

TubeMon

New online flux density and temperature measuring systems for Monitoring and optimized operation of external Tube receivers

Project duration: from 09.2019 to 08.2022
Report submitted: 08.2020

Publishable Summary

Solar power towers offer the highest cost reduction potential among all CSP technologies. Raising the receiver efficiency and extending its lifetime are suitable measures to reduce the electricity generation costs. In order to do that, the flux density and the temperature distribution have to be measured and controlled. Previous measurement methods suffer from severe disadvantages. The moving bar technique for measuring the flux density distribution is hardly feasible for large-scale receivers due to high efforts and costs. Formerly used thermography methods assume a constant emissivity and ignore the receiver's aging and spatial inhomogeneities.

The TubeMon project is a key for overcoming these limitations and boosting the enhancement of measuring systems, simulations and control for industrial-scale external tube receivers. It puts emphasis on the improvement of a promising flux density measurement technique and will lead it to application at large tubular receivers. Emissivity and thermographic temperature measurement will substantially gain accuracy. Demonstrational tests at a commercial power plant pave the way for posterior application and commercialization of the technologies. Progress in raytracing, modeling and control of flux and receiver operation supplement the project very well.

The project is carried out by a strong trinational consortium, bringing together experts of industry and science. Together, they make a significant contribution to the decrease of CSP costs.

Project consortium

Coordinator and all contact details:

Full name of organisation	Deutsches Zentrum für Luft- und Raumfahrt, Institut für Solarforschung
First and family name of coordinator:	Christian Raeder
Full address:	Karl-Heinz-Beckurts-Str. 13, 52428 Jülich, Germany
E-mail:	christian.raeder@dlr.de

Participating countries and financing:

Country	Number of organisations involved	Project costs in EUR	Public funding in EUR
Germany	2	719 102	719 102
Spain	1	313 406	188 043
Israel	1	352 408	176 204
<i>Total</i>	4	1 032 860	907 321

Funding agencies involved and contracts

Funding Agency	Contract N° and Title
Agencia Estatal de Investigación (AEI)	<ul style="list-style-type: none"> • PCI2019-111837-2 • PCI2019-111827-2
CDTI	EXP - 00128144 / SERA-20201007
Projektträger Jülich (PtJ)	<ul style="list-style-type: none"> • 03EE1020A «Verbundvorhaben: In4CIS – Neue in-line Methodik für fortgeschrittene Bewertung von hocheffizienten industriellen CIGS Prozessen; Teilvorhaben: Probenpräparation und Prototyp-Validierung am ZSW» • 03EE1020B «Verbundvorhaben: In4CIS – Neue in-line Methodik für fortgeschrittene Bewertung von hocheffizienten industriellen CIGS Prozessen; Teilvorhaben: Technische und ökonomische Evaluierung der industriellen Anwendung der entwickelten in-line Methodik für fortgeschrittene Bewertung von hoch-effizienten CIGS Prozessen»