Waste management and landfilling status quo in Serbia

WG 2 meeting, Tallinn, Estonia 9-11 August 2017

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MINEA MINING the EUROPEAN ANTHROPOSPHERE

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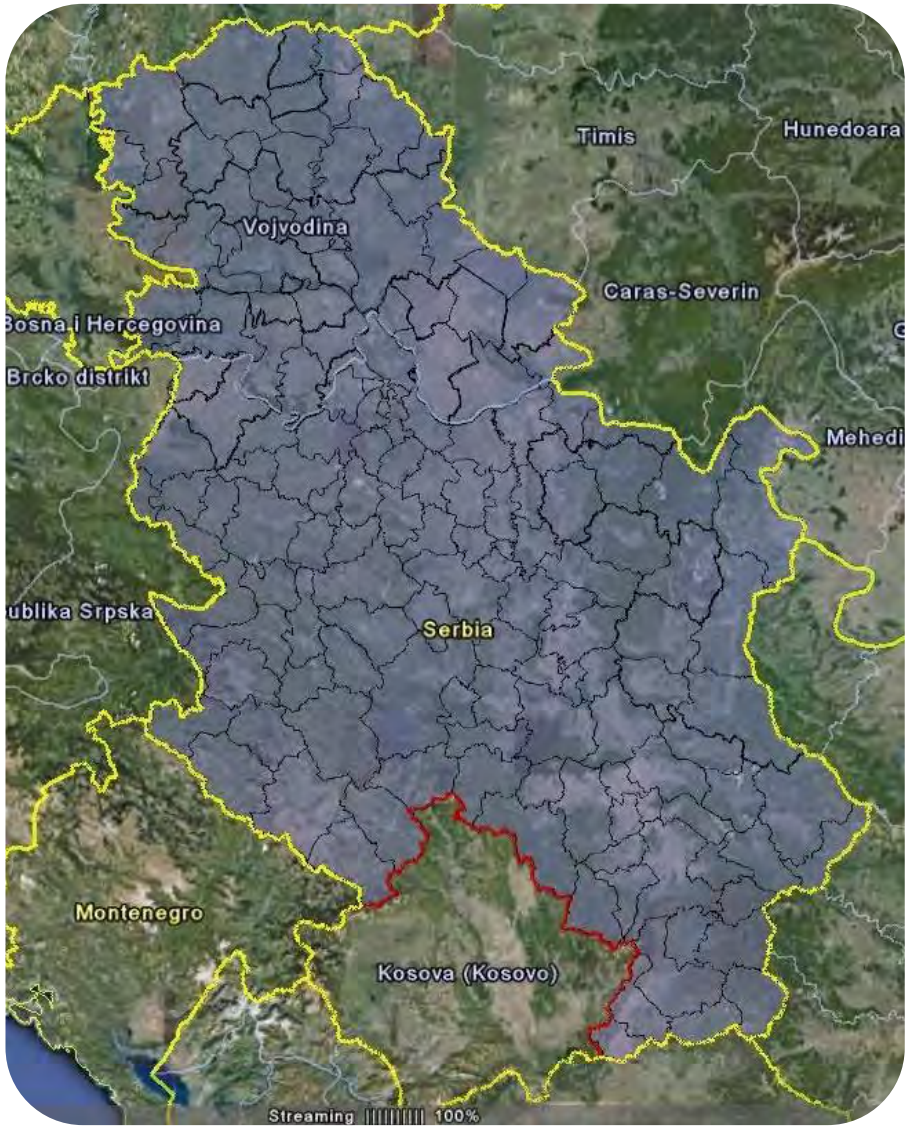
Republic of Serbia



Area: 88,361 km^2
Population: 7,186,862
Density: 211/sq mi

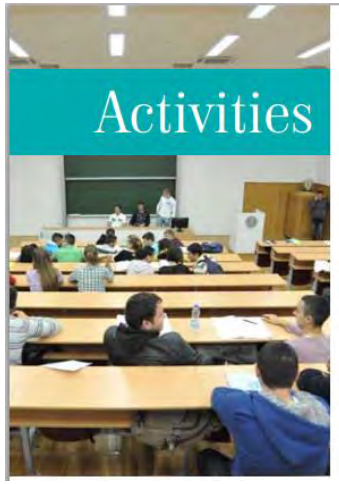
GDP:

- Total: $44.356 billion
- Per capita: $6,161

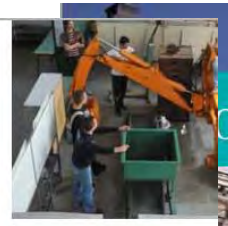
Faculty of Technical Sciences
Department of Environmental Engineering





