

# **Title: Solar-Thermal Solutions for High-Temperature Industrial Process Heating**

## **Project Overview**

**Objective:** Develop and demonstrate an innovative Solar-Thermal Industrial Process Heating (SIPH) system designed to deliver high-temperature heat (up to 200°C) for energy-intensive industrial processes.

**Problem Addressed:** U.S. industrial sector accounts for 33% of national energy consumption and 30% of CO2 emissions. Current heat pumps and solar technologies are limited by cost, efficiency, and scalability at high temperatures.

## **Key Innovations:**

1. Hybrid Solar & Absorption Heat Technology:

- Combines flat plate and evacuated tube solar collectors with advanced ammonia-water Absorption Heat Transformer (AHT) technology.
- Overcomes inefficiencies of traditional IHPs (limited to 150°C) by driving the AHT with solar heat.

2. Scalable & Cost-Effective Design:

- Targeted for small to medium-sized manufacturers.
- Lower equipment and operational costs compared to Concentrating Solar Collectors (CSC).

3. Operational Flexibility:

- Capable of running in multiple modes (solar-driven, waste heat recovery) to optimize energy efficiency.
- Designed for both retrofitting existing systems and new installations.

## **Expected Impact:**

- **Energy Efficiency:** Reduces industrial energy consumption by up to 50%.
- **CO2 Reduction:** Supports U.S. decarbonization goals by minimizing emissions in industrial processes.
- **Cost Savings:** Provides long-term operational cost reductions for manufacturers, making it a competitive solution in the global market.

## **Next Steps:**

- Prototype development and testing.
- Full-scale demonstration to validate real-world performance.

## **Market Potential:**

SIPH is poised for rapid commercialization, with significant potential in manufacturing, chemical, and other energy-intensive industries looking to decarbonize and save on energy costs.