

CONSTRUCTION AND WASTES FROM RESIDENTIAL RECUPERATION

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- **Introduction**
- **Goals**
- **Methodology**
- **Results and discussion**
- **Conclusions**

Urban world's population 54% (2014)

66% (2050)

Urban EU population 73% (2014)

80% (2050)



Rumbo, 2015

New construction and conservation



Público, 2010



Construction and Demolition Waste

Construction and Demolition Waste (CDW) – 25 – 30% of wastes

2004 – 766,000 ton

2012 – 821,000 ton

Different CDW definitions in EU

- activities from construction;
- total or partial demolition of buildings and civil infrastructures;
- road construction and maintenance;
- materials from land levelling.



CDW in Portugal

Decree-Law 73/2011, amendment to Decree-Law 46/2008

The residue from construction, reconstruction, extension, alteration, maintenance and demolition and collapse building.

European List of Waste - 1 - 20

Chapter 17 - Resíduos de construção e demolição (including excavated soil from sites contaminated).

Table . Codes to CDW from the European List of Waste (Commission Decision 2014/955/UE and 2000/532/EC)

Code	Description
17 01	concrete, bricks, tiles and ceramics
17 02	wood, glass and plastic
17 03	bituminous mixtures, coal tar and tarred products
17 04	metals (including their alloys)
17 05	soil (including excavated soil from contaminated sites), stones and dredging spoil
17 06	insulation materials and asbestos-containing construction materials
17 08	gypsum-based construction material
17 09	other construction and demolition wastes

The waste management concepts, definitions and management principles such as the "***polluter pays principle***" or the "***waste hierarchy***" are presented in Directive 2008/98/EC

CDW - has high potential for recycling and re-use, with possible resource value.

Technology for CDW separation and recovery is available with no significant costs, the **level of recycling and re-use** in EU varies from less than **10% to over 90%**.

The Waste Frame Directive (2008/98/EC) stipulates a minimum of **70% (by weight) for re-use, recycling and other material recovery** (including backfilling) for each Member States

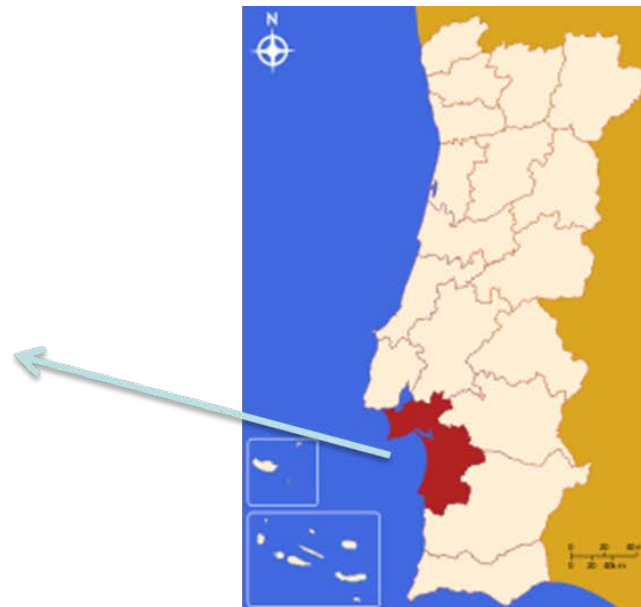
- The present study aims to quantify and characterise the CDW from residential recuperation of small constructions in specific area from Portugal.
- Propose mitigating measures to suitable disposal.



CDW from residential recuperation of small constructions are not registered.

According the Portuguese legislation (Decree-law 46/2008 and 73/2011), all small enterprises with no more of **10 workers** does not need to have his **CDW database recorded** at APA.

- An extensive literature review was made on data published from European Commission, articles and thesis in order to collect data from the **European and Portugal situation**.
- Construction enterprises working in Portugal and waste management entities (ME).
- Select a specific region of Portugal and only after the scope can be expand - high number the entities involved in the production, transportation and management of CDW.



