ETC/SCP

European Environment Agency

Municipal waste management in the former Yugoslav Republic of Macedonia

Prepared by

Margareta Cvetkovska and Arminda Rushiti
Ministry of Environment and Physical Planning of FYR Macedonia

Leonidas Milios
ETC/SCP

September 2013

EEA project manager
Jasmina Bogdanovic

Author affiliation
Margareta Cvetkovska (M.Sc.) and Arminda Rushiti, Ministry of Environment and Physical Planning of FYR Macedonia, www.moepp.gov.mk
Leonidas Milios, Copenhagen Resource Institute, www.cri.dk

Context
This study has been prepared by the Environmental Information Centre/Ministry of Environment and Physical planning of the former Yugoslav Republic of Macedonia, in cooperation with the European Topic Centre on Sustainable Consumption and Production (ETC/SCP), managed by Copenhagen Resource Institute (CRI), on behalf of the European Environment Agency (EEA). This report is part of the EEA support to the West Balkan countries under the project "Enhancing cooperation on waste policies with the West Balkan countries".

Contents

Highlights

- The amount of municipal solid waste generated during the period 2003-2011 has grown steadily, with a growth rate of more than 3 % annually in the earlier years, while in recent years the growth was less than 3 % per year. The generation of municipal solid waste follows closely the economic growth observed in the country during this period of time. The amount of municipal waste generated per capita was 357 kg/capita in 2011.
- The dominant method in managing municipal and other non-hazardous waste is disposal to legal landfills, which corresponds to 99.74 % of the total amount of municipal solid waste generated in 2012. The remaining 0.26 % of MSW was recycled or composted.
- MSW collection systems cover approximately 77 % of the national population.
- The Law on Waste Management of 2004, the National Waste Management Strategy of 2008 and the National Waste Management Plan of 2009, set the general framework of waste management in FYR Macedonia and paved the way for substantial institutional and organisational changes.
- Producer responsibility for packaging waste entered into force in January 2010 and in June 2011 ‘Pakomak’ became the first legal entity registered for the treatment of packaging waste.

1 Introduction

1.1 Objective

Based on historical MSW data the analysis undertaken for FYR Macedonia will include:

- The historical performance on MSW management based on available data and indicators;
- Uncertainties that might explain differences between the country's performance which are more linked to differences in what the reporting includes than differences in management performance;
- Relating the indicators to the most important initiatives taken to improve MSW management in the country, and
- Assessing the future possible trends and achieving of the future targets on MSW.

2 Ex-post analysis of FYR Macedonia's MSW management performance

Waste management in the former Yugoslav Republic of Macedonia was recently recognised as an issue of concern and a concentrated effort was put forward in order to mitigate its adverse impacts on the environment and society. In the previous years, waste management relied exclusively on dumping and landfilling of MSW.

The general policy directions on waste management were outlined in the First and Second National Environmental Action Plan, in 1996 and 2006 respectively. The Law on Waste Management, which was established in 2004, constitutes a cover regulation act and provides general rules applying to main issues on non-hazardous and hazardous waste and on special waste streams. It also represents the legal basis for a variety of secondary legislation as rulebooks or guidelines (ETC/SCP, 2011).

The core documents that shape the future vision of the FYR Macedonian waste management, on the national level, are the National Waste Management Strategy for the period 2008-2020 (Official Gazette no. 39/08) and the National Waste Management Plan for the period 2009-2015 (Official Gazette no. 77/09). The former aims at defining the long-term needs in the area of waste management, as well as the necessary legislative measures for enforcement. The latter makes an assessment of current conditions and outlines activities as well as resources and financial mechanisms in the waste management process for the period of its validity (ETC/SCP, 2011).

During the period 2007-2011 there was an intensive effort from the government to harmonise its waste legislation with the EU guidelines and directives, in which the majority of new regulations emerged. These regulations covered issues for landfilling, incineration, biodegradable municipal waste, packaging waste, WEEE etc. (ETC/SCP, 2011).

Tasks and responsibilities in the waste management field are in practice split among several institutions in the State with the dominant role of the Ministry of Environment and Physical Planning and municipalities.

