

European legal framework for sustainable waste management

Evropski pravni okvir za održivo upravljanje otpadom

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Abstract: The amount of produced waste and its inappropriate disposal is a global problem. Waste management aims to prevent waste generation and reduce its harmful impact on the environment. In order to reduce the amount of waste and reduce its harmful impact on the environment, the European Union has set ambitious goals for the realization of which it has adopted a number of different documents and rules. The circular economy is a model of production and consumption that includes sharing, renting, reusing, repairing, restoring and recycling existing materials and products, which aims to reduce the amount of waste to a minimum. In this way, the circular economy tackles climate change and other global environmental problems. The goal of European Union policies is to contribute to the circular economy by extracting resources from waste. The environmental goals of the European Union are ambitious, and their realization is necessary, and it is necessary to invest additional efforts in their realization, and the adoption of new legal rules will certainly be necessary.

Keywords: waste, waste management, sustainability, circular economy, legal framework, European Union.

Sažetak: Količina proizvedenog otpada kao i njegovo neodgovarajuće zbrinjavanje globalni su problem. Upravljanje otpadom usmereno je na sprečavanje nastanka otpada i smanjivanje njegovog štetnog uticaja na životnu sredinu. Kako bi se smanjila količina otpada te smanjio njegov štetni uticaj na životnu sredinu, Evropska unija je postavila ambiciozne ciljeve za čije je ostvarivanje donela niz različitih dokumenata i pravila. Kružna ekonomija je model proizvodnje i potrošnje koji uključuje deljenje, ponovnu upotrebu, popravku, obnavljanje i reciklažu postojećih materijala i proizvoda čime se količina otpada želi smanjiti na minimum. Na taj način cirkularna ekonomija utiče i na klimatske promene i druge globalne ekološke probleme. Cilj politika Evropske unije je da izdvajanjem resursa iz otpada doprinese kružnom gospodarstvu. Ekološki ciljevi Evropske unije su ambiciozni, a njihova realizacija je neophodna te je potrebno uložiti dodatne napore u njihovo ostvarivanje, a donošenje novih pravnih pravila svakako će biti nužno.

Ključne reči: otpad, upravljanje otpadom, održivost, kružna ekonomija, pravni okvir, Evropska unija.

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INTRODUCTION

Inadequately disposed waste in the environment (discharged into rivers, seas, at illegal landfills) is global and one of the biggest environmental pollution problems. The consequences of these pollutions have a harmful effect on the health of people and animal and plant species. As Herceg points out, inadequately disposed waste affects the quality of surface and underground water, changes and affects the soil, greenhouse gases from waste change local air quality, increase the risk of fires and explosions (Herceg, 2013). Traditionally waste management refers to collecting, transporting, and disposing of waste, where waste generated is collected and sent off to most often landfill sites or incineration facilities (Waste Mission, 2024). Here, the primary emphasis is on waste disposal, but it does not deal with the problems of reducing waste generation. Today, waste management has a broader meaning - it is aimed at preventing waste generation and reducing its harmful impact on the environment. In that sense, waste management can

be defined as a set of activities, decisions and measures aimed at:

1. preventing the generation of waste, reducing the amount of waste and/or its harmful impact on the environment,
2. performance of collection, transportation, recovery, disposal and other activities related to waste, and supervision over the performance of these activities,
3. care for landfills that are closed.

The amount of produced waste and its inappropriate disposal is a global problem. According to data from the European Commission, 5 tonnes of waste is produced by the average European each year (see Figure 1), and only 38% of waste in the European Union is recycled. Also, over 60% of household waste still goes to landfill in some European Union countries (European Commission n/a a). As stated in the Directive (EU) 2018/851, municipal waste constitutes approximately between 7 and 10 % of the total waste generated in the Union (Directive (EU) 2018/851, Preamble, point 6.).