CDW production

- 2002 - **Littoral North of Portugal** a production of **2,132,600 ton.year⁻¹** was estimated from the annual value per capita **325 kg.inhab⁻¹** (Spain).
- 2004 - per capita value in was **1,090 kg.inhab⁻¹** (EC 2011).
Eurostat (2015) the estimated value was **250 kg.inhab⁻¹**.
- 2006 - production was estimate in **4,425,157 ton** (Coelho and Brito, 2013), calculated from a regional study for the Lisbon Metropolitan Area and Setúbal Peninsula, with the corresponding per capita values of **173 and 292 kg.inhab⁻¹**.
3,607,449 ton are presented according to Eurostat (2015).

CDW disposal

Implementation of national legislation (Decree-Law No. 46/2008) – some progress, but unfortunately most of the CDW are going to landfill or dumped illegally.



Figure. CDW dumped illegally in a) Setubal and b) Portuguese islands

Construction activity and CDW generation in Europe

EU 28 - **821,160,000 ton** CDW (2012).

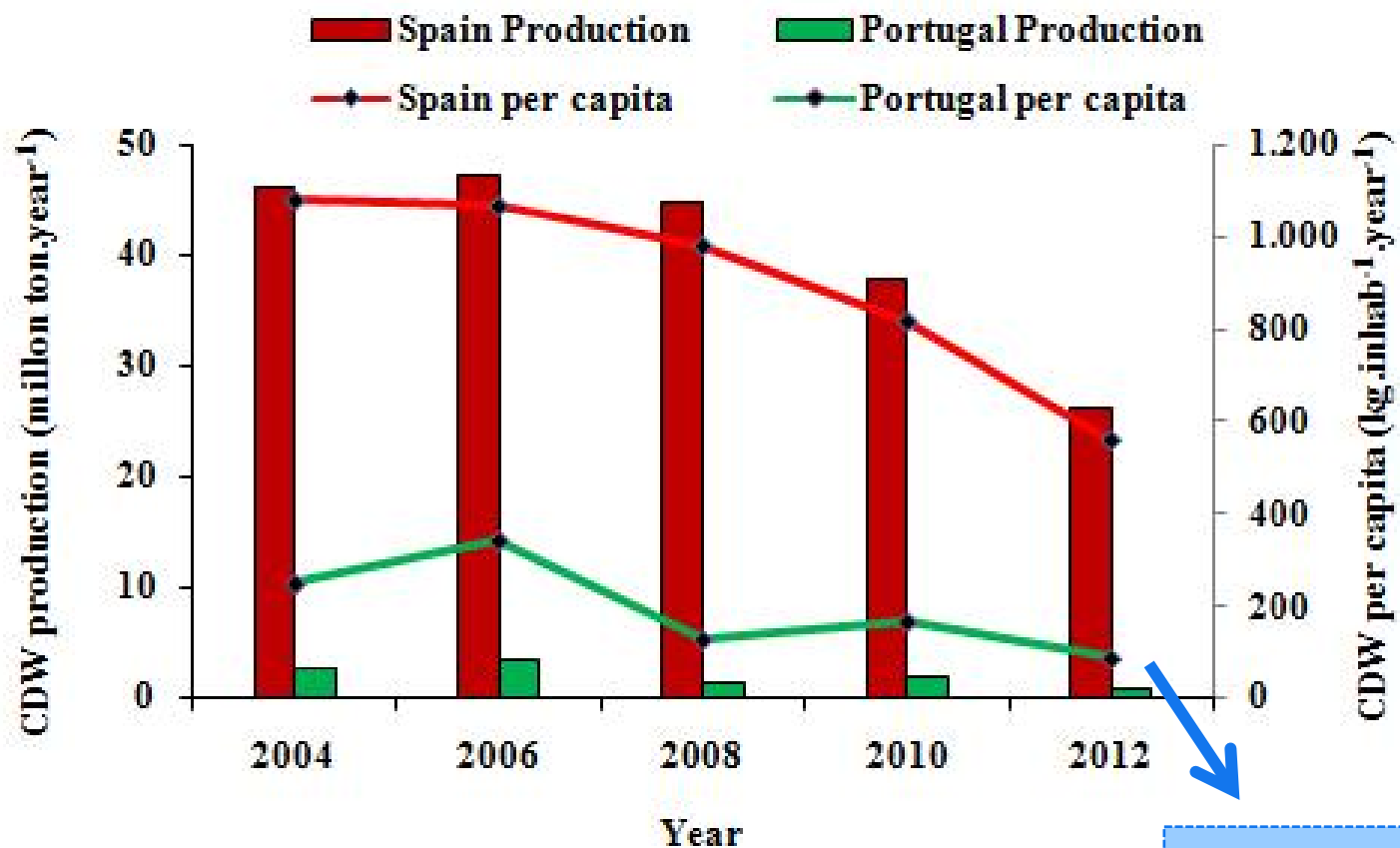
Latvia (7,509 ton) - annual per capita value of **4 kg.inhab⁻¹**.

