



EU-Latin America Dialogue  
on Raw Materials

Diálogo UE-América Latina sobre  
materias primas

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Matérias-primas

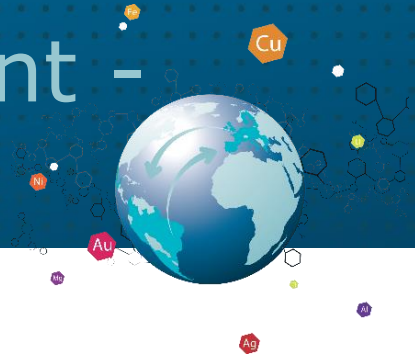
Argentina, Buenos Aires

8-9|05 2017





# European trends in mining waste management - Min-Novation project



## Scope of presentation

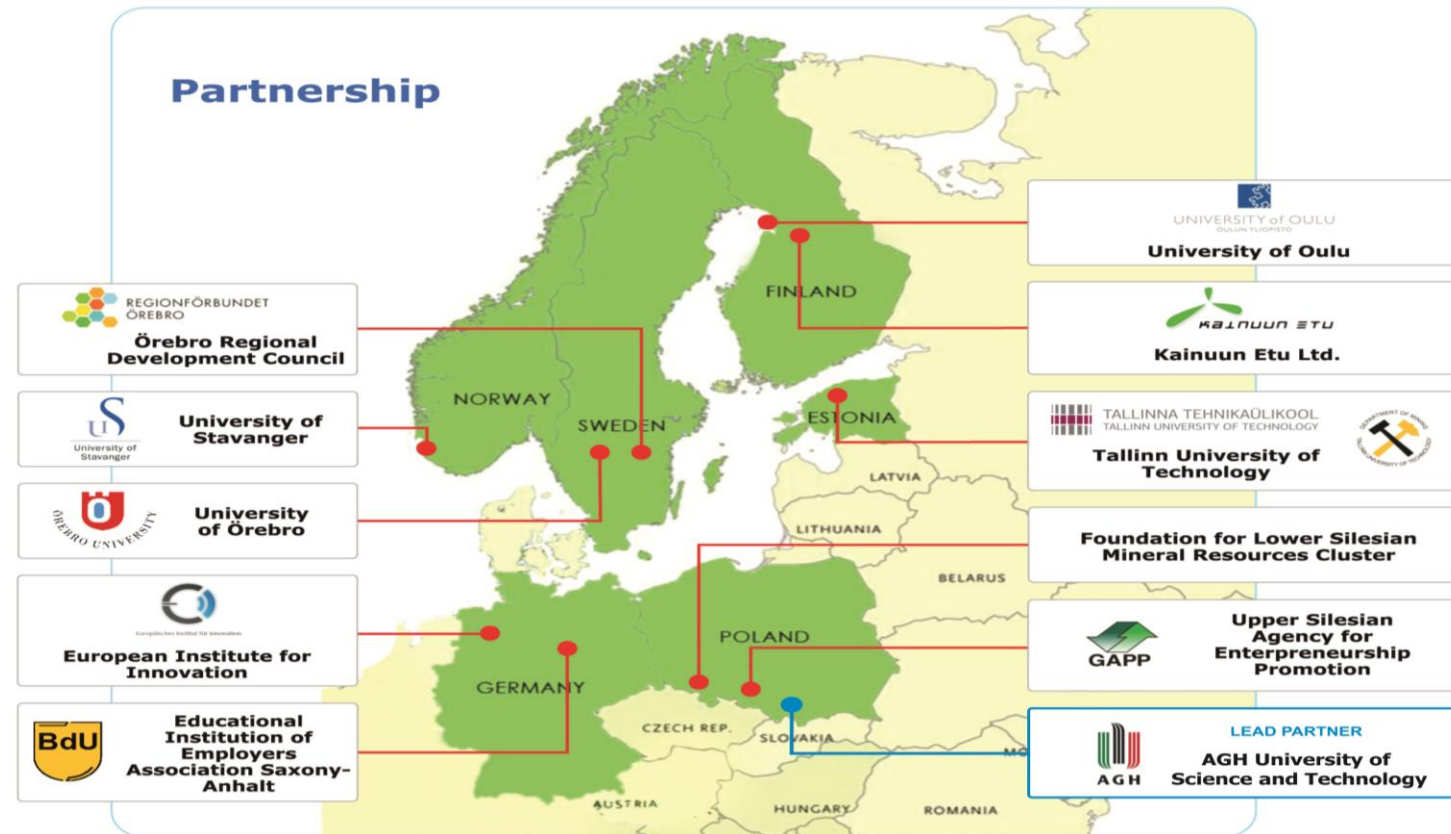
- About Min-Novation project
- Pilot installations for waste analysis and recovery
- Waste heaps as useful structures
- Waste heaps as industrial heritage and landmarks