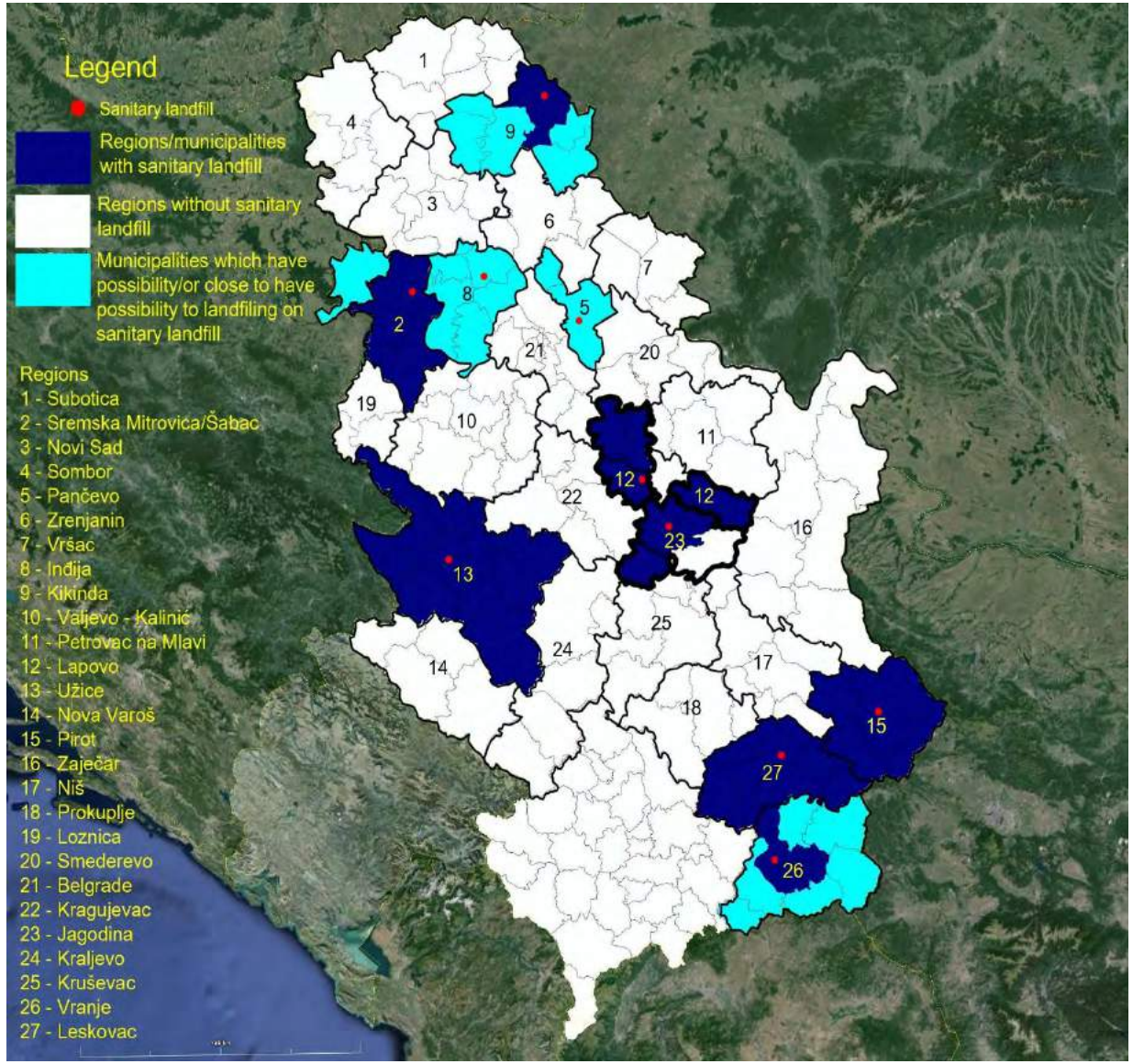









Waste management in Serbia – basic information's

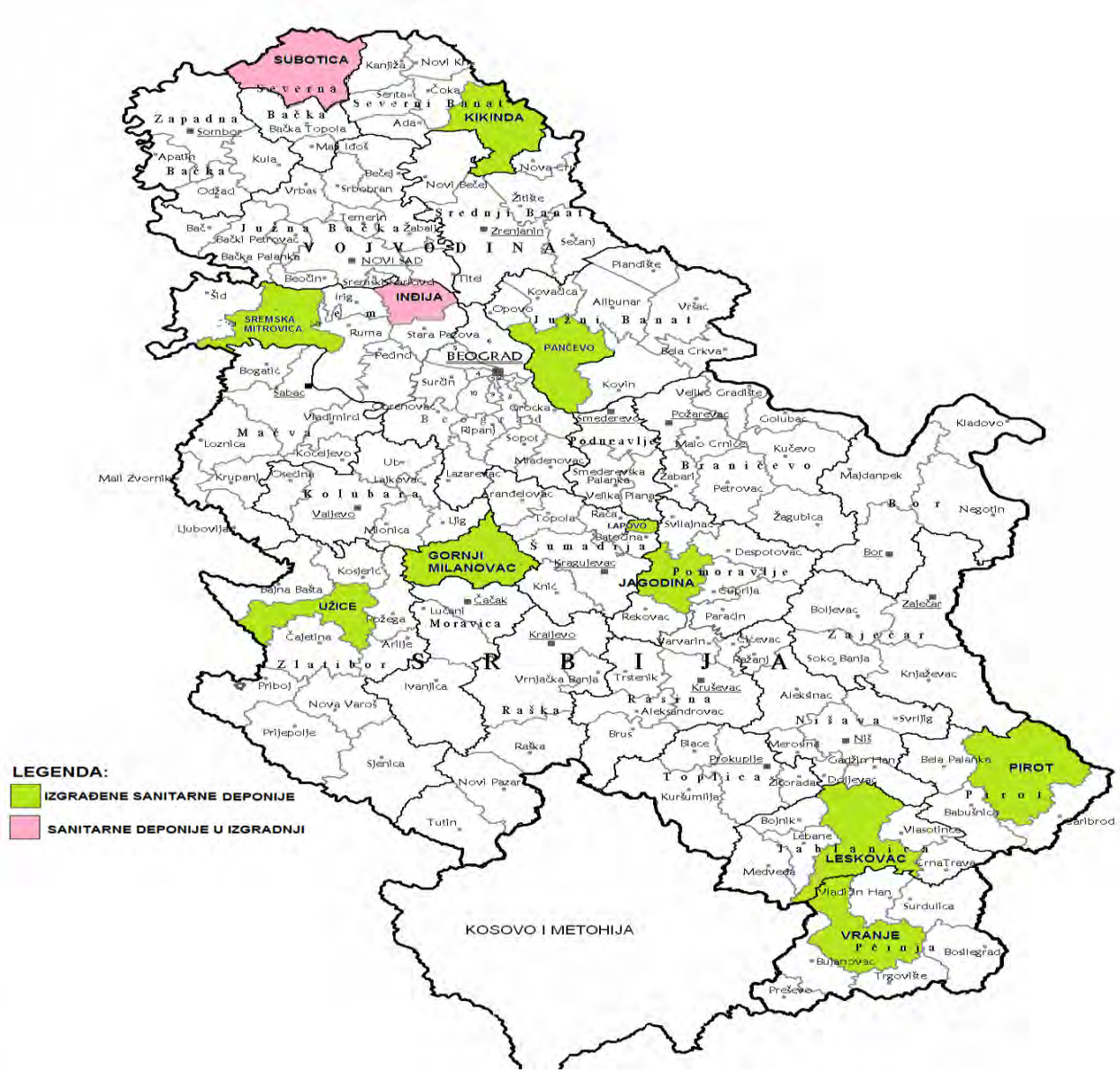


- MSW generation – 2,3 mil ton per year
- 0,87 kg per capita per day
- 27 regions (1 region = min 250,000 cap)

