Geo Soft Ing, s.r.o.
EKOLOGICKÉ SLUŽBY

Ťažba starých skládok

Ing. Marek Hrabčák

Geosofting, s.r.o., Prešov – Slovensko

Závislosť nakladania s MSW (%) od HDP/obyvateľa v krajinách EU27 (dáta EUROSTAT 2008).

Stakeholder.

A promising European pact for growth includes priorities from the Resource Efficient Roadmap

European Day 8 May 2012

Panel discussion

The next part of the day consisted of debates between Kurt Vandenberghe (Head of Cabinet for Janez Potocnik (Environment Commissioner) at the European Commission), Bas Eickhout (MEP Green Party), John Wante (Head of Service Policy Innovation at OVAM), Jan Henk Welink (coordinator Knowledge platform Sustainable resource management, Delft University of Technology), Antje Wittenberg (Working at DG Enterprise and Industry on the European Innovation Partnership Raw Materials), Stéphane Arditi (Senior Policy Officer Waste & Products for the European Environmental Bureau) and Michel Sponar (Policy Officer at DG Environment).

Waste v. raw materials

The discussion looked at the need to maintain the distinction between waste and raw materials. The audience included Heijo Scharff (Afvalzorg), who commented: ***"We need a single set of regulations for materials."*** Vandenberghe: "That is a good idea for the longer term: many member states are far from being ready at the moment. They need regulations for waste. Don't forget that the Netherlands has an enormous advantage. ***Dutch companies can help other member states.*** The Netherlands can focus more on waste prevention and the product policy."

Landfill mining

Another important subject was that of mining in old landfills, which contain considerable quantities of raw materials. The role of the landfills also came to the fore when it came to discussing possible ways of storing waste that may be recyclable in, for example, five years from now. This was embraced as an interesting idea but one question cropped up immediately: who will make the necessary investments in view of the uncertainties surrounding the "business case"?

EURÓPSKA KOMISIA

V Bruseli 29. 2. 2012
COM(2012) 82 final

OZNÁMENIE KOMISIE EURÓPSKEMU PARLAMENTU, RADE, EURÓPSKEMU HOSPODÁRSKEMU A SOCIÁLNEMU VÝBORU A VÝBORU REGIÓNOV

SPRÍSTUPNENIE SUROVÍN PRE BUDÚCI BLAHOBYT EURÓPY

NÁVRH EURÓPSKEHO PARTNERSTVA PRE INOVÁCIE V OBLASTI SUROVÍN

{SWD(2012) 27 final}

Podiel EÚ na celosvetovom **baníctve** sa za posledných 50 rokov podstatne zmenšil. Viedlo to k strate nevyhnutnej odbornosti a zručností. Takéto zručnosti sú však potrebné, aby sa zaistila bezpečnosť baníckych činností a aby sa splnila potenciálna rastúca potreba ťažiť hlbšie, vo vzdialenejších oblastiach a za ťažších podmienok (napr. na morskom dne, v arktickej oblasti). Vysoká úroveň bezpečnejších a ekologicky priaznivejších techník ťažby predstavuje nové výzvy a zároveň vytvára nové trhové príležitosti. Znížilo by sa tak aj riziko závažných nehôd v baníctve. Táto odbornosť a zručnosti však nie sú požadované iba v oblasti ťažby, ale v celom hodnotovom reťazci (prieskum, spracovanie, recyklácia, náhrada).

Aj keď Európa ako celok urobila významný pokrok, najmä pokiaľ ide o recykláciu odpadov, dá sa urobiť viac na zabránenie plytvania cennými surovinami vo všetkých fázach ich životného cyklu. Plným uplatnením prvých krokov európskej „hierarchie odpadov“ (prevencia, po ktorej nasleduje príprava na opakované využitie a recykláciu) by sa mohlo zabrániť nenapraviteľnej strate cenných zdrojov a mohli by sa vytvoriť nové podnikateľské a pracovné príležitosti v EÚ.

„Critical raw materials for the EU 2010.“

EK analyzovala 41 minerálov a kovov -14 z nich je pre EU kritických:

antimon, berylium, fluorit, galium, germanium, grafit, indium, kobalt, Pt skupina, vzácne zeminy = REE, magnézium, niob, tantal a wolfrám

