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COMMERCE AND
INDUSTRY OF SERBIA

INTRODUCTION TO CIRCULAR ECONOMY





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INTRODUCTION TO CIRCULAR ECONOMY

On the planet of limited resources, the current economic model with global patterns of production, consumption and trade is unsustainable. Numerous studies have shown that the annual world use of ores, minerals, fossil fuels and biomass could triple by 2050 if a way to separate economic growth from the rate of natural resources consumption is not found. The global energy consumption has doubled between 1800 and 1900, and just during the 20th century has increased by more than twenty times, is expected to grow by an additional 50% by 2030 if things continue at the current (business as usual) scenario. Assumptions are that during the same period the global water demand will also increase by 50% compared to today.

It is clear that the efficacy and safety of resources is essential for future economic competitiveness and flexibility, for companies as well as for individual countries. Both countries and companies are beginning to realize that the linear systems of resource exploitation expose societies as well as companies to a large number of serious risks. If a quality of life is to be maintained without reducing social standards, the way we use resources has to be redefined. The negative environmental and social impacts of consumption are increasingly felt at the global level. Having in mind that the number of middle class consumers in China is already greater than the population of Europe and that by 2020

there will be three billion more of such consumers in the world than today, an urgent change to the existing economic concept is necessary. In today's economy, natural resources are extracted from the ores and transformed into products that get disposed of after use. While recycling and measures to improve efficiency can help in reducing the need for raw materials, such methods remain essentially open, linear systems, which will likely put unsustainable demands on the environment in the near future.

A POTENTIAL CONSUMPTION TIME BOMB WILL LEAD TO INEVITABLE RESOURCE CONSTRAINTS



Source: World Bank, Ellen MacArthur Foundation circular economy team

What is circular economy?

Circular economy is an approach that transforms the function of resources in the economy - waste from the factory becomes a valuable raw material in another production process, while products can be repaired, reused or upgraded instead of being disposed of. It presents an alternative to the exhausted linear economy model guided by the principle "take, make, use, dispose" and refers to the maximum utilization of used resources instead of their being disposed of before the complete value utilization of the product is completed. Unfortunately,

today only a few percentage points of the original value of the product go back into production after use.

Such an economy also requires new business models that move from the concept of selling products to selling services. One example of the transition in this model is for example "selling driving hours" instead of selling the vehicle, which is already applied by the companies *GoGet* or *Hertz 24/7* through a scheme of joint use i.e. sharing vehicles.

LINEAR ECONOMY



CIRCUAL ECONOMY



The ultimate goal of circular economy is to develop a society where the generation of waste is minimized and there are high levels of reuse. Such a society would be achieved through a combination of eco-design, new business models (including rental, repair and re-use), and new recycling technologies.

What are the advantages of circular economy?

Circular economy not only promotes competitiveness, innovation, and protects the environment, but it also contributes to economic growth and job creation. This concept can lead to job creation in recycling as well as in the field of re-use and remanufacture of already utilized products.

Estimations are that the economic benefits of switching to this business model can make savings in materials measured in billions of euro.

Research carried out by the Ellen MacArthur Foundation, the leading organization in the field of promoting switching to circular economy shows that by using circular economy the following results could be achieved:

- if mobile phones are produced so that they are easier to disassemble, remanufacturing costs could be reduced by **50%** per phone;
- most households would be able to use the state of the art laundry machine if they **rented** instead of buying;
- The costs of packing, processing and distribution of beer could be lower by **20%** if breweries switched to a system of reusing bottles.



CIRCULAR ECONOMY AND THE EUROPEAN UNION

In December 2015 the European Commission adopted a new ambitious package of circular economy measures, which is largely related to changing regulations in the field of waste management with the aim of encouraging global competitiveness, strengthening sustainable economic growth and job creation. The package proposes a range of measures, such as

increased recycling, but also includes plans for increasing utilization from raw materials, products, and waste, which will increase energy savings and reduce greenhouse gas emissions. Proposals cover the whole life cycle - from production and consumption to waste management and secondary raw material markets.

