Domestic thermoelectric cogeneration drying system: Thermal modeling and case study

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Résumé en anglais	The demand for reducing fuel consumption and mitigating exhaust fumes accountable for the greenhouse effect push toward developing efficient energy recovery systems. Optimizing the heat recovery process can be achieved by adding multi-recovery stages. In this frame, the present work suggests a new multi-stage recovery system for heating water and air and generating electricity. The concept of the system is applied to the exhaust gases of a chimney. A complete thermal modeling of the system is drawn. Then a case study is carried out for three different fed fuels (diesel, coal, wood). The results show that when diesel is used water temperature achieved 351 K and 240 W electric power is generated. Moreover, a 0.16 m2 heat recovery heat exchanger area is required to heat air to 363 K at an air flow rate of 0.0076 kg/s. Such system can recover up to 84% of the energy lost to the environment when wood is utilized as a fed fuel.
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