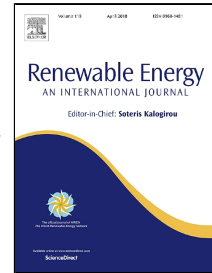


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Experimental study on a stove-powered thermoelectric generator (STEG) with self starting fan cooling



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1 **Title:** Experimental study on a stove-powered thermoelectric generator (STEG) with self starting
2 fan cooling

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7
8 **Abstract:**

9 In order to obtain electricity in off-grid areas and in emergency conditions (earthquake,
10 hurricane, tidal wave, military field, etc.), a prototype of stove-powered thermoelectric generator
11 (STEG) without battery embedded was built and tested. A novel type of heat collector, i.e. two
12 copper heat conducting flat plates installed oppositely, was designed to integrate a relative large
13 number of thermoelectric (TE) modules (eight TE modules in the present work). The heat
14 collector works with optimized heat sinks and cooling fans to maintain large temperature
15 difference and low cold end temperature, and to insure the self startup of the STEG. Hard charcoal
16 was used to test the performance of the STEG, including the startup performance, power load
17 feature, response dynamics when adding a load and thermoelectric efficiency. Results showed that
18 the STEG can be self startup. The measured maximum electricity power is 12.9 W, and the
19 thermoelectric efficiency lies between 2.4% and 2.8% when the temperature difference ranges
20 from 119 °C to 147 °C. The response time is short enough (several seconds) to stable the outputs,
21 and the cold end temperature is low enough, i.e. less than 65 °C to install normal cooling fans.

22
23 **Keywords:** Thermoelectric generator, power load feature, response dynamics, thermoelectric
24 efficiency

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