The performance of a temperature cascaded cogeneration system producing steam, cooling and dehumidification

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\textbf{ABSTRACT}

This paper discusses the performance of a temperature-cascaded cogeneration plant (TCCP), equipped with an efficient waste heat recovery system. The TCCP, also called a cogeneration system, produces four types of useful energy—namely, (i) electricity, (ii) steam, (iii) cooling and (iv) dehumidification—by utilizing single fuel source. The TCCP comprises a Capstone C-30 micro-turbine that generates nominal capacity of 26 kW of electricity, a compact and efficient waste heat recovery system and a host of waste-heat-activated devices, namely (i) a steam generator, (ii) an absorption chiller, (iii) an adsorption chiller and (iv) a multi-bed desiccant dehumidifier. The performance analysis was conducted under different operation conditions such as different exhaust gas temperatures. It was observed that energy utilization factor could be as high as 70% while fuel energy saving ratio was found to be 28%.

\textit{Keywords:} Temperature cascaded; Co-generation; Waste heat recovery; Energy utilization factor

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