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Municipal waste management in Spain

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Context
The Topic Centre has prepared this working paper for the European Environment Agency (EEA) under its 2012 work programme as a contribution to the EEA's work on waste implementation.

Disclaimer

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Highlights

- Spain still maintains very high rates of landfilling, surpassing 50% of MSW generated in 2010. Nevertheless, Spain has been successful in meeting the targets set by EU Landfill Directive of BMW diversion from landfills in 2006 and 2009;
- Recycling has improved the last 10 years showing an increase of more that 10% from 21% in 2001, to 33% in 2010. Despite this progress, an extraordinary effort is still required if Spain is to meet the 50% target of the Waste Framework Directive by 2020;
- The first and second National Municipal Solid Waste Management Plans (for the periods 2000-2006 and 2008-2015 respectively) have been instrumental in the development of MSW recycling by introducing several initiatives, from separate collection of recyclables to upgrading recycling facilities, and many more;
- The Landfill tax which was adopted by the most highly populated regions of Spain contributed to the diversion of MSW from landfills and the valorisation of material resources through recycling.

1 Introduction

1.1 Objective

Based on historical MSW data for Spain and EU targets linked to MSW, the analysis undertaken includes:

- The historical performance on MSW management based on a set of indicators;
- Uncertainties that might explain differences between the countries' performance which are more linked to differences of what the reporting includes than differences in management performance;
- Relation of the indicators to the most important initiatives taken to improve MSW management in the country; and
- Assessment the future possible trends and achieving of the future EU targets on MSW by 2020.

2 Spain's MSW management performance

The first Spanish Waste Law was passed in 1985, forcing municipalities to approach the problem of waste and to take measures for protecting the environment. The 1997 Packaging Law (11/1997) and the 1998 second Waste Law (10/1998) aimed at establishing the responsibility and obligations of each party involved in the waste management process (this being absent from the one enacted in 1985). Furthermore, selective collection of materials was enforced at local levels, and national recovery and overall recycling objectives were set (Barlaz et al, 2002; Justice and Environment, 2011).

The Municipal Solid Waste Plan, covering the period 2000-2006 and supported by the second Waste Law, introduced specific targets and discussed the distribution of funds for infrastructure development and the launch of information/awareness campaigns. Although not a law, the terms of the plan have been legally binding since the 1998 law stated that the autonomous regions must comply with the plan in whatever form it is elaborated (Barlaz et al., 2002).

In December 2008, the Ministers' Council of Spain approved the Integrated National Waste Plan for the period 2008-2015 (Justice and Environment, 2011). The plan provides a comprehensive analysis of the waste management situation, and in comparison with the previous plan, incorporates several other waste streams (EEA, 2010) and is based on regional waste plans for all seventeen autonomous regions. The plan includes many qualitative and quantitative targets to be achieved by 2012 for the different waste management options as well as targets applying specifically to regions (Spain, 2012).

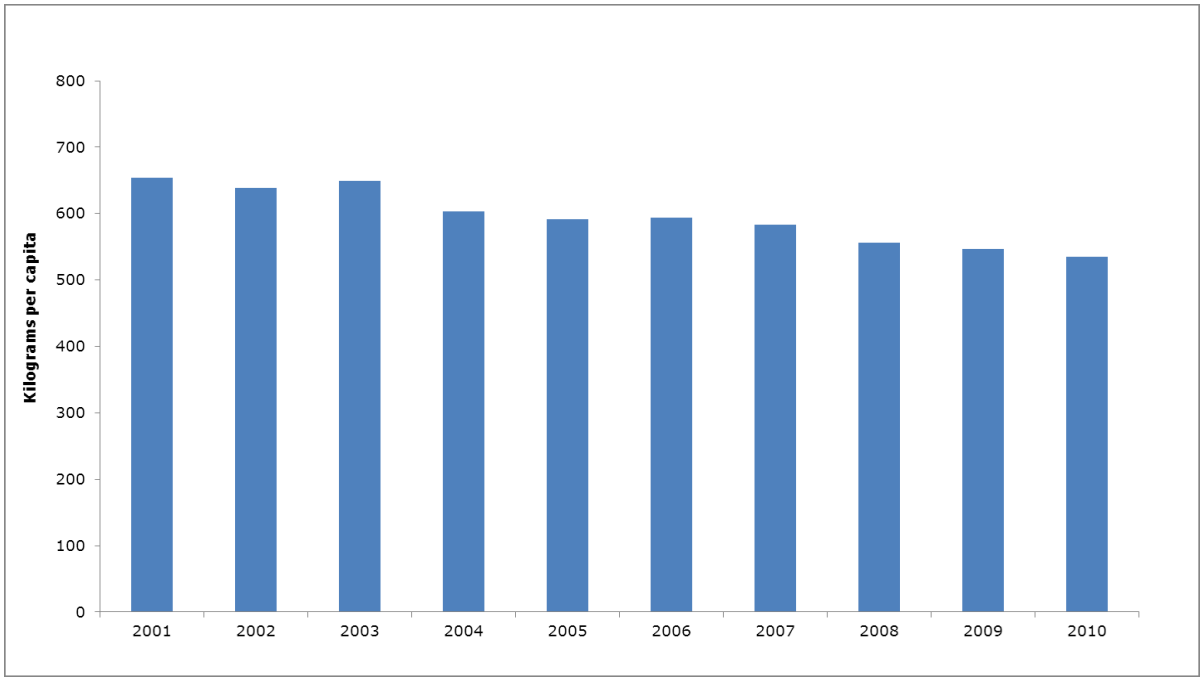
In July 2011 the new law (22/2011) on waste and contaminated soils came into force, transposing the Waste Framework Directive (2008/98/EC) into Spanish legislation and adopting all related targets and objectives (Ministry of Agriculture, Food and Environment, 2012).