As a consequence of the decentralisation process in the country, a lot of responsibilities were delegated to the municipalities. The municipalities are responsible for organising the collection, transportation and disposal of municipal wastes; deciding on the location of waste management facilities; issuing local regulations on waste management; financing and supervising dump/landfill closures and termination of waste management facilities. The establishment of non-hazardous and inert waste landfills is also the responsibility of the municipalities. However, the municipalities' waste management administration sectors are not yet fully developed (NWMP, 2008).

Waste collection services including other activities such as street cleaning, public parks and gardens, and cemetery maintenance are primarily performed by the Communal Enterprises. The collection and treatment of recyclable materials from MSW relies to a significant extent on the informal sector and is viable only through economies of scale (NWMP, 2008).

2.1 MSW Indicators

Table 2.1 shows the development of MSW generation in FYR Macedonia from 2003 to 2011. The generation of MSW has been continuously increasing, from about 399 000 tonnes in 2003 to 734 000 tonnes in 2011, a remarkable increase of almost 85 %. However, it has to be mentioned that the data from 2003 to 2007 are mostly estimations rather than actual data based on real analyses on the field, and therefore the data before year 2008 are not directly comparable with data from 2008 and onwards.

The increasing trend in waste generation which was estimated for the period 2003-2007 could have resulted in a doubling of MSW generation in less than 10 years. However, since 2008 when actual data became available, a stabilising trend emerged as it can be observed in Figure 2.1, showing a moderate development. This moderation could probably be attributed to the global economic recession, resulting in a slight decrease of GDP in 2009 in FYR Macedonia, when potentially the reduced consumption due to the economic downturn led to lower waste generation. Nevertheless, the economic downturn in FYR Macedonia was quickly reversed and in 2010 GDP growth resumed (Eurostat, 2013b). The generation of MSW per person peaked at 357 kg per capita in 2011.

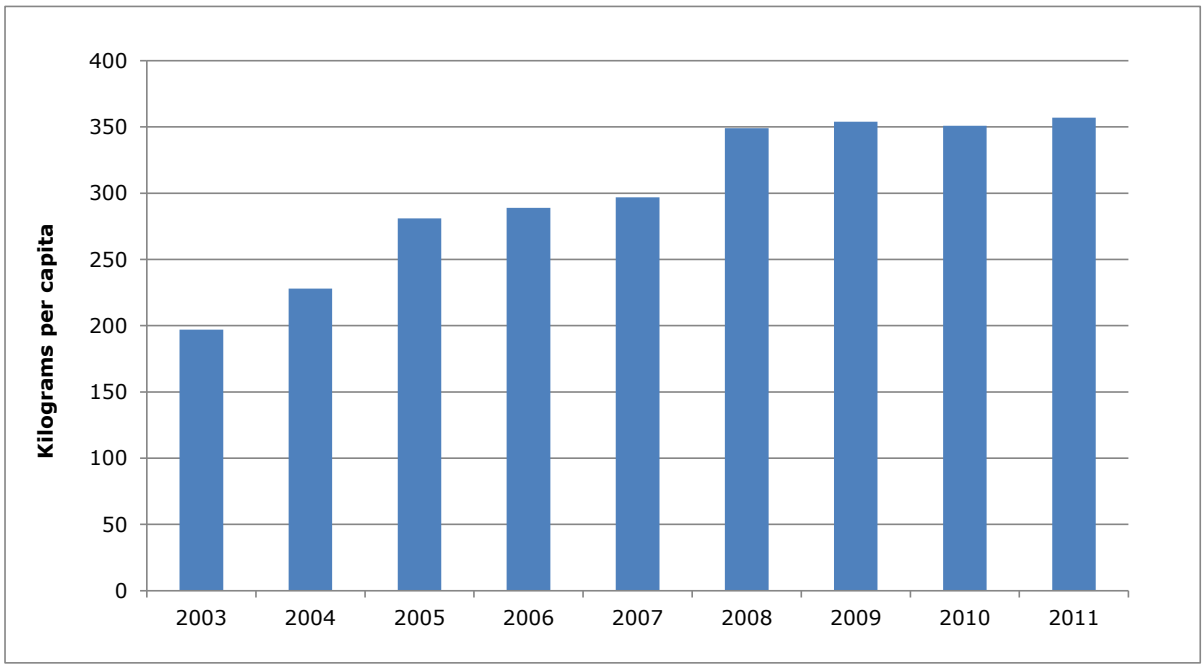
Table 2.1 MSW generation in FYR Macedonia

