

Management of public roads and private properties contaminated with metal containing ashes

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Content:

- 1. Problem
- 2. Risk based approach
(transboundary concept)
 - ashes on residential properties
 - ashes on public properties
 - non-covered ash roads
 - covered ash roads
- 3. Approach in the Netherlands
- 4. Approach in Flanders



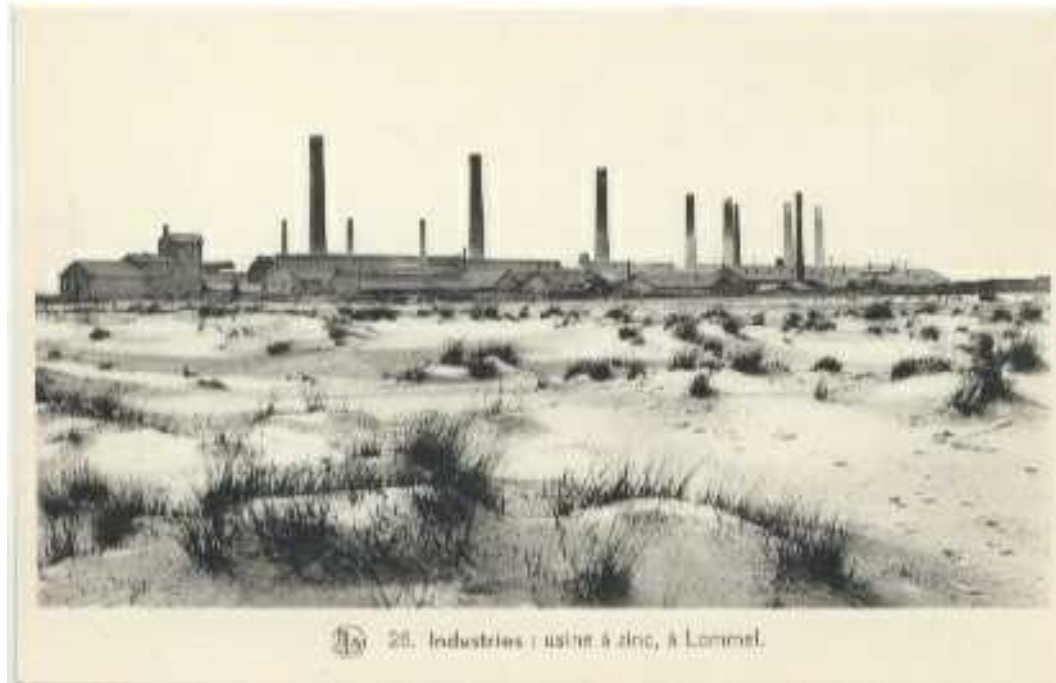
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1. Problem

- Use of non-ferro residues for road stabilisation
- High heavy metal content
 - dust formation
 - leaching
 - in conflict with current waste and excavated soil policy

- Thermal process (1890-1970)



- residues of melting \Rightarrow ash material, brick and muffles

BeNeKempen



Content of metals in ashes (pure)

Element	Zinc ashes (mg/kg)	Lead ashes (mg/kg)	Muffles (mg/kg)	VLAREA reference values (mg/kg)
Arsenic	4173	780	55	250
Cadmium	130	12	12	10
Cromium	133	33	65	1250
Cupper	17815	1889	1045	375
Kwik	-	-	-	5
Lead	11310	20042	383	1250
Nikkel	772	116	24	250
Zinc	67296	61100	1883	1250
Cobalt	423	363	65	
Molybdenum	180	45	7	
Antimony	394	683	8	

VLAREA: Flemish regulation for waste; VLAREA contains the limiting values for reuse of wastes.

