Country fact sheet

Municipal waste management

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Croatia

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European Environment Agency
European Topic Centre on Waste and
Materials in a Green Economy

Context

This country profile was prepared within the EEA's work on municipal waste, resulting in the following outcomes:

- 32 country profiles (this document) – The country profiles were originally produced by the ETC/SCP and were published by the EEA in 2013. The ETC/WMGE updated them for the EEA under its 2015 and 2016 work programme.

- An EEA briefing on Municipal waste management across European countries

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Related country profiles

Country information on waste prevention programmes can be found at:
http://www.eea.europa.eu/publications/waste-prevention-in-europe-2015

For country profiles on material resource efficiency policies, please visit:
http://www.eea.europa.eu/publications/more-from-less/

Contents

Highlights

- Recycling of municipal waste in Croatia only started recently, but many improvements have been made in the past few years. As in 2014 the recycling rate was 17 %, the country needs to speed up its recycling efforts if it is to fulfil the EU Waste Framework Directive (WFD) 50 % recycling target by 2020.
- The main challenge is to increase separate collection of materials from municipal waste and to develop recycling infrastructure.
- Reported municipal waste (MSW) recycling rates would be higher, and more realistic, if all recycled packaging waste from households and the service sector were included in the reported data.
- Croatia is also facing a challenge if it is to fulfil the diversion targets of the EU Landfill Directive. The increase in biodegradable municipal waste (BMW) since 1997 – Croatia's reference year for the Landfill Directive diversion targets – makes it very difficult for Croatia to meet the BMW targets.
- The establishment of the Environmental Protection Programmes and Energy Efficiency Fund in 2004 has been an important initiative to ensure that additional resources for financing and monitoring projects and programmes for waste management are available.

1 Introduction

1.1 Objective

Based on historical data on municipal waste (MSW) for Croatia, and EU targets linked to MSW in the Waste Framework Directive, the Landfill Directive and the Packaging Directive, the analysis undertaken includes:

- the historical MSW management performance based on a set of indicators;
- uncertainties that might explain differences in country performance, which may relate more to variations in reporting methodology than to differences in management performance;
- indicators relating to the country's most important initiatives taken to improve the management of MSW;
- possible future trends and the probability of achieving the EU 2020 MSW targets.

2 Croatia's municipal waste management performance

The first Waste Act in Croatia was adopted in 1995 and has since been amended a number of times (CEA, 2012a). The Sustainable Waste Management Act (OG 94/13) was adopted in July 2013 (EEA, 2015). Croatia became a member of the EU on 1 July 2013 and incorporation into Croatian legislation of the *acquis* in the area of waste management has been completed. The two main policy documents are the national Waste Management Strategy of 2005 and the National Waste Management Plan (NWMP) of the Republic of Croatia for 2007–2015 of 2007 (OG No. 85/07,126/10, 31/11, 46/15). (CAEN, 2015a; ETC/SCP, 2011)

The Waste Management Strategy assesses the situation, identifies the problems and obstacles, and establishes a framework for waste reduction and sustainable waste management. It is being implemented through the NWMP for 2007–2015, which serves as a framework document for county-level waste management plans (WMPs) and for the elaboration of individual projects that fit into the county/regional integrated waste management system. The concept of the NWMP is based on the waste management hierarchy, which gives priority to waste prevention, recycling, reuse and other types of recovery (EEA, 2011; Government of Croatia, 2007). A draft National Waste Management Plan 2015–2021 was published for public consultation in September 2015. A part of the draft document is a Waste Prevention Plan (CAEN, 2015a). A revised draft WMP, covering 2016-2022, was presented by the Ministry of Environment and Nature Protection (MENP, 2016) in June 2016, with a focus on strengthening separate waste collection through a greater number of recycling centres and decentralisation.

The MENP is responsible for the development and implementation of waste management policy at the national level. Institutional responsibilities are divided across sectors – the state is responsible for managing hazardous waste and waste incineration; counties are responsible for managing all other types of waste excluding municipal waste, which comes under the jurisdiction of local-level municipal governments (EEA, 2015). The Sustainable Waste Management Act prescribes possible inspections by environmental protection inspectors. It also contains an article on administrative supervision, which can be performed by the Ministry – in Article 169 of Chapter XI, penalties and fines for offences committed by local governments, such as when municipalities do not implement the national regulation, are outlined (CAEN, 2015a).

