TransWaste

Formalisation of informal sector activities in collection and transboundary shipment of wastes in and to CEE

Deliverable 3.2.2

Data Evaluation

4th period of the project TransWaste

Funded by CENTRAL EUROPE

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This project is implemented through the CENTRAL EUROPE Programme co-financed by the ERDF

CENTRAL EUROPE COOPERATING FOR SUCCESS.

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1 Introduction

Each participating country has its own ways of end-of-life routes for different products. Although each country underlies the same European Regulations and Directives, there are slightly different routes taken for certain products as this is dependent on the facilities available in those countries. For example is a TV set not in every country manually dismantled, in some other it is shredded and then automatically sorted. The type of routes of each product is not only differing from country to country, but also from region to region. To detect the different end-of-life routes each partner country is asked to describe their EOL options in their country. The outcomes are shown in this deliverable and shall serve

- as a following document on deliverable 3.2.1
- as a basis for the environmental, economic and even social assessment
- as an overview on the development of the waste management sector in each country

Chapter 2 shows the end-of-life options for each product in each country, which were already given in Deliverable 3.2.1. In chapter 3 the different options are described in detail. The number of facilities in each countries and their capacities are also given.

2 Identification of country specific end-of-life management

The following tables (out of deliverable 3.2.1) show the end-of-life options for all selected indicator products in the involved countries.

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Table 2.1: Shares of End of Life options for the formal collection of indicator products for each country (part one)

		waste incineration					Other thermal treatment[1]					mechanical treatment and landfill					mechanical biological treatment				
Exemplary picture of the category	**Category and Description**	AT	DE	HU	SK	PL	AT	DE	HU	SK	PL	AT	DE	HU	SK	PL	AT	DE	HU	SK	PL
	Steel					0,3%										1,4%					1,1%
Metals	Non-ferrous metals					0,3%										1,4%					1,1%
	Fire wood		1,0%			0,6%		14,0%			3,7%					3,4%					2,7%
Wood	Commode / dresser (untreated)	99,5%		8,9%		0,6%					3,7%					3,4%					2,7%
	Radio					0,6%										3,2%					2,5%
	Electric iron					0,6%										3,5%					2,7%
WEEE - small	Drilling machine					0,6%										3,5%					2,7%
	Computer					0,5%										2,9%					2,2%
	Printer					0,5%										2,9%					2,2%
	TV set CRT (CRT = cathode ray tube)					0,6%										3,2%					2,5%
	Computer monitor CRT (CRT = cathode ray tube)					0,5%										2,9%					2,2%
WEEE - IT	Mobile phone - GSM					0,5%										2,9%					2,2%
	Washing machine					0,6%										3,4%					2,6%
	Fridge					0,6%										3,4%					2,6%
	Dishwasher					0,6%										3,4%					2,6%
	Electric kitchen stove					0,6%										3,4%					2,6%
WEEE - big	Electric lawn-mower					0,6%										3,5%					2,7%
Fuel driven appliance	Petrol lawn mower					0,5%										20,0%					2,0%
Batteries/accumulators	Automotive battery					0,6%										3,1%					2,4%
	Plastic garden chair	99,5%	28,9%	8,9%		0,5%		3,2%			12,5%					20,0%		6,5%			2,0%
	Commode / dresser (lacquered)	99,5%	28,9%	8,9%		0,5%		3,2%			12,5%					20,0%		6,5%			2,0%
	Couch	99,5%	28,9%	8,9%		0,5%		3,2%			12,5%					20,0%		6,5%			2,0%
	Mattress	99,5%	28,9%	8,9%		0,5%		3,2%			12,5%					20,0%		6,5%			2,0%
	Carpet	99,5%	28,9%	8,9%		0,5%		3,2%			12,5%					20,0%		6,5%			2,0%
Furniture	Child car seat	99,5%	28,9%	8,9%		0,5%		3,2%			12,5%					20,0%		6,5%			2,0%
Toys	Push-powered vehicles (bobby cars)	99,5%	28,9%	8,9%		0,7%		3,2%								3,6%		6,5%			2,8%
	Inline skates for kids	99,5%	28,9%	8,9%		0,7%		3,2%								3,6%		6,5%			2,8%
	Bicycle for kids					0,5%										20,0%					2,0%
	Bicycle					0,5%										20,0%					2,0%
	Ski	99,5%	28,9%	8,9%		0,7%		3,2%								3,6%		6,5%			2,8%
	Shoes for ice skating	99,5%	28,9%	8,9%		0,7%		3,2%								3,6%		6,5%			2,8%
Sport and leisure utilities	Ski boot	99,5%	28,9%	8,9%		0,7%		3,2%								3,6%		6,5%			2,8%
Tyres	Tyres					0,1%	50,0%		50,0%		46,0%					0,7%					0,5%
	Pot	99,5%	28,9%	8,9%		0,7%		3,2%								3,6%		6,5%			2,8%
	Picture frame	99,5%	28,9%	8,9%		0,7%		3,2%								3,6%		6,5%			2,8%
Furnishing equipments	Lamp shade	99,5%	28,9%	8,9%		0,7%		3,2%								3,6%		6,5%			2,8%
Clothes	Textiles/ Clothes 1m³	20,0%	2,0%	8,9%		0,6%					4,3%					3,1%					2,4%

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Table 2.2: Shares of End of Life options for the formal collection of indicator products for each country (part two)

Exemplary picture of the category	Category and Description	material recycling[2]					landfill without treatment in advance					illegal disposal (e.g.littering)					ReUse (at legal ReUse shops)				
		AT	DE	HU	SK	PL	AT	DE	HU	SK	PL	AT	DE	HU	SK	PL	AT	DE	HU	SK	PL
	Steel	100,0%	99,0%	100,0%		61,6%					35,7%										
Metals	Non-ferrous metals	100,0%	99,0%	100,0%		61,6%					35,7%										
	Fire wood	100,0%	84,0%	100,0%		0,7%					88,8%										
Wood	Commode / dresser (untreated)					0,7%			90,6%		88,8%						0,5%		0,5%		
	Radio	99,5%	99,5%	79,4%		11,3%			20,1%		82,4%						0,5%		0,5%		
	Electric iron	99,5%	99,5%	83,6%		3,9%			16,0%		89,3%						0,5%		0,5%		
WEEE - small	Drilling machine	99,5%	99,5%	88,1%		3,6%			11,4%		89,6%						0,5%	0,5%	0,5%		
	Computer	99,5%	99,5%	85,2%		20,3%			14,3%		74,1%						0,5%	0,5%	0,5%		
	Printer	99,5%	99,5%	85,2%		20,3%			14,3%		74,1%						0,5%	0,5%	0,5%		
	TV set CRT (CRT = cathode ray tube)	99,5%	99,5%	79,5%		11,3%			20,1%		82,4%						0,5%	0,5%	0,5%		
	Computer monitor CRT (CRT = cathode ray tube)	99,5%	99,5%	85,2%		20,3%			14,3%		74,1%						0,5%	0,5%	0,5%		
WEEE - IT	Mobile phone - GSM	99,5%	99,5%	85,2%		20,3%			14,3%		74,1%						0,5%	0,5%	0,5%		
	Washing machine	99,5%	99,5%	85,5%		6,7%			14,0%		86,7%						0,5%	0,5%	0,5%		
	Fridge	99,5%	99,5%	85,5%		6,7%			14,0%		86,7%						0,5%	0,5%	0,5%		
	Dishwasher	99,5%	99,5%	85,5%		6,7%			14,0%		86,7%						0,5%	0,5%	0,5%		
	Electric kitchen stove	99,5%	99,5%	85,5%		6,7%			14,0%		86,7%						0,5%	0,5%	0,5%		
WEEE - big	Electric lawn-mower	99,5%	99,5%	79,4%		3,6%			20,1%		89,6%						0,5%	0,5%	0,5%		
Fuel driven appliance	Petrol lawn mower	99,5%	99,5%	?		12,5%					65,1%						0,5%	0,5%			
Batteries/accumulators	Automotive battery	100,0%	100,0%	100,0%		13,8%					80,1%										
	Plastic garden chair		61,4%	no dat							65,1%						0,5%				
	Commode / dresser (lacquered)		61,4%	no dat							65,1%						0,5%				
	Couch		61,4%	no dat							65,1%						0,5%				
	Mattress		61,4%	no dat							65,1%						0,5%				
	Carpet		61,4%	no dat							65,1%						0,5%				
Furniture	Child car seat		61,4%	no dat							65,1%						0,5%				
Toys	Push-powered vehicles (bobby cars)		61,4%	no dat							92,9%						0,5%				
	Inline skates for kids		61,4%	no dat							92,9%						0,5%				
	Bicycle for kids	99,5%	99,0%	no dat		12,5%					65,1%						0,5%	1,0%			
	Bicycle	99,5%	99,0%	no dat		12,5%					65,1%						0,5%	1,0%			
	Ski		61,4%	no dat							92,9%						0,5%				
	Shoes for ice skating		61,4%	no dat							92,9%						0,5%				
Sport and leisure utilities	Ski boot		61,4%	no dat							92,9%						0,5%				
Tyres	Tyres	49,5%		45,0%		23,0%					17,7%						0,5%				12,0%
	Pot		61,4%	no dat							92,9%						0,5%				
	Picture frame		61,4%	no dat							92,9%						0,5%				
Furnishing equipments	Lamp shade		61,4%	no dat							92,9%						0,5%				
Clothes	Textiles/ Clothes 1m³		89,0%	no dat		1,3%					80,1%						80,0%	10,0%			8,2%

after material recycling:						
landfill without pretreatment	x	x	x		100%
incineration	x	x	x		

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3 Description of EOL options

3.1 Germany

3.1.1 ReUse

The following kind of reuse-shops are operating in Germany:

- Second Hand Shops → for textiles, clothes
- Buying and Selling → electrical devices
- Second-hand car market
- Municipal furniture warehouse (for needy people)

3.1.2 Material recycling

Material recycling options in Germany and their capacities:

Recycling of:

- glass – 2 479 000 tons
- paper – 8 458 000 tons
- plastics → DSD (Grüner Punkt)- 4 237 000 tons
- metals/textile/composite materials – 1 545 000 tons
- batteries -
- waste oil -
- electrical devices - 468 000 tons

Process steps of material recycling for each option:

- Glass: collection/sorting → melting → new glass
- Paper: collection/sorting → crushing → paper production → recycling paper
- Plastics: collection/sorting → crushing → new plastics
- Metals: collection/sorting → melting → new products
- Batteries:
- Waste oil: collection → processing → production of heating oil, lubricants
- Electrical devices: collection → separation valuable materials/residuals → use as secondary raw materials

Shredder facilities: 595 (2008) - 13 476 700 tons → crushing of waste

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Table 3.1: WEEE in Germany (Eurostat, 2008)

Product category	**Put on the market**	**Total collected (2)+(3)**	**Recovery (tonnes)**	**Recovery rate (%)**	**Reuse and recycling (tonnes)**	**Reuse and recycling rate (%)**	**Reused as whole applicance (tonnes)**
Large household appliances	673 297	260 269	242 491	94	220 879	85	1 725
Small household appliances	148 341	82 791	75 695	92	59 624	73	624
IT & Telecommunication	319 983	155 007	142 471	95	122 922	82	4 246
Consumer equipment	392 952	146 292	137 215	94	116 050	80	678
Lighting equipment	75 386	249	88	96	68	75	157
Gas discharge lamps	30 246	8 948	n/a	n/a	8 839	99	0
Electrical & electronic tools	144 969	21 767	20 135	94	16 276	76	256
Toys, leisure & sports equipment	35 867	7 734	7 036	93	5 803	77	147
Medical devices	35 658	3 385	2 732	95	2 324	81	514
Monitor & control instruments	14 381	1 777	1 615	95	1 346	79	76
Automatic dispensers	12 465	5 557	4 994	96	4 776	92	365
Total	**1 883 545**	**693 776**	**634 472**	**944**	**558 907**	**899**	**8 788**