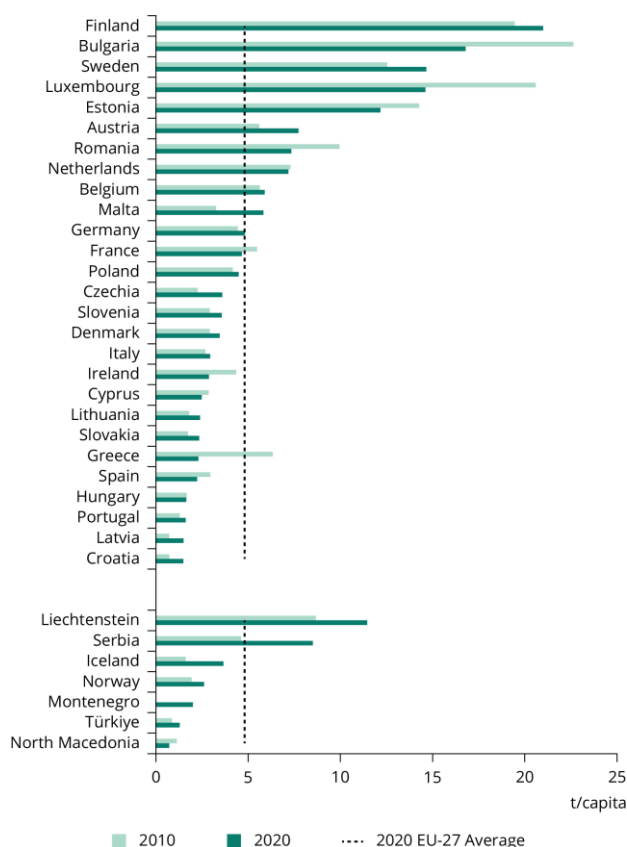


Figure 1. Generation of waste per capita and by European country (2010 and 2020)
Source: European Environment Agency (28.6.2023)

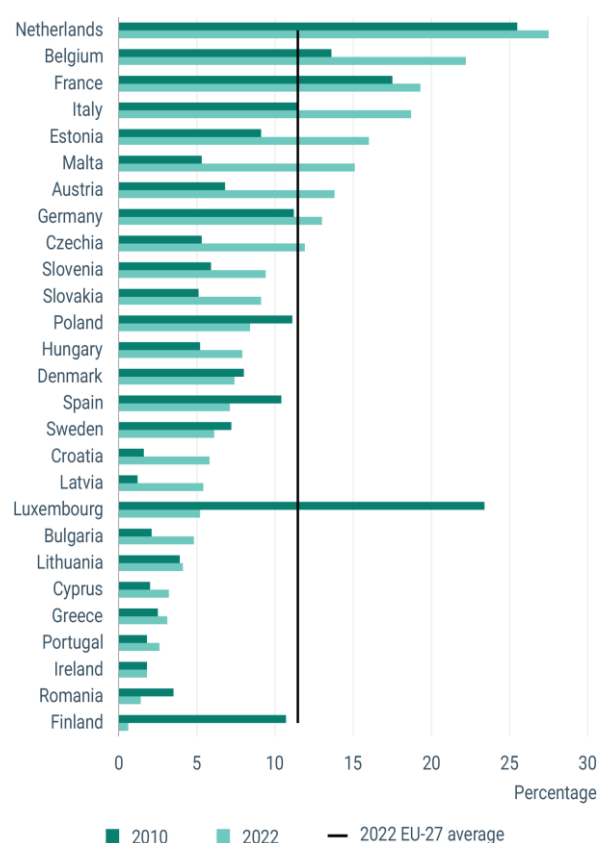


Figure 2. Circular material use rate by EU country (2010 and 2022)
Source: European Environment Agency (2.2.2024)

However, waste is not garbage and it can be a valuable raw material for further production. As described by Herceg, waste consists of discarded things that are sorted and usable. So, those that still have a useful value. On the other hand, litter (garbage) is everything that is discarded and unnecessary but unsorted. It has very little or no use value (Herceg, 2013). Still, there are other definitions of waste (Amasuomo et al., 2016; Dijkema et al., 2010; Van Ewijk et al., 2020). Dijkema et al. point out that a substance is a waste only when it is experienced as or labelled as waste (Dijkema et al. 2010), when the owner labels it as such. Therefore, it is necessary to accurately define and classify waste, because the classification of materials as waste will form the basis for the regulations necessary to protect the population and the environment in which the waste is processed or disposed of (Amasuomo et al., 2016).

It is undeniable that different types of waste and their huge amount represent a global problem of modern times. That is why appropriate waste management is essential for preventing waste, protecting living beings, health and the environment.

