Raw Materials Week
14-18 November 2022

(Re)mining extractive waste: Perspectives for the EU?

Closing event H2020 NEMO project

November 15, 2022 - 14h
[Plaza Hotel, Brussels, Belgium]

https://h2020-nemo.eu/
https://www.eurawmaterialsweek.eu/2022

The NEMO project has received funding from the European Union's EU Framework Programme for Research and Innovation Horizon 2020 under GA No 776846

(Re)mining Extractive Waste – Perspectives for the EU?

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HTTPS://H2020-NEMO.EU/

Background

Raw materials in the EU

- Access to raw materials one of EUs greatest challenges
  - Security of supply
  - Domestic production
  - Recycling and circularity
- Emphasized on policy level, e.g.
  - Raw Materials Initiative 2008
  - Strategic Implementation Plan on Raw Materials 2013
  - Management of Waste from Extractive Industries BREF 2018
  - Lists on Critical Raw Materials 2011-2020
  - Consultation for Critical Raw Materials Act (announced 30 Sept)

Recycling / Urban Mining

Primary mining

Tailings reprocessing

Background

Role of circular economy and reprocessing

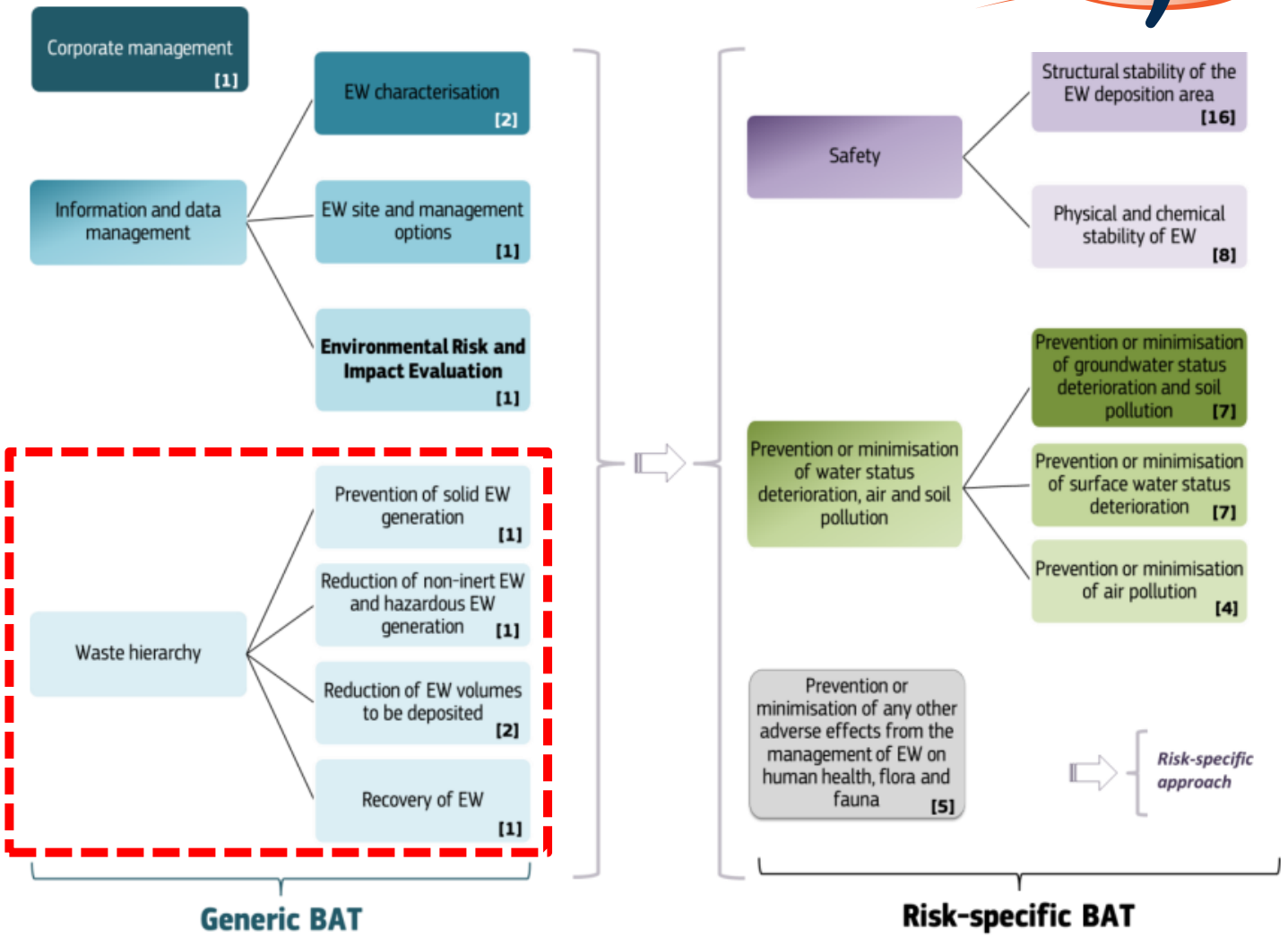
- JRC reports on reprocessing from mining residues and landfills 2019