Waste legislation in Spain is administered by the relevant authorities at different administrative levels. At the national level, the Ministry of Agriculture, Food and Environment is responsible for the national plans and attends to the authorization and inspection of waste shipments to/from third countries (outside EU). At the regional level, the autonomous regions are responsible for issuing strategic waste management plans for each specific region. They also attend to the authorization, inspection and sanction of waste management activities and the shipment of waste to/from EU countries. Finally, at the local level, the municipal authorities are responsible for the management of the urban waste (domestic, industry and commerce, offices and services), including separate collection and transportation of MSW (CIRIEC, 2010).

2.1 MSW Indicators

Figure 2.0 shows the development of MSW generation per capita in Spain from 2001 to 2010. There has been a gradual decrease during this period. In 2004 there is a break in series of the Eurostat data and a relatively abrupt drop can be observed between 2003 and 2004 compared with the previous years, falling from 649 to 603 kg per capita. Since 2004, the figure of municipal waste generated was computed after subtracting the amounts corresponding to (municipal) construction and demolition wastes and sludges. From 2004 to 2006 there is a marginal drop in MSW generation, while in the following period (2007-2010) the decrease is continuous and steady. However, only the data for the year 2009 is factual and the data for the years 2007, 2008 and 2010 are estimated. This decreasing trend is mainly attributed to estimations and the actual situation might be different in reality.

Figure 2.0 MSW generation per capita in Spain



Source: Eurostat, 2012

Spain has taken measures, initiated by the waste management plans, to reduce its dependency on landfills and has created a viable market in waste management, succeeding in diverting significant amounts of waste from landfill. Landfilling was steadily below 60 % of the generated MSW throughout the last decade. Since 2006, the absolute amounts of MSW have been decreasing, the figure was around 24.5 million tonnes in 2010 (9 % was incinerated). Recycling amounted to 33 % in the same year, following a peak of nearly 40 % in 2008.

Below some indicators are shown regarding the development of MSW management in Spain. Since 2004, the figure of municipal waste generated was computed after subtracting the amounts corresponding to (municipal) construction and demolition wastes and sludges (app. 7 % in 2004). Until 2003, these data were not subtracted from the overall figure as no information about this single variable was available (Eurostat, 2010).

2.1.1 The recycling of MSW from 2001 to 2010

Figure 2.1 shows the development of recycling of MSW in Spain related to total recycling, material recycling and organic recycling (compost and other biological treatment).

