

ASPECTS OF MUNICIPAL WASTE MANAGEMENT

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Abstract: *The growth of the urban population, as well as the industrial growth, contributes to the increase of the quantities of generated waste. These can affect the environment. In the European Union, the population has a predominantly urban distribution. For this reason, the article analyzes issues related to municipal waste generated. Failure to use raw materials to the maximum leads to rapid depletion of natural resources. Also, in this situation the amounts of waste can increase. The degree of global warming is also influenced by the way the products are made. Thus, in addition to household waste, municipal waste also includes waste generated by small businesses and institutions. For European Union member states, the article presents an analysis of the degree to which municipal waste is treated.*

Keywords: *municipal waste, waste management, European Union*

JEL CLASSIFICATION: Q53, Q50

Introduction

Given the degree of urban development, one of the major challenges is the way in which municipal waste is managed. Thus, municipal waste management is influenced by the numerical growth of the urban population, as well as by its desire to have a high degree of well-being (Radulescu et al., 2020).

The correct application of waste management strategies can lead to the sustainable development of a community (Profiroiu et al., 2020). Sustainable development also involves monitoring the efficiency with which waste is managed. A decrease in the amount of waste generated can decrease its impact on the environment (Bodislav et al., 2019). An important advantage is the existence of an appropriate waste collection infrastructure (Bran et al., 2020). The importance of proper waste management in industrial sectors is given by circular economy strategies (Bodislav et al., 2020). Improper waste management can change the degree to which greenhouse gas emissions affect people's daily work (Radulescu et al., 2020).

Thus, Table 1 presents the comparative situation of the amount of municipal waste generated, for the period 2010-2018 (kilograms per capita).

From the data presented, it is observed that at the level of the European Union the amount of municipal waste generated decreased in 2018 compared to 2010 (-12 kilograms per capita). The countries where the amount of municipal waste generated decreased significantly in 2018 compared to 2010 are: Bulgaria (-147 kilograms per capita), the Netherlands (-60 kilograms per capita), Cyprus (-49 kilograms per capita), Italy (-48 kilograms per capita), Belgium (-47 kilograms per capita), Great Britain (-46 kilograms per capita). Also, the countries where the amount of municipal waste generated increased significantly in 2018 compared to 2010 are: Czech Republic (+176 kilograms per capita), Luxembourg (+124 kilograms per capita), Estonia (+100

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kilograms) per capita), Slovakia (+95 kilograms per capita), Latvia (+83 kilograms per capita), Finland (+81 kilograms per capita).