Content of metals in ashes (in roads)

Element	ashes in roads (mg/kg)	VLAREA reference values (mg/kg)
Arsenic	70 – 8200	250
Cadmium	1 – 60	10
Chromium	20 – 230	1250
Copper	250 – 23000	375
Mercury	-	5
Lead	220 – 29000	1250
Nickel	40 – 560	250
Zinc	1700 – 67000	1250
Cobalt	10 – 670	
Molybdenum	9 – 130 (1290)	
Antimony	50 – 540 (1860)	

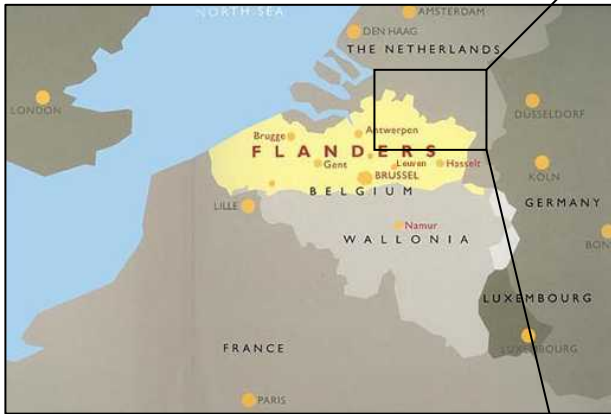
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Leaching (column leach test)

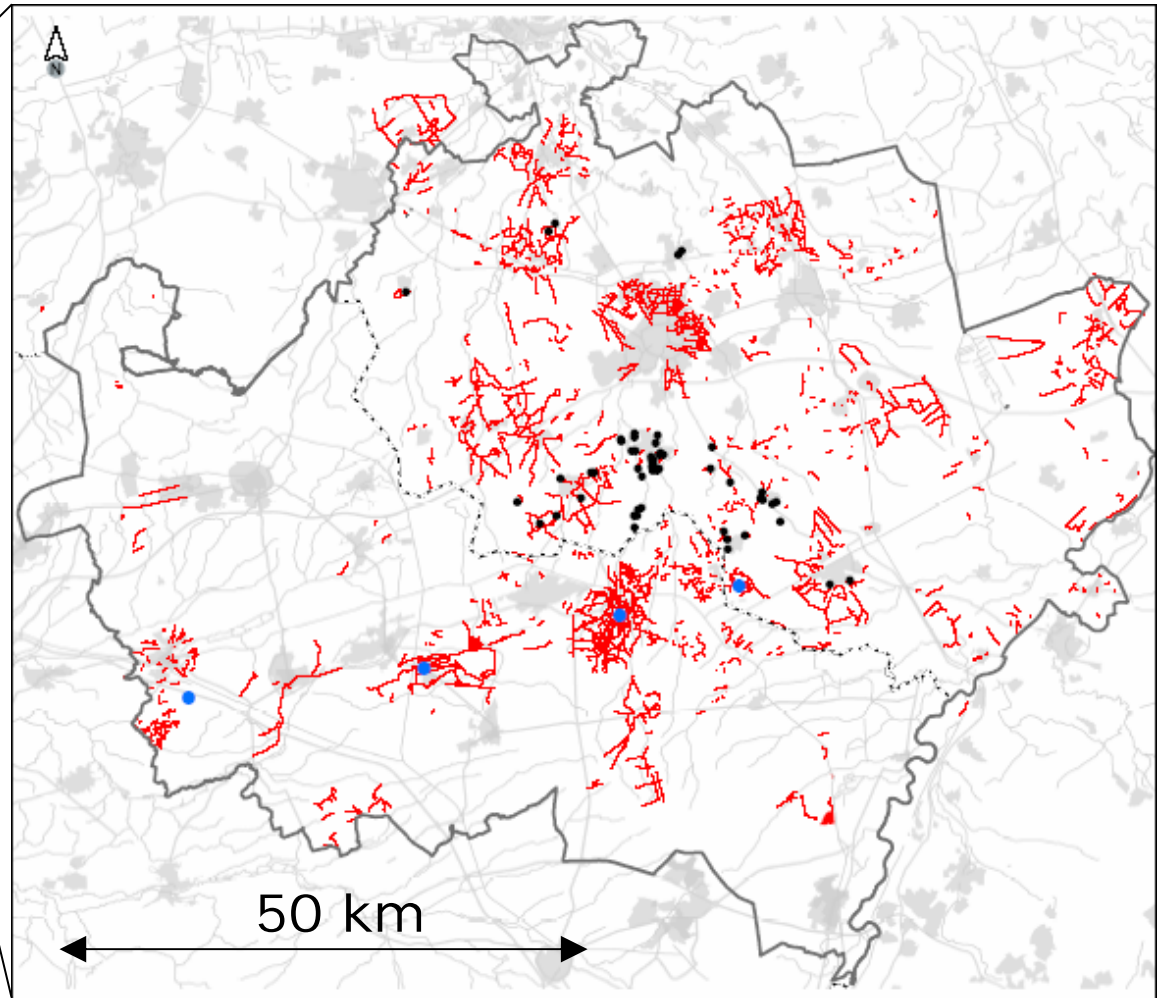
Element	ashes in roads (mg/kg)	VLAREA limiting values (mg/kg)
Arsenic	0.02-0.16	0.8
Cadmium	0.09-0.2	0.03
Chromium	0-0.01	0.5
Copper	0.15-0.26	0.5
Mercury	-	0.02
Lead	0.22-0.46	1.3
Nickel	0.07-0.15	0.75
Zinc	9.8-43	2.8
Cobalt	0.03-0.29	-
Molybdenum	0.03-0.25	-
Antimony	0.03-0.06	-