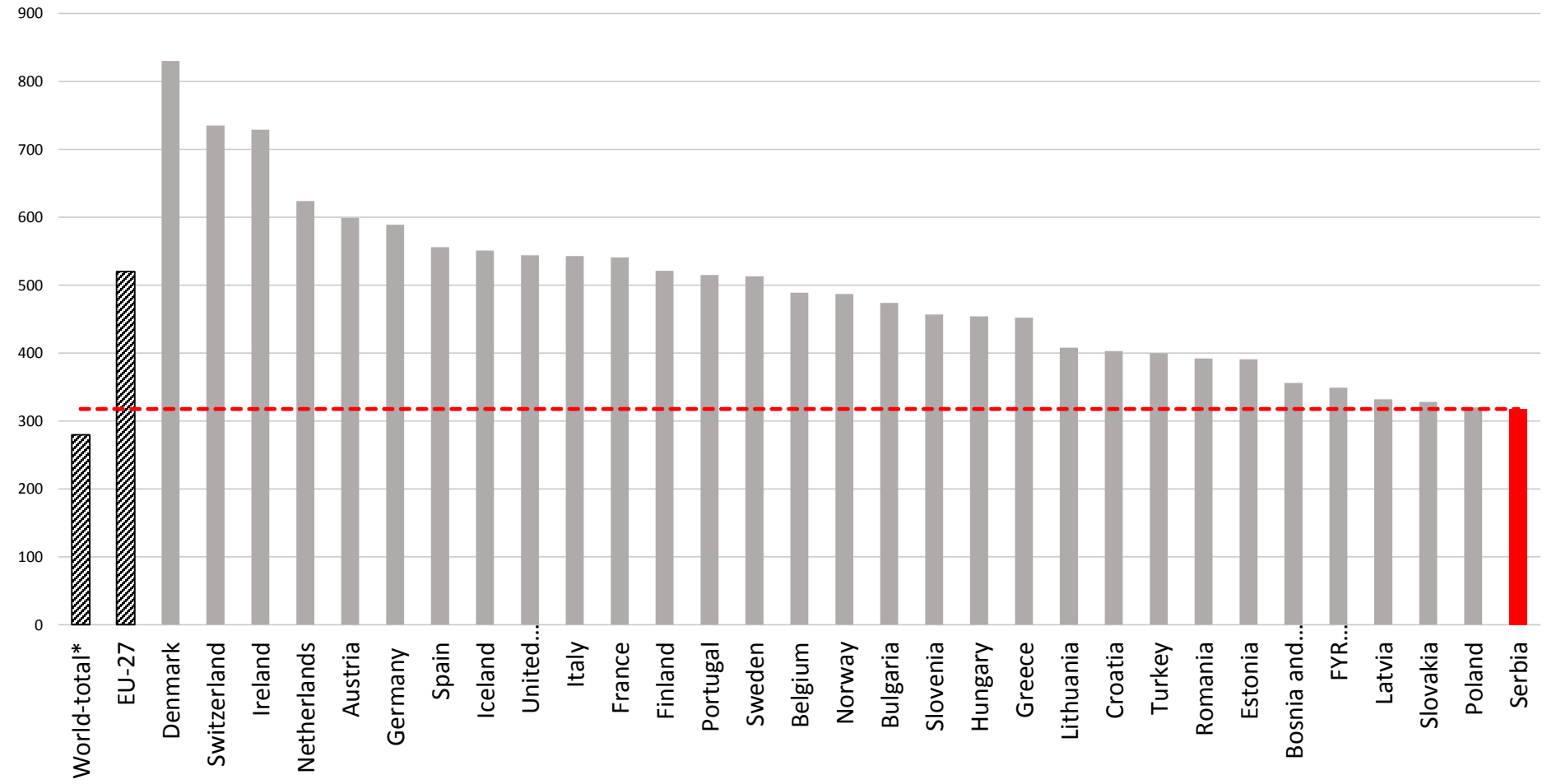
Type of landfilling	Percentage of the total generated MSW in Serbia (%)
Regional sanitary landfilling	12,3
Regional sanitary landfilling (in preparation)	8,7

