Near-zero-waste recycling of low-grade sulphidic mining waste for critical-metal, mineral and construction raw-material production in a circular economy

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https://h2020-nemo.eu/
Why NEMO (1)?

The mining of non-ferrous metals and precious metals produce the largest volume of metal-containing, extractive waste in Europe.

TAILINGS = potentially valuable material of enormous volumes.

>28,000 Mt stock in EU!
In the EIP’s 2016 Raw Materials Scoreboard report, mining residues are earmarked as one of the key waste streams in Europe for future valorization:

- Extractive waste involves one of the largest waste streams in Europe.
- Unmanaged tailings may represent an environmental hazard and may jeopardise the Social License to Operate for mining and metallurgical companies.
- These residues contain materials that are considered critical for the EU economy.
Why NEMO (3)?

- Metals: improved recovery of Cu, Zn, Co, Ni
- New opportunities: REE, Mn, Mg, Al, Fe, Sc
- Fertilizers
- Minerals: final storage of cleaned mineral fraction or use as cement raw material

- Metals: Improved recovery of Cu, Zn, Ag, Pb, Sb
- Minerals: cement raw materials and fertilizers
The NEMO project

Organisational structure:
NEMO S&T objectives

- To scale-up and integrate 4 innovative pilot plants that will together ensure:
  - the near-zero waste processing of low-grade, sulphidic mining waste (and low-grade ores) for metal and mineral recovery,
  - the concentration and stabilisation of hazardous elements,
  - the production of construction raw materials.

- To scale-up the production of alternative cement and construction end-products produced from >90% extractive waste.

- To demonstrate the technical and economic feasibility of the integrated pilot plants for two case-studies.

- To demonstrate the efficient and robust process control of the process.
The NEMO project

INPUT

Case study 1
Sotkamo Mine (FINLAND)

Case study 2
Las Cruces mine (SPAIN)

OUTPUT

Recovered (critical) metals and sulphates
Concentrated hazardous components

Mineral fraction cleaned from hazardous components for safe backfill and/or production of cement and construction materials

9 Work Packages (WPs)
The NEMO activities

Developing, demonstrating and exploiting new ways to valorise sulphidic tailings.

“4 PILOTS – 2 case-studies” concept

Experience
The NEMO activities

NEMO technologies will lead to the recovery of metals, the safe storage of hazardous materials and new applications in cementitious materials.
Stakeholder involvement

- Stakeholder analysis.
- Key players including local communities.
- Locals events: discuss Social License to Operate (SLO). Two-way communication starts with listening...
- High-level multi-stakeholder transition arena.

**Context setters:**
- Meet their needs to keep them satisfied.
- Mitigate possible negative influence.
- Monitor closely.
- Increase level of interest.

**Key players:**
- Engage closely, collaborate closely and consult regularly.
- Establish good relationships.

**Crowd/Bystanders:**
- Low priority.
- Monitor for development.
- Increase level of interest.

**Subjects/Defenders:**
- Show consideration.
- Keep informed.
- Build capacity and secure interests (as this could be a potential supporter/goodwill ambassador).
NEMO Benefits

Recovery of:

1) critical raw materials CRMs (Co, REE, Sc and Mg),
2) valuable metals (Cu, Ni, Zn, Pb, Ag),
3) minerals (Na$_2$SO$_4$, K$_2$SO$_4$ and MgSO$_4$),
4) construction raw materials for cement and concrete production.

Reducing Europe’s dependence on the imports.
Flexibility in handling distinct sulphidic tailings in Europe.
Main contacts

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