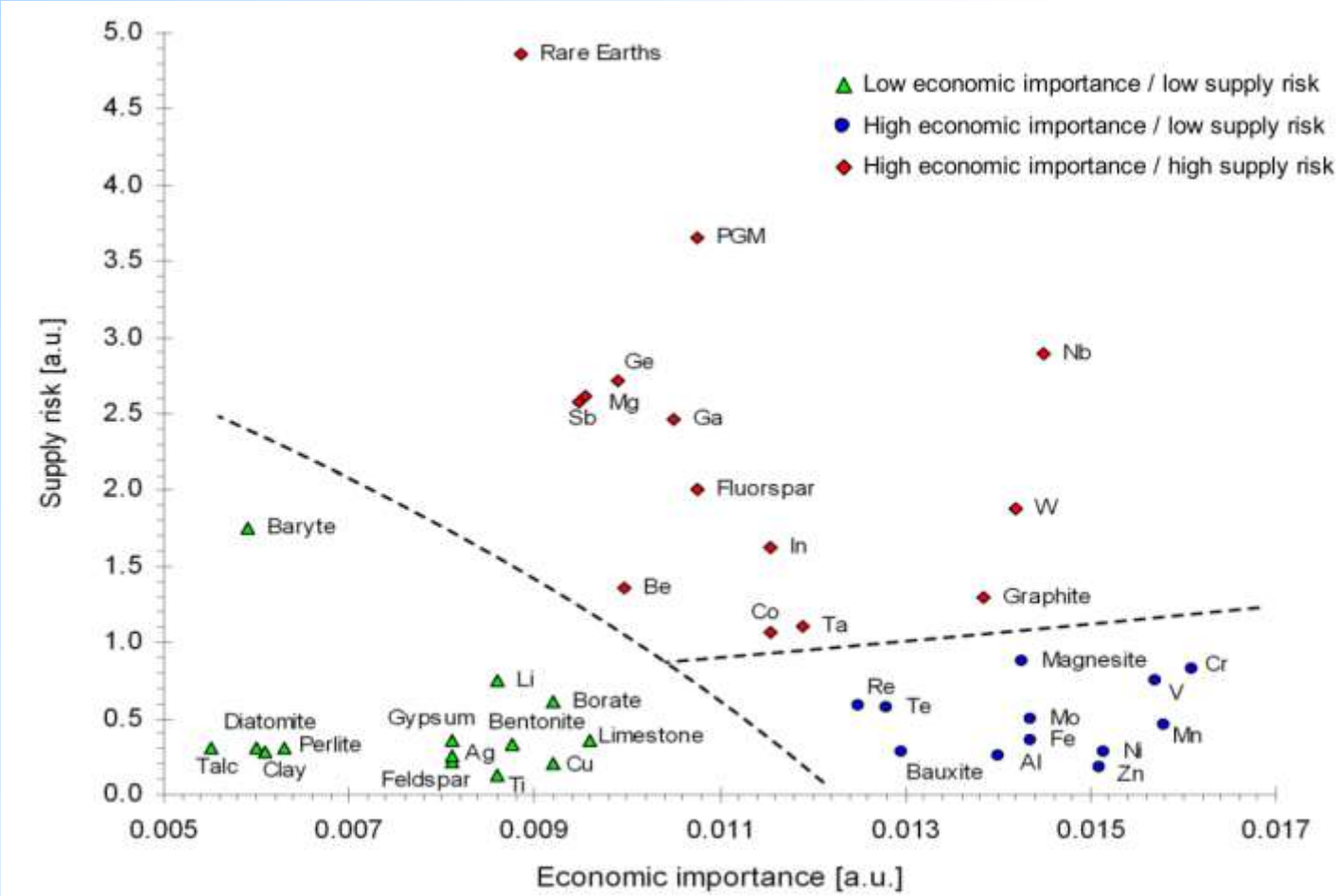


Figure 3: Economic importance and supply risk of 41 minerals and materials.

Critical raw materials for the EU 2010.

Ako sa uvádza v štúdii EK, **jedna tona mobilov obsahuje zhruba 300 – 350 g zlata, 140 g platiny a paládia a asi 70 kg medi.**

Pritom štáty EU dnes recyklujú v priemere len asi 2 % mobilov !

umicore
Precious Metals
Refining

„Urban Mining"– mehr als ein Modebegriff

Primär Produktion ≈5 g/t Au im Erz
Ähnlich für PGM

Recycling
≈ 200 g/t Au in PC Leiterplatten,
≈ 300 g/t Au in Mobiltelefonen (o. Batt.)
≈2000 g/t PGM in Autokat-Monolithen

Christian Hagelüken, ÖGUT Wien, 11.10.2010

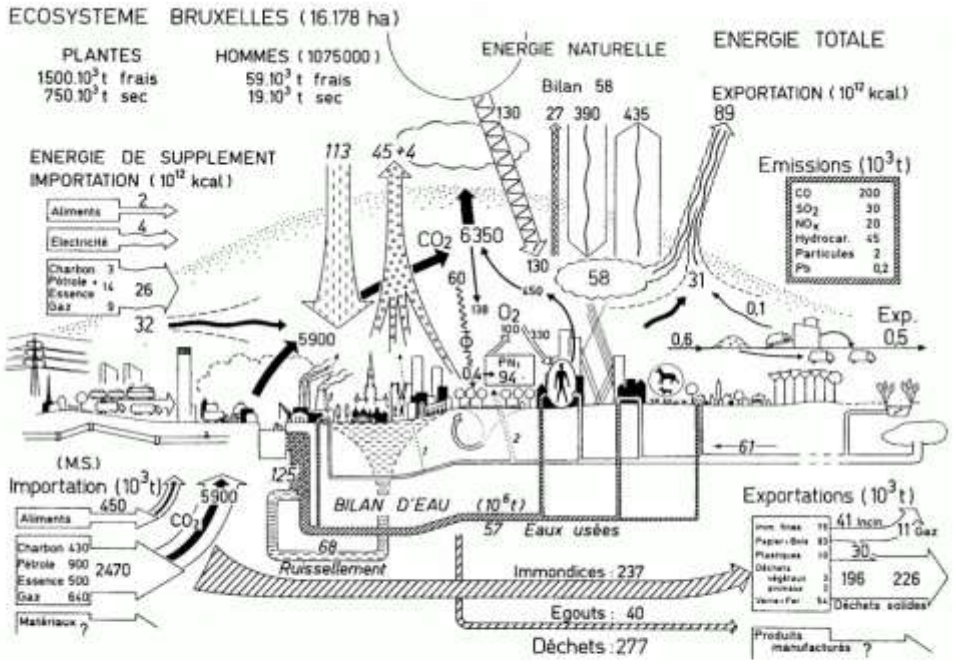
6

Urban Metabolism

Urban metabolism might be defined as *the sum total of the technical and socioeconomic processes that occur in cities, resulting in growth, production of energy, and elimination of waste.*

ABE WOLMAN
1892-1989

Ecological analogy – the city as a "superorganism"