The Commission's objective is to ensure that 65% of household waste is recycled by 2030, which is less than the previously announced target of 70%, and to significantly reduce the amount of metal, plastic, and food that ends up in landfills or pollutes the oceans.

Expectations are that this new waste management package will:

- provide Europe with access to quality and affordable raw materials
- sustainable growth will boost job creation – possibility to create more than 170,000 jobs by 2030

- contribute to the reduction of greenhouse gas emissions - both directly by reducing emissions from landfills and indirectly through recycling

- reduce the administrative burden, especially for small and medium enterprises, and public administration, by improving the definitions and simplifying reporting obligations



Why is Europe moving from linear to circular economy?

Because circular economy:

- protects the environment
- creates new jobs
- instigates innovative and efficient production methods
- increases the competitiveness of the European Union (EU)

Circular economy is closely linked with several EU priorities, including: the creation of new jobs and increased economic growth, investment, climate and energy, the social agenda, industrial innovation, as well as the global effort concerning sustainable development.



Why is circular economy relevant for Serbia?

In addition to improving Serbia's economy and the possibility for creating new jobs, the concept of circular economy is inevitable because it is embedded in the European regulations that all EU candidate countries must adopt and apply.

It is estimated that by the introduction of circular economy in Serbia, 30.000 new jobs can be created and the competitiveness of Serbian economy especially in the waste recycling sector can be improved.



What is the role of decision-makers?

Decision makers, especially policy makers, should focus on a swift transition to a circular economy, having in mind global challenges such as climate change, future water shortages, and others. While much of the investments, innovations and practices related to circular economy is led by the business sector, governments play a key role in providing support for innovation and creating conditions for investments.

In order for circular economy to thrive, not only will changes in policies related to production design principles and eco-design be necessary, but "green principles" in public procurement and the introduction of incentives to encourage efficiency improvement in the production process will also be required.

Some governments have already provided incentives to foster the development of circular economy - by adopting legislation which aims to achieve an increase in waste reduction targets, encouraging the promotion of eco-products, discouraging landfills by increasing the fee for waste disposal, and supporting a different approach that not only considers product design but also encourages reuse, remanufacture and the like.





In accordance with the Waste Framework Directive, EU member countries have, among other things, increased the construction and demolition fee for waste disposal, which has led to an increase in the re-use of materials, improved the recycling rate of concrete, timber and other building materials, and enhanced building processes in order to reduce waste.

What is the role of companies?

Waste prevention, eco-design and reuse can bring net savings to EU companies of 600 billion Euro or 8% of the annual turnover, reducing at the same time annual GHG emissions for 2-4%. In re-use, remanufacture and repair sector, expenses for remanufacturing of mobile phones would be twice as lower if these devices were made to be more easily disassembled. If 95% of used mobile phones would be collected, this would ensure saving of over 1 billion Euro.

If in the EU old cars would be repaired instead recycled, expenses for materials would decrease by 6.4 billion Euro and 140 million for energy, with GHG emission would be reduced by 6.3 million t.



MOST COMMON MISCONCEPTION ABOUT THE CIRCULAR ECONOMY

Isn't circular economy just another term for recycling?

No, circular economy is much more than recycling as it is based on organizing an industrial system focused on production from waste, i.e. in the process of repair, reuse and remanufacture. The aim is not only to design products to have the best possible end-of-life utilization but to also reduce the amount of energy used in the manufacturing process. As previously explained, the main difference compared to a linear economy, which is based on the principle "take-make-dispose," circular economy considers all options in the production chain to ensure that the least amount of resources possible is used, resources remain in use for as long as possible, the maximum value is extracted from them, and that, at the end-of-life

stage, as much as possible is recovered. Therefore, circular economy is about keeping the value of a product for as long as possible as opposed to the current average of nine years.

At the same time, however, one must be aware that there is a limit as to how many times waste can be recycled due to the fact that a part of the product is lost each time, it is necessary to invest more money in order to make new product, and recycling is energy intensive. Even with the application of all of the circular economy principles and with returning (raw) materials into the production process, it is not possible to recycle indefinitely and one part of the product eventually must end up in a landfill or incinerator.

Circular economy can be an opportunity for some, but it will have a negative impact on manufacturers ...

