Corporación Instituto de Tecnologías Limpias (ITL)
Antofagasta
Carrera #1615

CHALLENGE TITLE

Innovations in Electricity Storage and Charging Systems for Mining Applications

CHALLENGE DESCRIPTION

This challenge seeks to identify, develop, and validate innovative technologies for electricity storage and charging systems tailored to the operational demands of the mining sector. Solutions should address energy density, charging speed, safety, and integration with renewable sources, aiming to improve energy autonomy, reduce emissions, and enhance operational efficiency.

GENERAL OBJECTIVE

Develop and validate advanced electricity storage and charging systems that meet the technical, environmental, and safety requirements of mining operations.

SPECIFIC OBJECTIVES

1. Design high-performance electricity storage systems with optimized energy density and lifecycle.
2. Develop fast-charging technologies compatible with mining equipment and infrastructure.
3. Ensure safety and reliability under extreme mining conditions (temperature, vibration, dust).
4. Integrate renewable energy sources into charging systems to reduce carbon footprint.
5. Validate systems in operational environments and generate protocols for industrial adoption.

EXPECTED RESULTS

- Validated prototypes of electricity storage and charging systems.
- Performance indicators for energy density, charging time, and operational reliability.
- Safety and environmental compliance documentation.
- Integration protocols with mining infrastructure and renewable energy systems.

SCOPE

Includes:

- Technologies with TRL ≥ 4 applicable to mining energy storage and charging.
- Demonstrations in relevant environments and operational pilot testing.
- Evaluation of technical, energy, environmental, and economic performance.
- Integration with renewable energy and mining 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)

- Energy density improvement (% vs. baseline).
- Charging time reduction (% vs. conventional systems).
- Operational reliability under mining conditions (% uptime).
- Carbon footprint reduction through renewable integration (kg CO_2e/ton).

DESIRABLE CONTRIBUTION TO ITL CAPACITY BUILDING

- Infrastructure for testing and validation of electricity storage and charging systems.
- Development of safety and performance protocols for mining applications.
- Training programs on energy storage technologies and renewable integration.
- Partnerships with academic and industrial stakeholders for technology transfer.