1.0 Factsheet – Croatia

This factsheet analyses the situation regarding waste management policies and practices in Croatia, the focus being on **municipal solid waste** (MSW). The aim of the factsheet is to identify key issues in respect of waste management currently confronting the country, in particular against targets set out in the Landfill Directive and the Waste Framework Directive.

The following table presents some basic data and information related to current waste generation and management in Croatia, which the following analysis was based upon.

Table 1-1: Basic waste management data for Croatia

Population / Households	
Total inhabitants (2013) Decrease since 1991	4,262,140 About 8% [1]
Data on households	1 534 148 private households (with a reported average size of 75 m^2)
Data on urbanisation	56% on average City of Zagreb 94.5% Zagreb metropolitan area (City of Zagreb and Zagreb County) 76.4%
Municipal Waste Generation (source: AZO, the National EPA in its recent Report on Municipal Waste 2013[2])	
Total (tonnes in 2013)[3]	1 720 758
Total (kg/cap/annum)	404
Household Waste Composition (source: AZO in the draft final national Waste Management Plan 2015 – 2021)	
Food (kitchen waste)	30.9%
Garden	5.7%
Paper & cardboard	23.2%
Plastic	22.9%
Glass	3.7%
Metal	2.1%
Textiles	3.7%
Other	7.8%
Municipal Waste Management (data from 2013, source: AZO)	

[1] The Croatian Bureau of Statistics via https://en.wikipedia.org/wiki/Demographics_of_Croatia.
Same source – to which also data on households and urbanization refer to – predicts that the country´s population may undergo the 4 million-line within 2030.

[2] Published in March 2015 and available in Croatian only
http://www.azo.hr/IzvjesceOKomunalnomOtpaduZa2013

[3] Remaining numbers in this table refer to the source AZO and its 2013 Report on Municipal Waste (refer to above footnote). The given number for generated MSW adds to reported amounts (1 477 991 tonnes) amounts from the population not served by a collection system, estimates for municipalities for which no data was submitted, amounts coming from the service sector and a few other corrections. For data per county refer to **Error! Reference source not found.**.

MSW collection rate	98% (up from 80% coverage in 2000)
Recycling	258 056 tonnes
Composting	29 366 tonnes[4]
MBT	8,728 tonnes[5]
Landfilled	1 413 133 (household) + 365 657 (non-hazardous industrial) tonnes
Performance Against Targets (all information gathered from above quoted AZO report)	
Waste Framework Directive:	22.6 % Recycling for 2013 accounted against method 2 (2011/753/EU). (Note that using method 4 would result in a figure of 15.0%).
Landfill Directive:	With 115% BMW[6] compared to 1997[7], the 2013 target (75%) was clearly missed. In weight terms, the target was exceeded by 303 303 tonnes: 870 434 tonnes landfilled in 2013 against a target of 567 131 tonnes to be reached 31.12.2013.
Waste Management Infrastructure, available at present or within end of 2016	
Bring sites for recycling	52 recycling yards
Sorting facilities	Two public (Krk and Čakovec), plus some private material recovery facilities
Compost and biogas facilities	Ten compost plants for green and biowaste (with three in Zagreb) and a few biogas facilities.
Mechanical biological Treatment (MBT)[8]	Varaždin (private, in operation since end of 2011): Capacity 90 000 t/a Rijeka (Mariščina) in trial period: Capacity 100 000 t/a Pula (Kaštijun) under construction (80% completion): Capacity 90 000 t/a
Thermal treatment	None (Up until 2005 a small hazwaste incinerator was operated in Zagreb.)
Landfills	147 operational, and 164 closed facilities, on 311 locations. Out of the operational facilities, 57 can be classified as engineered landfills.

The specific generation of municipal waste of about 400 kg/cap/yr comprises also tourism,[9] which accounts for around 200,000 population equivalents[10]. Due to the country´s nature as

[4] This value is difficult to square with other information (e.g. the information contained in **Error! Reference source not found.**). It is very low when considering the number, and capacity, of compost and AD (anaerobic treatment) plants referred to in **Error! Reference source not found.**.

[5] The plan indicates the remainder of the 1.7 million tonnes consists of material that is temporarily stored, together with an amount estimated to account for households that are not budgeted as being part of the formal system

[6] Biodegradable Municipal Waste

[7] Reason for 1997 as reference year for the respective calculation (as in all other EU member states) might be recent European history (with a war in Croatia that followed the break-up of former Yugoslavia until 1995). 1997 parts of Croatia were still under jurisdiction of Republika Srpska Krajina (a de-facto regime which controlled up to a third of today´s Croatia) and this is assumed in here to be the reason that the Aquis EU – Croatia contains a later reference year than for other countries.

[8] Only those operating or under construction are listed. For data on projects refer to **Error! Reference source not found.**.

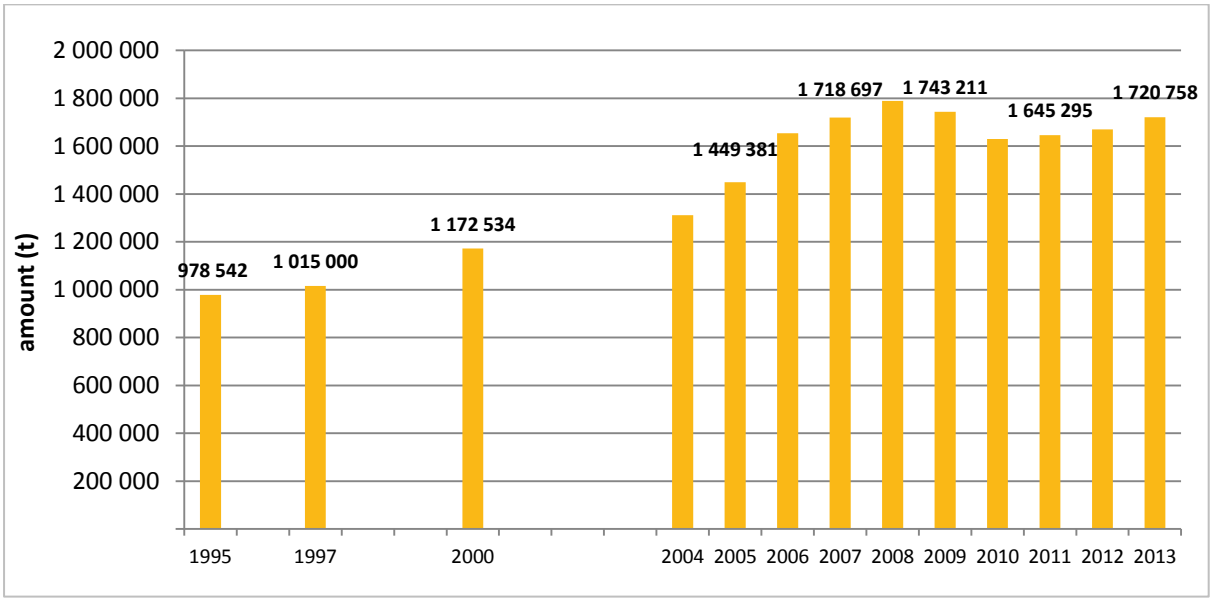
[9] The Croatian definition for municipal waste – laid down in Article 4 of the Act on Sustainable Waste Management (http://mzoip.hr/doc/act_on_sustainable_waste_management.pdf) – reads "waste generated by households or any other waste comparable in nature and composition to household waste, …".

[10] 66.5 million overnight stays in 2014, refer to http://www.iztzg.hr/UserFiles/file/institut/Hrvatski-turizam-u-brojkama-2014-Broj-04.pdf, Table on page 5.

a seasonal (mainly summer) tourist destination, this figure has to tripled or quadrupled when, for example, considering the need for capacity to manage waste at the peak of the tourist season.

The timewise development of Municipal Waste over the last two decades is shown in Figure 1.1. The curve may be interpreted as a strong increase after a war which ended in 1995 followed by some stagnation (which is reflected by general economic data).

Figure 1.1: Municipal waste generation over the last 20 years



Source: AZO in its recent Report on Municipal Waste 2013

For a country breakdown by districts of the generated municipal waste refer to Table 1.2.

