



MORECOVERY – ELEMENT RECOVERY ASSESSMENT SERVICE FROM INITIAL SCREENING TO PILOT-SCALE STUDIES

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BACKGROUND

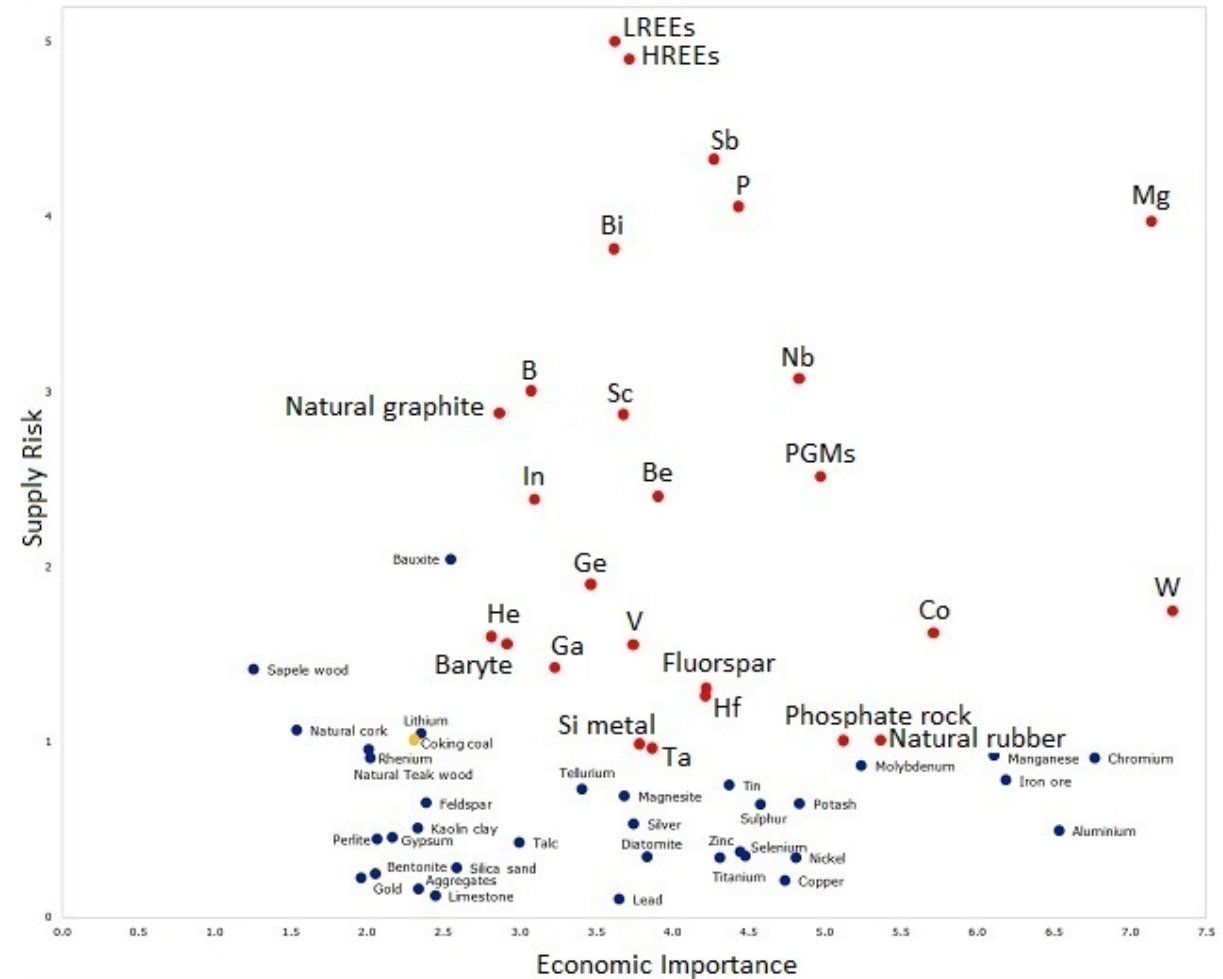
- The need for raw materials is increasing rapidly in EU and globally
- List by the European Commission containing critical raw materials (CRMs)
 - [European Commission: Critical Raw Materials](#)



2017 CRMs (27)			
Antimony	Fluorspar	LREEs	Phosphorus
Baryte	Gallium	Magnesium	Scandium
Beryllium	Germanium	Natural graphite	Silicon metal
Bismuth	Hafnium	Natural rubber	Tantalum
Borate	Helium	Niobium	Tungsten
Cobalt	HREEs	PGMs	Vanadium
Coking coal	Indium	Phosphate rock	