# About Min-Novation project



## Partnership



- Mining and Mineral Waste Processing Management Innovation Network
- Duration: 2011–2013
- 11 partners + 16 associated partners
- Budget: €3.5M



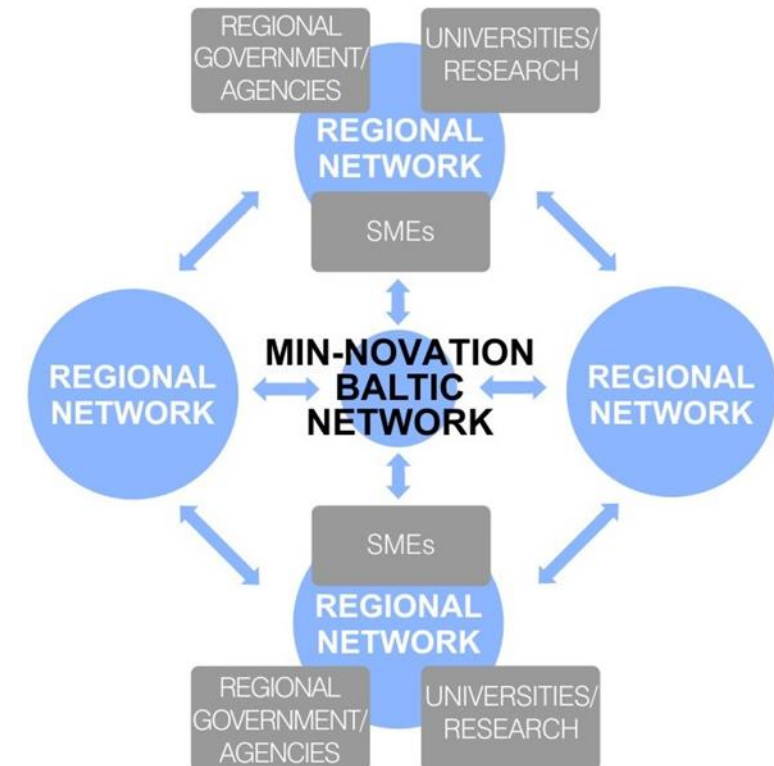




# THE CONTENT AND SCOPE OF Min-Novation project



- Waste management, which covers:
  - Prevention of waste generation
  - Minimization of the amount of waste produced.
  - Waste recovery
  - Disposal of waste
  - Reclamation of waste site and remediation of polluted environmentsin technological, legal, financial, social and environmental aspects.





