

Managing construction and demolition (C&D) waste – a European perspective.

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Abstract. In many countries, levels of Construction and demolition (C&D) waste generation have risen due to the rapid growth of towns and cities. Although now the activity has entered in a phase of decline, due to the change of the economic cycle, we don't have to forget all the problems caused by such waste, or rather, by their management. In this sense, important developments have been incorporated into European and International laws which aim to promote recycling and recovering.

Therefore, the main objective of this research is to give an overview of the current situation of C&D waste in Europe, as well as the different measures that have been applied to solve this situation.

Results show that countries with a high percentage of recycling rate of C&D waste take into account the recycling of soil, which correspond to a large part of the waste recycled. In this sense, soil is excluded in the new recycling target for C&D waste. Therefore, we can conclude that the management chosen for the C&D waste in Europe is still far from achieving the target for recycling, which demands an overall target of 70% for C&D waste should be recycled by 2020.

Keywords: Construction and demolition waste; Europe; Legislation; Generation rate; Recycling.

1. Introduction

In most European countries there was an increase in the generation of construction and demolition (C&D) waste during the 1990s [1]. Until today, no official information on generation and composition of the C&D waste has been found for all of the European Union (EU) members. The statistical office of the European Communities (Eurostat) provides information on generation and composition of C&D waste in 2008.

Moreover, the waste stream from the construction was identified as a priority waste stream by the EU, as it constitutes one of the largest waste streams, since it represents approximately 49% of the total waste generation in the EU. This represents 887 million tonnes of construction and demolition waste is generated in the EU in the year 2008 [2]. The C&D waste, generated by the EU countries include a wide range of materials, mostly inert such as: excavation materials, road construction and maintenance materials, but also can contain hazardous waste types, which can be present in significant proportions when buildings are demolished or renovated.

The generation of C&D waste per capita varies a lot between EU countries (figure 1) [3]. All countries where data for more than one year is available have seen an increase in generation per capita in the period 1995 to 2005 (except Germany). However, there are large variations in data quality and reference years [4]. In particular, these differences between countries in generation of C&D waste per capita are very high.

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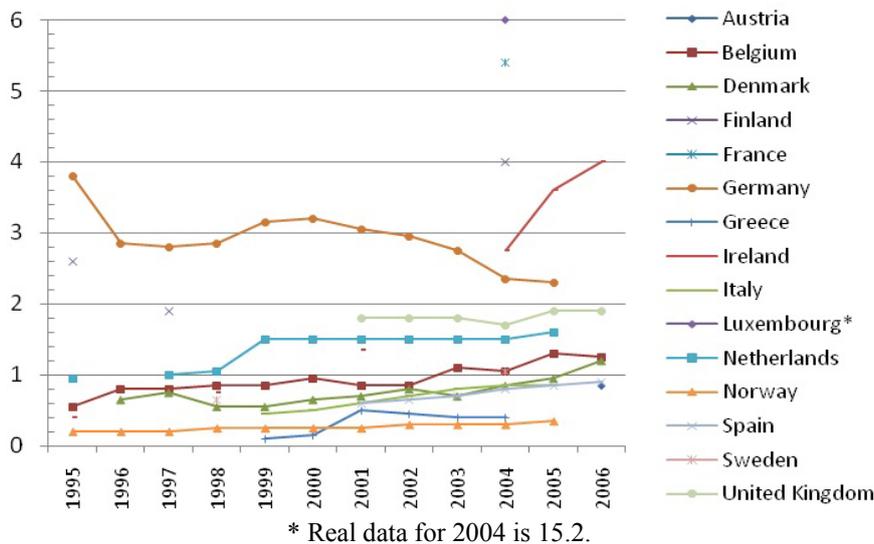


Fig 1. Tonnes of C&D waste per capita.

It can be assumed that the differences in the amount of waste from C&D activities derive from the: differences in building tradition; poor quality of available data; unequal levels of control and reporting of C&D waste in Member States; and differences in definitions. Moreover, in an attempt to correct the serious effects which the C&D waste produce on the environment, important developments have been incorporated into European and International laws, which aims to promote the culture of reuse and recycling.

2. Waste management legislation in the European Union

Waste management legislation is based on European law, all member states of the EU and of the European Economic Area (EEA) are bounded by the principles and targets introduced by EU waste legislation. In general, these policies must be transposed to the national laws of each country and the member states should be responsible for carrying out the waste management, which follows the principles of the waste hierarchy [5].

Environmental protection, and thus by definition also waste legislation, is one of the core concerns within the EU [6]. Regarding waste, it is reasonable to differentiate between two different periods; the years before and the years after 1990. The EU legislation on waste from 1975 to 1990 was dominated by administrative requirements (Member States must make waste management plans; EU has to establish a European Waste Catalogue and Member States have to transpose it...). Before 1990 no binding obligation on how to treat waste was introduced by the EU apart from refining waste oil. However, the period from 1990 to 2008 has been characterised by the introduction of a huge range of recycling initiatives and targets in different directives.

