



MINING the
EUROPEAN
ANTHROPOSPHERE



Harmonization between national and international classification systems

Case studies for mining waste in Hungary

Zoltán Horváth¹, Katalin Szabó¹, Szilvia Bányácsi¹, Ulrich Kral²
Mining and Geological Survey of Hungary¹, Technische Universität Wien²

Summary: This poster represents the need of the common language for secondary resources (here for mining wastes) and additional steps to improve the complexity of final reports including appropriate data not only for environmental aspects but also to establish the opportunity of classification and estimation of anthropogenic resource. This and the related development of the legislative framework supports the sustainable resource management. Additional surveys will improve the state of presented Hungarian sites in both classification system; in the UNFC 221-223 (Potentially commercial projects) and Indicated or Measured Resources by the CRIRSCO system.

Background

The need of the common language for secondary resources in order to facilitate the sustainable resource management system is obvious because the comparability and transparent procedure with appropriate data can support the resource efficiency for both the energy and non-energy fields with the mitigation of the raw material consumption. A special part of the secondary resources that is strong relation to the mining and exploitation are the „mining wastes”. The terms of „mining wastes” (may differ worldwide however the importance of this type of potential secondary raw material is crucial. This poster presents reference on the COST Action MINEA (www.minea-network.eu) and ORAMA (www.orama-h2020.eu) projects, the background of the European and a member state (Hungarian) legislative framework, three cases for the classification of the mining waste heaps and some recommendations for the content of relevant documentations.

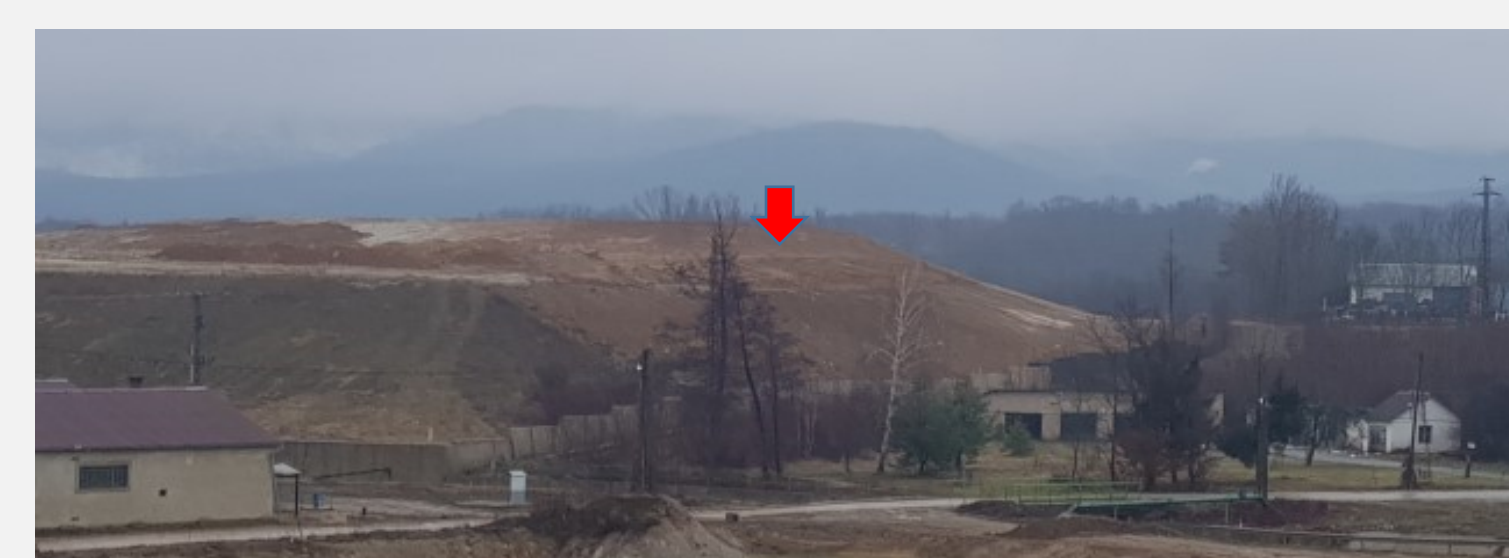
Aim & scope

Our aim was to use the international reporting standards (CRIRSCO family e.g. JORC and PERC) and UN classification framework (UNFC) for mining waste within three case studies. We looked at the available documents related to mining waste such as:

