

CHALLENGE TITLE

Grid stabilization through the retrofit of thermal power plants.

CHALLENGE DESCRIPTION

Coal-fired thermal power plants have an official retirement date of 2035 in Chile. Their retirement leaves behind valuable infrastructure that could be repurposed for electrical energy generation. This approach offers benefits such as lower investment costs, reduced construction time, readily available accessibility, and fewer required permits. Furthermore, it enables the provision of grid stability through the use of the existing turbines, which contribute inertia that enhances the robustness of the electrical system. In this context, the challenge involves identifying low-carbon technological solutions that leverage this existing infrastructure to maintain grid stability by repurposing thermal power plants—not only coal-fired plants but also those using other types of fossil fuels.

GENERAL OBJECTIVE

Evaluate clean energy technologies with storage capabilities that enhance the robustness of the electrical grid through the repurposing of existing thermal power plant infrastructure.

SPECIFIC OBJECTIVES

1. Enhance grid stability through the integration of clean technologies.
2. Repurpose existing thermal power plant infrastructure for low-carbon energy generation, including storage.
3. Co-develop pilot projects at semi-industrial and operational scales.

4. Provide training for active personnel currently working in thermal plants to facilitate their reintegration into the clean energy generation sector.

EXPECTED RESULTS

- Development of process and control systems to enable the integration of technologies into thermal power plants.
- Development of human capital for the reintegration of personnel from repurposed power plants.
- Creation of modeling and simulation systems for the integration of clean technologies with thermal power plants.
- Semi-industrial and operational prototypes that couple new technologies with existing thermal generation infrastructure.
- Validated techno-economic reports from prototype testing to determine economic viability and future implementation of the developed technologies in thermal power plants.

SCOPE

Includes:

- Thermoelectric power plants located in the northern macro-zone.
- Training plans for personnel previously employed at the thermal power plants.
- Demonstrations in a controlled, relevant environment, along with semi-industrial and operational piloting and validation.

- Energy storage systems.

Does not include:

- Proof of concept and/or laboratory-scale testing (TRL $\leq$ 4).
- 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.

KEY PERFORMANCE INDICATORS (KPIs)

1. Impact on grid stability.
2. Project investment cost.
3. Number of personnel to be trained.
4. Technology implementation time.
5. Cost of electricity generation.

DESIRABLE CONTRIBUTION TO ITL CAPACITY BUILDING

- Development of testing infrastructure for the new technologies.
- Training in the implementation of the systems.
- Development of control systems and certification for the application of the technologies in thermal power plants.
- Human capital development.