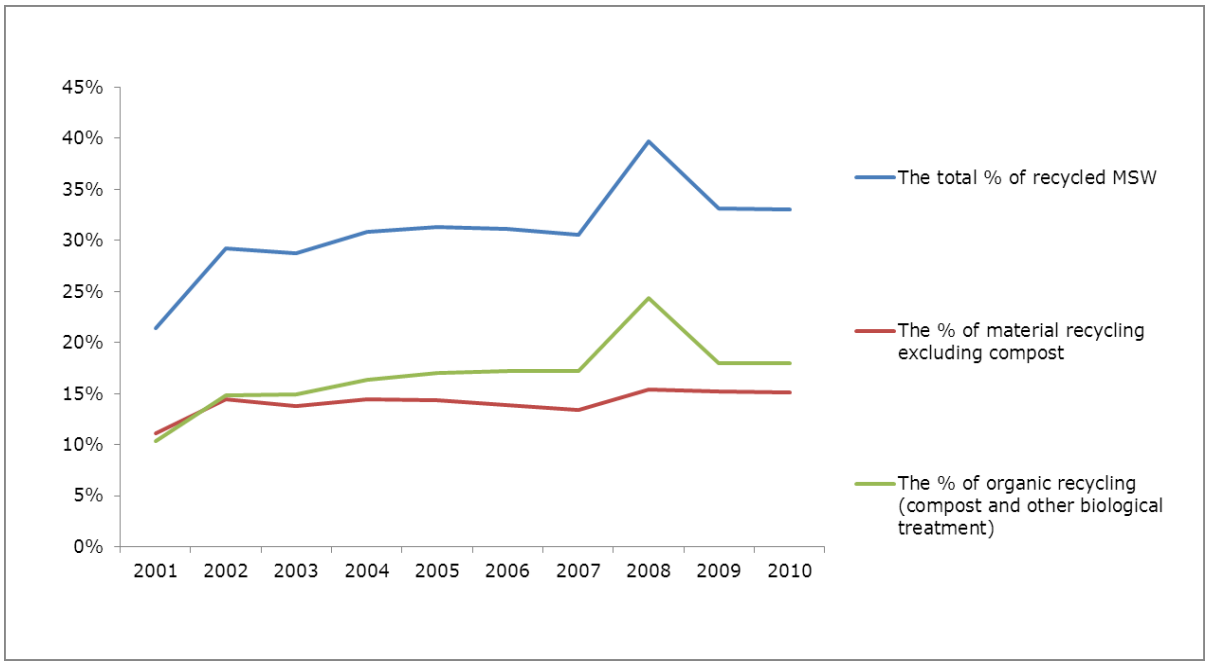
In 2001, the recycling rate was just over 20 % of the generated MSW but soon reached around 30 % and stayed at this level the following years. It is important to note that in absolute terms, the total recycling had been steady also in the previous years (2002, 2003) but the reporting of MSW created a small distortion of the real recycling rates.

The sudden increase of recycling observed between 2001 and 2002 could be attributed to the application of the first National Urban Solid Waste Management Plan and the fast uptake of the measures it introduced. After the first year though, development stalled significantly and there was only a small variation in the recycling rates each year.

A remarkable increase can be observed in 2008, which propelled MSW recycling to 40 %. The significant increase is observed mainly on organic recycling, which increased by 30 % compared to the previous year, from 4.5 million tonnes to 6.2 million tonnes, while material recycling increased moderately.

Unfortunately this dynamic trend was discontinued the following years, when both material and organic recycling returned to their pre-2008 rates and remained practically unchanged.

Figure 2.1 Recycling of MSW in Spain



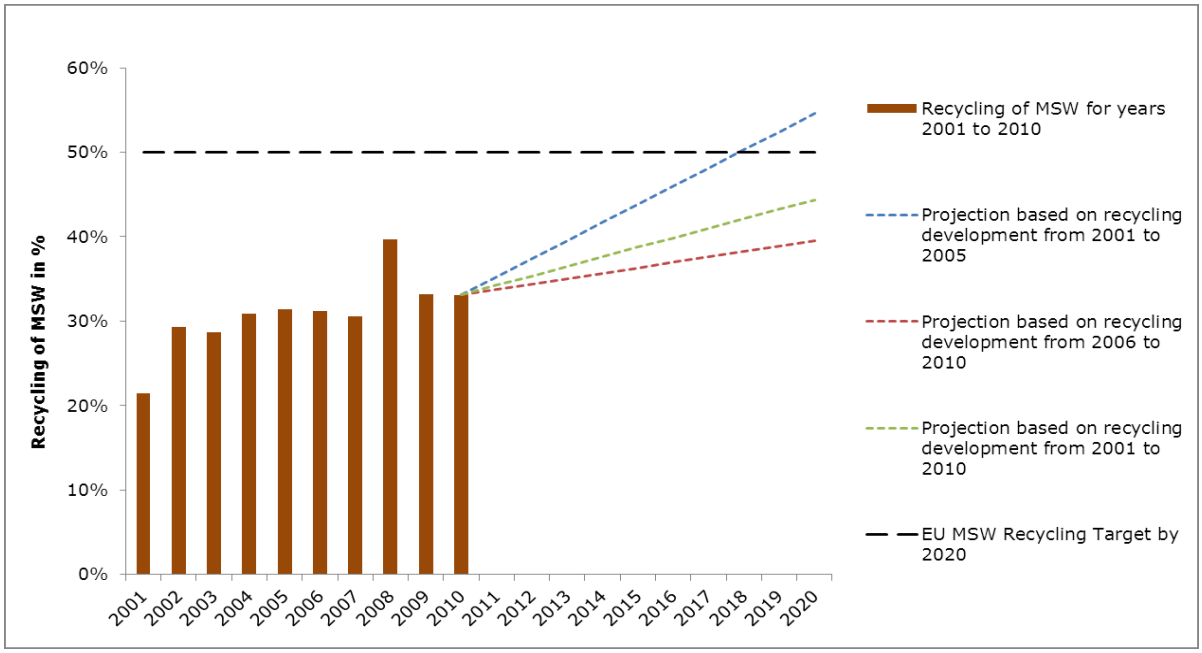
Source: Eurostat, 2012. Note: The percentages are calculated as % of generated MSW

