resource and energy consumption and the increase of energy efficiency, reduction of waste streams in production processes (aspiration towards zero waste), use of renewable energy sources, minimization of the use of hazardous chemical etc. are still sporadically present. However, there is no widely established, methodologically clear approach to these topics, which would inform primary and secondary school students, as well as university students, about the importance of the practical importance of the mentioned topics and other basic principles of circular economy, i.e. how to apply the principles of circular economy in various economic and social activities. At the secondary school level, some of the topics related to circular economy are studied as part of the sustainable development optional subject, but they are available to only a small number of students. At faculties of technical sciences, there are courses that train students to apply certain concepts of circular economy, although this is not always so clearly emphasized.

The concept of circular economy is not recognized at faculties of social sciences, primarily at faculties of economics and law, except for a small number of master's programs. In addition to formal education, non-formal education also does not offer adequate programs in the field of circular economy (training, courses, etc.). Here too, the lack of adequate education and training in the field of economics and law (for example, circular financing, risks that circular projects entail, regulation) is very visible. The importance of including the educational sector in the application of the circular economy concept is great, because institutionalization of the concept and its introduction into the activities provided for in the curricula would enable a wider social acceptance of the aforementioned ideas, the adoption of principles at the earliest ages, but also the creation of experts who are, after completing their education, capable of getting directly involved in the activity of companies that operate according to the stated principles, or who with their knowledge can contribute to the introduction of new technologies and new approaches to the organization of production in order to minimize or neutralize all waste streams, reduce energy consumption and achieve all other social benefits from the application concept of circular economy. In this way, it would also help define jobs and positions that fall under the domain of the circular, i.e., green economy, that is, definition of new educational profiles with the necessary knowledge, skills and qualifications.

#### **IV. ANALYSIS OF OPTIONS FOR THE ACHIEVEMENT OF OBJECTIVES**

For the purposes of analyzing the achievement of the of Circular Economy Development Program, in addition to the status quo option, three possible options were considered, which differ from each other in terms of the number of implemented measures and the group of participants included in them. The impact of the implemented measures was analyzed in each of the options through: economic savings based on the reduced use of resources and energy for those economic sectors that are recognized as the most important for the development of circular economy (industry, agriculture and construction); economic benefits for households (increase in their average income due to the increase in employment and lower expenses for the purchase of new products due to the longer life of final goods); economic benefits for economic operators due to the reduction of CO<sub>2</sub> emissions (reduction of the carbon footprint in the stages of the production process); change in Gross Domestic Product; change in the number of



employees of the economic operators; change in tax revenues of local self-government units; change in state budget revenues.

Basic macroeconomic assumption for the projection of savings and economic benefits is an average annual GDP growth rate of 3%. The time horizon of the analysis is ten years, that is, the total economic benefits and savings are calculated and presented for the three-year Program implementation period (2022-2024) and the period after the Program implementation (ending in 2032). Namely, more significant economic benefits for industry and households, as well as the impact of circular economy development on macroeconomic parameters in the Republic of Serbia can be expected only after the implementation of this Program, while in the short term, these impacts are less pronounced. This is because a certain period of time is needed for companies, households, individuals and local self-government units to accept the principles of circular economy and adjust their behaviors and expectations in accordance with them.

A social discount rate of 5% was used to calculate the present value of the total economic benefits in the specified period. Due to the lack of adequate data, the presented options do not include potential economic benefits for the environment resulting from reduced emissions of harmful gases into the atmosphere, nor economic benefits for the population due to the reduction of health costs due to a cleaner environment. The calculation of economic benefits by economic sector (industry, agriculture and construction) was done exclusively on the basis of estimated direct savings in the use of energy, fuel and water at the sector level.

This status quo option is based on the following assumptions:

- None of the proposed measures from the Circular Economy Development Program are applied;
- The use of energy from fossil fuels (coal) changes in accordance with measures from other national strategies and programs;
- The share of renewable energy sources changes in accordance with measures from other national strategies and programs;
- No replacement of primary sources of energy by secondary ones;
- No change in consumption patterns;
- No new products with extended lifespans are created.

