

Accepted Manuscript

Design and off-design models of a hybrid geothermal-solar power plant enhanced by a thermal storage

Martina Ciani Bassetti, Daniele Consoli, Giovanni Manente, Andrea Lazzaretto



PII: S0960-1481(17)30472-X

DOI: [10.1016/j.renene.2017.05.078](https://doi.org/10.1016/j.renene.2017.05.078)

Reference: RENE 8845

To appear in: *Renewable Energy*

Received Date: 19 January 2017

Revised Date: 25 March 2017

Accepted Date: 25 May 2017

Please cite this article as: Ciani Bassetti M, Consoli D, Manente G, Lazzaretto A, Design and off-design models of a hybrid geothermal-solar power plant enhanced by a thermal storage, *Renewable Energy* (2017), doi: 10.1016/j.renene.2017.05.078.

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

Design and off-design models of a hybrid geothermal-solar power plant enhanced by a thermal storage

Martina Ciani Bassetti^a, Daniele Consoli^b, Giovanni Manente^{c*}, Andrea Lazzaretto^d

^{a,c,d} University of Padova, Department of Industrial Engineering, via Venezia 1, 35131, Padova, Italy.

^b Enel Green Power - Innovation and Sustainability, Viale Regina Margherita 125, 00198, Rome, Italy.

Abstract

Geothermal resources are subject to thermal depletion during the lifetime of geothermal power plants. The decline of the geofluid temperature significantly affects both the magnitude and quality of the thermal energy available for electrical conversion and, in turn, plant efficiency and power output. Furthermore, the performance of geothermal power plants based on air-cooled Organic Rankine Cycle systems (ORCs) markedly decreases at warm ambient temperatures because of the higher turbine exhaust pressures. In this study a new hybrid Geothermal - Concentrating Solar Power (GEO-CSP) plant is modelled, which enables a better utilization of geothermal energy and improves the performance of the geothermal ORC system during the whole lifetime of the power plant. Solar energy is used to heat up the geothermal fluid entering the heat exchanger of the ORC. The CSP plant is equipped with a thermal energy storage (TES) unit which accumulates the surplus of solar thermal energy available during daytime, while releasing it during night-time when the efficiency of the power system is higher. The integration of the storage unit in the parabolic trough CSP system enables a 19% gain in the incremental annual energy production from solar, which

Download English Version:

<https://daneshyari.com/en/article/6763983>

Download Persian Version:

<https://daneshyari.com/article/6763983>

[Daneshyari.com](https://daneshyari.com)