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Until now, 1300 km ash roads identified



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Risk based approach Ashes on residential properties

- Remove the ashes (regulate removal)
 - to reduce human risks (lead, cadmium, arsenic uptake)
 - to reduce other risks (ground water, ecology)
 - to get control of what is done with the ashes
 - to solve economic uncertainty (value of real estate; often main concern of the land owner)

Risk based approach Ashes on public properties

- Removal is not always required
 - reduce dust formation and spreading
 - reduce leaching
 - regulate and control reuse (this is easier achievable on public properties)

Risk based approach Ashes on public properties

- Non-covered ash roads
 - cover the ash roads with concrete or asphalt
 - remove ashes if covering is not wanted
- Covered ash roads
 - ashes can remain in the foundation of the road
 - treatment of the ashes to reduce leaching
 - cement, lime, bitumen, ...

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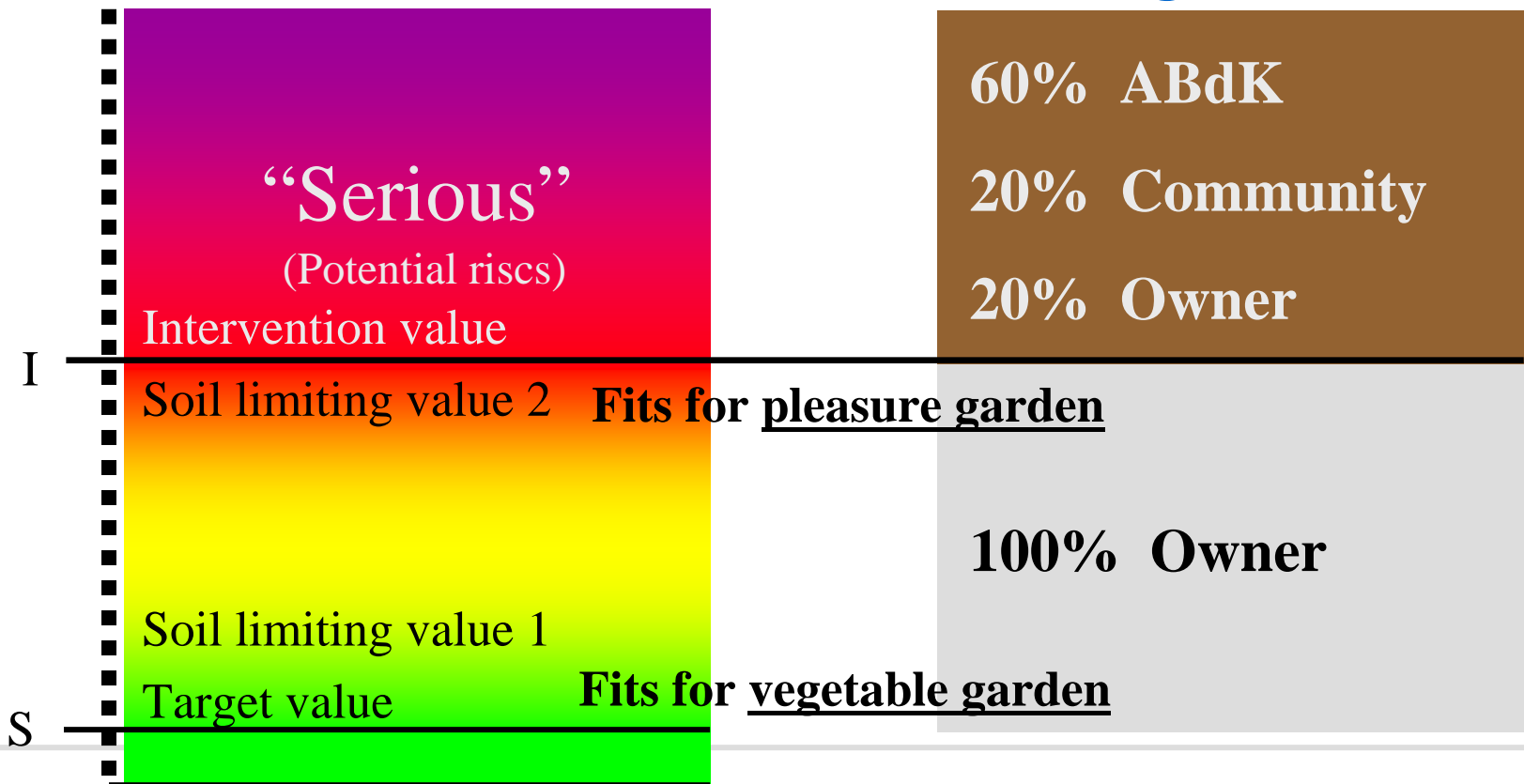
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Approach in the Netherlands Ashes on residential properties

- Co-finance removal
 - complete sanitation to obtain 'certificate of a clean soil'

Research costs: 100% ABdK

Partitioning of sanitation costs: **in general**



Approach in the Netherlands Ashes on residential properties

