LCA: preliminary results

Tarantula Clustering event, april 19th

Mathilde Legay – LGI

ION4RAW

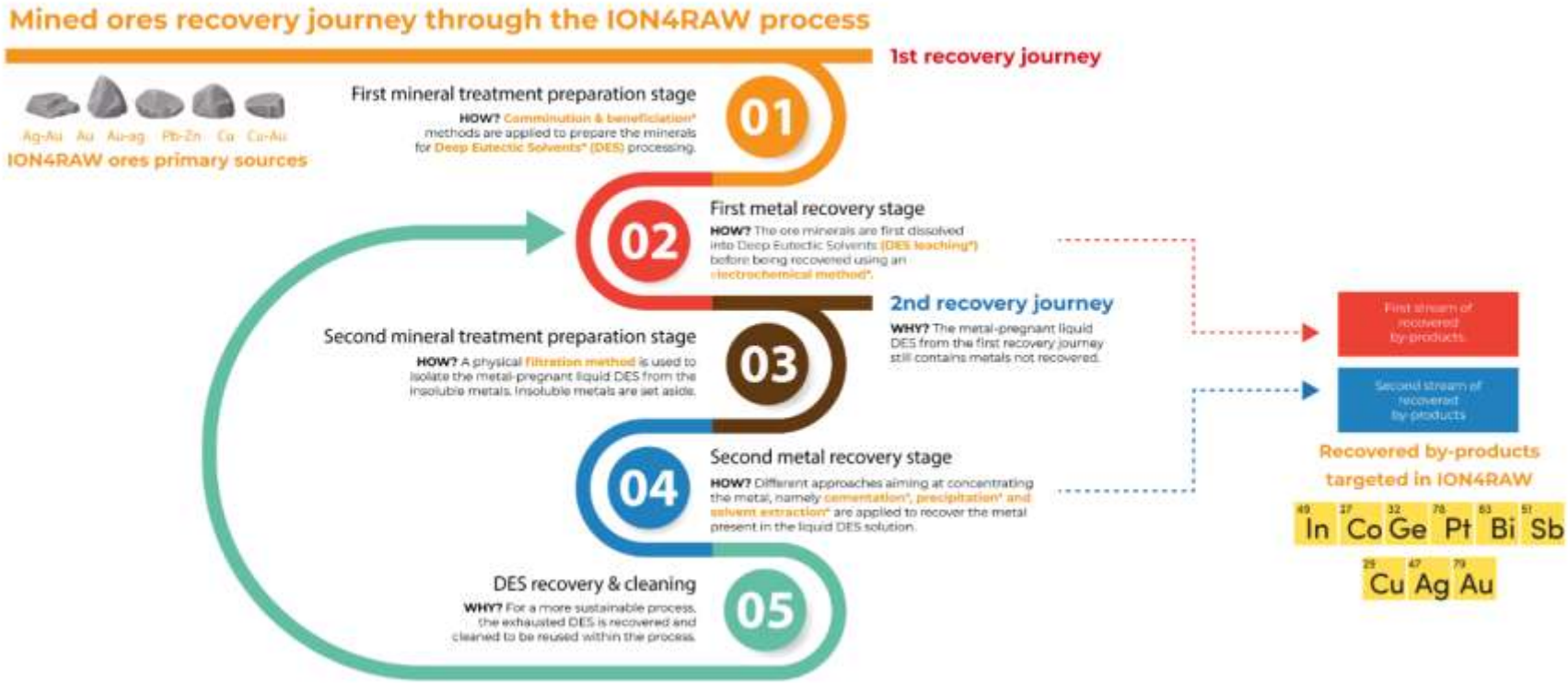
Ionometallurgy of primary sources for an enhanced raw materials recovery

This project has received funding from the EU's Horizon 2020 research and innovation programme under Grant Agreement No 815748. The content in this presentation reflects only the views of the authors. The European Commission is not responsible for any use that may be made of the information it contains.

