

CHALLENGE TITLE

Decarbonization of industrial plants through the incorporation of clean technologies in thermal processes.

CHALLENGE DESCRIPTION

While high-power electricity generation from renewable sources is rapidly developing in Chile, the integration of these sources into the thermal processes of the main industries in northern Chile is facing difficulties and barriers to consolidation, particularly for those requiring medium and high-temperature heat. This challenge aims to overcome these limitations through the co-development and implementation of clean technologies to decarbonize these critical industrial processes.

GENERAL OBJECTIVE

Remove the barriers hindering the penetration of renewable technologies to accelerate the decarbonization of industrial processes.

SPECIFIC OBJECTIVES

1. Evaluate renewable energy solutions for implementation in processes of relevant industries in the northern macro-zone of Chile.
2. Co-develop and validate process simulation models that incorporate clean technologies.
3. Establish semi-industrial and operational scale pilots for the application and validation of the technologies.
4. Co-develop control systems and protocols for their optimal operation.

5. Reduction of industrial process production costs through the incorporation of the technologies.

EXPECTED RESULTS

- Development of technological solutions to determine the feasibility of their integration into industrial processes, thereby reducing production costs.
- Simulation and validation models for industrial processes incorporating the proposed technologies.
- Generation of prototypes to enable testing of the technologies at semi-industrial and operational levels.
- Development of new control methodologies, including intelligent systems for optimizing the operation and maintenance of energy systems and their related thermal processes.

SCOPE

Includes:

- Demonstrations in a controlled, relevant environment, along with semi-industrial and operational piloting and validation.
- Integration of clean technologies in relevant industries with operations in the northern macro-zone.
- Development of new technologies and/or new process control systems.

Does not include:

- Proof of concept and/or laboratory-scale testing ($TRL \leq 4$).
- Only thermal processes are included; therefore, areas such as electrification for electromobility are outside the scope of this challenge.
- Solutions that pose risks to the safety of workers, equipment, or the environment.
- Technologies that increase the consumption of strategic resources such as water or energy.
- Interventions that alter or interfere with the continuity of the production process.

KEY PERFORMANCE INDICATORS (KPIs)

1. Carbon emitted in the industrial process.
2. Levelized Cost of Heat.
3. Operation and maintenance cost.
4. Improvements in control processes, for example: Equipment availability, product quality, system production, energy efficiency, degree of electrification, etc.

DESIRABLE CONTRIBUTION TO ITL CAPACITY BUILDING

- Infrastructure for technology piloting.
- Developed methodologies, control systems, and intelligent algorithms.
- Personnel capacity for the implementation and development of the technologies.