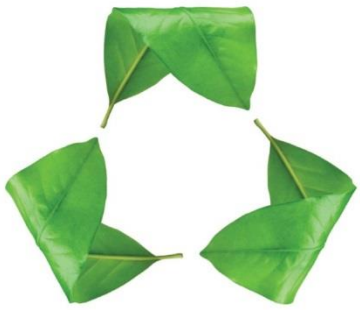
Workshop “Improving management of construction and demolition waste”

25 May 2016
Rue Philippe Le Bon Straat 3, Brussels

Background paper



Introduction

Context of the study

Construction and demolition waste (CDW) has received more and more attention in the past few years as it is a lens to understanding the potential for resource efficiency improvement in the construction sector. Indeed, construction and workshop activities are the main source of waste in the EU and currently, an important part of this flow is made of materials that can be readily recycled (glass, concrete, etc.) but with a recycling potential still under-exploited. Moreover, recycling performances between EU Member States (MS) differ significantly between MS (from 10% to 90%), showing that MS with the lowest recycling performances can certainly improve by applying good practices from MS with the highest recycling performances. The potential to increase construction sector resource efficiency by increasing CDW recycling rate is significant.

However, identifying and transferring good practices is not an easy task. In fact, practical management of CDW varies greatly across MS (due to local variations in context, legislation, enforcement, and construction practices). Moreover, monitoring and data capture of recycling performance are often not accurate, due to traceability and availability issues. Monitoring MS performances in recycling CDW is a real challenge that the MS and European authorities are facing. It is however an essential step in evaluating MS progress toward recovery targets.

Purpose of this background paper

This background paper was prepared in the context of the stakeholders' workshop that will be held the 25 May 2016 at the premises of the European Commission in Brussels, in the framework of the project 'Resource efficient use of mixed waste'.

The purpose of this background paper is to:

- Introduce the seminar on "Improving management of construction and demolition waste"
    - Objectives
    - Programme
    - Practical details
- Present the study "Resource efficient use of mixed waste"
    - Objectives
    - Content
    - Performance of the Member States, drivers and barriers
- Present the six breakout sessions that will be held during the workshop, around six key issues identified in the study:
    - EU targets
    - Prevention
    - Demolition practices
    - Reuse
    - Recycled materials market
    - Data

1. Workshop : Objectives, programme and details

1.1. Workshop objectives

The one day workshop has two key objectives:

- Discuss the findings of the study and share best practices.
- Carry out an open exchange of views with the aim of achieving a good understanding of barriers and opportunities, and the measures, tools and steps to take in order to address barriers and realise opportunities. It should also be considered how European legislation and funds could be used to improve the situation in the Member States.

Please do note that the measures that are presented for discussion could be implemented at EU level, at national level or at regional level. The fact that a given measure (e.g. taxation) is not suitable for EU-wide application should not prevent us from discussing their validity at national or regional level.

1.2. Workshop programme

In order to meet the aforementioned objectives, two forms of exchanges will be proposed:

- A plenary session to present the preliminary findings of the study
- Six thematic breakout sessions to enable exchanges of views between participants and discuss possible solutions at European level.

9:15	**WELCOME AND REGISTRATION**
9:30	**OPENING AND INTRODUCTION**
Welcome, purpose of the meeting. Presentation of ongoing initiatives on CDW Julio García Burgués, European Commission, Head of Unit, DG Environment	
9:40	**MANAGEMENT OF CONSTRUCTION AND DEMOLITION WASTE : STATE OF PLAY AND LESSONS LEARNT FROM THE STUDY**
Study, Current situation, key problems and challenges, preliminary conclusions Mathieu Hestin, Bio by Deloitte ; Gillian Hobbs and Katherine Adams, BRE ; Marie Pairon, ICEDD	
10.20	**PRESENTATION OF THE TOPICS OF THE BREAKOUT SESSIONS**
Mathieu Hestin, Bio by Deloitte	
10.30	**FIRST BREAKOUT SESSION**
1st topic: EU targets (Room 0.1, ground floor) Targets for CDW – Backfilling Session facilitated by Gillian Hobbs, BRE Speakers: Maria Arm, SGI ; John Barritt, John Barritt Consulting ; Geert Cuperus, FIR	
2nd topic: Prevention (Room 1.11, 1st floor) Prevention targets, eco and long-lasting design criteria, promotion of modular design Session facilitated by Katherine Adams, BRE Speakers: Caroline Henrotay, Brussels Environment (IBGE/BIM) ; Katherine Adams, BRE	

3rd topic: Demolition practices (Room 4.61, 4th floor) Sorting on site, pre-demolition audits and post-demolition reporting Session facilitated by Mathieu Hestin, Bio by Deloitte Speakers: Johan D'Hooghe, EDA ; Hervé Grimaud, Recylum ; Jean-Yves Burgy, Recovering	
11.45	**COFFEE BREAK**
12.00	**SECOND BREAKOUT SESSION**
4th topic: Reuse (Room 1.11, 1st floor) Drivers and barriers Session facilitated by Katherine Adams, BRE Speakers: Petr Hradil, VTT ; Claus Juul Nielsen, Gamle Mursten	
5th topic: Supporting the recycled materials market (Room 4.61, 4th floor) Green public procurement, standards for recycled materials, material content traceability, end of waste criteria Session facilitated by Mathieu Hestin, Bio by Deloitte Speakers: Brian James, UEPG ; Vincent Basuyau, European Commission – DG GROW ; Geert Cuperus, FIR	
6th topic: Data / Statistics (Room 0.1, ground floor) Level of detail, exhaustiveness, quality of data across all MS Session facilitated by Marie Pairon, ICEDD Speakers: François Wiaux, ICEDD ; Gillian Hobbs, BRE ; Dr C.P Baldé, Statistics Netherlands	
13:15	**LUNCH BREAK**
14.15	**RESTITUTION OF THE BREAKOUT SESSIONS**
Conclusions	
Questions and answers	
15.15	**MANAGEMENT OF HAZARDOUS CDW**
Asbestos management in Flanders, Belgium Philippe Van de Velde, OVAM	
16.00	**COFFEE BREAK**
16.15	**DEBATE: How to move towards CDW management in line with the waste hierarchy – priority of actions**
Discussion with Gerben-Jan Gerbrandy (MEP), Gunther Wolff (European Commission, DG Environment), Geert Cuperus (Fédération Internationale du Recyclage), Christophe Sykes (Construction Products Europe)	
17.00	**CLOSING SESSION**
Conclusions, next steps Mathieu Hestin, Bio by Deloitte – Recapitulation Mr Julio García Burgués, European Commission, Head of Unit, DG Environment – Conclusions	
17.15	**Close of the meeting**

1.3. Practical details

Date and time

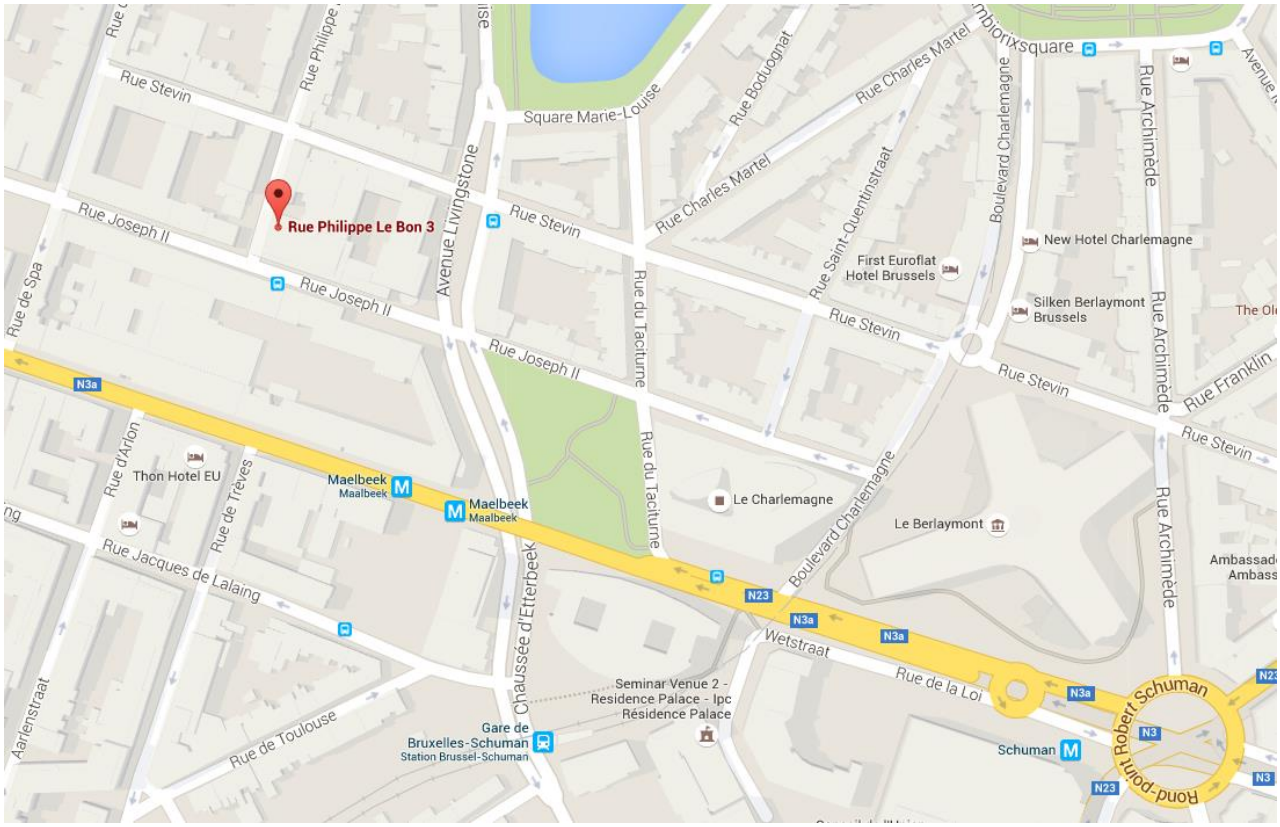
The workshop will be held on Wednesday, 25 May 2016, from 9:30 to 17:30