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3.1.3 Mechanical treatment

Mechanical treatment includes sorting plants that divides waste into different waste streams or minimize the volume. In Germany the following mechanical treatment plants are existent:

Sorting plants: 995 (2008) - 25 857 800 tons → Waste splitting into different fractions

3.1.4 Mechanical biological treatment

As already mentioned above the following number of MBTs are existent in Germany:

- MBTs are in usage – existing plants: 51
- Plants in development: not specified
- Capacities: 3 957 800 tons
- treatment of municipal waste with organic fraction, rotting to reduce organic fraction, production of substitute fuel

3.1.5 Waste incineration

The number of incineration plants operating in Germany are the following:

- Existing plants: incineration plants for urban waste: 70 (2010)
- Plants in development phase: not specified
- Capacities: 18 854 000 Mg

The technology is the following:

Technology: grate firing

Process steps:

- waste input → control, weighing
- waste bunker → storage, mixing
- grate firing → incineration, heat production
- boiler → steam production → generator → electricity
- emission control → removal of pollutants, dust
- chimney → exhaust gas

Efficiency:

- only electricity: 14 %
- Combined heat and power: ≈ 34 %

Output: → general plant (160.000 tons/year): 60 MW thermal energy; 14 MW electricity

3.1.6 Other thermal treatment

Other thermal treatment plants existing in Germany are the following:

- thermal waste treatment, using substitute fuel: 28 plants(2010)
- thermal waste treatment for hazardous waste: 29 plants(2008)
- co-incineration, e.g. cement industry

3.1.7 Landfill

Number of landfills in Germany:

Landfills: 1552 (2009) – EU-konform

- Class 0: 1113 (Class 0 : Landfill for soils)
- Class I: 217 (Class I: Landfill for minerals)
- Class II: 182 (Class II: landfill for waste material)
- Class III: 33 (Class III: Landfill for hazardous/special waste)
- Class IV: 4 (Class IV: Underground landfill, with minerals others than salt lick)
- Long-term storage: 3

Capacity: 35 436 200 tons

Number of illegal landfills: - not specified

3.1.8 Illegal Disposal

Illegal disposal in Germany exists in the following way:

Where: forests, shut down industrial areas, ditches, ...

Disposal of: bulky waste, scrap tyre, construction waste, garden waste, electrical devices, furniture, etc.

Extent: - Saxony – 4520 tons (2009)

- not specified for Germany

3.1.9 Waste Exports

Considering the waste exports an approval is necessary dependent on the waste characteristics. The following table gives information about the requirements to tranship waste according to the Verordnung 1013/2006/EG über die Verbringung von Abfällen (VVA).

Table 3.2: Allowableness of transhipped waste according to VVA (UBA, 2011)

	Between members of EU	**Import into EU**	**Transit through EU**	**Export out of EU**
Waste for disposal	Approval necessary	Approval necessary	Approval necessary	Prohibited
"Green Waste" (Appendix III, IIIA, IIIB of VVA) that do not contain hazardous substances	Duty of information	Duty of information	Duty of information	Duty of information
Other wastes	Approval necessary	Approval necessary	Approval necessary	Prohibited

Requiring approval: 1 600 000 tons (2008)

Don´t requiring approval: 21 000 000 tons (2008)

3.1.10 Summary Table

Table 3.3 gives an overview about the different treatment options and the corresponding number of plants as well as the number of inhabitants that mathematically can be served by one plant. Furthermore Table 3.4 to Table 3.6 display thermal treatment plants in different federal states of Germany as well as their location and the corresponding capacities.

Table 3.3: Number of plants and corresponding inhabitants in 2008

	Number of plants in 2008	**One plant for X 1000 inhabitants (2008: 82.002.400 inhabitants)**
Landfills	1645	50
Biological Treatment plants	2041	40
Sorting plants	995	82
Thermal Treatment plants	790	104
Mechanical biological treatment plants	51	1608

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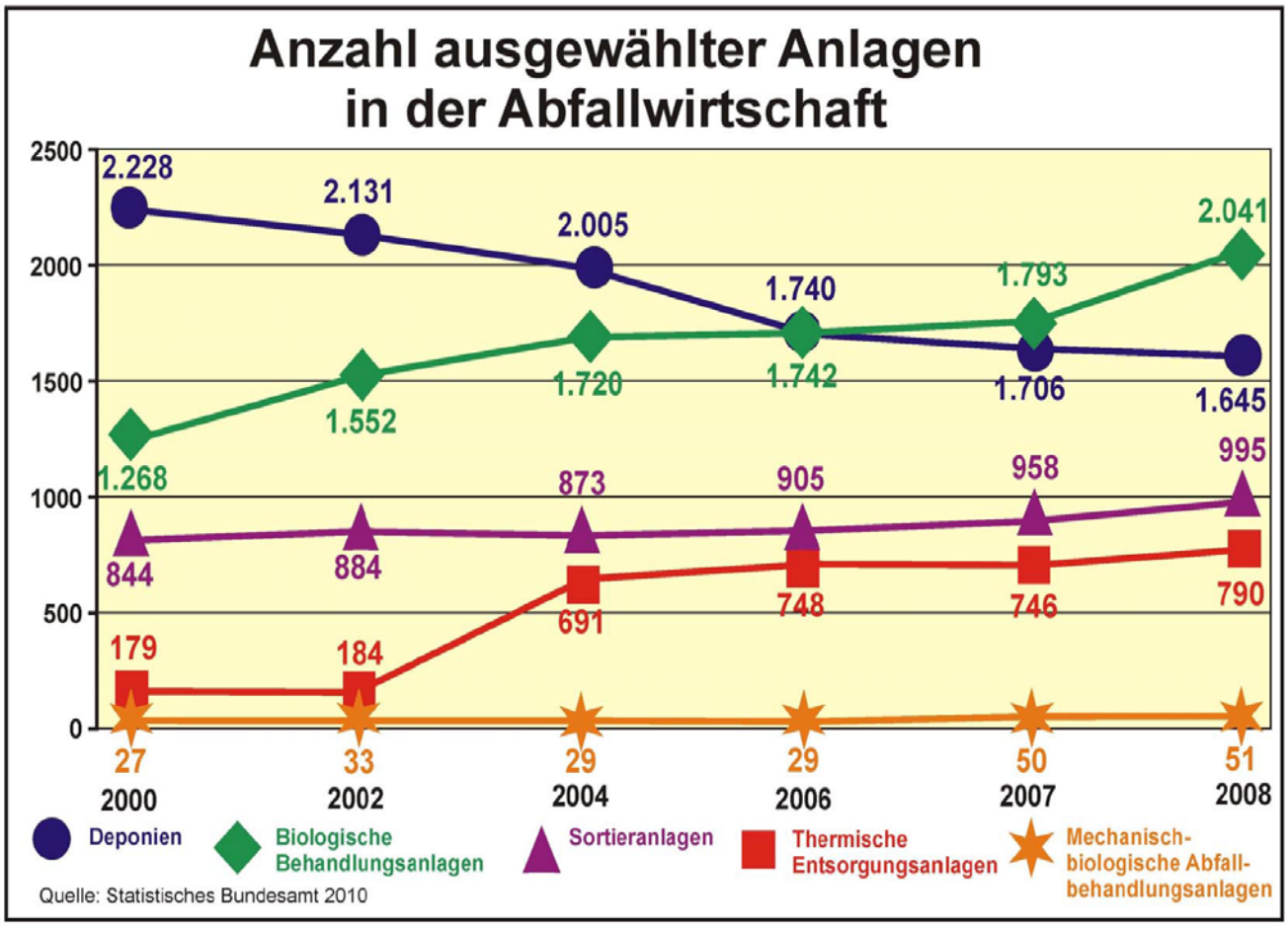

Figure 3.1: Number of waste management plants in Germany

Table 3.4: List of thermal waste treatment plants for municipal solid waste

Auflistung der thermischen Abfallbehandlungsanlagen mit dem hauptsächlichen Einsatzstoff Siedlungsabfall

Nr.	Bundesland	Anlage	Kapazität
1.	BE	Berlin-Ruhleben	520 000
2.	BW	Böblingen	140 000
3.	BW	Eschenbach	180 000
4.	BW	Göppingen	155 000
5.	BW	Stuttgart-Münster	420 000
6.	BW	Ulm	110 000
7.	BW	Mannheim	500 000
8.	BY	Augsburg	200 000
9.	BY	Bamberg	110 000
10.	BY	Burgau	25 000
11.	BY	Burgkirchen an der Alz	210 000
12.	BY	Coburg	115 000
13.	BY	Ingolstadt	240 000
14.	BY	Kempten	70 000
15.	BY	Landshut	40 000
16.	BY	Unterföhring	700 000
17.	BY	Weißenhorn	90 000
18.	BY	Nürnberg	220 000
19.	BY	Rosenheim	60 000
20.	BY	Schwandorf	450 000
21.	BY	Würzburg	215 000
22.	BY	Olching	95 000
23.	BY	Schweinfurt	175 000
24.	HB	Bremen	550 000
25.	HB	Bremerhaven	400 000
26.	HE	Frankfurt am Main	525 000
27.	HE	Kassel	150 000
28.	HE	Darmstadt	212 000
29.	HE	Offenbach	200 000
30.	HH	Hamburg	180 000
31.	HH	Hamburg	320 000
32.	HH	Hamburg	320 000
33.	MV	Ludwigslust	50 000
34.	NI	Laar	364 000
35.	NI	Hameln	240 000
36.	NI	Helmstedt	525 000
37.	NI	Salzbergen	120 000
38.	NI	Hannover	280 000
39.	NW	Kamp-Lintfort	249 000
40.	NW	Bielefeld	420 000
41.	NW	Essen	700 000
42.	NW	Hagen	120 000
43.	NW	Hamm	245 000
44.	NW	Herten	250 000
45.	NW	Iserlohn	238 000
46.	NW	Köln	590 000
47.	NW	Krefeld	380 000
48.	NW	Oberhausen	680 000
49.	NW	Solingen	105 000
50.	NW	Wuppertal	410 000
51.	NW	Düsseldorf	450 000
52.	NW	Leverkusen	210 000
53.	NW	Bonn	252 000
54.	NW	Eschweiler	360 000
55.	RP	Mainz	237 000
56.	RP	Ludwigshafen	180 000
57.	RP	Pirmasens	189 000
58.	SH	Kiel	140 000
59.	SH	Neustadt/Holstein	60 000
60.	SH	Tornesch-Ahrenslohe	80 000
61.	SH	Stapelfeld	350 000
62.	SL	Saarbrücken	255 000
63.	SL	Neunkirchen	150 000
64.	SN	Lauta	225 000
65.	ST	Leuna	390 000
66.	ST	Magdeburg	650 000
67.	ST	Staßfurt	300 000
68.	ST	Zorbau	280 000
69.	TH	Zella-Mehlis	160 000
70.	TH	Erfurt	73 000
Gesamtkapazität der Anlagen			**18 854 000**

Quelle: Umweltbundesamt, Abfallverbrennungsanlagen, eigene Zusammenstellung 2010

Table 3.5: Thermal treatment plants for refuse derived fuel

Thermische Abfallbehandlungsanlagen mit Ersatzbrennstoff als hauptsächlichem Brennmaterial