In June 2008 the European Parliament and the Council of the EU agreed on new recycling targets for C&D waste. The agreement is part of the new EU WFD (2008/98/EC) [7] which tries to move forward to a European recycling society and is considered one of the pivotal European Directives. This directive regulates general aspects of European waste legislation and, as well as outlining waste management measures and the obligations incumbent upon the originators and proprietors of waste, it also contains the general obligation for Member States to avoid waste and to recover and dispose of it in an environmentally compatible manner.

The WFD states the following target for C&D waste: “By 2020 the preparing for re-use, recycling and other material recovery, including backfilling operations using waste to substitute other materials, of non-hazardous construction and demolition waste excluding waste defined in category 170504 in the European Waste Catalogue (EWC) [8] shall be increased to a minimum of 70% by weight.”

It should be noted that the WFD does not include targets for individual waste types belonging to C&D waste, but does demand an overall target of 70%. The following measures are used by the EU/EEA countries to reduce de C&D waste generated:

- Landfill regulations: A stricter control of landfilling, for certain waste types of C&D waste represents a major driver towards better management. For example, in Denmark, it is forbidden the disposal in landfills of the waste that can be incinerated, as well as in the Netherlands or Germany, the disposal of waste that can be recycled. In addition, Denmark has a landfill disposal fee and a voluntary agreement with good practices and environmental management systems for demolition activities [9]. By the other hand, the Netherlands have a high rate of landfill disposal (approximately 83€/t) compared with other countries like Spain which the average rate of admission is around 12 €/t.
- Waste management Policy: Environmental policy should be based on; the precautionary principle, the polluter pays principle and the principle of co-operation. The producer of waste is required to consider the environmental impacts and possible risks occurred during his activity, in collaboration with the other agents involved. The producer should develop a system which minimizes the adverse environmental impacts and maximizes the recovery of resources. For that reason, the implementation of a waste management policy with not only economic instruments (taxes on landfill), but legal measures such as: demolishing selectively obligation, voluntary agreements and responsibilities. This measure is widely used in United Kingdom, Austria or Germany.

Also Spain has implemented a C&D waste policy with the development of the Second National Plan on C&D waste in 2008 [10] and the Royal Decree 105/2008 [11]. In this aspect, the construction industry is obligated by law to select and recover some types of C&D waste if the quantity generated exceeds a certain amount of waste. Austria also applies this measure, but in particular, the Spanish construction companies must segregate individually the different types of waste if they exceed the following amounts: >80t concrete; >40t bricks & tiles; >2t metal; >1t wood; >1t glass, >0.5t plastic; >0.5t paper.

- Voluntary Commitment: The implementation of a national voluntary commitment of the construction industry which aims to reduce 50% the amount of C&D waste landfilled, is a measure tried by Germany since 1996 [12], which has given good results.
- Quality Standards: The implementation of secondary raw material regulation and standards, for example standards on the quality of secondary materials from C&D waste. This is the most common measure; it is used in Belgium, Germany and Finland.

Among the main weaknesses of waste management policies and strategies include: Lack of practices to minimize waste generation; Lack of segregation practices on site of the different waste fractions; Lack of waste recovery practices; Low cost of littering compared to the additional costs of proper waste treatment; Lack of knowledge by agents of how to prevent C&D waste; Lack of adequate infrastructure network for treatment; and lack of a homogeneous distribution of such infrastructures in the territory generates shortfalls in areas with greater dispersion of population and, conversely, excess processing capacity in relation to the amount of C&D waste generated in other regions.

3. Recycling of C&D waste

3.1. Recycling rates of C&D waste

As seen before, Eurostat provides information on generation of C&D waste, but it does not provide information about recycling. In general, data about generation, composition and recycling of C&D waste are very limited, particularly regarding its development over time. To date, “The Recycling Society and its Environmental Effects” is a project which the European Topic Centre on Resource and Waste Management (ETC/RWM), is undertaking in cooperation with the European Environment Agency (EEA). This project identifies the present levels of recycling of different municipal waste streams and construction and demolition waste in the EU Member States and Norway, and their development over the last 10 years.

The current situation in Europe has improved slightly, since the C&D waste recycling averages reach approximately 47% for EU-27. Although this average is still far from the goals set in the European Management Plans of C&D waste. The recycling levels for the different waste types are shown in figure 2, using a colour scale.

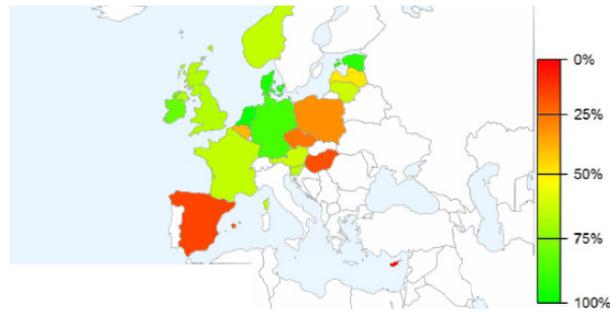


Fig. 2. Recycling rate of C&D waste.