2.1.2 The yearly increase rate of recycling of MSW

In order to assess the prospects for Spain to meet the 50 % recycling target as set out in the Waste Framework Directive[1], three scenarios have been calculated. The scenarios assume that recycling in the period 2010 to 2020 develops with the increase rates of recycling in the periods 2001-2005, 2006-2010 and 2001-2010. In Figure 2.2 different projections are presented based on linear regression of the recycling rates for different time periods and indicate the probability of whether or not the recycling target of 50 % by 2020 (WFD, 2008/98/EC) can be met in each of the scenarios.

[1] EU's updated Waste Framework Directive from 2008 (EU, 2008) includes a new 50 % recycling target for waste from households, to be fulfilled by 2020. In 2011, the European Commission decided that countries can choose between four different calculation methods to report compliance with this target. One of these methods is to calculate the recycling rate of MSW as reported to Eurostat (EC, 2011).

Figure 2.2 Future recycling of MSW in Spain



Source: Calculation by Copenhagen Resource Institute (CRI), based on Eurostat, 2012

It has to be kept in mind that these three scenarios are very simplistic and do not take into account any planned policy measures. In addition, they are based on one calculation methodology for recycling of municipal waste (MSW recycled/MSW generated, using data reported to Eurostat) whereas countries may choose to use another methodology to calculate compliance with the 50 % recycling target of the Waste Framework Directive. The scenarios in Figure 2.2 should therefore be interpreted only as to give some rough indications and assessment of the risk of missing the target.

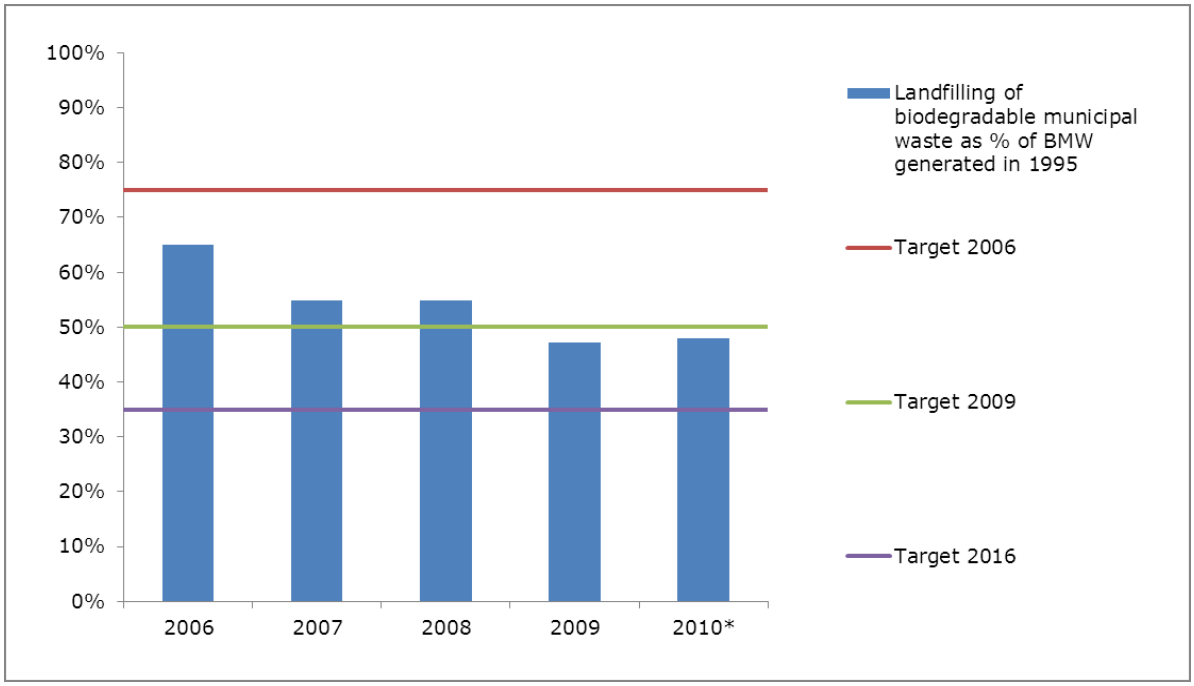
There would be a good chance of Spain fulfilling the 50 % target of the Waste Framework Directive if the future development of recycling followed the trend of the years 2001-2005. However, if Spain maintains the increase rate of recycling achieved throughout the period 2006-2010 or the period 2001-2010, the target would not be met. In any case, Spain needs to take an extraordinary effort to reach the target of Waste Framework Directive's recycling target of 50 % by 2020.