The coverage of organised municipal waste collection increased from 86 % of the population in 2004 to 96 % in 2010, which fulfilled the quantitative target for 2015 (90 %) set by the Waste Management Strategy of Croatia (CEA, 2012a; EEA, 2010), and by 2014, the share of the population with access to organised waste collection was 99 % (EEA, 2015). Waste not covered by the formal collection system is likely to be dumped in unofficial landfills (Gibbs *et al.*, 2014a). In 2014, 97 % of the MSW generated was reportedly treated (Eurostat, 2016).

The collection of mixed municipal waste is carried out by around 200 waste collectors, which are mostly owned by municipalities. Depending on the local government, separate collection of certain waste fractions is organised through door-to-door collection or by containers for paper, glass and plastics, called green islands, put in public areas near buildings. Many local communities intensified activities in organizing primary separate collection in 2013 and 2014. Citizens can also take waste to recycling sites. Additionally, packaging waste, waste electrical and electronic equipment (WEEE) and batteries are collected through producer responsibility schemes – some of what is collected is assigned to municipal waste quantities. (CAEN, 2015a)

There were 48 civic amenity sites in Croatia in 2014, typically located close to landfill sites, except in Zagreb (CAEN, 2015a). The waste fractions collected vary largely by site. For glass, plastic (PET), aluminium, ferrous and tin beverage packaging waste there is a deposit refund system based on an ordinance. A fee, varying from EUR 19.7 per tonne for glass to EUR 53.8 per tonne for PET and aluminium cans, is paid by the producers of registered disposable beverage packaging placed on the market. The fee is not paid for returnable packaging whose multiple use is ensured by the producer through the deposit system, but by drink and beverage packaging producers who do not produce multiple-use, returnable packaging. In each year, the fee is paid until the annual national target for the share of returnable packaging is met for a certain product type (Gibbs *et al.*, 2014a).

There are sorting and recycling plants, for example for paper, glass, metal, plastics and WEEE, which among other, recycle fractions of municipal waste by origin. Beverage packaging waste collected through the deposit refund system is first sorted in shops and then transferred to waste packaging management centres where further sorting and recovery takes place. Separated organic waste, currently mainly garden waste, is treated in open-air composting facilities – there are 10 composting plants, with a capacity about 80 000 tonnes per year. In 2014 there was one mechanical biological treatment (MBT) facility in operation, handling around 35 000 tonnes per year) and two facilities within waste management centres under construction (total capacity 190 000 tonnes per year. Three biogas plants have been licensed for waste management – mostly industrial waste, and in 2014 there was one biogas plant receiving around 50 tonnes of municipal waste. In 2014 there were 147 active landfill sites, half the number that existed in 2005. In the period 2005–2014, remediation or improvement activities on landfills were carried out for 120 sites; currently 53 are being worked on, and remediation and improvement is prepared for a further 131 sites. All landfills are expected to reach full compliance with the EU Landfill Directive by 2018. There are no MSW incineration facilities in Croatia. (CAEN, 2015a)

2.1 Municipal waste indicators

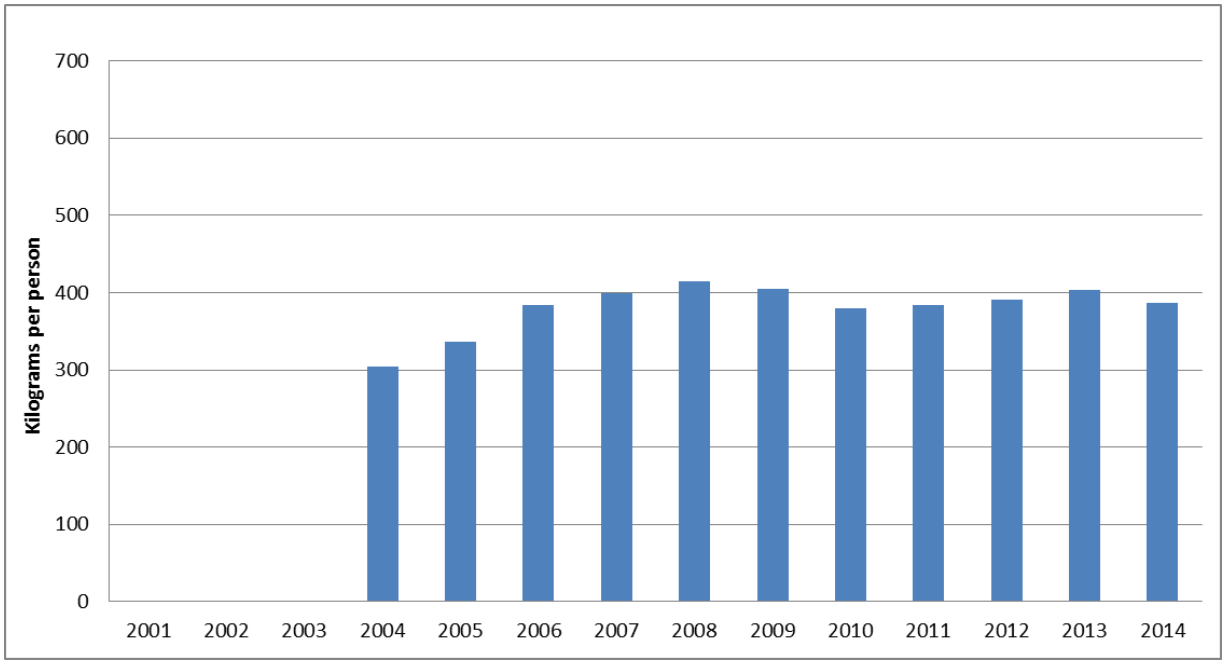
The following indicators illustrate the development of Croatian MSW management in 2001–2014. All figures have been calculated as proportions of generated rather than managed waste. Relating the indicators to managed amounts would generally result in higher rates for all waste management paths where the reported managed amount is lower than the reported generated amount: in 2014, the reported treated amount corresponded to 97 % of Croatia's generated municipal waste (Eurostat, 2016).