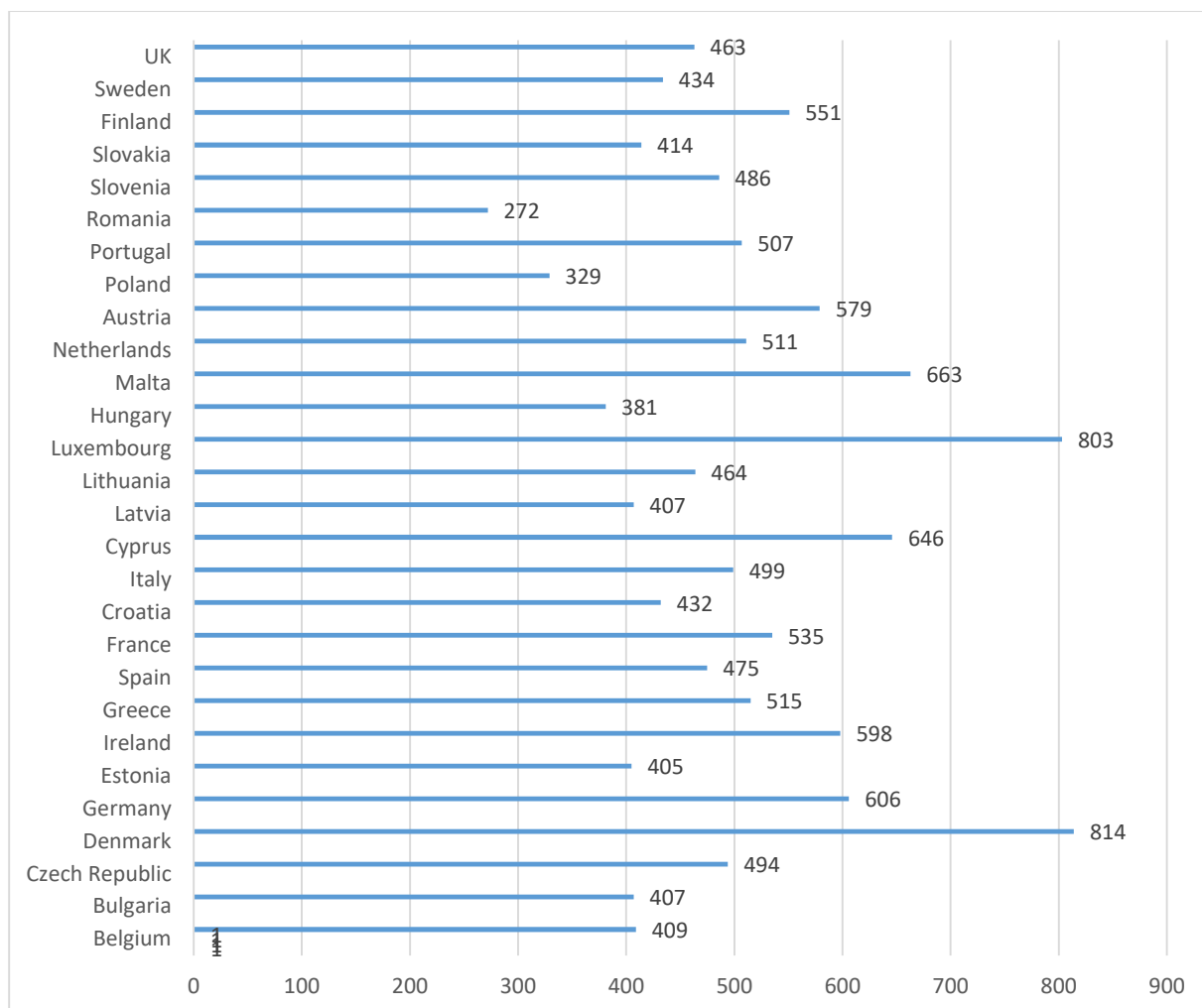
Table 1. Comparative situation of the amount of municipal waste generated, for the period 2010-2018 (kilograms per capita)

Countries	2010	2012	2014	2016	2018
European Union	504	486	478	489	492
Belgium	456	445	425	419	409
Bulgaria	554	460	442	404	407
Czech Republic	318	308	310	339	494
Denmark	-	806	808	830	814
Germany	602	619	631	633	606
Estonia	305	280	357	376	405
Ireland	624	585	562	581	598
Greece	532	495	488	498	515
Spain	510	468	448	463	475
France	534	527	517	530	535
Croatia	379	391	387	403	432
Italy	547	504	488	497	499
Cyprus	695	664	602	633	646
Latvia	324	323	364	410	407
Lithuania	404	445	433	444	464
Luxembourg	679	652	626	815	803
Hungary	403	402	385	379	381
Malta	601	590	591	641	663
Netherlands	571	549	527	520	511
Austria	562	579	565	564	579
Poland	316	317	272	307	329
Portugal	516	453	453	474	507
Romania	313	251	249	261	272
Slovenia	490	362	432	457	486
Slovakia	319	306	320	348	414
Finland	470	506	482	504	551
Sweden	441	454	443	447	434
UK	509	477	482	483	463

Source: made by the authors based on the existing data on the EUROSTAT website

For 2018, Figure 1 shows the quantities in kilograms per capita generated in the member countries of the European Union.

It is noted that in 2018, the highest amounts of municipal waste generated per capita are recorded in: Denmark (814 kilograms per capita), Luxembourg (803 kilograms per capita), Malta (663 kilograms per capita) per capita), Cyprus (646 kilograms per capita), Germany (606 kilograms per capita), Ireland (598 kilograms per capita). Also, the smallest quantities are generated in: Romania (272 kilograms per capita), Poland (329 kilograms per capita), Hungary (381 kilograms per capita), Estonia (405 kilograms per capita) , Bulgaria (407 kilograms per capita), Latvia (407 kilograms per capita).



*Figure 1. Comparative situation of the amount of municipal waste generated in the member countries of the European Union, 2018 (kilograms per capita)
Source: made by the authors based on the existing data on the EUROSTAT website*

From the point of view of the quantity of municipal waste generated, Table 2 presents the comparative situation of the quantity of municipal waste generated, for the period 2010-2018 (thousands of tons).

