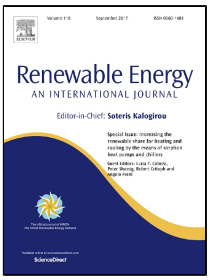
Accepted Manuscript



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PII:	S0960-1481(17)30477-9
DOI:	10.1016/j.renene.2017.05.083
Reference:	RENE 8850
To appear in:	*Renewable Energy*
Received Date:	23 December 2016
Revised Date:	24 April 2017
Accepted Date:	26 May 2017

Please cite this article as: Gerard Peiró, Jaume Gasia, Laia Miró, Cristina Prieto, Luisa F. Cabeza, Influence of the heat transfer fluid in a CSP plant molten salts charging process, *Renewable Energy* (2017), doi: 10.1016/j.renene.2017.05.083

Influence of the heat transfer fluid in a CSP plant molten salts charging process

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Abstract

The selection of a proper heat transfer fluid (HTF) is a key factor to increase the efficiency of concentrated solar power plants and therefore, to reduce their internal associated CAPEX (capital expenditures of developing and constructing a plant, excluding any grid-connection charges) and OPEX (operating expenditures from the first year of a project's operation). This paper presents a comparative study of two commercial HTF which are widely used in different industries and CSP plants: thermal oil Therminol VP-1 and silicone fluid Syltherm 800. First, the authors theoretically studied the properties of both HTF based on the data given by the manufactures. Afterwards, the authors experimentally perform the comparison in a two-tank molten salt thermal energy storage pilot plant built at the University of Lleida (Spain). The study is focused on the plate heat exchanger of the facility during several charging processes with a counter flow arrangement. Results from both studies showed that, for the same working conditions, Therminol VP-1 is the best candidate for the above-mentioned purposes due to its higher heat transfer, lower thermal losses and lower power consumption associated to the HTF pump. However, it presents problems a low crystallization point, which should also be considered.

Keywords: Heat transfer fluid; Therminol VP-1; Syltherm 800; Molten salts; Concentrated solar power plant; Plate heat exchanger