The generation of MSW in Croatia increased from 0.98 million tonnes in 1995 to 1.64 million tonnes in 2014. The level of MSW peaked in 2008 at 1.79 million tonnes (Eurostat, 2016; CEA, 2011a).

Figure 2.0 shows the development of MSW generation per person in Croatia from 2004, the first year for which data were reported, to 2014. There has been an increase from 304 kilograms per person in 2004 to 387 kilograms per person in 2014, compared to the EU average of 474 kilograms. Croatia's MSW generation per person peaked at 415 kg in 2008. Croatia's national data on MSW generation per person differs slightly from Eurostat's due to the use of different population data (CAEN, 2015a).

Data on municipal waste generated up to 2005 were estimated. From 2006 onwards, data were determined by combining data reported by municipal waste collectors with estimates for municipalities for which data were not reported. Quantities have decreased since 2008, partly because of the economic crisis and partly because of the improvement in data quality due to the introduction of weighing at an increasing number of landfill sites (CEA, 2012a).

Figure 2.0 Croatia, municipal waste generation per person, 2004–2014

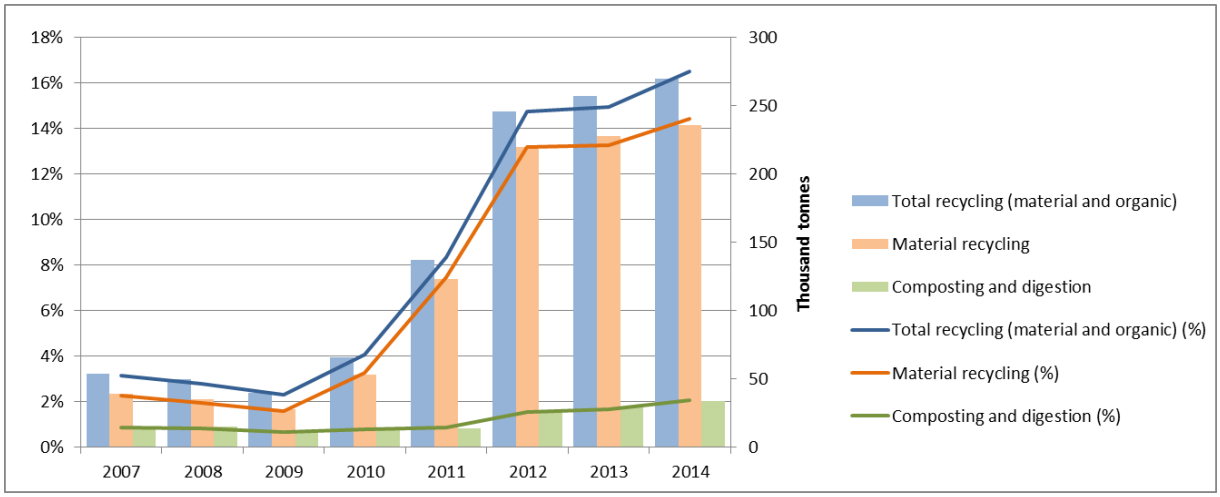


Source: Eurostat, 2016.

2.1.1 Municipal waste recycling, 2007–2014

Data on recycled MSW is available from 2007 onwards (Figure 2.1). The total recycling level was low until 2010 but a significant increase can be seen after 2010. In 2014 the total MSW recycling rate was 16 %, 85 % of which was material recycling, excluding composting and digestion. From 2011, the amount recycled also includes municipal waste originating from the service sector (NACE activities G to U, except G46.77) (EC, 2013). The level of organic recycling – composting and anaerobic digestion – is very low, at only 2 %, or 34 000 tonnes, of generated MSW in 2014. In 2014, 80 % of municipal waste went to landfill.