BACKGROUND

- CRMs combine raw materials of high importance to the EU economy and of high risk associated with their supply



BACKGROUND

- The amount of mine waste and environmental concerns are increasing
- Mine waste types include waste rocks and tailings, also e.g. precipitates and slags
- Especially sulphidic deposits are problematic
- Mine waste produced in Finland in 2018 (from the 46 largest mines and quarries)
 - *81 Mt of waste rocks*
 - *49 Mt of ore, of which most is tailings*
 - *TUKES 2018: [Tilastoja vuoriteollisuudesta 2018](#)*



BACKGROUND

- The ecoefficiency of mining and circular economy can be enhanced by the utilization of side streams and mine waste
- Need to develop more efficient recovery methods and to efficiently remove dissolved metals from mine water streams, while securing the surrounding environment and ecosystem

 **MORECOVERY**



MORECOVERY OVERVIEW

- The scope of the project is to support recovery process testing and design by creating and validating a modular recovery process service package for hydrometallurgy and water treatment
- At the end of the project, the modular recovery process services provided by GTK, UEF and Savonia for hydrometallurgy and water treatment are available for mining industry, fully operational and demonstrated

MORECOVERY OVERVIEW

- The new recovery service package will complement the existing processing services
 - *Conventional mineral processing services from lab to large scale piloting by GTK Mintec*
 - *Water treatment piloting services from lab to large scale piloting by Savonia*

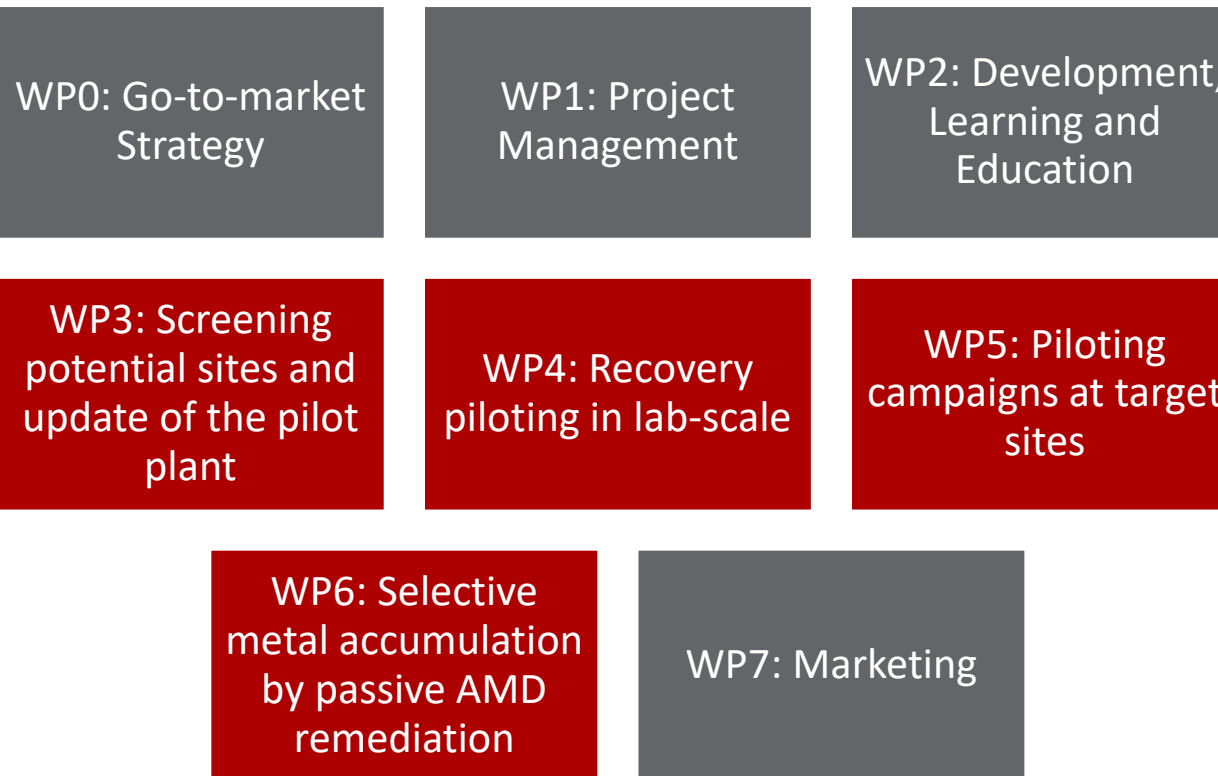


MORECOVERY OVERVIEW

- Partners: GTK (lead), Finnish Minerals Group (FMG), Keliber, LTU Business, Savonia University of Applied Science, University of Eastern Finland (UEF), University of Huelva (UHU) and the Spanish National Research Council (CSIC)
- Duration: 2019-2021
- Total budget: 1.5 M€