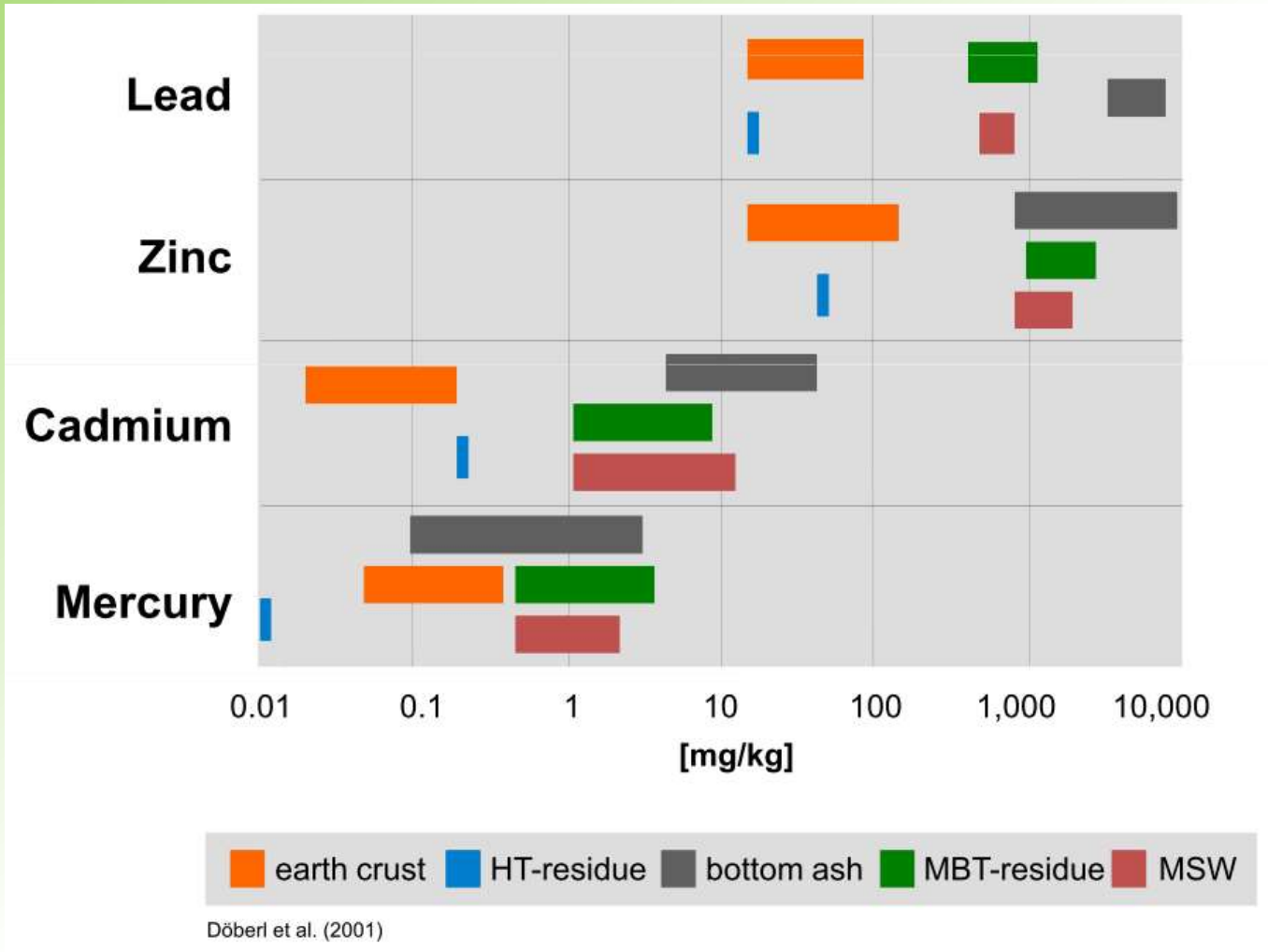
Brussels, Belgium early 1970s. *Souce:* Duvigneaud and Denayeyer-De Smet 1977

URBAN mining – „spiace suroviny“ v elektronike.

Metal		World Mine Production, 2007 (t/yr)	Demand from Electronics Sector (t/yr)	Electronics sector demand/mine production	
Silver	Ag	20,000	6,000	30%	
Gold	Au	2,500	250	10%	
Palladium	Pd	215	32	15%	
Platinum	Pt	220	13	6%	
Ruthenium	Ru	30	6	20%	
Copper	Cu	16,000,000	4,500,000	28%	
Tin	Sn	275,000	90,000	33%	
Antimony	Sb	130,000	65,000	50%	!!!
Cobalt	Co	58,000	11,000	19%	
Bismuth	Bi	5,600	900	16%	
Selenium	Se	1,400	240	17%	
Indium	In	480	380	79%	!!!

Source: Christian Hageluken, Umicore Precious Metals Refining, presentation at the Basel Convention, Geneva Switzerland, 7 Sept. 2007.