Estimated investments costs: 1 bilion $

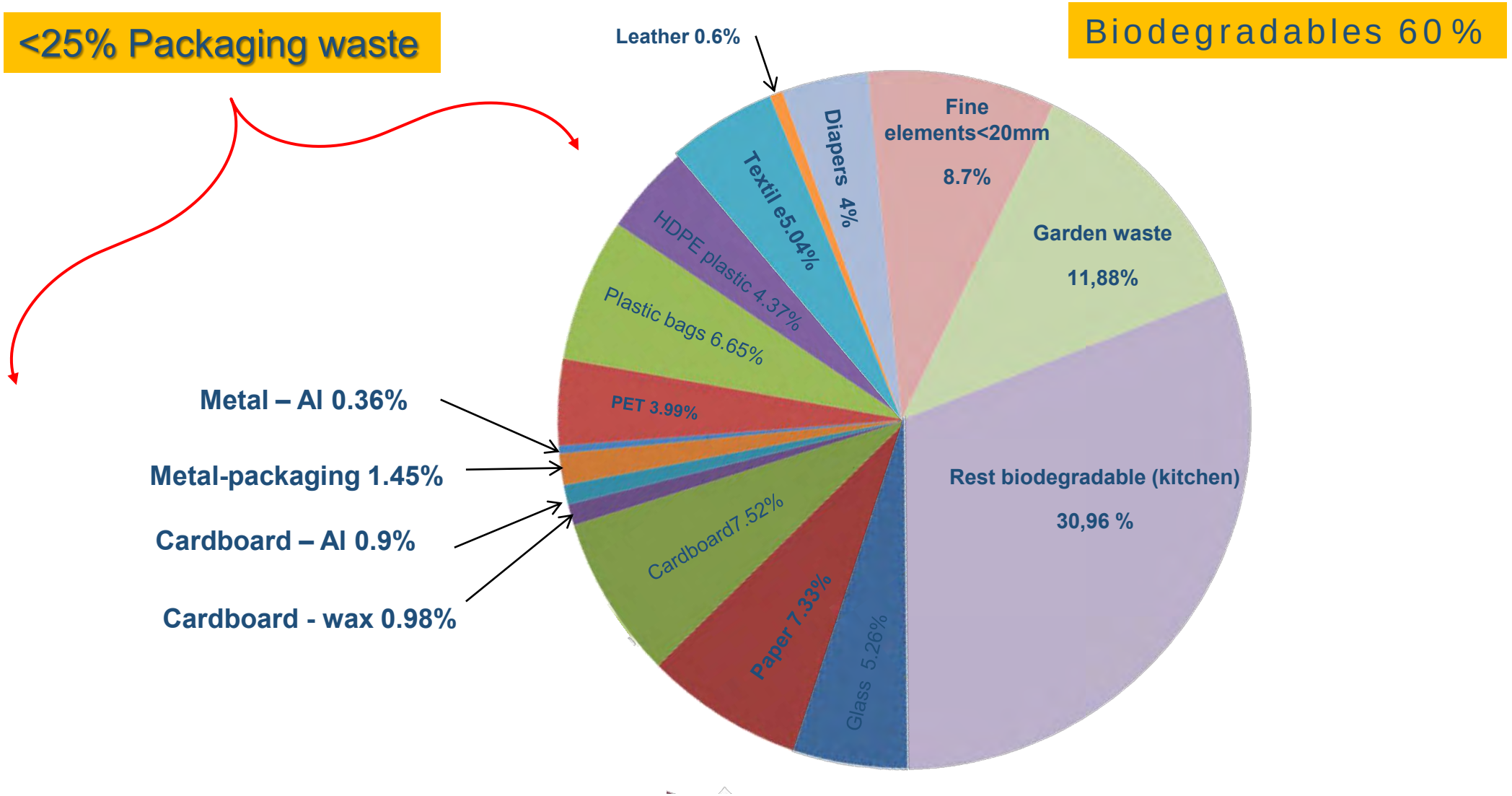
SANITARY LANDFILLS IN SERBIA



Waste generation in comparison to other EU countries kg/capita/per year



Waste composition



Measurements of waste generation and composition

Performed in 4 seasons

Waste quantity

Disposal of measured waste

Perform in period of one week i.e. when whole municipality was covered by collection

Waste composition

Samples collection (3 zones x 500kg)

Measuring of each category

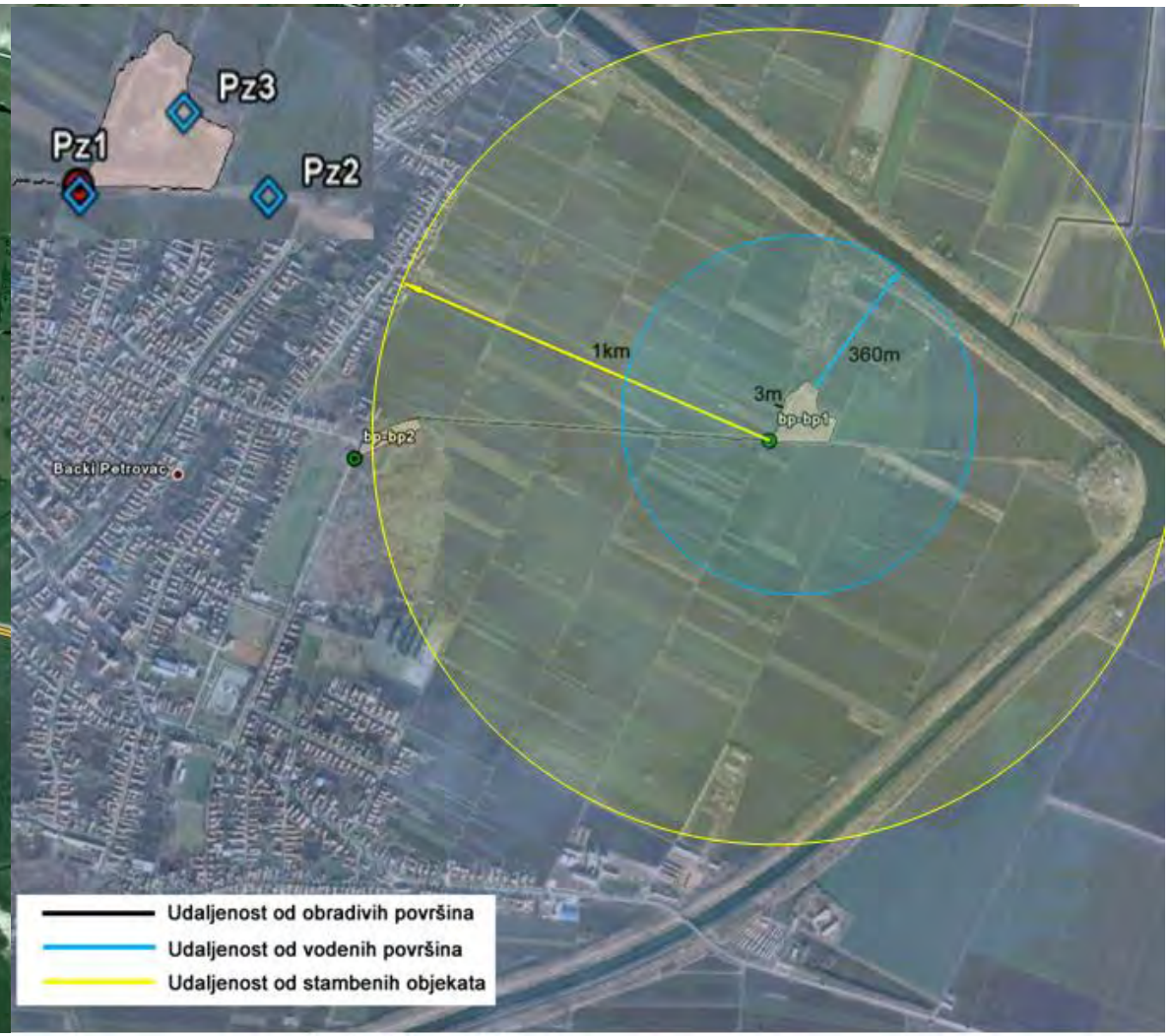
Manual sorting (15 fractions)

Waste management reality..?