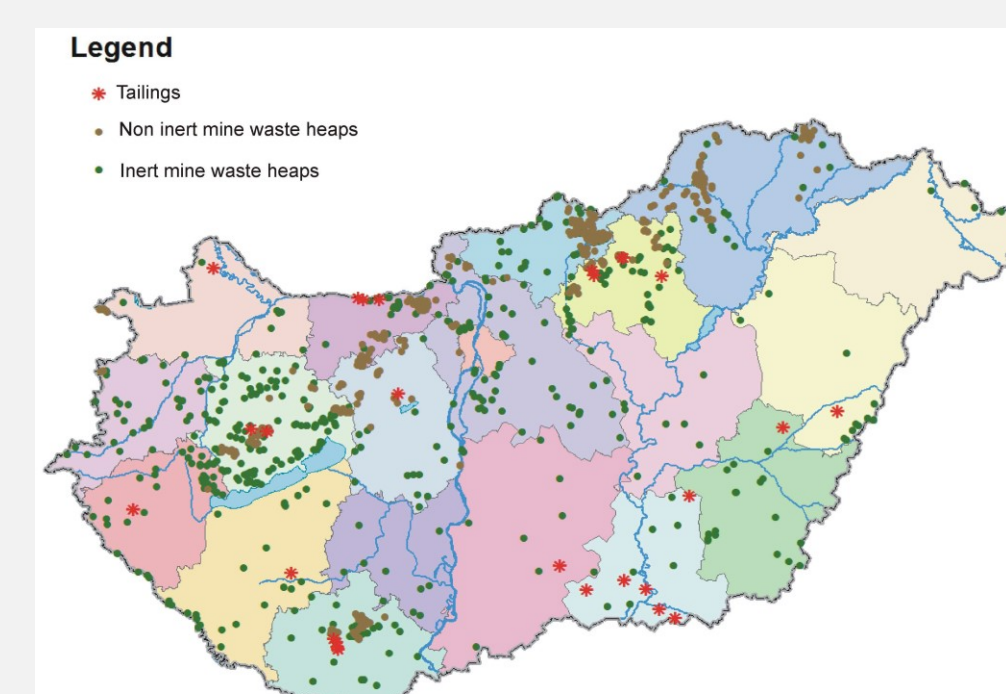
- register of mining waste facilities
- archive surveys of heaps and tailings ponds
- mining waste management plans
- surveys prepared for environmental purpose
- documents of remediation
- documents of scientific research

UNFC	CRIRSCO	Hungarian (Russian type)
111	Proved Reserves	Exploitation Reserves in fully explored deposits (No reserves in the Hungarian system)
112	Probable Reserves	Exploitation Reserves in estimated deposits
221	Measured Resources	Resources of category C1 in deposits of 1st, 2nd, and 3rd complexity groups and categories A and B
222	Indicated Resources	Resources of category C2 in deposits of all complexity groups and category C1 in deposits of the 4th complexity group
223	Inferred Resources	D1
334	Exploration Results	