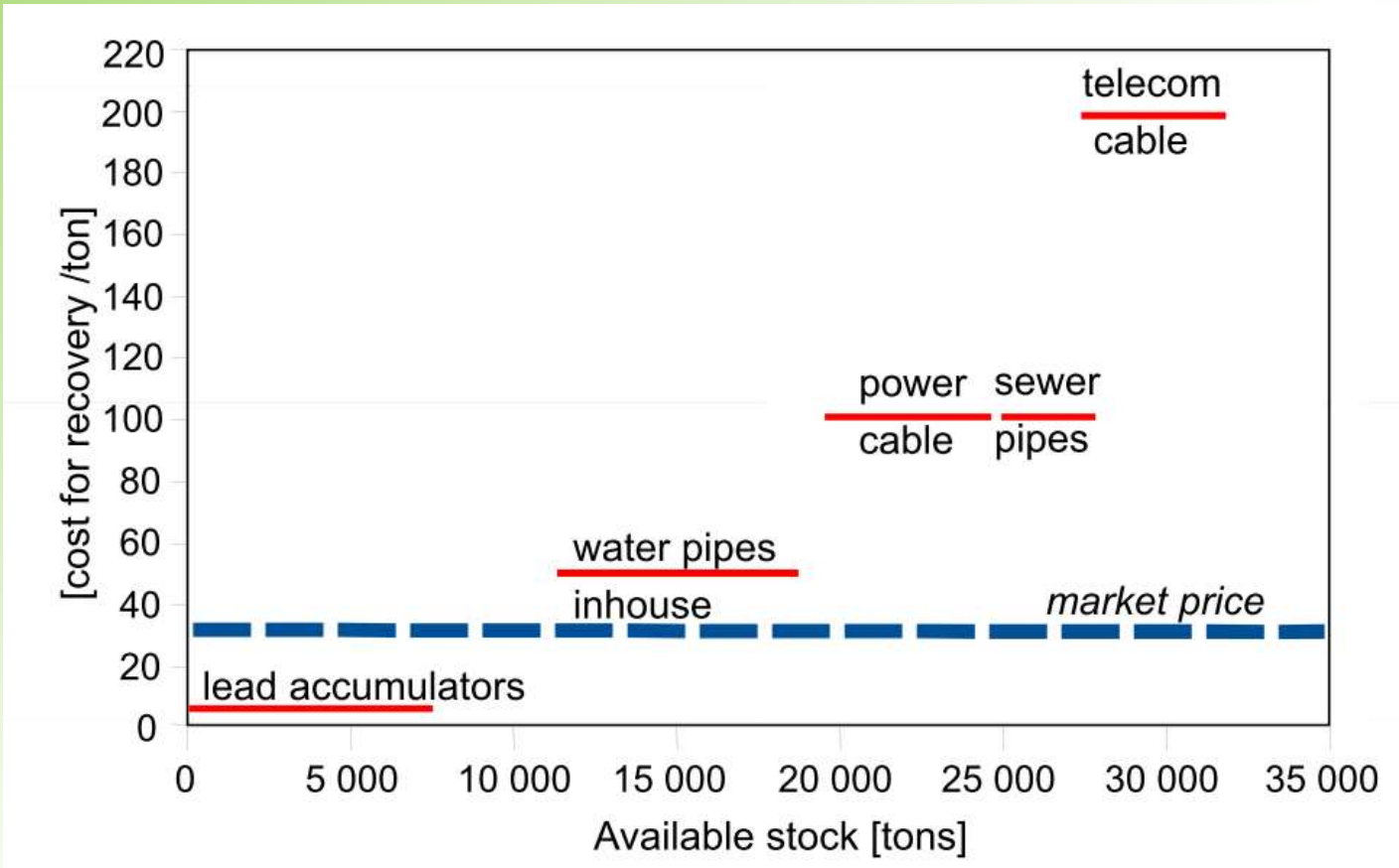
URBAN mining – „spiace suroviny“ v odpadoch.



Döberl et al. (2001)

Urban and Landfill mining.

What is the value of these recyclables? Ex. lead

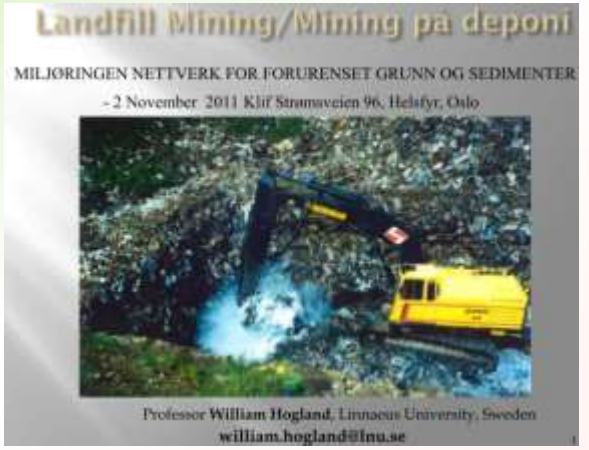


Prof. Dr. Paul H. Brunner
paul.h.brunner@tuwien.ac.at

Landfill mining.

Definition and objectives of LFM

- A process of excavating landfills using conventional surface mining technologies
- Excavation, processing, recycling and/or treatment of waste in landfills
- Objectives
  - Conservation of landfill space
  - Upgrading to state-of-the-art landfills (decreasing operational costs, regulations)
  - Pollution prevention and remediation
  - Site re-development (regain land for other uses)
  - Recovery of material and energy resources



V rokoch 2010-2012 sa uskutočnilo už 6 konferencii s vyše 50 príspevkami...

Landfill mining.

Mining Project Hunts Treasure in Old Landfills

Contributor: The Clean Mining Alliance .
Posted: 08/16/2012 12:00:00 AM EDT | 0

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Tags: Lindfill | mines | Remo Milieubeheer landfill site | Belgium | Clean Mining Alliance

Resource Potential of Landfill Mining – A National and Regional Evaluation

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Landfill mining: filling a gap or just creating a big hole?

Riverside Waste managing director Chris Oldfield shares his view on landfill mining

Without fail, the word 'landfill' appears in the media numerous times a day.
This is because the UK is now highly committed to preventing valuable

to recover and recycle millions of tonnes of irresponsibly landfilled waste, and in many instances use these buried resources as renewable energy fuels.
Metals and plastics can be separated, cleaned and mechanically recycled, and because plastics are made from oil they can even be used to harness energy using gasification or

Exploring the socio-economics of Enhanced Landfill Mining

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Abstract
This paper explores the socio-economics of Enhanced Landfill Mining (ELFM). A conceptual framework including performance drivers is presented. Technology (Waste-to-Energy (WtE) and Waste-to-Material (WtM) technologies), regulation (subsidies, taxes, allowances…) and markets (energy, material prices and input costs) determine the economic performance of ELFM. Using a case study, an investment model is developed to identify the impact of a broad range of parameters on the profitability of ELFM. Especially variations in WtE

Enhanced Landfill Mining: Material recovery, energy utilisation and economics in the EU (Directive) perspective

