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Contact:
Lieven.machiels@kuleuven.be +32494918649

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NEMO website: https://h2020-nemo.eu/
Lieven.machiels@kuleuven.be +32494918649
Mika.Paajanen@vtt.fi +358407370910

Horizon2020 SC5-14 project

NEMO

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

Lieven Machiels, Mika Paajanen, Peter Tom Jones, Päivi Kinnunen, Koen Binnemans

EIP Raw materials workshop Re-mining of mining waste for critical raw materials - May 16, 2018, Brussels

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Sulphidic mining waste?

What?

- Residues from mining and processing of sulphidic ores for the production of Cu, Pb, Zn, Ni, Co, Au,..

Quantities

- 600-900 Mtonne/yr produced in EU
- historic stockpile 28 000 Mtonne
- One of the largest volumes of extractive waste in the EU

Current treatment/opportunities

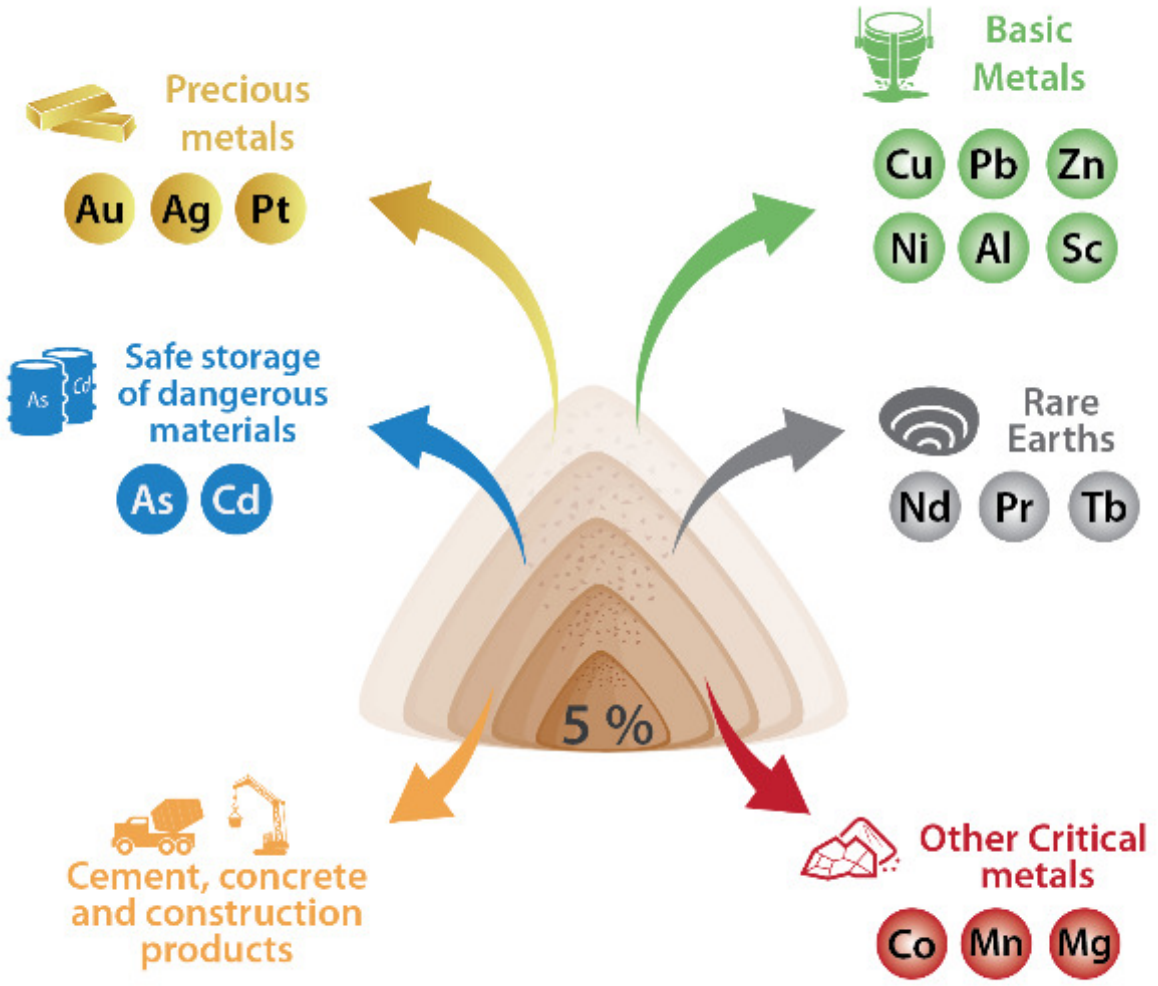
- Deposited in tailings ponds/dry stacked/back-filling in mine
- Stock of (critical) metals and minerals?

