Report on landfills in Estonia

at the WG 2 meeting in Tallinn, Estonia 10-11 August

Mait Kriipsalu

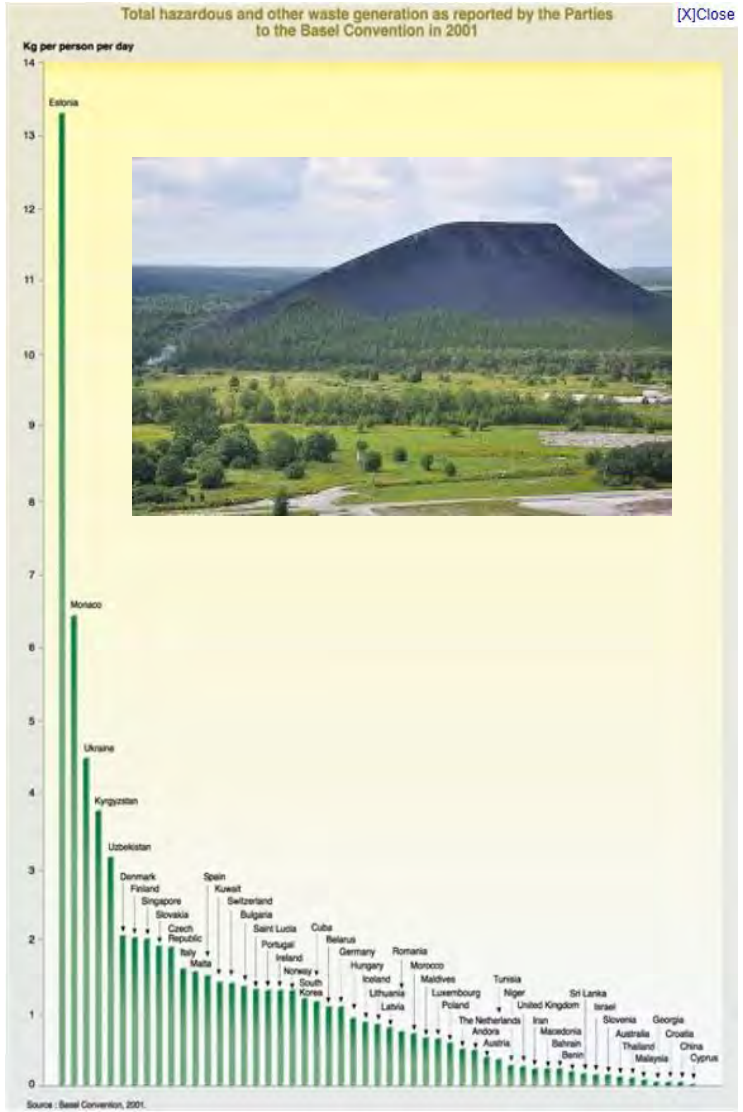
MINEA MINING the EUROPEAN ANTHROPOSPHERE

cost EUROPEAN COOPERATION IN SCIENCE AND TECHNOLOGY

Total waste generation

- Total amount of wastes exceeds 21.000.000 t/y
- Very high proportion of industrial waste, mostly oil-shale-related waste
  - Oil shale waste 80%
  - C&D waste 8%
  - Waste from wood industry 6%
  - MSW 3%
  - Agricultural waste 1%.

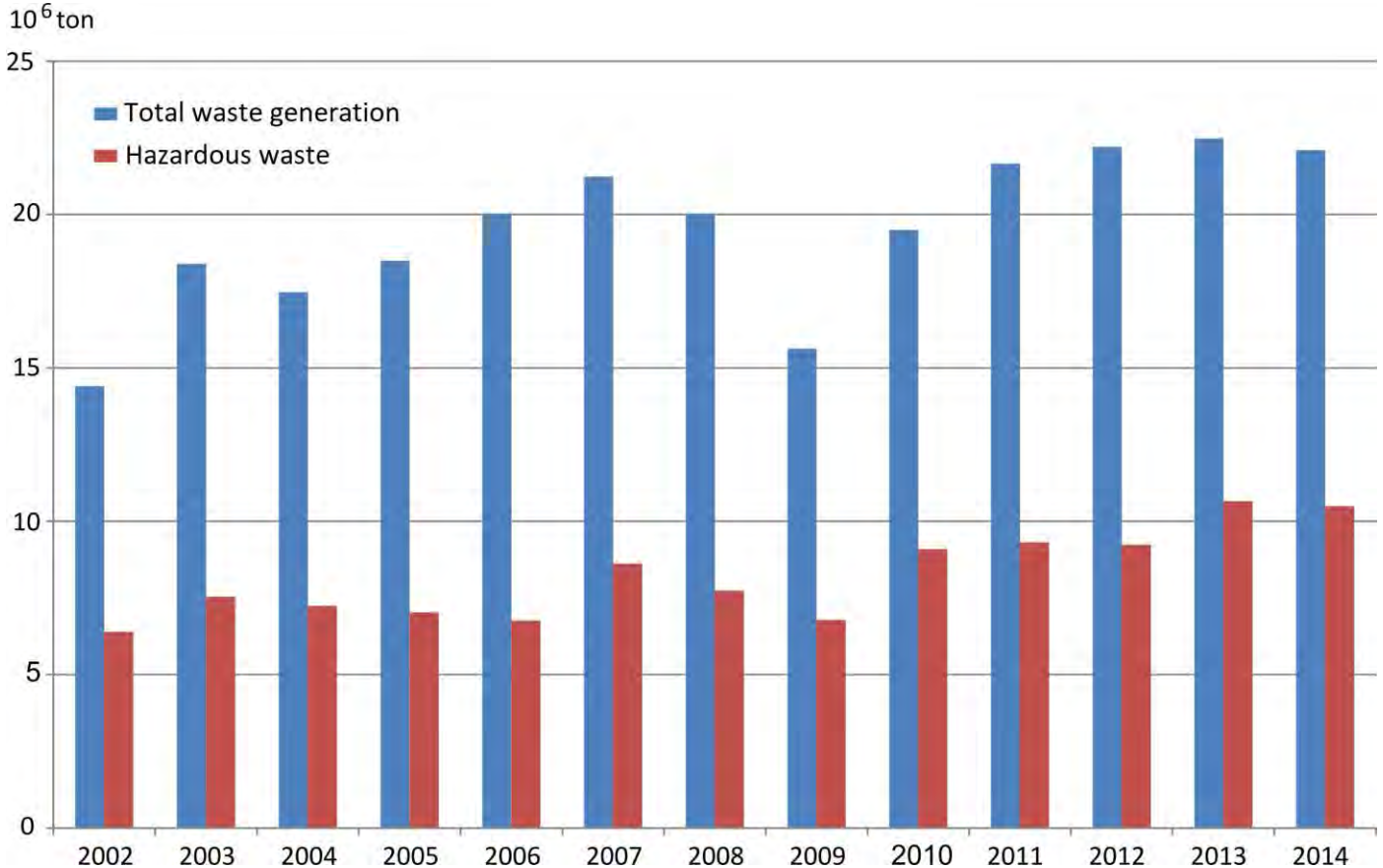
Total waste generation



Grid-Arendal

Characteristic to Estonia:

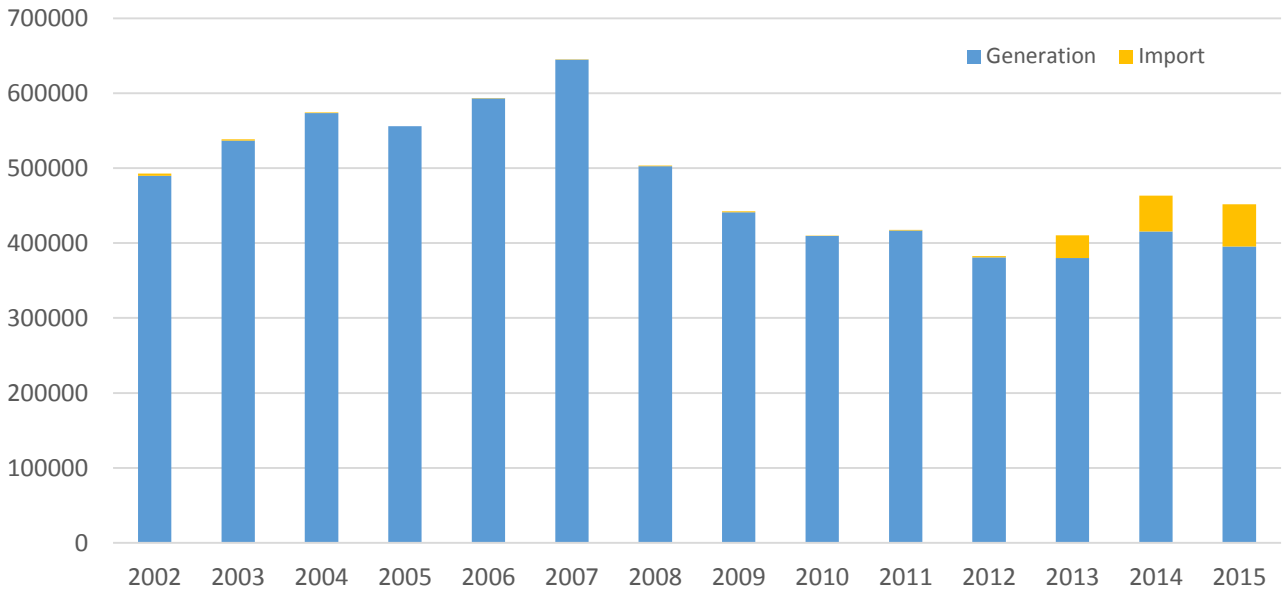
- Very high proportion of hazardous waste, mostly North-East of Estonia.
- Oil-shale-related waste (semi-coke, ash, stripped limestone) 97% of HazW
  - Why hazardous? High pH of ashes, phenols, tars, influence of oilshale chemistry.