Please arrive earlier so that the workshop can start on time.

Venue

The workshop will take place at the premises of the European Commission in Brussels, at rue Philippe Le Bon straat 3, Brussels.

The closest subway station is Maelbeek.



Access

Please note that a valid official identity document will be required to access the workshop.

2. Study: objectives, content and Member States performance

2.1. Objectives of the study

The main objectives of the project 'Resource efficient use of mixed waste' are the following:

- Analyse the current CDW management situation in the Member States "on the ground", against the background of national (and/or regional, where appropriate) waste management plans and waste prevention programmes, as well as their implementation in practice, in order to identify obstacles to recycling and potential deficiencies in CDW management practices in the Member States that could lead to non-compliance with EU waste legislation, in particular the waste hierarchy and the recovery target for CDW established in Article 11 of the Waste Framework Directive;
- Perform 6 case studies of entities (regions, municipalities and companies) with a good record as regards management of CDW, explaining why they can be regarded as success stories and highlighting their main key elements that contributed to their success, as well as the necessary preconditions;
- Identify good practices in terms of creating conditions for increasing CDW recycling rates and for improving the quality of recycling and recovery and formulating a set of recommendations to address the deficiencies observed in those Member States (MS) where management of CDW can be improved;
- Assess the plausibility of official CDW data, identifying the sources of inaccuracy, identifying best practices regarding data in Member States or regions and formulating recommendations to ensure that CDW can be effectively traced and that data duly reflect the actual waste raisings.

2.2. Content of the study

For the effective fulfilment of the abovementioned objectives, the work was broken down into four tasks, accompanied by the organisation of a workshop towards the end of this project:

- Task 1: Diagnosis of the situation as regards CDW generation and management in the EU Member States, including the distance to the target defined in Article 11 of the Waste Framework Directive;
- Task 2: Case studies;
- Task 3: Identification of good practices related to creating conditions for a sustainable management of CDW;
- Task 4: Assessment of the reliability of CDW data, including plausibility checks. Proposals for the improvement of CDW data.

2.3.Performance of the Member States, drivers and barriers

This section presents the performance of the Member States regarding generation and treatment of CDW. It also presents drivers and barriers for increasing resource efficiency in CDW management, as well as the lessons learned from the case studies.

2.3.1. CDW generation performance

The amount of CDW generated relative to the construction industry (amount of waste in tonnes /turnover of the construction sector in € Million) is shown in figure 1 for each MS together with the average for all MS. The data relates to waste generated and turnover for 2012 from Eurostat (with the exception of Ireland turnover data which is for 2011 and comes from the country report).

The confidence level in terms of the results should be viewed within the context of the data quality. Until all MS have a similar level of data quality it will be difficult to carry out a quantitative comparison of MS performance and have confidence in the trends that may be seen in the chart. As part of Task 4, data have been reviewed for each MS, scored out of 5 and converted into a quality level of poor, modest or good. The amount of CDW generated relative to the construction industry for each MS has been colour-coded according to the MS CDW data quality score, as shown in Table 1.

The ratio of CDW generation and the turnover of the construction sector can be regarded as an indicator of the waste intensity of the construction and demolition activities. However, several factors that render comparisons difficult have to be taken into account:

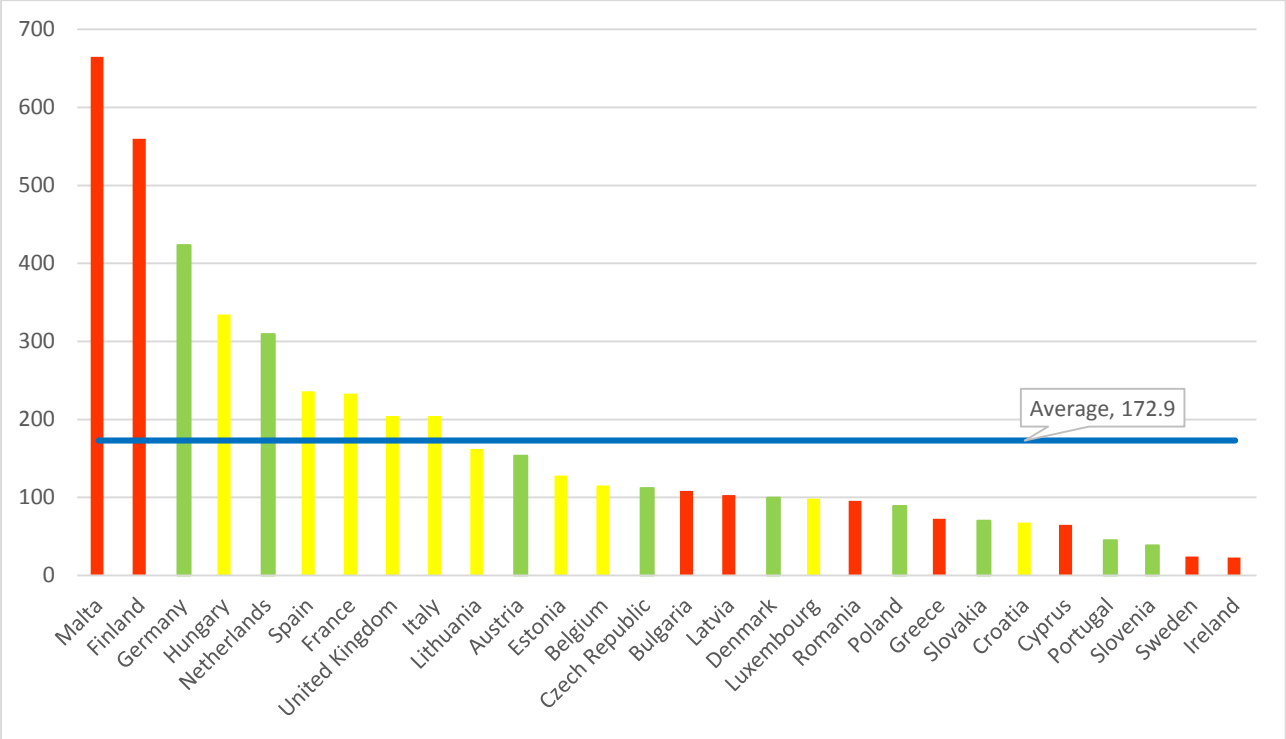
- Cost of labour: in countries with higher labour costs, expenditure of e.g. 1 M € may imply a lower constructed area than in countries with lower labour costs (as a bigger part of the same amount will be used to pay the workers, less money will be spent on construction materials)
- Inaccurate reporting of CDW: low quality of statistical procedures and illegal activities may lead to underestimating the actual amounts of CDW generated in some MS.
- The ratio of construction and demolition activities: statistics usually do not allow distinguishing between construction and demolition activities or between construction and demolition waste. However, the amount of CDW generated per invested 1 M€ will be much higher for construction than for demolition works.