2.1.3 Landfilling of biodegradable municipal waste

According to the EU Landfill Directive Member States have to reduce the amount of biodegradable municipal waste landfilled (BMW) with a certain percentage by 2006, 2009 and 2016. The targets are related to generated amount of BMW in 1995, in which Spain generated 11 934 142 tonnes of BMW.

Spain has reported the landfilled amount of BMW to the European Commission for the years 2007, 2008 and 2009 (EC, 2012). Figure 2.3 shows that in 2006 Spain had already reached the target of the Landfill directive for 2006 and in 2009 reached the respective target for 2009, with 47 % of BMW going to landfill. Data for 2010 is missing, but when we estimate the amount of BMW going to landfill by subtracting the increase in amount of MSW going to organic recycling from 2009 to 2010 from the amounts of BMW being landfilled in 2009, there is no further reduction observed and more efforts are needed in Spain to achieve the 2016 target .

Figure 2.3 Landfilling of biodegradable MSW in Spain



Source: EC, 2012 and CRI calculation*. The figure for 2010 is estimated by CRI

2.1.4 Regional differences of MSW recycling from 2001 to 2010

There is no regional data for recycling reported to Eurostat by Spain.

2.1.5 The relation between landfill tax level and recycling level of MSW

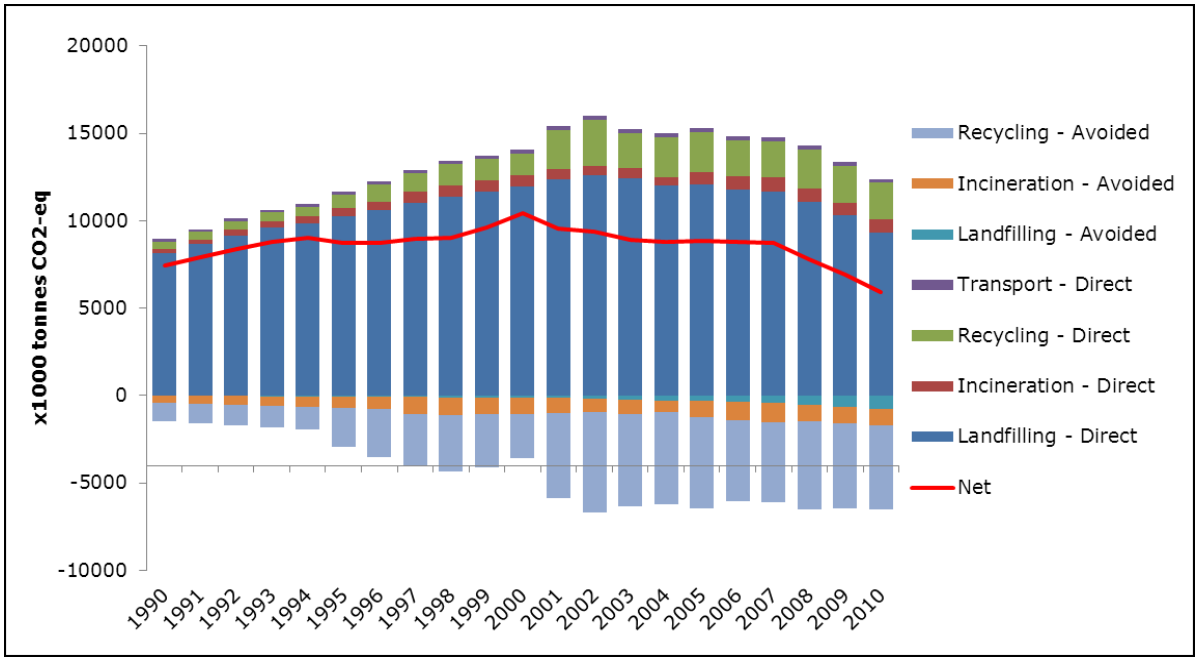
Spain has no national landfill tax but Article 16 of the Spanish Waste Act allows waste authorities in different regions of Spain to apply economic incentives in order to promote waste prevention and separate collection, including the introduction of landfill and incineration taxes on municipal waste. Furthermore, according to the legislation on taxation, the autonomous communities (regions) can, under certain circumstances, create their own taxes. Several regions in Spain have introduced taxes on landfilling and incineration but only the region of Catalonia has introduced a tax on landfilling of municipal waste, in 2004 (ETC/SCP, 2012).