As seen in figure 2, the recycling rate varies significantly among the countries. Five northern countries fulfill the Directive’s target recycling rates, reaching over 80% of C&D waste generation. By contrast, the southern countries recycle a very small part of C&D waste. The position of Spain regarding EU countries is not encouraging, even today, continues at the bottom of the list, with a recycling rate not reaching 40%. The significant differences on the management of C&D waste in each of the EU countries are mainly due to the following reasons: (1) The landfill prices are low and the penalties for breach are generally small or they do not exist. (2) Low-cost of raw materials is a harsh competition with recycled materials. (3) The management models used differ considerably from one country to another due to different levels of environmental protection. Although some countries have introduced years ago, preventive measures aimed at the recovery of waste, the C&D waste generated by most of them, are simply dumped in illegal landfills. This illegal disposal is a widespread management for the construction and demolition waste. (4) The different regulations in relation to C&D waste also reveal important differences between EU members. Laws affecting them are not unified, and very few states have specific legislation on C&D waste.

3.2. Composition of recycling of C&D waste

Not all countries have reported data on recycling of C&D waste to Eurostat. Despite this, results show that concrete, bricks, tiles and asphalt are the most commonly recycled C&D waste fractions, but almost all countries with a very high recycling level also recycle a significant quantity of soil (Figure 3).

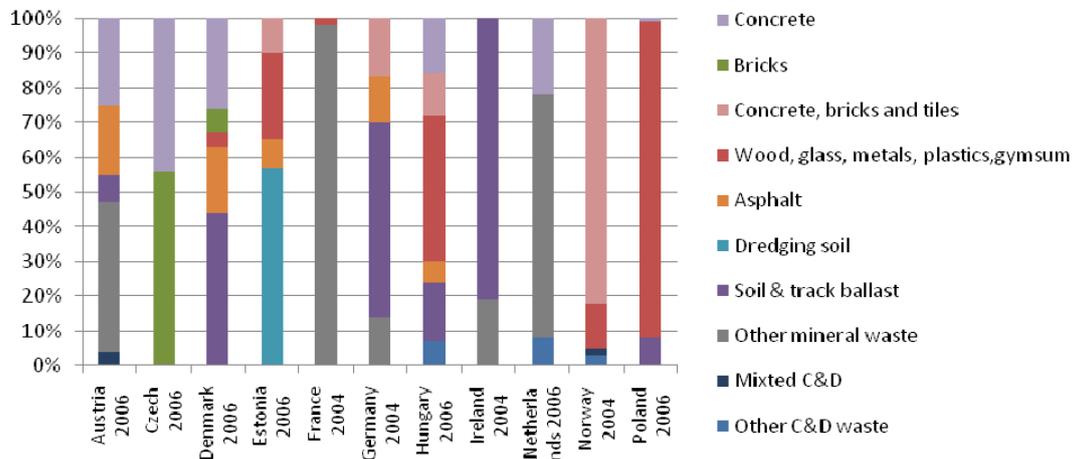


Fig 3. Composition and development of recycled C&D waste.

The very high recycling levels in some countries can possibly be explained by the composition of the recycled waste. It is possible to identify recycling of concrete, bricks, tiles and asphalt in all countries with recycling except Ireland and France. Denmark, Germany and Ireland have a high rate of soil and track ballast included in the recycling figures. France and the Netherlands have a high rate of other mineral waste included in the recycling figures, whereas Estonia has a high rate of dredging soils.

These results indicate that data on C&D waste does not include the same waste categories in all countries. Both dredging soil, soil & track ballast constitute a large part of the recycling. Denmark, Estonia, Germany and Ireland all recycle over 70% of generated C&D waste, but a minimum 40% of the total recycling is by the recycling of dredging soil, soil and track ballast.

The target of 70% recycling of non-hazardous C&D waste in the new WFD includes backfilling operations but excludes naturally occurring material defined in the category 170504 in the European Waste Catalogue (soil and stones not containing dangerous substances). It seems Denmark, Estonia, Germany and Ireland might exhibit a lower level of total recycling in tonnes if category 170504 is excluded. The precise influence of this on the recycled percentage of generated waste is difficult to gauge, since the generated amount of this waste category should also be excluded.

Further, most of the countries with a high total recycling as a percentage of generated waste also have a high amount in tonnes of recycled concrete, asphalt, metals.

4. Conclusions

It has been difficult to obtain sufficient and standardize data for all of the countries, especially in the recycling rate. In addition, as it has been shown, the generation rate in ton per capita differs among countries, due to the differences in building tradition or the economic activity of the country.

By the other hand, the recycling rate is quite reasonably in percentage (>50%) for most of the countries analysed. Moreover, the waste which comes from concrete, bricks, tiles and asphalt, is the most common waste which is being recycled by most of the EU/EEA members. Nevertheless, countries with a high percentage of recycling rate of C&D waste take into account the recycling of dredging soil, soil and track ballast, which correspond to a large part of the waste recycled. In this sense, soil is excluded in the new recycling target for C&D waste, according to the new WFD.

Therefore, we are still far away to reach the recycling target for 2020, we still need to improve national and European legislation, making great efforts to unify the data and definitions, towards the correct management of the C&D waste generated in the construction activity.

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