	2003	2004	2005	2006	2007	2008	2009	2010	2011
Thousand tonnes	399	463	572	589	606	714	726	721	735
Kilograms per capita	197	228	281	289	297	349	354	351	357

Source: Cvetkovska (2011) and Eurostat (2013a)

The quantities of generated MSW are assessed on the basis of data provided by the State Statistical Office of FYR Macedonia, for the period 2008-2011. For earlier years (2003-2007), the quantities of MSW were estimated by the Ministry of Environment and Physical Planning. The estimations were based on the analysis conducted within the study of waste management in the southwestern part of the country (prepared by ERM Lahmaeyer International GmbH, 2002-2004), which is considered applicable to the whole territory of FYR Macedonia.

Figure 2.1 MSW generation per capita in FYR Macedonia



Source: Cvetkovska (2011) and Eurostat (2013a)

The collection coverage of MSW in the municipalities of FYR Macedonia was about 72 % in 2008 (Eurostat, 2013a). The following years, the collection rate increased only marginally and in 2011 it had risen to 77 % according to the data and information submitted to the Ministry of Environment and Physical Planning (Cvetkovska, 2011).

Analysis of the MSW composition, which was carried out for the National Waste Management Plan of FYR Macedonia, revealed that municipal waste in FYR Macedonia contains a considerably high amount of biodegradable waste. According to the figures presented in Table 2.2, it is calculated that the biodegradable content of MSW in FYR Macedonia is as high as 62 %.

The biodegradable fraction of MSW consists mainly of food waste and green waste, and additionally wood, paper and cardboard, and textiles waste. According to Table 2.2, the biodegradable (organic) fraction which includes food and green waste is equal to 26 % of the generated MSW. Paper and cardboard equals to 11.9 %. The wood and textiles fractions amount to 2.7 % and 2.9 % respectively. Moreover, the fine mixed particles fraction (<10 mm), which is equal to 30.9%, contains approximately 60 % biodegradable organic materials (NWMP, 2008). Therefore, out of this 30.9 % a percentage of about 18.5 % can be added to the biodegradable MSW content. Conclusively, the final content of biodegradable waste in the MSW composition of FYR Macedonia is about 62 %. Taking uncertainty into account, this percentage could be placed safely somewhere between 60-65 %.

