Accepted Manuscript

A transient model for optimizing a hybrid nocturnal sky radiation cooling system

A. Amir, R. van Hout

PII: S0960-1481(18)30911-X

DOI: 10.1016/j.renene.2018.07.114

Reference: RENE 10388

To appear in: Renewable Energy

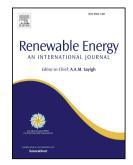
Received Date: 27 January 2018

Revised Date: 24 May 2018

Accepted Date: 23 July 2018

Please cite this article as: Amir A, van Hout R, A transient model for optimizing a hybrid nocturnal sky radiation cooling system, *Renewable Energy* (2018), doi: 10.1016/j.renene.2018.07.114.

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.



A transient model for optimizing a hybrid nocturnal sky radiation cooling system

A. Amir, R. van Hout*

Faculty of Mechanical Engineering Technion - Israel Institute of Technology Haifa, Israel

Abstract

Nocturnal sky radiation cooling (NSRC) is a passive, sustainable, cooling method that utilizes the sky as a radiation heat sink. Here, a reliable, hybrid NSRC system including a heat pump is presented and analyzed for the cooling of remote, off-grid data centers. An analytical system model that incorporates thermal and life cycle cost analyses including system control logic has been developed. The thermal analysis was validated by a detailed numerical analysis. In addition, a model for the radiator was developed and a performance curve of an ideal radiator is introduced. The strength of the here developed analytical, transient model lies in its ability to simulate a wide variety of possible system configurations using local, site dependent meteorological conditions over multiple years. The analysis determines the optimal system design based on minimum life cycle costs. The here presented concepts can be used for similar systems encompassing different components.

Keywords: Nocturnal sky radiation cooling, air-conditioning,

off-grid data centers, optimal system design

Preprint submitted to Renewable Energy

^{*}Corresponding author

Email address: rene@technion.ac.il (R. van Hout)

Download English Version:

https://daneshyari.com/en/article/6763578

Download Persian Version:

https://daneshyari.com/article/6763578

Daneshyari.com