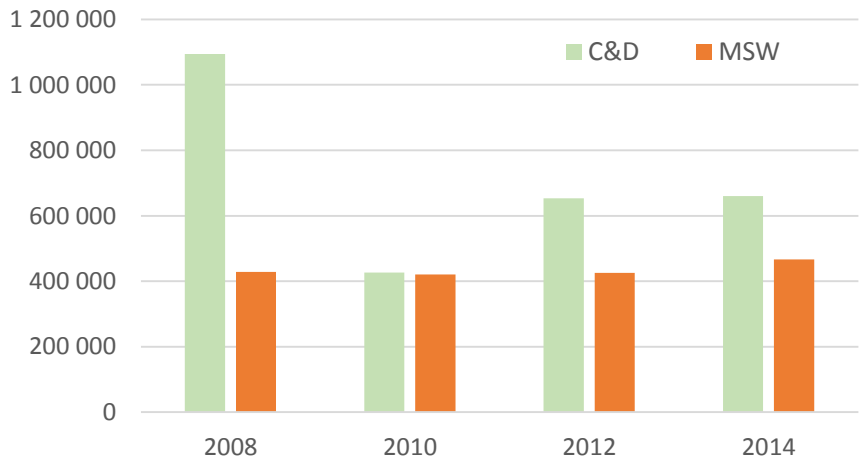
MSW generation

In 2015 → 395.516 t/year;
In 2015 → 300 kg/year/person

Historic data of MSW in Estonia



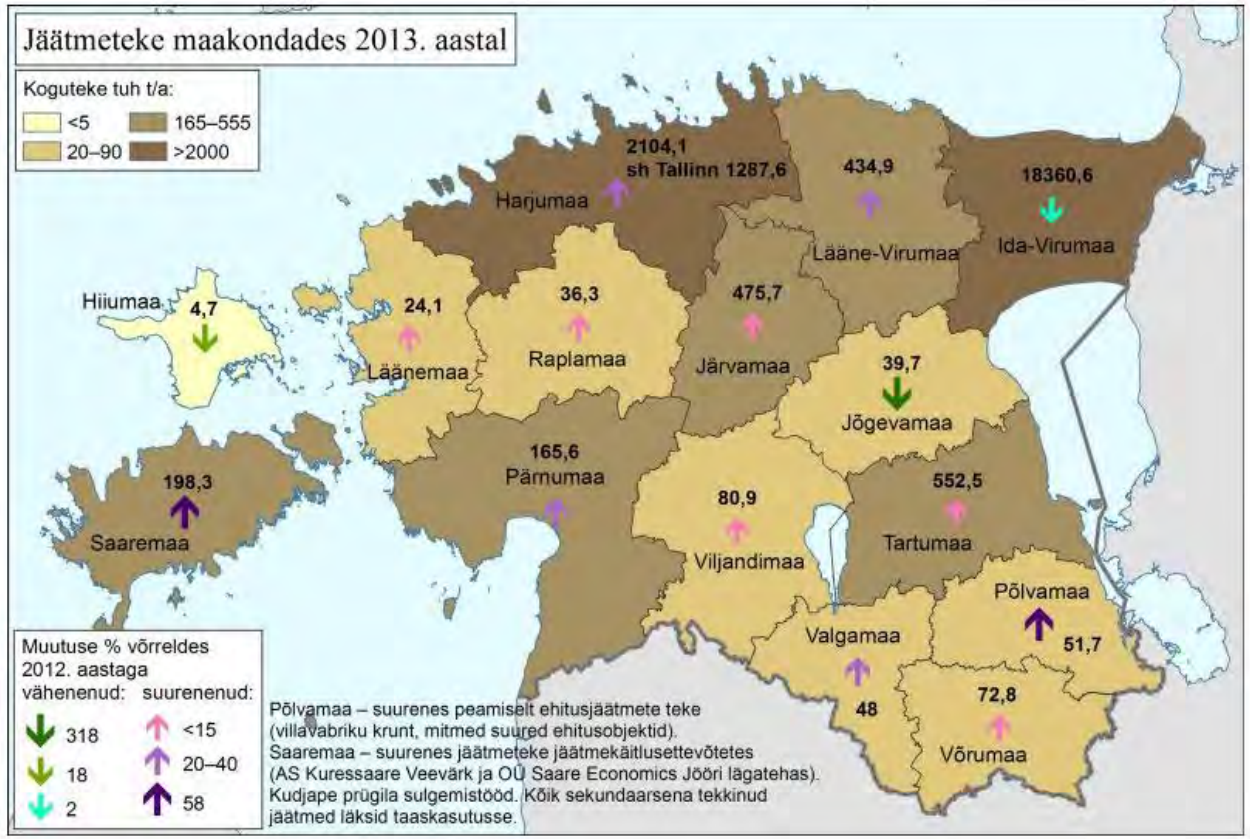
MSW versus C&D in Estonia



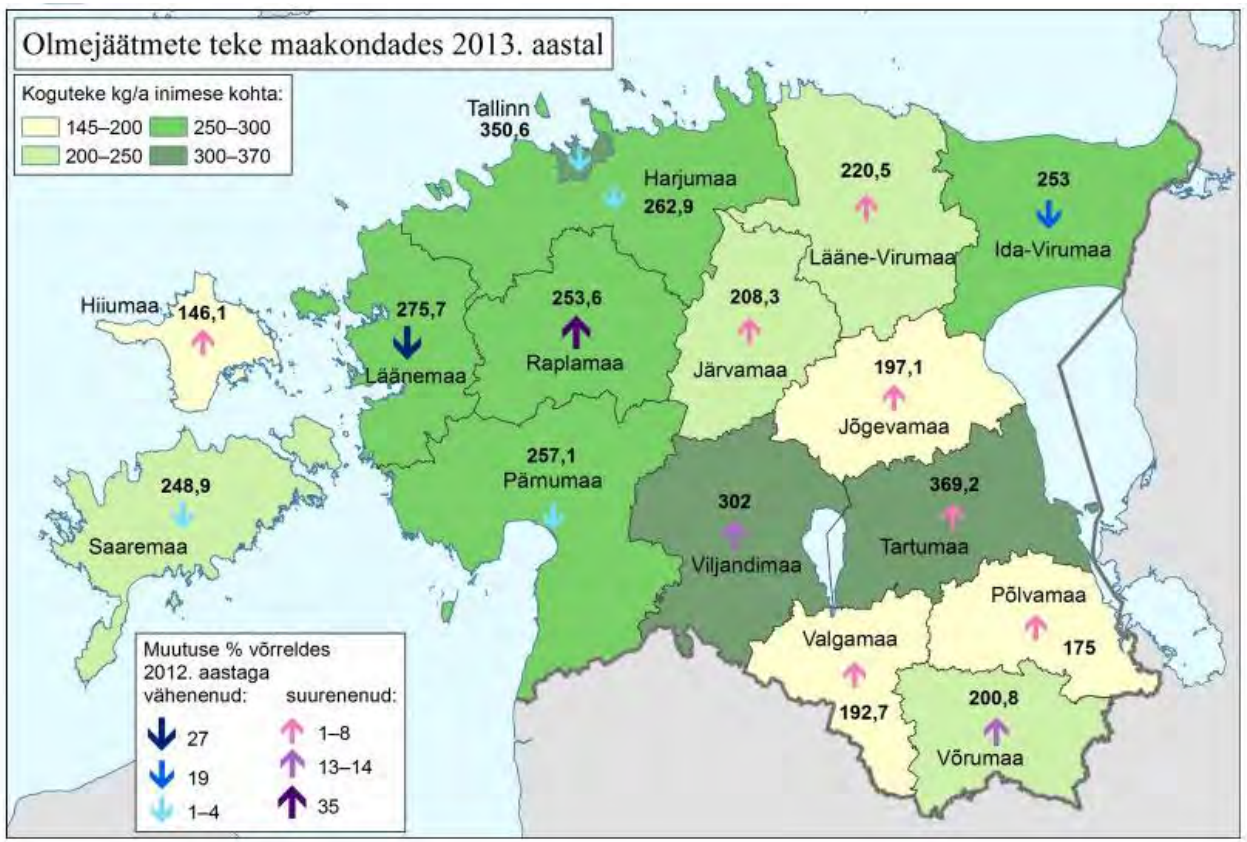
Data: Statistics Estonia, https://www.stat.ee/en