France (246,702,428 ton) - annual per capita value of **3,771 kg.inhab⁻¹**.

Differences in generation of CDW per capita are higher than the differences in generation of municipal waste



CDW production and the per capita value between the countries in the *Iberian Peninsula*



928,394 ton
88 kg.inhab⁻¹



Table. Portuguese CDW amounts from 2004 to 2011

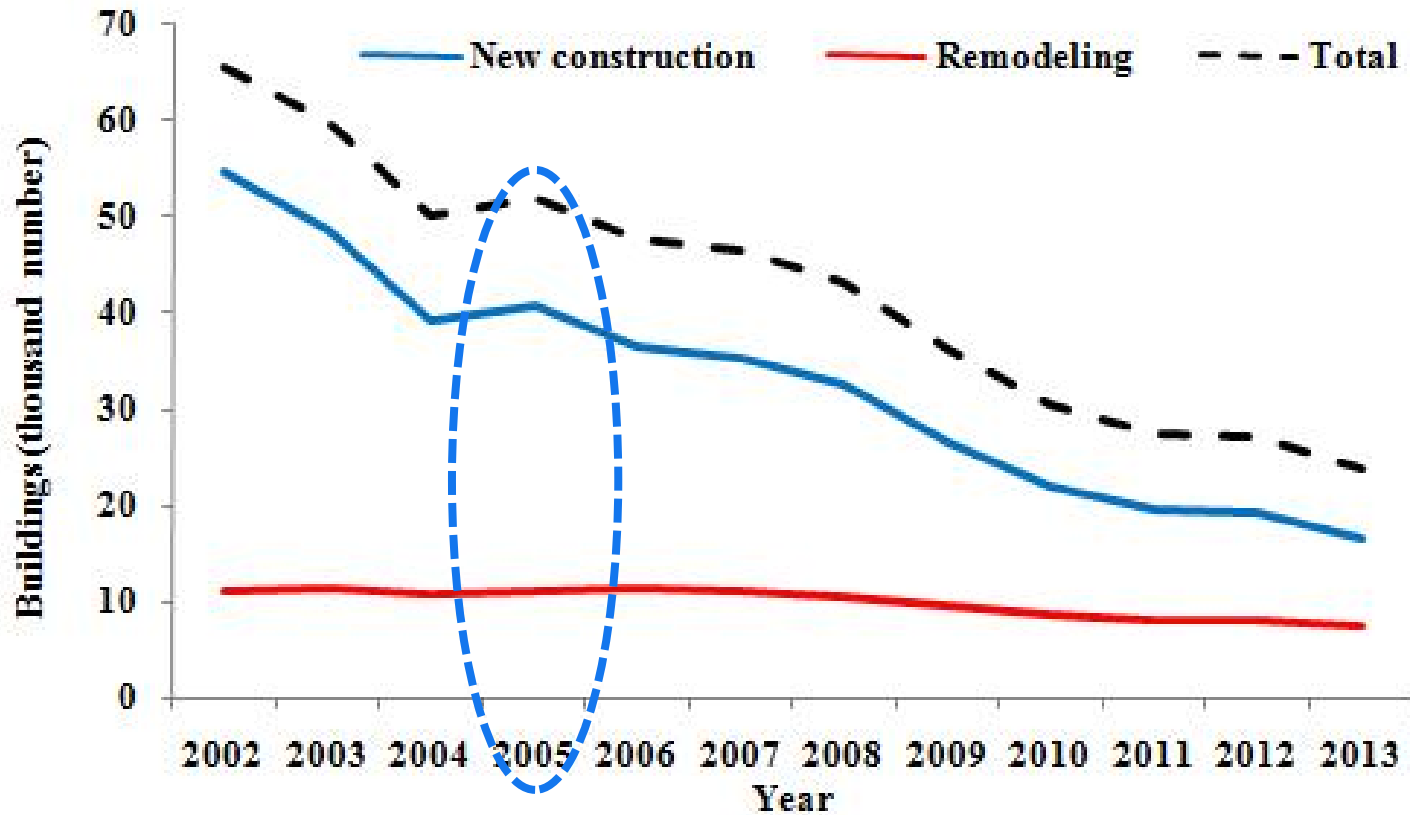
Year	CDW (ton) (INE 2010)	CDW (ton) (Eurostat 2015)
2004	2,625,930	2,625,939
2005	5,212,520	na
2006	3,607,232	3,607,449
2007	5,674,248	na
2008	8,148,290	1,364,419
2009	3,152,098	na
2010	na	1,779,897
2011	na	928,394

