

Waste management in Europe – from theory to practice

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Abstract

Daily human's activities produce waste which, since it is considered useless, is mostly thrown away. Many of these waste materials can be reused however and, if properly handled, can also become a resource for industrial or energy production. The way we live today generates massive quantities of waste and most people want to maintain their lifestyle, while preserving the environment and public health. Waste management has become one of the most critical issues today. Businesses, citizens and policymakers pursue ways to minimize the waste generated from most homes and businesses while reusing or disposing it in a cleaner and cost-effective way. The aim of this paper is to provide background information on these issues and challenges involved in urban solid waste management and to provide a basis for input on relevant European actions carried out.

Keywords: Circular Economy, Municipal Solid Waste, Consumption, Recycling Rate

JEL Classifications: E21, Q43, Q53

Introduction

For several decades, the Circular Economy (CE), as a philosophy, has existed. As it is called and referred to today, it is about the economic development being decoupled from the production and use of scarce natural resources with negative footprints such as fossil fuels or metals and minerals that are hard to recover, where reliance on them produces a competitive disadvantage over time. Circular methods often maintain as much flexibility as possible and energy for efficient use of the economy. When we talk about businesses, it is a matter of turning waste into money.

CE has emerged as an alternative economic reliable paradigm in the last couple of decades, dealing with the immediate global sustainability challenges generated by the Linear Economy (LE), which today represents a unidirectional economic model. Many scientists and writers addressing or supporting the positive effects

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that come with CE, sometimes refer to LE as the “take, make and dispose” triptych (Sillanpää and Ncibi, 2019; Stahel, 2016; Andrews, 2015).

Historically, while the term *circular economy* is relatively recent, the idea itself was established for several hundred years, if not thousands, and was applied spontaneously and naturally in periods when human beings and communities existed together in complete synergy with nature. We saw ourselves then as part of nature, and we used our curiosity and imagination to live better and consciously considering nature’s needs. The sedentary way of life, particularly as regards nature, profoundly changed the structure and the state of mind of human societies. In fact, we then began to consider domesticating the beasts, therefore why not take the chance and totally domesticate nature? Therefore, we began creating new methods and processes for this purpose and, the more we tamed nature, the more civilized we felt we became. Since the second half of the 18th century – the Industrial Revolution marked this period of development which turned into largely industrialized and urban areas, rural and agricultural societies within Europe and America – we have, by successive economic, agricultural and technological revolutions, achieved a new degree of “virtual” supremacy over nature (Goodbody, Rigby and Rigby, 2011).

A historical account as above may sound rather dark and prejudicial but if we look at the course of human history and how it relates to nature (mining, industrial farming, numerous pollution accidents, overfishing, overuse of resources in general) and to other people (slavery, colonialism, armed conflicts, etc.), we should agree that, if we continue to apply the current economic model, particularly in the energetic, industrial, and agricultural areas, we could not ignore the negative effects of such economic development plans, both on environment and communities, that will severely compromise the survival of future generations on Earth.

Sporadic warning calls should be targeted for decision-makers, businessmen and even to the general public about the dark side of this story, as well as about the urge to deal with the emerging social, economic and environmental issues carried out (mainly related to resources scarcity and waste).

Review of the scientific literature

Solid waste is one of the most critical environmental issues worldwide. Historically, since the beginning of humanity, the environment has drained all waste created by humans. The acceptable ecosystem in which the human race,

flora and fauna exist is a gift of nature, created by a range of natural activities. In the wake of the urbanization and development of technology, today's technologically advanced society have made a conscious or unconscious contribution to evolving and altering the natural surroundings. Human activities lead to air, water, and soil contamination in order to meet everyday's humans' needs. There is also a great deal of attempt at pollution reduction and regulation in different countries and regions around the world, the European Union (EU) not making an exception.

The effect of contamination caused by solid waste is one of the key concerns. This, however, is still not much centered in the debates and actions pursued around the world, despite the fact that much more needs to be done to tackle the situation in developed and developing countries. Solid waste consists of the items used in everyday life that have been discarded and may be food waste, metal etc. It is classified according to the source, origin and form of waste in several categories (de Vega, Benítez and Barreto, 2008; Buenrostro, Bocco and Cram, 2001). Municipal solid waste (MSW) varies somewhat from other waste types because it has no fixed generation period (Sipra, Gao and Sarwar, 2018; Singh et al., 2011; Cheng and Hu, 2010). In order to handle the confusion and nuisances of MSW, waste is created at different places at each time, through a controlled channel called the MSW management system, and structured processes are introduced for storage, collection, sorting, transportation, processing and disposal of waste (Kumar, 2016; Tchobanoglous, 2009; Tchobanoglous and Kreith, 2002).

