WORK PACKAGE 7:
TECHNOLOGIES ASSESSMENT AND PROJECT EVALUATION

OBJECTIVES

- Assessment and evaluation of the developed novel leaching technology capable to treat efficiently low qualified or low grade copper concentrates or polymetallic concentrates to yield high quality and added value metal products.
- Defining specific conditions and potentiality to apply the innovative developed technologies in existing hydrometallurgical plants or in new projects.
- Detection of potential synergies among industries to provide possibilities for integration of the technology in existing plants.
- To identify and quantify the environmental burden due to the considered technologies, with a direct comparison of their global environmental performance by means of a life-cycle-Assessment approach.

MAIN RESULTS

MID-TERM TECHNOLOGIES ASSESSMENT AND EVALUATION

Conceptual engineering study and an initial techno-economic assessment of the proposed technological solutions (atmospheric leaching, pressure leaching and bioleaching) have been performed for different raw materials which are investigated in INTMET project (BOR, CLC, KGHM and Somincor ores).
The engineering study has been conducted using data from previous lab scale tests, being supplemented with data from virtual simulations. Feed capacities evaluated are based on similar metal value of Cu+Zn+Pb in all four cases.
A conceptual block diagram design and tentative mass balance for each process has been included in the engineering study:

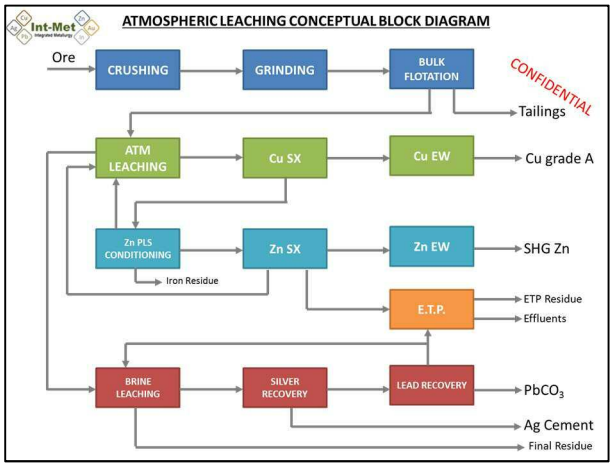

FIGURE 1 – ATMOSPHERIC LEACHING DIAGRAM.

IntMet has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 689515

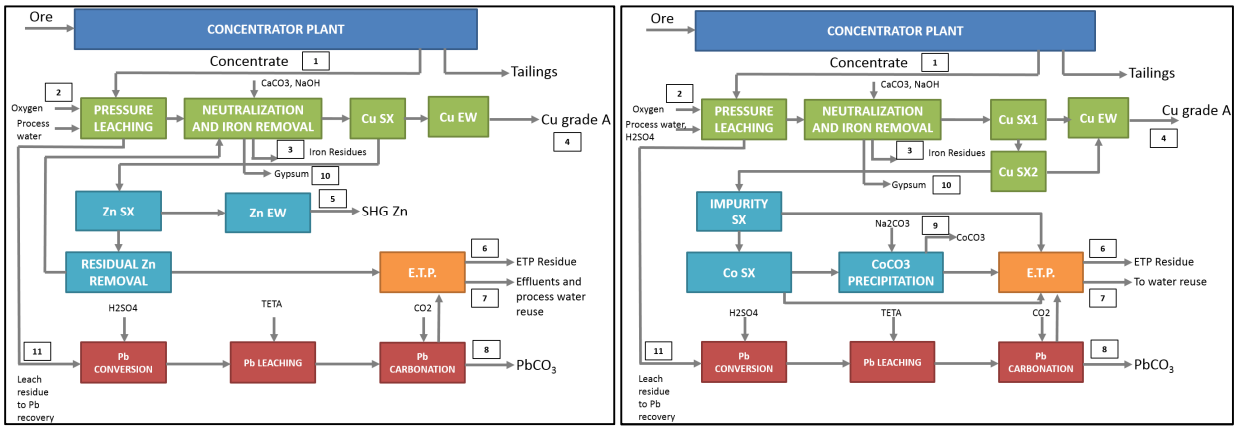

FIGURE 2 – PRESSURE LEACHING DIAGRAM S (BOR, CLC AND SOMINCOR CONCENTRATE AT LEFT AND KGHM AT RIGHT).

