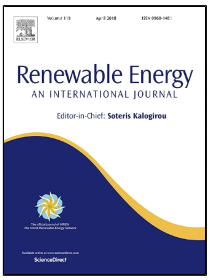
Accepted Manuscript



Two-tank molten salts thermal energy storage system for solar power plants at pilot plant scale: lessons learnt and recommendations for its design, start-up and operation

Gerard Peiró, Cristina Prieto, Jaume Gasia, Aleix Jové, Laia Miró, Luisa F. Cabeza

PII:	S0960-1481(18)30026-0
DOI:	10.1016/j.renene.2018.01.026
Reference:	RENE 9631
To appear in:	*Renewable Energy*
Received Date:	30 July 2017
Revised Date:	07 December 2017
Accepted Date:	11 January 2018

Please cite this article as: Gerard Peiró, Cristina Prieto, Jaume Gasia, Aleix Jové, Laia Miró, Luisa F. Cabeza, Two-tank molten salts thermal energy storage system for solar power plants at pilot plant scale: lessons learnt and recommendations for its design, start-up and operation, *Renewable Energy* (2018), doi: 10.1016/j.renene.2018.01.026

Two-tank molten salts thermal energy storage system for solar power plants at pilot plant scale: lessons learnt and recommendations for its design, start-up and operation

Gerard Peiró[1], Cristina Prieto[2], Jaume Gasia[1], Aleix Jové[2], Laia Miró[1], Luisa F. Cabeza[1,*]

[1]GREiA, INSPIRES Research Centre, University of Lleida, Pere de Cabrera s/n, 25001, Lleida, Spain

[2]Abengoa, c/ Energía Solar 1, 41012 Sevilla, Spain.

[*]Corresponding author: lcabeza@diei.udl.cat

Abstract

Renewable energies are main players to ensure the long-term energy supply. Solar power plants with thermal energy storage (TES) are one of the available renewable technologies which have more potential. Nowadays, there are still several aspects in the design and operation of these power plants which need to be improved, such as the correct operation of some specific instrumentation, the compatibility between TES materials and storage tanks materials, and operational process strategies. This paper presents the acquired experience during the design, start-up, and operation of a kWh scale pilot experimental facility built at the University of Lleida (Spain) together with Abengoa Research (Spain) in 2008. The versatility of this facility has allowed simulating real working conditions and therefore testing different TES systems, TES materials, solar power plant components, and operational strategies focused on TES for temperatures up to 400 ºC. In the present paper, the authors show the lessons learnt at pilot and present the main problems and limitations encountered, and give advices of this experimental set-up to extrapolate the data to real plant, to provide solutions to technical problems and reduce the cost of commercial plants.

Keywords: molten salts; two-tank; thermal energy storage (TES); concentrated solar power (CSP); lessons learnt; pilot plant