



Eco-efficient metal production methods from mining waste : a European Challenge

Promine Project : Biohydrometallurgy as a case study

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The processing and exploitation, for economic and environmental purposes, of the industrial and mining waste deposits from the European Union

**European Economic and Social Committee (EESC)
Consultative Commission on Industrial Change (CCMI)**



EU heavily dependent on mineral and metal imports

Annual trade deficit of €10 billion on metals ; 100% dependency on Co

In Europe, potential of primary and secondary resources (wastes) in base, precious and “high tech” metals but generally more complex (lower grades and / or smaller tonnages, polymetallic)

EC Policy : from the Raw Material Initiative

- Important to reducing the dependency for metals
- Needs on recycling and re-use and helping companies to discover how their **waste** and by-products can serve as **resources**
- Need of R&D in “**sustainable mining**” to minimise the environmental footprint and adverse social effects

Total budget: 17 M€ 27 partners (11 EU countries)
Coordinated by the Geological Survey of Finland

<http://promine.gtk.fi/>



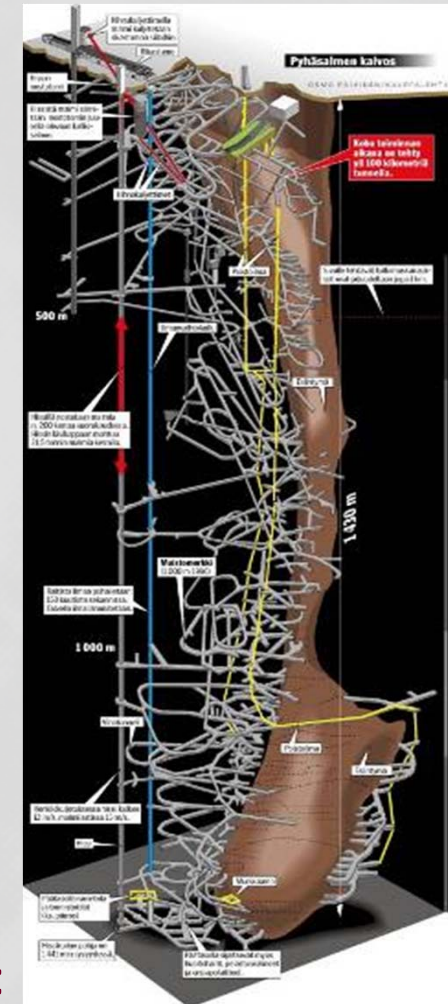
Objectives :

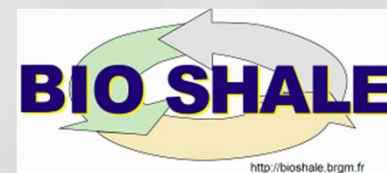
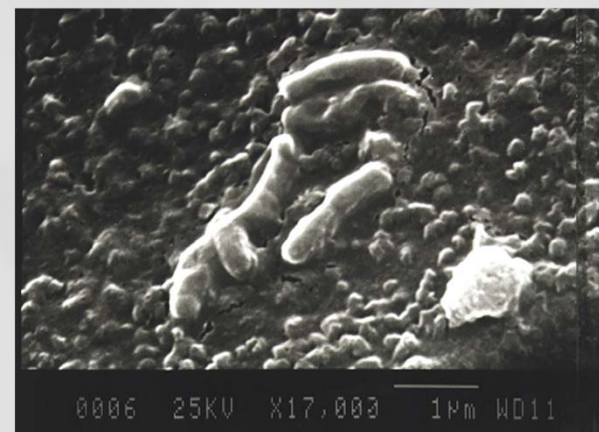
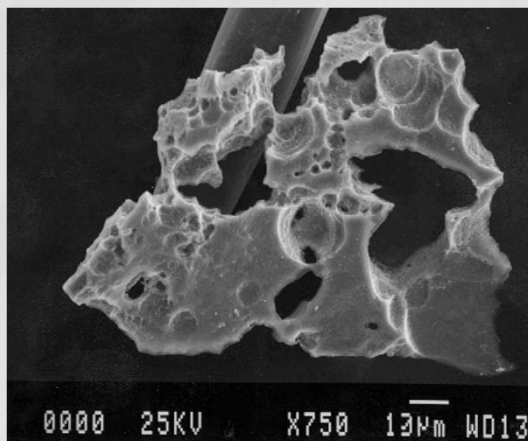
- To ensure that all potential mineral resources within EU are fully documented in a Geological Information System
- To develop 5 high value mineral-based products based on raw materials delivered by the extractive industry.
- To develop better exploitation eco-efficient mineral processing and metal recovery methods, including biohydrometallurgy
- To promote more environmentally responsible management in mining