Table 1.2: Croatia's districts: Data on population and MSW generation[11]

Županija (district)	Population (2011 census)	MSW generation (tonnes) in 2013. Source: AZO
1 Zagrebačka	317 606	80 164
2 Krapinsko-zagorska	132 892	27 626
3 Sisačko-moslavačka	172 439	50 473
4 Karlovačka	128 899	38 815
5 Varaždinska	175 951	32 910
6 Koprivničko-križevačka	115 584	21 247
7 Bjelovarsko-bilogorska	119 764	26 330
8 Primorsko-goranska	296 195	130 661
9 Ličko-senjska	50 927	24 528
10 Virovitičko-podravska	84 836	23 948
11 Požeško-slavonska	78 034	13 797
12 Brodsko-posavska	158 575	45 597
13 Zadarska	170 017	95 118
14 Osječko-baranjska	305 032	73 716
15 Šibensko-kninska	109 375	48 202
16 Vukovarsko-srijemska	179 521	42 352
17 Splitsko-dalmatinska	454 798	201 460
18 Istarska	208 055	110 611
19 Dubrovačko-neretvanska	122 568	64 942
20 Međimurska	113 804	20 708
21 Grad Zagreb	790 017	304 706

[11] Source: AZO, Report on Municipal Waste 2013.

Total	**4 284 889**	**1 477 911**
Additionally considered[12]		**242 847**
Total overall amount		**1 720 758**

1.1 Roles and Responsibilities of Key Actors

Municipalities (in legal terms, usually referred to as 'local government units') are responsible for waste collection. The Law on Sustainable Waste Management 2013 defines the request of establishing both services for mixed municipal waste and biowaste (designated as biodegradable municipal waste), as well as separate collection of waste paper, metal, glass, plastics, textiles and bulky waste. Furthermore the municipal level retains the obligation to remove fly tipping and perform communication (education and information) activities in its territory. Finally, and in the context of the present study with a view on the country´s institutional set-up, perhaps most importantly, the municipal level is also responsible for preparing and implementing waste management plans, which have to be in line with the *national* waste management plan (a new version of which, to start from 2016, has just been published).

Municipalities are also responsible for organising disposal services. As in other successor states of Yugoslavia the service of waste collection is physically performed by companies owned by the Municipality (with *Čistoća,* Croatian for *cleanliness*, as a typical company name). These companies are entitled to set fees for their services, and also collect them.

Croatia´s new system for residual waste management (which was decided "top down" and is sketched out in the new National Waste Management Plan) divides the country into 17 catchment areas with one centre (designated as the Regional Waste Management Center, or RWMC) in each area. It is understood that the 2013 Waste Act removed the regional competence for developing WMPs, although as is indicated above, municipal plans will continue to be in place (there are more than 500 of these). The mechanism through which Croatia will ensure coherence between the national and municipal plans is unclear.

These *Regional Waste Management Centers* are owned and will be operated by public companies owned by the county, or counties connected to a center. They comprise also a system of transfer stations (usually located at present landfills, so there will be no changes for the municipalities in terms of transport efforts). Transfer (i.e. transport between transfer station and treatment center) is also under the control of the RWMCs and usually outsourced to the private sector.

The *Croatian Environment Agency* (CEA-AZO) encourages environmental protection and promotes sustainable development in the Republic of Croatia by providing the required environmental data and information to decision-makers and the general public.

[12] Amounts from the population not served by a collection system, estimated quantities for three municipalities for which data was not submitted, amounts coming from the service sector, and a few other corrections.

1.2 Summary of Legislative Framework for Waste Management

The main legislation for Waste Management in Croatia is the Law on Sustainable Waste Management (OG 94/13), which has been in force since 23.07.2013.

It transposes into the legal system of the Republic of Croatia the following Directives of the European Union (note that the validity of *Regulations* which are listed further down is connected to the previous Waste Management Plan, the validity of which ends at the end of 2015):

- Directive 2008/98/EC of the European Parliament and of the Council on waste and repealing certain Directives (OJ L 312, 22. 11. 2008)
- Directive 2010/75/EC of the European Parliament and of the Council on industrial emissions (integrated pollution prevention and control) (OJ L 334, 17. 12. 2010)
- Council Directive 1999/31/EC on the landfill of waste (OJ L 182, 16. 7. 1999)
- Directive 2009/31/EC of the European Parliament and of the Council on the geological storage of carbon dioxide and amending Council Directive 85/337/EEC, European Parliament and Council Directives 2000/60/EC, 2001/80/EC, 2004/35/EC, 2006/12/EC, 2008/1/EC and Regulation (EC) No 1013/2006 (OJ L 140, 5. 6. 2009)
- 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 and repealing Directive 91/157/EEC (OJ L 266, 26. 9. 2006)
- Directive 2004/12/EC of the European Parliament and of the Council of 11 February 2004 amending Directive 94/62/EC on packaging and packaging waste (OJ L 047 18/02/2004)
- Directive 2000/53/EC of the European Parliament and of the Council of 18 September 2000 on end of-life vehicles (OJ L 269, 21. 10. 2000)
  Directive 2012/19/EU of the European Parliament and of the Council of 4 July 2012 on waste electrical and electronic equipment (WEEE) (OJ L 197, 24. 7. 2012).

This Act establishes the framework for the implementation of the following acts of the European Union:

- Regulation (EC) No 1013/2006 of the European Parliament and of the Council on shipments of waste (OJ L 190, 12.7.2006), as last amended by Commission Regulation (EU) No 255/2013 amending, for the purposes of adaptation to scientific and technical progress, Annexes IC, VII and VIII to the Regulation (EC) No 1013/2006 of the European Parliament and of the Council on shipments of waste (OJ L 79, 21.3.2013)
- Commission Decision 2000/532/EC replacing Decision 94/3/EC establishing a list of wastes pursuant to Article 1(a) of Council Directive 75/442/EEC on waste and Council Decision 94/904/EC establishing a list of hazardous waste pursuant to Article 1(4) of Council Directive 91/689/EEC on hazardous waste (SL L 226, 6.9.2000)
- Commission Decision 2011/753/EU establishing rules and calculation methods for verifying compliance with the targets set in Article 11(2) of Directive 2008/98/EC of the European Parliament and of the Council (OJ L 310, 25.11.2011).

Related regulations include:

- Act on Sustainable Waste Management (OG No. 94/13)
- Waste Management Strategy of the Republic of Croatia (OG No. 130/05)

- Ordinance on waste tyre management (OG No. 40/06, 31/09, 156/09, 111/11, 86/13)
- Regulation on the criteria, procedure and manner of determining compensation to real estate owners and local self-government units (OG No. 59/06, 109/12)
- Ordinance on waste oil management (OG No. 124/06, 121/08, 31/09, 156/09, 91/11, 45/12, 86/13)
- Ordinance on waste batteries and accumulators management (OG No. 133/06, 31/09, 156/09, 45/12, 86/13)
- Ordinance on the management of end-of-life vehicles (OG No. 136/06, 31/09, 156/09, 86/13, 91/13)
- Ordinance on the method and procedures for managing waste containing asbestos (OG No. 42/07)
- Ordinance on methods and requirements for thermal treatment of waste (OG No. 45/07)
- Ordinance on the methods and conditions for the landfill of waste, categories and operational requirements for waste landfills (OG No. 117/07, 111/11, 17/13, 62/13)
- Ordinance on construction waste management (OG No. 38/08)
- Ordinance on management of wastewater treatment sludge when used in agriculture (OG No. 38/08)
- Instruction on handling waste containing asbestos (OG No. 89/08)
- Ordinance on managing waste from research and mining of mineral raw materials (OG No. 128/08)
- Decision on Environmental protection and energy efficiency Fund's procedures for implementing measures for the improvement of waste containing asbestos' management system (OG No. 58/11)
- Regulation on border crossings on the territory of the Republic of Croatia which are allowed for the import of waste to the European Union and the export of waste outside of the European Union (OG No. 6/14)
- Ordinance on waste management (OG No. 23/14, 51/14)
- Ordinance on the management of waste electrical and electronic equipment (OG No. 42/14, 48/14, 107/14, 139/14)
- Ordinance on the management of polychlorinated biphenils and polychlorinated terphenils (OG No. 103/14)
- Ordinance on management of waste from the titanium dioxide industry (OG No. 117/14)
- Ordinance on by-products and end-of-waste status (OG No. 117/14)
- Ordinance on medical waste management (OG No. 50/15)

International treaties include the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal (Basel 1989) Published in OG–IT No. 3/94; this came into force with respect to the Republic of Croatia on 9 May 2000.

