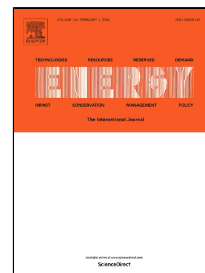


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Energy analysis of a co-gasification of woody biomass and animal manure, solid oxide fuel cells and micro gas turbine hybrid system

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1 **Energy analysis of a co-gasification of woody biomass and animal manure, solid oxide fuel cells**
2 **and micro gas turbine hybrid system**

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12
13 **ABSTRACT**

14 Co-gasification of woody biomass and animal manure is an effective technology to utilize
15 animal manure. In this work, the thermodynamic and economic analysis of an integration of co-
16 gasification of woody biomass and animal manure with solid oxide fuel cell (SOFC) and micro gas
17 turbine is carried out. The overall thermodynamic performance of this combined heat and power
18 (CHP) system is investigated by a mathematics models consisting of simple zero-dimensional model
19 of SOFC and one-dimensional model of downdraft biomass gasifier. The net present value (NPV)
20 method is adopted to investigate the economic feasible of the CHP system.

21 The gasifier model includes two parts. The pyrolysis-oxidation zone includes pyrolysis zone
22 and combustion zone, and a lumped capacitance method and chemical equilibrium are used to
23 simulate the species in pyrolysis-oxidation zone, while one-dimensional kinetic model is adopted to
24 analyze the performance of reduction zone, which considering geometrical dimensions of downdraft
25 gasifier and actual char conversion process.

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