Table 2. Comparative situation of the quantity of municipal waste generated, for the period 2010-2018 (thousands of tons)

Countries	2010	2012	2014	2016	2018
European Union	253.955	245.378	242.975	249.737	252.396
Belgium	4.972	4.944	4.762	4.746	4.677
Bulgaria	4.094	3.364	3.192	2.881	2.862
Czech Republic	3.334	3.233	3.261	3.580	5.248
Denmark	:	4.508	4.558	4.757	4.715
Germany	49.237	49.759	51.102	52.133	50.260
Estonia	406	371	470	494	535
Ireland	2.846	2.693	2.619	2.763	2.912
Greece	5.917	5.463	5.315	5.367	5.523
Spain	23.774	21.896	20.836	21.542	22.229
France	34.609	34.484	34.260	35.356	35.889

Countries	2010	2012	2014	2016	2018
Croatia	1.630	1.670	1.637	1.680	1.768
Italy	32.440	29.994	29.652	30.112	30.165
Cyprus	576	574	513	539	562
Latvia	680	658	726	802	785
Lithuania	1.253	1.330	1.270	1.272	1.301
Luxembourg	344	346	348	474	488
Hungary	4.033	3.988	3.795	3.721	3.729
Malta	249	248	257	292	321
Netherlands	9.484	9.203	8.894	8.861	8.806
Austria	4.701	4.883	4.833	4.928	5.119
Poland	12.032	12.084	10.330	11.654	12.485
Portugal	5.457	4.766	4.710	4.891	5.213
Romania	6.343	5.044	4.956	5.143	5.296
Slovenia	1.004	744	892	943	1.009
Slovakia	1.719	1.657	1.733	1.890	2.254
Finland	2.519	2.738	2.630	2.768	3.041
Sweden	4.140	4.324	4.295	4.439	4.416
UK	31.955	30.413	31.129	31.710	30.786

Source: made by the authors based on the existing data on the EUROSTAT website

From the data presented in Table 2, it is observed that at the level of the European Union the amount of municipal waste generated decreased in 2018 compared to 2010 (-1559 thousand tons). The countries where the amount of municipal waste generated decreased significantly in 2018 compared to 2010 are: Italy (-2275 thousand tons), Spain (-1545 thousand tons), Bulgaria (-1232 thousand tons), United Kingdom (-1169 thousand tons), Romania (-1047 thousand tons), the Netherlands (-678 thousand tons). Also, the countries where the amount of municipal waste generated increased significantly in 2018 compared to 2010 are: Czech Republic (+1914 thousand tons), France (+1280 thousand tons), Germany (+1023 thousand tons), Slovakia (+535 thousand tons), Finland (+522 thousand tons), Poland (+453 thousand tons).

For 2018, the following figure shows the quantities in thousands of tonnes generated in the member countries of the European Union.