MSW generation

MSW in Estonia by counties in 2013, thousands tons



MSW in Estonia by counties in 2013, kg/pers/d



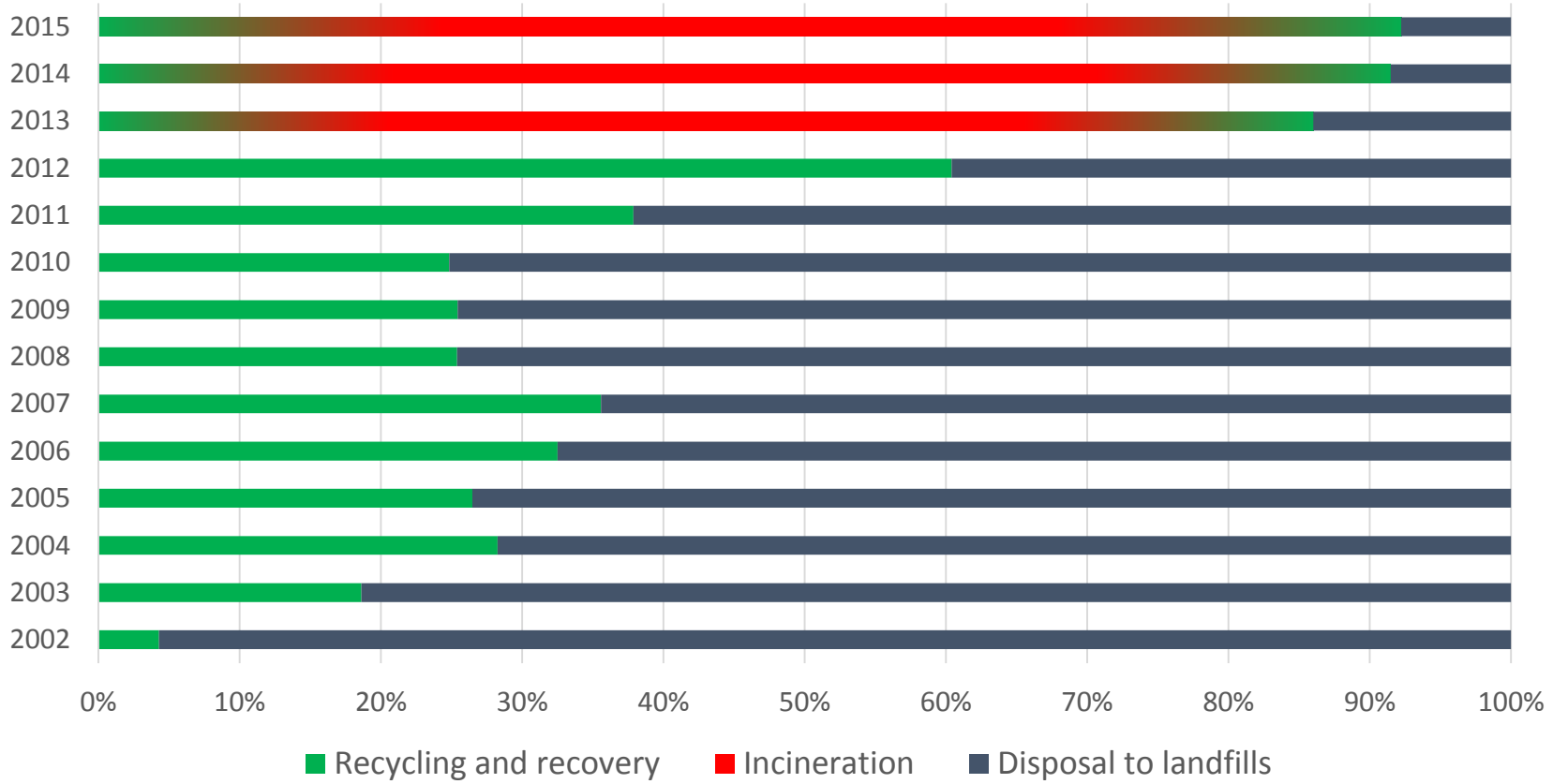
MSW composition

[legend]
A. Newly build private house area
B. Historic private house area
C. City center
D. Historic block-house area
E. New high-rise sleeping area
F. County, outside major cities
G. Small town
H. Large town

Material	Tallinn H								Tartu H			Elsewhere					
	Pirita [1] A	Tiskre [1] A	Nõmme [1] B	Põhja-Tallinn [1] D	Lasnamägi [1] E	Kesklinn [2] C, D	Nõmme [2] B	Haabersti [2] D,B	Kesklinn [4] C, D	Annelinn [4] E	Variku [4] D,B	Narva [3] H, D, E	Paide [2] G, B, D	Jõhvi [2] G, D,E	Ida-Virumaa [2] F	Pärnumaa [2] F	Raplamaa [2] F
Paper and cardboard	11,4	11,2	9,2	10,7	15,8	20,6	15,2	16,2	27,6	14,8	8,9	9,9	16,5	18,8	13,9	12,3	16,3
Food waste	22,6	19,6	19,1	23,5	33,7	25,3	28,3	34,9	27,7	28,9	22,1	40,3	29,8	33,2	35,5	27,9	32,1
Bio waste	23,5	44,0	27,3	16,6	9,9	8,1	7,8	4,1	8,3	11,9	14,2	6,0	4,2	7,5	5,6	4,8	5,3
Plastic	8,3	6,1	7,5	7,3	9,3	17,8	20,6	17,1	15,2	15,4	14,0	15,1	21,6	16,8	20,4	23,2	19,0
Glass	9,1	7,5	5,9	9,2	9,2	9,5	6,8	9,9	4,2	2,7	3,2	8,4	6,6	9,1	6,1	11,6	5,5
Textile	3,3	1,2	4,2	6,6	6,3	5,1	6,0	4,9	0,6	1,1	0,6	5,8	6,0	3,2	4,1	4,2	4,0
Metal	2,7	1,0	3,3	3,5	2,5	2,4	3,3	2,5	1,7	2,5	2,3	2,1	2,2	2,5	2,4	3,4	2,7
WEEE	0,4	0,2	0,5	1,0	0,8	0,7	0,4	0,5	0,7	0,2	0,8	0,2	0,6	0,3	0,9	0,3	0,7
Other combustible	8,5	5,0	7,1	5,9	7,1	6,1	6,0	5,8	10,3	17,0	19,4	7,3	5,8	4,2	7,3	8,1	9,8
Other non-combustible	9,5	4,0	15,0	14,9	4,8	4,3	5,3	3,9	3,4	5,2	14,1	4,9	6,5	4,5	3,7	4,1	4,3
Hazardous waste	0,6	0,4	0,9	0,8	0,6	0,2	0,5	0,2	0,4	0,2	0,2	0,3	0,1	0,1	0,2	0,3	0,3

[reference]
1. Tallinna kodumajapidamistes tekkivate olmejäätmete koostis ja kogused – Tallinna Keskkonnainfo J 2005:01. Tallinna Keskkonnaamet. 90 p.
2. Eestis tekkinud olmejäätmete (sh eraldi pakendijäätmete ja biolagunevate jäätmete) koostise ja koguste analüüs. 2008. SEI, Tallinn, 64 p.
3. Narva jäätmeuuring. 2009. SEI, Tallinn. 32 p.
4. Tartu linna ja Tartu maakonna biogaasi tooraine uuring. 2011. SEI, Tallinn. 68 p.

MSW treatment



- Landfilling < 8 % of MSW in 2016
- Biomass incineration is widely spread (wood chips, peat, shredded wood, sawdust pellets)
- One mass-burn facility for incineration of MSW (IRU)
- Co-incineration – 1 cement production facility Kunda Nordic Cement (Heidelberg)
- 3 operational MBT facilities – production of RDF and SRF
- Composting – open windrow dominates (sewage sludge, biowaste, ABPR, green waste).
- Recycling – packaging waste, C&D waste, WEEE