Nr.	Bundesland	Abk.	Standort	Kapazität	Status	
1.	HB	MKK	Bremen	226 000	Betrieb	2009
2.	HB	HKW	Bremen	66 000	Betrieb	2005
3.	SH	TEV	Neumünster	150 000	Betrieb	2005
4.	SN	RABA	Chemnitz	130 000	Betrieb	2003
5.	HE	TREA	Gießen	25 000	Betrieb	2010
6.	HE	MHKW	Neumünster	270 000	Betrieb	2009
7.	NW	EBS-KW	Hürth-Knapsack	240 000	Betrieb	2009
8.	BR	IKW	Premnitz	100 000	Betrieb	2008
9.	BR	EVE	Premnitz	150 000	Betrieb	2008
10.	BR	EBS-KW	Großräschen	240 000	Betrieb	2007
11.	BR	IKW	Rüdersdorf	226 000	Betrieb	2009
12.	BY	HKW	Gersthofen	70 000	Betrieb	2009
13.	HE	HKW	Witzenhausen	270 000	Betrieb	2009
14.	HE	IHKW	Korbach	70 000	Betrieb	2008
15.	MV	HKW	Stavenhagen	90 000	Betrieb	2007
16.	MV	HKW	Hagenow	80 000	Betrieb	2009
17.	NI	DZ	Weener	140 000	Betrieb	2008
18.	NW	EVA	Essen	26 000	Betrieb	2010
19.	NW	HKW	Minden	40 000	Betrieb	2002
20.	RP	IHKW	Andernach	114 000	Betrieb	2009
21.	SH	KW	Glückstadt	270 000	Betrieb	2010
22.	ST	IKW	Amsdorf	60 000	Betrieb	2004
23.	ST	IKW	Amsdorf	60 000	Betrieb	2009
24.	ST	TRB	Bitterfeld	110 000	Betrieb	2010
25.	ST	EBS-KW	Bernburg	400 000	Betrieb	2010
26.	TH	HKW	Meuselwitz	50 000	Betrieb	2000
27.	TH	TVA	Schwarza	60 000	Betrieb	2009
28.	MV	HKW	Rostock	230 000	Betrieb	2010
Kapazität von Anlagen im Status Betrieb				**3 963 000**		
29.	BR	HKW	Schwedt	250 000	Bau	2011
30.	BR	EBS-KW	Eisenhüttenstadt	340 000	Bau	2011
31.	HE	EBS-KW	Frankfurt Hoechst	675 000	Bau	2011
32.	NI	DZ	Dampfzentrale Stade	140 000	Bau	2011
33.	SH	HKW	Brunsbüttel	325 000	Bau	2011
Kapazität von Anlagen im Status Bau				**1 730 000**		
Summe der Kapazitäten				**5 693 000**		

Quelle: Umweltbundesamt, eigene Zusammenstellung allgemein zugänglicher Datensätze (Stand 10/2010)

Table 3.6 Thermal treatment plant for hazardous waste

Thermische Behandlungsanlagen für gefährliche Abfälle (Sonderabfallverbrennungsanlagen)

Nr.	Bundesland	Standort	Kapazität
1.	BR	Schöneiche	22 000
2.	BR	Schwarzheide	35 000
3.	BR	Schwedt	24 000
4.	BY	Baar-Ebenhausen	180 000
5.	BY	Kelheim	5 000
6.	HE	Biebesheim	100 000
7.	HE	Höchst	46 000
8.	HH	Hamburg	120 000
9.	NI	Bramsche	15 000
10.	NI	Emsland	10 350
11.	NI	Stade	45 000
12.	NW	Bergkamen	11 500
13.	NW	Dormagen	65 000
14.	NW	Herten	91 000
15.	NW	Knapsack I	9 860
16.	NW	Knapsack II	1 500
17.	NW	Köln	70 000
18.	NW	Krefeld-Uerdingen	25 000
19.	NW	Leverkusen-Bürrig	185 000
20.	NW	Marl	20 000
21.	NW	Münster	13 000
22.	NW	Wesseling	30 000
23.	NW	Wesseling	60 000
24.	NW	Schlebusch	26 280
25.	RP	Ludwigshafen	165 000
26.	SH	Brunsbüttel	52 000
27.	SN	Muldenhütten	33 000
28.	SN	Steinbach	15 000
29.	ST	Schkopau	45 000
Summe der Kapazitäten			**1 520 490**

Quelle: Umweltbundesamt, eigene Zusammenstellung allgemein zugänglicher Datensätze (Stand 2008)

3.1.11 Literature

Umweltbundesamt (2011): Disposal measures; http://www.umweltbundesamt.de/abfallwirtschaft/entsorgung/index.htm ; 28.06.2011

3.2 Austria

3.2.1 ReUse

Next to flea markets or second hand shops all over Austria there are so called reuse shops in Austria which are operated by waste management associations:

- Upper Austria: 7 shops (www.revitalistgenial.com), sale of 446 tons in 2010
- Styria: 7 shops in planning (http://www.abfallwirtschaft.steiermark.at/cms/beitrag/11472859/67081267)

Table 3.7 Data concerning second-hand market of the private sector in Austria (Arold and Koring, 2007)

Federal state	Inhabi-tants	Area (in km²)	Junk Goods Shops	Second-Hand-Shops	Antique Traders	Total	Inhabi-tants per Shop
Burgenland	278,655	3,965	5	4	6	15	18,577
Carinthia	560,089	9,536	3	8	17	28	20,003
Lower Austria	1,575,291	19,178	39	29	61	129	12,212
Upper Austria	1,399,226	11,982	19	30	61	110	12,720
Salzburg	526,875	7,154	4	20	48	72	7,318
Styria	1,199,489	16,392	20	28	52	100	11,995
Tyrol	693,651	12,648	7	12	23	42	16,516
Vorarlberg	362,258	2,601	4	12	12	28	12,938
Vienna	1,637,772	415	56	72	143	271	6,043

According to Arold and Koring (2007) next to the private second-hand shops in total 85 socio-economic second-hand shops are operating in Austria.

3.2.2 Material recycling

Material recycling takes place for separate collected waste fractions from households and similar facilities. In total 48 plants are operating in Austria with a total capacity of 1.2 Mio tons per year as a minimum. Waste fractions are:

- Paper, cardboard: 14 plants
- Glass: 6 plants
- Metals: 9 plants
- Plastic: 15 plants
- Wood: 4 plants
- Multi-treatment: 1 plant

There are 6 shredder plants in Austria dealing with all kind of metal waste (metal scrap >50%, WEEE 10%, ELV 16%, packaging material <10%, fraction of mechanical treatment plants for residual waste) with a total capacity of 539,000 tons per year

Furthermore 3 post-shredder plants in Austria deal with a further mechanical separation of iron and non-iron fractions, plastic fraction etc. with a total capacity of 284,800 tons per year.

In Austria there are 40 plants for the pre-treatment of WEEE:

- Monitors: 15 plants with 14,000 tons per year
- Cooling units: 4 plants (2 plants with complete treatment inclusive removal of cooling agent and treatment of insulation material with a capacity of 30,000 tons per year)
- Gas discharge lamp: 1 plant with a capacity of 1,000 tons per year, 1 pre-treatment plant and export
- Small electric appliances: 20 plants with manual dismantling, 4 plants with mechanical crushing and manual separation of hazardous components (capacity of 3 plants is 70,000 tons). Further mechanical treatment in the 6 shredder plants and other metal treatment plants.
- Big electric appliances: manual dismantling and removal of hazardous components in treatment plants of WEEE, mechanical treatment is done in the 6 shredder plants.

Separation and pre-treatment plants for recyclable materials:

- 182 plants with a capacity of 2.9 Mio tons (classification, separation, Iron and non-iron separation, confectioning (crushing, drying, pelleting)).

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Table 3.8: WEEE in Austria (Eurostat, 2008)

Product category	Put on the market	Total collected (2)+(3)	Recovery (tonnes)	Recovery rate (%)	Reuse and recycling (tonnes)	Reuse and recycling rate (%)	Reused as whole applicance (tonnes)
Large household appliances	79 411	34 926	30 579	89	28 984	84	620
Small household appliances	16 808	5 940	5 026	85	4 281	73	36
IT & Telecommunication	29 988	15 343	13 397	89	11 624	77	269
Consumer equipment	27 428	14 234	12 807	92	11 358	81	278
Lighting equipment	1 134	962	814	85	688	72	4
Gas discharge lamps	1 914	966	n/a	n/a	891	92	0
Electrical & electronic tools	6 465	1 806	1 526	85	1 332	75	21
Toys, leisure & sports equipment	2 596	62	53	85	45	73	0
Medical devices	1 893	213	179	86	149	72	5
Monitor & control instruments	2 874	157	135	86	115	74	1
Automatic dispensers	1 156	146	134	93	108	75	2
Total	**171 667**	**74 754**	**64 649**	**875**	**59 576**	**848**	**1 237**

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3.2.3 Mechanical treatment

Separation and pre-treatment plants for recyclable materials:

- 182 plants with a capacity of 2.9 Mio tons (classification, separation, Iron and non-iron separation, confectioning (crushing, drying, pelleting)).

Mechanical treatment plants for construction waste: 400 plants

3.2.4 Mechanical biological treatment

MBTs in Austria deal with municipal waste and similar commercial waste. Sewage sludge and other appropriate waste fractions can be treated together with such waste. In total 16 plants are operating with a total annual capacity of 741,000 tons.

3.2.5 Waste incineration

In Austria there are seven plants with grate firing and three plants with fluidized bed technology. The total annual capacity of waste incineration plants in Austria is 2.3 Mio tons. Details are given in the following table.

Table 3.9: Waste incineration plants in Austria

Location	Technology	Capacity in tons per year
Spittelau, Vienna	Grate firing	250,000
Flötzersteig, Vienna	Grate firing	200,000
Pfaffenau, Vienna	Grate firing	250,000
WAV, Wels	Grate firing	300,000
Dürnrohr, Zwentendorf	Grate firing	525,000
Arnoldstein	Grate firing	96,000
Zistersdorf	Grate firing	130,000
Simmeringer Haide, Vienna	Fluidized bed	110,000
Lenzing	Fluidized bed	300,000
Niklasdorf	Fluidized bed	100,000
Total		2,300,000

3.2.6 Other thermal treatment

Other thermal treatment plants in Austria incinerate the following waste fractions:

- High caloric fraction from mechanical (-biological) treatment plants

- Residues from wood treatment and recycling
- Sewage sludge and other sludges
- Residues from paper and pulp industry
- Plastics and packaging materials
- Scrap tyres and other rubber waste
- Hazardous waste and oil
- Meat and bone meal
- Shredder residues

In total 49 such thermal treatment plants are operating in Austria with a total capacity of 2.2 Mio tons per year as a minimum.

3.2.7 Landfill

In the year 2008 still 129,300 tons of untreated municipal waste was landfilled as a transition period until 31.12.2008 for the landfill directive allowed it. Since then no untreated waste was landfilled in Austria anymore.

Table 3.10: Types of landfills in Austria

Type of landfill	Number (Status quo 2008)	Free landfill volume 2008 in Mio m³
Landfill for excavated soil	462	39.5
Landfill for inert waste	13	1.8
Landfill for inert part of construction and demolition waste	90	8.5
Landfill for residues from incineration plants	40	12.5
Landfill for municipal solid waste	46	13.0
Others	15	2.0

3.2.8 Illegal Disposal

All landfills in Austria are registered and EU-konform. There are no illegal landfills known. Illegal dumping is punctually happening though.

3.2.9 Waste Exports

Waste which is exported from Austria are the following:

- Oil
- Salt slag and metal containing filter dust

- Scrap wood, treated
- Residues from waste incineration
- Sewage sludge
- Municipal waste and similar commercial waste, residues from MBTs

In total 700,208 tons were exported in 2009.