Intending to reduce the amount of waste and decrease its harmful impact on the environment, the European Union has set ambitious goals, which will be described in the paper. European Union has adopted a number of different documents and rules. In addition to the Waste Framework Directive, the legal framework includes a whole series of directives related to: waste batteries and accumulators, waste from vehicles, landfill waste, on waste management from extractive industries, packaging and packaging waste, the use of sludge from wastewater treatment plants in agriculture, waste electrical and electronic equipment. European Union waste policy aims to protect the environment and human health and help the EU's transition to a circular economy.

The circular economy is a model of production and consumption that includes sharing, renting, reusing, repairing, restoring and recycling existing materials and products, which aims to reduce the amount of waste to a minimum. In this way, the circular economy tackles climate change and other global environmental problems. European Union policies aim to contribute to the circular economy by extracting resources from waste.

The paper analyses the most important provisions of the Waste Framework Directive (which sets the basic concepts and definitions related to waste management) and other relevant regulations. Although there is a legal framework for waste, the implementation of directives in the European Union Member States differs significantly. The difference between the set goals and the results achieved so far is also visible.

1. OVERVIEW OF EUROPEAN UNION WASTE MANAGEMENT LEGAL FRAMEWORK

Waste management is a complex task, considering that almost every type of waste requires different treatments and regulations. Sustainable waste management seeks solutions that do not harm the environment or human health and aim to reduce the consumption of natural resources. Apart from environmental benefits, it has economic and social benefits as well. European Union targets for waste management are key drivers of increasing recycling rates, and European Union waste legislation includes more than 30 binding targets for 2015-2030 (European Environment Agency, 19.12. 2023).

The regulatory concept of waste comprises environmental principles, the legal definition, legal requirements, and policy implementation (Van Ewijk et al., 2020).

Waste management is based on compliance with generally accepted principles of environmental protection. Herceg enumerates the following principles of waste management: the principle of sustainable development, the principle of proximity and regional approach to waste management, the principle of hierarchy of waste management, the principle of "polluter pays", the principle of liability, the principle of public participation in decision making, the principle of zero waste (Herceg, 2013).

When we talk about European legislation related to waste, the first directives, although ineffective, were adopted in the 1970s, and legislation on waste was fragmented for a long time (Herceg, 2013). Waste management was emphasized as a priority in the first European Union Environmental Action Plan, adopted in 1972, and since then, it has continued to be one of the priority areas (Erceg et al., 2017).

There are many regulations, and most of them are directives. The main purpose of the directives is the harmonization of national legislation. They are binding on the member states regarding the results they need to achieve. However, they are left with a choice of methods by which they will achieve the goals of the European Union within the framework of their existing legal order.

Directives regulating waste can be divided into four groups:

1. Directives related to the waste management framework (e.g., Waste Framework Directive (2008/98/EC);

2. Directives related to special types of waste (Directive on packaging and packaging waste, Directive 2000/53/EC on end-of-life vehicles, Directive on waste electrical and electronic equipment,

Directive 2006/66/EC on batteries and accumulators and waste batteries and accumulators...);

3. Directives related to shipments of waste and the import and export of waste (Regulation 1013/2006 on shipments of waste);

4. Directives related to buildings for the processing and disposal of waste (Council Directive 1999/31/EC on landfill of waste) (Činčurak Erceg, 2024).

Nevertheless, the different requirements that certain types of waste require will necessarily require the adoption of new rules for those categories of waste, thus creating some new divisions. For example, Amasuomo lists different classifications and types of waste and explains that “common characteristics used in the classification of waste include the physical states, physical properties, reusable potentials, biodegradable potentials, source of production and the degree of environmental impact”. They are most often divided according to their physical state (solid waste, liquid waste, gaseous waste), source (household/ domestic waste, industrial waste, agricultural waste, commercial waste, demolition and construction waste, mining waste) and environmental impact (hazardous waste, non-hazardous waste) (Amasuomo et al., 2016).

For the purposes of European legislation, a European List of Waste was established by Decision 2000/532/EC, which has been amended several times. There is also a Commission notice on technical guidance on the classification of waste whose purpose is to give technical guidance on certain aspects of Waste Framework Directive and List of Waste.

