EXPECTED **IMPACT**

- **HIGHER EFFICIENCY:** Higher operating temperatures can improve the energy conversion efficiency and overall performance of CSP plants.
- **GREATER DISPATCHABILITY:** Advanced thermal storage enables solar energy to be stored as heat and delivered when it is needed, supporting a more flexible renewable electricity system.
- **LONGER SYSTEM LIFETIME:** Advanced materials, protective coatings, corrosion control and monitoring aim to reduce degradation and improve system durability.
- **LOWER COST:** HELIOTROPE targets an approximately 15% reduction in the Levelised Cost of Electricity (LCOE), contributing to more competitive CSP.
- **LOWER ENVIRONMENTAL IMPACT:** The project integrates sustainability, circularity and Safe and Sustainable by Design principles into the development of new materials and storage solutions.
- **SUPPORTING EUROPE'S ENERGY TRANSITION:** More efficient and dispatchable CSP can contribute to decarbonisation, energy security and increased integration of renewable energy.

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HIGHLY EFFICIENT AND LOW-IMPACT **INNOVATIVE THERMAL STORAGE SYSTEM** FOR ENHANCED DISPATCHABILITY IN CONCENTRATED SOLAR TOWER PLANTS

Concentrated Solar Power can provide renewable electricity even when the sun is not shining by storing solar energy as heat.

HELIOTROPE is developing innovative thermal energy storage technologies to enable CSP plants to operate at higher temperatures, improving their efficiency, dispatchability and sustainability.

The project brings together **novel molten salts, advanced materials and coatings, corrosion-control solutions and high-temperature receiver technologies.**

800°C High-temperature molten salt storage

850°C Receiver absorber surfaces

~15% Targeted LCOE reduction

HELIOTROPE OBJECTIVES

HELIOTROPE brings together **eight complementary objectives** to overcome the techno-logical barriers limiting high-temperature thermal energy storage in CSP.

1

Develop sustainable chloride molten salts

Develop and optimise novel chloride-based molten salts for thermal energy storage at temperatures of up to 750°C.

750°C

2

Develop sustainable carbonate molten salts

Develop and optimise novel carbonate-based molten salts capable of operating at temperatures of up to 800°C.

800°C

3

Develop advanced materials and protective coatings

Develop structural materials and coatings able to withstand aggressive high-tempe-rature molten-salt environments.

4

Achieve near-zero corrosion

Combine advanced materials, coatings and innovative corrosion-control strategies to minimise degradation and extend component lifetime.

5

Monitor corrosion in real time

Develop monitoring approaches to assess corrosion and material performance during operation, supporting safer and more reliable CSP systems.

6

Advance high temperature solar receivers

850°C

Develop advanced absorber materials and coatings capable of withstanding surface temperatures of up to 850°C.

7

Validate HELIOTROPE technologies

Test and validate the developed materials, molten salts, coatings and technologies under representative CSP operating conditions.

8

Enable sustainable and competitive deployment

Assess environmental, economic and circularity aspects and support the future exploitation and uptake of HELIOTROPE solutions.

FROM INNOVATION TO IMPACT



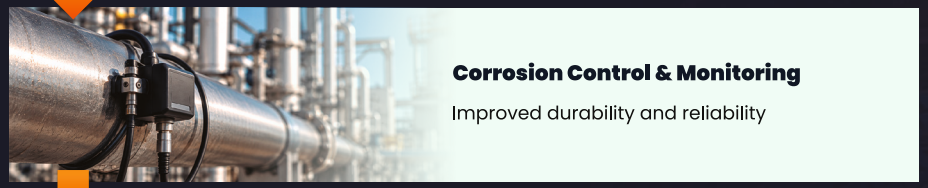
Advanced Molten Salts

High-temperature thermal storage



Materials & Coatings

Designed for demanding operating conditions



Corrosion Control & Monitoring

Improved durability and reliability



High-temperature Receivers

Harnessing solar heat at higher temperatures



Integration & Validation

Testing HELIOTROPE technologies in relevant conditions