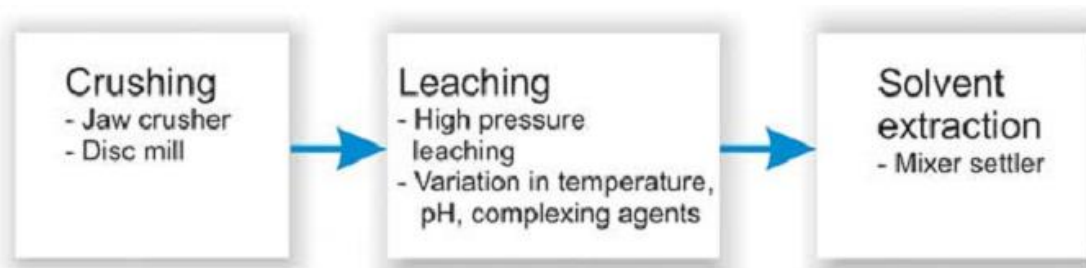
# Main project outputs

- **Baltic Business Database:** 550 companies spanning 6 countries which are involved in mining waste management
- **Compendium of mining waste management and State-of-the-Art:** over 70 case studies in the topic of prevention, recovery, reclamation
- **Min-Novation Baltic Network** and Regional Networks
- **4 pilot installations**
- **Final publication** – monograph





# 1 PILOT INSTALLATION – Mobile Metal Recovery Installation, Sweden



- Mobile pilot unit for element extraction and recovery
- The installation can test various metal-bearing wastes: oxidized sulphide ore wastes (source of e.g. Cu, Zn, Pb), flotation wastes (source of e.g. Cu) or weathered Linz-Donawitz (LD) slag from steel making (source of e.g. Cr, Mo, Ni, V)
- Useful also in reclamation processes (reduce the cost)



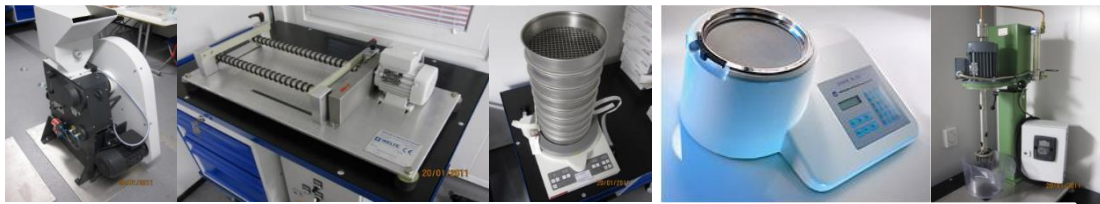




## 2 PILOT INSTALLATION – Mining Waste and Process Side Stream Assessment Lab, Finland



crushing > grinding > screening > sieving > flotation



filtering

fine grading



Thermodynamic reactions,  
material optimization,  
chemical characterization,  
material modification...

- Laboratory is a partially mobile installation
- Enables assessing chemical composition, mineral composition, thermal properties of various mining and processing wastes, as well as processing slurries and water from mining and processing.



# 3 PILOT INSTALLATION – Oil Shale Waste-to-Product Mobile Unit, Estonia

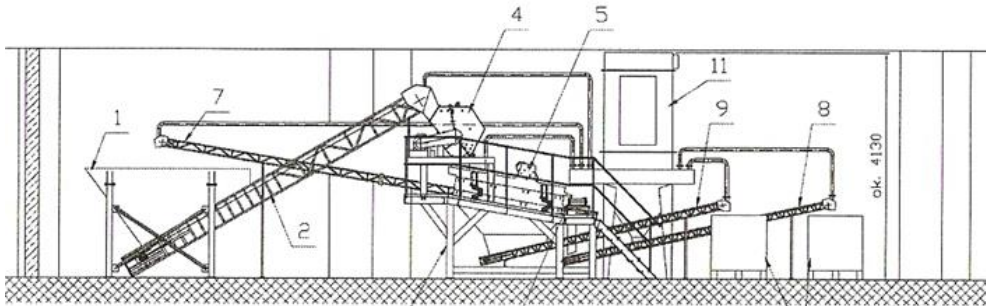


- Mobile unit for producing aggregates from oil shale waste and other waste materials
- Output: oil shale for oil or electricity production and limestone rock for aggregate production or backfilling