The following figure shows the waste intensity of construction sector in the Member States. The meaning of the codes used in this figure is explained in Table 1 (for details about the CDW data quality score, please refer to Chapter xxx)

Table 1: MS colour coding

CDW data quality score	Data Quality level	Colour used in charts
Between 1.5 and 2.5	Poor	**Red**
Between 2.6 and 3.6	Modest	**Yellow**
Greater than 3.6	Good	**Green**

Figure 1: Tonnes of waste generated per €Million of construction industry turnover, 2012



There is a very large variation in the amount of CDW generated related to the turnover, with Malta, Finland and Germany reporting significantly more than average and Sweden and Ireland reporting very small amounts. However, the analysis of the data indicates that for Finland, soils from CDW have been wrongly classified and so the amount generated is overestimated. In addition, the methods of estimating CDW generated for Malta, are thought to lead to double-counting so overestimating the amount. Finally, the method of data collection used by Sweden, based on treated CDW from licensed facilities only, results in an underestimation of mineral CDW. Therefore, the results from these countries may not be reliable. If the data from the top MS (Malta and Finland) and bottom MS (Sweden and Ireland) are excluded, the average is reduced to 148.7 tonnes/€million.

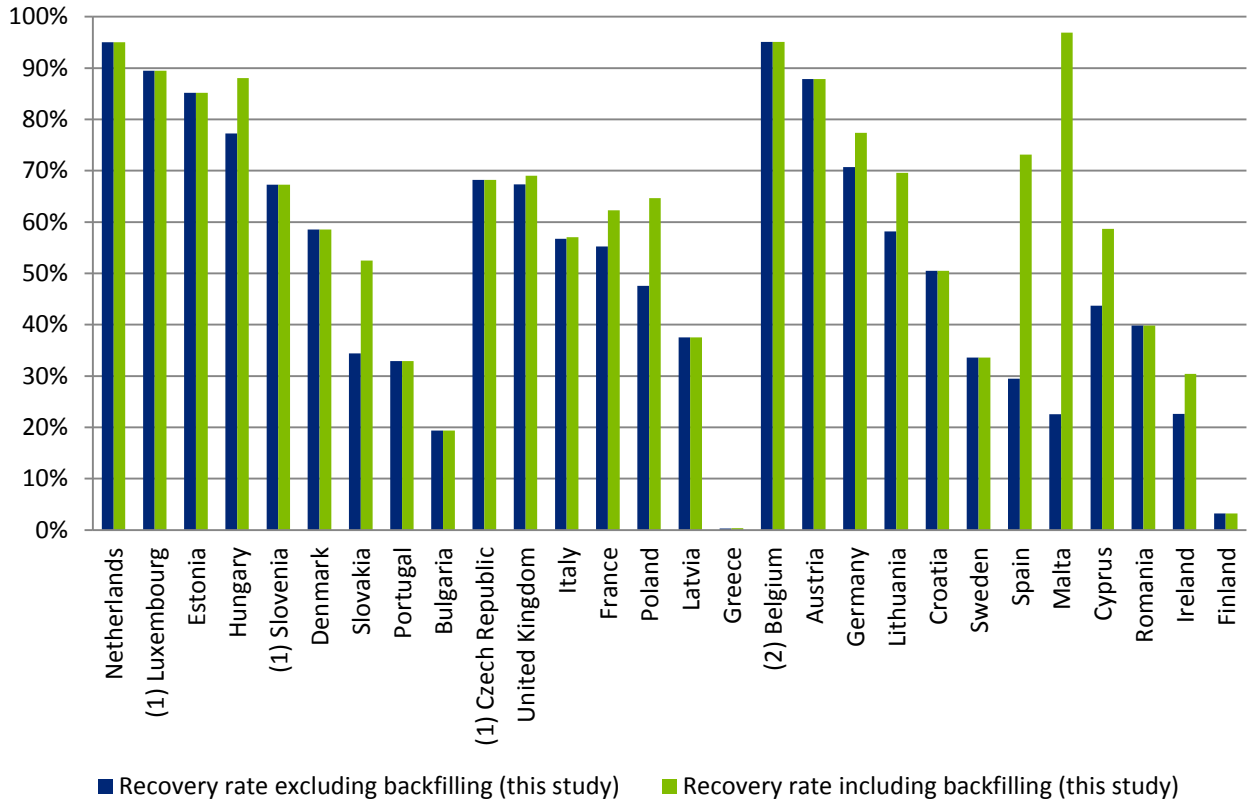
2.3.2. CDW treatment performance

An initial analysis of the available was performed to calculate a target for each MS, confirming that large differences exist between MS. While some MS have already reached the 70 % recovery and recycling target laid down in the WFD (which has to be achieved by 2020), others still need to take significant measures to improve their performance.

As far as backfilling is concerned, the inclusion or exclusion of the amounts reported as backfilling for the calculation of the recovery rate has an impact that widely differs between Member States. Countries that present the higher differences between both figures are: Malta, Spain, Slovakia, Cyprus and Poland. The inclusion or exclusion of backfilling to meet the recovery target by 2020 will certainly have a major impact for these countries.

The recovery rates of CDW in EU-28 MS, following the calculation method provided in Commission Decision 2011/753/EU, are presented in Figure 1.

Figure 1: Recovery rates of CDW in EU-28 MS in 2012



In the graph above, 9 MS (Austria, Belgium, Estonia, Germany, Hungary, Luxembourg, Malta, the Netherlands and Spain) appear to have already achieved CDW recovery rates higher than the WFD target and therefore have met the requirements set in the Waste Framework Directive (2008/98/EC). 9 MS (Croatia, Cyprus, Czech Republic, Denmark, France, Italy, Lithuania, the UK and Slovenia) show a relatively good performance with recovery rates in the spectrum of 50% - 70%. These countries could potentially meet the target in the next 5 years (by 2020), by intensifying their efforts and increasing recovery and recycling operations. Finally, 10 MS (Bulgaria, Finland, Greece, Ireland, Latvia, Poland, Portugal, Romania, Slovakia and Sweden) are quite far from the target and they would require an extraordinary effort to meet the WFD target by 2020.

Greece and Bulgaria have taken a first step by introducing binding legislation. The next step would be the quick implementation and enforcement of the legislation together with the development of appropriate CDW recovery systems that would enable increasing recovery rates. On the other hand, MS like Germany, Belgium and the Netherlands have already set higher national targets than the 70% recovery target, with the aim of maintaining the high recovery rates achieved to date.

One explanation for the difference in waste management routes is the availability of waste management facilities in the different MS. Many of the MS with higher proportions of recovery have a good spread of facilities available such as Denmark, Italy, Ireland, Germany and Luxembourg, whereas many MS with low recovery levels such as Croatia, Estonia and Slovakia have a limited spread of facilities. In addition, some MS have landfill bans (or partial bans) in place. For example, the Netherlands has a national landfill ban on recyclables while Belgium has bans only in some regions.

2.3.3. Drivers and barriers for increasing resource efficiency in CDW management

Taking into account that some MS have achieved higher recovery targets and exhibit more advanced CDW management systems than others, it is expected that MS with higher recovery rates would exhibit similar barriers and drivers in their effort to improve performance, and MS with lower recovery rates might also face similar barriers and drivers with each other. For this reason, the presentation of the most common drivers and barriers of MS for increasing resource efficiency in CDW management is grouped according to CDW recovery rates, as seen in Figure 1.

[1] Data are taken without backfilling for both numbers as when we take backfilling into account, the recovery rates are higher than 100%
[2] Data that are provided here are those reported to the EC for the WFD as national data provided data that showed 200% recovery rates

The main drivers and barriers for high performing MS are presented in Table 2. This could apply in principle to those MS which have already achieved the WFD target (Austria, Belgium, Estonia, Germany, Hungary, Luxembourg, Malta, the Netherlands and Spain). However, in some cases, the situation could be described as in Table 3 (medium performance), given that recycling of CDW may not be very developed in some of these MS (high recovery rates may be the result of massive backfilling or inaccurate statistics).

The drivers as well as the barriers in the following tables are presented in a random order and are not ranked in relation to significance and improvement potential. They apply to all the above mentioned MS, while some are more relevant to a few MS than other. If some issues are limited to few MS, this will be indicated by naming the relevant MS.

