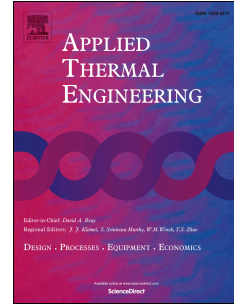


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Study and application of a regenerative Stirling cogeneration device based on biomass combustion

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1 **Study and application of a regenerative Stirling cogeneration device based on biomass**  
2 **combustion**

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13 **Abstract**

14 Fuelling micro-combined heat and power (micro-CHP) devices using renewable sources, such as  
15 biogas, can enhance the energy and environmental benefits associated with such devices. This  
16 paper presents a solution for increasing the electric efficiency of biogas-fed Stirling co-  
17 generators by recuperating the energy content of the combustion flue gas. When economically  
18 and energetically convenient for micro-CHP operation, the exhausts can be used to pre-heat fresh  
19 combustion air. It was assessed that, due to the introduction of a spiral gas-gas heat exchanger,  
20 whose main design parameters were identified, the electric efficiency of the Stirling unit can be  
21 raised to up to 22.5%. To determine the advantages of applying the system analysed over a  
22 traditional Stirling device, a specific algorithm for the optimal management of the micro-CHP  
23 unit was built and applied to a residential case study. The results demonstrate that the extra cost

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