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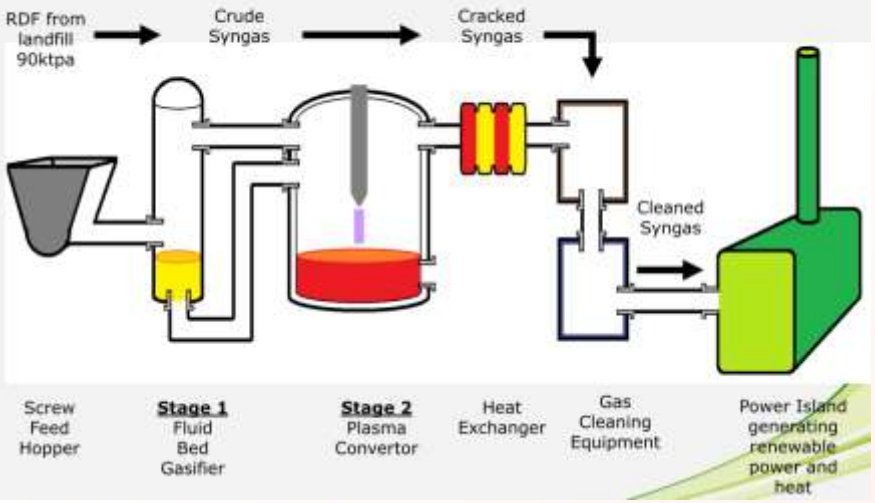
Landfill mining v praxi.

Landfill mining v praxi.

Enhanced Landfill Mining (ELFM): The Concept

- Recovery of 16 million tonnes of municipal and industrial solid waste stored at the Remo landfill site of Group Machiels in Houthalen-Helchteren/ Limburg, Belgium
- 4 Key Objectives:
  - Maximum recuperation of materials
  - Energy recovery with incorporated materials recuperation
  - CO_2 reduction, use and/or off-set
  - Recuperation of nature

The Gasplasma® Process



Budúcnosť skládkovania ?

(podľa ECS Inc. 2006)

Geosynthetics

The sustainable landfill revisited

Geosynthetics | April 2012

By Donald E. Hullings and Hal S. Boudreau III

Post Closure Care

POST-CLOSURE CARE COMPLETION AT MSW LANDFILLS AND RESIDUAL RISKS

D. LANER AND J. FELLNER

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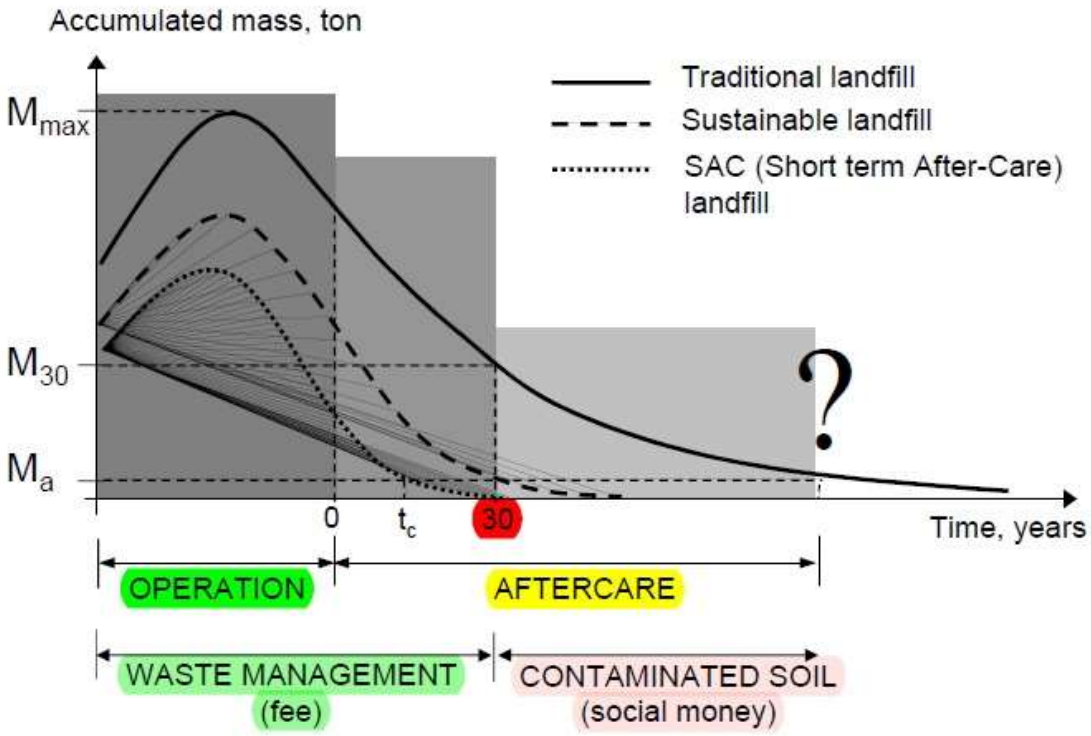
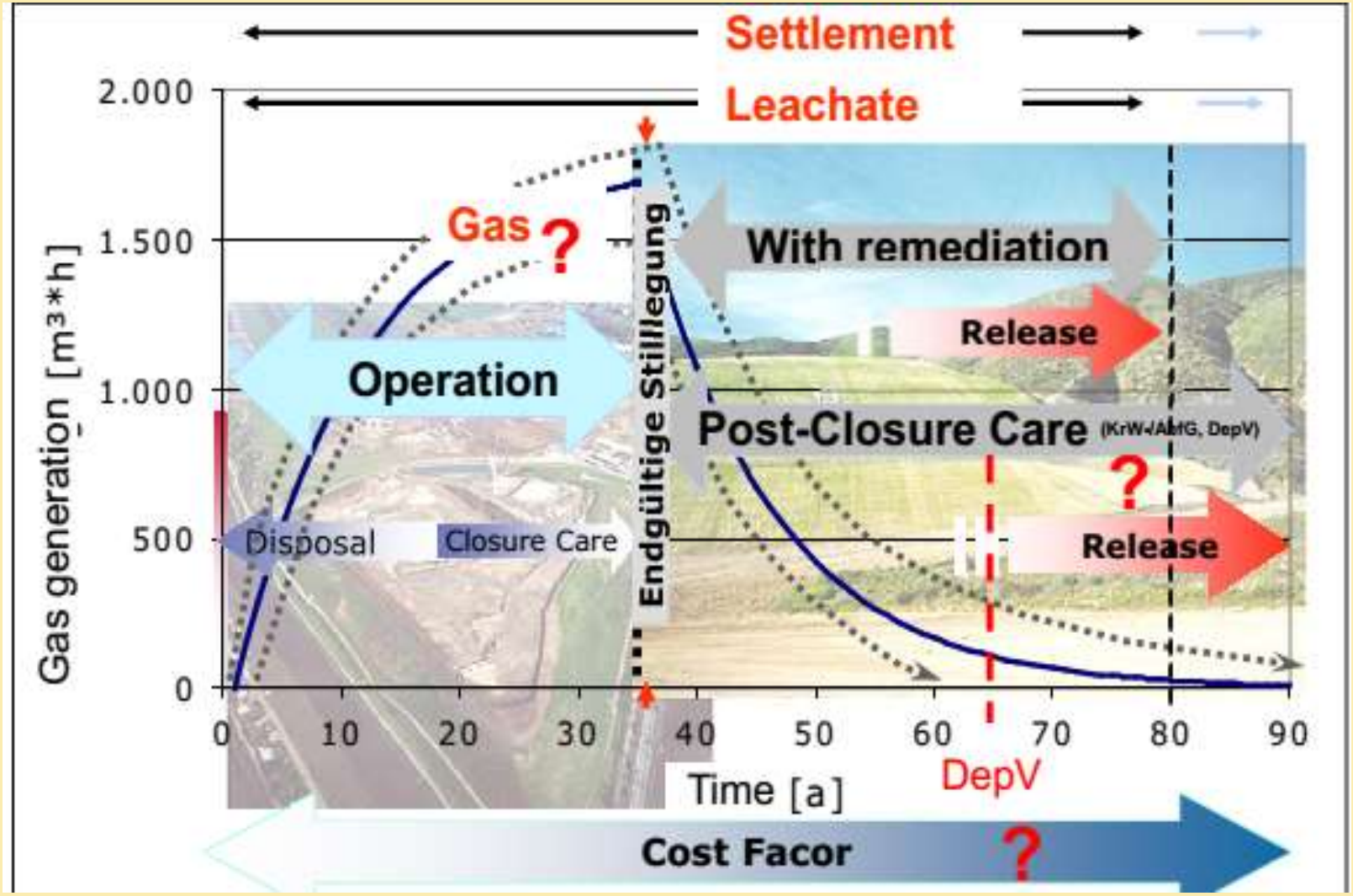