2. WASTE FRAMEWORK DIRECTIVE

The Waste Framework Directive (Directive 2008/98/EC) was adopted in 2008. It sets the basic concepts and definitions related to waste management. According to Art. 3(1): waste “means any substance or object which the holder discards or intends or is required to discard”. The Waste Framework Directive explains when waste ceases to be waste and becomes a secondary raw material, and how to distinguish between waste and by-products. Special conditions apply to hazardous waste, waste oils and bio-waste. Directive 2008/98/EC confirms the prevention principle, the precautionary principle, the “polluter-pays principle”, and establishes extended producer responsibility as a key principle in waste management. It also sets out the waste hierarchy as follows: waste prevention, preparing for reuse, recycling, recovery and disposal (Art. 4(1)). This waste hierarchy shall apply as a priority order in waste prevention and management legislation and policy. As emphasized in the literature, waste hierarchy is

the most significant instrument of the Waste Framework Directive as it places recycling after waste prevention and preparing for reuse (De Römph et al., 2020). However, “waste hierarchy has been contemplated in the international and national regulations, although there is no indicators for its implementation”, although recycling rate is the most widespread indicator (however, recycling rate issues and limitations have also been pointed out) (Pires et al., 2019). It also sets quantity-based targets for the preparation of reuse and recycling for specific waste streams. It is necessary to mention Art. 13, which states that: “Member States shall take the necessary measures to ensure that waste management is carried out without endangering humans health, without harming the environment and, in particular: (a) without risk to water, air, soil, plants or animals; (b) without causing a nuisance through noise or odors; and (c) without adversely affecting the countryside or places of special interest”. In accordance with Art. 15(1) original waste producer or other waste holder must treat it themselves or by a dealer or an establishment or undertaking which carries out waste treatment operations or arranged by a private or public waste collector. Pursuant to Art. 23(1) establishment or undertaking intending to carry out waste treatment must obtain a permit from the competent authority. Art. 34(1) stipulates the obligation of periodic inspections for establishments or undertakings which: carry out waste treatment operations, collect or transport waste on a professional basis, produce hazardous waste. Competent national authorities must establish waste-management plans (Art. 28) and waste-prevention programmes (Art. 29).

As part of a package of measures on the circular economy, Directive (EU) 2018/851 of the European Parliament and of the Council of 30 May 2018 amends Directive 2008/98/EC on waste. The amendment of 2018 did not modify the definition of waste, but added the definition of municipal waste (Art. 3(2b)). The Directive (EU) 2018/851 involved reform of the waste management policy: it changed the subject matter and scope of “the Framework Directive including therein the need to reduce waste generation and the importance of transitioning towards a circular economy, which is essential for guaranteeing the Union’s long-term competitiveness. This is a significant modification, as it opens the door to including waste management systems in the global objective of achieving a real circular economy” (López-Portillo et al., 2021). It strengthens rules on waste prevention. The waste hierarchy was not modified in the amended Directive (EU) 2018/851, but as discussed, the modification of the subject matter and scope implies the need for a systematic

reinterpretation of waste hierarchy (López-Portillo et al., 2021). Reinterpretation “should also be extended to other precepts such as Art. 13, which refers to the adoption of measures to ensure that resource management does not entail a risk to the environment or human health” (López-Portillo et al., 2021). The Directive (EU) 2018/851 introduced the obligation to adopt economic instruments and other measures to provide incentives for the application of the waste hierarchy (Art. 4(3)). Examples of economic instruments and other measures are listed in Annex IVa, and include, for example: charges and restrictions for the landfilling and incineration of; “pay-as-you-throw” schemes; deposit-refund schemes and other measures to encourage efficient collection of used products and materials; use of fiscal measures or other means to promote the uptake of products and materials that are prepared for re-use or recycled;

support to research and innovation in advanced recycling technologies and remanufacturing; public awareness campaigns, in particular on separate collection, waste prevention and litter reduction, and mainstreaming these issues in education and training.

Directive (EU) 2018/851 set out of new objectives for the recycling of municipal waste: 55% of all municipal waste by weight should be recycled or prepared for re-use in 2025, 60% in 2030 and 65% in 2035 (Art. 11 (2)). These goals will be challenging to achieve, as can be seen from Figure 3: Municipal waste recycling rates in Europe by country. It prescribes in Art. 9 (1)(g) a target for the reduction of food waste generation by 50 % per capita global food waste at the retail and consumer levels and to reduce food losses along production and supply chains by 2030.

