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### Paper Information

#### Experimental investigation of the effect of wind speed and wind direction on a solar chimney power plant

**Author(s):** O. C. Aja, H. H. Al-Kayiem & Z. A. Abdul Karim

#### Abstract:

Wind has been reported to have adverse effect on the performance of traditional solar chimney power plants but no reference has been made on the wind effect on inclined solar chimneys.

An experimental investigation on the effects of ambient wind speed and wind direction on the performance of a south facing inclined solar chimney power plant model is reported in this paper.

The effect of ambient wind speed and direction on the system performance was analyzed and the results showed that for the south facing collector, wind speed and directions have strong effects on the plant performance.

The wind speed was found to have considerable influence on the convective heat loss through the cover and the walls to the ambient.

Considering the wind direction, it was found that the system performance was favoured when the wind direction is from south moving north while the performance is impaired when the wind direction is from east or west.

The results also showed some performance degradation when the wind is from the north.

The findings also revealed that the walls of the air flow channel of the system resist the wind from sweeping the hot air generated in the system out to the ambient.

Based on the findings, the use of inlet guide vanes as wind breakers at the collector inlet of traditional solar chimney power plant can reduce the losses associated to the wind effect inside the collector.

The wind breakers will channel the natural energy of the wind into the system and enhance the system performance.

#### Keywords:

convective heat losses, open-solar-air collector, solar chimney power plant, solar energy, wind speed, wind direction, air velocity, system

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