Table 2: Drivers and barriers in MS with high CDW recovery rates

Drivers	*Barriers*
Market conditions ▪ **Economic incentives** play a crucial role in driving CDW management performance, measures such as landfill taxes and charges for unsorted CDW favour selective collection and recycling of CDW ▪ **The existence of quality standards and norms** which apply to recycled CDW and ensure the circulation and marketing of a high quality product, ready for use in new construction projects	**Market conditions** ▪ **Low prices of natural raw materials** undermine the market circulation of recycled materials which usually bear higher costs due to the treatment and recycling processes ▪ **Lack of trust in recycled CDW materials**, despite the fact that they fulfil requirements and quality standards equal to the primary raw materials ▪ **Small market for recycled materials**, as a direct result of both the above barriers in the use of recycled CDW by the construction sector actors ▪ In some MS (Germany) which are achieving high recycling rates, the market may not be able to absorb the quantities of recycled CDW in the future. ▪ In some MS (Spain), low prices of natural raw materials
Legislative framework ▪ **Strong legal framework** that enables a good level of CDW management leading to higher recovery rates of CDW ▪ In addition to the strong legal framework, the **effective and strong enforcement of the implementation of legal obligations (including sufficiently high sanctions in case of non-conformity)** is also considered as an important driver ▪ Sorting requirement for CDW ▪ **GPP in construction** and recycling quotas in materials used for construction (specifically in Italy and Portugal)	**Legislative framework** ▪ **No overarching legislation**, especially in the case of MS with decentralised waste management (e.g. Germany, Spain, UK) ▪ **Non-specific CDW legislation**, relying mostly in soft steering frameworks such as Waste Management Plans (e.g. Austria, Netherlands) or Local government regulations (e.g. Estonia) ▪ The potential of **GPP in construction and public tenders** in some cases still remains untapped (e.g. Estonia) ▪ **Lack of enforcement**
Recycling capacity ▪ **Adequate number and extensive network of CDW treatment facilities** covering satisfactorily the MS	**Recycling efficiency** ▪ **Mixed CDW materials and/or the presence of hazardous substances in CDW** makes recycling difficult
Initiatives facilitating resource efficiency in the construction sector ▪ **Close collaboration of all actors in the sector**, including private and public actors as well as policy makers and relevant institutions ▪ **Certification schemes for buildings,** including provisions for the resource efficient management of CDW ▪ **Establishment of specialised institutions** (sectoral, private, public) with the aim to improve the knowledge and recycling efforts of actors engaged in CDW management	
Reliability of CDW data	

The main drivers and barriers for the MS which show a relatively good performance with a potential to meet the target in the next 5 years (Croatia, Cyprus, Czech Republic, Denmark, France, Italy, Lithuania, the UK and Slovenia) are presented in Table 3. Some of the drivers and barriers observed in Table are found also in this group of MS.

Table 3: Drivers and barriers in MS with average CDW recovery rates

Drivers	*Barriers*
Legislative framework ▪ **Well-developed legislative framework** in place	**Legislative framework** ▪ **Lack of compliance with legislation, lack of implementation** ▪ **Lack of political will** to drive improvements ▪ **No End of Waste criteria** ▪ **No sorting requirement for CDW**
Market conditions ▪ **Financial incentives** for increased recycling, such as landfill taxes	**Market conditions** ▪ **Low prices of natural raw materials** undermine the market circulation of recycled materials which usually bear higher costs due to the treatment and recycling processes ▪ **Lack of trust in recycled CDW materials,** despite the fact that they fulfil requirements and quality standards equal to the primary raw materials ▪ **Lack of GPP promoting use of recycled CDW**
Standards and norms ▪ **Development of standards** for recycled CDW materials ▪ Existence of **several guidance documents**	**Treatment capacity** ▪ **Lack of adequate number and developed network of CDW treatment facilities**
	Mentality in the construction sector ▪ **Management of CDW is not** considered as high **priority** among the actors of the sector and no specific budget is allocating for the proper management of CDW
	CDW data ▪ **Problems with data reporting**, unreliable data, usually amounts of CDW missing – not properly tracked, unknown management and treatment

The main drivers and barriers for the MS which are far from the target and would require an extraordinary effort to meet the WFD target by 2020 (Bulgaria, Finland, Greece, Ireland, Latvia, Poland, Portugal, Romania, Slovakia and Sweden) are presented in Table 4. Some of the drivers and barriers observed in the tables above are also found in this group of MS.

Table 4: Drivers and barriers in MS with low CDW recovery rates

Drivers	*Barriers*
Legislative framework ▪ **Very specific legislative framework for the management of CDW** (Bulgaria, Greece, Slovakia) ▪ **Cooperation of actors in the construction sector** in order to promote proper management of CDW (mostly responding to legal obligations)	**Legislative framework** ▪ **Absence of specific legislation** concerning CDW (Romania, Latvia) ▪ **Persistence of illegal practices**, lack of enforcement, lack of sufficiently high sanctions in case of illegal disposal ▪ **No End of Waste criteria** ▪ **No sorting requirement for CDW**
	Market conditions ▪ **Low prices of natural raw materials** undermine the market circulation of recycled materials which usually bear higher costs due to the treatment and recycling processes ▪ **Lack of trust in recycled CDW materials**, despite the fact that they fulfil requirements and quality standards equal to the primary raw

Drivers	Barriers
	materials ▪ **No financial incentives for recycling**, absence of landfill taxes, pollution charges, low gate fees for mixed CDW, etc. ▪ **Lack of GPP promoting use of recycled CDW**
	Treatment capacity ▪ **Lack of adequate number and developed network of CDW treatment facilities**
	Mentality and culture in the construction sector ▪ **Low priority in managing CDW** – avoiding the costs of CDW management
	Lack of know-how ▪ **Lack of knowledge and experience** of setting up CDW management and recovery systems ▪ **Lack of coordination** between the actors along the CDW management chain
	CDW data ▪ **Problems with data reporting**, no reliable data, usually amounts of CDW missing – not properly tracked, unknown management and treatment
	Standards and norms ▪ **Lack of standards for recycled CDW materials** ▪ **Lack of guidance documents**

In the tables above, the main barriers for increasing CDW recovery as well as the most important drivers for the resource efficient use of CDW across the EU-28 MS are presented, grouped according to CDW recovery performance. Although it would be expected that MS would have to overcome different types of challenges for improving CDW management performance, depending on their level of progress so far, the results in the tables above show that this is still not the case in most MS. Some barriers are common to all MS irrespective of the level of CDW management performance. The same applies to some of the drivers in CDW management.

On one hand, **one of the most significant barriers observed is the unfavourable market conditions of CDW for all MS**. The extensive lack of trust in recycled products (quality issues), coupled with very low raw material prices and low/free landfill costs, leads to a highly uncompetitive market for recycled CDW materials. On the other hand, one of the most important drivers for increasing CDW recovery, recognised in all MS, is the adoption of a **strong legislative framework**, defining the appropriate practices needed for increased resource efficiency and sustainability of CDW management.

A powerful driver for higher utilisation of CDW is the **financial incentives through taxes and charges which redirect large amounts of CDW away from landfills** and enable the recovery and recycling of most of the materials found in CDW. MS lacking financial incentives perform rather poorly, as shown in Figure 1. The same effect can be achieved by implementing landfill bans for several CDW fractions. Financial incentives or bans must be coupled with **good enforcement to ensure CDW is managed legally**.

An obligation to sort CDW (combined with additional market measures) can also be effective to divert CDW from landfills and promote recycling and recovery.

One of the most striking differences between the different groups of MS, according to recovery performance, is the level of engagement of the actors throughout the CDW management value chain. While actors in MS in the first group (Table 2) show a high level of commitment and initiative, the main actors in the construction sector in the other groups of MS (Table 3 and Table 4) show a general indifference and low engagement in CDW management. In the last group (Table 4), CDW management is mostly regarded as a burden and not as an opportunity to recover valuable materials with high potential of reuse and recycling.

Two other critical conditions which can act as decisive drivers, or cumbersome barriers, are **whether recycling capacity is suitable and whether the CDW data are reliable**. MS in the first group possess an extensive network of CDW treatment facilities with adequate capacity to treat different types of materials from CDW and maintain reliable data about generated and treated quantities of CDW, enabling them to effectively monitor their performance and identify potential points of improvement in the CDW management chain. MS in the other two performance groups, lack of treatment capacities and suffer from unreliable data. Improving these two conditions would enable MS in the last two groups to improve their recovery performance.

Lastly, in order to improve the management of CDW and advance one step higher in the waste hierarchy, the specific barriers presented in the tables above should be overcome in concert with further supporting the in MS that are currently lacking the necessary incentives and tools to advance in CDW management.

2.3.4. Lessons learned from the case studies

From a list of initiatives that have been analysed (see Task 2), six success stories from regions, municipalities or companies which present particularly good practices and results in terms of CDW prevention and management, have been selected. The selection criteria included: representativeness, high potential for replicability and sustainability (economic, technical, social and environmental aspects) and interesting showcase of obstacles and leverages for sustainable management of CDW.

