Corporación Instituto de Tecnologías Limpias (ITL)
Antofagasta
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CHALLENGE TITLE

Reduction of Greenhouse Gas (GHG) Emissions in Energy-Intensive Mining Processes

CHALLENGE DESCRIPTION

Energy-intensive mining processes—such as comminution, material transport, and thermal drying—are significant sources of greenhouse gas (GHG) emissions in Chilean mining. This challenge aims to promote technological solutions that reduce GHG emissions in these processes, contributing to the sector's carbon neutrality goals. Technologies integrating process electrification, energy efficiency, green fuels, and emissions traceability will be prioritized, enabling cleaner, more efficient, and verifiable mining operations.

GENERAL OBJECTIVE

Co-develop and validate technological solutions that reduce GHG emissions in energy-intensive mining processes through the integration of electrification, energy efficiency, green fuels, and environmental traceability systems.

SPECIFIC OBJECTIVES

- Co-develop technologies applicable to mining processes that significantly reduce direct and indirect GHG emissions.
- Promote electrification, energy efficiency, and/or green fuels in mining operations.
- Implement monitoring and traceability systems for emissions using sensors, digital platforms, and verifiable protocols.
- Validate the technical, energy, environmental, and economic performance of solutions under real operational conditions.

- Generate technical and regulatory guidelines for the industrial adoption of low-carbon technologies.

EXPECTED RESULTS

- Technical reports with validation results of GHG reduction technologies.
- Emission reduction indicators per process (kg CO_2e/ton).
- Demonstration pilots of electrification, energy efficiency, or green fuels.
- Operational monitoring and traceability systems for emissions.
- Document outlining technical and regulatory guidelines for industrial technology adoption.

SCOPE

Includes:

- Technologies with TRL ≥ 4 applicable to mining processes with significant GHG emissions.
- Demonstrations in controlled relevant environments, semi-industrial and operational pilot testing and validation.
- Evaluation of technical, energy, environmental, and economic performance.
- Integration with environmental monitoring and energy management systems.

Does not include:

- Proof-of-concept and/or laboratory-scale tests (TRL < 4).
- Solutions that pose risks to worker, equipment, or environmental safety.
- Technologies that increase consumption of strategic resources such as water or energy.

- Interventions that alter or interfere with continuity of the production process.

KEY PERFORMANCE INDICATORS (KPIs)

- Reduction of GHG emissions per ton of processed ore (kg CO_2e/ton).
- Replacement of fossil fuels with clean sources (% substitution).
- Economic feasibility of the solution (US$/lb processed vs. conventional benchmark).

DESIRABLE CONTRIBUTION TO ITL CAPACITY BUILDING

- Infrastructure for pilot testing of low-carbon technologies.
- Development of emissions monitoring and traceability platform with sensors.
- Generation of validation and certification protocols for GHG reduction technologies.
- Training and operational/integration protocols related to electrification, energy efficiency, and green fuels applied to mining.