Because of the fact that the landfill tax for municipal waste applies only for one region in Spain and also because Spain does not provide regional data but only national data of MSW generation and treatment to Eurostat, it is not possible in this report to investigate the effect of the development of the landfill tax in Catalonia on the recycling levels of MSW in Spain.

2.1.6 Environmental benefits of better MSW management

Figure 2.7 shows the development of GHG emissions from MSW management, calculated by using a life-cycle approach. The graph shows the direct emissions, the avoided emissions and the net emissions of the MSW management. Figure 2.7 shows a steady decrease of the net GHG emissions of municipal waste management in Spain since 2000, when GHG emissions peaked. The most important reason for this reduction are the significant avoided emissions which result from recycling as well as the reduction in the direct emissions from landfilling.

Figure 2.7 GHG emissions from MSW management in Spain



Results presented in this figure should not be used for the compilation of GHG reporting (national inventory report of the IPCC) or compared with IPCC figures, as the methodology employed here relies on life-cycle thinking and, by definition, differs from the IPCC methodology.

Assumptions concerning the production of Figure 2.7

All the GHG emissions (positive values) represent the direct operating emissions for each waste management option. These direct operating emissions have been calculated with the use of the IPCC methodology for landfills and incineration and life cycle modelling for the other technologies (recycling, bio-treatment and transport).

For the indirect avoided emissions (negative values), the calculations integrate the benefits associated with the recovery of energy (heat and electricity generated by incinerators, electricity generated by the combustion of landfill gas or methane from anaerobic digestion). Other avoided emissions include the benefits of recycling of food and garden waste, paper, glass, metals, plastics, textiles and wood in the municipal solid waste. Recycling is here assumed to include material recycling and bio-treatment. Avoided emissions of bio-treatment include fertilizer substitution. All processes generating electricity are assumed to substitute electricity mix of Spain in 2009. Processes generating heat are assumed to substitute average heat mix for the EU-25 in 2002. The electricity mix and heat mix are assumed to remain constant throughout the whole time series. The compositions of the MSW disposed in landfills, incinerated or recycled respectively are based on ETC/SCP (2011). The complete methodology is available from ETC/SCP (2011).