Illegal exports reported in the Federal Waste Management Plan of Austria are ELVs to Africa, electronic waste to Asia and Africa and household waste to Eastern European countries.

3.2.10 Summary Table

Table 3.11: Types of facilities in Austria

Types of facilities in Austria in 2010	Number	One plant for X 1000 inhabitants
Incineration plants for municipal solid waste	10	839
Thermal treatment facilities (excl. incineration plants for municipal solid waste	49	171
Chemical-physical treatment facilities	43	195
Treatment plants for specific waste (fats and frying oil, chemicals, batteries, etc.)	93	90
Treatment plants for WEEE	40	210
Shredders	9	932
Treatment plants for demolition and construction waste	400	21
Biotechnical treatment facilities for pre-processing of residual waste and other waste (MBT)	16	524
Plants for aerobic biotechnical treatment of separately collected biogenic waste, green waste etc. (composting facilities)	466	18
Sorting plants for separately collected waste and other waste	182	46
Recovery plants for separately collected waste	48	175
Plants for anaerobic biotechnical treatment (biogas facilities)	157	53
Landfills (mass waste, residual waste, demolition and construction waste, excavated soil)	666	13

According to Arold and Koring (2007) for one second-hand enterprise there are 9,356 inhabitants in Austria.

3.2.11 Literature

Arold H.; Koring C. (2007): An Investigation and Analysis of the Second-Hand Sector in Europe. New Vocational Ways and Qualifications for Professionalisation in the Second-Hand Sector, Quali Pro Secon Hand, European report. ITB Universität Bremen. Germany

If not stated otherwise, the following source was taken:

BAWP (2011): Federal Waste Management Plan. http://www.bundesabfallwirtschaftsplan.at/

3.3 Hungary

3.3.1 ReUse

There are no dedicated reuse shops according to the Waste Framework Directive (2008/98/EC), but there are numerous second-hand shops in the country for clothes, furnitures and electronic devices.

3.3.2 Material recycling

The reply covers the waste stream of WEEE, clothing, furnitures and free time activity equipment. As only WEEE-relevant directive is in force, so organised collection and treatment system exists only for this waste-stream. What relates to the other streams, there are no collective schemes for them. These wastes are disposed by organised special waste collection events by the local waste collector company or by illegal way. It is hard to ascertain whether the product has become waste or it still can be used as its primary intention. The second hand market of these products is relevant in Hungary.

In case of other waste streams other than the concerned product categories, like municipal solid waste, the next packaging fractions are collected separately throughout the country (it means it is selectively collected in towns, and bigger municipalities):

- plastic bottles
- cardboard, newspapers
- Glass bottles

An organised collection system exists also for this fractions, financed by product fee.

For other fractions, like ALU cans, tetrapack boxes, and biologically degradable organic content the selective collection system exist only on certain area of the country.

Other waste streams, like biologically degradable organic waste from gardening activity of municipalities are also separately collected.

According to the the public benefit activity report of the biggest Hungarian Producers' Responsibility Organisation, called Öko-Pannon Nonprofit PLC., they recovered (material recycling - 57,2% and energetic recovery - 3,8% together) 61% of their co-ordinated amount in 2010. Their system serves

5,3 million inhabitants. The municipalities contracted with Öko-Pannon collected an average amount of 10 kg/person/year waste last year.

The material recycling actions of the above mentioned fractions are diversed in Hungary and foreign countries as well.

Usual material recovery process for each fractions, ie. plastics are selected by colour and type, then washed, homogenised and granulated for putting back into the production loop.

For End-of-Life Vehicles: there are 3 shredder-plants (2 in Budapest (Ereco: 12.000 t/year, MüGu: 100.000 t/year, 1 in Fehérvárcsurgó: 120.000 t/year).

For WEEE: in Hungary there are 5 PRO-s. The biggest of them, named Electro-coord Kft. covers about the 75 % of the WEEE concerned producers in Hungary. They are in contract with 14 recyclers (Electro coord, 2009), throughout the country. They process at about 40 thousand tons of WEEE annually. Among them, there are only 4 owning Shredder machine, while the rest dismantle typically by handwork.

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Table 3.12: WEEE in Hungary (Eurostat, 2008)

Product category	Put on the market	Total collected (2)+(3)	Recovery (tonnes)	Recovery rate (%)	Reuse and recycling (tonnes)	Reuse and recycling rate (%)	Reused as whole applicance (tonnes)
Large household appliances	70 514	28 322	24 218	86	23 786	84	:
Small household appliances	13 371	3 198	2 580	84	2 569	83	:
IT & Telecommunication	16 727	5 719	4 759	85	4 626	83	:
Consumer equipment	18 270	6 545	5 131	80	4 905	76	:
Lighting equipment	4 796	286	238	83	238	83	:
Gas discharge lamps	1 475	480	n/a	n/a	400	83	:
Electrical & electronic tools	7 455	275	238	88	238	88	:
Toys, leisure & sports equipment	1 199	16	12	93	12	92	:
Medical devices	11	5	3	57	3	57	:
Monitor & control instruments	718	28	25	87	25	87	:
Automatic dispensers	625	45	45	99	45	99	:
Total	**135 160**	**44 919**	**37 249**	**842**	**36 845**	**917**	**0**

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3.3.3 Mechanical biological treatment

The total annual capacity of the MBT plants in Hungary: 332.000 tons

There are additional 346.000 tons capacity is desired to be realised until the end of 2014.

3.3.4 Waste incineration

In Hungary at the time, there are 17 incinerators (Humusz, 2010). One of them is a MSW-incinerator, with the annual capacity of 420 kt. Based on different studies, additional 5 MSW-incinerators are preferred until 2014. (Actually, they are improbable to be realised until that time).

The next table summarizes the incinerators and their capacity as well as their technology:

Table 3.13: Waste incineration plants in Hungary

Company	Location	Wastestream	Annual capacity	Technology	Efficiency	Electricity (E) or thermal (T) utilization
Fűzfői hulladékégető Szolgáltató Kft	Balatonfűzfő	Hazardous and non hazardous inidustrial and medical wastes	7.200 t	Rotary kiln type	n.a.	n.a.
Duna-Dráva Cement Kft.	Beremend	Hazardous and non hazardous (tyres, plastics)	30.000 t	Cement kiln	-	-
FKF Zrt., Fővárosi Hulladékhasznosító Mű	Budapest	MSW	420.000 t	Rotary kiln type	63% (Kszgysz, 2008)	E, T
Septox Kft.	Budapest	Medical waste	3.025 t	Three-staged kiln furnace	n.a.	-
HAJDÚKOMM Kft.	Debrecen	Medical waste	1.400 t	Chamber kiln	n.a.	-
SARPI Dorog Kft.	Dorog	Solid and liquid wastes (chemical and medical industry), sludge, biogas	35.000 t	Rotary kiln type	n.a.	E
Győri Hulladékégető Kft.	Győr	Hazardous and non hazardous inidustrial and medical wastes	8.000 t	Rotary kiln type	n.a.	E, T
HOLCIM Zrt.	Lábatlan	Solid non hazardous waste (biomass, tyres, plastic), Liquid waste (refuse oil, emulsion)	20.000 t	Cement kiln	-	-

Orviron Kft.	Oroszlány	Oil and paint contaminated solid waste	700 t	Chamber kiln	n.a.	n.a.
Huntsman Corporation Hungary Vegyipari Termelő-Fejlesztő Zrt.	Pétfürdő	Distillation residue	3.200 t	n.a.	n.a.	n.a.
Észak-magyarországi Környezetvédelmi Kft.	Sajóbábony	Hazardous and non hazardous solid and liquid wastes	17.600 t	Rotary kiln type	n.a.	T
MOL Rt. Dunai Finomító	Százhalombatta	Hazardous waste	20.000 t	Rotary kiln type	n.a.	n.a.
SZOTE Szolgáltató Kht.	Szeged	Medical waste	750 t	Chamber kiln	n.a.	n.a.
Megoldás Környezetvédelmi és Kereskedelmi Kft.	Szombathely	Hazardous and non hazardous waste	1.480 t	Chamber kiln	n.a.	n.a.
MOL Rt. Tiszai Finomító	Tiszaújváros	Hazardous waste	7.200 t	Rotary kiln type	n.a.	n.a.
Ecomisszió Kft.	Tiszavasvári	Hazardous and non hazardous solid and liquid wastes	5.080 t	Rotary kiln type	n.a.	E
Duna-Dráva Cement- és Mészművek Rt.	Vác	Solid non hazardous waste (biomass, tyres, plastic)	13.000 t	Cement kiln	-	-

3.3.5 Other thermal treatment

Please see table above for other thermal treatment options in Hungary.

3.3.6 Landfill

The following landfills are existent in Hungary:

closed but not recultivated landfills: 2232 (MSW development strategy)

closed and recultivated: 328 (MSW development strategy)

EU-conform (registered) landfills in operation: 72

Free capacities of the legal landfills: 36 million m3

3.3.7 Illegal Disposal

Illegal disposals are emerged throughout the country and estimated about 15-20 thousand (Fomi, 2010).

There are Programme for the recultivation of these landfills (in 2010. 100 million HUF (cca. 36.000 EUR) amount was dedicated to this).

3.3.8 Waste Exports

The exported amount of waste is about 1-4% of the generated amount. The destinations are mainly EU-countries. The import is less than 1%.

In 2007. there had been a scandal because of an illegal import of 4500 tons of german MSW. The waste was transported back to the origin. No other case since that time has been emerged.

3.3.9 Summary Table

Due to the lack of specific information similar table like the Austrian data cannot be compiled, but aggregate treated amounts and specific waste stream quantities can be presented. The source of data is the National Waste Management Plan for 2009-2014.

Table 3.14: Generated amount of waste annually (without sewage sludge)

Indicator	2009	2010	2011	2012	2013	2014
Total waste ratio related to the previous year (%)	97,14%	97,73%	100,00%	97,67%	97,62%	97,56%
Total amount of waste annually (thousand tons)	22.000	21.500	21.500	21.000	20.500	20.000

Table 3.15: The change of waste treatment methods in Hungary, 2000-2008. (without sewage sludge)

Indicator	2000		2004		2005		2006		2007		2008	
	Kilo-tons	%	Kilo-tons	%	Kilo-tons	%	Kilo-tons	%	Kilo-tons	%	Kilo-tons	%
Amount of waste	40.000		30.045		28.558		26.607		25.858		22.647	
Material recycling	10.190	25,5	9.087	30,2	7.832	27,4	6.698	25,2	5.341	20,7	6.142	27,1
Energy recovery	800	2,0	911	3,0	1.271	4,5	1.627	6,1	1.355	5,2	765	3,4
Incineration	190	0,5	170	0,6	53	0,2	101	0,4	78	0,3	65	0,3
Landfilling	21.175	52,9	17.416	58,0	13.603	47,6	13.594	51,1	11.326	43,8	9.563	42,2
Other	7.645	19,1	2.461	8,2	5.799	20,3	4.587	17,2	7.759	30,0	6.112	27,0

Table 3.16: Predicted change of waste treatment methods in Hungary until 2014. (without sewage sludge)

Indicator	2009		2010		2011		2012		2013		2014	
	Kilo-tons	%	Kilo-tons	%	Kilo-tons	%	Kilo-tons	%	Kilo-tons	%	Kilo-tons	%
Amount of waste	22.000		21.500		21.500		21.000		20.500		20.000	
Material recycling	6.380	29,0	6.880	32,0	7.310	34,0	7.560	36,0	7.790	38,0	8.000	40,0
Energy recovery	1.000	4,5	1.120	5,2	1.290	6,0	1.470	7,0	1.740	8,5	2.000	10,0
Incineration	100	0,5	130	0,6	150	0,7	170	0,8	185	0,09	200	1,0
Landfilling	9.240	42,0	8.920	41,5	8.820	41,0	8.530	40,6	8.260	40,3	8,000	40,0
Other	5.280	24,0	4.450	20,7	3.930	18,3	3.270	15,6	2.525	12,3	1.800	9,0

