

Second Generation Integrated Microturbine, Absorption Chiller, and Solid Wheel Desiccant System

This paper describes a second generation Cooling, Heating, and Power (CHP) for Buildings system. CHP systems have the potential to double the thermal efficiency of conventional coal-burning power plants by utilizing waste heat and eliminating losses due to transmission and distribution. However, system integration issues need to be reduced before these objectives can be realized. The CHP System being evaluated consists of a microturbine generator that provides on-site electrical power, using natural gas as fuel, for a medium-sized commercial office building. The waste heat of the microturbine is used in a single-effect absorption chiller, which provides cooling, and a solid wheel desiccant system, which provides dehumidification. Technical issues related to modifications of the original CHP system are described and improvements to the original system design and performance are evaluated including a reduction in the number of components, a reduction of parasitic power consumption, and improvements in controls for the heat recovery process. Overall system performance as well as individual component performance is compared between the first generation CHP system and the current system. For example, a 62% reduction in parasitic power consumption is accomplished in the new design. Recommendations are presented for further improvements on integrated CHP systems for commercial applications.

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