MSW is being created and controlled worldwide and various countries progress at varying speeds to set management goals and achieve them. The management of MSW is difficult when it comes to sudden and rapid urban growth in developing countries. The globalization of the economy has led to more goods being available and a large quantity of solid waste being produced (Princen et al., 2002).

Owing to the rapid growth in waste production, the twentieth century and in particular the time since World War II have represented an unparalleled global level of economic activity. Between 1971 until 2018, the world's total energy production has increased with 155.60%, from 5,642 Mtoe to 14,421 Mtoe (IEA, 2020b) and the world's total final consumption with 134.19%, from 4,243 Mtoe to 9,938 Mtoe (IEA, 2020b), while the total energy supply from renewables and waste has increased only with 115.77%, from 615 Mtoe to 1,327 Mtoe (IEA, 2020a), but with a more rapid pace from 2010 onwards (1,205 Mtoe – 10.1% increase).

Research results and discussions

The European Commission has determined that the process of selective waste collection is not properly implemented, because not enough incentives have been adopted to direct municipal waste toward recycling, and the extended producer responsibility schemes for packaging are not effective. Moreover, the above-mentioned European institution has noted what we are seeing today that there is no infrastructure to support selective collection and that, perhaps for this reason too, the involvement of citizens in selective collection is very low. The European Commission also recommends adopting national plans on waste management, improving extended producer responsibility schemes, selective waste collection, financial incentives, technical support to local authorities, but also improving communication and awareness and the use of EU and other funds.

Whether or not the country is part of the European Union, measures to be implemented gradually are equally important, to develop a sustainable policy of selective recycling. It should be understood that the recycling targets for packaging cannot be met if a functional system is not established at the level of the territorial-administrative units. We cannot ignore the fact that, however much we strive to achieve the recycling targets for municipal waste, we will not be able to complete this process without integrating the whole chain of active factors, including the citizens.

At continental level, it was considered appropriate to analyze the situation of recycling rates of municipal waste in EU member countries, but also in countries such as Switzerland, Turkey, Iceland, Norway, Montenegro, Bosnia and Herzegovina or Serbia. Recycling policies may have particular or different characteristics depending on the government approach, so that the percentages offered can elucidate the current state of selective recycling of waste across Europe.

Table 1. Recycling rate of municipal waste in Europe

Country/Region	2014		2015		2016		2017		2018	
European Union - 27 countries (from 2020)	43,4	s	44,9	s	46,3	s	46,9	s	47,4	s
European Union - 28 countries (2013-2020)	43,4	s	44,7	s	46	s	46,5	s	47	s
Belgium	53,8		53,5		53,5		53,9		54,6	
Bulgaria	23,1		29,4		31,8		34,6		31,5	

Country/Region	2014		2015		2016		2017		2018	
Czechia	25,4	e	29,7	e	33,6	e	34,1	e	34,5	e
Denmark	45,4		47,4		48,3		47,6		49,9	
Germany	65,6		66,7		67,1		67,2		67,3	e
Estonia	31,3		28,3		28,1		28,4		28	
Ireland	39,8		:		40,7		40,4		:	
Greece	15,4		15,8		17,2		18,9		:	
Spain	30,8		30		33,9		36,1		36	e
France	39,7	e	40,7		41,9	e	43		44	e
Croatia	16,5		18		21		23,6		25,3	
Italy	41,6		44,3		45,9		47,8		49,8	
Cyprus	16,8		17,9		17,2	e	16,1	e	:	
Latvia	27		28,7		25,2		24,8		25,2	
Lithuania	30,5		33,1		48		48,1		52,5	
Luxembourg	47,7		47,4		48,2		50,4		50,1	e
Hungary	30,5		32,2		34,7		35		37,4	
Malta	7,4		6,7		7		7,1		6,5	
Netherlands	50,9		51,8		53,5		54,6		55,9	
Austria	56,3		56,9		57,6		57,7		57,7	
Poland	26,5	e	32,5	e	34,8	e	33,8	e	34,3	e
Portugal	30,4		29,8		30,9		28,4		28,9	
Romania	13,1		13,2		13,3		14		11,1	
Slovenia	36		54,1	e	55,6	e	57,8	e	58,9	e
Slovakia	10,3		14,9		23		29,8		36,3	
Finland	32,5		40,6		42		40,5		42,3	
Sweden	49,3		47,5		48,4		46,8		45,8	
United Kingdom	43,4		43,3		44		43,8		44,1	
Iceland	29,7		28,2		33,2		25,8		:	
Norway	42,2		42,8		38,2		38,8		40,7	
Switzerland	53,5	e	52,7	e	52,5	e	52,5	e	52,5	e
Montenegro	5		4,5		:		3,5		5,5	
Serbia	0,7		0,8		0,3		0,3		0,3	
Turkey	:		:		9,2	e	9,2	e	11,5	e