#### 4.1. OPTION 1

The first option assumes the implementation of activities aimed at supporting the industry in the transformation to a circular business model, such as education, financial incentives, analysis of the situation in the field of fiscal policy, as well as the creation of business plans and good practice guidelines that would serve as a positive example for other companies in and outside the sector.

This option implies that the criteria for allocating funds to companies through public calls (grants) within the available programs/funds are adapted to the introduction of circular economy principles. Also, companies receive support for applying to public calls by providing assistance in the preparation of applications and their submission in accordance with the procedures defined by open public calls.

The first option implies that government institutions and commercial banks are connected in order to find easier access to funds for financing projects of companies in the field of circular economy (loans, subsidies, etc.), but that the banks themselves have developed and incorporated into their operations a general understanding of the importance and ways of functioning of circular economy (creation of a guide for “circular financing”, development of new credit lines, recognition of the risks involved in financing this field, etc.).

Although these measures cover only the economic sector, economic savings and benefits will also be achieved by households, as well as by local self-government units and the state through an increase in budget revenues due to an increase in employment.

#### 4.2. OPTION 2

In addition to the measures aimed at supporting the industry, activities are also carried out to support local self-government units, i.e. to raise the awareness of competent authorities of local self-governments and public and utility companies about the concept of circular economy. The assumption of this option is that the creators of local policies, by applying the principles of circular economy, change the structure and operations of the local economy, improve the infrastructure and contribute to more sustainable local development. Also, by applying the concept of circular economy, local governments improve the quality of the environment by reducing emissions of polluting substances into the air, water and soil, thereby simultaneously improving the quality of life of their citizens.

The second option foresees the application of innovation and smart specialization in the development of the circular economy concept. This means that cooperation has been established between scientific and research organizations and companies in the field of innovation and optimization of production. Improving cooperation between scientific research organizations and economic operators and increasing innovative performance affects all sectors of the economy and serves as the basis for sustainable economic development. At the same time, the improvement of processes and equipment contributes to a more efficient use of resources, the replacement of hazardous materials and raw materials from the production process, and the reduction of waste generation.

### 4.3. OPTION 3

In addition to supporting the economic sector and local governments, this option also assumes the improvement of the waste management system, the application of green procurement and voluntary instruments, as well as the significant participation of educational institutions in the development of circular economy concept. This option assumes that a system of primary waste selection has been established, forms of industrial symbiosis have been established in order to optimize the use of resources and reduce the amount of waste, the construction sector has developed a system for construction and demolition waste management, recycling processes for certain waste streams and systems for managing food, surplus food and food waste have been improved compared to the status quo scenario.

In the third option, policy makers correctly foresee where imbalances can arise between the skills that employees currently possess and those skills that are necessary for the transition to a circular economy. Harmonization of the aforementioned skills of the workforce is possible only with strong cooperation between educational and scientific institutions and companies.

Given that this option implies the application of the concept of circular economy to all subjects in society with a special emphasis on raising consumer awareness, the expected economic benefits at the micro and macro level are significantly higher compared to the status quo option.

## V. EDUCATION OF SPECIFIC GROUPS OF COMPANIES FOR THE APPLICATION OF THE CIRCULAR ECONOMY CONCEPT

Adequate technical capacities are necessary for the transition of companies to a circular economy; therefore the measure foresees the education of professionals who are in a position to carry out this transition. It is expected that the acquired knowledge will initiate a search for ideas on the application of technical and technological, organizational and business innovations and other changes in production processes in order to reduce resource consumption and increase energy efficiency.

The focus of the measure is on the education of specific groups of companies, such as:

- Operators who are obliged to obtain integrated permit on the topics of applying best available techniques and reaching the emissions limit values prescribed by BREF documents with the help of the circular economy concept and with the aim of reducing waste generation,
- Manufacturers of packaging on the topic of circular product design, use of alternative materials that generate less waste, as well as materials to replace single-use plastics;
- Entities from the agricultural sector on the topic of utilization of by-products, energy production from renewable energy sources;

- Companies from the processing industry sector (production of electrical and electronic equipment, batteries and vehicles, furniture, plastic products, textiles, etc.), on the topic of efficient use of raw materials and energy, circular product design, chemical leasing and the introduction of voluntary instruments.
- Small and medium-sized enterprises in production that, when designing products, should apply the requirements of eco-design for products when these requirements are prescribed by special technical regulations.