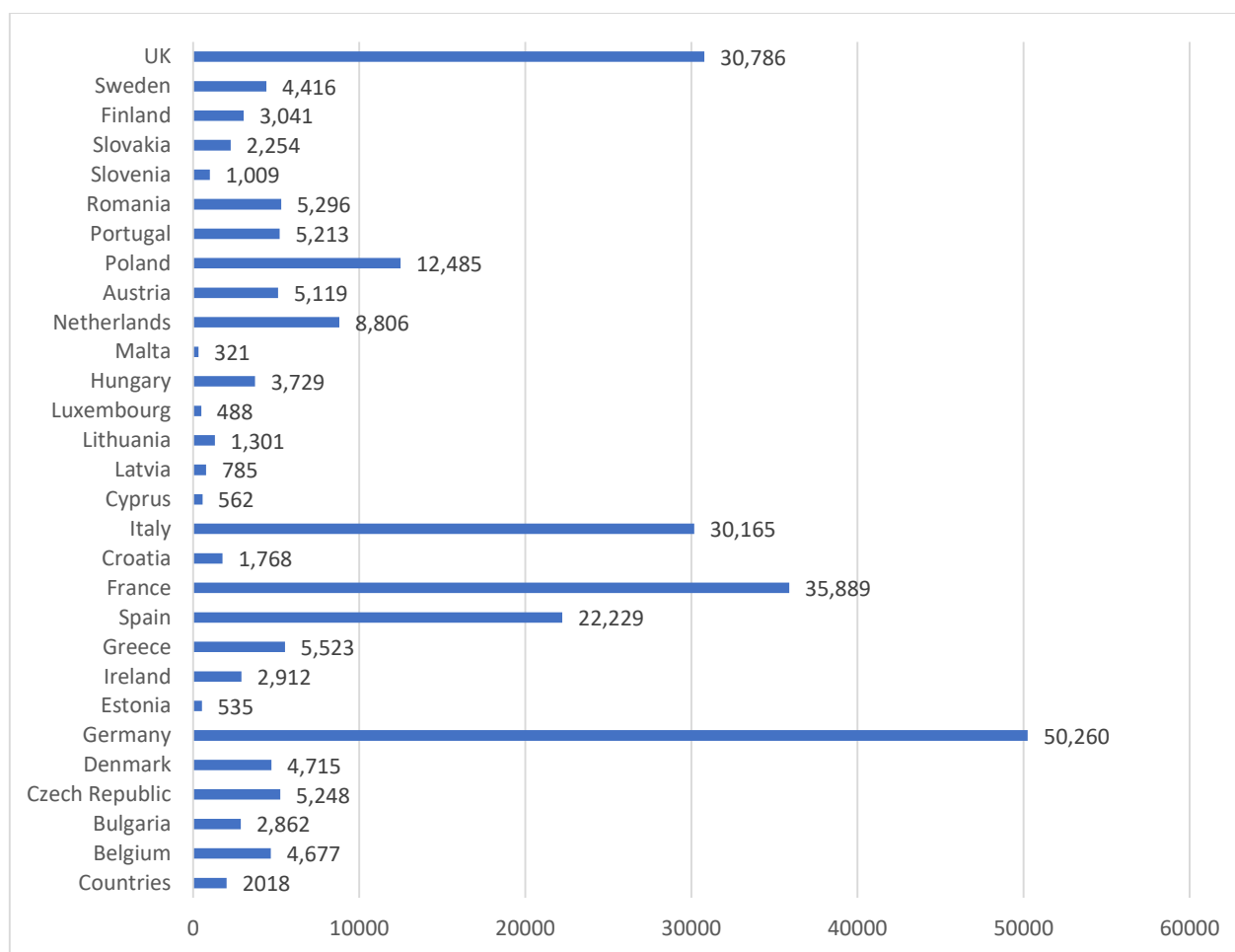


Figure 2. Comparative situation of the amount of municipal waste generated in the member countries of the European Union, 2018 (thousands of tons)

Source: made by the authors based on the existing data on the EUROSTAT website

It is noted that in 2018, the highest amounts of municipal waste generated are recorded in: Germany (50260 thousand tons), France (35889 thousand tons), United Kingdom (30786 thousand tons), Italy (30165 thousand tons). Spain, Spain (22229 thousand tons), Poland (12485 thousand tons).

Also, the smallest quantities are generated in: Malta (321 thousand tons), Luxembourg (488 thousand tons), Estonia (535 thousand tons), Cyprus (562 thousand tons), Latvia (785 thousand tons), Slovenia (1009 thousand tons).

An important aspect of waste management is waste treatment. Thus, the following table presents the comparative situation of the amount of municipal waste treated, for the period 2010-2018 (kilograms per capita).

Table 3. Comparative situation of the quantity of municipal waste treated, for the period 2010-2018 (kilograms per capita)

Countries	2010	2012	2014	2016	2018
European Union	492	474	469	482	484
Belgium	436	425	418	419	409
Bulgaria	547	433	416	404	407
Czech Republic	304	308	310	339	473
Denmark	:	806	808	830	812

Countries	2010	2012	2014	2016	2018
Germany	602	619	631	633	606
Estonia	256	187	303	344	382
Ireland	575	530	531	572	589
Greece	532	495	488	498	515
Spain	510	468	448	463	475
France	534	527	517	530	535
Croatia	373	381	374	394	396
Italy	515	483	453	452	455
Cyprus	676	625	562	603	564
Latvia	324	302	362	376	351
Lithuania	369	429	425	422	417
Luxembourg	679	652	626	815	803
Hungary	403	402	376	380	383
Malta	577	553	549	568	617
Netherlands	571	549	527	520	511
Austria	548	560	547	552	570
Poland	264	252	272	307	329
Portugal	516	453	453	446	485
Romania	279	212	218	258	264
Slovenia	393	311	257	382	383
Slovakia	309	296	282	345	414
Finland	470	506	482	504	551
Sweden	441	454	443	447	434
UK	504	470	472	484	465