1. Geological mineral resource modelling across Europe

2. New nano-products from mineral exploitation & Eco-efficient metal production methods (on secondary materials)

3. Assessment of sustainability & Env. Impact (LCA Approach)





Bioleaching is a reasonable alternative or complementary technique to classical techniques (Pyrometallurgy) - some niches exists (metal grade, contaminants, location, ...)



BOLIDEN

THE UNIVERSITY OF
WARWICK

K G H M
Cuprum
Research & Development Centre

G.E.O.S.

GLIWICE



PRIFYSGOL
BANGOR
UNIVERSITY

AIR LIQUIDE

MILTON ROY
Mixing

- Technico-economic evaluation Capex/Opex (Metal in € / kg)
- Integration of social and environmental impacts (LCA Approach + Costing of Impacts ?)

Géosciences pour une Terre durable
brgm



Today, Knowledge on Mining waste is essentially focused on the potential Hazards and environmental impacts

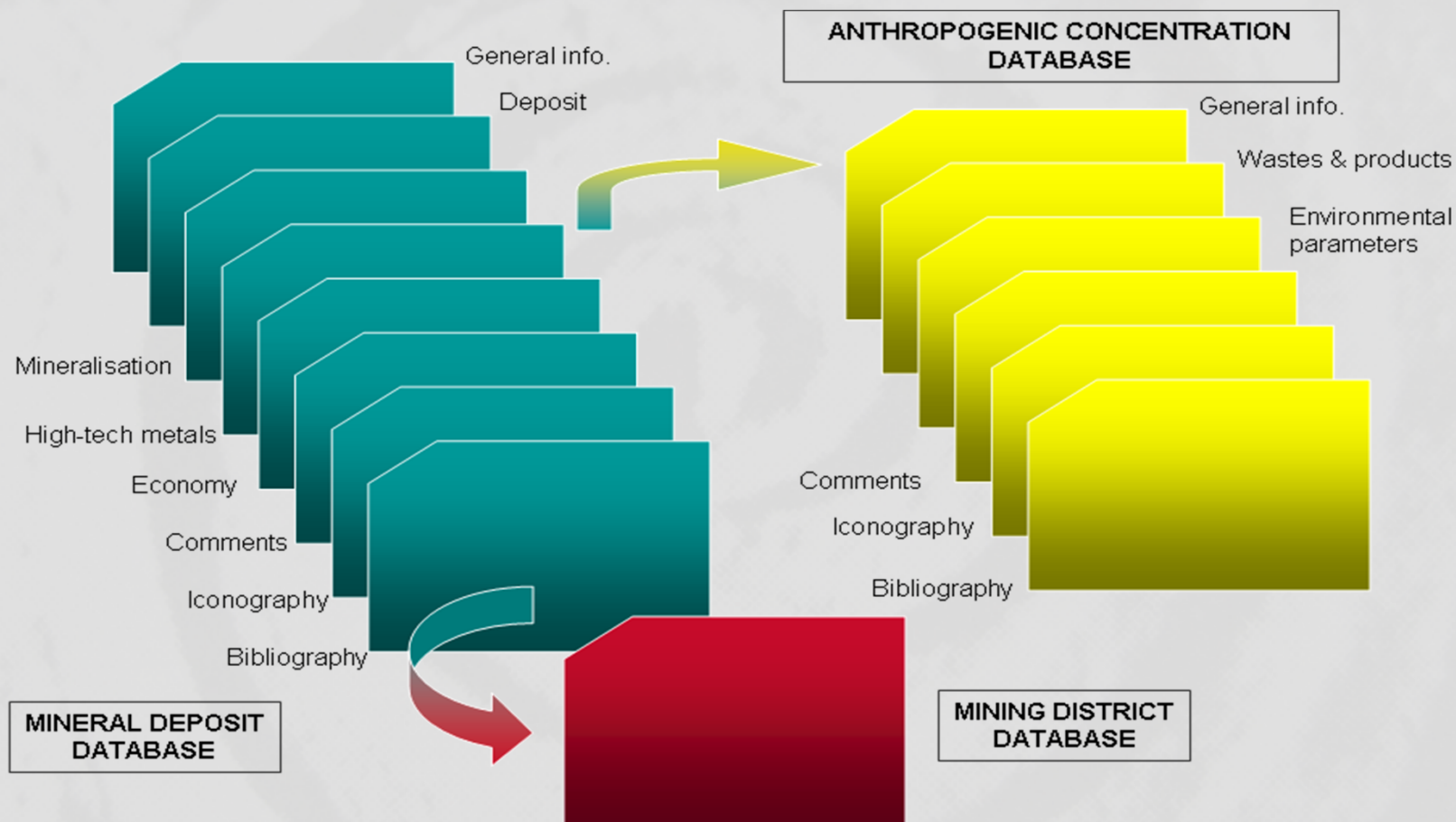
Implementation of the Mine Waste Directive (Directive 2006/21/EC) , as defined by Article 20: "Inventory of closed waste facilities including abandoned waste facilities which cause serious negative environmental impacts or have the potential of becoming a serious threat to human health"