Source pictures: http://tailings.info

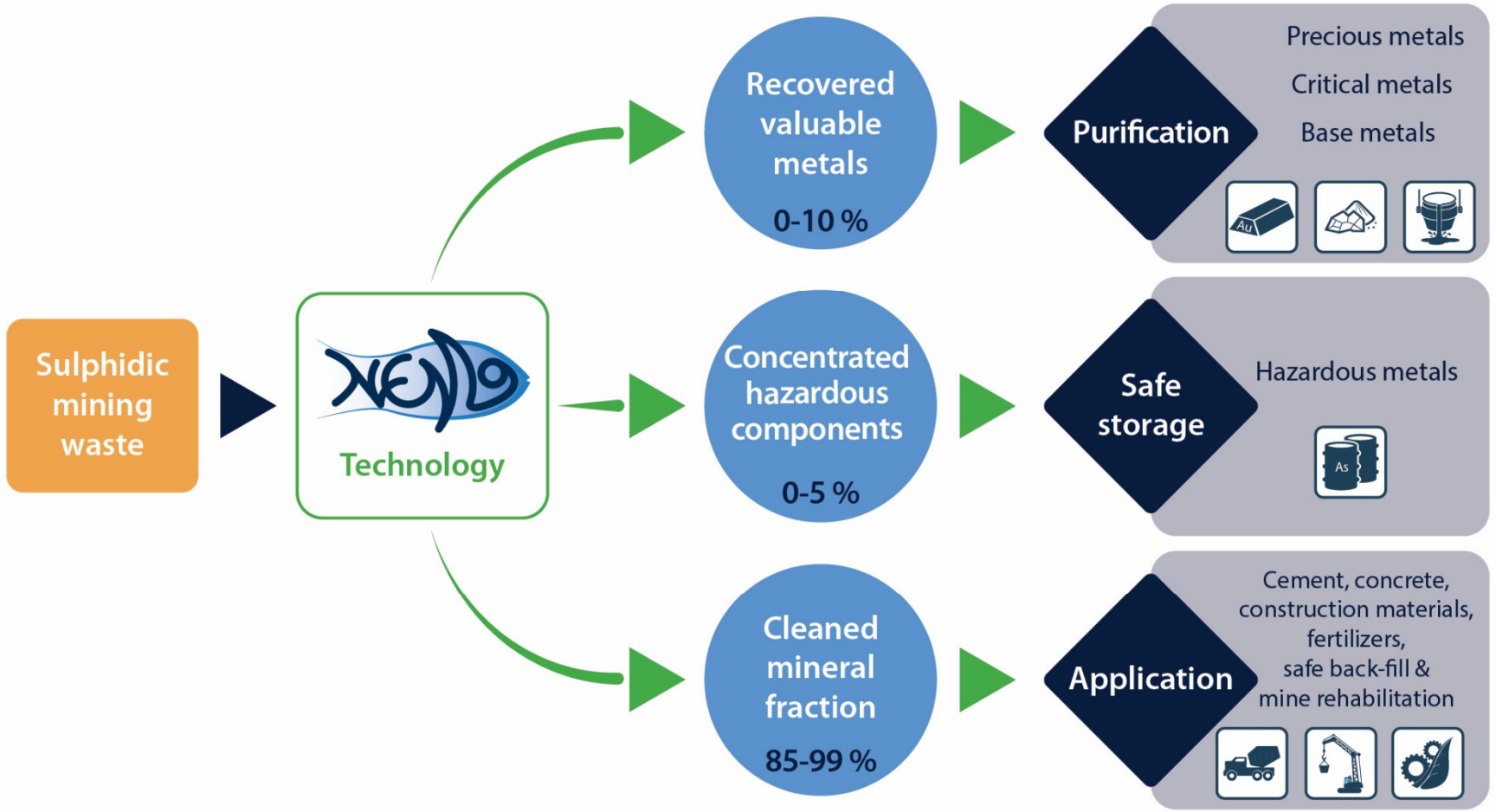
The NEMO concept?

