THE PROJECT

GENERAL CONTEXT

The thermodynamic solar power plants present a current water consumption of 4 m3/MWh mainly needed to dicharge the waste heat of their Rankine cycle. Under arid area, this aspect induces potentially a major conflict of use on a much more fundamental ressource than electricity. Therefore, their is a critical need in alternative dry cooling systems still allowing high efficiencies.

THE DRYRSP CONCEPT

The solar field of a CSP plant represents 50% of its initial cost and is used only daily. For a 50 MW CSP plant, this solar field has a surface of 150.000 m² for a cost of about 100 M€. The DryRSP concept consists to use this solar field as a macro heat exchanger under convective and radiative transfers. Under arid conditions, the earth atmosphere offers an open window to the infra red spectra available for heat discharge toward space at -270°C. This cooling effect allows also the condensation of the surounding humidity producing about 0.12 L/m²/night. The plant does not consume water any more but produces water !

SCIENTIFIC AND INDUSTRIAL IMPACTS

SCIENTIFIC

- Optimisation of mixed convective and radiative transfers on dynamic complex surfaces
- Interactions between coupled heat transfer phenomena and water condensation,
- Optimization of the surface propeties for enhanced radiative transfer

INDUSTRIAL

- New CSP plants without water consumption offering a difference in the market
- CSP plants producing water by condensing humidity, potentially applied to water desalination in costal areas
- New generation of solar fields including innovative integrated heat exchangers and active surfaces used 24h/day

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