Table 2.2 Estimated composition of MSW in FYR Macedonia

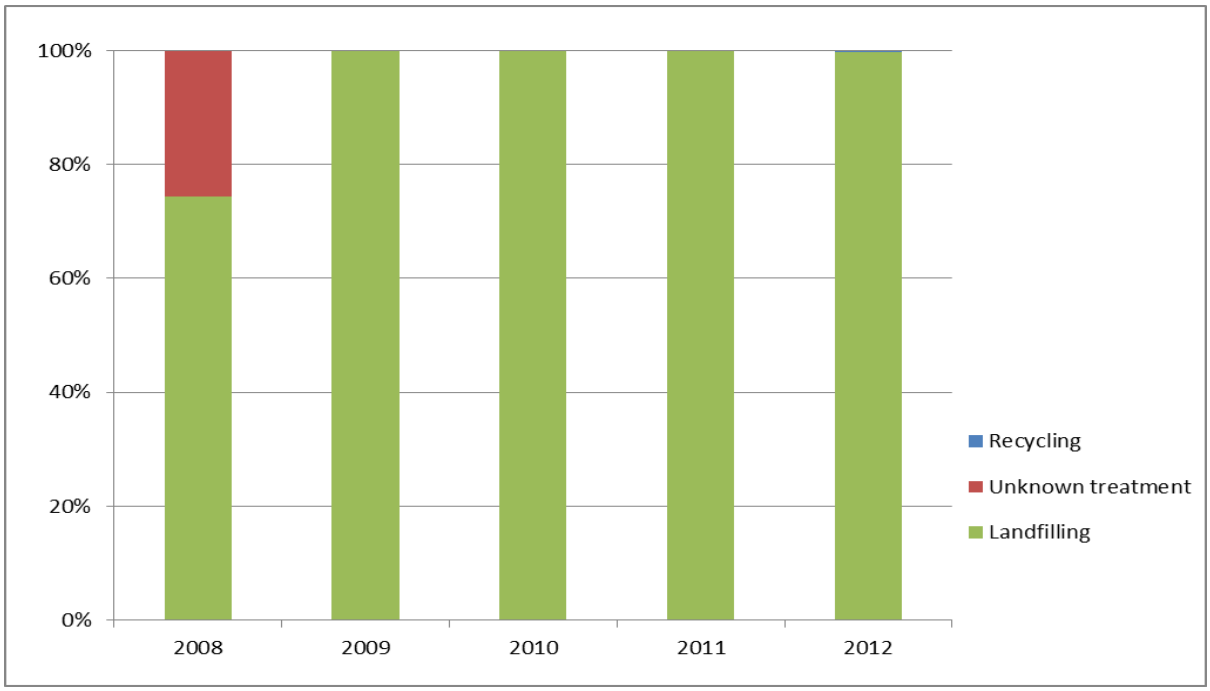
Type of waste	Estimated quantity (tonnes/year)	Percentage

Biodegradable (organic) waste	148 819	26.0
Wood	15 454	2.7
Paper and cardboard	68 113	11.9
Plastics	54 949	9.6
Glass	20 033	3.5
Textiles	16 599	2.9
Metals	14 882	2.6
Composite packaging	12 592	2.2
Other waste (complex products, inert materials, other categories)	42 929	7.5
Hazardous household waste	1 145	0.2
Fine mixed particles (<10 mm)	176 866	30.9
Total MSW	**572 381**	**100**

Source: NWMP (2008)

Landfilling of MSW is the most typical option with a share of 99.74 % in 2012, while the processing which includes recycling and composting accounts for 0.26 %, according to data provided by the mayors of municipalities to the Ministry of Environment and Physical Planning. As can be observed in Figure 2.2, the situation has been drastically improved compared to 2008 when 74 % of the collected MSW were landfilled, and no treatment method was known for the remaining 26 % or 186 000 tonnes of MSW, which is presumed dumped in various locations across the country.

Figure 2.2 MSW treatment in FYR Macedonia



Source: Eurostat (2013a) and Ministry of Environment and Physical Planning (2012)

2.1.1 The recycling of MSW

Recycling and composting of MSW covers a minor 0.26 %, according to data provided by the Ministry of Environment and Physical Planning for 2012 (Ministry of Environment and Physical Planning, 2012).

One of the main goals in waste management in FYR Macedonia is the recovery of valuable ingredients of the waste to be organized by the producers, importers, distributors, and retail traders, as well as specialized service companies. Fractions of waste that can be recycled in a cost-effective manner in FYR Macedonia include particularly plastics, secondary and tertiary packaging, used tires, waste oils and lubricants, scrap metal, waste electric and electronic equipment. As substitute for non-renewable natural resources waste contributes to reduction of GHG emissions (SOER, 2010).

2.1.2 Landfilling of biodegradable municipal waste

Currently, nearly all biodegradable municipal waste collected by the municipal enterprises in FYR Macedonia is disposed into landfills. The biodegradable fraction of MSW is estimated to be about 62 % and therefore it would be of significant environmental advantage if biodegradable waste was diverted from landfills.

A multitude of regulations, incorporating elements of the Landfill Directive (1999/31/EC), have been adopted into the national legislative framework during the years 2007-2009 (ETC/SCP, 2011). Furthermore, in 2009, a set of targets was introduced quantifying the percentages of biodegradable municipal waste (BMW) that should be diverted from landfills. There are three milestones which need to be met by 2017, 2020 and 2027 (Table 2.3), by achieving a certain percentage reduction of BMW landfilled within a period of time starting from the year 2011.