Country/Region	2014	2015	2016	2017	2018
Bosnia and Herzegovina	0	0	0	0	:

Source: Data processed from EUROSTAT

(:) - not available

(e) - estimated

(s) - Eurostat estimated

Regarding to the above table, it can be noted that the level of selective recycling of municipal waste differs both in terms of geographical area and of EU community. In this respect, the time period analyzed showed an increasing trend in the rate of waste recycling in countries such as Belgium, Bulgaria, the Czech Republic, Denmark, Germany, Ireland, Greece, Spain, France, Croatia, Italy, Lithuania, Luxembourg, Hungary, Netherlands, Austria, Poland, Slovenia, Slovakia, Finland, United Kingdom, Montenegro and Turkey. Of the those listed above, only the Czech Republic, Germany, Greece, France, Croatia, Italy, Lithuania, Hungary, the Netherlands, Austria, Slovenia, Slovakia and Turkey reported gradual growth over the period under review.

This indicates that there are some internal or external factors that have led to a downward trend in the recycling rate of municipal waste in some countries. On the other hand, a decrease in the indicator analyzed was reported in countries such as Estonia, Cyprus, Latvia, Malta, Portugal, Romania, Sweden, Iceland, Norway, Switzerland and Serbia. Also, the percentages helping to raise the EU average recycling rate of municipal waste come from countries such as Belgium, Germany, Lithuania, Luxembourg, the Netherlands, Austria and Slovenia, which report a share of more than 50%. On the other hand, there was a minimum rate of less than 15% of the indicator analyzed in countries such as Malta and Romania. This indicates that the two countries must approach a selective recycling policy at national level in a very short time so as to avoid fines coming from the European Union, which are gradually increasing from one year to the next.

As regards countries outside the EU community, it was found that Switzerland has a high standard of living due to the high level of indicator analyzed, while countries such as Montenegro, Serbia, Turkey and Bosnia and Herzegovina are presenting a defamatory report on the circular recycling system of municipal waste.

Conclusions

The European Union has established that the process of selective collection of municipal waste must be properly implemented, which is why it has allocated

various incentives and schemes on extended producer responsibility in respect of packaging, which in fact do not have the capacity to cover the costs of selective collection. In addition, the European Commission has noted what we are seeing today, that there is no infrastructure to support selective collection and that, perhaps for this reason too, the involvement of citizens in selective collection is very low. Irrespective of the geographical location or affiliation to the EU community, equally important are measures that need to be implemented gradually in order to develop a sustainable policy of selective recycling. It should be understood that the recycling targets for packaging cannot be met if a functional system is not established at the level of the territorial-administrative units.

As regards the case study carried out, it was found that during the period analyzed there was an increasing trend in the rate of waste recycling in countries such as Belgium, Bulgaria, Czech Republic, Denmark, Germany, Ireland, Greece, Spain, France, Croatia, Italy, Lithuania, Luxembourg, Hungary, the Netherlands, Austria, Poland, Slovenia, Slovakia, Finland, United Kingdom, Montenegro and Turkey. On the other hand, a decrease in the indicator analyzed was reported in countries such as Estonia, Cyprus, Latvia, Malta, Portugal, Romania, Sweden, Iceland, Norway, Switzerland and Serbia.

Also, as regards countries outside the EU community, it was found that Switzerland has a high standard of living due to the increased level of indicator analyzed, while countries such as Montenegro, Serbia, Turkey and Bosnia and Herzegovina are presenting a defamatory report on the circular recycling system of municipal waste. The indicator under consideration is also closely linked to responsible consumption, which are important issues of interest at both European and global level.

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