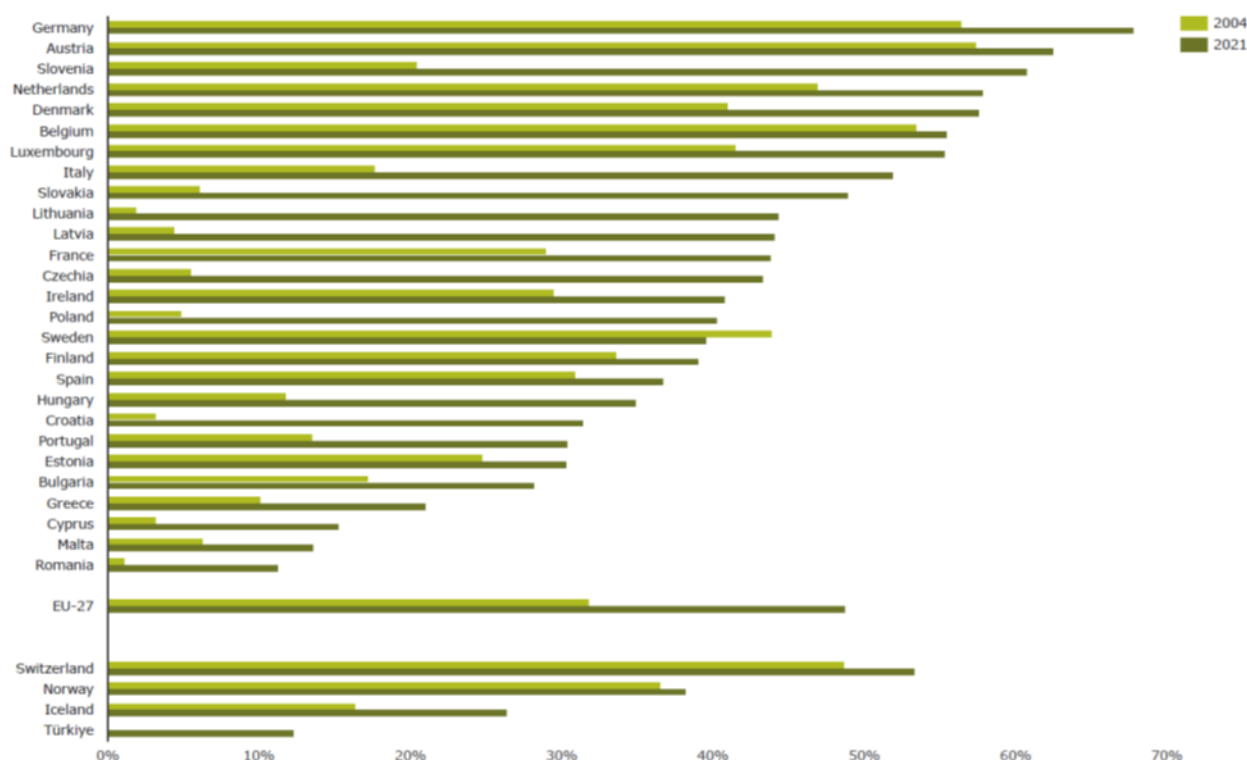


Figure 3. Municipal waste recycling rates in Europe by country
Source: European Environment Agency (19.12.2023)

Furthermore, the Directive obliges Member States to: establish, by 1 January 2025, a separate collection of textiles and hazardous waste generated by households (with the obligation of a separate collection at least for paper, metal, plastic and glass); ensure that, by 31 December 2023, bio-waste is collected separately or recycled at source (for example, by composting).

3. OTHER REGULATIONS REGARDING WASTE

It has already been stated that the European legal framework consists of a large number of special regulations for different types of waste. Their analysis would exceed the scope of this paper. However, some of them will be provided with basic information. Note that they were all amended with the aim of achieving the environmental goals of EU.

Council Directive 1999/31/EC of 26 April 1999 on the landfill of waste (Directive (EU) 2018/850 of the European Parliament and of the Council of 30 May 2018 amending Directive 1999/31/EC on the landfill of waste) by introducing stringent technical requirements it aims to prevent, or reduce negative impact from landfill on surface water, groundwater, soil, air or human health.

European Parliament and Council Directive 94/62/EC of 20 December 1994 on packaging and packaging waste aims at harmonising national measures concerning the management of packaging and packaging waste and improving the quality of the environment by preventing and reducing the impact of packaging and packaging waste on the environment. Directive (EU) 2018/852 (amendment of Directive 94/62/EC) contains updated measures aimed at preventing the production of packaging waste, and promote the reuse, recycling and other forms of recovering of packaging waste, instead of its final disposal, thus contributing to the transition towards a circular economy.