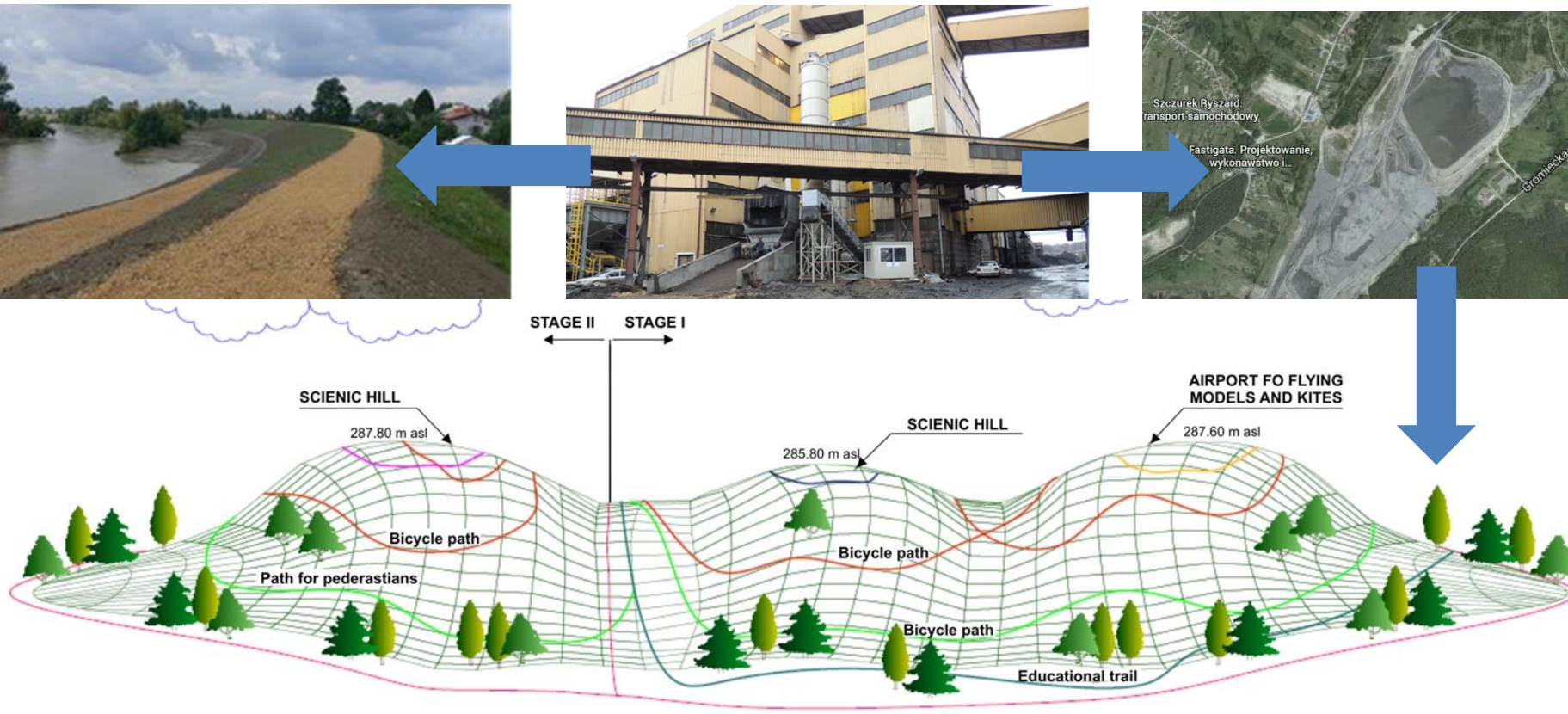
## 4 PILOT INSTALLATION – Coal-Derived Aggregate Production Line, Poland



- Installation is used for recovering of wastes from coal processing plants (mixture of sandstones, mudstones and shales)
- Output: crushed aggregates for road construction



# Public facilities built with aggregates produced on the basis of waste rock; Poland



- Installation for waste recovery was included in a coal enriching plant technology
- Selected waste rock is mixed with a binder (ash, cement, lime)
- Aggregates are used for engineering work and to build a public facilities
- Aggregates have all the necessary technical approvals and hygiene certificates issued on the basis of a variety of tests





