

# Accepted Manuscript

Research Paper

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PII: S1359-4311(16)31728-8

DOI: <http://dx.doi.org/10.1016/j.applthermaleng.2017.04.034>

Reference: ATE 10182

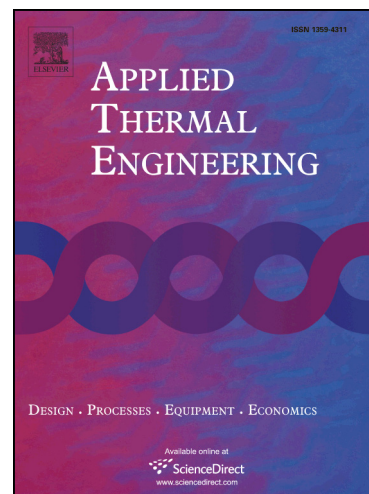
To appear in: *Applied Thermal Engineering*

Received Date: 7 November 2016

Accepted Date: 8 April 2017

Please cite this article as: U. Sahoo, R. Kumar, P.C. Pant, R. Chaudhary, Development of an innovative polygeneration process in hybrid solar-biomass system for combined power, cooling and desalination, *Applied Thermal Engineering* (2017), doi: <http://dx.doi.org/10.1016/j.applthermaleng.2017.04.034>

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## Development of an innovative polygeneration process in hybrid solar-biomass system for combined power, cooling and desalination

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### Abstract:

In the polygeneration process simultaneous production of power, vapor absorption refrigeration (VAR) cooling and multi-effect humidification and dehumidification (MEHD) desalination system from different heat sources in hybrid solar-biomass (HSB) system with higher energy efficiency take place. It is one of the solutions to fulfill energy requirements from renewable sources and also helps in the reduction of carbon dioxide emissions. The VAR cooling system operates using the extracted heat taken from turbine and condenser heat of the VAR cooling system is used in desalination system for production of drinking water as per demand requirement. Though the production of electricity decreases due to extraction of heat from turbine for VAR cooling and desalination, the complete system meets the energy requirements & increases the primary energy savings (PES). The thermodynamic evaluation and optimization of HSB system in polygeneration process for combined power, cooling and desalination is investigated to identify the effects of various operating parameters. Primary energy savings (PES) of polygeneration process in HSB system is achieved to 50.5%. The energy output is increased to 78.12% from this system as compared to simple power plant.

**Key Words:** Polygeneration, hybrid solar-biomass, energy, exergy, primary energy savings

### 1. Introduction

The energy demand for cooling and process heat/desalination applications are increasing continuously due to increase in the electricity requirements for industries, office campuses, institutions. Globally, in industrial sector about two-thirds of total consumption of energy is used

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