1.3 Status of Waste Management Plan(s)

As well as a plan on the *national level,* as noted above, the Croatian Law on Sustainable Waste Management of 2013 foresees a waste management plan *for each municipality* (referred to in the law as a "local self-government unit")[13]. That is a change compared to the previous situation, which foresaw the development of 21 regional plans (by county/županija, plus the City of Zagreb). Now, there are more than 500 municipal plans (the 20 counties are subdivided into 127 towns and 429 municipalities[14]) with plans valid until end of 2015.

It can be assumed that about half of the Croatian municipalities maintain such a plan which, we understand, is drafted by licenced engineering consultancies (as a rule)[15].

A draft National Waste Management Plan 2015 – 2021 was published on September 21 2015[16] for public consultation (1 month) with some delay (it should actually have been adopted by 31 December 2014[17]). The adoption of the plan requires a public hearing and acceptance of the parliament. However, at the time of the plan's publication, no parliament was in place, and the technical government that was in place until February 2016 did not have the power to adopt the most recently issued plan. Although a parliament has now been set up, no further announcement regarding the plan had been made at the time of writing. It is therefore unclear at the time of writing as to when the plan will be formerly adopted.

1.4 Summary of the Key Objectives of the Plans

1.4.1 Waste Management Plan

The newly issued National Plan describes the current situation with regards to waste management and also indicates some future plans with regard to the future investment in infrastructure and service development. However, it contains relatively little in the way of firm policy commitments.

The plan indicates it foresees the implementation of a series of measures, policies and activities (investments), which will be provided to establish a comprehensive and effective system of waste management, while integrating existing systems already in place, and waste management facilities provided and constructed under the previous planning period. General measures for waste management covering MSW are largely limited to the following:

- The plan indicates there is a need to continue to pursue improvements to systems for the separate collection of municipal waste. It is indicated this will be achieved primarily through:

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[13] http://mzoip.hr/doc/act_on_sustainable_waste_management.pdf, article 21/1
[14] https://en.wikipedia.org/wiki/Croatia#Administrative_divisions
[15] Source: Danko Fundurulja, IPZ Uniprojekt Terra d.o.o., Zagreb
[16] http://www.mzoip.hr/doc/nacrt_plana_gospodarenja_otpadom_republike_hrvatske_za_razdoblje_2015-2021.pdf
[17] Refer to http://mzoip.hr/doc/act_on_sustainable_waste_management.pdf, Article 181

    - the development of infrastructure and procurement of equipment;
    - educating and informing stakeholders of the system; and
    - the revision of the tariff system in such a way that costs vary by quantity of waste produced.
- The plan further indicates there will be improvements to systems used to collect the waste from containers on the "doorstep", as well as an increase in the number of 'green islands', and their appropriate spatial distribution. A network of recycling yards will be established, as well as sorting infrastructure.
- With regards to biodegradable waste, this type of separate collection is to be set up "where possible" on the doorstep. The plan foresees the introduction of containers for biowaste in the recycling yards and makes a general commitment to improve the collection of organic waste at a local level. Additional treatment infrastructure is also to be provided (composting and biogas facilities). Home composting will also be promoted.
- In addition to the activities in the Waste Management Plan for the period 2007 to 2015, activities relating to the development and establishment of 13 RWMCs for waste management will be undertaken (relating to landfills, MBT plant required for the operation of the RWMCs, transfer stations, etc.).
- An increase in energy from waste infrastructure is also assumed, with the planning process expected to consider energy recovery from sludge, the co-incineration of refuse-derived fuel and energy recovery from mixed municipal waste (in Zagreb).
- There is a general commitment to improve data quality although no detail is provided.

In general, the plan is lacking in any other detail as to how the above "measures" will be put into place, and how the objectives will therefore be achieved. Other measures that had previously been understood (through consultation with industry) to be included within the plan - such as landfill taxes or other financial means of incentivising performance – were not included.[18] The plan also does not address how important targets such as that contained in the landfill directive for 2016 are to be achieved.

1.4.2 Waste Prevention Programme

There is no stand-alone Waste Prevention Programme in Croatia, waste prevention is dealt with as a part of the (both former and recently published) national Waste Management Plan.

Whilst the former NWMP refers to prevention very generally in two short chapters [19] (in the 2013 Report on Municipal Waste the term "prevention" cannot even be identified), the

[18] On a meeting held within this project with national representatives in October 2015 in Zagreb it was communicated that an ordinance defining details of a landfill tax will be issued very soon.

[19] See subchapter '5.1.1. Waste Generation Prevention' and
'5.1.4. Prevention and Minimization of Waste from Production Processes'
contains even more general content (such as "In existing production processes it is necessary to introduce improvements aiming at the reduction of waste amounts") and therefore it is refrained from further quoting herein.

2013 Act on Sustainable Waste Management defines, in Article 18, elements of a waste prevention plan which – amongst a few elements to be assessed in a comparatively straightforward manner (eg. a request to organise training courses for competent authorities, and the promotion of eco-design and creditable eco-labels) – includes also the setting of targets as regards waste prevention.

(1) A waste prevention plan shall form a constituent part of the [Waste Management] Plan and shall contain, in particular:

1. waste prevention targets,

2. measures required to attain waste minimisation or waste prevention targets, which relate to:

– planning or other economic instruments promoting efficient use of source materials and resources,

– the promotion of research and development in cleaner technologies and products and the promotion and implementation of the results of such research and development,

– the development of effective and meaningful indicators of environmental pressures associated with waste generation with a view to contributing to waste prevention at the level of local and regional self-government and at national level,

– the promotion of eco-design (the systematic integration of environmental aspects into product design with the aim of improving the environmental performance of the product throughout its whole life-cycle),

– the provision of information on waste prevention techniques with a view to facilitating the implementation of best available techniques in industry,

– organisation of training courses for the competent authorities as regards the insertion of waste prevention requirements in permit issuance procedures,

– inclusion of measures for waste prevention in installations which are exempt from environmental permit requirements under the act governing environmental protection – those measures may include assessments or plans for waste prevention,

– organising awareness campaigns or the provision of financial, decision-making or other support to persons,

– conclusion of voluntary agreements, organising consumer/producer panels or sectoral negotiations in order that the relevant businesses or industrial sectors set their own waste prevention plans or targets or correct wasteful products or packaging,

– promoting credible environmental management systems (EMSs), including EMAS and ISO 14001,

– economic instruments such as incentives for cleaner purchases involving the purchase of products with less packaging,

– organising awareness campaigns and information provision directed at the general public or a specific set of consumers,

– the promotion of creditable eco-labels,

– agreements with industry, such as the use of product panels such as those being carried out within the framework of Integrated Product Policies, or with retailers on the availability of waste prevention information and products with a lower environmental impact,

– in the context of public and corporate procurement, the integration of environmental and waste prevention criteria,

– the promotion of the reuse and/or repair of appropriate discarded products or of their components, notably through the use of educational, economic, logistic and other measures.

(2) Appropriate specific qualitative or quantitative benchmarks shall be determined for waste prevention measures adopted in order to monitor and assess the progress of the measures, and specific qualitative or quantitative targets and indicators may be determined.

The recently published NWMP includes the following measures aimed at increasing waste prevention activity:

1. Encourage the reuse of materials from demolition but establishing an incentive fee for these materials.
2. Organise an educational campaign on the prevention of food waste generation.
3. Work on improving data collection relating to food waste
4. Promotion of sustainable construction by developing a guide to sustainable construction.
5. Establish a system of food donations.
6. Organise communications campaigns influencing the consumption behaviour of citizens.
7. Promotion of home composting.
8. Encouraging the exchange and re-use of products through development of a framework and guidelines for undertaking reuse activities in Croatia.