Hungarian Mineral Resource Inventory



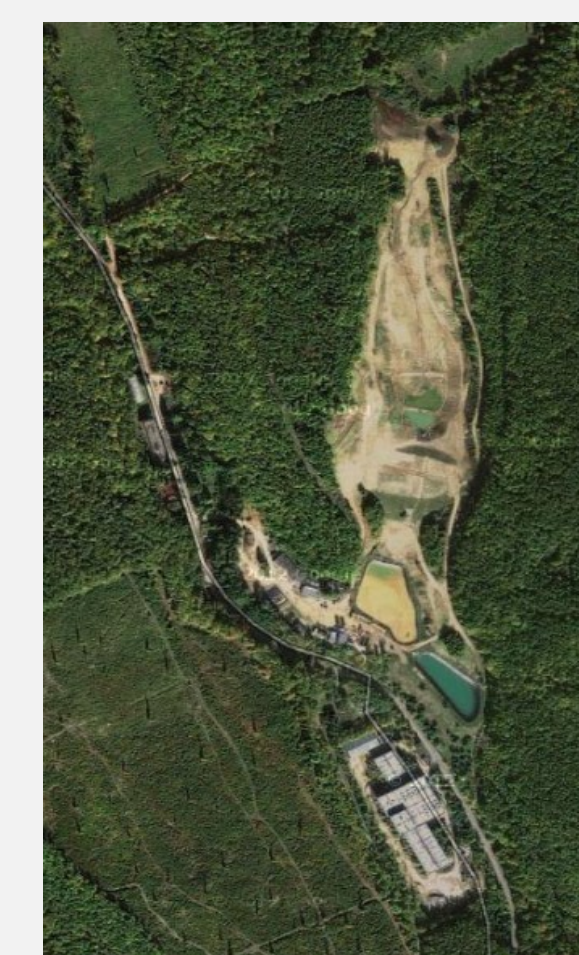
Mining waste tailings in Recsk (the photo was taken by Zoltán Horváth)



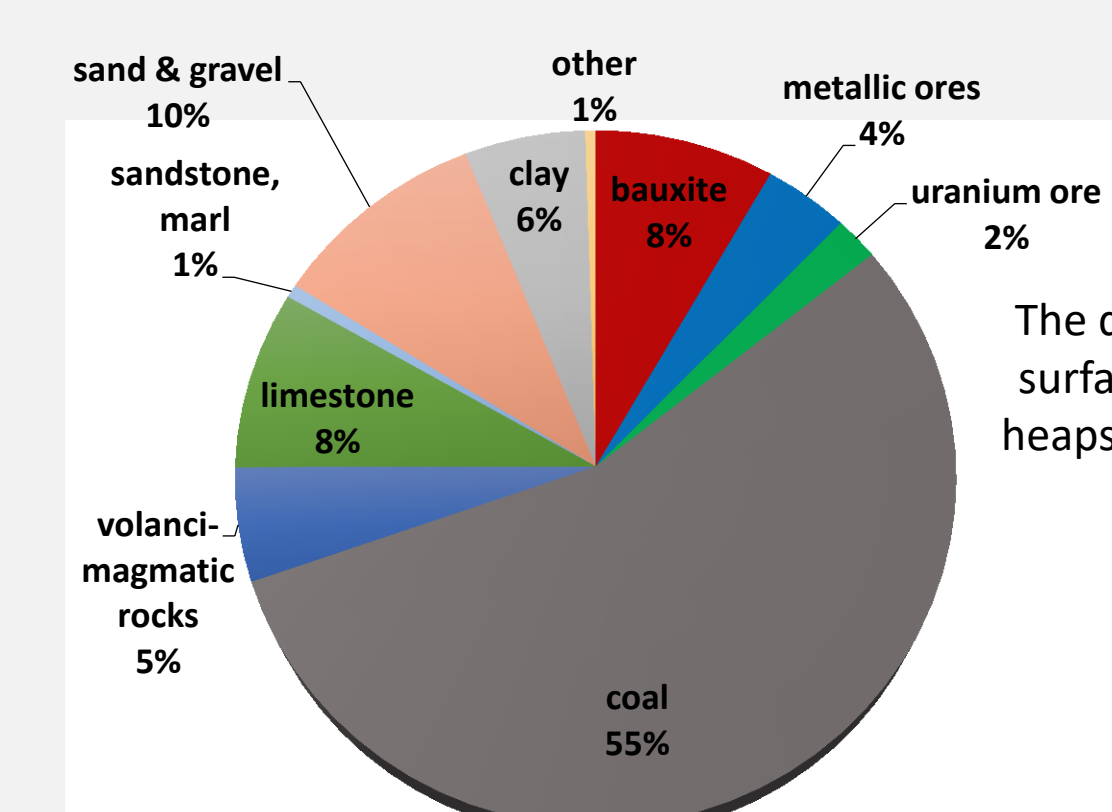
Distribution of tailing ponds, non inert mining waste heaps and inert mining waste heaps in Hungary, based on the inventory. Administrative areas (counties) are shown by different colours (Minerals4EU Foresight study 2015)