Source: made by the authors based on the existing data on the EUROSTAT website

From the data presented in Table 3, it is observed that at the level of the European Union the quantity of municipal waste treated decreased in 2018 compared to 2010 (-8 kilograms per capita). The countries where the amount of treated municipal waste decreased significantly in 2018 compared to 2010 are: Bulgaria (-140 kilograms per capita), Cyprus (-112 kilograms per capita), the Netherlands (-60 kilograms per capita). per capita), Italy (-60 kilograms per capita), United Kingdom (-39 kilograms per capita), Spain (-35 kilograms per capita).

Also, the countries where the amount of treated municipal waste increased significantly in 2018 compared to 2010 are: Czech Republic (+169 kilograms per capita), Estonia (+126 kilograms per capita), Luxembourg (+124 kilograms per capita), Slovakia (+105 kilograms per capita), Finland (+81 kilograms per capita), Poland (+65 kilograms per capita).

For 2018, Figure 3 shows the quantities in kilograms per capita treated in the member countries of the European Union.

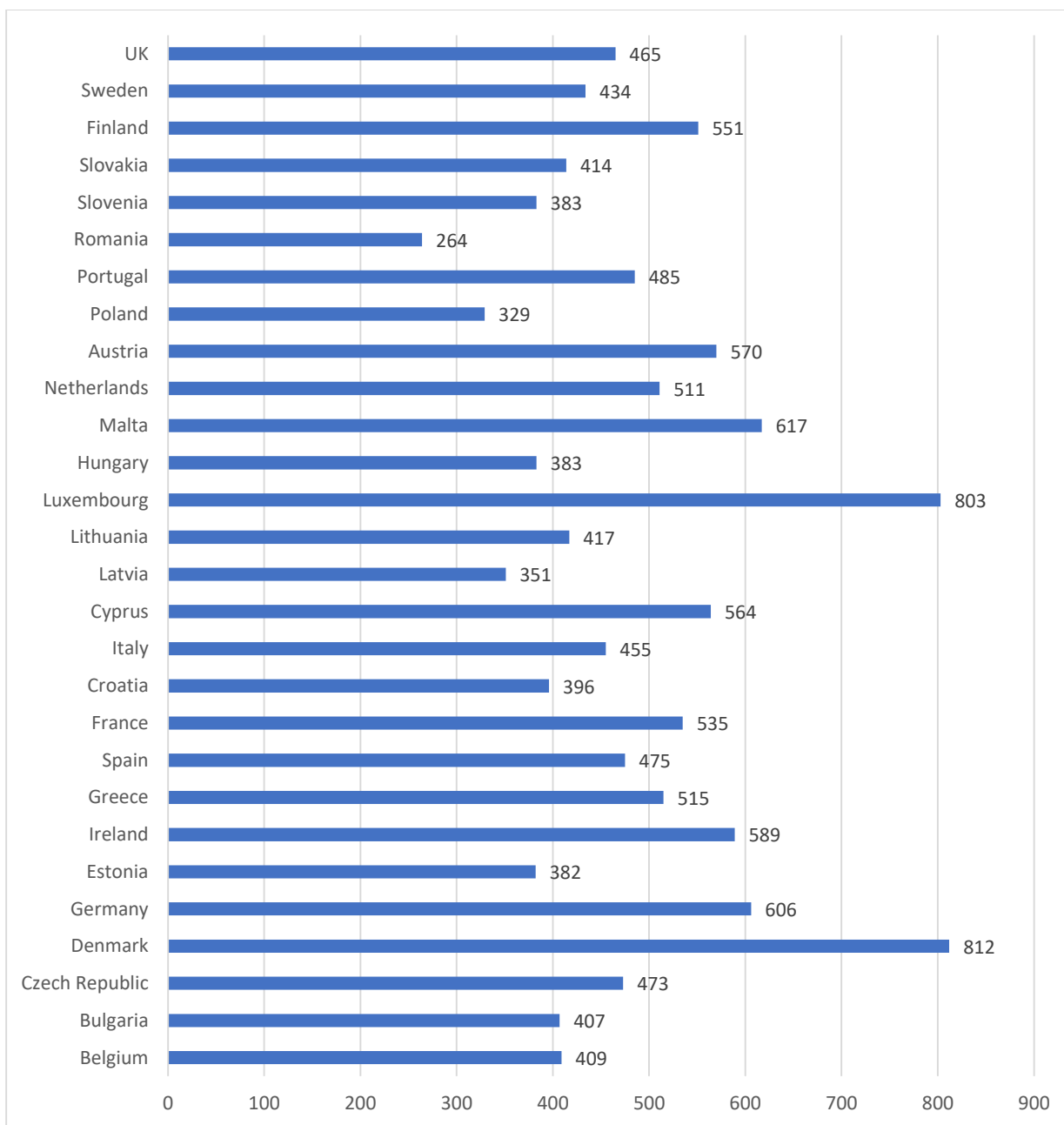


Figure 3. Comparative situation of the quantity of municipal waste treated in the member countries of the European Union, 2018 (kilograms per capita)
 Source: made by the authors based on the existing data on the EUROSTAT website

It is noted that in 2018, the highest amounts of municipal waste treated per capita are recorded in: Denmark (812 kilograms per capita), Luxembourg (803 kilograms per capita), Malta (617 kilograms per capita). Germany (606 kilograms per capita), Ireland (589 kilograms per capita), Austria (570 kilograms per capita), Cyprus (564 kilograms per capita).

Also, the smallest quantities are treated in: Romania (264 kilograms per capita), Poland (329 kilograms per capita), Latvia (351 kilograms per capita), Estonia (382 kilograms per capita), Hungary (383 kilograms per capita), Slovenia (383 kilograms per capita).