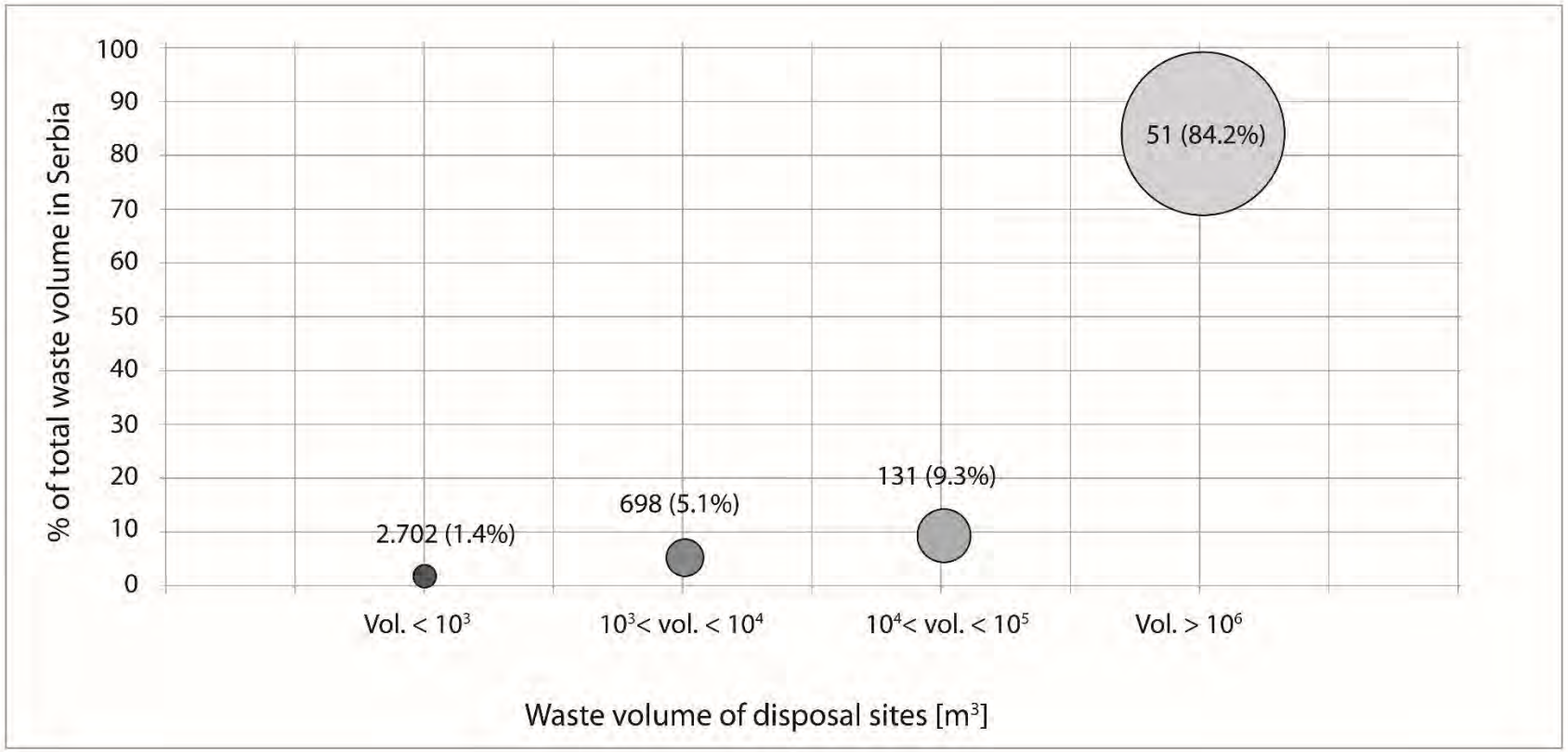
Oznaka i kategorija deponije	ap-ap1		Kontrolisana (gradska) deponija		
Godina početka deponovanja otpada	1985				
Naselja i broj stanovnika čiji se otpad odvozi na deponiju	**Naselje**		**Broj stanovnika**		
	Apatin		19320		
	Svilojevo		1364		
	Kupusina		2356		
	Prigrevica		4781		
	Sonta		4992		
	UKUPNO:		**33007**		
Koordinate deponije	**Geografska širina**		**Geografska dužina**		
	N= 45°38'34,37"		E= 18°58'0,79"		
Geometrija deponije	**Površina (ha)**	**Dubina otpada (m)**	**Zapremina otpada (m^3)**	**Br.biotrnova**	**Br.pijezometara**
	3.89	2	77800	0	0
Prekrivanje deponije	Dnevno	Nedeljno	Mesečno	Po potrebi	**Ne**
Mehanizacija	**Za sakupljanje**		**Za rad na deponiji**		
Udaljenost deponije od objekata	Nema podataka				
Opremljenost deponije	Električna energija				Ne
	Gorivo (rezervoari, agregati i sl.)				Ne
	Vodovod				Ne
	Kanalizacija				Ne
	Kolska vaga				Ne
	Rampa i prijavnica				Ne
	Ograda				Ne
	Čuvarska služba				Ne
	Nasip				Ne
	Zeleni pojas				Ne
	Uređeni unutrašnji putevi				Ne
	Priključak na javni put				Ne
	Protiv požarna oprema				Ne
	Sistem za prikupljanje gasova				Ne
	Platforma za pranje vozila				Ne

	Drenažni sistem-sistem za prikupljanje procednih voda	Ne
	Sistem kanala za odvođenje padavina	Ne
	Prečišćavanje procednih voda	Ne
	Ravnjanje	Ne
	Zbijanje	Ne
	Dezinfekcija, dezinsekcija i deratizacija	Ne
	Mere zaštite od buke	Ne
	Mere zaštite od odnošenja otpada vetrom	Ne
Monitoring	Monitoring zemljišta	Ne
	Monitoring površinskih voda	Ne
	Monitoring podzemnih voda	Ne
	Monitoring vazduha	Ne

Risk assessment for all existing sites - priorities



Waste management in Serbia – status quo



Summary of landfill sites in Serbia

Criteria	Number of landfills/dumpsites	% of total number	Area (ha)	Volume (m^3)	% of total volume
Depth of landfill layer (m)					
< 1 m	**3,302**	**92**	**819**	**3,640,193**	**8.3**
< 1 < 3	**210**	**6**	**200**	**4,344,805**	**9.9**
> 3	**70**	**2**	**321**	**36,050,680**	**81.8**
Volume of landfilled waste (m^3)					
<1.000	**2,702**	**75**	**154**	**604,629**	**1.4**
<1.001<10.000	**698**	**19**	**480**	**2,251,995**	**5.1**
<10.001<100.000	**131**	**3.5**	**313**	**4,087,590**	**9.3**
<100.000	**51**	**1.5**	**393**	**37,091,464**	**84.2**
Total	**3,582**	**100**	**1,340**	**44,035,678**	**100**

