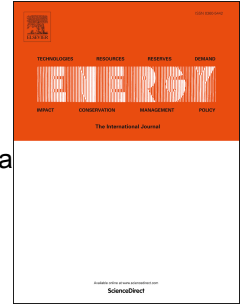


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Off-design performance analysis of a power-cooling cogeneration system combining a Kalina cycle with an ejector refrigeration cycle

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1 **Off-design performance analysis of a power-cooling cogeneration system**
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6
7 **Abstract**

8 This paper conducts the off-design performance analysis of a novel
9 power-cooling cogeneration system combining a Kalina cycle and an ejector
10 refrigeration cycle for low-grade hot water. Five plate heat exchangers, a separator, an
11 axial inflow turbine, two pumps, an ejector and two throttle valves are adopted. The
12 ejector refrigeration cycle using R134a is driven by the ammonia-poor solution from
13 the separator. A novel method for predicting the off-design performance of the
14 power-cooling cogeneration system is proposed. Variable hot water parameters,
15 condensation temperature and evaporator temperature are analyzed by the sliding
16 pressure operation approach. The results indicate that the system shows 619.74 kW
17 net power and 71.28 kW cooling at design conditions. As the mass flow rate ratio or
18 the inlet temperature of hot water increases, the net power, thermal efficiency and
19 exergy efficiency increase, while the cooling and cooling exergy decrease. The exergy
20 efficiency reaches the maximum of 39.82% at the saturated evaporator temperature of
21 6 °C. The cooling is more strongly affected by the hot water inlet temperature than the
22 saturated condensation temperature, while the turbine efficiency, net power, thermal

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