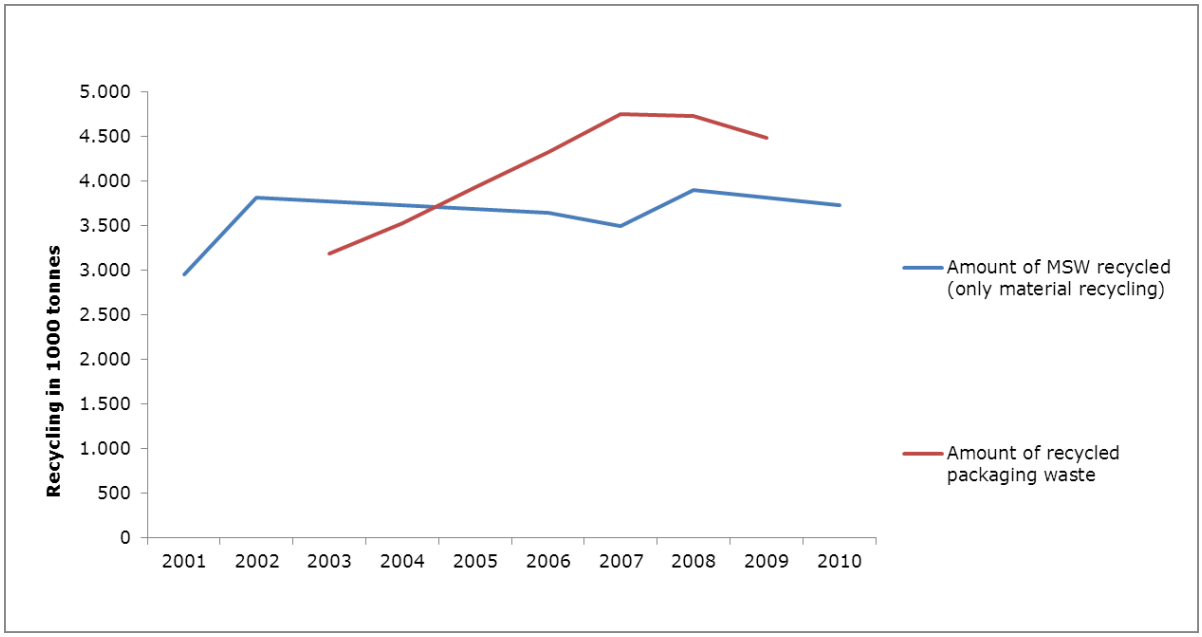
2.2 Uncertainties in the reporting

Some uncertainties or differences included in the reporting of MSW can result in different recycling levels. One example of such differences which might influence the recycling rate of MSW could be the extent of packaging waste from households and similar packaging from other sources that are

included in the reported recycling of MSW. Most Member States have producer responsibility schemes on packaging waste. Private operators of such schemes do not always report on the sources of the packaging waste, and the packaging waste is therefore not always regarded or reported to Eurostat as MSW.

In the case of Spain, Figure 2.8 shows that whereas the amount of recycled packaging waste increased considerably since 2003, the amount of recycled MSW did not follow this increase, and from 2005 and onwards the amount of recycled packaging waste is exceeding the reported amount of MSW recycled, reaching a remarkable difference of 1 million tonnes in 2007. The reason for this is that the recycled quantities of packaging waste reported include municipal and non municipal packaging waste. Therefore, the total amount of recycled packaging waste appears to be higher than the total amount of MSW recycled (Ministry of Agriculture, Food and Environment, 2012). However, it is not possible to draw any conclusions about the quantities of the separate fractions of municipal and non municipal packaging waste and how they could affect the total amounts of MSW recycled, so a level of uncertainty still remains.

Figure 2.8 A comparison of packaging waste recycled and material MSW recycled



Source: Eurostat, 2012

Another factor for uncertainty could be MSW sent to Mechanical Biological Treatment (MBT), where the whole amount received at the MBT plant in some countries is allocated to recycling. In other countries it is in fact only the actual amount recycled after the MBT, which is reported as recycled MSW, excluding the amount subsequently sent to landfilling or incineration after MBT treatment.

In Spain, around 5 % to 25 % of the local population is directly connected to a MBT plant and therefore considerable amounts of MSW are treated in MBT plants, (up to 1 million tonnes of MSW per year). The waste stream that is mechanically sorted prior to biological treatment is usually split into recyclable fractions (this also applies in aerobic digestion systems), while energy recovery is of relatively little importance (Steiner, 2007). In Spain, only the actual amount of waste recycled after MBT is included in the reporting as recycled MSW and the amount that is not recycled is allocated to landfilling or incineration depending on the fate of the secondary waste (Ministry of Agriculture, Food and Environment, 2012). Therefore, there is no uncertainty in the reporting of MSW sent to Mechanical Biological Treatment.

2.3 *Important initiatives taken to improve MSW management*

The most important initiative, which legally binds all waste management activity in Spain, is the National Waste Law (10/1998) which came into force in 1998. It is a national Waste Framework legislation. The law introduces the separate collection of MSW in all municipalities in Spain having more than 5 000 inhabitants and most importantly it is banning the disposal of recyclable materials (ETC/SCP, 2006).