Waste policy and regulatory

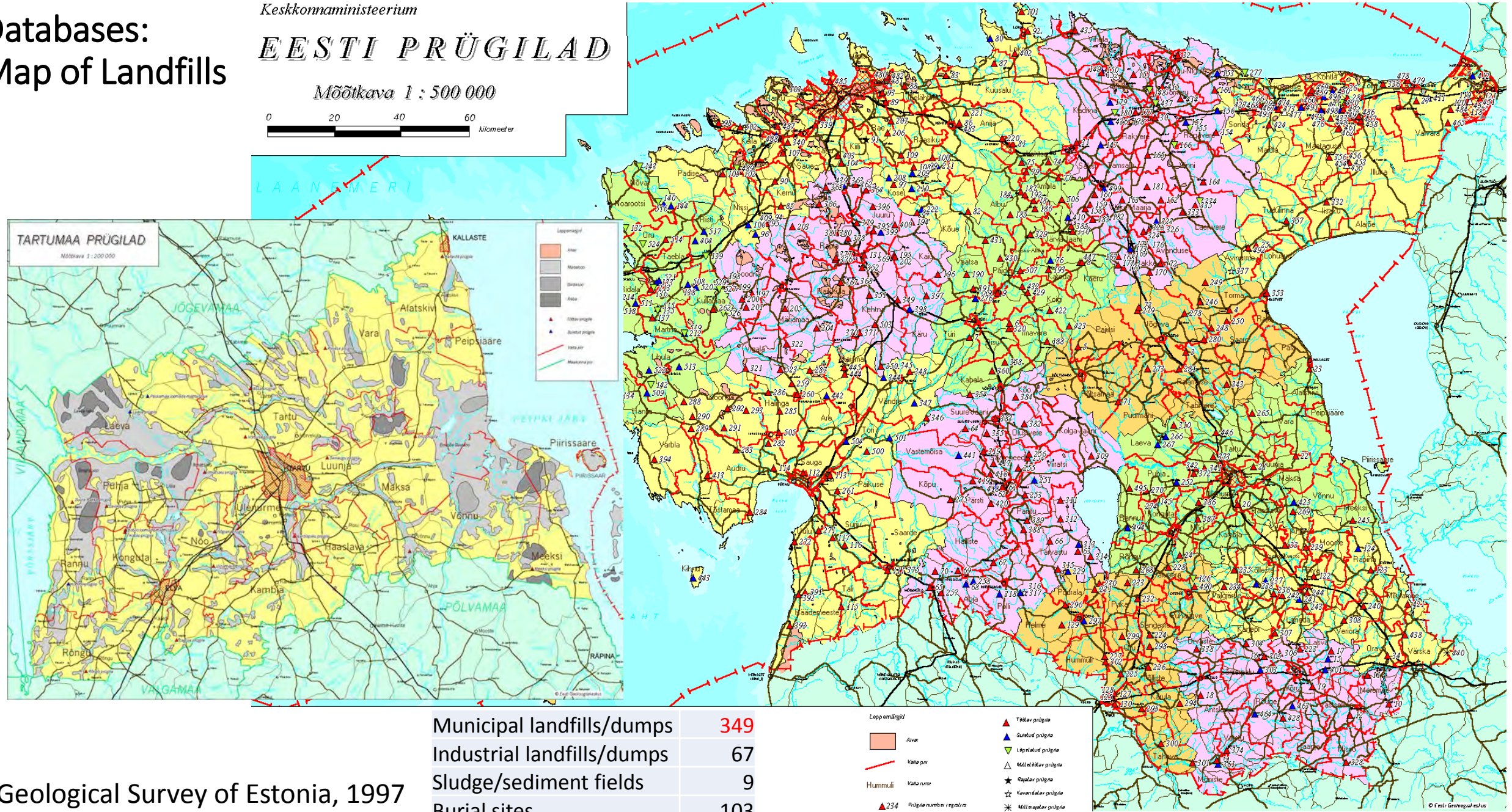
- All previous dumps have been closed since 2009 and covered since 2013;
- All newly built 5 landfills are compliant with the requirements of the Landfill Directive;
- One Landfill for Hazardous waste;
- One mass-burn incinerator (national) and one hazwaste incinerator (private);
- Few ash-deposits for oil-shale industry;
- Policy instruments:
  - all waste owners are in registry,
  - municipal waste is collected by private companies on demand of municipalities (everyone pays);
  - landfill tax (pollution charge, approx 30 €/t if landfilled);
  - gate fee at LF (currently 60 €/t (+20 % tax) for unsorted municipal waste 20 03 01);
  - gate fee at incinerator (approx 30 €/t);
  - organic waste ban (by 2020, just 20% of previously disposed amount is allowed in LF);
  - packaging law, deposit on beverage packages;
  - producers' responsibility (batteries and accumulators, ELW, WEEE, tyres, agricultural plastic foil and nets);
  - administrative penalty;
  - some end-of-waste regulations in force (compost, digestate, sludge);
  - «green purchase» and «eco-labelling» is weak instrument.

Landfill situation

- Closed new sanitary MSW landfills – 1 (Torma has initiated closure procedure)
- Closed non-sanitary MSW landfills (dumpsites) – 500+
  - Incl industrial landfills, ash-fields, oil-shale landfills, burial sites for animals, inert waste landfills
  - MSW dumps approx 350, all closed

	Name	Location	Owner	Operator	Area (ha)	Disposal area (ha)	Height (m)	Height allowed (m)	Status
1	Külama prügila	Hiiumaa, Emmaste vald, Külama küla	Emmaste Parish		13,7	0,5	3		Closed
2	Käina prügila	Hiiumaa, Käina vald, Käina küla	State land	Hiiu Autotrans OÜ	4,2	1,0	1	2	Closed
3	Risti (Ristivälja) prügila	Hiiumaa, Kõrgessare vald, Malvaste küla	State land		2,3		4		Closed
4	Kehra prügila	Harjumaa, Anija vald, Ülejõe küla	State land		4,0		6	7	Closed, sludge deposit in operation
5	Sõrve prügila	Harju mk, Harku vald, Sõrve küla	Harku Parish		12,8	2,6	8	9	Closed
6	Jõelähtme prügila	Harju mk, Jõelähtme vald, Rebala küla	Tallinna City	Tallinna Prügila AS	66,8	8,6	15		Operational
78	Räpo (Võru) prügila	Võru mk, Võru vald, Sika küla	Võru vald		4,2	3,1	11		Closed
	Total				**509**	**93**			

Databases:
Map of Landfills



Municipal landfills/dumps	349
Industrial landfills/dumps	67
Sludge/sediment fields	9
Burial sites	103
	528