PROMINE : Preparation of an Anthropogenic concentrations Data Base for inventoring secondary valuable mining and metallurgical residues

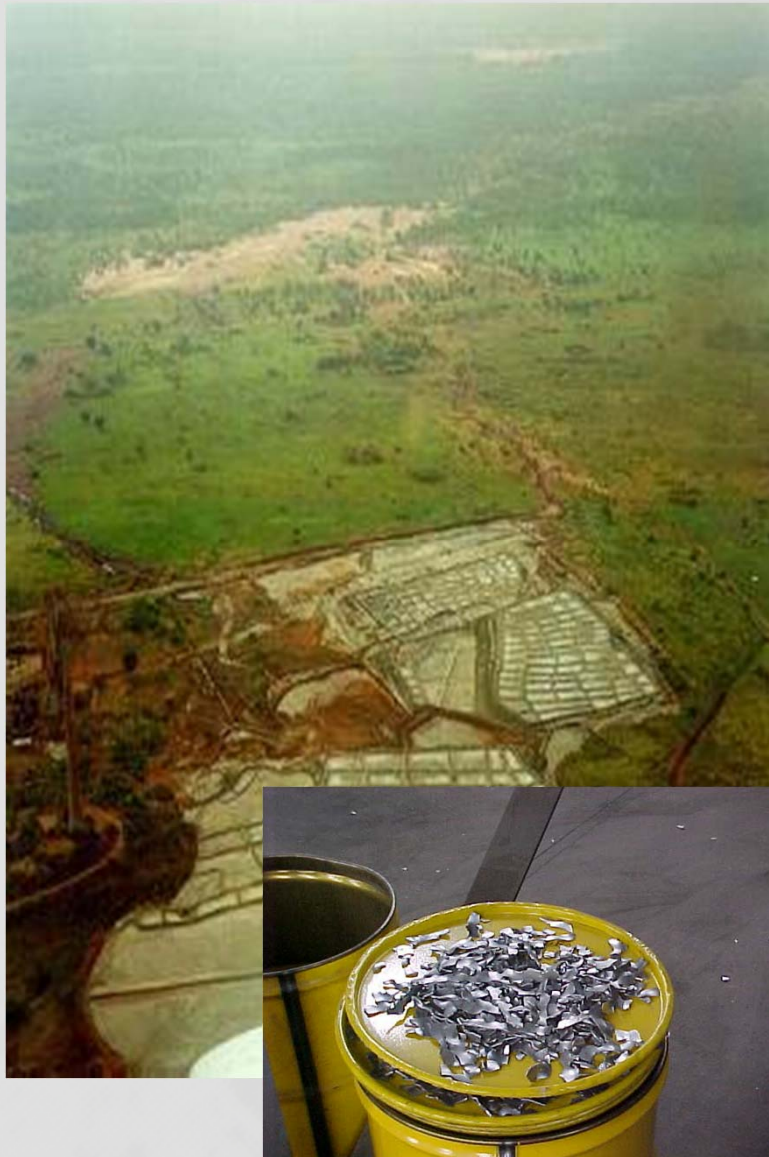
(volume and potential remaining metals)

Mining Waste = Resources ?





PROMINE database are INSPIRE (ISO,OGC) compliant For interoperability



KASESE COBALT
COMPANY LIMITED