LANDFIL STATUS

OTHER REGIONS

Valjevo 3,9%
Kragujevac 3,2%
Zrenjanin 2,5%
Smederevo 2,4%
Sombor 2,2%
Kraljevo 2,1%
Kruševac 2,0%
Vršac 1,3%
Zaječar 1,2%
Petrovac 1,2%
Loznica 1,0%
Nova Varoš 0,7%
Prokuplje 0,7%

STRUCTED AND IN OPERATION Kikinda 0,7% (+1
Gornji Milanovac 0,3% (+0,2%)
Lapovo 0,5% (+1,3%)
Jagodina 1,9% (+0,5%)
Užice 2,8% (+1,5%)
Vranje 0,7% (+1,7%)
Pirot 0,8% (+0,6%)
Leskovac 2,2% (+3,7%)
Sremska Mitrovica 1,8%
Pančevo 2,1%

13.8% of total MSW

LANDFILLS IN PREPARATION PHASE

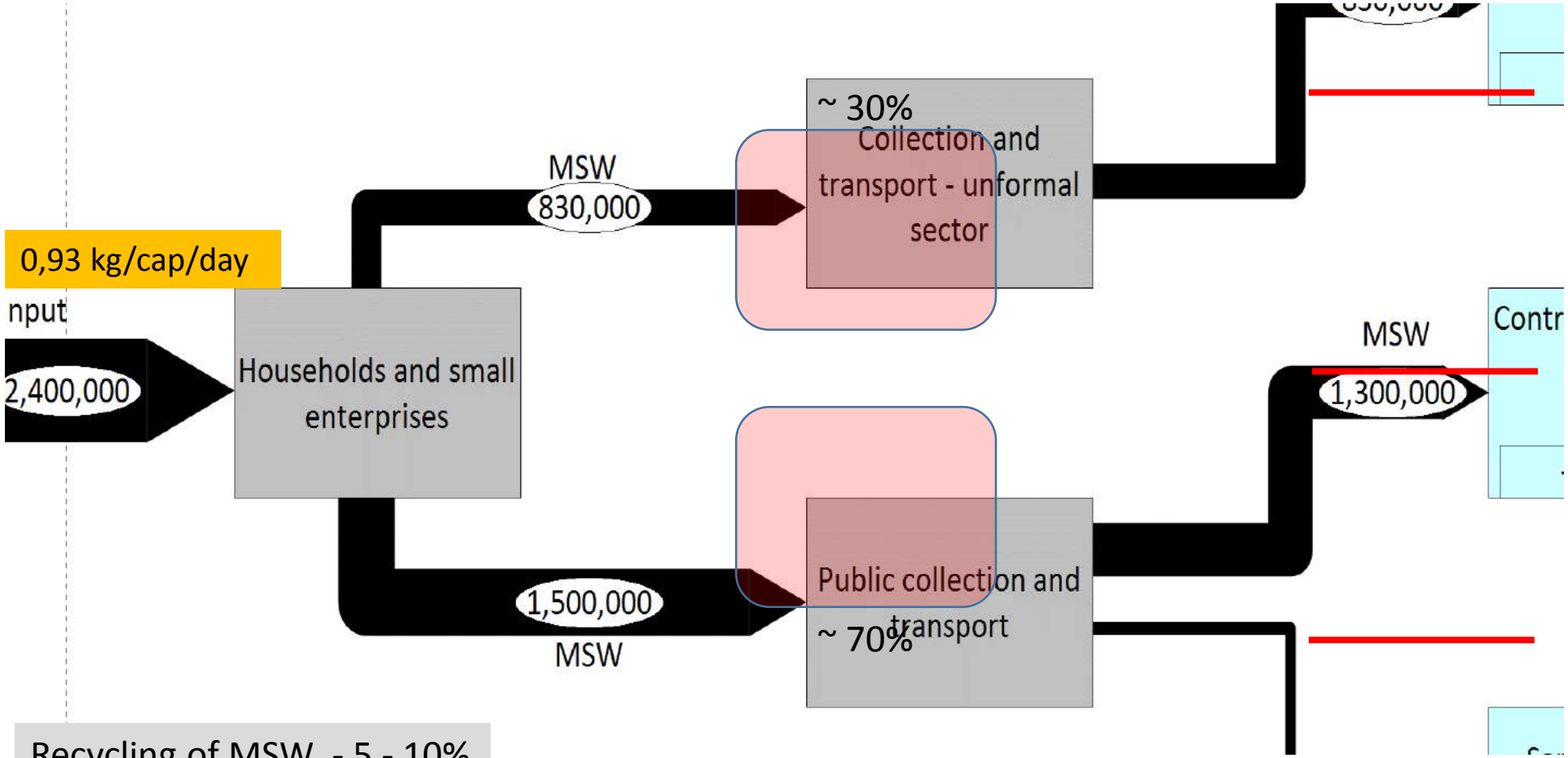
Subotica 3,4%
Inđija 3,1%

LARGEST REGIONS

Beograd 33,6%
Novi Sad 7,2%
Niš 3,6%

44.4% of total MSW

LANDFILLS - MAIN MSW TREATMENT OPTION IN SERBIA



Recycling of MSW - 5 - 10%

Basic composting of MSW < 1% (MBT facilities 0)