Evolution:

- Recovery of a few g/tonne of ore (e.g. Au)
- Recovery of associated elements (e.g. Cu, Pb, Zn)
- NEMO: aiming at Integral valorisatior of the ore



The NEMO concept?



The NEMO concept?

Positive side effects NEMO concept..

- Conversion of sulphides to sulphates, which can be valorised as fertilizer, in cement, etc.
- No risk for acid mine drainage
- Residual mineral fraction is clean, allowing its valorisation in construction applications or for safe back-fill and post-closure mine rehabilitation
- Hazardous elements are no longer diluted in the mineral fraction but concentrated and safely stored
- Waste reduced **to 5% of original volume**

1 [VTT]

2 [VITO]

3 [IDENER]

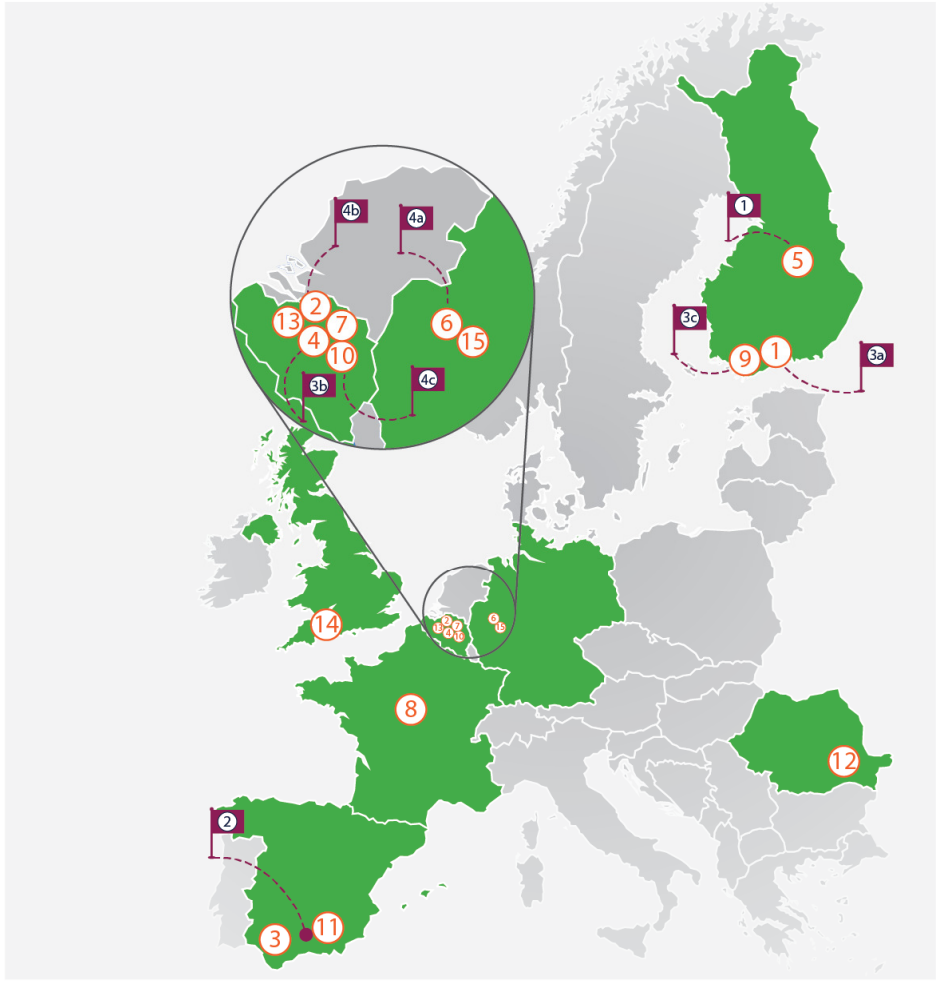
4 [KU Leuven]

5 [Terrafame]

6 [Thyssenkrupp]

7 [Resourcefull]

8 [BRGM]



9 [Skyscape Oy]

10 [Jacobs]

11 [Cobre Las Cruces]

12 [IMNR]

13 [CATAPA]

14 [UNEXE]

15 [DMT]

1–16 Partner organisations

University

Small and medium-sized enterprise (SME)