Table 3.17: The generated amount of the main waste streams

Indicator	2000	2004	2005	2006	2007	2008
Municipal Solid Waste (ktons)	4.552	4.592	4.646	4.711	4.594	4.553
Municipal Liquid Waste (ktons)	5.500	4.569	4.939	4.514	4.165	3.925
Hazardous waste (ktons)	3.393	970	1.203	1.367	1.082	715
Waste of agriculture and food industry (ktons)	5.000	6.215	4.857	3.940	4.858	1.188
Waste from Industry and other farming activity (ktons)	16.455	9.639	8.784	8.079	7.489	7.386
Demolition and construction waste (ktons)	5.100	4.060	4.129	3.996	3.670	4.882
Total amount of waste amount (ktons)	**40.000**	**30.045**	**28.558**	**26.607**	**25.858**	**22.647**
Population (capita)	10.200.298	10.097.549	10.076.581	10.066.158	10.045.401	10.030.975
Waste amount per capita (kg)	**3.921**	**2.975**	**2.834**	**2.643**	**2.574**	**2.258**

Table 3.18: The situation of recovery in 2008. (without sewage sludge)

2008	Total amount of waste (ktons)	Material recycling		Energy recovery		Total recovery	
		(ktons)	(%)	(ktons)	(%)	(ktons)	(%)
Waste of agriculture and food industry	1.188	552	46,5	168	14,2	720	60,7
Non hazardous industrial and other farming waste	7.386	2.495	33,8	163	2,2	2.658	36,0
Demolition and construction waste	4.882	2.231	45,7	0	0,0	2.231	45,7
Municipal Solid Waste	4.553	692	15,2	394	8,6	1.086	23,8
Municipal Liquid Waste	3.925	5	0,1	-	-	5	0,1
Hazardous waste	714	167	23,3	40	5,6	207	28,9
Total	**22.647**	**6.142**	**27,1**	**765**	**3,4**	**6.907**	**30,5**

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Table 3.19: The situation of disposal in 2008. (without sewage sludge)

2008	Total amount of waste (ktons)	Incineration		Landfilling		Total disposal	
		(ktons)	(%)	(ktons)	(%)	(ktons)	(%)
Waste of agriculture and food industry	1.188	1	0,1	7	0,6	8	0,7
Non hazardous industrial and other farming waste	7.386	5	0,1	3.349	45,3	3.354	45,4
Demolition and construction waste	4.882	0	0,0	2.650	54,3	2.650	54,3
Municipal Solid Waste	4.552	0	0,0	3.341	73,4	3.341	73,4
Municipal Liquid Waste	3.925	-	-	0	0,0	0	0,0
Hazardous waste	714	60	8,4	216	30,2	276	38,6
Total	**22.647**	**66**	**0,3**	**9.563**	**42,2**	**9.629**	**42,5**

3.3.10 Literature

Electro coord (2009): http://www.electro-coord.hu/web/uploads/File/jelentesek/EvesBesz2009.pdf

Fomi (2010): http://www.fomi.hu/honlap/magyar/szaklap/2010/10/1.pdf

Humusz (2010): http://www.humusz.hu/piro/egetok/magyarorszag

Kszgysz (2008): http://www.kszgysz.hu/e107_files/downloads/hulladek,mint/Banhidy_20080409 kszgysz.pps

MSW development strategy (2008)

National Waste Management Plan for 2009-2014

3.4 Slovakia

3.4.1 ReUse

- We do not have concrete reuse shops, maybe some socioekonomical facilities are working on selling products of reuse, and of course second hand shops, mainly for textile.

3.4.2 Material recycling

- Process steps of material recycling for each option:

✓ Glass: collection/sorting → melting → new glass

✓ Paper: collection/sorting → crushing → paper production → recycling paper

✓ Plastics: collection/sorting → crushing → new plastics

✓ Metals: collection/sorting → melting → new products

✓ Waste oil: collection → processing → production of heating oil, lubricants

✓ Electrical devices: collection → separation valuable materials/residuals → use as secondary raw materials

Table 3.20: WEEE in Slovakia (Eurostat, 2008)

Product category	Put on the market	Total collected (2)+(3)	Recovery (tonnes)	Recovery rate (%)	Reuse and recycling (tonnes)	Reuse and recycling rate (%)	Reused as whole applicance (tonnes)
Large household appliances	32 946	12 458	10 856	87	10 779	87	0
Small household appliances	4 964	1 323	1 036	78	981	74	0
IT & Telecommunication	6 533	2 532	2 254	89	2 189	86	0
Consumer equipment	7 273	2 265	1 945	86	1 909	84	0
Lighting equipment	3 345	184	169	92	163	89	0
Gas discharge lamps	340	128	n/a	n/a	112	88	0
Electrical & electronic tools	4 400	180	152	85	150	84	0
Toys, leisure & sports equipment	495	7	6	84	6	84	0
Medical devices	94	80	69	87	69	87	0
Monitor & control instruments	110	77	70	91	70	90	0
Automatic dispensers	155	155	135	87	134	87	0
Total	**60 656**	**19 388**	**16 691**	**865**	**16 562**	**939**	**0**

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3.4.3 Mechanical treatment

- There are seven plants with mechanical treatment for recycling of plastic waste, with shredder facilities of plastics with capacity each- 10000m3.
- There are three shredder facilities for plastics NDPH 300 with capacity 150-200 kg/h
- There are another 31 plants with shredder facilities for plastic with no description and capacity 350-400t /year.
- There are three plants with mobile crasher RESTA 630x500 with capacity 10-40t/h
- There are shredders in paper industries with capacity 58 390t/year, no concrete number of plants.
- There are 5 plants with shredders- compact crushing and separating line- for fluorescent lamps
- All together 49 plants with mechanical treatment.

3.4.4 Mechanical biological treatment

- We have ten plants for composting with capacity each 29000t/year
- And four plants with biological degradation-Biodekon,200t/y and 2 Ropstob SB 25 000t/y and ENVI with capacity 5000t.
- All together 14 plants with mechanical biological treatment.

3.4.5 Waste incineration

- In Slovakia are 19 waste incineration, where one is in development state, three are out of service. There are four plants with co-incineration.Details are in the following. Table.

Technology:

- **OLO:-** Technology three levels of flue gas purification
- **Kosit, a.s:-** The system of two steam boilers with natural circulation for the vacuum incineration grate type" Dusseldorf"
- **Duslo :-** Two separate firing line. The first line of rotary furnace dohrievajúcou chamber and a second fluid line to the furnace
- **Slovnaft: incineration of sludge**
- **Fecupral :-incineration of hazardeous waste**

  boiler incorporating environmental and boiler plant with rotary kiln RSP 1000 and re-heaters chamber

- **A.S.A.- the best and the most available technology from protection of air pollution point of view**
- **VAS :- incineration of animal fats with rendering technology**

Waste incineration CAPACITY ≥ 2 T/H	**Place**	**Capacity**	**In use**
Municipal waste			
OLO, a.s. Spaľovňa odpadov	Vlčie hrdlo, Bratislava	32,7 t/ h	
Kosit, a.s., Košice	Košice	10 t/h	
Industrial waste			
Duslo, a.s.	Šaľa	10 000 t/year 30,5 t/day 1,26 t/h	
Slovnaft, a.s.	Vlčie hrdlo, Bratislava	28500 t/year 3,77 t/h	
Waste incineration CAPACITY ≤ 2 T/H	**Place**	**Capacity**	**In use**
Hospital waste			
Univerzitná nemocnica Bratislava Pažítková 4 821 01 Bratislava	Bratislava	337 kg/h	Sourse is in trial operation till 31.01.2011
Fakultná nemocnica Trenčín	Trenčín	120kg/h with calorific value of waste18 MJ.kg -1	Since 01.07.2009 permanent operation
Nemocnica s poliklinikou Prievidza	Bojnice	50kg/h	
Nemocnica s poliklinikou Sv. Lukáša, Galanta	Galanta	Allowed capacity 40kg/h	
Univerzitná nemocnica Martin	Martin	98kg/h	In permanent operation since 07.07.2010
Kysucká nemocnica s poliklinikou Čadca	Čadca	120kg/h	In permanent operation since 2009

Fakultná nemocnica Trnava	Trnava – areál Fakultnej nemocnice	120kg/h (280 t/year)	The permanent operation was allowed at 2010
Fakultná nemocnica, a.s. , Nitra	Nitra	60 kg/h	The incineration is out of service since 2008. Was not repeired
Nemocnica s poliklinikou F. D. Roosevelta	Banská Bystrica		Out of service
Industrial waste			
Chemko Light Stabilizers, s.r.o.	Strážske	140 - 180kg/h	
Fecupral, s.r.o.	Prešov	150kg/h	
Železničné opravovne a strojárne, a.s., Zvolen	Zvolen	100kg/h	operation has suspended two years due to non-EL
A.S.A. Slovensko, s.r.o., odštepný závod Žilina	Kysucké Nové Mesto	312 kg/h 1500 t/year	In permanent service since 10/2009
Rendered fats			
V.A.S, s.r.o., Mojšová Lúčka	Mojšová Lúčka	440kg/h	In permanent service since 12/2004

Other thermal treatment	Place	Capacity
Cement industry		
Holcim (Slovensko), a.s., Rohožník	Rohožník	RP PC2 - 28 t/h; RP BC – 2,5 t/h
Cemmac,a.s.	Horné Sŕnie	Tyres – 1,09 t/h TAP – 3 t/h. ORO -12000 t/year

Považská cementáreň, a.s., Ladce	Ladce	Catalogy number of waste capacity 130 205 – 100 t/ year 130 307 - 100 t year 130 502 - 10 t/ year 130 506 - 10 t/ year 150 202 - 10 t/ year 150 203 - 10 t/ year Glycerin - 72960 t/ year 160 103 - 10 000 t/ year Meat and bone meal 46 080 t/year animal fats – 4,6 t/h. 91 210 – 8,0 t/h. TAP BIO - 6,0 t/h.
V.S.H., a.s.	Turňa nad Bodvou	max. 7,0 t TAP

3.4.6 Other thermal treatment

- The co- incineration is mentioned in the table above.
- Decodom, a.s. –processing wood waste by boiler PD 6000/8 -2t/h a 2714t/year
- Nine thermal treatment plants with Heater unit –KONFORMA IBV AT 303 and 307 -3,7t/year and 2-6,2t/h
- Four trade, s.r.o. -heat treatment of castings with heat oven LAC 1000 and melting aluminum alloys in rotation oven
- FABAs.r.o.- burning briquettes
- 3 plants with technology heat oven 3000t/year
- 1 plant for burning wood waste 39 000t/year
- Nine plants for burning and processing oils and fats
- In total 27 other thermal treatment plants in Slovakia.

3.4.7 Landfill

- In our country are 136 landfills with EU-konform. Hazardous waste landfills 13,other than hazardous landfills 114, inert waste landfills 46.

- Capacity. Al together: 3 224 224,44 t, what is around 48% of waste.

3.4.8 Illegal Disposal

- Normally it occurs on the backround of our villages or in forests, and in some hidden places in country. There are 6000 illegal disposal in Slovakia.

3.4.9 Waste Exports

- I have included the category waste exports as it is interesting to see, if wastes are exported whether on a legal or illegal way.