Type CDW regarded for the total CDW amount

Less construction activity

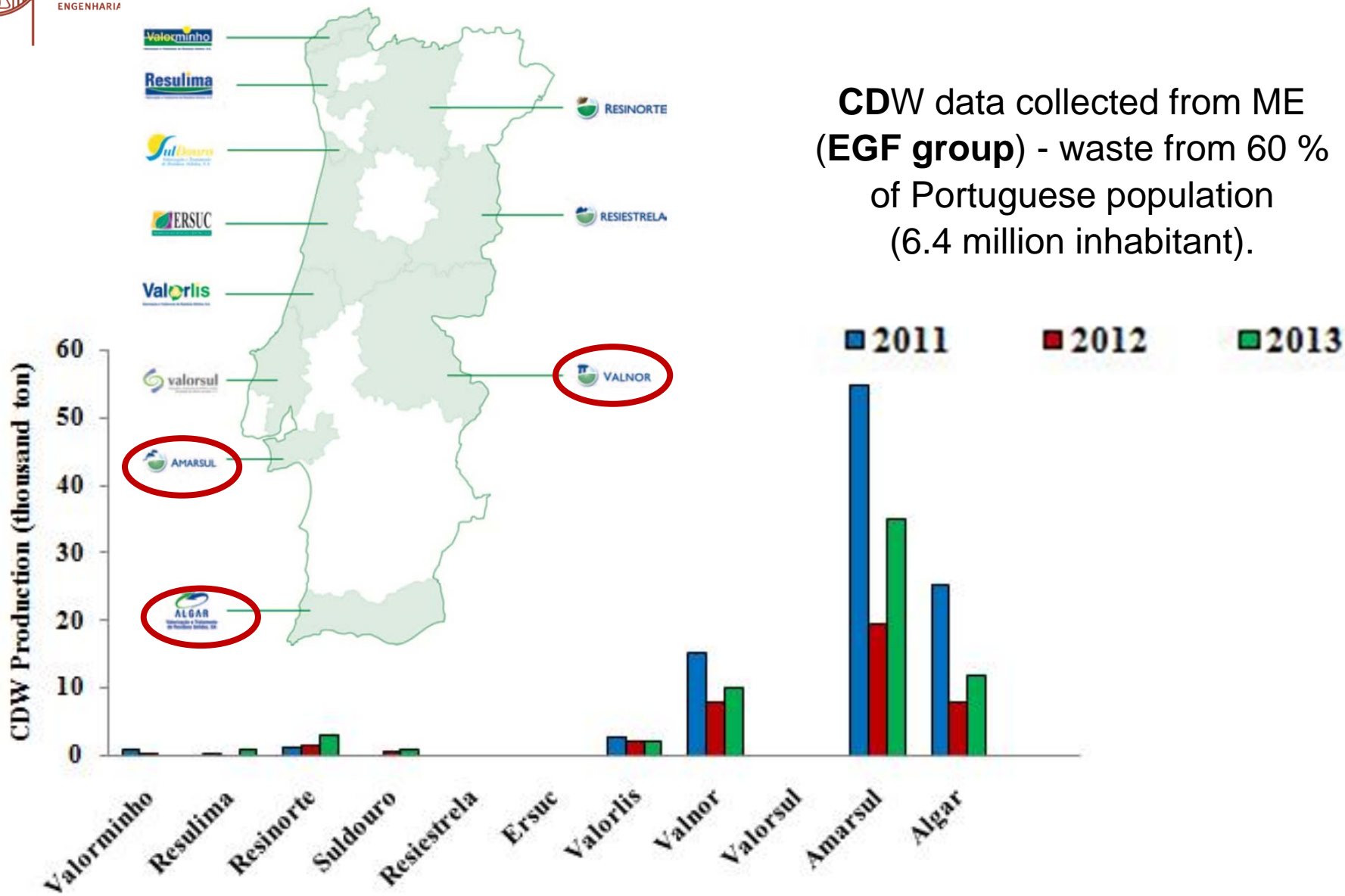
na – Not available

Evolution of construction activity in Portugal



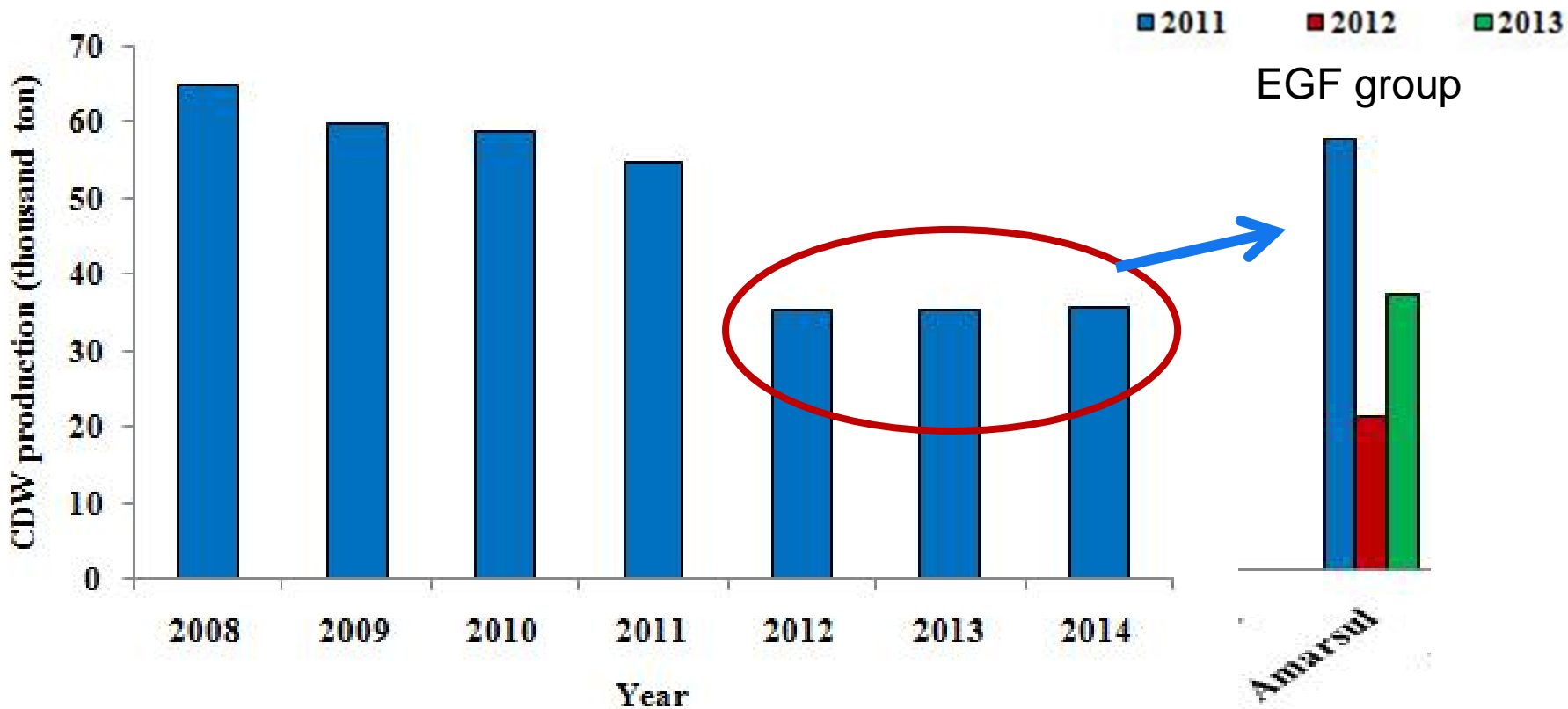
CDW from several regions in Portugal

Region	CDW (2006) (ton)	Pop (2008) (inhab.)	Per capita (ton.inhab ⁻¹ .year ⁻¹)	Per capita (kg.inhab ⁻¹ .d ⁻¹)
Norte	1,432,265	3,745,439	0.382	1.048
Centro	1,327,148	2,383,284	0.557	1.526
Lisboa	581,659	2,819,433	0.206	0.565
Alentejo	477,910	757,069	0.631	1.729
Algarve	305,581	430,084	0.711	1.947
Arquipélagos	300,599	491,941	0.611	1.674
Total (*Average)	4,425,157	10,627,250	0.416*	1.141*