Although some detail is provided on some of these measures, the current version of the plan does not include a timetable of when these measures will be implemented.

In the past, an initiative on waste prevention was launched by an NGO, Zelena Akcija (http://zelena-akcija.hr/en). They launched a 'Zero Waste Manual' in December 2007, providing practical advice and tips to maximize prevention, reuse and recycling efforts. A new edition of this manual was announced for 2010,[20] but could not be identified. In addition, Zelena Akcija has signed agreements with a number of municipalities to join the Zero Waste network.

[20] http://ec.europa.eu/environment/waste/prevention/pdf/Zero_Waste_Factsheet.pdf

1.5 Progress towards the Fulfilment of Targets

1.5.1 Landfill Directive Targets

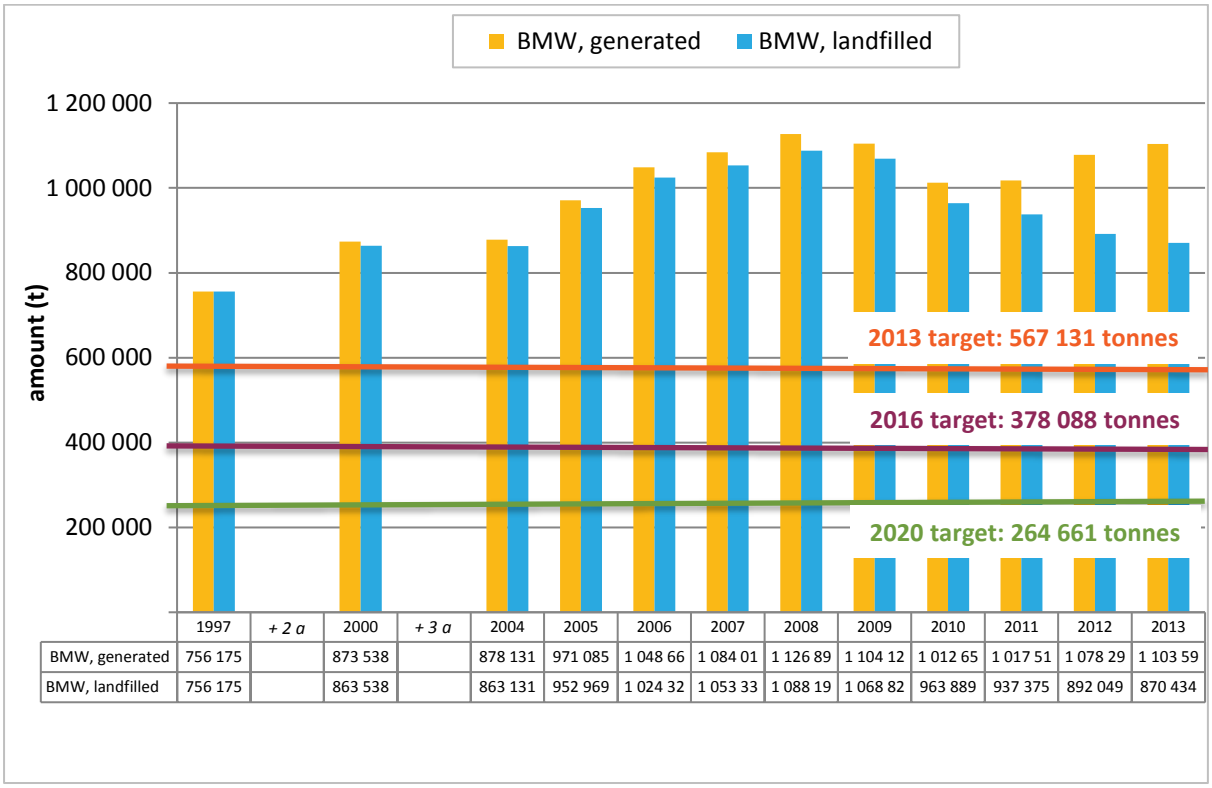
Croatia has a four-year derogation on the due date for achievement of the biodegradable tonnage targets, so the relevant target years are 2010, 2013 and 2020.

Figure 1.2 shows the current status of compliance with the Landfill Directive. As already outlined in the overview table introducing to this report, the 2013 target has been missed by around 300 000 tonnes (in percentage terms, the amount of landfilled biodegradable municipal waste compared to the reference year 1997[21] is 115% as compared with the target figure of 75%).

It can be assumed that the 2016 target will be missed by a similar magnitude since it is unlikely that the reduction of landfilled BMW will continue in the period 2014 to the end of 2016 at the same rate as was observed for the period 2009 until the end of the reporting period. Such a reduction could be achieved by the beginning of 2016 only by separate collection (no new treatment facilities are planned to be operational in the interim), with a reduction potential to be estimated below the 200 000 tonnes reported for the period 2009 – end of 2013. Residual waste treatment as reduction method will be only available after 2016 for about 100 000 tonnes BMW in this year (two MBT facilities, for details refer to the table introducing this country report). Considering this amount plus another 100 000 tonnes diverted via increased separate collection and composting the 2016 target will also be missed by about 300 000 tonnes (in percentage terms: slightly below 100% of the 1997 level, and at best 85%, as set against the target level of 50%).

[21] The reason for the reference year 1997 – instead of 1995 as for the other EU member states – is referred to in Table 1-1, section “Performance against targets”. Furthermore might be pointed at this occasion at a country-specific “unfairness” of the Landfill Directive which sets targets against a reference year 1997 with a waste yield having been low in Croatia by obvious reason: A war which ended two years before, and the related low economic activity (example tourism: < 10% of the overnight stays compared to 2014) thus waste generation.

Figure 1.2: Compliance with Landfill Directive: Biodegradable Municipal Waste amounts generated versus landfilled 1997 – 2013



	1997	+ 2 a	2000	+ 3 a	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
BMW, generated	756 175		873 538		878 131	971 085	1 048 66	1 084 01	1 126 89	1 104 12	1 012 65	1 017 51	1 078 29	1 103 59
BMW, landfilled	756 175		863 538		863 131	952 969	1 024 32	1 053 33	1 088 19	1 068 82	963 889	937 375	892 049	870 434

Source: AZO in its recent Report on Municipal Waste 2013

1.5.2 Waste Framework Directive Targets

Croatia has opted for calculation method 2 to report progress against the WFD targets, and was achieving a rate of 22.6% against this method in 2013.

Interestingly the new WMP 2015 – 2021, published at the end of September 2015, presents data from the same year (2013) as in its previous version, but with previously "additionally considered amounts" allocated to single counties (for details refer to Table 1.3) and broken down by five regions and by county. The respective calculation results in an overall value of 15%, herein gathered according to calculation method 4 – which might be due to doubts concerning calculation method 2.[22]

[22] The Report on Municipal Waste 2013 – published March 2015 by AZO, the National EPA – reads on page 15 (English translation further below):
Nepostojanje preporučene jedinstvene metodologije za određivanje sastava komunalnog otpada, a time i neprovođenje sustavnog praćenja sastava komunalnog otpada u najvećem broju gradova/općina dovodi u pitanje vjerodostojnost opisanog izračuna posebno za one općine i gradove koji izdvajaju biorazgradivi otpad iz komunalnog otpada.
The absence of the recommended uniform methodology for determining the composition of municipal waste, and thus the non-implementation of systematic monitoring of the composition of municipal waste in most towns / municipalities calls into question the credibility of the described calculations especially for those municipalities and cities that stand out separate biodegradable waste from municipal waste.

It seems that the North-Western part of the country shows better performance in separate collection than the Eastern and Southern parts (Dalmatia), whereas the Northern part of the coast (including Istria) is around the country average level of performance.

With the amounts of separate collection having almost doubled in the three years from 2010 to 2013, it can be said that progress is in the right direction. Even so, the country seems have better prospects for to meeting this target than the 2016 targets for Biodegradable Municipal Waste set out in the Landfill Directive.