Table 5: Presentation of the selected case studies for Task 2

Initiative	Scope	Date	Description and results
Zenrobotics Recyclers, in partnership with Suez Link to Zenrobotics website	International – Industrial sector	2013	A Finnish company developed a robotic recycling system (Zenrobotics Recyclers) which picks raw materials (wood, plastics, metal, stone, concrete etc.) from construction and demolition waste and sorts them. Suez Environment/Sita signed a framework agreement with this company to develop this process at an international level. Result: 12 000 tonnes of waste treated per year with a recovery rate of 90%.
Democles Link to Democles website	France – Public-private partnership	2014-2015 (in progress)	Democles is a collaborative project aimed at improving the management of the end of life of finishing works waste from demolition/rehabilitation sites, set up by 28 organisms, companies and administrations. 10 test sites made it possible to characterise the waste stream, to identify drivers and barriers and to measure the savings that would enable the recovering of finishing works waste sorted beforehand compared to their destruction when still mixed. Results on test sites are available. The project focuses on the 10 Mt of waste of the finishing works, which represent a quarter of the building works waste.
From production to recycling: a circular economy for the European gypsum Industry with the demolition and recycling Industry Link to Gypsum to Gypsum website	International (France, Germany, Belgium, UK) – Public-private partnership (GtoG study, by Recovering, within Life EU project)	2013	State-of-the-art study on Gypsum products that lead to the publication of the European Handbook on best practices in deconstruction techniques that aims to promote the implementation of best practices for a controlled deconstruction process of such gypsum-based systems, which might ease recovery.
Construction works in the preparation of the Olympics games in London Link to Olympic Delivery Authority website	London, local, public	2011	The Olympic Delivery Authority (ODA) pledged to hold the greenest Games of modern times and sustainability was built into all the activities, from the procurement to the operation of the Games. The ODA set a number of CDW targets during the demolition, design and construction phases of the London 2012 Olympic Park, including: • 90% re-used or recycled demolition waste by weight; • 90% re-used or recycled construction waste by weight; • 20% of materials to be from a re-used or recycled source by weight; • 25% recycled aggregate by weight.
Estonian Recycling Competence Centre	National, Waste association (incl.	2014	The Estonian Recycling Competence Centre offers training courses for employees in recycling

Initiative	Scope	Date	Description and results
Link to Estonian Recycling Competence Center website	private and public stakeholders)		companies, local authorities and sharing of international experiences with the aim of increasing the competency of actors involved in CDW recycling. It also promotes the use of recycled aggregates.
Pilot project of a mechanical treatment plant for C&D inert waste Link to the webpage of the project	Romania, local, (Buzau), Public-private initiative	2011	Development of a recycling plant has contributed to proper management of CDW; reducing and eliminating illegal dumping of CDW. The levels are not available but according to the interviewed stakeholders the initiative was very successful.

Each case study is unique and addresses specific issues in a specific context. However, it is interesting to point out that there are a lot of initiatives across MS with high potential for replication and for successful results toward reaching the WFD recovery target as well as enhancing sustainable CDW management practices.

The case studies provide interesting solutions to the following issues that are encountered by most MS:

- **Sufficient treatment capacity**: some MS face the issue of insufficient treatment capacity and thus have some difficulties to reach higher recycling rates. As shown in the case studies of Romania and Estonia, backfilling or landfilling are then the main options for inert CDW. The development of a treatment plant in regions with no recycling tradition and lacking treatment infrastructure (such as the plant in Romania) is an example that could be followed in other regions and countries in order to increase the treatment capacity of MS. This would result in the increase of recycled material availability and thus facilitate the development of a recycled material market. It is important to note that the development of such treatment plant should be accompanied by the involvement of all stakeholders of the value chain so that all the value chain is reconsidered to take into account the availability of recycled materials. Financial support also needs to be identified prior to the development of a successful secondary material market. Regulation incentive may also support such an initiative, mainly to avoid the constant domination of landfilling in some MS;
- **Low cost of landfill as well as low cost raw materials**: in direct connection with the previous issue, the low cost of landfill as well as the availability of low cost raw materials are major barriers, not enabling recycled materials to be cost effective. Stakeholders may be convinced of the advantages of recycling using the results of the LCA performed in the Romanian case study as well as the knowledge gained from the case study performed by the Estonian Recycling Competence Center. The GtoG project also draws the conclusion that the landfill levy for disposing of gypsum waste should be set to act as a disincentive to disposing of gypsum waste. It thus appears that the development of a recycled material market will most probably need to be accompanied by regulation incentives to ensure its economic advantage especially where raw materials are easily available;
- **Waste streams separation**: when looking into the issue of CDW recycling, it is clear that the variety of materials as well as collection of mixed CDW are important barriers toward recycling. The Democles project in France offers interesting opportunities by involving all the stakeholders in looking into the finished work waste and identifying operational solutions to facilitate on-site waste sorting as well as recycling. Good practices implemented during construction of the London Olympic Venues could also be replicated in other places to improve sustainable CDW management and the interesting analysis of the cost/benefits shown in this case study may also help to convince stakeholders. Automatization of sorting and recycling processes (such as ZenRobotics Recyler) may offer other interesting opportunities. The development of such sorting units in MS would facilitate the availability of good quality waste streams for recycling. Finally, the GtoG project, by looking into demolition practices, pointed out the importance of proper on-site sorting to ensure gypsum recycling.
- **Acceptability of secondary materials**: Acceptability of materials, notably recycled materials by the construction industry is a key issue. All the case studies (except ZenRobotics), which involved all stakeholders along the value chain, confirmed the importance of involving the actors of the construction sector. Indeed, when developing a new sorting and recycling plant such as the one in Romania, it is important to promote the development of a market for the recycled materials. Within the Democles project, involving the recycling industry, as well as the construction sector enables to identify opportunities for sorted materials to be reincorporated in the recycling industry and to define the possible options to reuse these materials in construction materials considering the actors requirements. The GtoG project also highlighted the importance for demolition companies to be aware of the acceptance criteria at gypsum recycling facilities, as well as for recyclers to know the specifications of the gypsum to be reincorporated. Increased communication through the value chain

allows for consistent volumes and quality of recycled gypsum to be available for reincorporation. This project also concluded that a requirement for the specific level of reincorporation of recycled gypsum in new gypsum products should be considered as part of the green procurement framework. Finally, the Estonian Recycling Competence Center shows that developing standards or certifications is a great driver toward the development of secondary materials market, setting rules for the composition of the materials and ensuring the quality of the materials.

3. Workshop breakout sessions

The different tasks of the study have led us to accumulate a large amount of data and information regarding CDW management performance and practices across EU. Even if we encountered difficulties, mainly due to poor data quality, this work enabled us to identify the key elements that can improve CDW management and to draw preliminary recommendations and conclusions, which are presented below.

We believe this workshop is a great opportunity to discuss these key elements in order to validate or to query our preliminary recommendations.

As shown in the agenda on p3, the workshop will include six breakout sessions. Each breakout session will last around 1h15 and will be broken down as follows:

Introduction by the facilitator	5 minutes
2 to 3 best practice presentations by invited speakers	20 - 30 minutes
General discussion	30 minutes
Wrap-up by the facilitator	10 minutes

The presentation of each breakout session topic is given below, as well as the preliminary recommendations, the key issues to be discussed and the invited speakers.

3.1. Breakout session 1: EU Targets

3.1.1. Presentation of the topic

In order to comply with the objectives of the Directive 2008/98/EC on waste (Waste Framework Directive), and move towards a European recycling society with a high level of resource efficiency, Member States shall take the necessary measures designed to achieve the following target: 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 naturally occurring material defined in category 17 05 04 in the list of waste shall be increased to a minimum of 70 % by weight.

EU targets are a very powerful driver to promote a better management of CDW. However, inert waste represent the vast majority of CDW total weight and a high overall recovery rate for CDW can be achieved by recovering more than 70% of the mineral fraction and taking actions to recover other fractions, that are often more valuable from a resources point of view.

Moreover, backfilling is not precisely defined and it is clear that the notion of backfilling is not being understood in the same way and hence not being consistently applied across the MS. This makes it difficult to understand the actual recovery levels. There are diverging views on whether all backfilling operations as implemented in the MS constitute 'genuine' recovery or, on the contrary, it may be necessary to narrow down the scope of backfilling to ensure these operations contribute to resource efficiency and do not pose a threat to the environment. In addition, the fact that the 70% recovery target could be achieved in some MS by simply backfilling CDW is regarded controversially. These two issues suggest that the current 70% target might be not be well-defined.

Focus on backfilling

As the definition of the CDW recovery target in the Waste Framework Directive enables MS to count the amounts utilised for backfilling[3] into the calculation of their national CDW recovery target, the term *backfilling*

[3] As a reminder, the Circular Economy Package adopted by the European Commission on 2 December 2015 introduces a definition for backfilling: *"backfilling" means any recovery operation where suitable waste is used for reclamation purposes in excavated areas or for*

attracted a great importance. But as the WFD itself does not provide a definition for backfilling, there is a relative confusion among Member States (MS) concerning the term *backfilling* and its application as a recovery or disposal operation. This results in considerable variation in the reporting systems applied by MS to demonstrate their performance against the Article 11 (2) 70% target for construction and demolition waste.