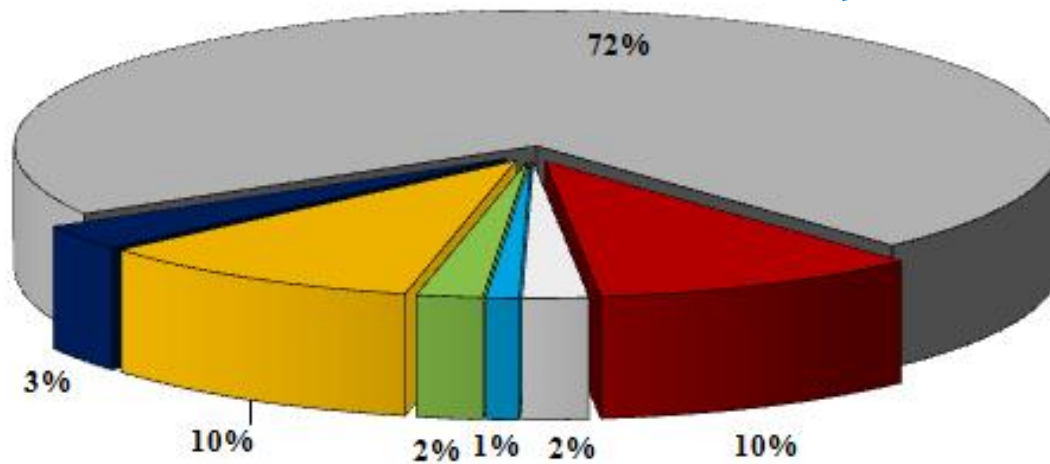


CDW from AMARSUL



Lack of real value from the surveys

Estimated **CDW** composition



■ Concrete and ceramic masonry
 ■ Wood
 ■ Paper
 ■ Glass
 ■ Plastic
 ■ Metal
 ■ Others

Selected Region – Setúbal

City Hall	Area characterization			
	*Population	*Buildings	*Houses	**Total area (km ²)
Almada	174,030	34,163	101,443	70.2
Seixal	158,269	30,124	79,486	95.7
Barreiro	78,764	11,008	41,739	32.0
Moita	66,029	12,398	34,659	55.3
Montijo	51,222	12,996	26,733	348.6
Alcochete	17,569	4,575	8,818	128.4
Palmela	62,831	21,631	33,141	465.1
Setúbal	121,185	24,242	62,749	230.3
Sesimbra	49,500	20,433	31,792	195.5
Alcácer do Sal	13,046	7,535	8,818	1,499.9
Grândola	14,826	9,337	12,041	825.9
Santiago do Cacém	29,749	13,370	18,431	1,059.7
Sines	14,238	4,791	8,318	203.3
Total	851,258	206,603	468,168	5209.9

Selected Region – Setúbal

City Hall	ME	Big bag cost (€/unit) [year]	Collection and transport			Additional information
			Responsibility	Local	Cost [year]	
Almada	Amarsul	---	Producer	Ecocenter/Ecopark	Until 1m ³ : free >1m ³ : 3.5€/ton [2015]	
Seixal	Amarsul	25.36€ [2013]	Producer	Ecocenter/Ecopark	Until 1 ton/week: free >1 ton: 2.73€/ton [2013]	The ecocenter reuse CDW to cover pathways at ecocenter
Barreiro	Amarsul	---	---	---	---	
Moita	Amarsul	---	---	---	---	
Montijo	Amarsul	---	---	---	---	
Alcochete	Amarsul	---	Producer	Ecocenter/Ecopark	---	Individual: cost - 6.60€/big bag and free collection by municipal services [2015]