For end of the year 2018 national legislation sets the target to treat all municipal waste prior to landfilling. The Ordinance on Packaging and Packaging Waste sets, for the year 2013, targets for shares of returnable packaging which seem to be very ambitious – 60% for wine, 90% for beer, and 60% for mineral water and milk beverages[23] – however no respective confirmation could be gathered.

Issues with recycling data collected from the producer responsibility organisations are outlined in Section 1.7.

[23] http://www.bottlebill.org/assets/pdfs/legis/world/croatia2005.pdf provides a provisional translation

Table 1.3: Waste Framework Directive: Compliance Results per county[24]

Županija (county)	Total amount of MW Municipal Waste (t)	Directly sent for recovery (t)	Percentage of MW sent for recovery (%)
Eastern Croatia			
16 Vukovarsko-srijemska	49 311	4 857	9.8
14 Osječko-baranjska	85 829	11 273	13.1
11 Požeško-slavonska	16 064	1 993	12.4
12 Brodsko-posavska	53 089	7 685	14.5
10 Virovitičko-podravska	27 883	4 581	16.4
6 Koprivničko-križevačka	24 738	4 992	20.2
3 Sisačko-moslavačka	58 766	6 288	10.7
7 Bjelovarsko-bilogorska	30 656	3 609	11.8
North-Western Croatia			
1 Zagrebačka	93 337	17 437	18.7
2 Krapinsko-zagorska	32 166	6 562	20.4
4 Karlovačka	45 193	5 428	12
5 Varaždinska	38 318	8 453	22.1
20 Međimurska	24 111	8 734	36.2
City of Zagreb			
21 City of Zagreb	354 775	61 610	17.4
Coastal and Mountain Croatia			
8 Primorsko-goranska	152 131	30 279	19.9
18 Istarska	128 786	18 519	14.4
9 Ličko-senjska	28 559	4 323	15.1
Dalmatia			
13 Zadarska	110 748	11 301	10.2
15 Šibensko-kninska	56 123	6 145	10.9
17 Splitsko-dalmatinska	234 564	22 567	9.6
19 Dubrovačko-neretvanska	75 613	11 423	15.1
Total	**1 720 758**	**258 056**	**15**

Source: AZO in its recent Report on Municipal Waste 2013

[24] For a geographical overview showing counties and regions it is referred to page 10.

1.6 Implementation of Specific Waste Framework Directive Articles

1.6.1 Article 4: Application of the Waste Hierarchy

Article 7 of the Waste Management Act 2013 essentially reads as a transposition of Article 4, but the basis for implementing the hierarchy is not well-defined, still less, reflected in the approach, within the Article itself. The measures currently being used to implement the waste hierarchy in policy and law appear to be limited to:

- Article 8, regarding recovery, which defers responsibility in respect of outlining the principles and methods to the waste management plan
- Article 11(7), regarding separate collection
- Article 27 – a charge on landfilling of excess over quota (though we understand this has not yet been implemented)
- Article 29 – an incentive charge for reducing amount of mixed MSW
- Article 35, regarding the form which separate collection systems should take in local self-governing units

Article 35 has not, perhaps, been sufficiently specific regarding how 'separate collection' infrastructure is defined.

Article 169, which would allow for enforcement of Article 35, does not appear to have been pursued with vigour: we understand that there is a desire to work constructively with local self-governing units, but equally, there might be difficulty in enforcing the wording of Article 35 in the way that might have been intended. In any event, where local self-governing units are being relied upon to meet targets, and where these are legally binding, then given the apparently slim margin for error, the sanction for non-compliance (as per Article 169) ought to be credible.

Article 27 appears to define an incentive to encourage compliance with landfill quotas for biodegradable municipal waste, but our understanding from the workshop is that the instrument foreseen has not yet been implemented. The same appears to apply to the instrument foreseen under Article 29.

The Draft Plan includes a waste prevention programme, which is a positive step, but could be further developed, not least, to reflect the 2013 Act.

1.6.2 Article 10: Recovery

Article 8 of the Waste Management Act 2013 begins by stating that waste shall be recovered, in accordance with the principles and methods of waste management set out in the Act. The Act itself contains relatively little information on these principles and methods, referring instead to guidance being provided in the waste management plan, although the need for products to be developed with recovery in mind, and the need for product producers to encourage recovery options. It further confirms that waste need not be recovered in the following cases:

> *1. technical know-how does not allow waste recovery,*
>
> *2. the costs of waste recovery are several times higher than the costs of waste disposal,*

3. further use of the waste or its components is not possible,

4. the disposal of waste creates less environmental burden than its recovery, in particular as

regards:

– the emission of substances and energy into the air, sea, water and soil,

– the utilization of natural resources,

– the energy to be expended or the energy which can be reclaimed, or

– hazardous substances contained in the waste generated by waste recovery.

At the time of writing Croatia has two public sorting facilities at Krk and Čakovec, together with some private material recovery facilities.

1.6.3 Article 11: Reuse and Recycling

As was indicated in Section 1.6.1, the Waste Management Act is lacking some detail with regard to enforcing the introduction of separate collections within the country. Despite the relatively weak legislative requirements, a further achievement of Croatia relative to other countries in South East Europe is its significant yield of recyclables and biowaste (see Figure 1.4**Error! Reference source not found.**). This can be explained by a number of factors:

- *A certain tradition;* reutilization of secondary raw materials enjoyed generally high attention in the economically higher developed state entities of former Yugoslavia;
- *Industries with a constant demand for recyclables (apart from plastics) available in the country*[25]*,* and a vital trade sector connecting to nearby countries maintaining such industries (Slovenia, Austria, Italy)
- *Zagreb,* in particular, can be assessed as "ahead" compared with neighbouring metropolitan areas; door-to-door collections schemes for paper and biowaste – formally still pilot projects – have been introduced since 1995 (Figure 1.3 shows a typical set-up), although it is unclear how many such schemes have been introduced.

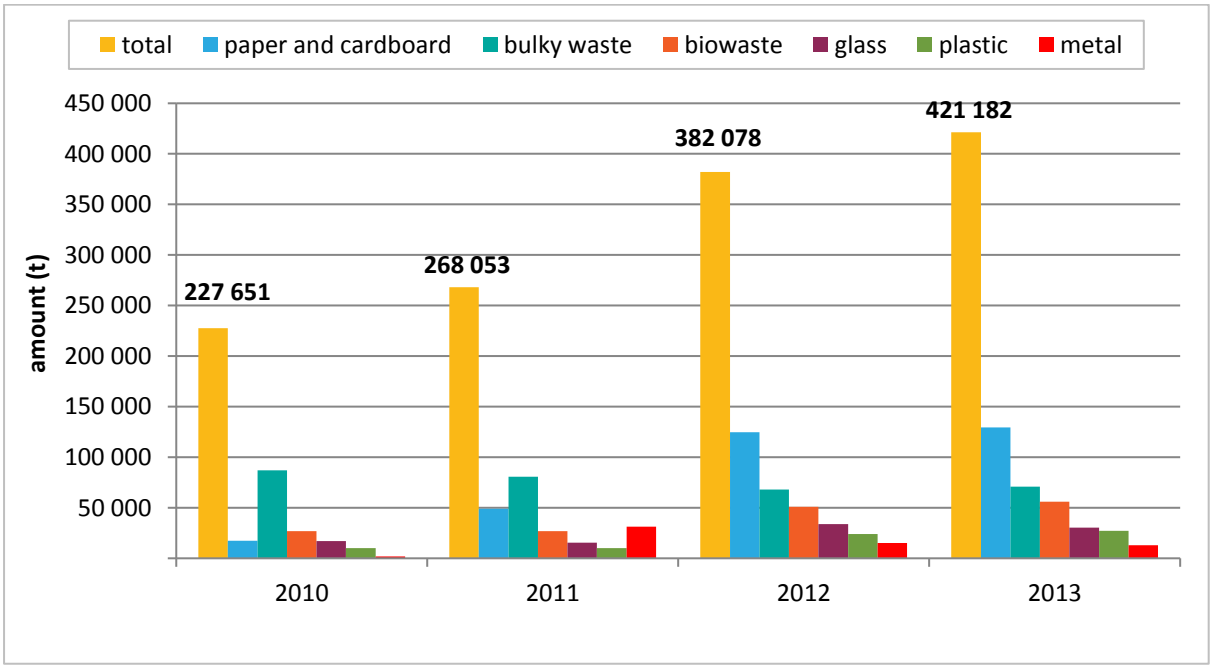
[25] There is a container glass factory in the north (Hum na Sutli), paper mills in Zagreb and Belišće (Slavonia), and steelworks in Split and Sisak. Despite of the latter two facilities being recorded as bankrupt, scrap iron generally finds markets available, although prices may be depressed at present.