An interesting case is exemplified in Austria, where backfilling is strictly controlled and permitted as a form of recovery only if the following criteria are fulfilled:

- Substitution of other materials for a concrete purpose (structural engineering),
- ensuring a quality comparable to that of the substituted product by a quality assurance system
- And limitation of the use to an extent absolutely necessary for reaching the goal of backfilling.

In 2013, CDW mineral waste in line with the WFD 70% recovery target requirement was 8.3 million tonnes. Recycling was 7.1 million tonnes (86%), backfilling was 0.3 million tonnes (4%) and landfilling 0.6 million tonnes (7%).

3.1.2. Preliminary recommendations

Based on the work performed so far in the course of the study, the following preliminary recommendations were formulated:

- Revise the 70% target after 2020
- Introduce separate targets for inert, non-inert & non-hazardous and hazardous waste
- Reassess the inclusion of backfilling in the calculation of the 70% objective by clarifying the definition and/or revising the accounting method, or even exclude certain backfilling operations from the objective.

3.1.3. Key issues to be discussed

The key issues to be discussed during this breakout session are:

- Would introduction of separate targets for each type of waste help increasing the recovery rates of non-inert waste?
- Should backfilling be excluded from recovery definition? Should it be kept but more precisely defined?
- Should the existing 70% recovery target for CDW be kept and an additional recycling target (e.g. 50%) be introduced to ensure that the 70% target cannot be met by backfilling only?
- Should a specific R-code (recovery operations according to the Waste Framework Directive) be introduced for backfilling

3.1.4. Invited speakers

The following organisations/speakers will present the topic of EU targets:

- Maria Arm, Swedish Geotechnical Institute (SGI), Sweden
- John Barritt, John Barritt Consulting Ltd, UK
- Geert Cuperus, Fédération Internationale du Recyclage (FIR), The Netherlands

3.2. Breakout session 2: Prevention

3.2.1. Presentation of the topic

Waste prevention comprises both quantitative prevention (reduction of the amount of waste generated) and qualitative prevention (reduction of hazardousness). Prevention measures may target construction waste,

engineering purposes in landscaping or construction instead of other non-waste materials which would otherwise have been used for that purpose.

acting as an immediate driver, or demolition waste (through building design, lifetime extension, modularity, reusability of elements, etc.), thereby providing a delayed effect overtime.

The most straightforward key performance indicator (KPI) for quantitative waste prevention is the amount of CDW generated relative to the turnover of the construction sector. According to this indicator, the best performance is shown predominantly by countries in Eastern Europe, and the worst performance by countries predominantly in Western Europe.

If we assume that CDW statistics are fully reliable, we could conclude that wealthier countries tend to produce greater levels of CDW. This could be due to the differences between labour and product costs. Where labour is expensive, it could lead to more wasteful practices, as projects have to be completed in the shortest period, with surplus materials at the end of a project being more acceptable than project delays. Conversely, where project costs are a key issue and material supply is less efficient, this could promote better use of existing resources on site, thus reducing waste leaving the site.

However, caution should be taken when drawing conclusions form CDW statistics. Evidence gathered in the framework of the present study suggests that there is high degree of uncertainty as regards official statistics; the uncertainties are due to the lack of accurate and comparable statistical methodologies and the amount of waste that is not legally managed (which may differ in the different countries). Therefore, it is difficult to conclude on the performance in terms of CDW prevention in the MS.

Generally, there are far fewer CDW prevention measures compared to recycling and recovery. There appears to be little evidence of pan-European consistency in the approaches taken.

Some examples stand out as being clearly targeted at **quantitative waste prevention**:

- UK – Designing out Waste and SMARTWaste benchmarks
- Luxembourg – Mandatory Site Waste prevention and management plans
- Belgium (Brussels) – Opalis website with tools and guidance
- Belgium (Flanders) – Plan for material efficient construction
- Nordic – TemaNord proposals for targets and indicators for waste prevention across the Nordic region
- France – ADEME large waste prevention budget – unclear how much is devoted to construction sector
- Malta - Guidance on the excavation of limestone with a view to reduce construction and demolition waste is planned, as are discussions between all relevant stakeholders during the revision of local plans to limit unnecessary waste. There is an emphasis on promoting the value of the limestone resource at the excavation stage and on harnessing the potential of technology to make the process more resource efficient. For more information, see: http://www.eea.europa.eu/publications/waste-prevention-in-europe-2015 (p38)

A number of MS apply **qualitative waste prevention** measures aiming to reduce the use of hazardous substances in new construction:

- Czech Republic - Expert analysis of hazardous substances
- Belgium; Flanders Region – Waste prevention plan objective to eliminate hazardous substances in new construction
- Sweden – BASTA database on construction materials with low/no hazardous content

3.2.2. Preliminary recommendations

Based on the evidence gathered so far in the course of the study, the following preliminary recommendations can be formulated:

- Make eco and long-lasting design criteria more demanding for new buildings
- Favour design for modularity, deconstruction and reuse at materials level
- Set a specific EU target for CDW prevention
- Have reliable site-level benchmarks, against which targets can be set and progress monitored
- Develop an EU (with MS variation if applicable) dataset for wastage rates to highlight the products that are inherently wasteful at the point of installation to encourage actions to reduce these amounts at a sector or proprietary level.
- Greater understanding at a building-level of the environmental and economic benefits associated with demonstrated levels of waste reduction (e.g. reduction compared to the relevant benchmark) would act as a driver to implement waste reduction activities. Reusing buildings instead of demolishing them would prevent much waste but needs to be set against other environmental issues, such as energy efficiency

- Offsite fabrication and building information modelling could help to reduce waste (but this has still to be proven)

3.2.3. Key issues to be discussed

Prevention is at the top of the waste hierarchy. However, national and European policies do not focus sufficiently on waste prevention. As a result, there are far fewer prevention measures compared to recycling and recovery. There appears to be little evidence of pan EU consistency in the approaches taken.

The key issues to be discussed during this breakout session are:

- Which could be suitable CDW prevention indicators?
- Should there be a specific target for CDW prevention and in what form? Would different targets for construction waste and demolition waste be needed?
- To what extent make eco and long-lasting design criteria more demanding for new buildings?
- How to promote modular design and should we promote it?
- Which prevention measures have proven to be successful for CDW prevention? Are there additional good practice examples from the Member States?
- Are there approaches to successfully reduce the amount of square meters per inhabitant without reducing quality of living and wellbeing?

3.2.4. Invited speakers

The following speakers will present their views on waste prevention:

- Katherine Adams, Building Research Establishment (BRE), United Kingdom
- Caroline Henrotay, Brussels Environment (IBGE/BIM), Belgium

3.3. Breakout session 3: Demolition practices

3.3.1. Presentation of the topic

Demolition practices are crucial as the outcome of demolition waste (reuse, recovery, recycling, landfill) depend upon them. The study shows that these practices vary across countries but more importantly they rely on the clients and prime contractors. If the latter does not ensure that CDW is being sorted and routed to the right outlet, CDW will most probably end- p being landfilled. And even if the clients and prime contractors gave precise instructions regarding CDW sorting and recovery, their actual implementation and results will depend on the site organisation, the information and sensitisation of the workers and the control procedures.

Demolition practices are also of great importance in the fight against illegal dumping.

3.3.2. Preliminary recommendations

Based on the work performed so far in the course of the study, the following preliminary recommendations were formulated:

- Make sorting on site compulsory: improved separation of materials reveals a strong trend for higher levels of recovery compared to MS with high levels of mixed waste. Source separation is more likely to occur where there are incentives relating to lower waste management costs; or legal requirements, such as selective demolition
- Make pre-demolition audits, selective demolition and post-demolition reporting compulsory
- Enhance landfill restriction and taxing, especially on inert waste
- Incentivise design for deconstruction and develop standards for salvaged product
- Improve the consistency of law enforcement across Europe:
    - Identify and set minimum resourcing levels needed to adequately enforce CDW related legislation
    - Ensure all CDW hazardous waste is correctly identified and dealt with correctly
    - Ensure all CDW hazardous waste is correctly identified and dealt with correctly Ensure all CDW hazardous waste is correctly identified and dealt with correctly
    - Greater uptake of EDOC (electronic duty of care)

3.3.3. Key issues to be discussed

Demolition practices are a key issue when it comes to CDW generation and recovery. Unfortunately, due to the ever-present low commitment level of clients / contractors on this issue and the large number of actors on construction sites, demolition practices too often result in the mixing of all CDW fractions and sometimes in illegal dumping.