Table 2.3 Targets for BMW diverted from landfill in FYR Macedonia

Year	Quantity of BMW that is allowed to be disposed on Landfill on the whole territory of FYR Macedonia (1 000 t)	Quantity of BMW landfilled, expressed as a mass percentage of MSW generated in 1995	Reduction of the quantity of BMW landfilled, expressed as a percentage reduction of the BMW generated in 1995
Reference year 1995	305	62 %	
2011-2017	229	47 %	25 %
2011-2020	153	31 %	50 %
2011-2027	107	22 %	65 %

Source: FYR Macedonia (2009a)

2.1.3 Packaging waste evolution

At the moment in FYR Macedonia there are four legal entities which have permissions for treatment of packaging waste (collective handlers):

1. Pakomak
2. Euro-Ekopak
3. Ekosajkl
4. Eko-pak hit

According to the annual report (submitted to the Ministry of Environment and Physical Planning) for 2011, the total amount of packaging placed on the market in the country is 48 340.83 tonnes.

Table 2.4 Packaging placed on the market (tonnes) and packaging waste recycled(tonnes) in 2011, by material

Type of material	Placed on the market	Recycled (or exported for recycling)	Recycling rate
Glass	9 241.36	29.00	0.31 %
Plastic	13 963.12	2 657.06	19.03 %
Paper and cardboard	16 660.45	2 927.32	17.57 %
Metal	1 691.37	66.96	3.96 %
Wood	2 973.93		
Composite materials	2 808.09		
Other/ packaging not selected by type	1 002.51		
TOTAL	**48 340.83**	**5 680.34**	**11.75 %**

Source: Ministry of Environment and Physical Planning (2012)

From the table above, it is noticeable that packaging placed on the market in 2011, by type, amounts to 48 340.83 tonnes. There were 1 002.51 tonnes of packaging which was not reported by its type. The total amount of collected packaging waste was 6 198.87 tonnes, of which 4 166.19 tonnes were packaging waste from municipal sources and 2 032.68 tonnes of packaging waste from other sources.

The amount of recycling in 2011 was 2 625.89 tonnes in FYR Macedonia, an amount which relates to recycled plastic material, whereas the exported amount for recycling and other types of processing waste was 3 054.45 tonnes. Specifically, the amounts exported for recycling, by type, were 2 927.32 tonnes of paper and cardboard, 29 tonnes of glass, 66.96 tonnes of metal and 31.17 tonnes of plastic.

In total, 5 680.34 tonnes were recycled, which corresponds to 11.75 % of the packaging placed on the market. Specifically, by type of material (Table 2.4), the recycling of glass packaging, in relation to the glass packaging placed on the market, is equal to 0.31 %; the recycling of plastic packaging, in relation to the plastic packaging placed on the market, is equal to 19.03 %; the recycling of paper and cardboard packaging, in relation to paper and cardboard placed on the market, is equal to 17.57 %; and the recycling of metal packaging, in relation to the amount of metal packaging placed on the market, is equal to 3.96 % (Ministry of Environment and Physical Planning, 2012).

2.1.4 Greenhouse gas emissions of waste management

It is not possible at the moment to include a detailed modelling of the GHG emissions and sinks of waste management, due to lack of data. However, it is possible to give an indication of the direct emissions of greenhouse gases that are reported to the IPCC for the waste sector.

The GHG emissions from the waste sector accounted for 7 % of the total greenhouse gas emissions in the country, according to the Third National Report of the FYR Macedonia to the Framework Convention on Climate Change of the United Nations (currently under preparation), which covers the period 2003-2009. The 90 % of the emissions of the waste sector comes from landfills, while the remaining 10 % arises from the combustion of waste and wastewater sludge (UNFCCC, 2013).

Table 2.5 shows the emissions from the waste sector in FYR Macedonia expressed in CO_2-eq. for the period 2003-2009.