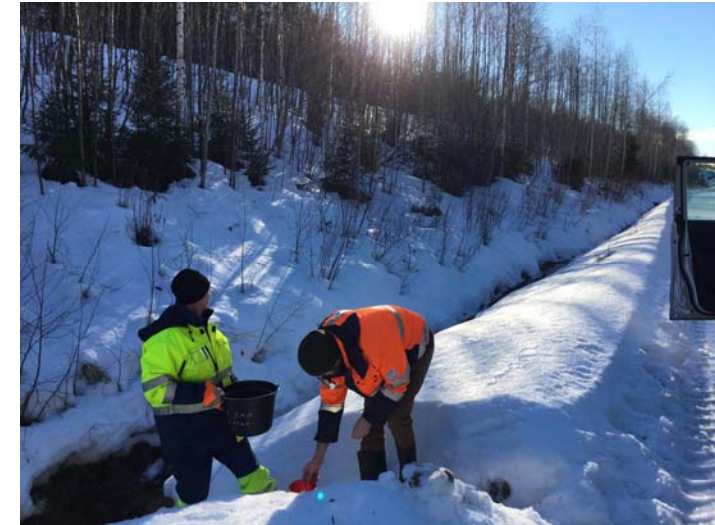


MORECOVERY STRUCTURE



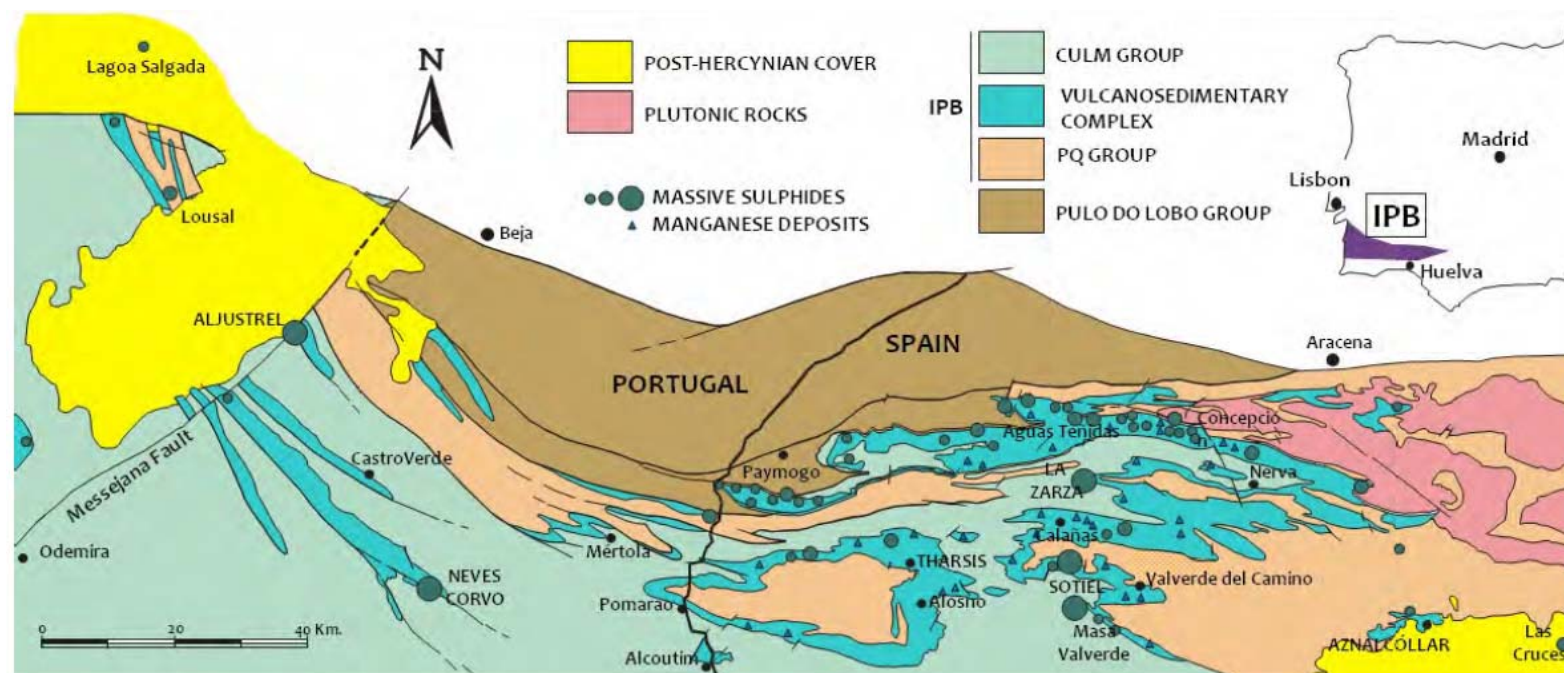
SCREENING AND SAMPLING OF POTENTIAL SITES

- Existing drainage data from 18 potential extractive waste facilities from 10 mine sites has been collected by GTK and inspected by UEF
- Further sampling of mine wastes and drainages from Hitura, Siilinjärvi, Kotalahti, Särkiniemi and Hammaslahti.
- Keliber case sample material produced at GTK Mintec
- Tentatively interesting elements for recovery
 - *Hitura: Ni, Co*
 - *Keliber: Nb, Ta*
 - *Siilinjärvi: REE, P*