Blengini, G.A.; Mathieux, F., Mancini, L.; Nyberg, M.; Viegas, H.M. (Editors); Salminen, J.; Garbarino, E.; Orveillon, G.; Saveyn, H.; Mateos Aquilino, V.; Llorens González, T.; García Polonio, F.; Horckmans, L.; D'Hugues, P.; Balomenos, E.; Dino, G.; de la Feld, M.; Mádai, F.; Földessy, J.; Mucsi, G.; Gombkötő, I.; Calleja,I. *Recovery of critical and other raw materials from mining waste and landfills: State of play on existing practices*, EUR 29744 EN, Publications Office of the European Union, Luxembourg, 2019, ISBN 978-92-76-03391-2, doi:10.2760/494020, JRC116131.

BREF on Management of Waste from Extractive Industries 2018 (Directive 2006/21/EC)

Waste hierarchy:

1. Prevent generation of solid EW
2. Reduce non-inert and hazardous EW generation
3. Reduce EW volumes to be deposited
4. Recovery of EW



Reprocessing of mine residues

Examples: Co and Ni potentials at Boliden

[1] Based on 10-year reprocessing plan
[2] Contribution to EU economy, based on 2019 demand statistics

700 M€

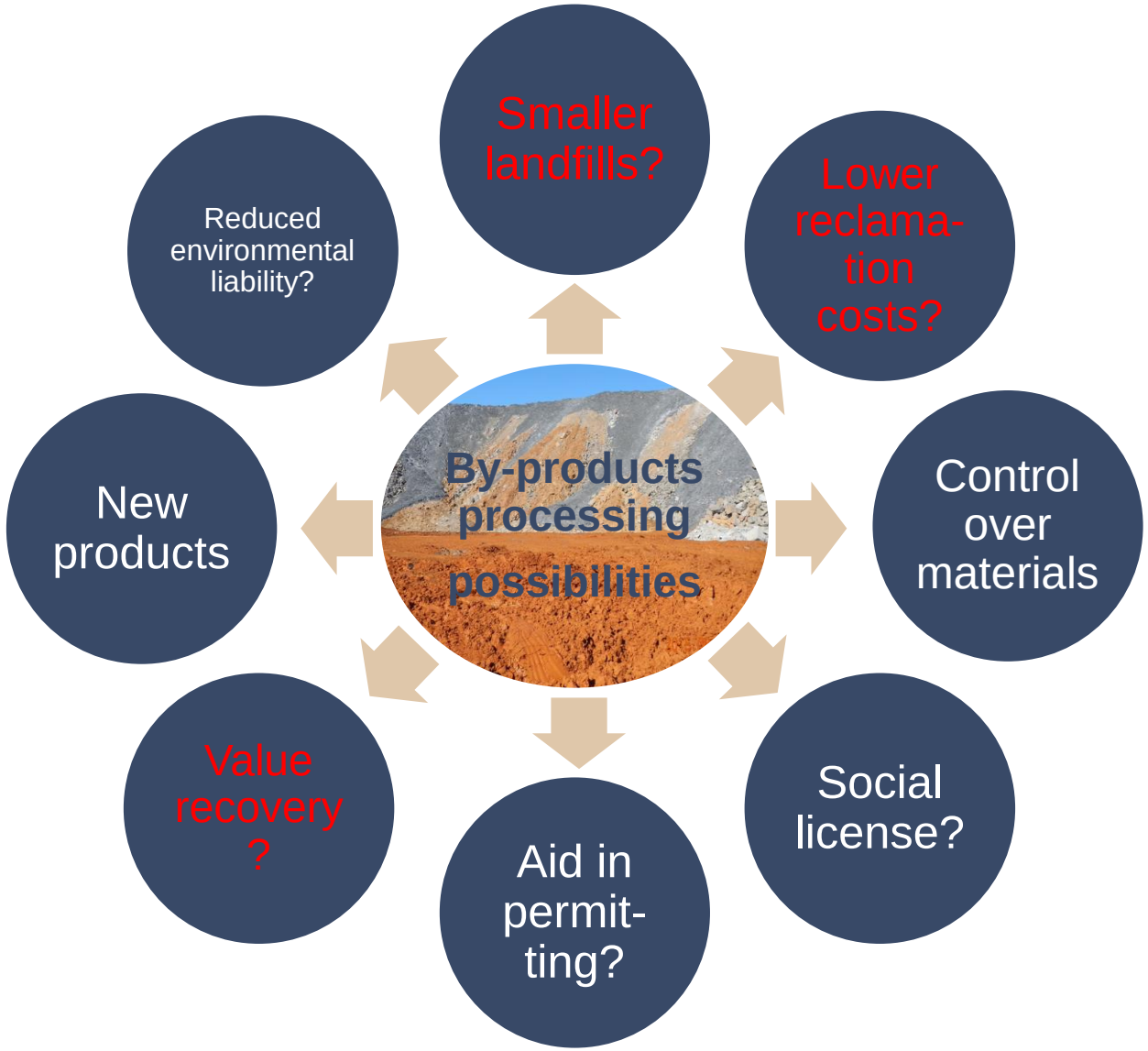
30 M€/y

25 M€/y

Descriptor	Luikonlahti site	Aitik site	Kevitsa site
Tailings type	HS-tailings	HS-tailings	HS-tailings
Tailings amount	**1.6 Mt**	1 Mt/y	**100 kt/y**
Nickel potential	**0.4%, 7000 tons**	0.02%, 200 tpa	**1.05%, 1000 tpa**
Share of EU demand	3%[1,2]	<1%[2]	4%[2]
Cobalt potential	**0.7%, 10000 tons**	**0.06% 600 tpa**	0.05%, 50 tpa
Share of EU demand	10%[1,2]	6%[2]	0.5%[2]
Other elements	Cu, Zn	Cu, Au	Cu, PGM