Figure 1.3: MSW collection scheme in Zagreb introduced in an affluent area

Photo: M. Steiner

- *The country´s status in respect to packaging management;* Croatia is one of the small number of European countries which has a deposit for disposable beverage packaging in place. Note that this practice, introduced in 2006 for non-refillable beverage packaging with volumes > 0.2 l,[26] is less important in terms of yields (measured by weight) than it is on the appearance of public space, with a generally perceived reduction of littering in, and beyond, touristic areas.

Figure 1.4: Recovery of biowaste and recyclables 2010 – 2013



[26] https://en.wikipedia.org/wiki/Container_deposit_legislation#Croatia

Source: AZO in its recent Report on Municipal Waste 2013

A good example of a more advanced Croatian municipality is Čakovec, a town of 15 000 population (30 000 including suburbs) and capital of Međimurje, Croatia´s most northern county bordering Slovenia and Hungary. Through its efforts in respect to public awareness, offering customized services, and by giving incentives for separate collection (e.g. by automatically monitoring the frequency of emptying residual waste bins and integrating the frequency of collection in the waste fee),[27] there has been a 30% fall in residual waste in the last 5 years.[28]

Krk, the Adriatic´s largest island can be seen as Čakovec´s analogy in the tourism sector. The island has a resident population of about 20 000, with 10 000 beds offered to tourists.[29] Since 2005, separate collection for paper and cardboard, glass, metals, PET, and biowaste has been introduced by a combination of door-to-door collection and seven recycling yards (one per municipality). The island´s public provider of waste management services reports the proportion of separate collection as 40%, and there is a goal to increase this rate by 2 – 3% annually [30].

1.6.4 Article 14: Costs of Waste Management

Croatia's approach to developing recycling infrastructure is unusual in that there is a heavy emphasis on the role of the Environmental Protection and Energy Efficiency Fund. Although local self-government units have the freedom to make decisions to 'do more' by way of recycling, the fund plays a very significant role in allocating funds for recycling. The current approach, therefore, seems to be to support the provision of recycling through financial disbursements rather than giving a clear incentive to prevent and recycle waste through increasing the costs of disposal of residual waste.

The cost for implementing the RWMCs will be borne by the *Environmental Protection and Energy Efficiency Fund* which is established under the provisions of the Act on the Environmental Protection and Energy Efficiency Fund for the purpose of financing of the preparation, implementation and development of programmes and projects and similar activities in the field of conservation, sustainable consumption, protection and improvement of the environment, and in the field of energy efficiency and use of renewable energy sources. The Fund is established as an extra-budgetary fund, in the capacity of a legal person with public authority, set out in the aforementioned Act. Its revenues – for 2014, reported at € 176 million[31] – come from the EPS Extended Producer Responsibility schemes

[27] The website of Čakom, the Municipality´s public utility for waste management and related services http://www.cakom.hr/usluge/cistoca.html# provides also to the non Croatian speaker a comprehensive overview on services and activities. ,

[28] Presentation "Waste management in the city of Čakovec" given by Mr Saša Avirović, Head of Technical Department of Čakom on a workshop performed within the present project October 2015 in Zagreb.

[29] http://www.krkadria.com/de/reiseziele/

[30] http://www.ponikve.hr/sustav-prikupljanja-i-zbrinjavanja-otpada

[31] Source: Presentation "Current waste management situation in Croatia" held by Ms Irena Relić, Head of Office of the Minister of Environmental and Nature Protection on a workshop performed within the present project October 2015 in Zagreb.

(fees are collected for so called "special categories of waste"[32]), and other license fees. The Fund´s rights and duties are exercised by the Croatian Government on behalf of the Republic of Croatia which, has joint and unlimited liability for the obligations of the Fund.

Gate fees at the RWMCs are reported in feasibility studies (in which the respective projects have been defined) at a level around €50 / t [33] which might turn out to be an underestimate when compared with gate fees in other countries (although it is not always clear whether these gate fees are intended to apply to the MBT process itself, or the costs of the process, as well as the costs of managing with the outputs from the facilities).[34]

Table 1.4 lists charges for packaging waste to be paid to the Environmental Protection and Energy Efficiency Fund by producers or importers to cover the costs of managing packaging waste.

Table 1.4: Charges for packaging waste by packaging material [35]

Material		Charge per t (ca.)
PET		€ 54
Aluminium cans		€ 54
Iron cans		€ 30
Paper, cardboard		€ 50
Multi-layered packaging with dominant paper/cardboard component	For beverages:	€ 54
	For other purposes:	€ 99
Plastic bags		€ 198
Wood		€ 20
Textile		€ 20
Other polymer materials		€ 99
Glass		€ 20

As was indicated in Section 1.1, waste collection is physically performed by companies owned by the Municipality. These companies are competent to set fees for their services,

[32] At present packaging waste, End of Life Vehicles, WEEE, waste oils, waste tyres, and waste batteries / accumulators, for details refer to section 1.6.
[33] Source: Danko Fundurulja, IPZ Uniprojekt Terra d.o.o., Zagreb
[34] Example Austria with about 25% of its population connected to MBT systems reports a range of about € 140 – 160 / t for catchment areas connected to MBT: https://www.tirol.gv.at/fileadmin/themen/umwelt/abfallwirtschaft/downloads/tirol_ph3_062010.pdf, page 10
[35] Source: http://www.bottlebill.org/assets/pdfs/legis/world/croatia2005.pdf, with exchange rates HRK/€ from October 2015

and also collect them. Fees are usually dependent on the size of waste containers and the frequency of their collection.[36] In Zagreb, the waste fee depends on floor space.

€ 7 per month for a household is a typical fee level for collection and management of municipal waste. Čakom, as the operator of a system perceived as one of the most advanced ones in the country (Čakovec, North Croatia), reported € 10 per household per month. For Zagreb 1 kn per square meter and month is reported, resulting in € 10 per month for a flat with 75 m^2, the average dwelling size available to a private household according to national statistics.

Gate fees for landfill are shown in Table 1.5. The data shows a north-south divide, observed also for other development indicators (regarding gate fees to be expected for future treatment systems, please refer to the description of the related technical infrastructure below). In Čakovec, the example with the highest gate fee, some charges are added to the quoted cost (one designated "for investments in environmental protection"), raising the cost for disposing of MSW to about € 90 per tonne. This level of disposal cost provides significant incentive for increasing recycling.

Table 1.5: Examples for landfill gate fees for household and commercial waste

Municipality	Gate fee per ton (rounded, excluding VAT)
Čakovec[37]	€ 49,90
Zagreb[38]	€ 42,35
Karlovac[39]	€ 39,25
Split[40]	€ 26,25

1.6.5 Article 22: Encouraging the Separate Collection of Biowaste

There is no legislation covering the introduction of separate collection for biowaste. The current plan notes the high quantity of kitchen waste in the residual waste stream, indicating that the introduction of such collection services should be a priority if the intention was to reduce biodegradable waste being landfilled and if the intention was to pursue the hierarchy. However, although door to door separate collections for biowaste were introduced in Zagreb in 1995, these are understood to be introduced only in few areas of the country. At the workshop, Croatia indicated an intention to follow the Austrian model

[36] Collection frequencies for residual waste vary strongly, from weekly (continental part) to daily (Dalmatia in summer). In Zagreb residual waste is collected three times a week. Biowaste is usually collected weekly and paper (where door-to-door systems are applied) fortnightly.
[37] http://www.cakom.hr/images/stories/dokumenti/cjenik-komunalnih-usluga.pdf
[38] http://www.zgos.hr/default.aspx?id=21
[39] http://www.cistocaka.hr/index.php/cjenik.html
[40] http://www.cistoca-split.hr/Usluge/Cjenikusluga/tabid/69/Default.aspx

in respect of waste management, but but there is no evidence of separate collection of biowaste being actively pursued, as it has been in Austria, at the time of writing.