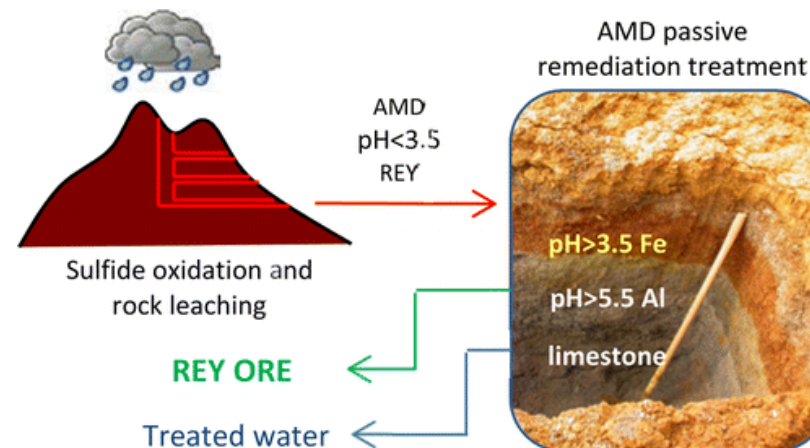
REE RECOVERY POTENTIAL AT THE IBERIAN PYRITE BELT, SPAIN

- Investigations on the SCYRE-rich acid mine drainages (AMD) in the Iberian Pyrite Belt (IPB)
- Potential targets for recovery piloting found
 - *E.g. high-REE containing (mean 9.2 mg/L) drainage water from the Poderosa mine*



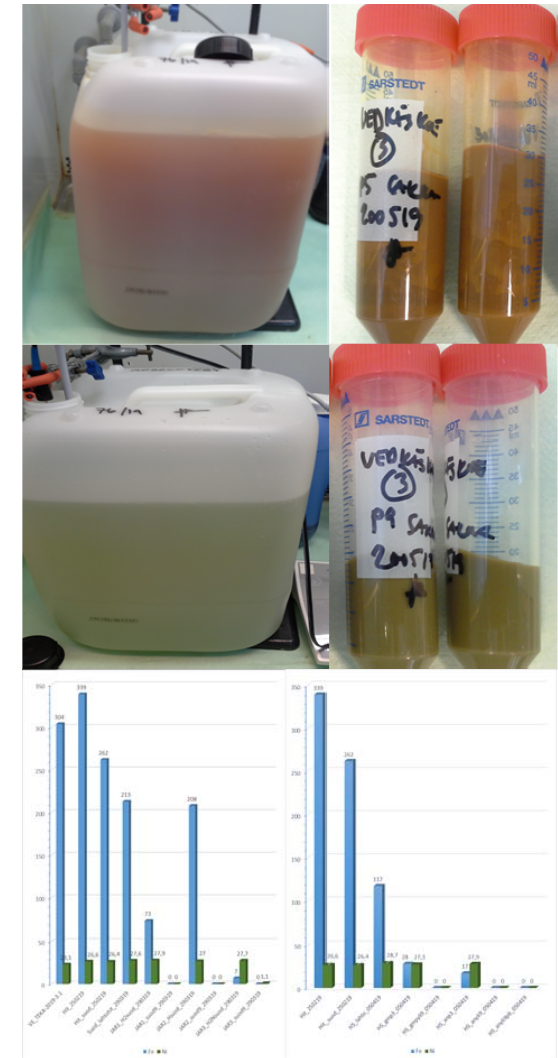
REE RECOVERY BY SELECTIVE METAL ACCUMULATION, SPAIN

- Investigating selective metal accumulation by passive AMD remediation system
 - In the passive treatment system, the REEs are mainly bound to the Al-rich layer, onto basaluminite*