Reprocessing of mine residues

A window of opportunity

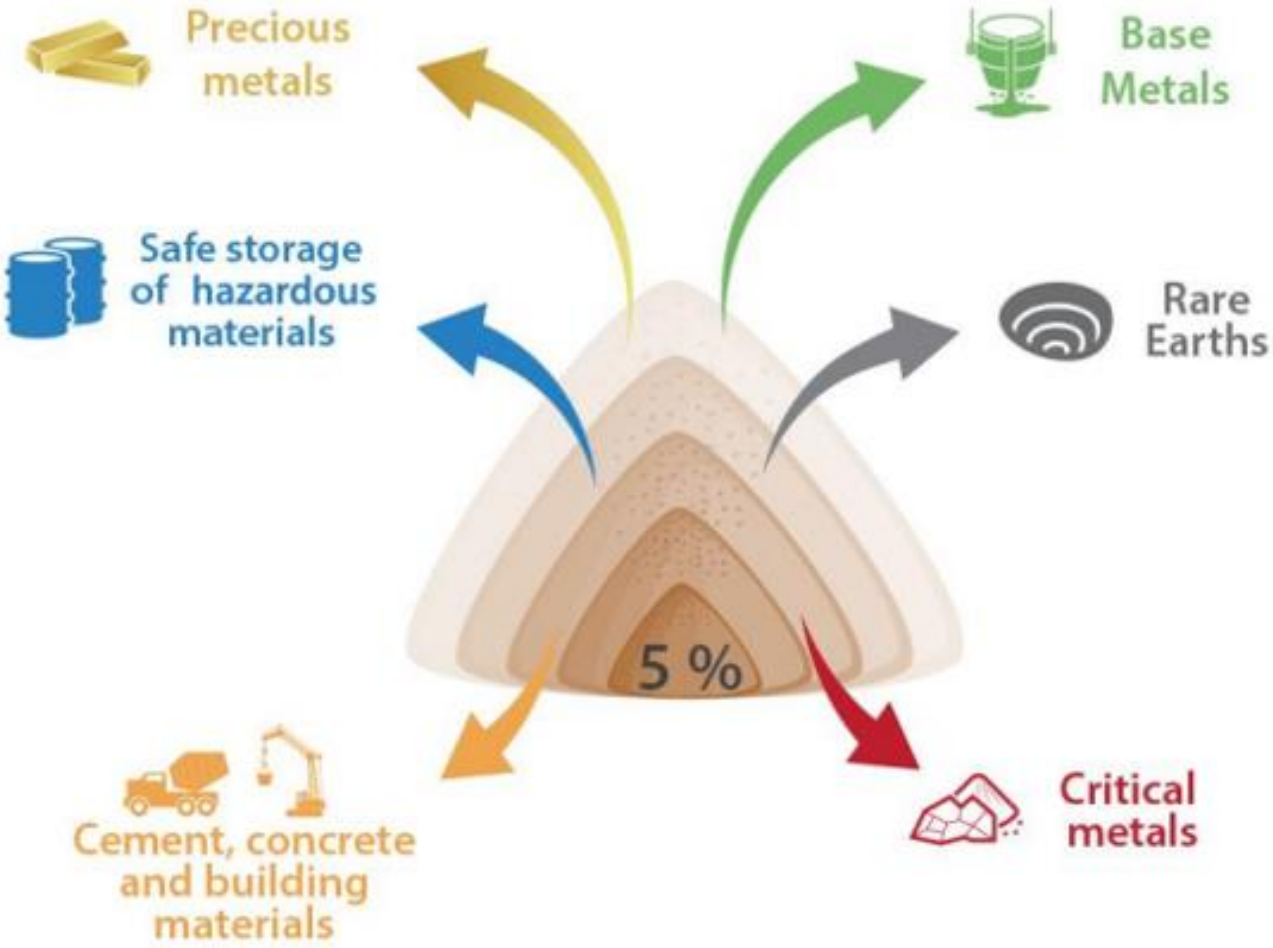


Potential benefits of tailings reprocessing:

- Reduction of amount and/or less hazardous residues
- Secondary supply of raw materials, e.g. CRMs
- Production of construction materials from residues
- Social licence/Permitting benefits