From the point of view of the quantity of municipal waste treated, the following table presents the comparative situation of the quantity of municipal waste treated, for the period 2010-2018 (thousands of tons).

*Table 4. Comparative situation of the quantity of municipal waste treated,
for the period 2010-2018 (thousands of tons)*

Countries	2010	2012	2014	2016	2018
European Union	247.791	239.076	238.169	246.168	248.390
Belgium	4.746	4.716	4.684	4.752	4.677
Bulgaria	4.044	3.164	3.004	2.877	2.859
Czech Republic	3.186	3.233	3.261	3.580	5.028
Denmark	:	4.507	4.559	4.757	4.707
Germany	49.236	49.759	51.102	52.133	50.260
Estonia	340	247	398	453	505
Ireland	2.622	2.439	2.473	2.718	2.865
Greece	5.917	5.463	5.315	5.367	5.523
Spain	23.774	21.896	20.836	21.542	22.229
France	34.609	34.484	34.260	35.356	35.889
Croatia	1.604	1.627	1.582	1.642	1.619
Italy	30.505	28.765	27.537	27.374	27.488
Cyprus	561	540	479	514	491
Latvia	680	615	722	737	676
Lithuania	1.143	1.283	1.247	1.211	1.167
Luxembourg	344	346	348	474	488
Hungary	4.033	3.988	3.713	3.734	3.746
Malta	239	232	238	259	299
Netherlands	9.483	9.202	8.893	8.861	8.806
Austria	4.582	4.718	4.673	4.825	5.041
Poland	10.040	9.582	10.331	11.654	12.485
Portugal	5.457	4.766	4.710	4.607	4.984
Romania	5.645	4.261	4.338	5.085	5.134
Slovenia	805	639	530	790	795
Slovakia	1.666	1.601	1.528	1.875	2.253
Finland	2.519	2.738	2.630	2.768	3.041
Sweden	4.140	4.324	4.295	4.439	4.416
UK	31.665	29.940	30.481	31.785	30.918

Source: made by the authors based on the existing data on the EUROSTAT website

From the data presented in the table, it is observed that at the level of the European Union the quantity of treated municipal waste increased in 2018 compared to 2010 (+599 thousand tons). The countries where the amount of treated municipal waste decreased significantly in 2018 compared to 2010 are: Italy (-3017 thousand tons), Spain (-1545 thousand tons), Bulgaria (-1185 thousand tons), United Kingdom (-747 thousand tons), the Netherlands (-677 thousand tons), Romania (-511 thousand tons).

