



# Solar Hybrid Air-sCO2 Power Plants



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#### **anilamiT**

SHAR BoP coi		integrated demonstration in CSP real plants at relevant scale (TRL7)	Test in Lab and Cyber Physical validation (TRLS)	Preliminary tests and conceptual design (TRL4)	
SHARP-sCO2 first cycles and oP components on the Mark	<ul> <li>Stakeholders promotion of SHAR-sCO2 - CSP and energy actors engagement via identified business</li> <li>Models</li> </ul>	<ul> <li>Identification of Measures to overcome Technical and overcome Technical and Kon-Technical Barriers</li> <li>Roadmapto Certification</li> <li>Components design optimisation (costs and (costs and</li> </ul>	tzoM aft to zizvland • U3-ottable EU/extra-EU stasham qambaoa alaozqu •	<ul> <li>Cost analysis for preliminary market value setup</li> <li>Analysis of the competitor technologies</li> <li>(cost/performance)</li> </ul>	BUSINESS
s and Market	<ul> <li>Components upscale and standardization to make them ready to Market</li> </ul>	<ul> <li>Scale Up/Replicability studies in EU</li> <li>and extra-EU contexts</li> <li>Industrial scale test and different</li> <li>Industrial scale test or sCO2</li> <li>Invbomachinery coupling</li> </ul>	<ul> <li>Validation Campaign at single lab and via cyber-physical integrated approach</li> </ul>	<ul> <li>Conceptual design of SAAR-SCO2 enabling</li> <li>Thermoeconomic</li> <li>Thermoeconomic</li> <li>Simulations for optimal cycle layout</li> </ul>	RESULTS
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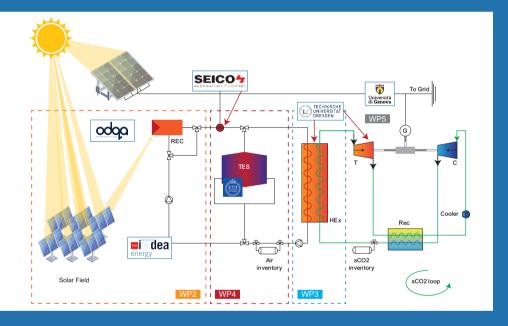
## **The Concept**

SHARP-sCO2 aims at developing a new generation of highly efficient and flexible concentrated solar power (CSP) plants. Keeping on working with CSP-sCO2 cycles and investigating how to exploit air as operating fluid, SHARP-sCO2 will enhance and validate novel enabling technologies in EU top level CSP labs, including receiver, thermal storage, sCO2-air Heat Exchanger, electrical heater and piping and control system. SHARP-sCO2 proposes a Multi-lab validation approach towards a more cost-efficient and flexible generation of hybrid CSP-PV plants leveraging on existing industrial/R&D partners' scientific and commercial know-how.



### **Technologies**

Leveraging on a smart and integrated hybridization with PV, enabled by the development of an innovative electric heater, SHARP-sCO2 will maximize the production, exploiting PV affordability while counting on the unique energy storage capabilities of CSP plants via thermal media.



#### **KEY INNOVATIONS**

- Novel air receiver able to reach 1000°C and 4 MW/m2
- Novel electric heater for packed beds/air systems
- Novel radial packed bed TES optimized for slag and waste
- New air to sCO2 Heat Exchanger design for CSP and waste recovery
- Dynamic simulator of airsCO2 CSP plants
- Techno-economic model of new hybrid PV- air CSP plants

#### **Expected Impact**

SHARP-sCO2 gives an innovative contribution to the evolving CSP technology aiming at:

- Fostering a higher shares of variable output renewables in the energy system
- Developing future, higher-efficiency CSP plants
- Reducing the levelized cost of electricity of future CSP plants
- Developing significant performance regarding start-up, shutdown and load variation of future CSP plants
- Improving environmental profile of future CSP plants