The NEMO Concept

Near-Zero-Waste Recycling of Low-Grade Sulphidic Mining Waste



Extractive-waste problem

Resource-recovery opportunity

Reprocessing of mine residues

NEMO Case sites

Boliden Luikonlahti site, Kaavi, Finland

Process/material:
High-sulphur flotation tailings

Metals: Cobalt, Nickel, Copper, Zinc

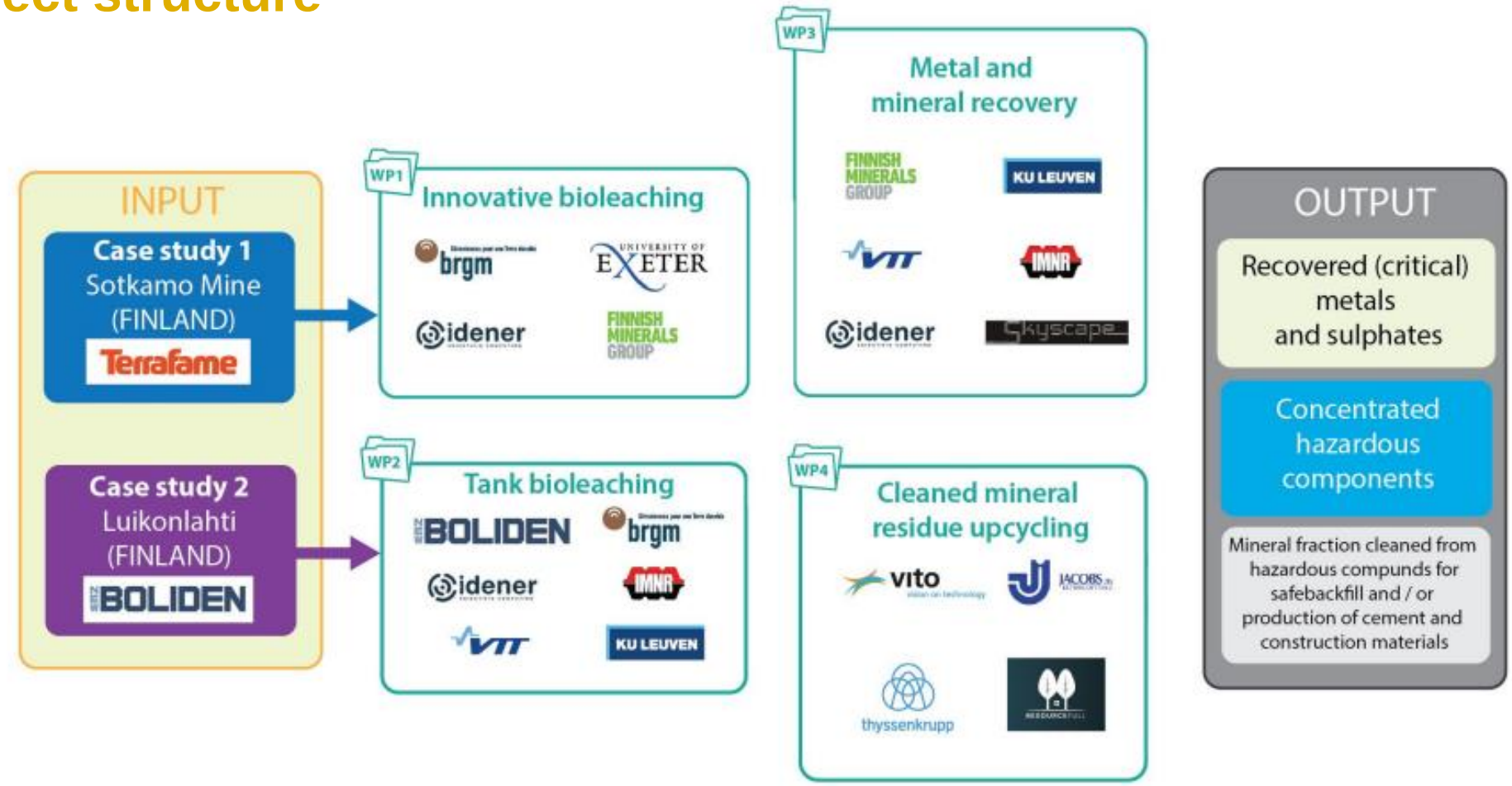
Terrafame site, Sotkamo, Finland

Process/material:
Ore (heap leaching)

Metals: Nickel, Copper, Cobalt, Zinc, Scandium(?)