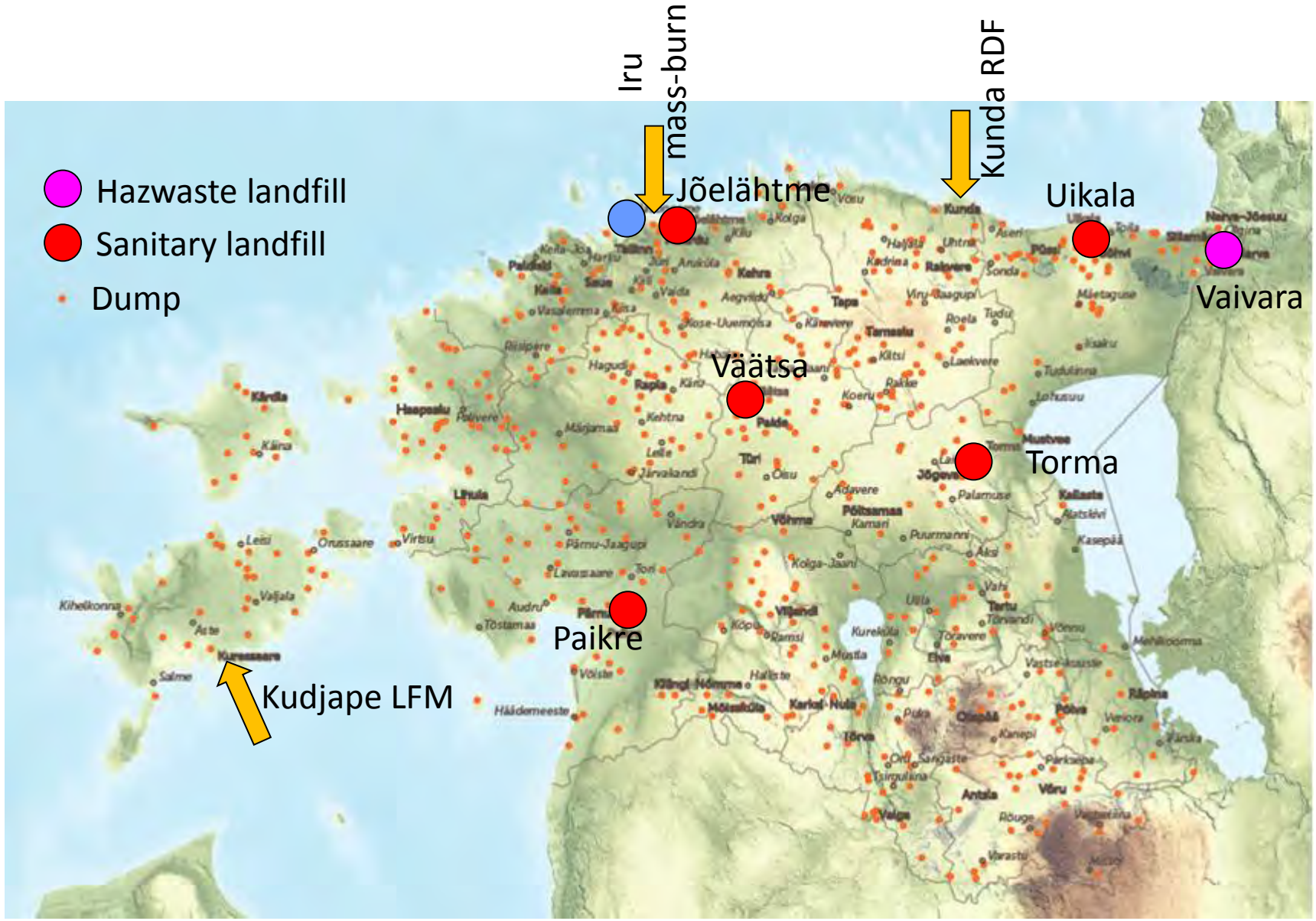
Geological Survey of Estonia, 1997

Väätsa

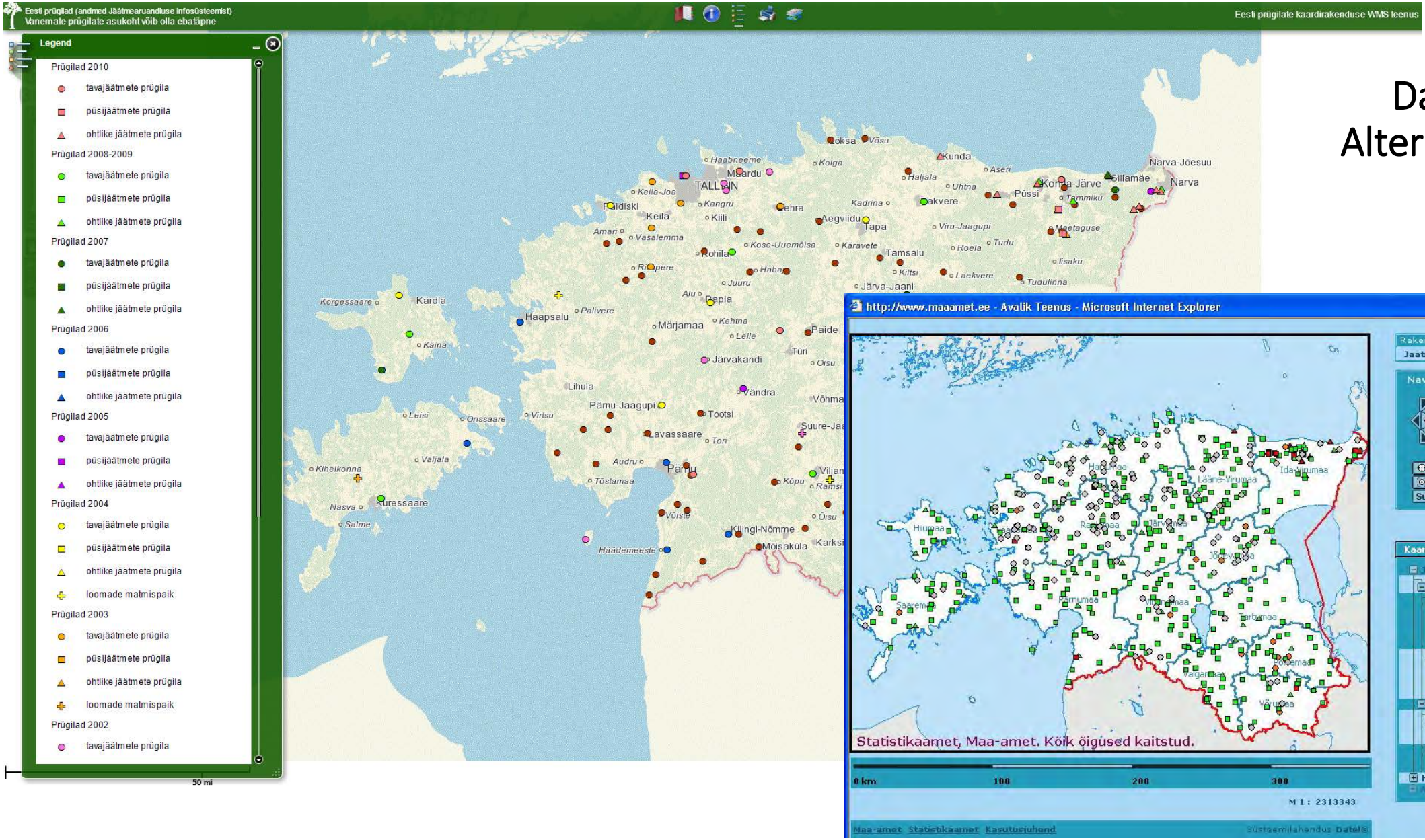
Landfill policy in Estonia

Number of landfills/dumps:
1990: 530
2000: 170
2009: 27
2015: 12 (6 MSW, 6 HazW)
http://www.keskkonnainfo.ee

National strategy:
All dumps had to be closed by 2009
Currently there are 5 NEW sanitary Landfills, which meet EU regulations: Torma, Väätsa, Jõelähtme, Uikala, Paikre (location, bottom liners, disposal by cells, cover layers, gas collection, leachate treatment, waste acceptance procedures, documentation and all licences in place).