LABORATORY-SCALE TESTING

- The most interesting targets will be further studied at the UEF laboratory for recovery potential
- Studied targets at UEF include:
 - *Ni and Co recovery from Hitura drainage and water treatment sludge*
 - *Nb and Ta recovery from the Keliber Li ore side stream*
 - *REE-rich drainage samples from Spain*
 - *P and REE recovery from Siilinjärvi gypsum and drainage*
- Based on lab-scale tests at UEF, larger scale piloting will be designed together with Savonia and GTK



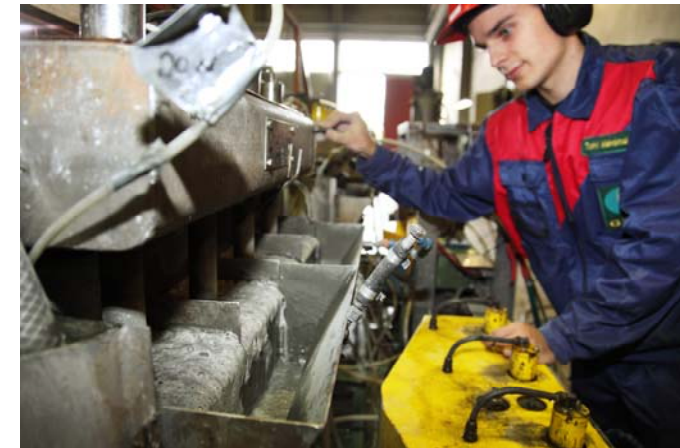
UPDATE OF THE PILOT PLANT

- Designing larger scale field piloting based on UEF lab results
- Piloting equipment will be installed in a 40'' sea container
- Updating includes obtaining water treatment equipment (oxidation-precipitation-sedimentation units), leaching units for solid materials, and general supplies for the piloting container (electricity, ventilation, etc.)



LARGER-SCALE PILOTING AT CASE SITES

- In 2020 larger scale piloting will be done in Finland
 - *Hitura Ni-Co recovery based on water treatment system*
 - *Keliber ore Nb-Ta recovery based on leaching*
- In 2021 larger scale piloting will be done in Spain
 - *REE recovery from drainage waters and/or from the passive treatment system sludge*



EXTERNAL COMMUNICATION

- Project web-page: <http://newprojects.gtk.fi/Morecovery/>
- Morecovery-project in ResearchGate:
<https://www.researchgate.net/project/Morecovery>
- Social media: The project will utilize the existing social media profiles of the partners and personnel. The hashtag #Morecovery in relation to the project should be used

EXTERNAL COMMUNICATION

Morecovery



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New [#innovation](#) project [#Morecovery](#) will develop modular recovery process services for [#Hydrometallurgy](#) and [#WaterTreatment](#).
Read more: eitrawmaterials.eu/morecovery-new... [#EITRawMaterialsProject](#) [#ConnectingMatters](#) [#CRMs](#) [#SustainableDevelopment](#) [#criticalrawmaterials](#)



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[#Morecovery](#) tähtää kaivannaisteollisuuden jätteiden ja sivuvirtojen talteenottoon ja hyödyntämiseen. [#GTK](#) [#mineraalitalous](#) [#kiertotalous](#) bit.ly/2ZiqvtL



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Published: 06.08.2019

The piloting container has arrived!

The isolated 40' container, in which the recovery equipment will be assembled, has arrived. Next steps include installing electricity and ventilation, after which the recovery equipment will be set up. The plans for 2020 include piloting at the target site(s).



The 40' sea container is now ready to be equipped. Image: Teemu Karlsson / GTK.

MORECOVERY SUMMARY

- During the project a modular recovery service package will be created, which will be offered by GTK, Savonia and UEF
- Creating the service package includes: screening of potential test sites, sampling, further lab-scale tests, designing and construction of larger scale pilot plant, piloting at selected sites
- After the project the recovery services for hydrometallurgy and water treatment are available for mining industry





THANK YOU

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