Table 1.6 lists the capacity of compost plants presently available: altogether, this amounts to about 65 000 tonnes annually. The same source mentions also eight biogas plants, three of them licenced, with a capacity of 45 000 t/yr. It is assumed that the stated capacity refers to the licensed plants.

Table 1.6: Compost plants in Croatia and available capacity in 2015[41]

Municipality	Location	Capacity (t/a)
Prelog		5 005
Čakovec		10 000
Koprivnica		3 570
Imbriovec		6 990
Krk		6 000
Perušić		500
Kloštar Ivanić		2 000
Zagreb	Jakuševec	10 000
	Markuševac	10 000
	Jankomir	10 000
Total		**About 65 000**

Compost quality out of these facilities is good according to local sources, and meets the demand of the market.

1.7 Summary of Policy Mechanisms and Instruments to Meet Targets

Legal/Economic instruments

A system of Extended Producer Responsibility is in place and applies (apart from packaging and packaging waste) to End of Life Vehicles, WEEE, waste oils, waste tyres, and waste batteries / accumulators. It is intended to extend the system to asbestos and C&D Waste. For packaging waste a collection rate of 68% is recorded for 2014 (133,100 t from 195,400 t put in the market). However, a yearly amount of 200,000 t of packaging waste generated seems to be far too low when looking at MSW composition, eg. a share of 23% each for paper/cardboard and for plastic from 1.7 million t municipal waste reported for 2013 (Table 1-1).

A deposit on non-refillable beverage packaging has been in place since 2006. From the consumer´s perspective it applies for volumes > 0.2 l and amounts to 0.5 kuna (= ca. €0.07)

[41] Source: AZO in the recent national Waste Management Plan 2015 – 2021, page 28

per item. Deposits can be reclaimed in larger stores, or via automatic reverse vending machines.

The return rate of bottles is given as 94%, with more than 70% of the returned bottles being PET.[42]

A non-compliance fee for landfill is discussed. This would apply not as an amount payable for each tonne of landfilled waste, but in the form of a levy applied when yearly amounts of waste allowed to be landfill are exceeded).

1.8 Investment in Waste Management Infrastructure

Comprehensive data on investments in waste management infrastructure - including related activities - is reported as expenditures managed by the Fund for Environmental Protection & Energy Efficiency. The data for 2015 and the two years before are presented in **Table 1.7**. The Fund covers the bulk of waste management related investments in this period. The key point is that the centrally managed Fund covers – together with support from the EU – the investment expenditures of the RWMCs, whilst the remaining investments (in collection equipment, recycling yards, remediation of landfills) are funded to the tune of 40 – 60% by the Fund depending on the financial status of the municipalities (and in some cases, municipalities may contribute 10% only).[43]

Together with the two RWMCs Mariščina and Kaštljun presently under implementation, and to be supported with € 35 million each,[44] the total investment in waste related activities and infrastructure in Croatia from 2013 to date can be estimated at around € 130 million, or €10 per inhabitant and year.

[42] Same source as given in footnote **Error! Bookmark not defined.**
[43] Appraisal provided by Danko Fundurulja, IPZ Uniprojekt Terra d.o.o., Zagreb
[44] Consultant´s estimate

Table 1.7: Recent expenditures referring to Waste Management disbursed by the Fond for Environmental Protection & Energy Efficiency[45]

Component	Expenditures (Mio. €)			2013 - 2015
	2013	2014	2015	
"Soft support", 100 projects supporting awareness and R&D activities [46]				**0.8**
Collection containers including some minor equipment for composting	0.7	5.7	4.5	**10.9**
Collection vehicles, landfill operation equipment, mobile recycling yards	2.2	8.7	8.0	**18.8**
Recycling yards, 87 units approved, the majority under implementation				**1.1**
Remediation and closure of 300 out of 301 landfills, (no agreement with Zagreb)	-	6.9	4.4	**11.3**
Total				**About 43.0**

The capital – Zagreb counts slightly less than 20 % of Croatia´s population – seems to benefit less than the remaining country from investments disbursed by the Fond (refer to last column of Table 1.7) which might be explained by the fact that relevant investments have been initiated before 2013.

Until now, *waste treatment* has been heavily reliant on waste disposal. Treatment other than landfill for residual waste is currently in place in the form of a single MBT facility with undefined treated amounts.[47] Two other facilities – which form part of Regional Waste Treatment Centres – will be available in the course of 2016. Others are in the planning

[45] Source: Presentation "Investments in waste management system in Republic of Croatia" held by Mr Saša Pupovac (Environmental Protection and Energy Efficiency Fund) on a workshop performed within the present project October 2015 in Zagreb.

[46] Not limited to waste management but environmental protection in general

[47] Varaždin MBT, in operation since 2012, a private investment in difference to the country´s remaining MSW treatment structure organized in public RWMCs Regional Waste Treatment Centres was implemented after about 100 000 tonnes of municipal waste originating from the Varaždin catchment area had been stored in bales in the facility´s vicinity since 2005. For a more detailed description of this case and facility which seems not to be reflected in official documents (as the former and recent Waste Management Plan) refer to http://www.ig-iut.at/download/iut_view_2013.pdf.

phase: an overview of the proposed capacity of treatment for different regions is provided in Table 1.8.

What is striking, when looking at both proposed and realized technologies, is the frequent combination of *bioreactor landfills* with *MBT facilities*: in four of the 10 cases of MBT plants, the specific proposal is for a *biodrying technology* linked to bioreactor landfills: this is a strange combination, not least since the use of bioreactor landfills would suggest the waste is not stable when placed in the landfill, implying that little would have been done to move towards landfill Directive targets.

What also was perceived during the visit of the two MBT facilities under construction (Mariščina/Primogorje and Kaštijun/Istria[48], both furnished with biodrying technology) are the difficulties to be expected in respect of the marketing of SRF [49] as the plant´s main output. It is understood that the local cement industry (a key target for the marketing of the produced SRF) maintains legal approvals for only small amounts (around 5 000 tonnes annually) for a waste stream in question which can be expected to be, for each of the two sites, in the range of rather 50 000 t/yr.

Both facilities show generous, spacious layouts and contain equipment perceived as the "high end" of Mechanical-Biological Treatment Technology, suggesting that a considerable amount of over-engineering may have occurred.

57 of the 147 operational *landfills* can be classified as engineered landfills. Considerable public attention is paid to "hot spots" (dumpsites, either in operation, or under remediation).

There was considerable concern raised at the workshop regarding the capacity for residual waste treatment being planned at the regional waste management centres. Furthermore, the total treatment capacity of about 1 300 000 tonnes/year is extremely high given the current level of MSW generation (of 1.7 million tonnes). Even allowing for waste growth as projected in the revised plan (the basis of the projections or which are not entirely clear), this level of treatment will make it extremely difficult for the levels of recycling now being proposed in the revised legislative proposal in the circular economy package to be met. It should be considered that the existing Waste Framework Directive, whilst it sets recycling targets which Croatia might meet (under method 2), also requires Member States to implement the waste hierarchy as a priority order in policy and law.

The authorities indicated that the capacities had been carefully planned so as to allow for recycling targets to be achieved, but it is understood that the target being planned for is essentially that of meeting 50% recycling, as measured using Method 2. This would effectively lead to a recycling rate of the order 30% (or less) of all municipal solid waste (MSW). Given that the Commission has ambitions to increase recycling targets to 65% of all MSW, the capacity planning that has taken place would appear to have the potential to limit the scope for recycling in the coming years, so raising questions as to whether new recycling targets could be met, as well as regarding the value for money of the planned investments.

