Corporación Instituto de Tecnologías Limpias (ITL)
Antofagasta
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CHALLENGE TITLE

Optimization of Flotation and Leaching to Reduce Waste and Inputs.

CHALLENGE DESCRIPTION

Flotation and leaching processes are fundamental for mineral recovery, but they also represent significant sources of waste generation and consumption of water, energy, and reagents. Limited efficiency in these processes directly impacts the sustainability and competitiveness of mining operations. This challenge seeks to promote technologies that improve metallurgical efficiency while reducing waste generation and the use of critical inputs. Priority will be given to solutions that integrate real-time control, selective reagents, and more sustainable process designs, enabling cleaner, more efficient, and resilient mining.

GENERAL OBJECTIVE

Contribute to the sustainability of metallurgical processes through the development and validation of technologies that optimize flotation and leaching, reducing waste and critical inputs such as water, energy, and reagents.

SPECIFIC OBJECTIVES

1. Co-develop flotation and leaching technologies that enhance metallurgical recovery with lower waste generation.
2. Design real-time control systems to optimize operational conditions.
3. Validate the use of selective reagents and low environmental impact formulations.
4. Conduct pilot tests to measure technical, water, energy, and environmental efficiency.

5. Generate technical guidelines and operational protocols for the adoption of the platform in mining operations.

EXPECTED RESULTS

- Technical reports with validation results of optimized flotation and leaching technologies.
- Indicators of reduced waste, water, energy, and reagent consumption.
- Demonstration pilots of real-time control systems and selective reagents in semi-industrial and operational environments.
- Technical guideline document for industrial adoption.

SCOPE

Includes:

- Technologies with TRL $\geqslant$ 4 applicable to flotation and leaching.
- Demonstrations in controlled relevant environments, semi-industrial and operational piloting and validation.
- Evaluation of technical, metallurgical, water, energy, and environmental performance.
- Studies on integration with process control and environmental management systems.

Does not include:

- Proof-of-concept and/or laboratory-scale tests with TRL < 4.
- Solutions that pose additional risks to worker, equipment, or environmental safety.
- Technologies that increase consumption of strategic resources such as water or energy.
- Interventions that negatively interfere with the continuity of the production process.

KEY PERFORMANCE INDICATORS (KPIs)

6. Improvement in metallurgical recovery (%).
7. Reduction in water, energy, and reagent consumption (%).
8. Accuracy and stability of the real-time control system (% of time in optimal conditions).

DESIRABLE CONTRIBUTION TO ITL CAPACITY BUILDING

- Infrastructure for pilot testing of optimized flotation and leaching.
- Development of validation and technological certification protocols for metallurgical efficiency.
- Training and operational protocols associated with technology use.
- Capacity building in integration of real-time control, selective reagents, and sustainable process design.