Figure 2.1 Croatia, recycling of municipal waste, 2007–2014, per cent and tonnes



Source: Eurostat, 2016

In 2014, 24 % of the generated amount of MSW, 396 594 tonnes, was separately collected – of this, 30 % was paper, 19 % bulky waste and 17 % organic waste (CAEN, 2015a). However, a large part of it went to landfill. Some landfill operators separate recyclables in MSW and forward them for recycling, but these quantities are not included in the reported amount of recycled waste due to a lack of data (CEA, 2012a).

Recycling of MSW is a new activity in Croatia and it takes time to get the infrastructure in place. The bottom line is that there is room for improvement in both material and organic recycling.

The EU's 2008 Waste Framework Directive (WFD) includes a target for certain fractions of MSW: 'by 2020, the preparing for re-use and the recycling of waste materials such as at least paper, metal, plastic and glass from households and possibly from other origins as far as these waste streams are similar to waste from households shall be increased to a minimum of overall 50 % by weight'. EU Member States may choose between four different methodologies for calculating compliance with the target[1]. Croatia has chosen calculation method 2 (*Gibbs et al.*, 2014) and has reported a recycling rate of 22 % according to this methodology for 2014 (CAEN, 2015a). The recycling rates shown in this paper correspond to method 4, the only method for which time series data exist. In 2015, the European Commission has proposed new targets for municipal waste of 60 % recycling and preparing for reuse by 2025 and 65 % by 2030, based on only one calculation method, and with the possibility of time derogations for some countries, including Croatia (EC, 2015).

Using method 2, Croatia will have to increase its recycling rate by 28 percentage points in the period 2014–2020, corresponding to 4.7 percentage points per year. Within the period 2007–2014, the country increased its recycling rate, calculated using data reported to Eurostat, method 4, by 1.9 percentage points per year.

[1] Commission Decision 2011/753/EU allows countries to choose between four different calculation methods to report compliance with this target. Member States have the option of considering four alternative waste streams and fractions:

1. paper, metal, plastic and glass household waste;
2. paper, metal, plastic, glass household waste and other single types of household waste or of similar waste from other origins;
3. household waste;
4. municipal waste (the method used in this document).

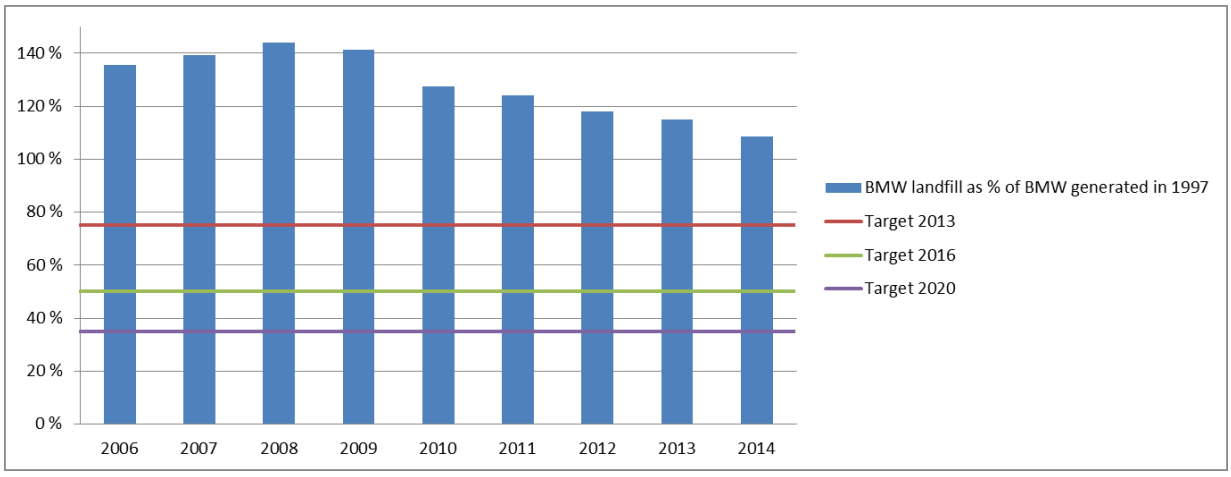
While the results for the two methodologies are not comparable, these numbers give some indication of the annual rate at which Croatia will have to accelerate its recycling efforts if it is to meet the WFD targets.