Figure 5. Qualitative trend of the accumulation of the mass of carbon or nitrogen along the landfill lifetime for different kinds of landfill.

Post Closure Care



We need more - raw materials or energy ?

Exploring the socio-economics of Enhanced Landfill Mining

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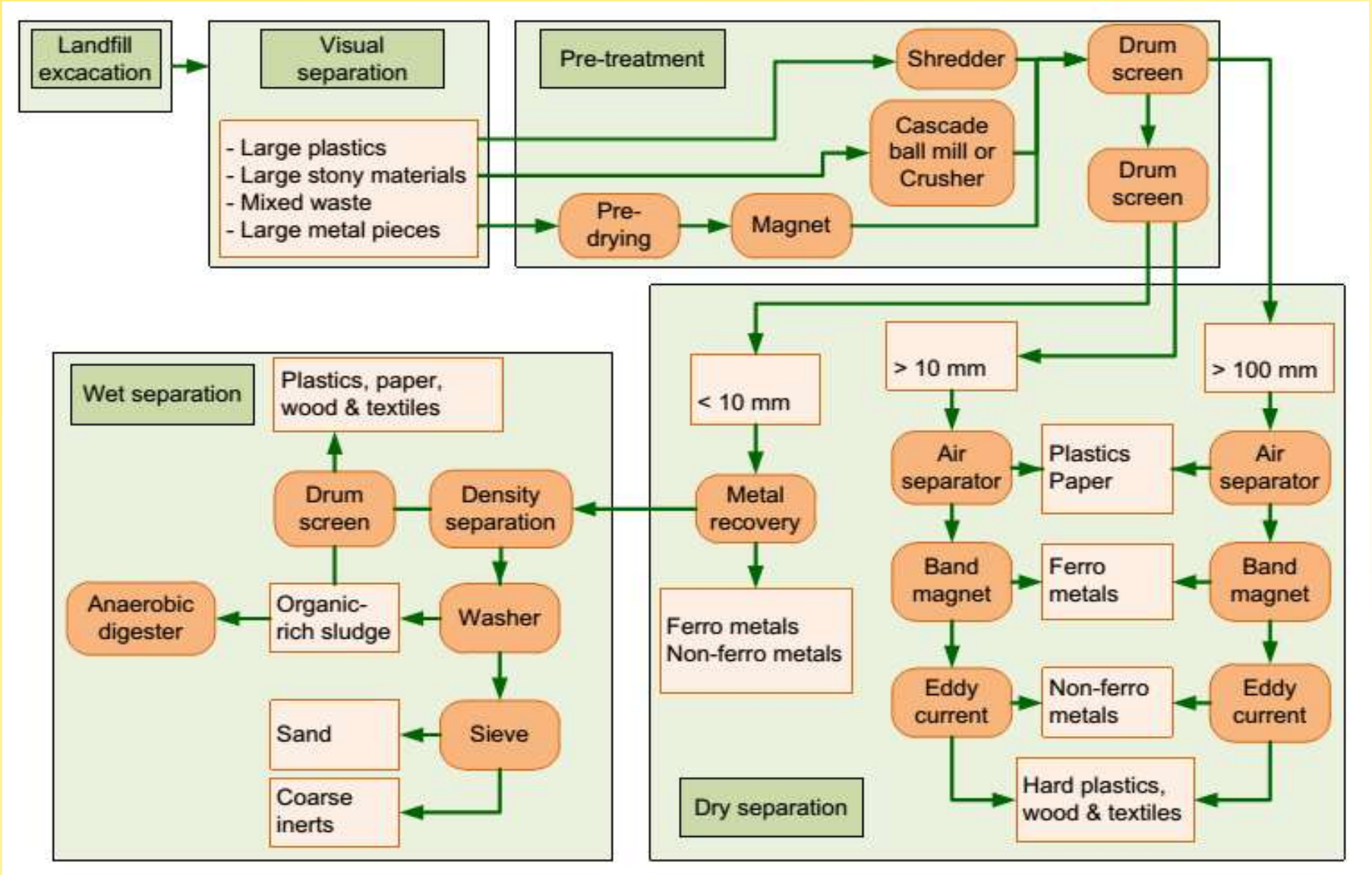
Table 3: Social Cost Benefit Analysis for ELFM in Flanders

