

## عنوان مقاله:

Performance Enhancement and Environmental Impact Analysis of a Solar Chimney Power Plant: Twenty-four-hour Simulation in Climate Condition of Isfahan Province, Iran

## محل انتشار:

ماهنامه بین المللی مهندسی، دوره 30، شماره 8 (سال: 1396)

تعداد صفحات اصل مقاله: 10

## نویسندگان:

P Karimipour-Fard - *Department of Mechanical Engineering, Faculty of Engineering, University of Isfahan, Hezar Jarib Ave., Isfahan, Iran*

H Beheshti - *Department of Mechanical Engineering, Faculty of Engineering, University of Isfahan, Hezar Jarib Ave., Isfahan, Iran*

## خلاصه مقاله:

The aims of this study are to enhance the performance of a solar chimney power plant (SCPP), investigate utilization of thermal energy storage (TES) and analyze the environmental impact of the SCPP in providence of Isfahan, Iran. To achieve these goals, multi-stage numerical simulations during twenty-four hours of a day are performed in climate condition of Isfahan province (central region of Iran). Isfahan province has proper environmental condition for utilization of SCPP as a source of electricity and the environmental crises during the last decade in Iran have made utilization of green power plants a necessity. Performance enhancement of the SCPP is carried out by improvement in geometrical characteristics of collector and chimney of the SCPP. Considered factors for performance enhancement of SCPP are height, ceiling slop and radius of the collector as well as height, radius and throat shape of the chimney. Then a TES is employed to produce power in the absence of solar radiation in new proposed optimal configurations. In continue carbon dioxide emission and water consumption of enhanced configurations of SCPP are compared with shale gas, coal, hydroelectric and biomass power plants for same output power to investigate environmental impact of the SCPP. Results illustrate that improved collector of the SCPP increases the output power by almost 139% and enhanced chimney of the SCPP improves performance of the power plant by approximately 68.1%. Results also show that the SCPP with the TES would produce power during night hours in a stable range and TES has higher performance in SCPP with optimal proposed configurations. The results confirm that the SCPP is a proper choice for power generation in province of Isfahan (central region of Iran) and the enhanced SCPP with TES improves the .output power range and environmental benefits considerably

## کلمات کلیدی:

Solar Chimney Power Plant, Numerical Simulation, Performance Enhancement, Thermal Energy Storage, Environmental Analysis

## لینک ثابت مقاله در پایگاه سیویلیکا:

<https://civilica.com/doc/685733>