- Allowed export 1 070684,1 t

- Hazardous waste export allowed 17 384,1 t

- Other waste export 1 053 300 t

3.4.10 Summary Table

Types of facilities in Slovakia in 2010	**Number**	**One plant for X 1000 inhibitants**
Incineration plants for municipal solid waste	2	250 000
Thermal treatment facilities	27	185
Chemical-physical treatments	21	238
Treatment plants for specific waste	29	172
Treatment plants for WEEE	22	227
Shredders	49	102
Treatment plants for demolition and construction	12	311
Biotechnical treatment facilities for pre-procesing	14	357

of residual waste and other waste		
Landfills	136	36

Literature: www.enviroportal.sk, www.odpady.sk, www.minzp.sk 2005-2008

- Book –Správa o životnom prostredí na Slovensku 2008/2009(the 2010 is not out yet)

WASTE RECOVERY

Code	**Aktivity**	**Total (t)**	**Hazardous waste (t)**	**Other waste (t)**
R1	Used mainly as fuel or to extract energy through different approach	429 068 1	12 584	416 484
R2	Solvent reclamation/regeneration	4 020	3 995	25
R3	Recycling or reclamation of organic substances which are not used as solvents (including composting and other biological transformation processes)	583 119	29 851	553 268
R4	Recycling or reclamation of metals and metal compounds.	680 866	6 703	674 163
R5	Recycling or reclamation of other inorganic material	1 789 301	2 533	1 786 768
R6	Regeneration of acids and bases	392	228	164
R7	Recovery of components used for pollution abatement	376	194	182
R8	Recovery of components from catalysers	2 399	2 355	44
R9	Oil re-refining or other re-uses of soil	10 121	10 067	54
R10	Treatment of soil to benefit the agricultural production or to improve	796 051	9 771	786 280

	environment			
R11	Use of waste obtained from the activities R1 to R10	34 303	375	33 928
R12	Treatment of waste generated by any of the R1 to R11 activities.	216 842	11 311	205 531
R13	Storing of waste before using any of the R1 to R12 activities (besides temporary storage prior to collection at the place of waste generation).	650 531	20 542	589 989
Total		5 157 389	110 509	5 046 880

WASTE DISPOSAL

Code	**Aktivity**	**Total (t)**	**Hazardeous waste (t)**	**Other waste (t)**
D1	Underground or surface waste disposal. (e.g. landfill)	3 211 530	109 791	3 101 739
D2	Treatment by soil processes (e.g. biodegradation of liquid or sludge waste in soil, etc.)	153 319	117 693	35 356
D8	Biological treatment non-specified in this annex that generates compounds and mixtures eliminated by any of the D1 to D12 activities.	38 626	16 716	21 910
D09	Physical-chemical treatment non-specified in this annex that generates compounds and mixtures eliminated by any of the D1 to D12 activities. (e.g.	83 140	52 932	30 208

	vaporizing, drying, calcinations, etc.)			
D10	Incineration on land	65 878	47 772	18 106
D13	Mixing or blending prior to any of the D1 to D12 activities.	9 138	2	9 136
D14	Placing into other packaging prior to any of the D1 to D12 activities.	81	80	1
D15	Storage before implementing any of the D1 to D14 activities (besides temporary storage prior to collection at the place of waste generation).	420 089	39 302	380 787
Total		3 981 801	384 558	3 597 243

3.5 Poland

3.5.1 ReUse

At some points repairing electronic equipment and appliances it is possible to buy hardware that has been repaired at this point and is for sale. In Poland prosper used clothing stores where second hand clothing from other EU countries can be cheaply obtained. Various second hand furniture shops from the Netherlands and other countries are active on the market. In addition there are markets where second hand goods can be bought, mostly once per week.

The formal re-use of Electrical and Electronic Equipment is very limited. In 2008 an amount of 9 t was reported for Poland.

3.5.2 Material recycling

Apart from the recycling for the traditional recyclables, which are not topic of Transwaste (paper, glass, plastics) the following recycling options are shortly discussed here: bulky waste and WEEE recycling.

According to the national waste management plan in Poland in 2008 268.000 t **bulky waste** was generated (without WEEE). Only a share of this generated amount was collected separately (the remainder staying in the mixed household waste): 97.000 t. The latter amount stems both from

households (87.000 t) and from generators producing household like waste (infrastructural sources, likes schools, parks, street cleaning etc.) (10.000 t).

There is no national data available on the recycling and disposal processes of the separately collected bulky waste. Most the waste management centers have a place where bulky waste is manually disassembled. Sorted wastes goes to recycling (metals, wood for plywood production) to wood for energy recovery and RDF, the rest is disposed of, mainly at landfills. Just a few plants for mechanical dismantling actually exist. Last year a new wastes dismantling site was opened in Krakow, which consists of three lines for:

- Mechanical disassembly of bulky waste (furniture, window frames)
- Manual disassembly of WEEE
- Tires shredder

The capacity of this plant is 6.000 t/year.

In other cases the collected bulky waste is directly disposed of at the landfill. It is expected that within the next few years the number of installations will be growing. The bulky waste enables to achieve recycling and recovery in a rather low tech manner, thus helping to divert biologically degradable waste from landfill.

WEEE management system

In Poland any amount of WEEE can be given away to municipal or private collection points. Moreover entities introducing WEEE on the market are required to collect from the consumer the corresponding type of equipment in the relationship 1:1 during the purchase of a new equipment.

Entities that collect WEEE are: retailers and wholesalers, special WEEE collection points, registered scrap metals collection points and service centers (only if the equipment can't be repaired).

Used equipment is received from the collection points by authorised companies/institutions, which collect and load WEEE at collection points, transport it and unload at the processing plants, where all dangerous ingredients and other materials/ components requiring special treatment (eg freon, mercury, cadmium) are being removed from the equipment.

The rest is processed into raw materials for recycling (eg scrap metal). Afterwards separated material fractions go to operators in the recovery, recycling or disposal. In the course of further waste management, arising after the processing of WEEE, hazardous wastes are being neutralized and substances/ materials that are suitable for reuse, get back into circulation. Recycles are, for example, steel mills or plants producing plastic products.

The basis for financing the entire system is a separated amount, part of the price of each new product called KGO - cost of waste management (recycling fee).

Rate of fee depends on the type of WEEE.

This recycling fee (paid by consumers), goes (through retail stores and warehouses) to the entity putting WEEE onto the market. The producer/ importer is obligated to use the full amount of KGO for the construction and financing of WEEE collection system.
In practice, this task is outsourced to specialized recovery organisations, which shall also take over the recycling fee.

Recovery organisations take over from the importers/ producers also responsibilities in field of organising the collection, receiving, processing, recovery, recycling and disposal of used equipment.

In **Table 3.21** on overview of the WEEE management system in Poland is provided.

Table 3.21. Number of entities operating in WEEE management system in 2008

Recovery organisations	7
Producers/ importers	3178
Collectors	7264
Processing plants	123
Recyclers	82

The recovery organisations on the Polish market have the market shares as shown in **Table 3.22**.

Table 3.22. Market shares of recovery organisations in Poland, 2008

	Equipment put on market by the supported entities		**Supported entities**	
	thous. of tonnes	**%**	**number**	**%**
ElektroEko	268,5	47,6	210	6,6
Biosystem Elektrorecykling	104,3	18,5	897	28,2
Europejska Platforma Recyklingu	63,9	11,3	134	4,2
CCR RWEEE	34,6	6,1	407	12,8
Auraeko	30,3	5,4	401	12,6
IT Recykling	18,4	3,3	89	2,8
AE- Centrum	2,7	0,5	64	2
beyond the recovery organisations	41,4	7,3	976	30,7
Total	564,2	100	3178	100

The results of the Polish WEEE management system for the year 2008, as reported to Eurostat are provided in the following table.

Table 3.23. WEEE in Poland, 2008

	Product category	Put on the market (tonnes)	Put on the market (%)	Total collected* (tonnes)	Total collected* (%)	Reuse and recycling (tonnes)	Reuse and recycling rate (%)	Recovery (tonnes)	Recovery rate (%)	Reused as whole appliance (tonnes)
1	Large household appliances	264731	46,9	17682	31,3	7681	43,4	7844	44,4	1,0
2	Small household appliances	56585	10,0	2226	4,0	1050	47,2	1098	49,3	0,6
3	IT & Telecommunication	73736	13,1	14949	26,5	5782	38,7	5953	39,8	5,7
4	Consumer equipment	71571	12,7	8080	14,3	5093	63,0	5214	64,5	1,4
5	Lighting equipment	34133	6,0	11253	19,9	1668	29,6	696	15,1	0,1
6	Electrical & electronic tools	43644	7,7	1582	2,8	530	33,5	606	38,3	0,1
7	Toys, leisure & sports equipment	7402	1,3	222	0,4	40	18,1	48	21,9	0,1
8	Medical devices	3371	0,6	136	0,2	17	12,3	25	18,4	0,0
9	Monitor & control instruments	4887	0,9	156	0,3	36	23,4	41	26,5	0,0
10	Automatic dispensers	4120	0,7	141	0,2	240	170,0	240	170,0	0,0
	Total	**564179**	**100**	**56426**	**100**	**22138**	**39,2**	**21765**	**38,6**	**9,0**

*Collected from private& other than private households

3.5.3 Mechanical treatment

In Poland there are 173 waste sorting plants (86 - separately collected packaging waste, 36 - mixed municipal waste, 51 - mixed and separately collected). Because still municipal waste is landfilled without pretreatment, it will be necessary to expand the sorting capacity by building new lines. The sorting installations are generally operated located in the vicinity or at landfills. The most commonly used lines have drum screens (vibrating), dividing the waste into fractions of 0-40 mm, 40-80 (100) mm,> 80 (100) mm. The fraction 0-40 mm is landfilled, the fraction 40-80 (100) goes to the biological stabilisation, while the fraction> 80 (100) mm is re-sorted by hand and partly is used for the production of alternative fuels.

3.5.4 Mechanical biological treatment

Currently there are 11 MBT plants with total capacity of 412 thousand tons. Due to the obligation to reduce the amount of biodegradable waste going to landfill (the targeted share of reduction has to rise in the coming years) this capacity is insufficient. Currently an expansion of the MBT capacity by 1,1 million ton is in the planning phase. This however, is not sufficient to meet the reduction targets.

3.5.5 Waste incineration

In Poland there is only one functioning incineration plant, located in Warsaw. Out of an annual input of 110.000 t of solid communal waste 46.000 is sorted out (by sieving) for combustion. The other materials are directly landfilled or treated biologically (aerobic).

In the incineration the following cleaning stages are applied:

- Selective Non Catalytic Reduction (SNCR), by injecting ammonia to the boiler
- Dry scrubber, addition of lime hydrate, followed by bag filters (removal of sulphur oxides, HF, HCL and dust
- Active carbon filter (volatile heavy metals, persistant organic compounds, dioxines and furanes)

The slag and ashes created during the combustion process are solidified by addition of binding materials. The resulting granulate is harmless for the environment, which can be used as a raw material for the building industry or landfilled.

The energy contained in the input materials is transformed into electric energy. Out of 46.000 t/a of waste input a total of 13.080 MWh/a electricity is produced.

In Poland in accordance with the requirements of the National Waste Management Plan 2010 the construction of several waste incinerators is planned. Currently, the most advanced plans are the following investments in the table below.

Table 3.24 Locations planned municipal waste incineration plants in Poland

Municipality	Capacity t/year
Bydgoszcz-Toruń	180 000
Kraków	260 000
Poznań	200 000
Warsaw	266 000

3.5.6 Other thermal treatment

Co-combustion of waste and RDF is carried out in 9 cement plants. In 2009 went to the a total of 752 thousand t of waste materials were used as secondary fuels in cement kilns. The estimated demand (due to the upward trend in cement production) for the future can be as high as 1.137 million t.

