

CHALLENGE TITLE	
E1: Development of Circular Economy Solutions for Solar and Wind Power Plant Waste	
MACRO-AREA	
Renewable Energies	
PROBLEM/GAP	
Chile lacks sufficient technical and technological infrastructure to manage the growing waste from solar and wind power plants, preventing its valorization and effective recycling. This gap generates two critical consequences: on one hand, increasing environmental damage due to inadequate material disposal and loss of high-value metals and minerals.	
CHALLENGE DESCRIPTION	
Chile has positioned itself as a world leader in renewable generation, with more than 55 million photovoltaic modules installed since 2010. However, this rapid growth brings a silent crisis: by 2024, approximately 11,000 tons of waste from solar panels (glass, silicon, aluminum, copper, and precious metals such as silver and indium) are generated annually. Added to this are wind turbine blades (composed of fiberglass and non-biodegradable epoxy resins), towers, cooling systems, converters, and backup batteries. To date, there is limited specialized infrastructure for the valorization and recycling of waste, causing environmental damage and loss of component value. Additionally, since 2023, the REP Law requires solar and wind technology manufacturers and importers to organize and finance waste collection and valorization systems. Without viable technical solutions, companies face fines, trade barriers, and reputational risks.	
GENERAL OBJECTIVE	
To design, technologically validate, and implement a circular economy management model for solar and wind power plant waste in Chile, enabling the valorization of annually generated waste, complying with the REP Law, reducing landfill disposal, and generating marketable and/or reusable by-products.	
SPECIFIC OBJECTIVES	
1.	Development of technologies to diagnose the condition of waste.
2.	Generate and scale technological solutions for the valorization of solar and wind industrial waste.
3.	Minimize waste from the solar and wind industries.
4.	Validate the economic viability of new business models.
EXPECTED RESULTS	
1. Creation of industrial pilots in relevant environments. 2. Design, development, and field validation of technologies. 3. Reduction and valorization of industrial waste. 4. Demonstration and validation of business models for waste reduction and valorization.	
SCOPE	
Includes:	

- Demonstrations in controlled relevant environments, piloting, and semi-industrial and operational validation.
- Development of diagnostic systems to determine the condition of industrial waste.

Excludes:

- Battery waste management.
- Proofs of concept and/or laboratory-scale tests ($TRL \leq 4$).
- Solutions that pose risks to worker safety, equipment, or the environment.
- Interventions that alter or interfere with the continuity of production processes.

KEY PERFORMANCE INDICATORS (KPIs)

1.	Waste valorization rate.
2.	Amount of waste valorized and waste not discarded.
3.	Waste evaluation and diagnostic time.
4.	Cost of revalorized waste and potential income from by-product revalorization.

DESIRABLE CONTRIBUTION TO ITL CAPACITY BUILDING

- Pilot infrastructure for the generated technology.
- Creation of algorithms and intelligent systems for industrial waste evaluation and management.
- Capacity building in the area of simulation, modeling, and industrial waste management technologies.

INDUSTRY AFFECTED BY THE CHALLENGE

Solar and wind industry.