2.1.2 Landfilling of biodegradable municipal waste

According to the EU Landfill Directive, EU Member States have to reduce the amount of biodegradable municipal waste (BMW) sent to landfill and sets a specific targets for 2006, 2009 and 2016, relative to the amount of BMW generated in 1995, but in Croatia's accession negotiations with the EU, it was agreed to use 1997 as the base year. A 75 % target has to be fulfilled in 2013 and 50 % target in 2016 (CEA, 2012b).

Figure 2.2, based on Croatia's national data (EU, 2012; CEA, 2011b), shows that the 2013 target was not met and demonstrates that Croatia is facing a huge challenge in trying to reach the 2016 target to reduce BMW landfill to 50 % of that generated in 1997. This is mainly because BMW generation rose from 756 000 tonnes in 1997 to 1.01 million tonnes in 2010, of which 96 % went to landfill, 1.3 % was composted and the rest, mainly paper and cardboard, was sent to other recovery operations (CEA, 2012a). With the reported trend, it is very unlikely that the 2016 target will be reached, and there is a risk that Croatia will also miss the 2020 target.

Figure 2.2 Croatia, landfilling of biodegradable municipal waste, 2006–2014, % of biodegradable municipal waste generated in 1997



Note: The target dates take account of Croatia's four-year derogation period. The percentage is calculated based on BMW generated in 1997.

Source: CEA, 2011b (data for 2006-2009); CAEN, 2015a (data for 2010-2014)

2.1.3 Regional differences in municipal waste recycling, 2001–2013

No regional data for recycling of MSW in Croatia is held in Eurostat's database. Therefore, this indicator could not be applied to Croatia in this report.

2.1.4 Recycling and landfill taxes

Croatia has not introduced a landfill tax.

2.1.5 Environmental benefits of better municipal waste management

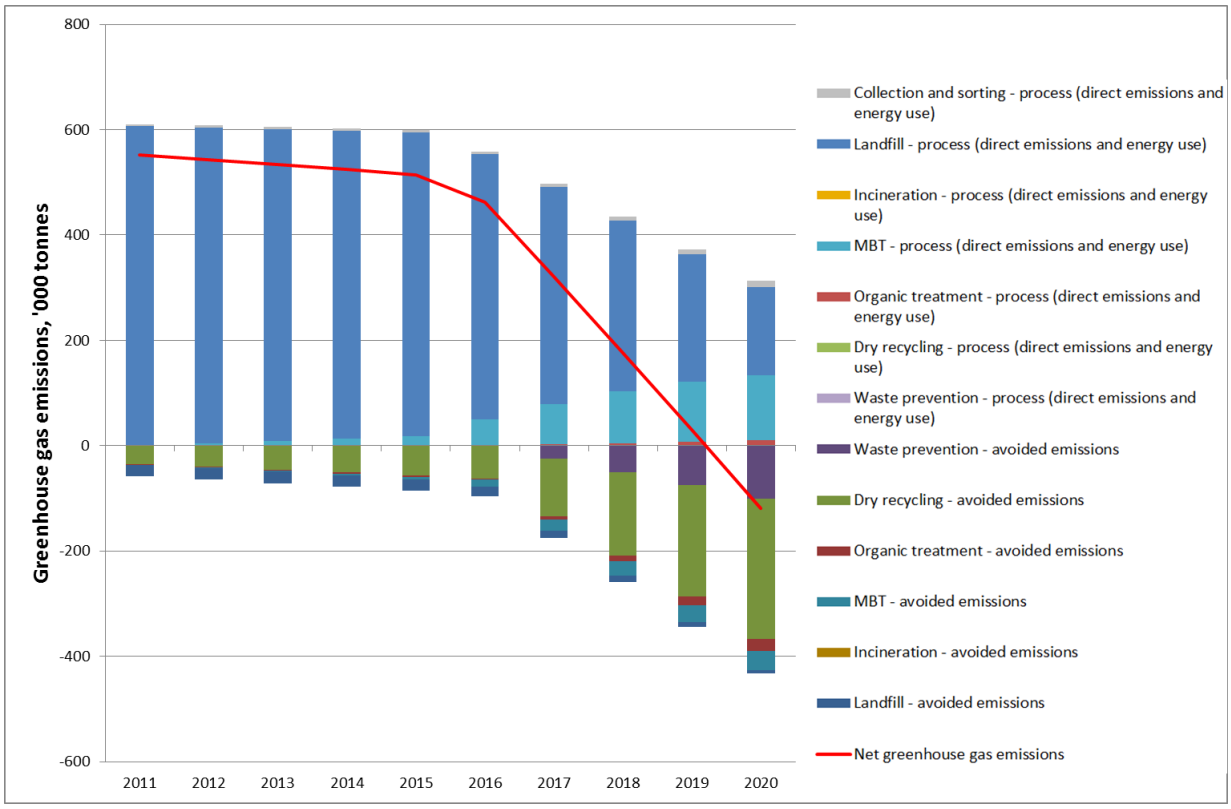
Figure 2.3 shows a scenario for the development of greenhouse gas emissions from MSW management in Croatia. The scenario assumes a 1.5 % annual increase in MSW generation, and full implementation of EU legislation for municipal waste. The calculation of emissions is based on data