Data		
Site surface (m^2)	20 000 000	
Costs		
Total (€)	12 779 680 000	
Benefits	13 096 814 876	
Total WtM (€)	1 534 382 080	12 %
Total WtE (€)	9 937 782 556	76 %
Landfill reclamation (€)	1 368 000 000	10 %
Reduced carbon footprint	256 650 240	2 %
Total (€)	317 134 876	

Costs related to the total landfill volume	
Measure	Costs in (€/m^3)
Without in situ stabilization, minimum period 30 years	9 – 22*[1)]
Without in situ stabilization, minimum period 40 - 70 years	12 – 27*[1)]
With in situ stabilization, minimum period 30 years	7 – 19*[1)]
With in situ stabilization, minimum period 40 - 70 years	9 – 25*[1)]
Costs for landfill excavation	from 10**[2)]
Additional disposal costs	from 20[2)]
Total costs including the site specific costs (currently evaluated projects)	from 40[2)]

Technologické možnosti LM



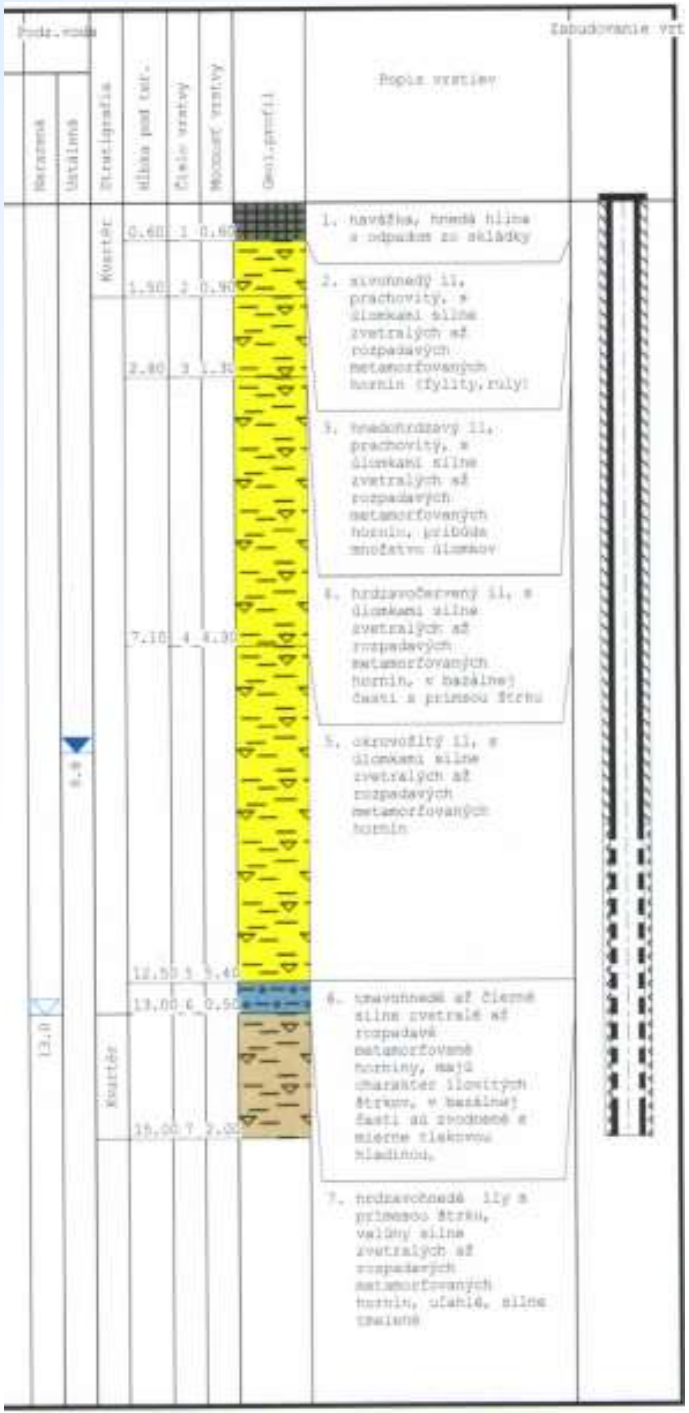
Landfill mining v praxi (SK)