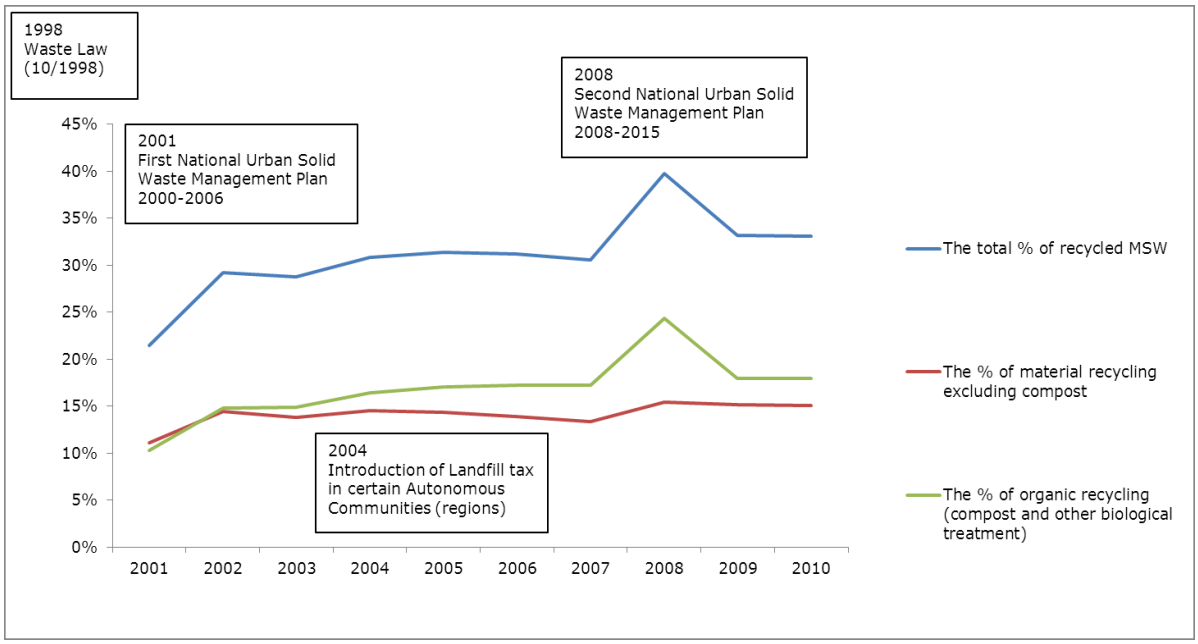
For the effective and timely implementation of the National Waste Law, the first National Solid Waste Management Plan 2000-2006 was drawn, which set targets for the waste management in Spain. It introduces the streamlining of treatment and disposal of MSW, trying to keep under control the MSW arising. Special attention is given to the valorisation of BMW, especially via composting (ETC/SCP, 2006).

From 2004, in some of the autonomous communities (regions) of Spain, a landfill tax was introduced in an effort to divert as much as possible waste from landfills but it is only in Catalonia where the tax applies to MSW (ETC/SCP, 2012). At the same time, additional investments in waste infrastructure and separate collection schemes reinforced the taxation schemes (ETC/SCP, 2006).

In December 2008, the second National Solid Waste Management Plan 2008-2015 updated and reintroduced some of the concepts of the previous plan and set ambitious targets for the 7-year period. Specifically it set the three 'R's (reduce, re-use, recycle) framework as the main driver of Spanish waste management and set out the guidelines and the main measures to be implemented, which are developed in thirteen specific plans for each type of waste (CIRIEC, 2010).

Apart from the national plans, regional plans are equally important in the management of MSW in Spain. Already in 2001, Catalonia had introduced its own Waste Management Plan, the Catalan Municipal Waste Management Programme (PROGREMIC). It was more far-reaching than plans from other regions and set a good example for the other regions of Spain to follow (ETC/SCP, 2006).

Figure 2.9 Recycling of MSW in Spain and important policy initiatives



2.4 Future possible trends

Figure 2.2 shows that Spain would be able to fulfil the target of 50 % recycling of MSW by 2020 if the annual increase rate would follow the development pattern of the period 2001-2005. To achieve this rate will take an extraordinary effort.

Whatever the case, Spanish recycling efforts will require a minimum increase of 1.7 percentage points per year between 2010 and 2020 in order to reach the 50 % target by 2020. This can only be achieved by the systematic and concentrated effort of all stakeholders involved in urban waste management in national, regional and local level.

According to the EEA's State of the Environment and Outlook 2010 country assessment for Spain (EEA, 2010), waste generation in Spain in 2020 is likely to be linked to economic circumstances. Nevertheless, the preventive measures implemented under the 2008-2015 National Integrated Waste Plan (PNIR), approved in December 2008, are expected to notably reduce waste generation, increase recycling rates, and lower landfill. Waste generation has already shown a tendency towards reduction since 2007 and is expected to continue as the economic crisis remains.

Further measures are needed in order to enhance recycling. Some of the measures set out in the PNIR have already been implemented, and others will be put into practice during the remainder of its term. These are expected to decrease the impact on the natural environment significantly in coming years (EEA, 2010).

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