and assumptions contained in the European Reference Model on Municipal Waste Generation and Management. The approach taken in the model is rooted in life-cycle thinking, in that it considers not only direct emissions, but also avoided emissions associated with the recycling of materials, or the generation of energy from waste management processes. The more detailed methodology is described in Gibbs *et al.* (2014b). The level of emissions depends on the amount of waste generated and the treatment it undergoes each year.

Figure 2.3 shows direct emissions, avoided emissions and net emissions from the management of MSW. All the emissions (positive values) represent the direct operating emissions for each waste management option. The phases of the waste management chain covered include waste prevention; material recycling; composting and anaerobic digestion; MBT and related technologies; collection and sorting; and incineration and landfill. The graph is based on the assumption that existing legislative targets of are fully met.

For avoided emissions (negative values), the calculations integrate the benefits associated with energy recovery and material recycling of paper, glass, metals, plastics, textiles and wood, and bio-treatment of food and garden waste from MSW. The scenario assumes full implementation of existing EU legislation on waste management that all Member States are obliged to undertake (Gibbs et al., 2014c).

Figure 2.3 Croatia, scenario for greenhouse gas emissions from municipal waste management, 2011–2020



Source: ETC/WMGE, calculation based on the European Reference Model on Waste

Note: Results presented in this figure should not be used for the compilation of greenhouse gas reporting for the Intergovernmental Panel on Climate Change (IPCC) national inventory report, or be compared with IPCC figures, as the methodology employed here relies on life-cycle thinking and, by definition, differs substantially from the IPCC methodology. MBT means mechanical-biological treatment.

In countries with a low share of landfill and high rate of recycling, waste management can have an overall positive impact on greenhouse gas emissions, reducing emissions as a whole. Croatia is not yet one of these countries. Based on the scenario with full policy implementation of the EU targets related to MSW, net greenhouse gas emissions from treatment of MSW in Croatia would be expected to be close to zero by 2020. The reduction would be mainly due to avoided emissions from material separation and recycling as well as reduced emissions from landfill.

Greenhouse gas emissions from landfills are caused by the breakdown of organic wastes accumulated over the past decades. In the model, which calculates landfill impacts over a 100-year period, the longer-term emissions from any given waste are attributed to the year in which that waste was deposited (Gibbs *et al.*, 2014b). Therefore, the positive effect of diverting BMW from landfill shows in the figures as an immediate reduction in greenhouse gas emissions from landfill.

In comparison, GHG emissions from waste according to the IPCC methodology accounted for 5 % of total national GHG emissions in Croatia in 2013 (CAEN, 2015a).

2.2 Uncertainties in the reporting

Some uncertainties or differences in how countries report recycling of MSW can result in different recycling levels. This applies, for example, to the following issues:

- the extent of packaging waste from households and similar packaging from other sources are included in or excluded from reports of the MSW recycling;
- the definition of municipal waste used by the country, such as the inclusion or exclusion of home composting;
- the methodology used to report the inputs and outputs of MBT and sorting plants.

The definition of municipal waste in Croatia includes both household waste and similar waste from other sources. In practice, however, waste management companies do not always report all waste – for example from offices – as municipal waste. (Gibbs *et al.*, 2014a)

According to the Croatian Agency for Environment and Nature (CAEN) (2015a), packaging waste is included in the municipal waste data reported to Eurostat. For certain fractions, for example waste paper, it is difficult to differentiate packaging from non-packaging quantities in the data reported by waste collectors. It is also difficult to differentiate municipal and non-municipal waste quantities. Waste collectors are asked to estimate the share of quantities collected from service sector, which are then added to municipal waste quantities. (CAEN, 2015a)

All recycled amounts reported to Eurostat refer to the amounts of separately collected waste delivered to treatment companies for recovery operations (input). There is no reliable data on the output or losses incurred in the processing and thus the data include rejects and losses (CAEN, 2015a).