Plastic and plastic waste are particularly significant problems for the environment. Statistics show

that around 25.8 million tons of plastic waste is generated in Europe every year, of which less than 30% is collected for recycling (COM(2018) 28 final). Special attention is paid to the problems of micro-plastics (Činčurak Erceg, 2022). Directive (EU) 2019/904 of the European Parliament and of the Council of 5 June 2019 on the reduction of the impact of certain plastic products on the environment which aims to prevent and reduce the impact of certain plastic products on the environment, and includes an EU-wide ban on single-use plastic products whenever there are alternatives. It applies to the single-use plastic products listed in the Annex, products made from oxo-degradable plastic, and fishing gear containing plastic. In the context of waste management, Art. 9 should be mentioned, which stipulates that the Member States must take the necessary measures to ensure separate collection for the recycling of beverage bottles with a capacity of up to three litres, including their caps and lids by 2025, in an amount equal to 77% of the products placed on the market in a given year by weight (90% by 2029). At least 25% of beverage bottles should come from recycled plastic by 2025, increasing to 30% by 2030.

Figure 4. European Union targets for waste management

Area	Target	Relevant EU Directive
Municipal waste management	Preparing for reuse and recycling rate of municipal waste: At least 55% by 2025, 50% by 2030 and 65% by 2035 (by weight)	Waste Framework Directive
	Mandatory separate collection of textiles and household hazardous waste (by January 2025)	
	Mandatory separate collection (of recycling at source) of bio-waste	
Landfilling of waste	Share of municipal waste that is landfilled: maximum 10% by 2035	Landfill Directive
	Ban on the landfilling of waste suitable for recycling or other materials or energy recovery (from 2030)	
Packaging waste	Recycling rate for packaging waste, all materials: 65% by 2025 (70% by 2030) Paper and cardboard: 75% by 2025 (85% by 2030) Ferrous metals: 70% (80%); Aluminium: 50% (60%); Glass: 70% (75%); Plastic: 50% (55%); Wood: 25% (25%).	Packaging and Packaging Waste Directive
	Mandatory producer responsibility schemes for all packaging	
	The revised PPWD would bring changes that include: Reuse and refill targets to 2030 and 2040 Mandatory deposit return system (DRS) to ensure the separate collection of at least 90% of single-use plastic bottles and beverage containers, by 2029 (possibility of exemption for countries who still achieve the 90% separate collection target)	
End-of-life vehicles	Reuse, recovery and recycling targets Minimum of 95% of reuse and recovery (by weight, per vehicle) by 2015 Minimum of 85% of recycling (by weight, per vehicle) by 2015	End-of-Life Vehicles Directive
	Minimum rate of separate collection: 45% by 2016	
Batteries and accumulators	Minimum rate of separate collection: 45% by 2016	Batteries Directive
Electrical and electronic equipment (EEE)	Minimum rate of separate collection: 65% of the average weight of EEE placed on the market in the 3 preceding years in the member state, or 85% of WEEE generated on the territory of the member state	Waste Electrical and Electronic Equipment Directive

Source: OECD (2024)

Directive 2006/66/EC of the European Parliament and of the Council of 6 September 2006 on batteries and accumulators and waste batteries and

accumulators promotes a high rate of collection and recycling of waste batteries and improvement in the environmental performance of all involved in the life-

cycle of batteries, including their recycling and disposal. The Directive 2006/66/EC aims to cut the amount of hazardous substances (mercury, cadmium and lead) dumped in the environment by reducing the use of these substances in batteries and treating and re-using the amounts used.

Directive 2000/53/EC of the European Parliament and of the Council of 18 September 2000 on end-of life vehicles sets out measures to prevent and limit waste from end-of-life vehicles and their components by ensuring their reuse, recycling and recovery.

Directive 2006/21/EC of the European Parliament and of the Council of 15 March 2006 on the management of waste from extractive industries and amending introduces measures for safe management of waste resulting from the extraction, treatment and storage of mineral resources and the working of quarries. Operators must draw up a waste management plan that prevents or reduces waste generation, and encourages waste recovery and safe waste disposal.