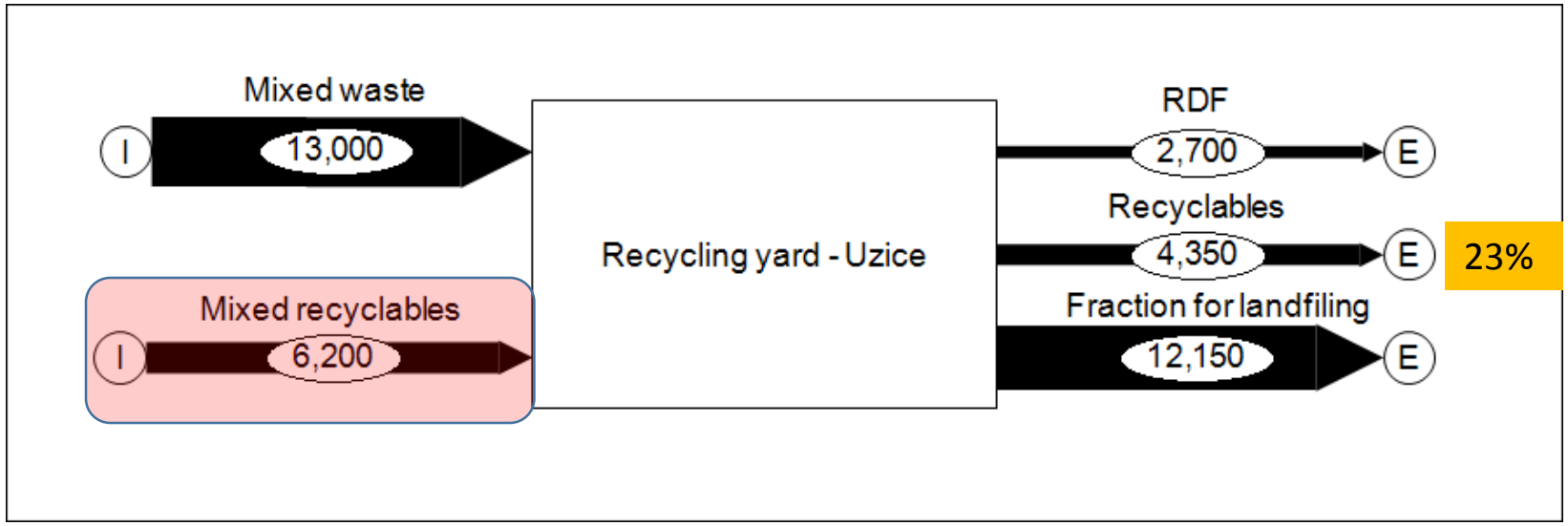
Incineration – 0% (excluding cement kilns)

Waste management in Serbia – status quo

- Population under organized collection system – 70%
- Budget for waste management per household – 50–60 Euro $year^{-1}$
- Chargeability – 70%

Status of treatment – recycling

- No more **than 10 recycling centers** (more precisely sorting facilities) in Serbia
- Main noted obstacles in the operation of this waste separation facilities are **very low efficiency** of extracted recyclable materials, due to **mixed MSW as a input.**



Waste to energy - Cement kilns in Serbia

End of life tyers
Biomass
Waste Oil
Refuse derived fuels
Meat and bone meal

1.2 Mt clinker production capacity

No implementation of hazardous waste

0.6 Mt clinker production capacity

End of life tyers
solid shreded waste,
Meat and bone meal,
biomass

0.9 Mt clinker production capacity

Waste management in Serbia – future intentions

- *Landfill Directive:*
  - Divert 65% of biodegradable waste from landfill by 2020
  - Cease deposition of certain wastes to landfill (e.g. liquids) 2001
  - Close non-sanitary landfill by 2009
- *Packaging Waste Directive*:
  - Recovery 60% by 2008, recycling 55 - 80% by 2008
- *Waste Framework Directive*:
  - Recycle and reuse 50% of paper, plastic, metal, glass by 2020

Policy on waste management

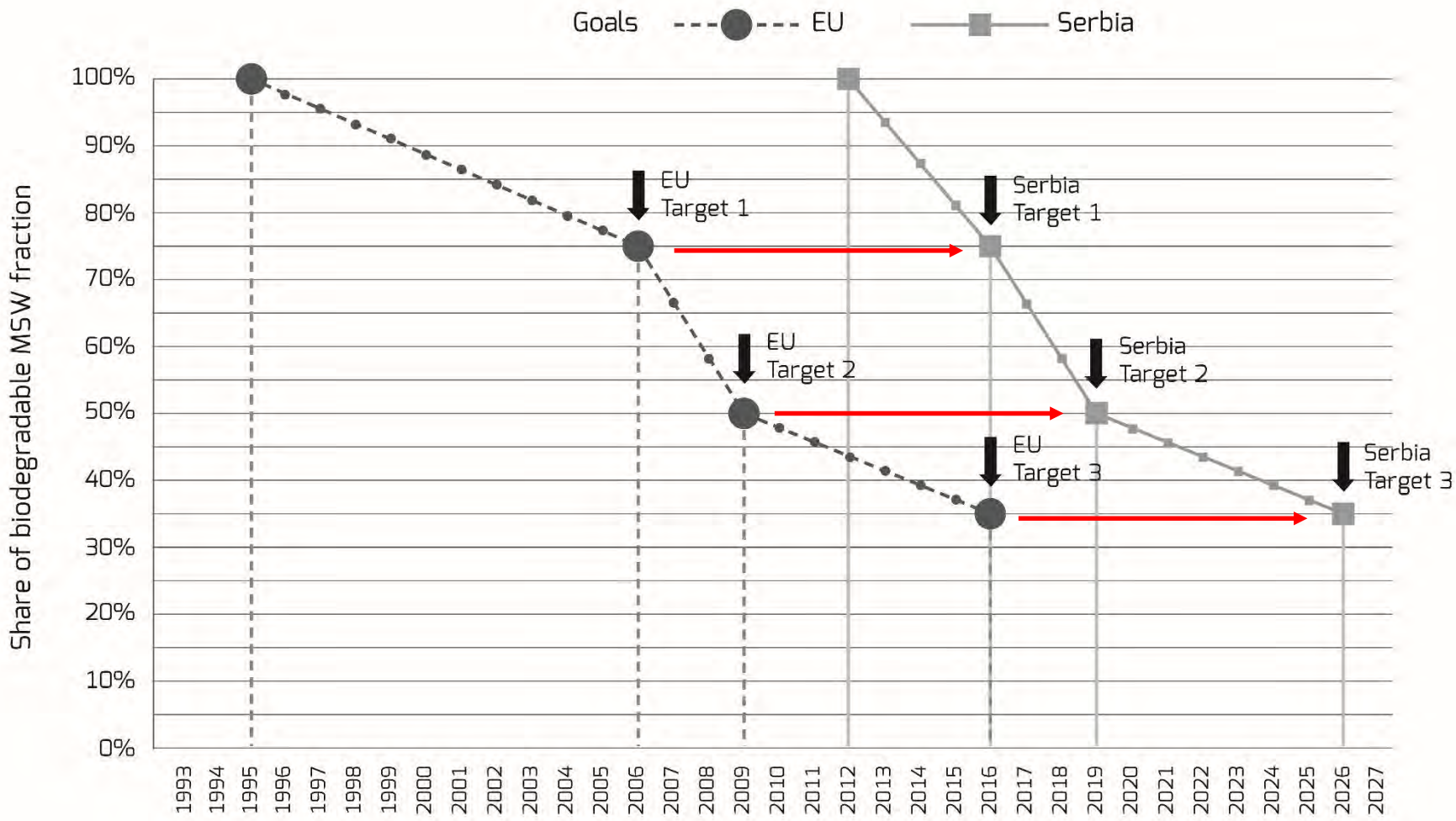
- The National Waste Management Strategy for the period 2010–2019
- Law on Waste Management ,
- ("Official Gazette of RS", no. 36/2009, 88/2010 and 14/2016);
- Law on Packaging and Packaging Waste Management (Official Gazette of RS, no. 36/09)
- Decree on Waste Landfilling (Official Gazette of RS, no. 92/2010)
- Decree on packaging and packaging waste