According to the CEA (2012a) recycled waste only includes waste for which there is sound evidence that recovery took place – this was requested for the purpose of reporting to Eurostat. It does not include, for example, quantities destined for recovery that are temporarily stored with an exporter, or usable components separated from municipal waste at landfill sites and later submitted for recovery, for which landfill operators do not usually report data. Furthermore, some quantities are incorrectly reported as waste from businesses rather than MSW, which is the case for some packaging paper waste (CEA, 2012a).

It is the intention of the CEA to improve the quality of data reported by waste collectors and to work on methods for calculating recycling rates (CEA, 2012a).

2.3 Important initiatives for improving municipal waste management

The adoption of the Waste Act in 2004, the Waste Management Strategy in 2005 and the NWMP in 2007 are all important initiatives for improving municipal waste management taken by Croatia in the last decade.

According to analysis by Arcadis (2014), the current NWMP, adopted in 2007, formally complies with the requirements of the WFD. In practice, however, the status of waste management in Croatia is not up to EU standards and most targets specified in the NWMP have not been met. Based on the NWMP and Sustainable Waste Management Act (OG, 94/13), local authorities – towns and municipalities – are obliged to develop local WMPs. The responsibility for implementation is allocated to the Ministry of Environment and Nature Protection and local authorities, as well as to the Environment Protection and Energy Efficiency Fund (EPEEF). (Arcadis, 2014)

A revised NWMP was proposed in 2015. The new plan included the introduction of new targets in compliance with the WFD; measures to increase separate collection, recovery and recycling; remediation or improvement of landfill sites; construction of 13 MBT plants and one new waste-to-energy plant; and projects on waste prevention, education and information sharing. Market accession of private waste management companies will be allowed. A waste prevention programme is also planned for inclusion in the revised NWMP (CEA, 2015b; Gibbs *et al.*, 2014a).

However, this plan was not adopted and a revised version of the NWMP (2016-2022) was presented by the new Croatian government in June 2016. This draft plan increases the focus on separate collection, more recycling centres, sorting and reuse centres while decreasing the planned capacities for new treatment plants for mixed residual waste. The aim is to comply with the EU waste acquis, to create jobs at recycling centres and sorting plants, and to keep fees for the citizens down. At the same time, the new plan should enable Croatia to utilize EU funds of EUR 475 million for building up waste management infrastructure. (MENP, 2016)

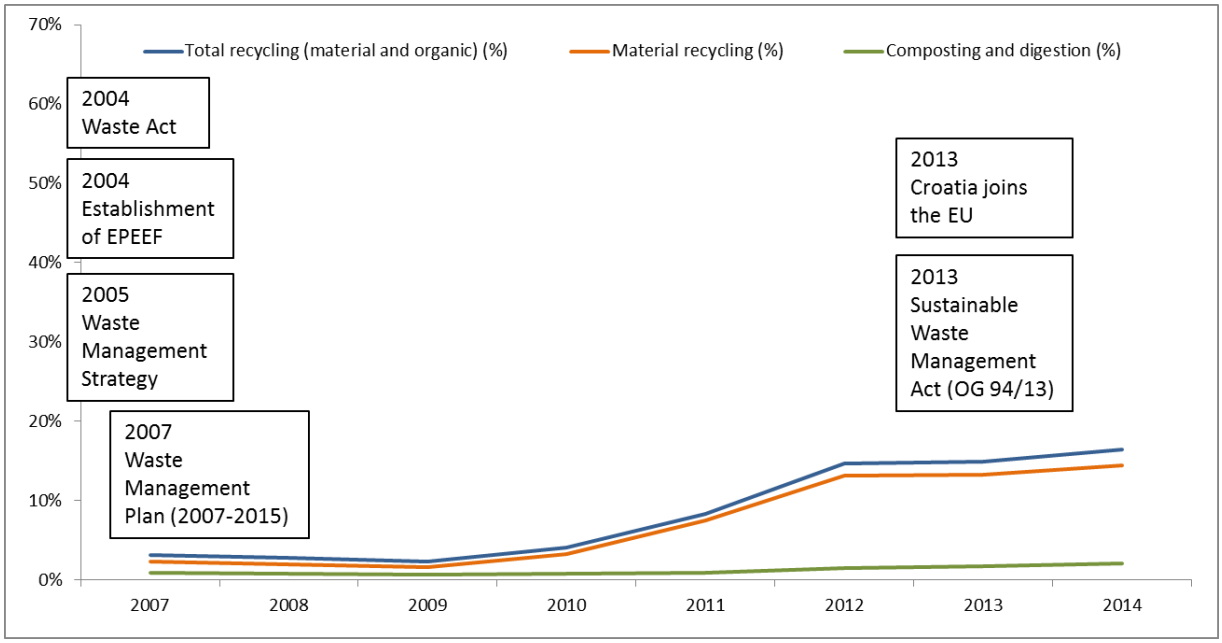
The Sustainable Waste Management Act (OG 94/13), in which municipal waste issues are regulated especially in articles 23–41, was adopted in July 2013. According to the Act (art. 54), local government became obliged to provide separate collections of paper, metal, glass, plastics, waste electric and electronic equipment (WEEE), waste batteries and accumulators, end-of-life vehicles, end-of-life tyres, waste oils, textiles and footwear, and clinical waste by 1 January 2015. Article 55 of the Act sets a target of preparing for re-use and recycling 50 % of paper, metal, plastic and glass collected from households and other sources, if their wastes are similar to household waste, by 1 January 2020. Municipalities will be responsible for organising the separate collections, but monitoring of the system will be carried out at a national level (Gibbs *et al.*, 2014a; CEA, 2011a; EEA, 2010). Municipalities and cities are also responsible for the adoption and implementation of the local government's WMP and for the provision of waste prevention educational and information activities in their areas. Although a landfill tax has still not been introduced, waste disposal charges are prescribed for cases of non-compliant landfills – when the allowable amount of landfilled waste is exceeded. This is passed on by providers of collection services for mixed municipal and biodegradable municipal waste to the users, and is proportional to the amount of the waste they produce in the accounting period. (EEA, 2015; CAEN, 2015a)