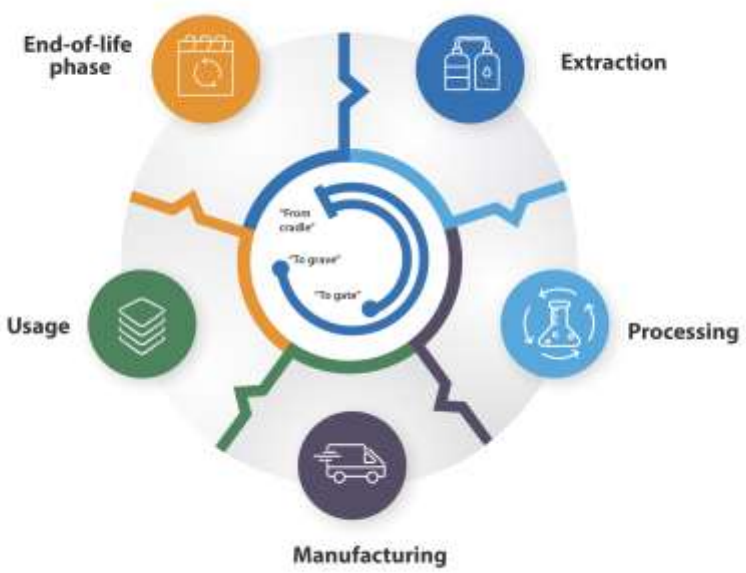
LCA methodology

- Using the LCA, LGI provides recommendations :
  - To identify hotspots in the process that need intervention to improve environmental performance
  - To enable choices between different process parameters based on their environmental impact
  - To compare the environmental impacts of the technology with those of current processes.

ION4RAW Process



LCA methodology

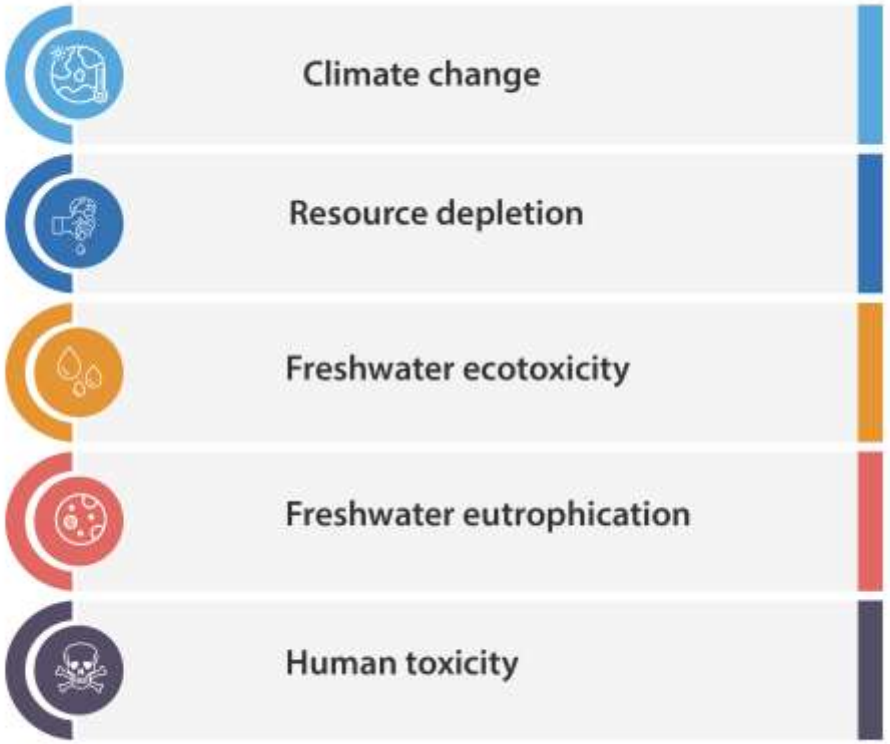


Scope & Goal

- To recover 1kg Cu with its by-produts
- Economic allocation is used for the recovery of copper, bismuth, antimony, tellurium, silver, iron, lead and zinc.
- ReCiPe MidPoint method.
- The software OpenLCA 1.10.2 was used with the database Eco-invent v3.6.
- Scope : the project chose to focus on El Porvenir, Cu/Pb concentrate.

ION4RAW

Impact Categories



ION4RAW – LCA collaboration

Lab-scale

- Data collection
- Preliminary assessment
- Process parameters comparison

Upscaling

- Data collection
- Preliminary assessment
- Process parameters comparison

Pilot-scale

- Data collection
- Preliminary assessment
- Process parameters comparison
- Uncertainty analysis
- Comparison with state-of-the art processes