Table 2.5 Emissions from the waste sector in FYR Macedonia for the period 2003-2009

	Emissions expressed in $CO_{2\ eq.}$ [kt]						
Sector	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**
Waste	832.55	838.82	840.22	851.85	862.25	872.21	880.85

Source: UNFCCC (2013)

Emissions from landfills expressed in CO_2-eq. by statistical regions of FYR Macedonia are shown in Table 2.6.

Table 2.6 Emissions from solid waste disposal sites shown by statistical regions in FYR Macedonia

Region	**Emissions expressed in $CO_{2\ eq.}$** [kt]
Poloski	118.48
Skopski	227.43
Northeast	66.57
East	68.36
Southeast	65.42
Vardarski	58.76
Pelagoniski	89.08
Southwest	84.23
TOTAL	778.69

Source: UNFCCC (2013)

There is a target in the National Waste Management Plan (2009) of FYR Macedonia for reducing greenhouse gas emissions from landfills by approximately 25 % CO_2-eq until the year 2014, compared to the amount of greenhouse gas emissions from landfills in 2008.

2.2 Uncertainties in the reporting

There is uncertainty concerning the accuracy of data on MSW, being estimated rather than measured, except for the main landfill Drisla in the capital Skopje. Regarding data collection and reporting there is an effort underway to improve the process and make it electronic.

Another issue which needs to be taken into consideration in waste data reporting in FYR Macedonia is whether the recycling figures of packaging waste are included in the total MSW recycling figures or not. Currently, it seems that the recycling figures of MSW are underestimated. There is an amount of recycled packaging waste which is reported separately and is not integrated into the MSW recycling rates.

In section 2.1.1 the recycling rate of MSW for 2012, as reported by the Ministry of Environment and Physical Planning, is equal to 0.26 %. In section 2.1.3 the amount of packaging waste recycled is equal to 5 680.34 tonnes which compared to the total MSW generated in 2011 of 735 thousand tonnes, equals to 0.77 % of material recycling. Taking into account that only 67 % of that packaging waste collected comes from municipal sources, the recycling of packaging waste which can be attributed to MSW is about 0.5 %. Consequently, the recycling figures for FYR Macedonia could be 0.5 % higher than reported today.

2.3 Important initiatives taken to improve MSW management

In terms of the legal aspects addressed in MSW management, a significant progress has been made. Implementation remains the key area that will determine the success of the plan in the period until 2015.

There are registered companies that perform processing of waste, including recycling of paper, cardboard, plastics and metals (Ministry of Environment and Physical Planning, 2012). The Ministry of Environment and Physical Planning and the Government support and facilitate municipalities in setting up regional bodies and boards, and in promoting plans and investments for the regional management of waste.

The process of establishing regional networks of waste treatment and disposal facilities under public private partnership is underway in two regions in FYR Macedonia. In two other regions, areas for the construction of waste management facilities have already been assigned. There is a plan for the construction of new waste management infrastructure, including waste collection, treatment and final landfilling of MSW at regional level. The new infrastructure is planned to cover more than 200 000 inhabitants per region, in order to reach the required economic threshold for the investments, and ensure the operation of the facilities at affordable prices (SOER, 2010).

Remediation of contaminated sites – hot-spots, i.e. industrial contaminated sites and non-compliant municipal and industrial landfills, is estimated to contribute significantly to the reduction of negative impacts on human health, agricultural land, biodiversity and nature. The closure and rehabilitation of around 23 ha of non-compliant MSW landfilling area and 11 ha of specific high-risk landfilling area is well underway and is planned to be finished within six years (SOER, 2010).

2.4 The future possible trends on MSW by 2020

The requirements concerning the capacity of municipal solid waste management systems will be greatly influenced by the future economic development of the country. The assumed future waste generation scenarios are related to population growth and GDP growth, following applied OECD methodologies. The annual rate of increase in the generation MSW waste in FYR of Macedonia is estimated at 1.7 % (NWMP, 2008).