# Aidu Pyramids building with waste rocks at the Ojamaa Oil Shale Mine, Estonia



Photo: A.Ostreġa

- Waste rocks (limestone) coming from processing at the Ojamaa Oil Shale Mine is using for constructing pyramids
- Aidu Pyramids are building in the former open pit located near by mining plant





# Aidu Pyramids building with waste rocks at the Ojamaa Oil Shale Mine, Estonia



Source: <http://kta.ee/aidu-pyramid>

- There is concept to adapt this structures for sports and recreation facilities, restaurants, beaches, wine cellars and other attractions
- The main idea is to give something useful back to local people instead of leaving them with a waste heap





# Lady of the North – sculpture at the Shotton Surface Mine, UK



- It is a reclining female figure set into the local landscape
- Design by world-renowned artist Charles Jencks
- Built with 1.5 Mt of overburden and then blasted with “hydro seed”
- Open park with view point is attraction for the community to enjoy while the mine is still in operation





# Waste heaps as useful structures – oil shale semi-coke heap, Estonia



- Oil shale semi-coke heap converted for recreational area with a ski slope
- Private investment

Fot. A.Ostreĝa, [www](http://www)





# Waste heaps as useful structures – oil shale semi-coke heap, Estonia



- Is still warm inside (at a depth of 25 m, the temperature reaches 90o C) - the hotel and nearby houses are connected to this heat source via a heat pump.





# Waste heaps as industrial heritage - CONE NO. 1 „SZARLOTA” in Upper Silesia region, Poland



New structure build with waste material from current production – modern CONE

Historical - CONE NO. 1 „SZARLOTA”; protected by law as historical monument

Slime separators

Space – approx. 45 ha  
Height of Cone no. 1 – 140 m AGL  
Height of modern Cone – 190 m AGL

Photo: KWK Rydułtowy-Anna

- Cone no. 1 – include useful materials
- No social acceptance for waste recovery
- Shape and the height of the dump are the result of an already historical storage technology– the cone method
- Is protected in the frame of local land use plan





# Waste heaps as industrial heritage - CONE NO. 1 „SZARLOTA” in Upper Silesia region, Poland



Rereational area

CONE NO. 1 „SZARLOTA”

Modern CONE

- Historical complex commemorating mining operations in the town



Source: ISAR Design Office





# Waste heaps as industrial heritage - Hohe Linde in Mansfeld-Südharz region, Germany



- Hohe Linde - one of the most outstanding waste heap in region with long tradition of copper extraction
- Located close to historical mine - museum
- Height 145 m, area 12.5 ha, mass 20 mln t

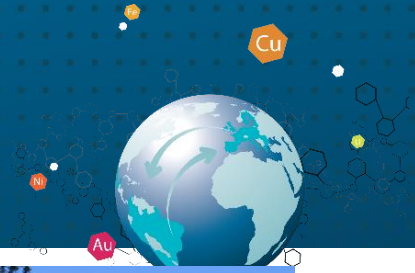


Photo: A.Ostreĝa and [www](http://www.hohe-linde.de)





# Waste heaps as industrial heritage – Örebro County, Sweden



Ljusnarsberg Copper mine (1622-1975)



Stollberg Fe-Mn-Zn-mine

photo: A.Ostręga

## Heritage Conservation Act 1988

**chapter 2 §1:** Ancient monuments are protected under this Act. Ancient monuments are the remains created by man during ancient times, which have been produced by ancient techniques and use and which are permanently abandoned.





# Waste facilities at the 11/19 Hard Coal Mine in Loos en Gohelle, Nord-Pas de Calais, France



Giant – the highest twins heaps (146 m AGL)

- Today approx. 200 heaps remain, of which some are subject to recovery, while others have been adapted for a variety of functions, e.g. leisure
- 51 waste dumps were recognised as symbols and elements of the region's mining identity, and were entered onto the UNESCO World Heritage List





**Ruhr Area, Germany** - Numerous landfills were regenerated in such a way that they became characteristic landmarks of the Ruhr Area



# Title of the slide



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