Table 3.25. Fuel from waste in the cement industry in 2009

Fuel from waste	Amount, 1.000 t
RDF	589
Scrap tyres	65
plastics	14
Waste wood	12
Waste with high Carbon	13
Sludge	2
Other	57
Total	**752**

3.5.7 Landfill

In 2009 there were about 800 landfills functioning, but only 520 of those meet EU requirements. The free capacity of these latter landfills is 115,9 million m^3. In the next 8 years there is no need to build new landfills.

3.5.8 Illegal Disposal

Illegal landfills appear in different areas (ditches, woods, abandoned lots, communal areas). Data on the locations of illegal landfills should be available from communities. If no owner of the waste can be found, the communes are obliged to liquidate wild dumps. There is no nationwide database of the quantity of wild dumps, because they are constantly removed. An internet service exists (www.posprzatajmy.pl), where anyone can announce the existence of a wild dump, with a description, location and picture. However, such a service is far from complete and information on amounts is lacking.

There are examples of projects dealing with illegal disposal (Regionale Entsorung und Recykling in den Kreisen Görlitz und Zgorzelec, RegReg: www.regrec.eu), some municipalities decided to install cameras in forest, but overviews of amounts of illegally disposed waste are lacking.

In Poznań (fifth city in terms of population) in 2010 over 400 illegal landfills of municipal waste in urban areas were revealed. Department of Real Estate Management in the City Office of Poznań ordered arrangement of 982 urban properties with a total area 227,24 ha. From this area 334 tons of waste were collected- which gives 0,6 kg/cap; costs of the cleaning works reached nearly 1,3 million PLN.
It was observed that mostly residents of detached houses, and people operating in the industry of vehicle mechanics and upholstery are getting rid of waste illegally. Based on the rate of 0.6 kg/cap for Poznań, the estimated amount of waste at wild dumping sites in Poland in 2010 was **22.920 t.**

However, this is very, very approximate and uncertain value.

3.5.9 Waste Exports

The transport of waste has risen since the entry of Poland to the EU in 2004. From the year 2005 the number of requested permits for waste transports is by and large stable.

Table 3.26: International waste transport permit requests in Poland in the years 2004-2009

Year	Total permits	Of these:		
		import	export	transit
2003	186	n.d.	33	n.d.
2004	130	n.d.	n.d.	n.d.
2005	433	317	116	-
2006	438	366	81	21
2007	443	361	82	-
2008	549	392	101	56
2009	444	355	65	24

For the year 2009 a more detailed overview is provided in the table below.

Table 3.27: Number of international waste transport permit requests in Poland in 2009

Type of decision	Total	Permit given	No permit given	Tacit consent
Total	444	397	44	3
import	355	320	35	0
export	65	56	9	0
transit	24	21	0	3

The concerned permit requests are listed according to the mass of waste involved in the table below.

Table 3.28: Mass concerned in international waste transport (of which: hazardous) permit requests in Poland in 2009

Type of decision	Permit given (1.000 t)	No permit given (1.000 t)	Tacit consent (1.000 t)
import	13.000[1]	190	-
export	200 (64)	20,7 (6,2)	-
transit	76 (52)	1 (0,8)	1 (0,8)

For the year 2008 also information is available resulting from border controls. In this year the following amounts of waste were considered to be transported illegally:

Table 3.29: Illegal waste transports in Poland in 2008

Action	2008		2009	
	Transports	Amount (t)	Transports	Amount (t)
import *of which:*	44	4.700	23	
sorting residues from the Netherlands	*1*	*3.600*	*0*	
'green list'	*23*	*500*	*13*	*320*
communal waste		*200*	*0*	
other		*400*		
export	7	140	3	60
transit	5	20	2	100

The term illegal in the above table both refers to transports that have a valid permit, but transport another type of waste than described in the permit as well as transports not having any permit. The wastes transported are either completely illegal (not allowed to cross the border) or lack a proper permit.

[1] of which: 10 mln t of metals

3.5.10 Summary Table

Table 3.30: Number of plants in total in Poland

Installation type	Number of plants
Incineration plants for municipal solid waste	1
Other thermal treatment	9
Sorting plants for separately collected waste	86
Sorting plants for municipal solid waste	36
Sorting plants for municipal solid waste and separately collected waste	51
Fermentation plants	3
Mechanical-bioloogical waste treatment	11
Landfills	520

4 Summary

Each participating country has its own ways of end-of-life routes for different products. The type of route is depending on the facilities available in the countries and on the development of waste management sector. For the purpose of the assessments carried out in workpackage 3, the description of the different EOL routes in each country is necessary. Focus is given to the indicator products, such as metals, wood, small and big WEEE, fuel driven appliances, batteries, some furniture, toys, sport and leisure utilities, tyres, furnishing equipment and clothes.

Indicator products which go the formal way of **ReUse**, meaning collection and sale at official reuse shops is estimated by the partners is neglecting. Only for textiles the official ReUse stream was given more importance: 80% of textiles in Austria are ending up in ReUse schemes, 10% in Germany and 8% in Poland. Poland furthermore states that tyres are also officially reused to 12%. In German there are several official ReUse shops operating: second hand shops, buying and selling shops for electrical devices, second hand markets and also municipal furniture warehouse (for needy people). Only 1% of WEEE is officially reused as a whole. In Austria ReUse shops are starting to expand all over the country. Next to private second hand shops also 85 socio-economic second hand shops are operating in Austria. WEEE appliances are reused as a whole to only 2%. In Hungary no dedicated reuse shops according to Waste Framework Directive are operating, but numerous second-hand shops for clothes, furniture and electronic devices are operating. In Poland the formal reuse of EEE with reported 9 tons is neglecting. Some points offer repairs for EEE. Additionally second hand shops for clothes and furniture are active on the market.

According to the estimation of partners to **material recycling** of the indicator products, more relevance was accounted to metals, wood and WEEE and batteries and partly tyres. These items require mechanical treatment (shredder plants) in advance. Furniture appliances and furnishing equipment are stated in Germany and Hungary to be partly recycled. In Austria this applies only to some regions, where socio-economic enterprises are dealing with dismantling furniture for material recycling. Other furniture is shredded and ends up at waste incineration plants. Also in Poland it is mentioned that material recycling for bulky waste only takes place when disassembled manually. Most of the waste management centres have a place where bulky waste is manually disassembled. Sorted waste goes to recycling, to wood for energy recovery and RDF, the rest is disposed of mainly at landfills. Material recycling concerning WEEE is in participating countries enforced. Reuse and recycling rates for WEEE range from 27% in Slovakia and Hungary to 39% in Poland. For WEEE recycling shredder plants are operating in the partner countries. In Germany there are 595 shredder facilities for crushing the waste. In Austria there are 6 shredder plants which have an input of 10% WEEE. Three post-shredder plants deal with the further mechanical treatment. Additionally 40 plants in Austria are responsible for the pre-treatment (manual dismantling, crushing etc.) of WEEE. Hungary has 3 shredder plants and 5 additional pre-treatment plants for WEEE. 4 among them own shredders, the rest dismantle WEEE manually. In Poland there are 123 processing plants for WEEE which remove hazards and recycle other components.

Mechanical treatment plants are sorting plants, which sort high caloric fraction from low caloric fraction of the municipal solid waste. Yet, these plants are of minor importance for the indicator products. **Mechanical biological treatment** (MBT) plants are also existing in all participating countries although they are planned to be expanded in the next years in Hungary and in Poland. Only a minor part of the indicator products ends up at MBTs; in Germany only 6.5% of some

furniture, toys, furnishing equipment and sport and leisure utilities. In Austria there is no MBT known which takes bulky waste.

Thermal recovery, like **waste incineration** plants or other **thermal treatment** plants, is found as a last step of the hierarchy of the Waste Framework Directive. In Austria the majority of bulky waste ends in waste incineration plants. In Germany about 30% end up there, in Hungary only 9% and in Poland only 0.5 to 0.7%. The reason for the low percentage in Poland is that only one plant is existent until now. It is located in Warsaw. The construction of other waste incineration plants is planned. 17 incinerators for municipal solid waste as well as for medical and hazardous waste exist in Hungary. 5 plants are planned until 2014. In Germany 70 waste incineration plants plus 29 plants for hazardous waste and 28 other thermal treatment plants plus an unspecified number of co-combustion in cement industry are operating in total. In Austria 7 waste incineration plants and 49 other thermal treatment plants are operating.

Even though **landfill** without pre-treatment is according to the EU-Directive on landfills not allowed anymore. In Poland it is still that most of the indicator products are landfilled without pre-treatment. From 800 total landfills only 520 meet the EU requirements. In Hungary there are 72 landfills in operation which are EU-conform. In Austria since 2008 no untreated waste has been landfilled anymore. Landfills for excavated soil, inert waste, residues from incineration plants and municipal solid waste are existing in Austria. In Germany similar types have been established.

Partners were also asked to describe official **waste exports**. Permits need to be given to international waste transports and data on type and weight need to be recorded. Some waste though which are listed as “Green Waste” according to the EU-Directive on waste transhipment don’t need an approval. Only a duty of information is necessary. Germany has exported 1.6 Mio tons in 2008 which required approval and another 21 Mio tons which didn’t require approval. From Hungary 1 to 4% of the total generated amount is exported. Poland exported around 200,000 tons and Austria around 700,000 tons in 2009. **Illegal exports** are also reported in some countries. In Austria it is reported of ELVs which are illegally transhipped to Africa, electronic waste to Asia and Africa and household waste to Eastern European countries. An illegal transport detected in Hungary was in 2007, when 4500 tons of municipal solid waste was transported from Germany. Illegal transports recorded at Polish border controls counted to 23 import incidents (at least 320 tons) and 3 export incidents (60 tons) in 2009.

Illegal disposal is another disposal options which is still used in the countries, but data on it cannot be easily obtained or is uncertain. In Poland in 2010 over 400 illegal landfills of municipal waste were revealed. In Hungary it is estimated that 15 to 20 000 tons are disposed illegally. Cleaning programmes have been developed in both countries though. In Austria and Germany the number of illegal landfills are not specified and not known respectively. Punctual illegal disposal though exists in areas like forests or ditches etc. (tyres, bulky waste, etc.). The corresponding amounts are unknown.

By direct comparison of all partner countries and their status of waste management it can be observed that new European countries are in fast progress and their numbers of waste management facilities are increasing. Yet, it still needs some years until the same conditions are setup in all countries. As direct comparison the following figures shall give an overview. Figures derived from Eurostat data from the year 2009.