- Owner has to pay a part of the cost
- Cost:
 - 27 – 50 €/ton
 - 2.000 € – 10.000 € (part for landowner)
- Stimulate partners to subscribe
- Appoint most favourable contractor

Approach in the Netherlands Ashes on public properties

- Classification of ash containing roads by the community
- Indicating the priority
- Indicating future infrastructure projects
- \Rightarrow deal for co-financing removal/treatment

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Approach in Flanders Ashes on residential properties

- Removal of ashes, free of charge (no complete sanitation)
 - removal based on visible inspection and limited amount of measurements
- Reduce the cost
 - create a mono-landfill for ashes

Approach in Flanders Ashes on public properties

- Uncovered ash roads
 - use landfill, limited cost



Approach in Flanders Ashes on public properties



- Covered ash roads
 - regulate reuse (part of the work specifications)
 - procedure how to work with ashes in road construction (guidelines)
 - treatment of ashes
 - organisation of process location (sieving, mixing)
 - safety of employees
 - organisation of traffic
 - dust prevention measures

Unknowns

- Total amount of ashes
- Total cost for removal
- Willingness to cooperate
- Total sanitation ↔ ash removal
- Reuse in new roads

Interest

- Treatments to decrease leaching
- Techniques for quick identification of ashes
- Guidelines for reuse in road construction
- Cheap quality material for refill