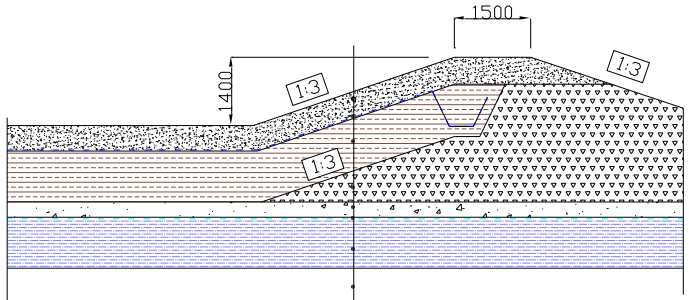
Databases: Alternative maps



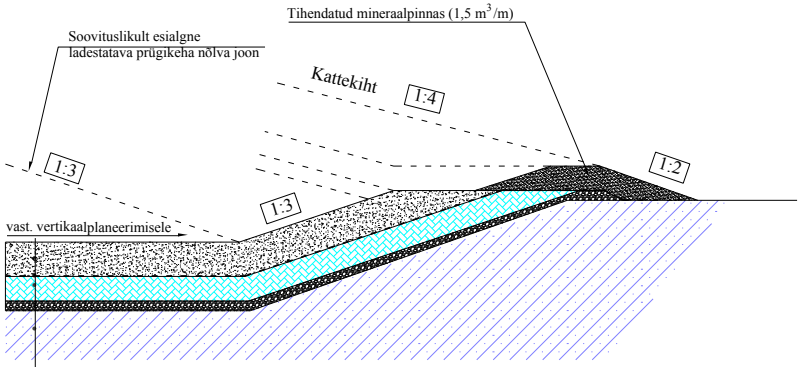
Electronic database of landfills: http://ks.keskkonnainfo.ee/website/prygilad/

Some illustrations about technical details of landfills

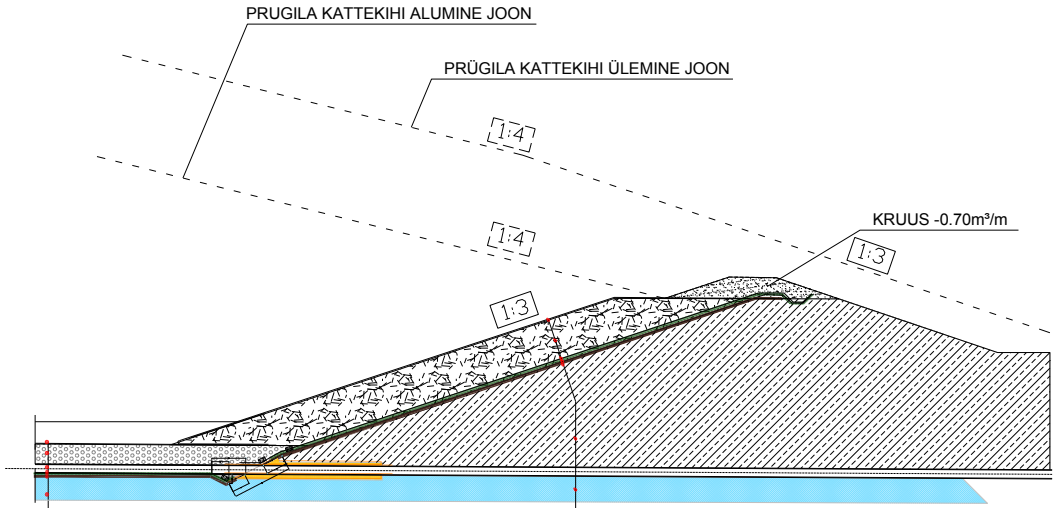
Landfill design is described in national landfill ordinance, which is in compliance with EU directives.



DRENAAZ- JA KAITSEKIHT (jäme liiv) K>10 m/s	500 mm
ISOLEERKIHT (HDPE kile)	2,0 mm
GEOLOOGILINE BARJÄÄR (savi) K <10 m/s	1000 mm
MINERAALPINNAS	0 ... 1500 mm
ALUSKIHT, KRUUS	300 mm
IV kl. GEOTEKSTIIL	
OLEMASOLEV SAVILIIV	1000 ... 3000 mm
OLEMASOLEV KRUUS	