Research organisation

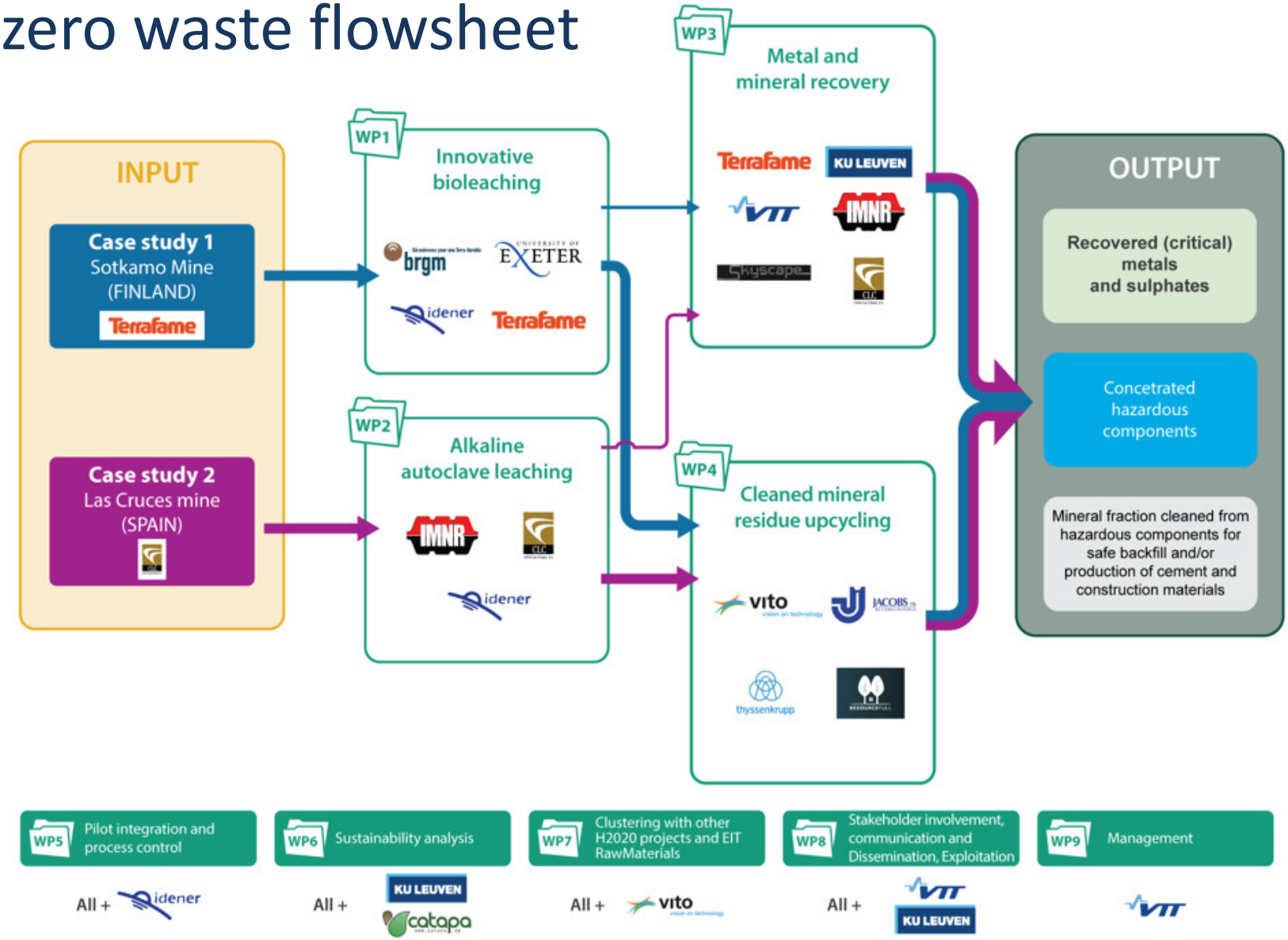
Civil Society

Large company

Pilots

RawMaterials Connecting matters

The NEMO concept – 4 pilots creating a near-zero waste flowsheet



Case study 1: Sotkamo Ni-Co mine, Finland

Case study 2: Las Cruces Cu mine, Spain

The NEMO concept – example of a technology

In different poly-metal sulphidic mines, REE and Sc are currently leached from ores but not recovered from leach solutions, resulting in these elements to end up in waste precipitates

NEMO aims at selective recovery of these elements from the leach solution as well as their further separation using aqueous and non-aqueous solvent extraction

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