In addition to the target listed in this brief overview of the directives, The European Union's targets related to waste include the introduction of economic instruments to reduce landfilling; "the introduction of simplified and improved definitions and harmonized calculation methods for recycling rates across the EU; specific measures to promote reuse and encourage industrial symbiosis, that is, the use of by-products from one industry as raw materials in another; mandatory extended producer responsibility schemes for manufacturers to encourage them to introduce more eco-friendly products to the market and support recovery and recycling systems (e.g. for packaging, batteries/accumulators, electrical and electronic equipment, and end-of-life vehicles)" (Szamek, 2024).

4. PROBLEMS OF IMPLEMENTATION OF THE DIRECTIVES

Although there is an extensive legal framework for environmental protection in the European Union, the problems of applying regulations in the Member States are still the biggest problem. Moreover, Zorpas points out that the European Union has released more than 1,000 legislations and directives related to environmental protection, but the absence of the implementation of those documents contributes to the waste production (Zorpas, 2020). In this sense, he also points out that "whereas most Member States already have a waste management system in place, even the most developed systems have to meet specific methodology and approach in order to advance the quality of life, meets environ-

mental and legal standards, adopts best practices, substantially increases public participation and environmental education, the need for efficiency, and quality management" (Zorpas, 2020). Waste management strategies must comply with United Nations' Sustainable Development Goals., circular economy and industrial symbiosis concept as well as the Waste Framework Directive targets, concept and philosophy (Zorpas, 2020). López-Portillo et al. point out that the European Commission also recognised the implementation gap of the EU's environmental law as well as the European Environmental Agency indicated "the reinforcement of policy implementation and the improvement of its coherence as one of the main action areas to advance in the transition towards a sustainable society" (López-Portillo et al., 2021).

Legal literature usually emphasizes the problems of implementing European directives into national legislation. In this sense, the Waste Framework Directive is no exception. Its transposition into national law and the subsequent policy implementation differ in each Member State. As Van Ewijk et al. point out, "the national context, including government budgets, bureaucratic capacity, political trends, lobbying, established practices, and the inherited policy landscape, leads to distinct waste management arrangements" (Van Ewijk et al., 2020).

Member States must report to the European Commission on the implementation of European Union waste legislation. When European Union laws are not adequately implemented, the Commission can take legal action. However, to avoid reaching that stage, the Commission first offers technical support to Member States to guide them through implementation. Infringements of environmental law account for the largest number of cases dealt with by the European Commission - about 20% of the total. (European Commission, n/a b). According to the European Environment Agency, the European Union is slowly progressing towards more recycling and less landfilling (European Environment Agency, 21.3.2023). As stated in the Communication "Environmental Implementation Review 2022 - Turning the tide through environmental compliance" despite some progress, compliance with the basic obligations of the Waste Framework and the Landfill Directive is yet to be achieved. What is certainly worrying is the fact that the European Commission is pursuing infringement proceedings against 12 Member States for non-compliance with the Landfill Directive as well as there are some Member States that are far from achieving the recycling targets and still operate non-conform landfills. It is clear that

there is a big difference between legislative requirements and practice. Establishing a suitable waste management system needs significant resources, cooperation, and time, and waste management approaches and policies are failing in many countries (Činčurak Erceg, 2024). So, achieving the EU's waste targets requires a significant effort and achieving the goals will be neither quick nor easy.

5. CIRCULAR ECONOMY AND INDUSTRIAL SYMBIOSIS AS A WAY TO REDUCE WASTE

It has already been mentioned that the qualification of waste may change, so what is considered waste today can be a resource in the future. So, the production process can be used for the transformation of waste, and the waste/by-products of one industry can be the raw material of another.

De Römph et al. mention the problem of defining the term circular economy and state that no commonly accepted definition exists. Nevertheless, it can be said that the circular economy "is an economy in which materials are used sustainably, moving away from a linear ('take-make-dispose') economy into a circular one" (de Römph et al. 2020). It is based on the idea that the value of materials is maintained in the economy for as long as possible. It aims at conserving resources, tries to minimise and control the environmental as well as human health impacts of the entire material system (de Römph et al., 2020). It also reduces the production of waste to a bare minimum (López-Portillo et al., 2021).