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[48] Extensive information available at http://mariscina.eu/mariscina.php and http://www.kastijun.hr/.
[49] Solid Recovered Fuel

In addition, as was previously indicated, Croatia's infrastructure system has been designed very much using a top-down approach, as is reflected in the new plan. It is not clear, however, that this is the correct approach for ensuring there is appropriate infrastructure to allow prevention, preparation for reuse, and recycling activities to flourish (i.e. separate collection) at the local level.

Table 1.8: Overview on the status of Croatia´s MSW treatment infrastructure[50]

Name(s) of county(ies) the catchment area is composed of, *with name of district where RWMC is located set in italics.*	Number of population	Capacity (t/yr)	Data on RWMC (Regional Waste Management Centres)			
			Location	Main elements (defined in feasibility studies))	Status	Full operation to expected in
1 Zagrebačka županija (ž.)	317 606	?	To be defined in feasibility studies		Pending	?
2 Sisačko-moslavačka ž.	132 892	?	To be defined in feasibility studies		Pending	?
3 part of **Sisačko-moslavačka ž.** ***4 Karlovačka ž.*** **9 Ličko-senjska ž.**	p.o.[51] 172 439 128 899 50 927	60 000	Babina Gora	MBT (biodrying plus bioreactor landfill)	Under tendering	Dec. 2018
2 Krapinsko-zagorska ž. **5 Varaždinska ž.** ***6 Koprivničko-križevačka ž.*** **20 Međimurska ž.**	132 892 175 951 115 584 113 804	150 000	Piškornica	MBT (biodrying plus bioreactor landfill)	Under tendering	Dec. 2018
7 Bjelovarsko-bilogorska ž. **10 Virovitičko-podravska ž.**	119 764 84 836	40 000	Doline	MBT	Pending	Dec. 2019
8 Primorsko-goranska ž. **9** part of **Ličko-senjska ž.**	296 195 p.o. 50 927	100 000	Mariščina	MBT (biodrying plus bioreactor landfill)	Operating – test phase	Jan. 2016

[50] All data according to various local sources (Mr. Fundurulja from IPZ Uniprojekt Terra d.o.o. as the most valuable one) and/or the Consultant´s best guess.
[51] p.o.: part of.

Name(s) of county(ies) the catchment area is composed of, *with name of district where RWMC is located set in italics.*	**Number of population**	**Capacity (t/yr)**	**Data on RWMC (Regional Waste Management Centres)**			
			Location	**Main elements (defined in feasibility studies))**	**Status**	**Full operation to expected in**
3 part of **Sisačko-moslavačka ž.** ***12 Brodsko-posavska ž.*** **11 Požeško slavonska ž.**	p.o. 172 439 158 575 78 034	40 000	Šagolje	MBT	Pending	Dec. 2019
9 part of **Ličko-senjska ž.** ***13 Zadarska ž.***	p.o. 50 927 170 017	100 000	Biljane Donje	MBT - composting	Under tendering	Dec. 2018
10 Virovitičko-podravska ž. **11** part of **Požeško-slavonska ž.** **12 Brodsko-posavska ž.** ***14 Osječko-baranjska ž.*** ***16 Vukovarsko-srijemska ž.***	84 836 p.o. 78 034 158 575 305 032 179 521	90 000 80 000	Orlovnjak (MBT, thermal treatment in županje N^{o} 16)	MBT Thermal treatment (grate combustion)	Pending	Dec. 2019
15 Šibensko-kninska ž.	109 375	50 000	Bikarac	Sorting & composting	Under tendering	June 2018
17 Splitsko-dalmatinska ž.	454 798	110 000	Lečavica	MBT - composting Thermal treatment	Design & tendering	Dec. 2018
18 Istarska ž.	208 055	90 000	Kaštijun	MBT (biodrying plus bioreactor landfill)	Under construction	May 2016
19 Dubrovačko-neretvanska ž.	122 568	60 000	Lučino Razdolje	MBT	Design & tendering	Dec. 2018
21 City of Zagreb	790 017	300 000	Zagreb	Thermal treatment (grate combustion)	In discussion (since the 1990s)	Unlikely within present decade

Figure 1.5: Regions, counties, and MW treatment infrastructure available 2016

2.0 Summary

Croatia has joined the European Union relatively recently, and compliance with the legislation has therefore required significant changes to the country's waste management systems and legislation in recent years.

In comparison with other south eastern European countries, separate waste collection enjoys a reasonably extensive tradition. Some areas such as Čakovec are performing well in respect of separate collection, whilst in Zagreb, the separate collection schemes in some parts of the city have been in operation since 1995. Progress also been made in respect of

ensuring coverage of waste collection services, and in tackling non-compliant landfills. The country also has in place a deposit refund scheme for non-refillable beverage packaging which has been operating since 2006.

Despite recent progress, there are a number of potential issues with the approach being taken in the country, which will need to be addressed to ensure future compliance with the targets in the directives.

- The basis for implementing the waste hierarchy is neither well defined in the current legislation or the recently issued waste management plan. There appears to be no mechanism for implementing the hierarchy as a priority order for waste management in line with Article 4;
- The waste prevention programme that has been developed lacks ambition even to the extent that the Waste Management Act indicated it might be;
- Although some areas are performing relatively well with regard to recycling, many are not, such that the waste framework directive recycling targets are also at risk of being missed. Related to this, recycling targets have not been devolved to the municipalities.
- Despite food waste forming a significant proportion of the waste stream, there is no firm commitment in the legislation or in the recently issued plan to introduce source segregated biowaste collection schemes.
- There are inconsistencies in the data on recycling reported through the producer responsibility schemes: in particular the amount of packaging reported as being placed on the market appears extremely low in comparison to the amount of municipal waste and its composition. This implies that Croatia's actual performance in respect of packaging recycling is likely to be considerably lower than that indicated in the data returns currently being submitted to Eurostat.
- Much of the investment to date in waste management in Croatia has been focused on the lower tiers of the waste hierarchy.
    - In 2016, two EU supported projects (MBT facilities at Zagreb and Zadar) will become operational. Despite this significant investment, however, the related targets set out in the Landfill Directive will not be met even in the medium term. In addition, these investments seem to have been specified in ways which appear, at first sight, to be unusual from a technical perspective. Overcapacity for residual waste treatment is also likely to be a future problem, given the higher targets included within the Circular Economy package, and the proposed MBT capacity.
    - Waste infrastructure is financed from centrally from the Environmental Protection and Energy Efficiency Fund. The process of obtaining this funding appears to be relatively bureaucratic and inflexible, as it is run through a tendering system. Despite this finance coming via the fees of producer responsibility schemes, funding does not seem to be available for other activities higher up the hierarchy such as the operation of separate collection services.
- The newly issued plan lacks detailed policy statements that could be expected to assist Croatia in making the required progress to meet the above targets.
- More importantly, future progress in moving waste management up the hierarchy may be compromised by the development of what appears to be an excessive

amount of residual waste treatment capacity. Although there is some flexibility in terms of the technical configuration, it should be of some concern that the capacity being developed would, if fully utilised, make it difficult to meet recycling targets in excess of 30% or so. Given the legislative proposal in the revised circular economy package, both the rationale for, and the likely value for money of, the waste treatment infrastructure being planned deserve to be scrutinised urgently;

- There are no incentives in place – such as landfill taxes, or sanctions applied to local authorities attached to targets – which would provide an economic incentive to drive performance at a local level towards the activities at the upper tiers of the hierarchy. The new plan gives little confidence that such measures will be introduced in the near future.

3.0 Information Sources

Information for compiling this report has been generally referenced by footnotes. The most relevant sources are listed below.

Croatian Act on Sustainable Waste Management [52]
http://mzoip.hr/doc/act_on_sustainable_waste_management.pdf

Waste Management Strategy of the Republic of Croatia (2005)[53]
http://mzoip.hr/doc/waste_management_strategy_og_130-205.pdf

Waste Management Plan for the Republic of Croatia for the period from 2007 to 2015[54]
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