
Comparison Between Performance Of Conventional And Sloped Solar Chimney Power Plants

Conception to build up a mathematical model of sloping solar chimney that supporting by mountainside was a new idea in 1931, where would occupy vast space reach to thousands of meters without any technical limitations that leads to improve conversion efficiency and make build gigantic vertical chimney is easy [21], avoiding selecting the regions that have bad weather as a high wind, dust storms and heavy hailstorms [22]. Therefore, building a solar chimney power plant with a floating chimney that attaching on the mountainside is a proposal to solve the issue of bad weather [23], some of experts proposed a floating solar chimney to avoid disadvantages in the conventional solar chimney power plant as an expensive construction cost, technological restrictions and external restrictions as an earthquake [24].

A many studies have conducted for comparison the behavior both of a floating chimney fixed on a mountainside and the conventional solar chimney power plant. Where a simulation have conducted on a sloped solar chimney power system that is designed to supply electricity to villages in Northwest China by 5 MW. The study focused on the behavior of some parameters such as pressure, increasing the temperature of airflow, efficiency of the system and solar collector. The results indicate that the sloped solar chimney system has better performances, especially in spring and autumn Season figure (1) shows most of parameter values increase by March, September while values decrease in July and November. Generally, the parameters of the system were symmetrical and stable and the overall efficiency was low, although the solar radiation was abundant [5], according to specific topography to know if it's useful for stable electricity cost and desert regions. The chimney designed as a floating chimney fixed on a mountainside segment as shown in figure (2). To resist the airflow and strong dust storms [23], the segments of chimney designed to be curved and used wires with small bases to attach the chimney on the mountainside and the feature of the solar chimney is can be extended to thousands of meters [21]. Performance evaluation of this model finds out the power obtained can meet the overall electricity consumption in China with higher energy conversion efficiency comparison with a concrete vertical chimney [2]. Another A study has conducted on two sorts of the solar chimney power plants, first one fixed at high latitudes which build with a slope of mountain hills, for three locations selected in Canada and the second has fixed at the southern locations to horizontal.

Where the thermal performance of the first plant reaches to 85%, output of plant well as and that is considered a sufficient comparison with the second plant and the total thermal performance for both of plants was less than 0.5%. For a mathematical model that designed for MATLAB platform [25], increasing the height of the chimney is a great advantage that will contribute to decrease the pressure at the turbine and the properties of the diameter of the collector which considered as important factors at design of solar chimneys that will decrease the cost as well as civil engineering problems [26]. According to the comparison was made for conventional solar collector of solar chimney power plant that shown in the figure (3) with the sloped solar collector of solar chimney power plant [27], by using the second law of thermodynamics, which has a vastly acceptance as robust tool for measuring the behave and performance of the solar chimney plants [28], with an entropy generation number of the 5-MW plants that suggested for these systems to identify the effects of height chimney by two

systems. Results show a contrast between the minimum entropy generation and the maximum second law efficiency, which will increase with increasing of the chimney height. While at change pressure and temperature for both of them, found that the sloped solar chimney power plant is better than conventional solar chimney power plant at thermodynamically [29], performances of sloped solar collector are higher, specifically at high altitudes and when it's build at along the hillside [23].

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