Effective education of specific groups of companies implies a detailed analysis and identification of their needs for new knowledge and a well-designed plan to strengthen the capacity of companies, which includes a training program and schedule of implementation. In addition, it is planned to produce specialized manuals and other informative and educational material on topics that are particularly important for understanding and applying the concept of circular economy.

The institution responsible for the implementation of the measure is the ministry responsible for environmental protection of the Republic of Serbia, which is to implement the measure in cooperation with the ministry responsible for economic affairs of the Republic of Serbia, the Chamber of Commerce of Serbia, and the National Alliance for Local Economic Development (NALED) and civil society organizations. Some of the activities provided for in the measure will be implemented by the staff of the Ministry of Environmental Protection of the Republic of Serbia as a part their regular activity, which will be covered by funds regularly allocated from the budget of the Republic of Serbia. Additional funds will be provided from international donors in the amount of RSD 4,285,000 for the implementation of activities related to the creation of specialized manuals and the organization of workshops. The degree of implementation of the measure will be monitored through the total number of drafted specialized manuals intended for companies and the total number of companies that participated in the organized workshops.

The measure is informative and educational in nature.

## VI. SUPPORT TO COMPANIES IN FINDING INCENTIVES AND FINANCIAL INSTRUMENTS

The transition to a circular economy entails certain costs, which are the main obstacle for companies striving to modernize their production and invest in innovation. Increasing the investment of companies in the application of circular economy model can be achieved through appropriate programs for the allocation of grants or the use of favourable loans and timely and adequate information of companies about the programs/sources of financing that are available to them.

Current levels of investment are still insufficient to develop the transition to a circular economy on a comprehensive basis. In the previous period, economic and fiscal incentives were predominantly aimed at overcoming the negative consequences of the crisis caused by the COVID-19 pandemic. Such incentives were in fact an incentive to a linear economic system, rather than an investment in the transformation of the Serbian economy towards a

sustainable economy. Therefore, it is necessary to conduct an analysis of fiscal policy and administrative procedures in order to define proposals for incentive mechanisms for companies for a faster and simpler introduction and application of circular economy principles in business.

Also, it is necessary to adjust the criteria for the allocation of funds through public calls (grants) within the available programs/funds so that they support the application of circular economy principles. At the same time, in order to better absorb the available financial resources, it is necessary to provide support to companies in the preparation and submission of applications for public calls in accordance with the defined procedures of public calls.

Connecting government institutions and commercial banks through consultative activities in order to find easier access to funds for financing projects of companies in the field of circular economy (loans, subsidies, etc.) is very important. In order for the role of banks in this direction to be stimulating, it is necessary for banks to develop and incorporate into their operations a general understanding of the importance and manner of functioning of the circular economy. Banks should create and issue widely accepted and recognized guidelines for financing circular economy projects. It is also necessary for banks to adapt existing financial models or develop completely new ones for projects in the field of circular economy. This means that social benefits and environmental costs need to be included in existing or new financial models.

Currently in the Republic of Serbia, banks that offer “green loans” in fact finance, to the greatest extent, projects in the field of energy efficiency, but not those in the field of circular economy. That is why it is important to introduce new credit lines to small, medium and large companies that will follow circular business activities. Commercial banks should also work on improving their personnel so that they can effectively assess the risks and vulnerabilities of circular projects.

Providing assistance to companies in ensuring favourable financial means for the introduction of circular economy principles will affect their competitiveness on the domestic and foreign markets, as well as the quality of the environment, the reduction of climate change and, consequently, the health and general well-being of citizens.