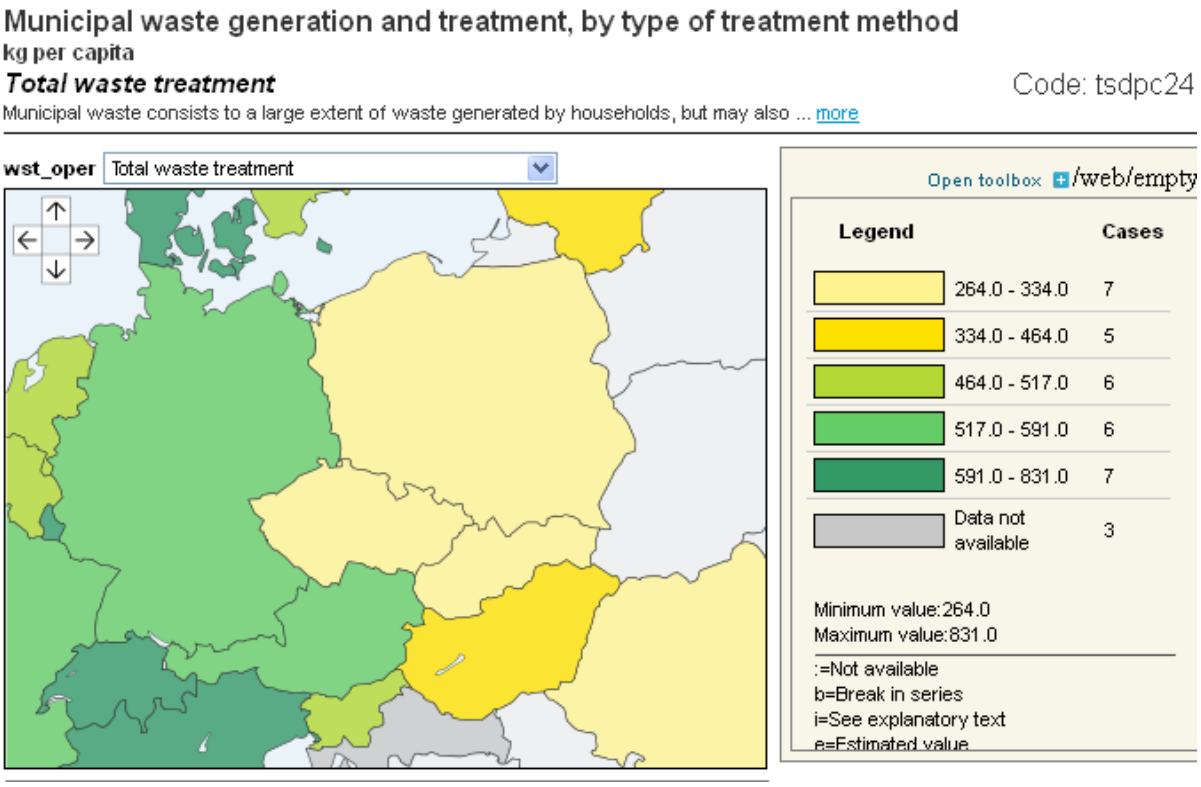

Figure 4.1: Municipal waste generation and treatment, total waste treatment in kg per capita

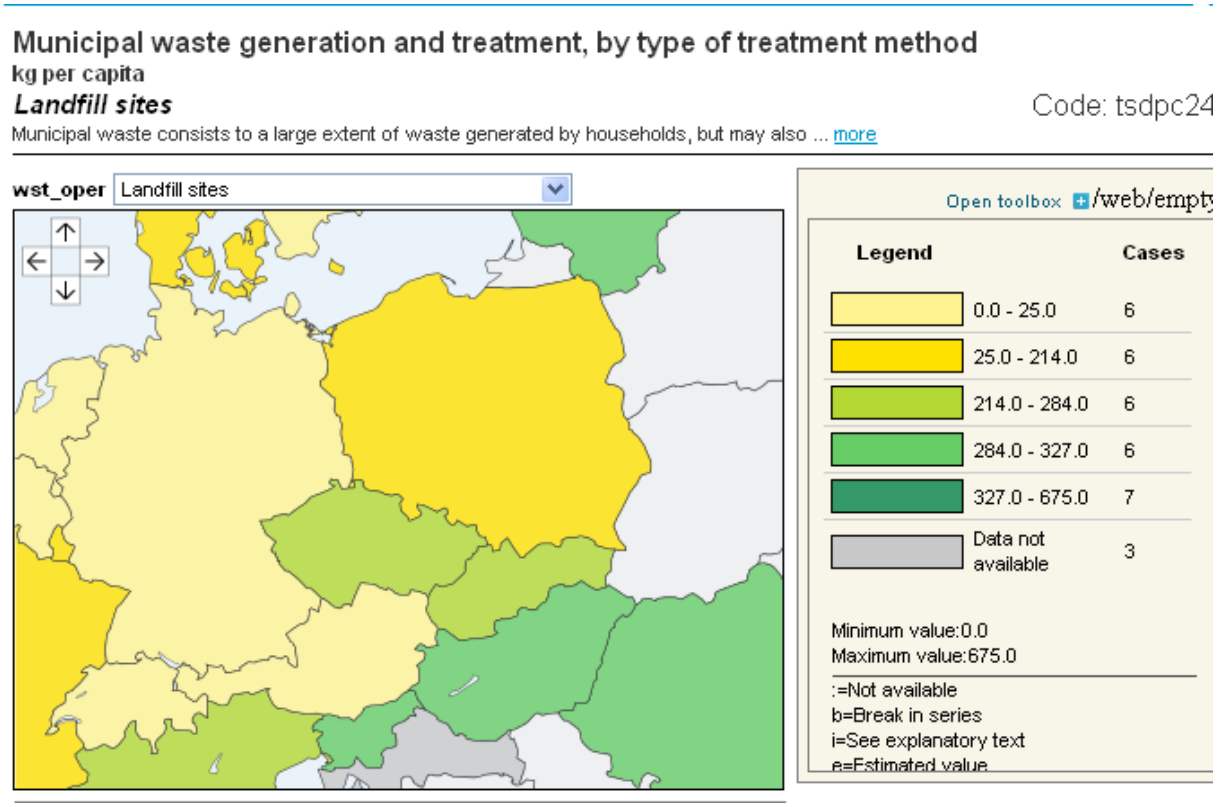

Figure 4.2: Municipal waste generation and treatment, landfill sites in kg per capita

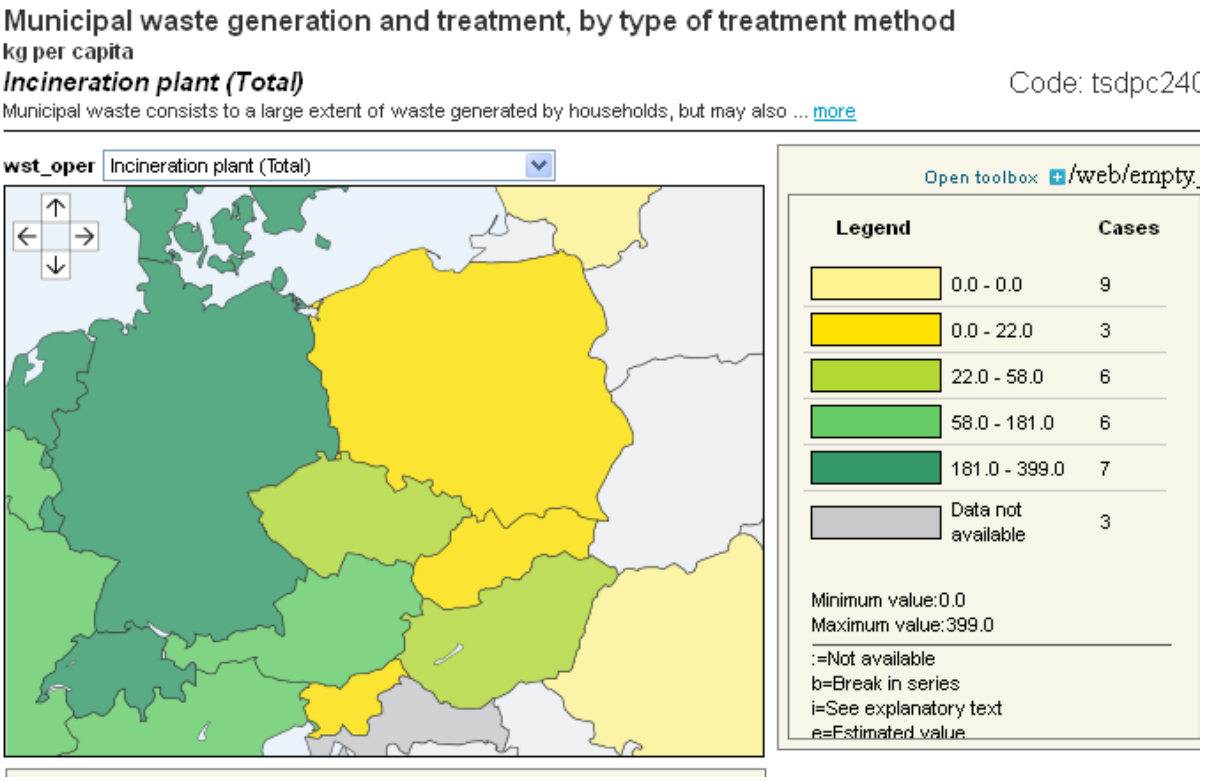

Figure 4.3: Municipal waste generation and treatment, incineration plants in kg per capita

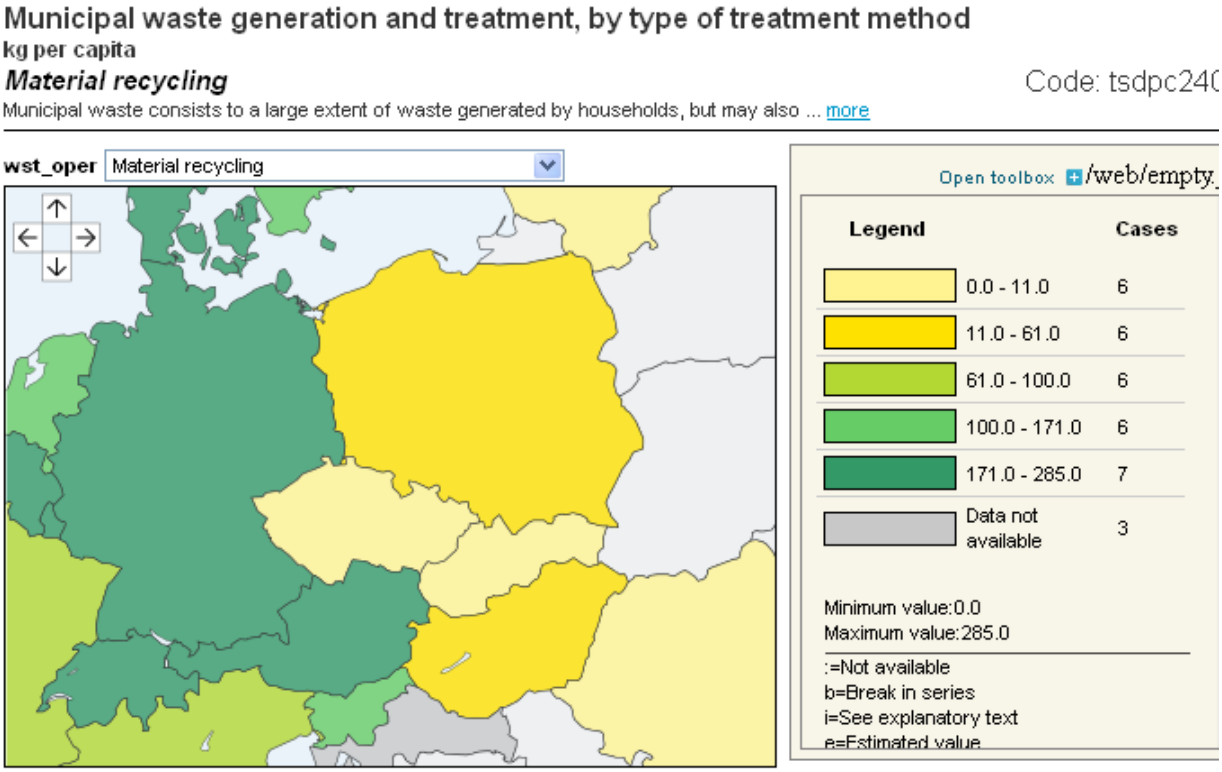

Figure 4.4: Municipal waste generation and treatment, material recycling in kg per capita