Also, the countries where the amount of treated municipal waste increased significantly in 2018 compared to 2010 are: Poland (+2445 thousand tons), Czech Republic (+1842 thousand tons), France (+1280 thousand tons), Germany (+1024 thousand tons), Slovakia (+587 thousand tons), Finland (+522 thousand tons).

For 2018, Figure 4 shows the quantities in thousands of tonnes treated in the Member States of the European Union.

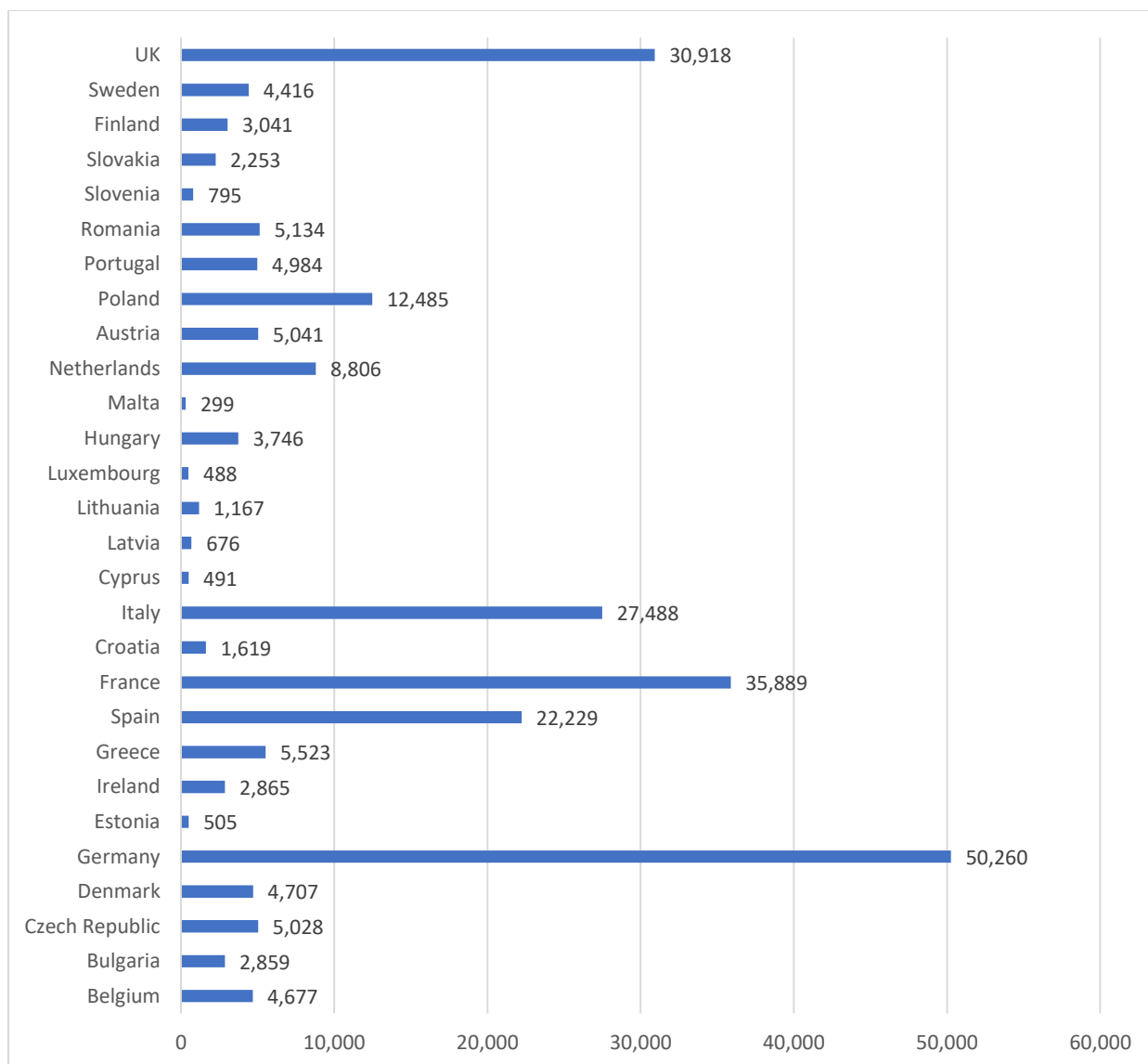


Figure 4. Comparative situation of the quantity of municipal waste treated in the member countries of the European Union, 2018 (thousands of tons)