The institution responsible for the implementation of the measure is the Ministry of Environmental Protection of the Republic of Serbia, which is to implement the measure in cooperation with the Ministry of Economy and the Ministry of Finance of the Republic of Serbia, the Chamber of Commerce of Serbia, the Association of Banks of Serbia, the National Alliance for Local Economic Development (NALED) and the companies. Some of the activities provided for in the measure will be implemented by the staff of the Ministry of Environmental Protection of the Republic of Serbia as a part of their regular work, which will be covered by funds regularly allocated from the budget of the Republic of Serbia. Additional funds from international donors in the amount of RSD 1,500,000 will be provided for the implementation of activities related to the adjustment of the criteria for the allocation of funds and the preparation of the analysis of fiscal policy and administrative procedures. The degree of implementation of the measure will be monitored through the total number of commercial banks that were involved in consultative activities, the total number of continuously available

programs/funds that support the introduction of circular economy principles and the analysis of fiscal policy and proposals for incentive mechanisms for the introduction of circular economy.

The measure is of an incentive type.

## VII. ANALYSIS OF THE POTENTIAL FOR THE APPLICATION OF THE CIRCULAR ECONOMY MODEL IN CERTAIN FIELDS OF PROCESSING INDUSTRY AND SUPPORT TO SELECTED COMPANIES

The measure involves selection and detailed analysis of at least two different fields of the processing industry in order to assess the potential and the necessary investments for the transition to a circular economy. The basis of the analysis should be the processes and activities carried out by companies, which most often are linked to the goals of circular economy, such as:

- Increasing energy efficiency at the level of an installation or its individual parts;
- Reducing the use of natural resources as a result of best available techniques;
- Reduction of waste generation;
- Reduction of air, water and soil pollution;
- Use of renewable energy sources and materials;
- Application of new technologies and replacement of raw materials with less harmful and renewable ones;
- extending the life of the product through design and maintenance;
- reprocessing and recycling of certain components and materials;
- Research projects and innovations;
- Digitalization.

The analysis of individual fields should point to the potential of the introduction of circular economy and serve as a basis for initiating more intensive and extensive cooperation between businesspeople of different sectors of the industry, as well as between scientific and research organizations and educational institutions with economic operators.

Representatives – companies for each of the analysed fields of the processing industry – are to be selected, and a business action plan for the transition to circular economy will be drawn up for them, based on a detailed assessment of the current situation, as well as an analysis of the potential for the application of the circular economy model. The analysis needs to use modern tools, such as indicators of circularity, life cycle analysis, etc.

In addition to increasing the competitiveness of companies on the domestic and foreign markets, the implementation of business action plans for the transition to a circular economy will contribute to a more efficient use of resources, reduction of pollution, improvement of working conditions in selected companies, as well as employment of additional personnel.

Successfully implemented business action plans can serve as case studies and examples of good practice for other companies in the covered fields of the manufacturing industry.

Financial resources for the implementation of the measure in the amount of RSD 10,000,000 will be provided from international donor aid. The institution responsible for the implementation of the measure is the Ministry of Environmental Protection of the Republic of Serbia, which is to implement it in cooperation with the Ministry of Economy and the Chamber of Commerce of Serbia. The degree of implementation of the measure will be monitored through the total number of fields of the processing industry included in the analysis of the potential for the application of circular economy and the total number of companies that have prepared business action plans for the transition to circular economy.

The measure is informative and educational in nature.

## VIII. ENCOURAGING COOPERATION BETWEEN SCIENTIFIC-RESEARCH ORGANIZATIONS AND COMPANIES IN THE FIELD OF INNOVATIONS AND PRODUCTION OPTIMIZATION

Bearing in mind that the transition to a circular economy model is closely related to the development and application of innovative solutions in production and business and requires significant research and development activities, it is necessary to encourage cooperation between companies and scientific research organizations in achieving this goal.

Accordingly, the measure envisages the establishment of a program for the allocation of financial resources for the introduction of innovative and other technical solutions in companies, with the aim of transitioning to a circular economy model. Funding programs should be implemented through specialized public calls that will support the cooperation of companies and scientific-research organizations on priority topics for the development of the national economy, such as, for example, development of smart packaging, development of new additives (fillers, pigments), digitalization of processes, etc.