The key issues to be discussed during this breakout session are:

- Should sorting on site be compulsory? If yes: how should the sorting requirement be defined?
- Should pre-demolition audits and post-demolition reporting be compulsory and how should it be implemented?
- Should a mandatory deposit being requested by local/regional authorities before demolition and reimbursement being conditional to delivering proof of lawful CDW management

3.3.4. Invited speakers

The following speakers will present their views on the topic of demolition practices:

- Johan D'Hooghe, European Demolition Association (EDA), Belgium
- Hervé Grimaud, Recylum, France
- Jean-Yves Burgy, Recovering, France

3.4. Breakout session 4: Reuse

3.4.1. Presentation of the topic

There are a number of good practices within MS that could be adopted across the EU. Reuse is regarded as the optimal solution to reduce unavoidable waste, but it has been neglected as a policy objective when compared to recycling and recovery. Strong policies that promote the practice of reuse, in preference to recycling/recovery, will achieve better outcomes in terms of environmental and social (jobs) impact. The economic benefits of reuse are less clear given the lack of studies focussing specifically on the economic benefits of reuse vs. recycling.

Reuse is not being covered by reporting obligations. It was therefore not possible to measure performance in terms of reuse across MS using the national datasets. Hence, higher and lower performing MS could not be identified. The qualitative data from the country reports indicated that there is less emphasis on reuse of products/materials compared to recycling, recovery, and waste prevention. Approximately 50% of the MS have none or only one activity reported that is directly relevant to reuse of products/materials.

A number of consistent measures to promote - directly or indirectly - reuse were identified, including:

- Mandatory pre-demolition audits (Hungary, Belgium and Finland)
- Waste exchange platforms (Austria, Czech Republic, Ireland etc.)
- Industrial symbiosis programmes (Slovakia, Hungary)

It was noted that all of these measures could equally promote recycling, unless specific actions to promote reuse are adopted within them.

A number of MS activities targeted reuse:

- UK – Salvo (network and directory of reclamation facilities across the UK)
- Netherlands – Circle City (Greendeal Cirkel Stad)
- Belgium – Reuse VADEMECUM and Opalis reuse website
- Austria – Project RaABa – regional network for component reuse
- Denmark – REBRICK – mechanical brick cleaning process
- Finland – building reuse demonstration project

The barriers to reuse mainly relate to markets (certification issues) and demand (time consuming to deconstruct).

3.4.2. Preliminary recommendations

Based on the work performed so far in the course of the study, the following preliminary recommendations can be formulated:

- Make eco and long-lasting design criteria more demanding for new buildings
- Promote waste exchanges and industrial symbiosis programmes to help match supply and demand
- Innovate to reduce the health and safety risks and the time needed for removing products for reuse during demolition
- Develop building passports and material passports, along with design for deconstruction and building information modelling (BIM)
- Improve construction products and materials declaration and recertification
- Incentivise the establishment of private/social enterprises to act as stockholders for products and materials, enabling their accumulation and retention for a demand that might not be available when they are removed from buildings at end of life.
- Invest in tools to have data that can be used to promote reuse in preference to recycling.

3.4.3. Key issues to be discussed

Like prevention, reuse is regarded as the optimal solution to reduce unavoidable waste, but it has been neglected as a policy objective when compared to recycling and recovery. Some of reuse drivers (mandatory pre-demolition audits, waste exchanges, industrial symbiosis programmes) and barriers (certification issues, time needed to deconstruct) are known. The objective of this breakout session will be to think about the best ways to overcome the main barriers and to leverage and replicate the drivers.

The key issues to be discussed during this breakout session are the main barriers and drivers for reuse of construction products / materials.

3.4.4. Invited speakers

The following speakers will present their views on the topic of reuse:

- Petr Hradil, VTT Technical Research Centre of Finland, Finland
- Claus Juul Nielsen, Gamle Mursten, Denmark

3.5.Breakout session 5: Recycled materials market

3.5.1. Presentation of the topic

Five of the EU MS stand out in terms of the amount of recycled aggregates produced. The Netherlands, the UK, Belgium, Germany and France produce around 90% of the recycled aggregates made in the EU (179 MT), hence enabling a significant displacement of primary aggregates. The ability to use these products in construction applications is heavily dependent on their compliance with MS/EU standards relating to the aggregates applications they are being produced for.

Of these five countries Belgium (Flanders), France, Netherlands and the UK have end-of-waste (EoW) regulations in place for inert CDW or producing recycled aggregates. Germany has similar regulations in draft. Austria is the only other country to have EoW for recycled aggregates and is the 8th highest producer of recycled aggregates. This presents a significant correlation between EoW criteria being in place in a MS and the production of recycled aggregates. This is not surprising since the recycled aggregates are effectively being converted into products that conform to relevant standards governing their use as products. They also cease to be a waste and are therefore not subject to the many restrictions/ additional requirements that can be placed upon subsequent use, in terms of proving exemptions, or obtaining permitting and planning consent.

Other measures that are in place to promote recycled aggregate production include:

- Czech Republic – reduced VAT for recycled materials
- UK - primary aggregates levy, credits in sustainability standards such as BREEAM, Ska and CEEQUAL
- Guidance, tools and case studies across MS
- Labelling and certification schemes

- Searchable databases to find suppliers of recycled aggregates
- Focus on developing specifications for different applications, such as road building
- Recycling of road materials back into road construction which includes bitumen as well as aggregates

There are references to other recycled products, which incorporated wood, gypsum, roof felt, metals, insulation and plastics.

The two main barriers to the use of recycled content are:

- Lack of certification
- Lack of incentives, e.g. through public procurement

There are no data available to assess levels of use of reclaimed materials across the EU and this mirrors the absence of activity in terms of promoting reuse, as discussed in the reuse section above. A particular barrier to reuse related to the difficulty in achieving certification for reuse into construction. For example, destructive tests can be carried out on a small sample of manufactured products to determine conformance for a whole batch of product. This is not possible for salvaged products because there are not guaranteed ways of proving a small sample will be representative of the entire stock of products or materials. Therefore, the use of reclaimed products back into construction tends to be at a lower performance requirement, e.g. non-load bearing; or where the client is prepared to take on the risk of failure or defect

3.5.2. Preliminary recommendations

Based on the work performed so far in the course of the study, the following preliminary recommendations were formulated:

- Enhance green public procurement through the introduction of mandatory percentages of recycled aggregates in large civil engineering projects
- Develop a reuse/reclaimed products programme of support & promotion within MS and across the EU. A powerful driver could be to have a reuse % target – either for management of CDW or to displace new products and materials that would otherwise have been used in the built environment
- Develop standards for recycled materials for various utilisation for waste that did not meet EoW criteria
- Facilitate material content traceability
- Encourage the use of Environmental Product Declaration (EPD) in order to facilitate the assessment of construction products and materials sustainability
- Introduce EoW criteria for recycled aggregates across all MS? At EU level?
- Introduce for non-aggregate applications across all MS
- Encourage the construction products and materials supply chain to have much greater provision for taking back and incorporating recycled materials into new products
- Deploy financial incentives to use recycled aggregates, e.g reduction on VAT for recycled materials

3.5.3. Key issues to be discussed

It is crucial to develop the recycled materials market in order to promote recycling over landfill. Indeed, without secured trade opportunities and profitable selling prices, the recycled materials market will never take off. In this view, technical standards and End of Waste criteria, as well as the public procurement lever, should be developed and strengthened.

The key issues to be discussed during this breakout session are:

- To what extent and under what conditions could green public procurement be enhanced?
- Should/could standards for recycled materials for various utilisation be developed?
- How to facilitate material content traceability?
- End of Waste state of play

3.5.4. Invited speakers

The following organisations/speakers have been invited to present specific insights on the topic of recycled materials content:

- Brian James, European Aggregates Association (UEPG), UK
- Vincent Basuyau, DG GROW, European Commission
- Geert Cuperus, Fédération Internationale du Recyclage (FIR), The Netherlands

3.6. Breakout session 6: Data collection practices: how to improve reporting

3.6.1. Presentation of the topic

one of the objectives of the present study was to assess the reliability of CDW data (Task 4), by assessing the quality of MS Eurostat CDW data, by analysing the production process of CDW data (the way countries collect and report CDW data), and by looking at important changes that might affect the data quality in the near future, in particular with regards to comparability of CDW data across MS, as well as in terms of consistency of time series.

The present study shows the overall modest quality of reported CDW data in EU. In average, the quotation of the quality of CDW data is 2.3/5, and quotations range from 1.5 to 4.3 (more details regarding the ranking system will be provided in the report to be published). For most of MS, further improvements are therefore needed concerning the collection and the reporting of CDW data to the EU.

In the EU, the Member States (MS) are homogeneously spread in three categories. A third of the MS displays a good data quality, a third displays a modest data quality and a last third a poor quality (Table 6).