Not only are the prices of resources and raw materials constantly increasing, but one also has to keep in mind their future availability. One of the responses to such challenges are restoration and remanufacture, as recent studies have shown that,

instead of opening a new production plant, much more can be earned by opening a re-manufacturing one. Large remanufacturing companies, such as *Caterpillar*, are recognizable by their "new" product, which are assembled from previously decommissioned and repaired machines.

In Europe, over a million people work in the remanufacture and recycling sector. The French *Renault* has adopted the principles of circular economy since remanufacturing requires not only more workers, but also reduces the amount of waste, and maintains the reduction of

capital costs is on the same level as profit. Over 300 people are employed in the field of remanufacturing, making products ranging from water pumps to other mechanical parts that are later sold for 50-70% of their original value and with a one-year warranty.

Circular economy is just another new 'mantra', why change a system that works?

New trends happen quickly. For example, just 10 years ago people were buying newspapers much more while today most read on-line editions or shop over the Internet. 'Business as usual' is not necessarily the safest development path. Many companies that were leaders in their

field but have not adjusted to the changing times do not exist today. Circular economy is based on the concept that if companies or societies want to prosper, they must decouple development and growth from resource consumption.

Only developed countries can apply circular economy principles?

On the contrary, for developing countries using the principles of circular economy ensures both industrialization and sustainable development.

In developed countries the focus of circular economy is on optimizing the existing system as well as further increasing prosperity. Developed countries are certainly responsible for much of the world consumption; however, one should not ignore the fact that the increase in demand in recent years has been driven by changing lifestyles and population

growth in developing countries, who have simultaneously experienced infrastructure development involving intensive resource use. Keeping in mind the projected growth of the middle class in the coming years, circular economy presents a logical step as two conditions are necessary for its implementation: the existence of an active economy and the existence of a middle class that will bear the cost of this principle. This is why developing countries should be more committed to the application of circular economy principles.

Changing the packaging design in order to reduce waste

As one of the key objectives of circular economy is to completely avoid waste generation, it is clear that product packaging is of great concern, especially given the large quantities of packaging waste currently generated daily around the world.

Rethinking packaging design is one of the important steps in the implementation of the circular economy principles and can, given the increase in eco-conscious consumers, ensure an advantage to a company over its competitors. Manufacturers are increasingly paying more attention to design and material packaging, which are drafted in such a way that, if they are

to be recycled, they are to be made entirely of materials that can be recycled or that they be made to be reused and durable.

For several years now, *Philips* has not only been applying circular economy principles within all of its work stages but is also an active promoter of the principles. One of the examples of changing the packaging design to adhere to the reduction of newly created waste is packaging an iron in a package made completely of cardboard, without protective foils and other materials. Simply overlapping the cardboard at different angles will keep the appliance safe from potential damage during transit.



Photo: Philips

In order for circular economy to be fully implemented, companies are solely responsible?

In order for circular economy to be fully implemented changes are required not only in production but also in consumption patterns. Improving the production process in order to be as efficient as possible in its use of resources and energy and to create environmentally friendly technologies is certainly the responsibility of companies. Truth be told, the motives of companies to shift towards circular economy often do not stem from concerns for environment, although these are considered in the new business models. The motive for companies more often than not lies in the chance to improve the reputation of the brand. One should not forget the needs of companies to be more competitive in the market, which usually involves reducing costs and creating entirely new opportunities for growth through product and service innovation.

However, it is not enough to just change or improve production methods. It is important to work on changing consumption patterns and consumer awareness in both developed countries and developing countries. Although a greater portion of this publication has focused on the economy and decision-makers in the process of transitioning to a circular economy, it has to be emphasized that consumers are also crucial actors in this process and the

change in their behavior should not be neglected. If everybody is to develop the consumption patterns of consumers in developed countries, sustainability will be impossible. It is thus extremely important to work on changing the patterns of consumption models.

In the consumer goods sector about 20% of the total value of the material is recovered while 80% ends up as waste.

