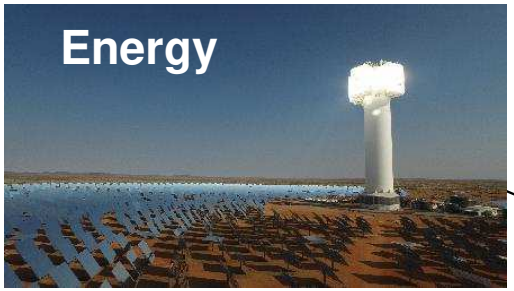
Solar & Thermal Energy Storage

- TOPCSP_EU Project

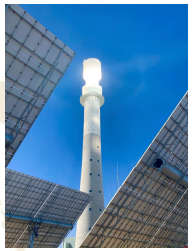
Ridha HARZALLAH

John Cockerill

Our sectors of activity



Solar receivers all around the world



Haixi, China
Molten Salt Receiver

DEWA, Dubai
Molten Salt Receiver

Khi Solar I, South Africa
Direct Steam Generation

Cerro Dominador, Chile
Molten Salt Receiver

Top CSP

- **Partners** : U3CM
- **John Cockerill scope** : PhD co-supervision : Life Cycle Analysis of a state-of-the-art CSP plant and comparison with other renewable technologies
- **Strategical axis** : Consolidation (1)
- **Status** : Kick off meeting in October 2022
- **Fundings** : 100% → 267k€

WP 1: Cost reduction and improved reliability of commercial CSP plants

WP 2: Next generation of CSP plants working with alternative HTFs

WP 3: New scientific approaches and computational tools to generate disruptive innovation in CSP technologies

Universidad Carlos III de Madrid **T3.3 - Thesis 3 (DC10):** Life Cycle Analysis of a state-of-the-art CSP plant and comparison of the results with other renewable energy generation technologies

TOPCSP: Thesis List

WP 1: Cost reduction and improved reliability of commercial CSP plants

T1.1 - Thesis 1 (DC1): The development of a universal flux density measurement system for large-scale external and cavity receivers with high-performance image processing.

Host: DLR Supervisors: Dr. C..Raeder (DLR) Secondments at: Synhelion and CyI.

T1.2 - Thesis 2 (DC2): The numerical simulation of the turbulent two-phase flow of direct stem generation solar receivers and validation of the results with experiments.

Host: CNRS Supervisor: Dr.S. Mer and Dr. A. Toutant Secondments at: VM and DLR.

T1.3 - Thesis 3 (DC3): The development of modified steam cycle layouts to improve the flexibility and reduce the cost of the power block of CSP plants.

Host: RWTH. Supervisor: Prof. M. Wirsum. Secondments at: UNIBS and VM.

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TOPCSP: Thesis List

WP 2: Next generation of CSP plants working with alternative HTFs

T2.1 - Thesis 1 (DC4): A numerical and thermomechanical study of central receivers working with high temperature molten salts.

Host: UC3M. Supervisors: A. Acosta and C. Sobrino. Secondments at: CNRS and ACX.

T2.2 - Thesis 2 (DC5): The development of a sCO2 power cycle model that works with modified working fluids

Host: UNIBS. Supervisor: Prof. P. Iora. Secondments at: RWTH and B&R.

T.2.3 - Thesis 3 (DC6): The design and analysis of a molten salt heating system to be used as an energy reservoir.

Host: USE. Supervisor: C. Prieto. Secondments at: UC3M and Ingenergio.

T2.4 - Thesis 4 (DC7): The optimisation and techno-economic performance analysis of thermochemical and photo-thermochemical cycles for H2 production to be integrated in a point-focus CSP system.

Host: POLIMI. Supervisor: M. Binotti. Secondments at: CyI and Synhelion

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TOPCSP: Thesis List

WP 3: New scientific approaches and computational tools to generate disruptive innovation in CSP technologies

T3.1 - Thesis 1 (DC8): The development of an open-source computational framework to automatically generate receiver designs fulfilling multiple objectives.

Host: CyI. Supervisors: Prof. Manuel Blanco and Dr. Nicolaou. Secondments at: POLIMI and JC.

T3.2 - Thesis 2 (DC9): The coupled optimisation of solar field and receiver/cavity geometry based on cost, performance, and durability.

Host: VM. Supervisors: Dr. J. Valverde (VM) and Prof. J. Galán-Vioque (USE). Secondments at: CyI and DLR.

T3.3 - Thesis 3 (DC10): Life Cycle Analysis of a state-of-the-art CSP plant and comparison of the results with other renewable energy generation technologies.

Host: JC. Supervisors: M. Smolders (JC) and D. Santana (UC3M). Secondments at: UC3M and USE.

Key Takeaways

- Intense R&D activities
- Several sources of financing
- Know-how continuous development
- New products and services
- Increase our value proposition
- Marketing and Networking

Thank you

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