- **+ 17 different decrees**
- **+ 42 rulebooks**
- **http://www.ekologija.gov.rs/dokumenti/**

Recycling policy goals

		I period					II period				
		2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
OVERALL TARGETS											
Recovery	%	5	10	16	23	30	38	44	50	55	60
Recycle	%	4	8	13	19	25	31	36	42	48	55
MATERIAL SPECIFIC RECYCLING TARGETS											
Paper and cardboard	%	0	0	14	23	28	38	42	47	53	60
Plastic	%	0	0	7.5	9	10.5	14	17	19	21	22.5
Glass	%	0	0	7	10	15	19	25	31	37	43
Metal	%	0	0	9.5	13.5	18.5	23	29	34	39	44
Wood	%	0	0	2	4.5	7	11	12	13	14	15

Landfill ordinance goals

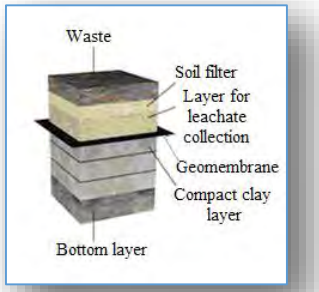


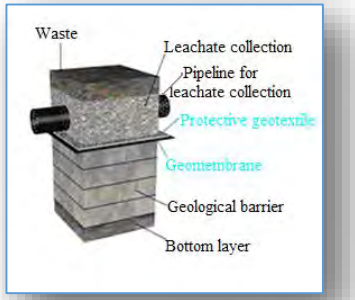
Landfill recultivation options:

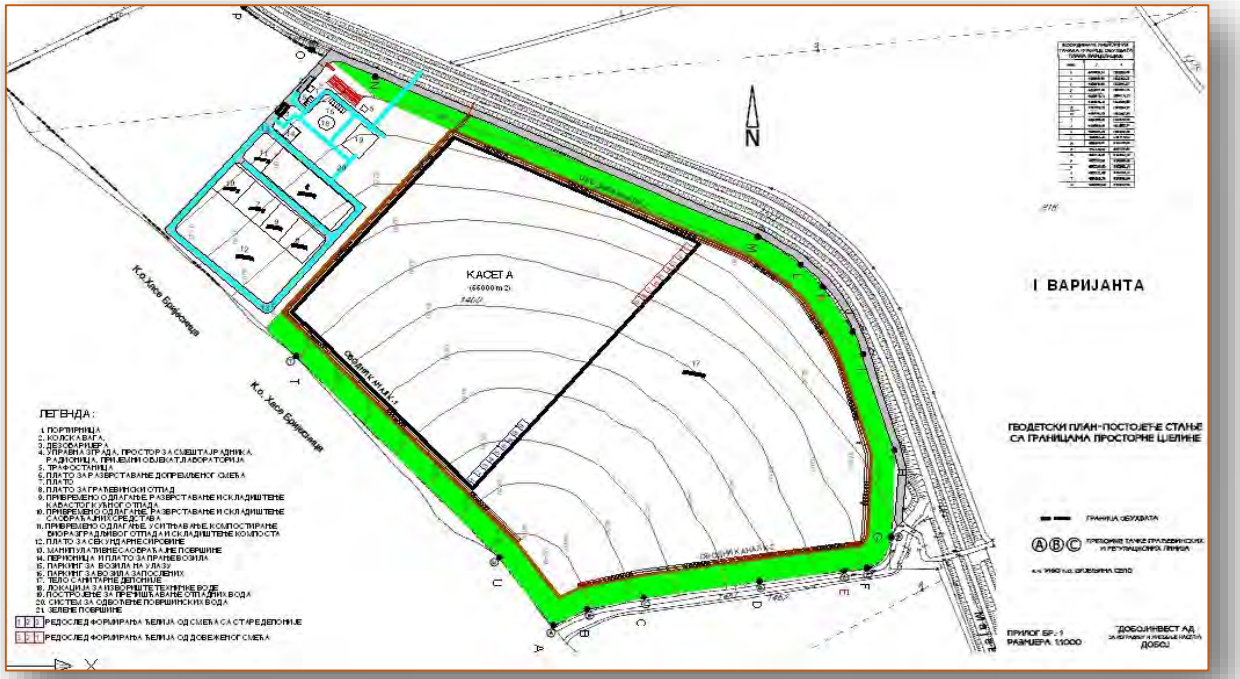
- Waste Loading and removing
- Covering with simple earth cover
- Covering with earth and water impermeable layer without gas drainage layer
- Covering with earth and water impermeable layer including gas drainage layer (“state of the art”)

Sanitary landfill construction

- Requirements defined by law, and landfill ordinance – fully compliant with EU requirements







Boundaries for waste management development

Political indicators

- Problems of a young democracy
- Complying political problems

Economic indicators

- Poverty problems
- Slow economic development
- The lack of sufficient sources for investments

Boundaries for waste management development

Socio-economic and structural indicators

- Existing problems in society in all sectors: economy, education,
- Problems with future planning
- Problems with ownership (property)
- Problems with job positions
- Problem of public good perception
- Low capacity for implementation of legislation
- Short dedication to the project realization and very weak persistence of bringing the project to the end
- Corruption

Thank you!