

CHALLENGE TITLE	
A2: Cost-effective Solutions for Mitigating Evaporation Losses on Large Surfaces	
MACRO-AREA	
Water/Tailings	
PROBLEM/GAP	
In areas of high solar radiation, water losses due to evaporation occur in leach pads, ponds, and massive tailings lagoons. These invisible losses critically affect the water balance and increase the demand for fresh replacement water, representing a significant opportunity cost for mining operations and water resource management in the basin.	
CHALLENGE DESCRIPTION	
The challenge consists of developing and validating cost-effective solutions to reduce water losses due to evaporation on large surfaces such as ponds, leach pads, or deposits associated with mining operations. Technologies or design and operation strategies that reduce evaporation without compromising facility safety or stored water quality are sought. Proposals must consider their performance in different climatic contexts, including comparative pilots to assess effectiveness, implementation feasibility, and scaling potential in real operations.	
GENERAL OBJECTIVE	
To develop and validate cost-effective solutions to reduce water losses due to evaporation on large surfaces, without affecting operational safety or water quality.	
SPECIFIC OBJECTIVES	
1.	Reduce evaporation losses without affecting the safety or chemical quality of stored water.
2.	Optimize deposit geometry and operation to reduce solar exposure.
3.	Validate cost-effective solutions such as floating covers, shades, or monomolecular layers to mitigate evaporation in leach pads, ponds, and tailings.
EXPECTED RESULTS	
1. Quantitative characterization of evaporation losses on representative surfaces (leach pads, ponds, deposits). 2. Sustained and demonstrable reduction of the evaporation rate through pilot solutions with documented water balance. 3. Prototype validation. 4. Increase in operational water availability by mitigating water evaporation losses, supporting the economic viability of the solution. 5. Reduction of fouling due to dust accumulation in water.	
SCOPE	
Includes: • Controlled trials and pilot operation on real assets (ponds, leach pads, or mining operation deposits), considering Pelambres as a test and operation alternative. • Installation and operation of meteorological-hydrological instrumentation to	

quantify water losses and validate results.

- Comparative evaluation of mitigation technologies (floating covers, shades, chemicals, or others).
- Techno-economic assessment of validated solutions and scaling roadmap.

Excludes:

- Structural redesign and detailed engineering of existing deposits or pads.

KEY PERFORMANCE INDICATORS (KPIs)

1.	Reduction in evaporation rate compared to baseline (%).
2.	Volume of water retained or recovered (m ³ /year).
3.	Cost of the solution per volume of water saved (USD/m ³).
4.	Implementation cost per unit of covered surface (USD/m ²).
5.	Impact on stored water chemical quality (conductivity, pH, TDS).
6.	Estimated useful life of the solution under northern Chile climatic conditions (years).
7.	Operational availability without affecting facility safety (%).

DESIRABLE CONTRIBUTION TO ITL CAPACITY BUILDING

- Standardized evaporation measurement protocols for industrial surfaces, replicable across different deposit types and regional climatic conditions. (Yes)
- Bank of mitigation technologies evaluated under real northern Chile conditions, as a reference for benchmarking and decision-making in new operations. (Yes)
- Meteorological-hydrological instrumentation capacity installed at ITL, available as a monitoring service for partners and mining operators. (Yes)

INDUSTRY AFFECTED BY THE CHALLENGE

Mining (leach pads, ponds, deposits), Agricultural companies, Sanitation Service Companies.