The NEMO Concept

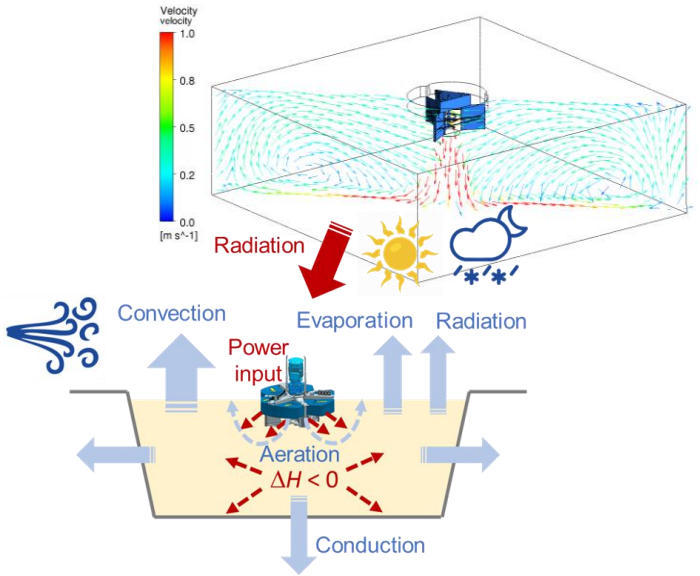
Project structure



Heap leach piloting

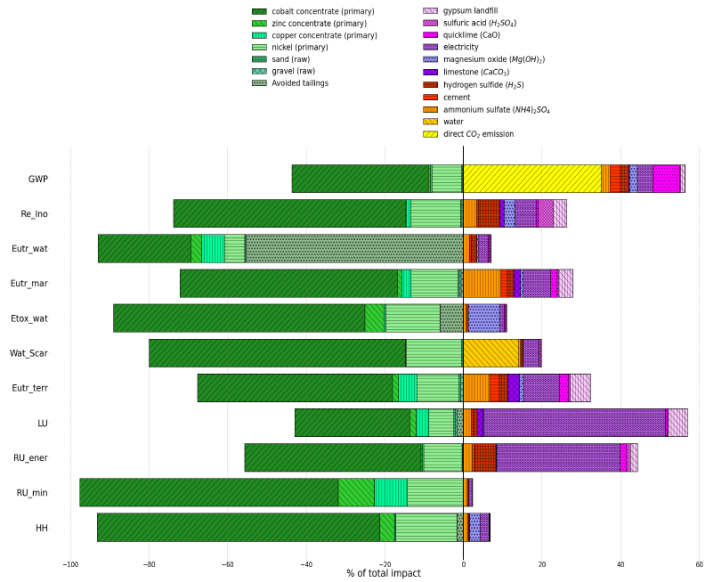
Commissioning of industrial pilot and production for downstream processing

Bus stop/waiting area being constructed from mine tailings



Mass and energy balances, numerical simulation

Leaching and precipitation in mini-pilot scale



Life cycle assessment of environmental performance…

Symposia/conferences…

Stakeholder analysis and Social LCA…

Stakeholder meetings, high-level expert panels, interviews …

Valorization of mine tailings as artificial aggregate: implementation in cement-based materials

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Abstract. Mine tailings are significant environmental liabilities worldwide. This adds up to the increasing depletion of non-renewable resources for use as

Dissemination through conferences, journal papers, reports, web/social media…

The NEMO Consortium

Highlights

NEMO Project Presentations

✓ Metal extraction from residues

Anne-Gwenaelle Guezennec (BRGM)

✓ Production of construction materials (Matrix valorisation)

Arne Peys (VITO), Thomas Lapauw (ResourceFull)

✓ Life Cycle Assessment incl Social LCA

Andrea Di Maria (KU Leuven)

✓ Stakeholder aspects

Alberto Vazquez (CATAPA)

✓ Q/A and Expo

Thank you!

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