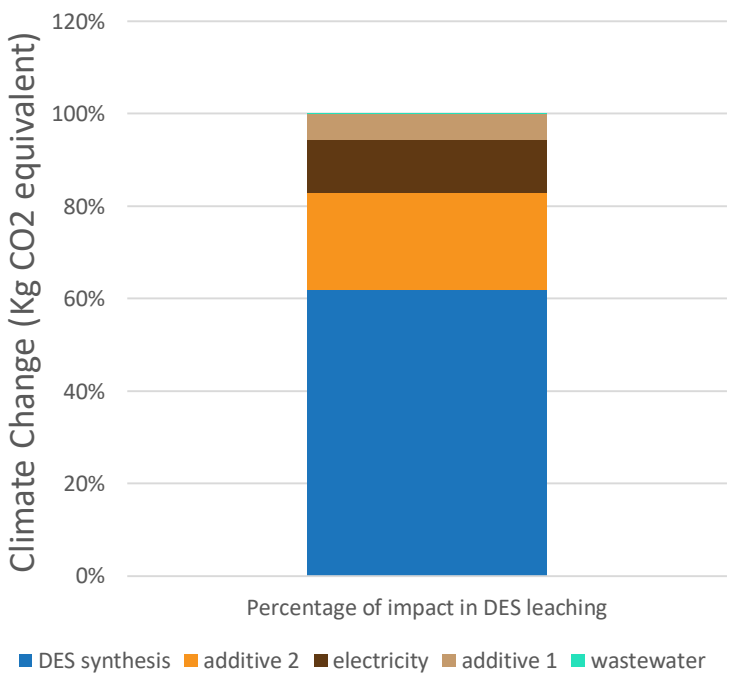
ION4RAW

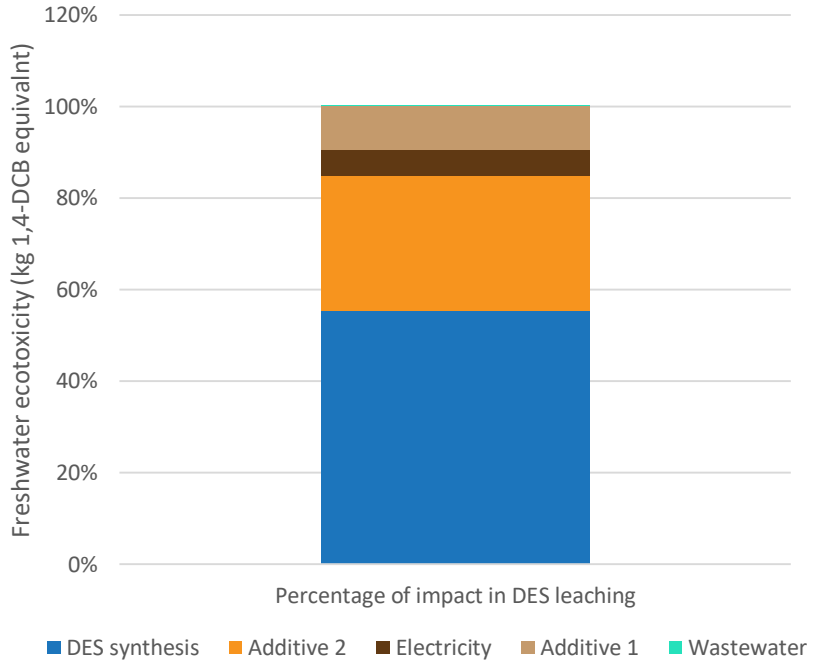
Hypotheses

- Hypotheses: technology transferred to Europe
- The chemicals' origin remains unknown, so their environmental footprint was based on a worldwide estimation in ecoinvent.
- The project’s ambition is to offer a mine-to-metal solution, where mineral processing is expected to take place at the mine site. Thus, no transportation is considered during the different steps of the process.
- The 93% DES recovery was not accounted
- Other hypotheses will be available in the upcoming deliverable.

DES Leaching focus

Climate change





Main conclusions in Litterature

Use of Deep Eutectic Solvents (DES) in ION4RAW

- In ION4RAW, the DES is recovered and reused at 93% .

DES physiochemical characteristics

- DES production is easier than other Ionic Liquids (IL) (Smith et al., 2014) and other conventional solvents (Murugan et al., 2021; Vanda et al., 2018).
- Instability in use phase (Ijadar et al., 2022) & difficulties with recycling and reuse (Lanaridi, 2021) are common.

Upscaling for metallurgy and Life Cycle Assessment (LCA)

- DES metallurgy upscaling faces many issues (Jones, 2023; Jovell et al., 2022).
- There isn't enough LCA of DES usage (del Mar Contreras-Gámez et al., 2023; Yuan et al., 2022).

Main conclusion from the preliminary results

- Data collection: important to have strong communication with partners to anticipate and evaluate impacts with relevant hypotheses
- Freshwater toxicity & human toxicity: results not always available in the litterature
- Laboratory results greatly differ from hypotheses
- Upscaling results differ from laboratory results

Path forward

- Recommendations to decrease additive concentrations to reduce freshwater ecotoxicity and eutrophication
- The 93% DES recycling will need to be proven effective and accounted in the LCA
- The LCA is being performed for upscaling stage
- Uncertainty analysis to be performed
- Communication with partners
- Hypotheses/decision-making on available data

Thank you. Get in touch for more information!

Follow the progress of the project on the ION4RAW website.

Project coordinator: María Tripiana, IDENER
Contact us: contact@ion4raw.eu

Visit our website: www.ion4raw.eu

Follow us on Twitter!
@ION4RAW_EU

Follow us on LinkedIn!
ION4RAW H2020

WP7 Contact

Mathilde Legay
mathilde.legay@lgi.earth

ION4RAW