



# THERMODYNAMIC ANALYSIS OF SOLAR UPDRAFT TOWER POWER PLANT: A CASE STUDY OF JAMSHORO, SINDH

Hamza Khan<sup>a</sup>, Dr. Khanji Harijan<sup>b</sup>, Ans Ahmed Memon<sup>b</sup>

<sup>a</sup> Department of Post Graduate Studies, Mehran University of Engineering and Technology, Jamshoro, Pakistan,  
Phone: +92-311-0139681, E-mail: [hamza.khan1995@yahoo.com](mailto:hamza.khan1995@yahoo.com)

<sup>b</sup> Department of Mechanical Engineering, Faculty of Engineering, Mehran University of Engineering and Technology, Jamshoro, Pakistan.

## KeyWords

**Renewable Energy, Solar Updraft Tower Power Plants, Solar Chimneys, Solar Power Production, Jamshoro Sindh.**

## ABSTRACT

We are living in era of energy crisis. In this hour of need the renewable energy is the best choice among all. The Solar Updraft Tower Power Plant is an adaptation of the use of sustainable energy resources, a distinct and innovative synthesis of three exiting ideas: greenhouse effect, chimney effect and wind effect. The present research primarily on the thermodynamic analysis of "Solar Updraft Tower Power Plant": A case study in Jamshoro Sindh, presenting the estimation of power potential from this technology in Jamshoro by focusing the transfer of heat from the sun to the collector, up to the production of electrical power by the wind turbine, considering the air as an ideal gas. The governing equations used in the simulation consist of the Continuity equation, Navier-Stokes equation, Energy equation, and Radiation transfer equation. The mathematical equations were modeled in a simplified form by considering normal thermodynamic actions of the air to determine the performance of prototype plant in terms of electrical power production. The equations were modeled and simulated on the software Engineering Equation Solver. It can be concluded that the SUTPPs are very appropriate for remote areas where there is plenty of solar energy capacity; such as Tharparker, Jamshoro and some areas of Balochistan. These types of technologies should go on the road to commercialization with the diminishing supplies of fossil fuels and the exacerbation of air emissions and greenhouse effect.

