Source: made by the authors based on the existing data on the EUROSTAT website

From Figure 4, it is observed that, in 2018, the highest quantities of treated municipal waste are registered in: Germany (50260 thousand tons), France (35889 thousand tons), Great Britain (30918 thousand tons), Italy (27488 thousand tons), Spain (22229 thousand tons), Poland (12485 thousand tons). Also, the smallest quantities are treated in: Malta (299 thousand tons), Luxembourg (488 thousand tons), Cyprus (491 thousand tons), Estonia (505 thousand tons), Latvia (676 thousand tons), Slovenia (795 thousand tons).

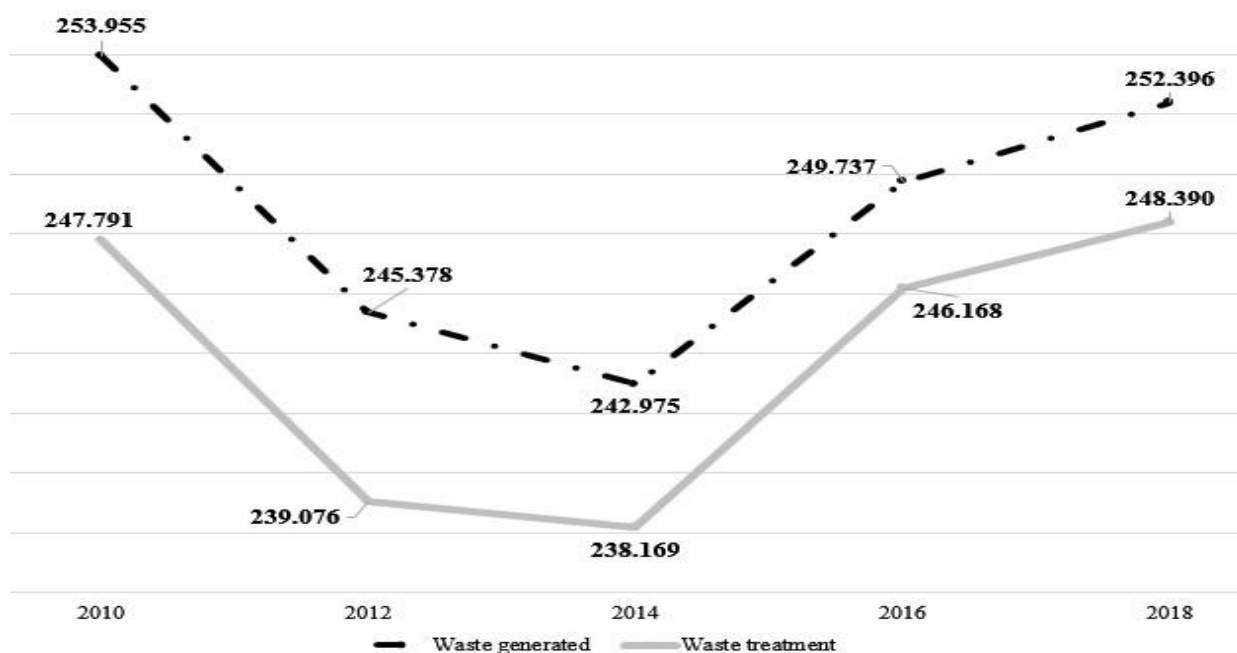


Figure 5. Evolution of the quantities of municipal waste generated, respectively treated, for the period 2010-2018 (thousands of tons)

Source: made by the authors based on the existing data on the EUROSTAT website

Figure 5 shows the evolution of the quantities of municipal waste generated, respectively treated, for the period 2010-2018 (thousands of tons). It is found that, for the period 2010-2014, both for the quantities generated and for the quantities treated, the trend was decreasing. Also, for the period 2014-2018, there is an increase in the quantities generated, respectively in the quantities treated.

Conclusions

Human health can be affected by some hazardous waste. The environment is also degrading due to the harmful effect of hazardous waste. This increases the importance that must be given to the most correct management of waste, which also involves the possibility of recycling and reuse of waste. From the analysis performed, at the level of the European Union, it is found the increase of the interest for the decrease of the quantity of municipal waste generated. The amounts of treated municipal waste have also increased.

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