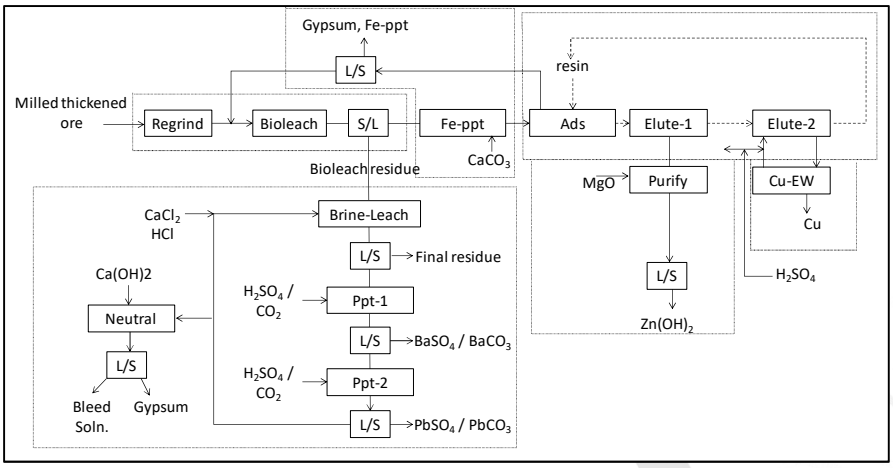

FIGURE 3 – BIOLEACHING DIAGRAM.

Based on flowsheet calculations and estimated equipment types and sizes, a rough economical evaluation in terms of CAPEX and OPEX has been made. Annual turnover has been also estimated for each process:

		CLC	BOR	SOMINCOR	KGHM
Concentrate tpy		1.000.000	880.000	360.000	325.000
ATM. LEACHING	CAPEX (M€)	194	183	160	105
	OPEX* (M€)	74	80	79	34
	SALES (M€)	272	240	288	271
PRESSURE LEACHING	CAPEX (M€)	761	503	316	310
	OPEX* (M€)	250	191	90	54
	SALES (M€)	284	207	227	299
BIOLEACHING	CAPEX (M€)	-	154	-	-
	OPEX* (M€)	-	39	-	-
	SALES (M€)	-	118	-	-

TABLE 1- ECONOMIC ESTIMATE.

(*) Labour and maintenance costs not included.

LIFE CYCLE ASSESSMENT FOR DATA VALIDATION AND PRELIMINARY RESULTS

An environmental assessment has been carried out in order to fulfill WP7 objectives. This assessment aims at identifying and quantifying the environmental burden relative to the technologies developed in INTMET, by use of Life Cycle Assessment (LCA).

First insights on the environmental impacts induced by the process chains have been obtained. At this point, two case studies have been conducted: the concentration of SOMINCOR ore and the whole treatment chain, from comminution to metal recovery, regarding CLC ore. Despite the assessment of only two case studies has been conducted so far, results give clues that can be already used with respect to the other process chains under development.

Key contributing flows within each developed process chain have been highlighted and perspectives for eco-designing processes have been accordingly offered by focusing on the weak points (in an environmental perspective) of the developed processes in the second half of the INTMET project.

On the one hand, regarding the SOMINCOR case study, a large share of the environmental impacts is induced by electricity consumption as well as reagents and ancillary materials use, through the comminution and flotation steps. In addition to this, the tailings disposal phase (by impoundment) is also relatively contributing from an environmental perspective due to tailings direct emissions to both surface and ground waters.

On the other hand, regarding the CLC case study, electricity and reagents/ancillary materials are also responsible for the largest part of the process chain environmental burden. In particular, these impacts are mostly induced throughout the atmospheric leaching and Pb & Ag leaching stages. Similarly to the SOMINCOR case study, the tailings disposal in this case is also responsible for relatively substantial impacts regarding the toxicity impact categories.