Improving cooperation between scientific research organizations and economic operators and improving innovative performance affects all sectors of the economy and is a driver of economic growth and the basis of sustainable economic development.

Financial resources for the implementation of the measure will be provided from the budget of the Republic of Serbia, from the project "Reducing the carbon footprint of local communities by applying the principles of the circular economy in the Republic of Serbia", in the amount of RSD 10,800,000 and from the Global Environment Fund (GEF) in the amount of RSD 3,600,000. The institution responsible for the implementation of the measure is the Ministry of Environmental Protection of the Republic of Serbia, which is to implement the measure in cooperation with the Innovation Fund, the United Nations Development Program (UNDP) office, scientific research organizations and companies. The degree of implementation of the measure will be monitored through the total number of published public calls for projects related to the introduction of innovative and other technical solutions with the aim of applying circular economy model and the total number of companies that

have achieved cooperation with scientific and research organizations through the mentioned calls.

The measure is of an incentive type.

## IX. RAISING AWARENESS AT INTERESTED PUBLIC AND EDUCATIONAL INSTITUTIONS ABOUT THE CIRCULAR ECONOMY CONCEPT

In order for the process of transition to a circular economy to be successful, it is necessary to develop certain knowledge and skills among the professional public, as well as to motivate and encourage the population to change their habits. Therefore, the strengthening of awareness, timely information and education of the population of all ages about the principles and benefits of the transition to a circular economy is a necessary goal of this Program. To achieve it, it is necessary to carry out systematic education using promotional materials, media and educational institutions. Raising awareness of the interested public and educational institutions about the importance of introducing a circular economy for the economy and modern society, as well as the preservation of resources and the protection of human health and the environment, can be achieved by applying informational and educational measures/activities. Also, considering that the introduction of the circular economy concept contributes to achieving the goals of sustainable development, special attention will be focused on the connection between circular economy and sustainable development, and the concept that strives to improve the quality of life through the interconnection of economic development, environmental protection and social responsibility will be promoted. Achieving this specific objective will contribute to the development of a circular culture among different layers of society, including young people who are future participants in social and economic processes. To monitor the achievement of a specific objective, the total number of implemented circular economy campaigns will be used as an indicator.

## X. RECOMMENDATIONS

Instead of a basic conclusions, the following five recommendations are given:

1. The transition (to a circular economy) will contribute to faster economic growth, greater prosperity and better health of citizens and future generations;
2. Serbia cannot become a member of the EU without changing policies and sustainable use of resources – the implementation of the circular economy principles is a chance for accelerated accession;
3. Systematic implementation and development of sustainable resource policy and transition to business models of the circular economy is needed;
4. Changing energy policy and promoting sustainable energy sources is part of a successful, systemic and strategic transition;
5. Institutional support for the involvement of all identified actors for the circular economy on the path of transition will enable the continuity and efficiency of the initiated process of circular transition.



If education is considered the following conclusions are given, according to Roadmap to circular economy in Serbia, published by Serbian Ministry of Environmental Protection and UNDP in 2020, the most frequently used word during the consultations with the private sector was “education”, which was highlighted as the important condition for raising awareness and developing circular production, consumption and culture in Serbia:

- Initiate a public national campaign to promote circular economy in Serbia.
- Launch the circular economy education initiative in Serbia, and coordinate the content according to age and target groups.
- Secure stronger institutional support to formal and informal educational systems and initiatives on the topic of circular economy.
- Encourage the private sector to educate the citizens through campaigns, actions, and activities at conventions and festivals.
- Increase the flexibility of the formal education system so that the curriculum can include projects in the circular economy domain.
- Establish a network of education initiatives in the circular economy domain.
- Develop education models for children and youth.
- Edit and publish educational material on circular economy and circular culture.

For the companies belonging to automotive sector and operating in Serbia the recommendations are:

1. When creating a product, insist on circular design.
2. Focus on eco-design in the context of sustainable business opportunities.
3. Apply for grants for circular economy projects.
4. Continuously improve the procedures and standards in the context of sustainable business.
5. Use the blockchain technology for everyday operations.