Another important initiative was the establishment of the EPEEF in 2004, set up by a decision of the government of Croatia to ensure additional resources for financing projects, programmes and similar undertakings in the field of conservation, sustainable use, protection and improvement of the environment. Among other initiatives, it co-finances projects on waste prevention; projects for improving separate collection, reuse and recovery of certain waste types; and for remediation of landfill sites and building infrastructure – recovery and waste management centres, containers, home composters, vehicles (CEA, 2015b; ETC/SCP, 2011).

The EPEEF also collects a number of environmental fees, including those for burdening the environment with hazardous and non-hazardous industrial waste (ETC/SCP, 2011). Moreover, the EPEEF collects fees from producers/importers of products within specific waste streams, and collection/recovery schemes such as for packaging waste, waste oil, WEEE, waste tyres, batteries/accumulators, and end-of-life vehicles. The EPEEF compensates waste management companies for expenses related to the collection, treatment or recovery for these waste streams (CEA, 2011a; ETC/SCP, 2011).

Until recently, the waste collection service fees paid by household were based on the size (square metres) of the living space, and very few were covered by pay-as-you-throw schemes (Gibbs *et al.*, 2014a). An increasing number of municipalities/cities, however, are now calculating fees based on the mass/volume of waste produced combined with data on number of people living in a household (CAEN, 2015a).

Figure 2.4 Croatia, recycling of municipal waste (per cent) and important policy initiatives, 2007–2014



2.4 Possible future trends

Meeting the EU's 50 % recycling target by 2020 will require significant effort. It is possible that part of the needed increase in the recycling rate could be fulfilled by systematically including some of the recycling of packaging waste from MSW sources in reported MSW recycling (Section 2.2). This was partly done for the service sector in 2012–2014 (CAEN, 2015a).

A reduction in untreated waste sent to landfill is planned, with introducing new infrastructure for municipal waste treatment. Altogether, 13 waste management centres based on MBT technology are planned in counties or regions. These are the main planned treatment route for bio-waste. Outputs, expected to be around 35 % of MSW inputs, from the plants will be biogas and solid recovered fuel, and after stabilisation the residual bio-waste will go to landfill. In future, household food waste separated at source will undergo composting, which is at present mainly carried out for only garden waste in the city of Zagreb. The planned facilities will be co-financed by EPEEF and other funds. Two waste management centres, at Mariscina for Primorsko-goranska county and Kastijun for Istria county, are under construction, while other centres are different stages of preparation (CAEN, 2015a; CEA, 2015b; Gibbs *et al.*, 2014a; CEA, 2011a).

Additionally, one waste-to-energy plant is being considered for the city of Zagreb. Together with the planned MBT plants, the incineration plant should make a significant contribution to reducing the landfill of biodegradable waste by 2018–2020 (CEA, 2015b; EEA, 2010).

The national Waste Management Strategy states that neither waste treatment plants nor new landfill sites will be placed on any of Croatia's islands and thus all municipal waste will have to be transported to the mainland for treatment (Gibbs *et al.*, 2014a).

Under all circumstances, securing the necessary increase in recycling and treatment capacity will require an exceptional effort from the Croatian government and local authorities, and good cooperation between the public and private sectors.

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