The National Waste Management Plan includes financial estimates for two key areas, namely legislative development and infrastructure financing. Infrastructure investments are estimated at about EUR 51 million. Investments under these estimates cover the construction of two regional landfills and the upgrading of the main landfill Drisla in the capital city Skopje (ETC/SCP, 2011).

Finally, in the National Waste Management Plan of the Former Yugoslav Republic of Macedonia a set of comprehensive and ambitious targets is presented (Table 2.7). These demonstrate the keen interest of the country for the swift improvement of its MSW management performance in the future years.

Table 2.7 Targets for MSW management in FYR Macedonia

Activity / waste stream	Target	To be achieved by
Improving of collection of mixed municipal waste	collection efficiency 90 %	2014
Landfill of waste:		
- landfill of MSW on temporary facilities (after conditioning)	100 % of the collected MSW	2014
- landfill of MSW on facility compliant with EU standards	50 % of the total MSW	2014
- reduction of biodegradable waste disposed on landfills (transition period needed)	reduction to 75 %	2017
- reduction of the greenhouse gas emissions (landfills only)	reduction for app 25 % of CO2 eq.	2014
Packaging waste (transition period needed)	recovery 60 % recycling (minimum 55 %, maximum 80 %)	2020

Source: NWMP (2008) and Law of packaging and packaging waste (2009b)

References

Cvetkovska Margareta, 2011: 'Facts, trends and challenges in waste management in the Republic of Macedonia'
http://forum.eionet.europa.eu/eea-west-balkans-cooperation-interest-group/library/etc-scp-activities-wb/eea-wb-ipa-waste-2011/country-visits/former-yugoslav-republic-macedonia/presentation-waste

ETC/SCP, 2011: 'Waste policies factsheet for Macedonia (FYR)'
http://scp.eionet.europa.eu/facts/factsheets_waste/2011_edition/factsheet?country=MK

Eurostat, 2013a: 'Waste database municipal waste' [Accessed June 2013]
http://epp.eurostat.ec.europa.eu/portal/page/portal/waste/data/database

Eurostat, 2013b: 'National accounts (including GDP) database' [Accessed April 2013]
http://epp.eurostat.ec.europa.eu/portal/page/portal/national_accounts/data/database

Ministry of Environment and Physical Planning, 2012: http://www.moepp.gov.mk/default-MK.asp?ItemID=84F1C8FBC7AC644E9546F523C7B81FBC

NWMP, 2008: 'National Waste Management Plan of (2009-2015) of the Republic of Macedonia
http://www.moepp.gov.mk/WBStorage/Files/NWMP_2009-2015_%20of%20RM_finaL.pdf

PakoMak, 2013: 'Pakomak: Company for packaging and packaging waste management'
http://www.pakomak.com.mk/PakomakSite/en-index.html

FYR Macedonia, 2009a: 'Correction in the Rules on the amount of biodegradable waste allowed to be disposed into landfill (Official Gazette no. 108/2009)' *(Original title:* Исправка на Правилникот за количеството биоразградливи состојки во отпадот што смее да се депонира ('Службен весник на Република Македонија' бр. 108/2009)*)*
http://www.moepp.gov.mk/WBStorage/Files/Ispravka%20na%20Pravilnikot%20za%20kolicestvoto%20na%20biorazgradlivi%20sostojki%20od%20otpadot%20sto%20smee%20da%20se%20deponira.pdf

FYR Macedonia, 2009b: 'Law of packaging and packaging waste' *(Original title:* Закон за управување со пакување и отпад од пакување*)*
http://www.moepp.gov.mk/WBStorage/Files/Zakon%20za%20otpad%20od%20Pakuvanje%20-%20precisten%20tekst%20za%20informativni%20celi.pdf

SOER, 2010: 'Country assessments – Republic of Macedonia'
http://www.eea.europa.eu/soer/countries/mk/soertopic_view?topic=waste

UNFCCC, 2013: 'Greenhouse gas emissions by sector – waste' *(Original title:* Од каде доаѓаат емисиите на стаклени гасови во секторот – отпад*)*
http://www.unfccc.org.mk/content/Documents/INVENTORY/Otpad_FINAL.pdf