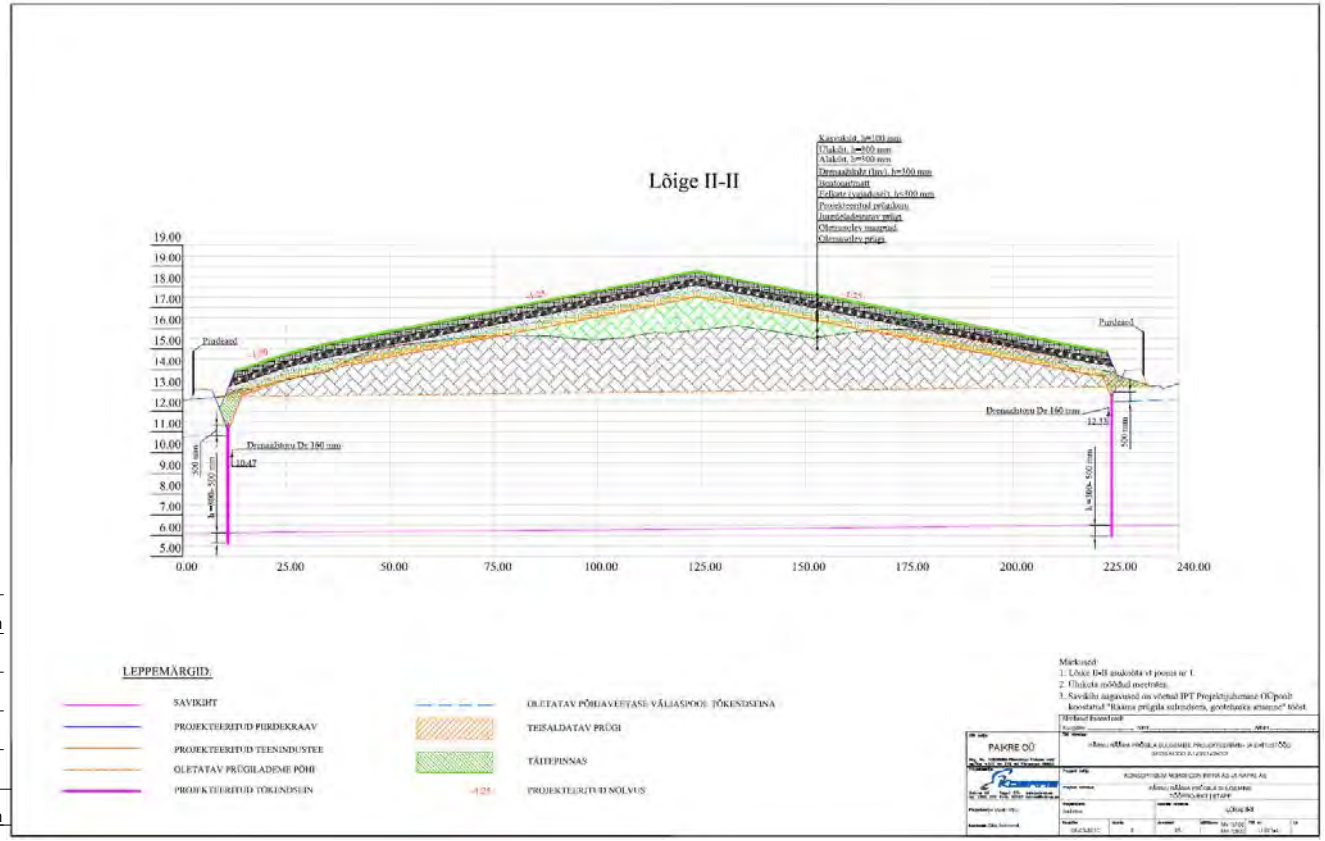


JÄME LIIV (DRENAAZIKIHT) K>10^{-3}m/s	>700 mm
GEOTEKSTIIL 2000 g/m^2 (ca 12 - 14 mm)	
ISOLEERKIHT, HDPE KILE	2 mm
SAVIBARJÄÄR, 2x250 mm K<10^{-9}m/s	500 mm
ALUSKIHT, KILLUSTIK fr. 20...40 mm	>200 mm



2x IV kl. GEOTEKSTIIL
FIBO KERGKRUUS (fr.10...20mm)
DRENAAZHTORU HDPE Ø160mm
GEOTEKSTIIL 1200 g/m²
HDPE KILE >2 mm
BENTONIITMAT, KAAL >4000 g/m²;KUIV PAKSUS >6 mm
OLEMASOLEV LOODUSLIK SAVI

IV kl. GEOTEKSTIIL	
PURUSTATUD AUTOKUMMID (paigaldus kõrgus)	700...800 mm
GEOTEKSTIIL 1200 g/m²	
HDPE KILE	>2mm
BENTONIITMATT, KAAL >4000 g/m²;KUIV PAKSUS >6 mm, K≤5x10^{-11}m/s	
TIHENDATUD MINERAALNE PINNAS (LIIVSAVIMOREEN) max. TERA SUURUS 100mm (VALLI SÜDAMIKUS, VÄLISKÜLJEL)	
OLEMASOLEV LOODUSLIK SAVI	min 300mm



Landfill situation – aftercare

- Study on aftercare requirements, OÜ RealEnviron, Tartu 2007-2008
- All 15 counties were covered, inspection of closed landfills was made on-site; and recommendations delivered for aftercare routines.
- Every closed landfill has owner, who operates aftercare according to waste permit.

- Investigations on contaminated areas?
  - Yes, massive information exist, and massive remediation works has been done. Priority list exists.
  - Landfills are included in list of contaminated areas only if there is contaminated site within a landfill (e.g pil pond at Laguja dump).


RealEnviron
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Lihtsustatud menetlusega riigihange
„Uuring prügilate järelhoolduse korraldamiseks".

LÕPPARUANNE

Töö teostaja

Jargo Jürgens
OÜ RealEnviron
Tel. 52 14 263
real.environ@mail.ee
www.realenviron.ee
Kurekella 4, Tõrvandi,
61707 Tartumaa

TARTU 2007-2008

Experiences from landfill reclamation and/or landfill mining projects in Estonia

Kudjape

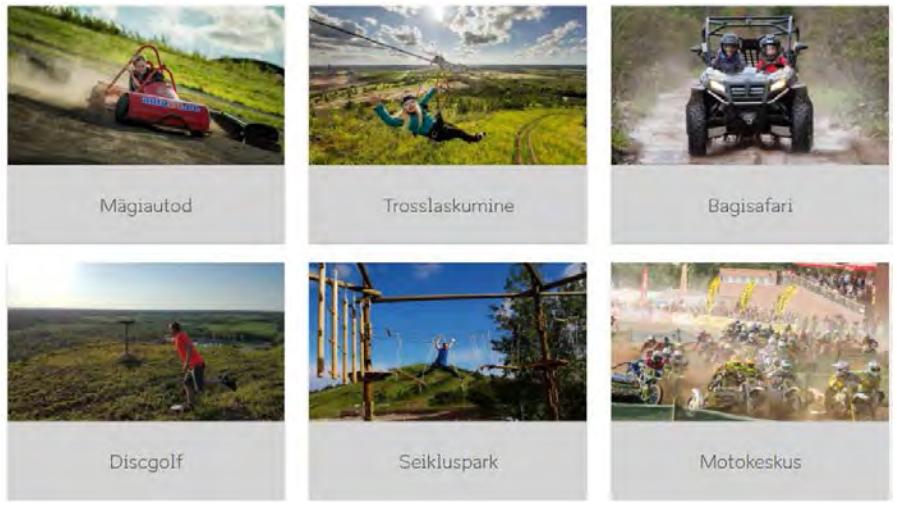
2012-2013, aftercare until now.
Objective: closure of a dumpsite by extracting cover material from the same dump. Fine fraction was used for methane degradataion layer. Landfill was remediated and opened for public as a park.
Waste composition and properties were well studied along with water and gas data.

Torma

2015, Sorting and characterisation event.
Objective: determine waste composition.

Experiences from landfill reclamation and/or landfill mining projects in Estonia

Kiviõli



2016, Former industrial landfill was turned to a public adventure park. Summer and winter sports are available, infrastucture in place.

Paide

2017, previous Paide dump has been planned to work as sportsground. Planning stage currently.