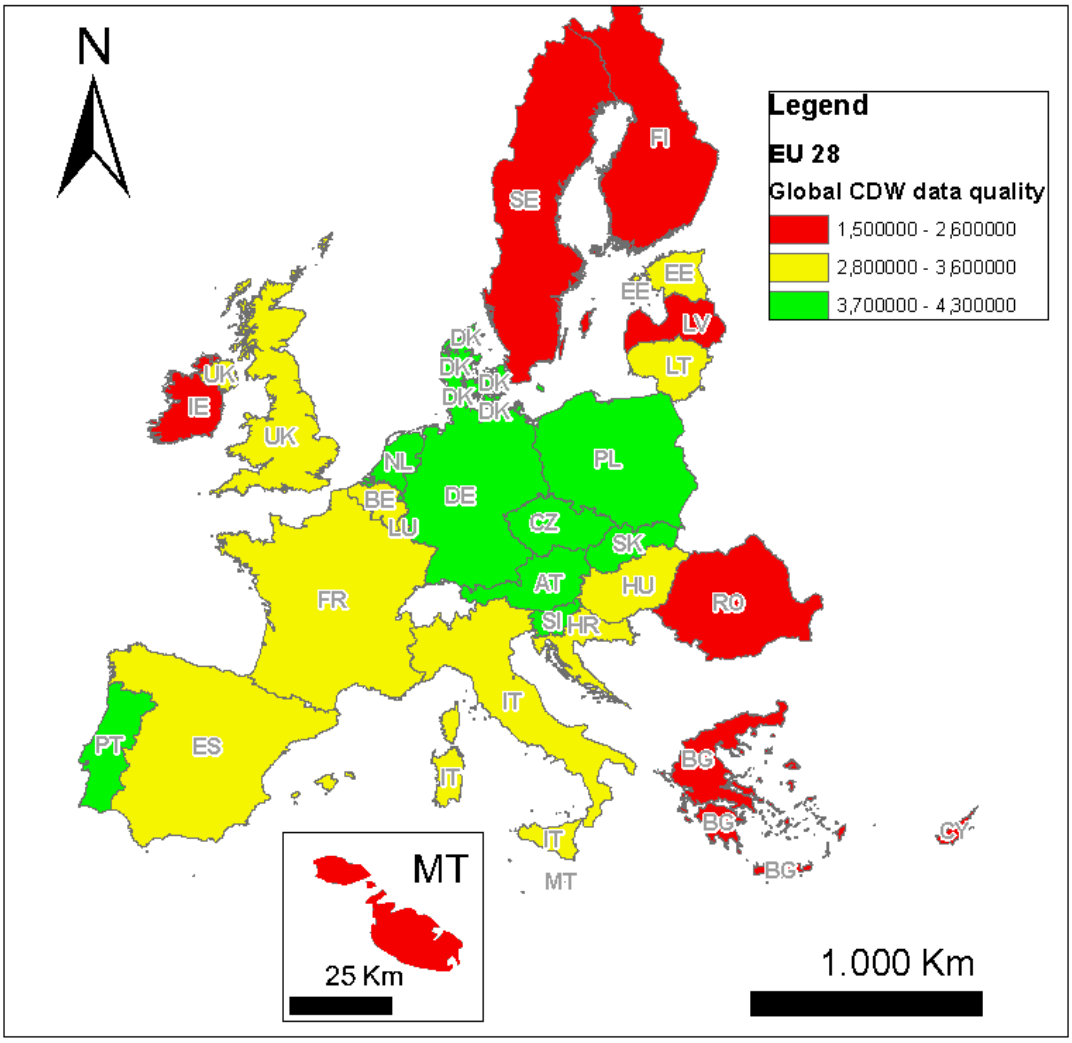
Table 6: Levels of overall CDW data quality in 2012 (MS are classified by alphabetical order in each category)

Good	Modest	Poor
Austria	Belgium	Bulgaria
Czech Republic	Estonia	Croatia
Denmark	France	Cyprus
Germany	Hungary	Finland
The Netherlands	Italy	Greece
Poland	Lithuania	Ireland
Portugal	Luxembourg	Latvia
Slovakia	Spain	Malta
Slovenia	United Kingdom	Romania

Most of the MS that present a similar level of data quality are geographically clustered. Member States characterized by a good quality level of the CDW data are nearly all located in Central Europe. These form an important area from The Netherlands to Poland in the W-E direction, and from Denmark to Slovenia in the N-S direction. Portugal also presents a good level of CDW data quality while it is not geographically close from the other MS of the same category.

At the opposite, one third of the EU MS display a poor quality of their CDW data. Among them, 4 are located in Northern Europe (i.e. Sweden, Finland, Latvia and Ireland) and 6 in Eastern Europe (i.e. Romania, Bulagria, Greece, Cyprus, Malta).

Figure 4: Spatial distribution of the overall data quality in EU in 2012 (Good in green, modest in yellow, poor in red)



3.6.2. Preliminary recommendations

Data quality

As far as the methodologies of CDW data collection are concerned, the common points between Member States characterized by a good level of quality of their CDW data, and the subsequent recommended practices to ensure the quality of CDW data are the following:

- For Member states using surveys to collect data on CDW:
    - The survey should be updated on a yearly basis and should cover a representative sample of industries, following some thresholds based on the number of employees (e.g. as in Portugal) and/or on the generated amount of CDW (e.g. as in Slovenia), to assess which groups of industries have to be either exhaustively selected, or in part, or not considered at all (in line with the WStatR manual).
    - An extrapolation of CDW data is often necessary when collected information do not cover entirely the actual waste production and treatment deposits. For example, in case of surveys, the non-replying and non-questioned waste producers have to be estimated using data reported by similar units. Easily available economic proxies (e.g. Turnover and employment) are recommended used to choose the reporting unit within the same sector that is most similar to the non-reporting unit. A possible method used to choose which unit is more similar to the one missing is the closest neighbour unit method (e.g. in Portugal).
- For Member states using administrative sources to collect data on CDW:
    - The key points are to avoid both the undercoverage (and the subsequent underestimation of CDW amounts) and the double counting (and subsequent overestimation of CDW amounts). This last issue is of paramount importance when CDW generation data are estimated based

on treatment data (secondary information). Therefore, two efficient methods can be used. The first recommendation is to adopt an input oriented approach for CDW generation data (e.g. as in Germany), which means that treatment plants report directly to the NSO the amounts of waste received for treatment (rather than the amounts of CDW leaving the plants). Also, some MS have established systems to ensure the traceability of CDW and provide reliable data, e.g. allowing to avoid double counting.

- For all data collection methodologies, consistency and comparability among Member states could be improved by:
    - Having a common definition of CDW : i.e. Excluding dredging spoils (EWC code W127) and of soils (EWC code W126) from the definition of CDW (these waste types are not supposed to be declared as CDW according to the definition of CDW used by the EC, as explained in the section 2.1.1) ; Some MS (e.g. Finland) include soils in W121, leading to an overestimation of CDW amounts (see the section 5.1.2);
    - Separately reporting backfilling data, even though a clear definition does not always exist in all MS.
    - The collaboration of different national organisms to achieve the wide range of tasks all along the process of CDW data collection. These kinds of collaboration ensure a cross-check of the data, probably inciting each actor to thoroughly achieve its task.
    - The statistical control (quality checks) and correction of the data: external controlling organism (e.g. in Germany) or experts from NSO (e.g. in Czech Republic and Denmark) perform manual checks (first undertaken by experts in the field and then by contacting respondents to clarify any technical issue) and/or automatic checks.
    - The inclusion of waste imported and the exclusion of waste exported in the treatment table.

Data exhaustiveness

Apart from improving existing data, our research showed that, in order to best measure CDW management practices, more detailed data should be collected:

- Waste generation data at site, activity, regional and national level for new build, demolition and refurbishment waste
- Waste generation data at material and product level
- Waste treatment data available for reuse, recycling, ‘backfilling’, energy recovery and disposal
- Waste treatment data split by recovery route and material type
- Waste treatment data split by recovery route, sector and activity type

3.6.3. Key issues to be discussed

Statistical reliability is of outmost importance to ensure the validity and precision of any kind of analysis on CDW and hence for policymaking.

The key issues to be discussed during this breakout session are:

- How to improve data quality and level of detail: splitting by nature / outlet?
- How to improve data exhaustiveness: on recycled and reclaimed content, on reuse, on prevention…?
- How to ensure the same level of quality across all MS: definitions, data collection process, frequency?
- Should recycling and recovery be reported separately?
- Should construction waste and demolition waste be reported separately?
- Should MS report about their treatment and disposal facilities?
- Should a specific R-code (recovery operations according to the Waste Framework Directive) be introduced for backfilling?

3.6.4. Invited speakers

The following speakers will present their views on the topic of data/statistics:

- François Wiaux, IGeert Cuperus, FIR, EU
- Gillian Hobbs, Building Research Institute (BRE), UK
- Dr Cornelis Peter Baldé, Statistics Netherlands, The Netherlands