*Stavebné práce **2 in 1***

Geo Soft Ing, s.r.o.
EKOLOGICKÉ SLUŽBY

Stav z roku 2009

IGHG prieskum



Výpočet stability svahov – software PSLOPE v.0.94/B

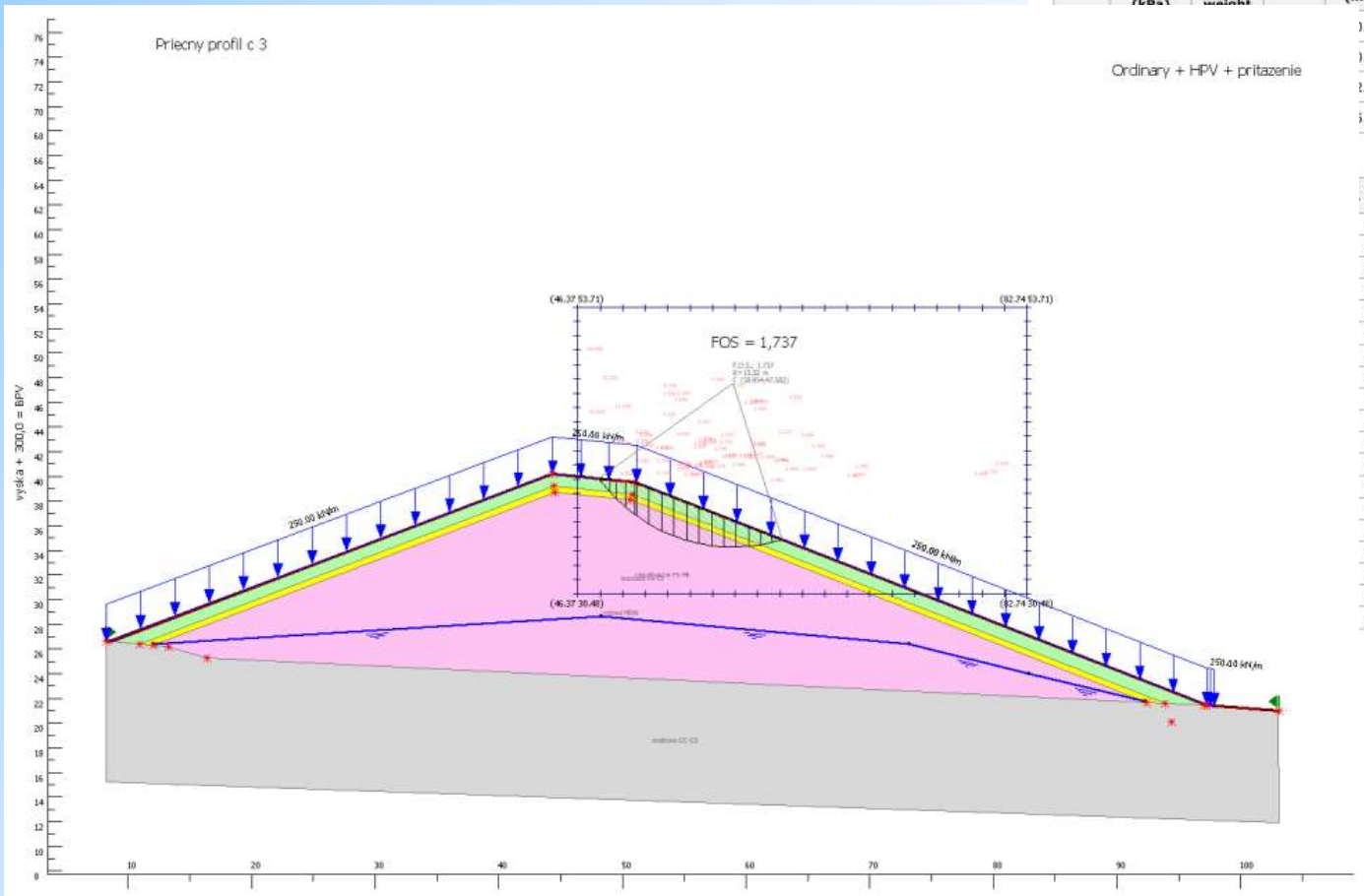
Project name:	Štítnik – PF č. 3 vpravo	Date:	30. VI. 2011	Version:	3K-Ord-1
Method of analysis:	Ordinary	Type surfaces:	circle	Trial surfaces:	20
F.O.S. : (Factor of safety)	**2,578**	Vertical slices:	15	No. vertices:	
		radius R:	15,96	co-ordin.X.Y:	66,03 – 342,89
		Ground water:	Nie	Ex. surcharge:	nie

Soil surface vertices

Point No.	X coord (m)	Y coord (m)
1	27.383	88.867
2	28.940	88.754
3	147.793	134.113
4	169.993	131.833
5	324.260	71.433
6	343.700	70.000

Soil layers data

Layer	Bulk Unit weight (kPa)	Sat. unit weight	phi (°)	c (kPa)	Description
				.00	podlozie GC-G5
				.00	odpad MSW
				.00	tesniaca F6-CI
				.00	rekultivacna F5-ML



(m)	Weight (kN)	h (m) piezometric	U_a (kN)	U_b (kN)	Q (kN)
1.06	2.27	0.00	0.00	0.00	0.00
0.61	4.08	0.00	0.00	0.00	0.00
0.48	4.69	0.00	0.00	0.00	0.00
3.69	68.89	0.00	0.00	0.00	0.00
2.67	94.29	0.00	0.00	0.00	0.00
2.25	108.89	0.00	0.00	0.00	0.00
2.01	117.78	0.00	0.00	0.00	0.00
1.86	122.70	0.00	0.00	0.00	0.00
1.76	124.52	0.00	0.00	0.00	0.00
1.70	123.72	0.00	0.00	0.00	0.00
1.66	120.60	0.00	0.00	0.00	0.00
1.64	115.32	0.00	0.00	0.00	0.00
1.63	107.97	0.00	0.00	0.00	0.00
1.65	98.56	0.00	0.00	0.00	0.00
1.68	87.05	0.00	0.00	0.00	0.00
1.73	73.30	0.00	0.00	0.00	0.00
1.82	57.07	0.00	0.00	0.00	0.00
0.62	13.34	0.00	0.00	0.00	0.00
1.26	10.41	0.00	0.00	0.00	0.00

Alpha : inclination of slice base
Weight : slice weight
Q : external surcharge
U_b : surface water force

Odťaženie starej časti skládky – „landfill mining“

Úprava tvaru starej skládky podľa profilov

From Waste to Treasure...

„Facts do not cease to exist because they are ignored...“

Aldous Huxley

Ďakujem za pozornosť

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