The number of eco-conscious consumers is continuously growing, as illuminated by the increased interest in various types of ownership and business models, such as *Airbnb* or *Spotify*, which put greater emphasis on the use of product rather than the possession. Their voice is becoming more and more important to companies, as proven by the large number of international brands, including *H&M*, *Nike*, *Philips*, *Caterpillar*, *Renault*, *General Motors*, etc., who increasingly pay attention to circular economy principles. Also, the number of new companies that are trying to position themselves in the market and win customers by emphasizing the use of re-used materials in their production is growing.

CIRCULAR ECONOMY IN SERBIA

Taking into account the European Commission recommendations on circular economy, the Ministry of Agriculture and Environmental Protection has proposed amendments to three laws concerning the environment, including the Law on Waste Management, which was adopted by the National Assembly of the Republic of Serbia on January 2016.

Also, the Chamber of Commerce and Industry of Serbia (CCIS), with the support of the project "Municipal Waste and Wastewater Management - IMPACT" implemented by the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH, launched a strategic initiative to consider the possibilities of transitioning the Serbian economy towards a circular economy model. GIZ IMPACT is implemented in cooperation with the ministries in charge of environmental issues and aims to create conditions for the introduction of circular economy in Serbia at both the national and municipal level. In cooperation with the CCIS and respective ministries, a strategy for introducing circular economy in Serbia's waste management sector is being prepared. Relevant stakeholders are included in the preparation of the strategy, among which are also members of the parliament as a

result of the activities of the informal Green Parliamentary Group, who will monitor the whole process. The members of this informal parliamentary group have, during the previous session of the National Assembly of the Republic of Serbia, already been introduced to the advantages of adopting circular economy principles.

An increasing number of companies in the world are operating under the circular economy principles. Implementing these principles in businesses is not completely new in Serbia, either. The following are three examples of companies that already operate in accordance with the circular economy principles and produce new goods using materials that were previously regarded as waste. These three examples are not the only ones, but they illustrate that in Serbia there are companies - pioneers of circular economy. The names of the companies described in the three examples included in this brochure were purposefully left out with the intention of avoiding the marketing of certain companies over others.

From carton packaging to waterproof eco construction panels

A local privately-owned company, founded in 2014, annually produces 100.000m² waterproof eco-construction panels made from waste and used carton packaging, which, instead of ending up in landfills, were returned as raw materials in production process.

Tetra Pak packaging contains 75% paper, 20% polyethylene (plastic) and 5% of aluminum, and recycling process of laminated cardboard packaging is similar to the process of paper recycling as collected packaging is put into a pulp masher (large mixer) and water is added. The researches and collected data show that the paper recycling process reduces water pollution by 35% and air by 74% in comparison to the primary production of paper.

In EU countries, above 30% of the total amount of packaging is being recycled, where Germany is the largest recycler with multi-layer cartons recycling rate of 68% and. In Serbia approximately 16.000 tons of multilayer cardboard packaging is generated annually.

These construction panels are waterproof, unlike other panel materials that are now used in construction, such as OSB panels. In

addition, the product is **100% ecological**, since its production is completely environmentally friendly as no adhesives, additives, and formaldehyde are used and carton packaging, which would have alternatively ended up at a dumpsite/landfill, is used as a production material. Waterproof panels are eco-building material consisting of pressed particles of recycled carton, while panels completely meet high demands on shape stability, consistency and minimal characteristics changes, thus providing excellent opportunities not only for construction, but also a number of other applications. By using up to 20kg of carton, packaging to produce one 2,5m² panel, the company takes care of the environment. For monthly production of the eco panels, 250 tons of waste carton packing is used.



The application of these panels is wide: roof and inter-floor structures, wall and ceiling sandwich panels, construction of exterior and interior walls, various types of flooring, the final lining of walls/ceilings, panel materials for repair and reconstruction, upgrading housing, carpentry and joinery, revetments, production of floor beams, temporary construction fences, temporary covering of openings in buildings, modular (temporary) toolsheds on construction sites, fairs, decorations, sets of furniture, base for upholstery furniture, door fill, and for the construction of exhibition stands, podiums, billboards and much more. The panels are also good heat-insulating materials and received attests concerning physical damage proved that they fulfill construction requirements and standards.