Case studies in Hungary

- Site I. = heaps of Recsk-I. mining site (Cu)
- Site II. = heaps of Recsk-II. mining site (Cu)
- Site III. = heaps of Gyöngyösoroszi-I. mining site (Pb-Zn)



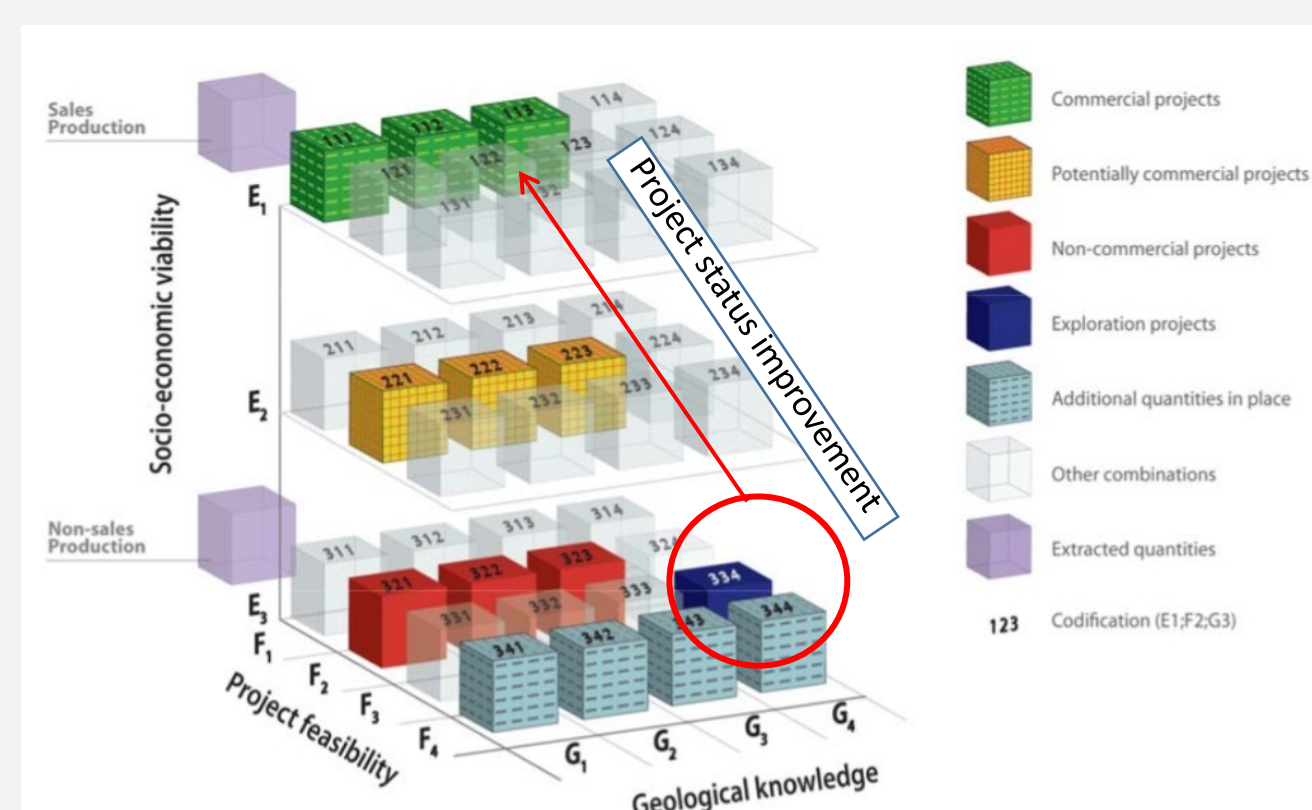
Heaps of Gyöngyösoroszi-I. mining site (Google Earth)