The European Union has been implementing measures in the circular economy framework since 2014 (Ofak, 2024). Commission's Communication of 2014 "Towards a circular economy: A zero waste programme for Europe" pointed out the need to evolve towards a more circular economy. In the year 2015, the first European Union Action Plan "Closing the loop – An EU action plan for the Circular Economy" (COM/2015/0614 final) was adopted. It is a set of documents addressing the full material cycle and includes several legislative proposals concerning European Union waste law. In 2020, a new Circular Economy Action Plan was adopted: "A new Circular Economy Action Plan for a cleaner and more competitive Europe" (COM/2020/98 final). The new EU's Circular Economy Action Plan "aims to expand the circular economy to the mainstream economic actors to achieve climate neutrality by 2050 and separate economic growth from the use of resources, as foreseen in the European Green Plan" (Ofak, 2024). However, it should be emphasized that "there is currently no initiative for a 'Framework Directive' on the circular economy that would bring

all sectoral measures into alignment, and CEAP, as an action plan, is not legally binding" (Ofak, 2024). Critically analysing the Circular Economy Action Plan, Ofak concludes that the new action plan includes more legislative measures compared to the 2015 plan and that the examination of the advancement in the implementation of legislative measures indicates that the Member States generally support the actions outlined in it. However, Ofak also points out that the suitability of the selected instruments for transitioning the economy from a linear to a circular model is uncertain. She clarifies, citing the results of the research of other authors (Watkins, Van der Ven and Bondi, (2023) *The Missing Piece of the EU Green Deal, The case for an EU resources law*) that the EU's strategy for moving towards a circular economy does not place sufficient focus on reducing material resource usage through addressing consumption habits.

The industry's negative impact on the environment worldwide is recognised as a serious problem and environmental awareness is growing. A significant part of this impact could be reduced by improving resource efficiency. An important role in the transition towards sustainable development also has an Industrial Symbiosis. Chertow (2000) has defined Industrial Symbiosis as traditionally separate industries engaged "in a collective approach to competitive advantage involving physical exchange of materials, energy, water and by-products. Industrial Symbiosis involves the direct physical exchange of materials, energy and/or by-products" (Chertow, 2000). So, Industrial Symbiosis is the business relationship between industrial facilities or companies in which the waste or by-products of one become raw materials for another. Both Circular Economy and Industrial Symbiosis prioritize sustainability, but they have different focuses. Circular Economy is a broader concept, involving sustainable practices for all materials and products. Industrial Symbiosis, on the other hand, specifically targets industrial waste and by-products. So, Industrial Symbiosis also contribute to reuse of waste and by-products. With the concept of Industrial Symbiosis, it is possible to divert waste from landfills and reduce the negative impact on the environment. On the one hand, from a business perspective, Industrial Symbiosis can reduce the need for raw materials and waste disposal costs. From an environmental point of view, the benefits of Industrial Symbiosis are the reduction of consumption of natural resources and waste disposal, as well as the reduction of emissions to air, water and soil resulting from the production of saved raw materials.

CONCLUSION

Waste management was previously aimed at protecting health and the environment from the impact of littering, and more recently, it has been focused on the resource value of waste. Poor waste management is widely recognised as a source of economic costs, health and environmental risks. Waste management has been an essential concern for European Union and Member States legislators. Although numerous documents have been adopted and the goals set are ambitious, the development and progress of waste management and measures for proper treatment and disposal of waste is slow. In this sense, it is necessary to strengthen efforts in order to achieve the set goals. It is necessary to introduce regular activities to raise awareness about waste, practices of prevention, reuse, recycling, recovery of materials, etc. To significantly reduce waste production, prevention is widely acknowledged as the most important approach, taking precedence over recycling and other waste management strategies. In this context, ongoing education and increased awareness about the importance of minimizing waste generation are essential.

As shown in the paper, the European legal framework for waste management contains numerous directives, regulations and policies. A large number of regulations, as well as their frequent changes, are difficult to follow. Also, although there are general targets for waste reduction, precise mechanisms for monitoring and measuring progress are often missing. Also, the implementation of all these different directives can be complex and complicated. In practice, the implementation differs greatly among the Member States, which ultimately leads to the failure to achieve the goals achieved.

Although the circular economy and industrial symbiosis are mentioned as a possible way to reduce waste and environmental pollution, it seems that they are not used enough in practice, and the regulations do not regulate them enough. The environmental goals of the European Union are ambitious, and their realization is necessary, and it is necessary to invest additional efforts in their realization, and the adoption of new legal rules will certainly be necessary.

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