Palmela	Amagra (Ambilital)	9.65€[2009]	Until 1m ³ : municipal services >1m ³ : producer	Ecocenter/Ecopark	---	
Setúbal	Amagra (Ambilital)	---	---	---	---	Accommodation: big bags until 3m ³ ; >3m ³ container provision
Sesimbra	Amarsul	---	---	---	---	
Alcácer do Sal	Amagra (Ambilital)	---	Until 1m ³ : municipal services >1m ³ : producer	Ecocenter/Ecopark	---	
Grândola	Amagra (Ambilital)	---	---	---	---	
Santiago do Cacém	Amagra (Ambilital)	---	---	---	---	
Sines	Amagra (Ambilital)	---	---	---	---	Deposition at Sines Ecocenter - 41.34€/ton

Selected Region – Setúbal



Big Bag



Metallic container

- **The CDW survey in Portugal is a very complex task mainly due the poor information and the weak answers from all entities.**
- **In small works because Portuguese legislation don't required the CDW record.**
- **The Portuguese CDW production was about 930 thousand ton (2011) as consequence of the construction and demolition activity decrease.**
- **The Setúbal region represent almost 1 % of Population, with a total of 206,603 buildings (468,168 houses).**

- **The CDW data from that region was mainly collected from the ME entities. The principal EM is AMARSUL which collect about 35,000 ton of CDW in 2014.**
- **In this work, it was possible to see what information is disposable, in Portugal and other European countries and establish some correlation and homogenization.**

Thank you for your attention.

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Questions ?