The distribution of the surface area for waste heaps, compared to the total area

Bridging between national inventory and international reporting system and the UNFC classification framework (Horváth et al. 2014)

Classification according to UNFC



UNFC-2009 Categories and Examples of Classes (UNECE 2013)

Classification of the sites according to UNFC

	E	F	G
Site I. (Recsk-I.)	3	3	3
Site II. (Recsk-II.)	3	4	3
Site III. (Gyöngyösoroszi)	3	4	3

This means that these sites are „Additional quantities in place” and „Other combinations” by the UNFC and „Exploration results” according to the CRIRSCO system.

Results

Classification according to PERC

Assessment criteria	Site I.	Site II.	Site III.
General	Purpose of Report	+	+
	Project Outline	+	+
	History	+	+
	Key Plan, Maps and Diagrams	+	+
	Project Location and Description	+	+
	Topography and Climate	partly	partly
	Legal Aspects and Tenure	+	+
Sampling Techniques and Data	Personal introduction into projects and verification of the data	+	+
	Type(s) of sampling	+	+
	Drilling techniques	not relevant	not relevant
	Drill sample recovery	not relevant	not relevant
	Logging	+	-
	Other sampling techniques	+	-
	Sample preparation (instead of sub-sampling techniques and sample preparation)	+	+
	Assay data and laboratory investigation	+	+
	Verification of results	-	-
	Data location	+	+
	Data density and distribution	+	+
	Reporting Archives	+	+
	Audits or reviews	-	-

Assessment criteria	Site I.	Site II.	Site III.
Estimation and Reporting of Mineral Resources and Mineral Reserves	Database integrity	-	-
	Structure of the heap/tailing pond (instead of geological interpretation)	+	+
	Estimation and modelling techniques	-	-
	Metal equivalents or other combined representation of multiple components	partly	partly
	Cut-off grades or parameters	-	-
	Tonnage Factor/In-situ Bulk Density	-	-
	Mining factors or assumptions	-	-
	Metallurgical factors or assumptions	-	-
	Mineral Resource estimate for conversion to Mineral Reserves	-	-
	Cost and revenue factors	-	-
	Market assessment	-	-
	Others	-	-
	Classification	-	-
	Audits or reviews	-	-

Traditional / Russian system:
„D” category

Recommendations for the Legislative framework

Closing the loop - An EU action plan for the Circular Economy; Extractive Waste Directive 2006/21/EC (MWD) (in Hungary has been transposed into the Ministerial Decree No. 14/2008. (IV. 3.) on mining waste management). The Circular Economy Action Plan is instrumental in reaching the Sustainable Development Goals of the U.N. 2030 Agenda, in particular Goal 12 of ensuring sustainable consumption and production patterns. The Commission is committed to develop a guidance and promotion of best practices in the mining waste management plans(MWMP) as one of the actions to implement the CEAP's goal. In compliance with the MWD the MWMP shall contain the characterization of the waste to be deposited in a waste facility. The purpose of the characterization of extractive waste is to ensure the environmentally safe management of waste and protect human health and environment. To achieve the aims of the CEAP it would be recommended to extend the provided data in the MWMP in order to allow the estimation of the volume and quality of the secondary mineral resource at least indicated level.