Apart from operating in accordance with the circular economy principles, the additional value of this company is that production machines were constructed in-house by the company's own engineers and that this production process is unique in Serbia as well as in this part of Europe.



Heating from the coffee roasting waste

One of the leaders in coffee production and processing in Serbia places an important segment of its business on the use of ISO 9001 and HACCP standards, while its operation is run by the principles and standards of ISO 14001 standards related to the protection of the environment. One of the most important requirements of these standard is efficient energy use with an emphasis on renewables.

In terms of environmental impact (reduction of energy consumption by 15%, greenhouse gases emissions by 15%, and municipal waste by 15%), the company implemented a unique system of heating based on biomass, more precisely the coffee chaff briquettes, which also acts an example of circular economy in Serbia.

Coffee chaff is a membrane removed from coffee seeds in the processing phase and is actually a by-product of the roasting process. In order to deposit and store it, coffee chaff is compressed into briquettes. Annually, about 140 tons of coffee chaff briquettes remains in the factory after the production process. In searching for ways to re-use this waste, it was realized that coffee chaff burns well. Its calorific value was tested by the Faculty for Mechanical Engineering and the

Vinca Institute of Nuclear Sciences in Belgrade. The research results showed that coffee chaff has excellent thermal power and can be used as biomass fuel.

In cooperation with the Faculty of Mechanical Engineering's Innovation Centre, the company developed boiler for heating that uses coffee chaff briquettes. Since 140 tons of coffee chaff briquettes that is produces annually is enough for about three months of heating, the boiler is designed to burn other types of biomass as well. This type of heating can be considered unique as there is no information that coffee chaff is being used in such manner in other parts of the region or beyond.



Besides the use of chaff, which would otherwise end up as waste, an additional important result of this type of heating is reduced CO₂ (GHG) emissions. Although the contribution to environmental protection that the project has made is valuable for the area in which it is implemented, it should, however, not be ignored that the boiler for briquette combustion and the additional equipment were produced in Serbia.

Also, the company is working on reducing the amount of municipal waste while also increasing the amount of collected waste that can be recycled or otherwise disposed of. Thanks to the cooperation with licensed waste management companies as well as the implementation of the ISO14000 standards, the company collects and supplies authorized collection companies with cardboard, nylon, metal, wood, plastic, waste batteries, accumulators, electronic scrap, used cartridges and toners, and waste oil.

Waste tires as a valuable resource

One of the two waste tire recycling facilities/plants in Serbia has achieved the highest percentage of waste recycling using modern technology. Over 82.000 tons of recycled waste tires and other rubber waste has been treated since 2009 until today, with the installed capacity of 45.000 tons of waste tires per year. This is the only plant in Europe for the recycling of large dumper tires from the quarries (up to 3.5 m in diameter and 2,6t weight).

The company is the first facility in Serbia that started recycling car and truck waste tires, as well as other types of scrap tires, which have been previously been ending up in landfills

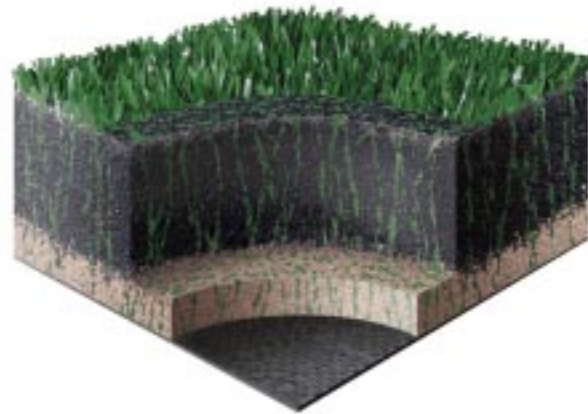
without the possibility of further processing and/or recycling. The method is 100% ecological, i.e. has no harmful effects on the environment. In this recycling process no additional waste is generated and no air, water or soil pollution takes place. In the recycling process, the largest percentage of produced materials is: 60% rubber granules, 35% steel wire, while the remaining 5% is canvas.

Studies have shown that the mechanical recycling process is much more favorable to the environment and nature than burning for energy purposes! By recycling, the rubber granules enter the re-use cycle and natural resources are preserved. Solving the problem of accumulated waste tires has environmental, energy and economic viability. Physical properties of used tires have great value as they are not toxic, they are not bio-degradable; their shape, weight and flexibility make them fully usable for a large number of different products either in the form of granules or in the form of dust. During the last decade, numerous studies have contributed to finding a multitude of new products from and applications for recycled tires.

Through the treatment of collected tires, new products containing practical value are created from material that was previously considered waste. After treatment (shredding waste tires) and separation of the textile cord, rubber granules of desired dimensions are produced to be used for the production of new rubber products in the following industries: **construction** (roof insulation, sound barriers in construction, waterproof membranes, rubber hoses...), **transport** (addition to asphalt so as to increase the safety during braking, vibration, noise reduction, development of transport infrastructure/signs and parts for new cars, railroad crossings), **sports and recreation** (base for sports fields and playgrounds), **households** (household rubber, protective rubber lining and objects for horticulture), **agriculture** (covering for stables and equestrian sports).



In developed EU countries, the recycling rate has grown from 10% in 1989 to over 80% presently. According to the EU Directive 99/31/EC, disposal of whole or shredded tires in municipal landfills has been banned since 2006. Serbia has aligned its legislation in accordance with the European Directive, but the process of implementation is insufficient and requires continuous improvement through strong inspection and control of all participants in the chain. That is why Serbia, since 2009, provides incentives for the rubber recycling industry in an effort to reduce quantities of historic waste, particularly within the industry and on municipal landfills/dumpsites, and to stimulate citizen interest and involvement in the responsible management of discarded tires. The primary purpose of incentives is to ensure disposal which is safe for the environment to control the amount of rubber disposed of on a specific location, and to encourage industries to use products made from recycled tires.



ABOUT GERMAN DEVELOPMENT COOPERATION

GIZ global – solutions that work

We provide services worldwide in the field of international cooperation for sustainable development. GIZ has over 50 years of experience in a wide variety of areas, including economic development and employment, energy and the environment, and peace and security. The diverse expertise of our federal enterprise is in demand around the globe, with the German Government, European

Union institutions, the United Nations and governments of other countries all benefiting from our services. The German Federal Ministry for Economic Cooperation and Development (BMZ) is our main commissioning party, but we also work with the private sector, fostering successful interaction between development policy and foreign trade.

GIZ expertise – building capacities for waste management

GIZ supports sustainable waste management worldwide through a range of programmes and partnerships for more than 30 years. By establishing regulated waste disposal services, we aim to avoid environmental damage, improve health and hygiene for the population and promote resource efficiency. We devise appropriate solutions, develop political

instruments and offer advice on necessary restructuring processes. We target support at establishing basic disposal services in settlement areas and utilising valuable raw materials such as paper or metals, and are in favour of more climate-friendly means of waste disposal that produce fewer emissions.

GIZ local – a German and Serbian partnership

German international cooperation with the Republic of Serbia began immediately after the country's democratic transition in the year 2000. Since then GIZ supports Serbia's efforts to achieve convergence with EU policies and standards, to strengthen economic performance and to consolidate democratic structures.

Commissioned by the BMZ, the GIZ IMPACT project aims to improve pre-conditions for introduction of a circular economy at national and municipal levels in the area of waste and wastewater management.

As partners it collaborates with the Ministry of Agriculture and Environmental Protection, the Ministry of Economy, the Chamber of Commerce and Industry, the Provincial Secretariat for Urban Planning, Construction and Environmental Protection of the Vojvodina, the Standing Conference of Towns and Municipalities, the Serbian Solid Waste Association and the Serbian Environmental

Protection Agency; additionally it cooperates with non-governmental organisations, private recycling companies and the informal waste sector.

The project comprises four areas of activity:

1. Development of inter-municipal cooperation improving delivery of public waste and wastewater services;
2. Support for municipalities preparing small and medium-scale investments in recycling projects;
3. Inclusion of minorities and informal waste pickers in the regulated waste management system;
4. Raising of environmental awareness and setting up support mechanisms fostering introduction of circular economy schemes.

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