



## **OPTIMAL CAPACITY SIZING OF AN ENERGY SUPPLY SYSTEM IN A MICROGRID BY CONSIDERING THE EFFECT OF BACKUP CONTRACT AND SCALE ECONOMY**

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**ABSTRACT**—A methodology was developed to design the number and capacity for each piece of equipment (e.g., gas engines, batteries, thermal storage tanks) in a microgrid that has a combined heat and power (CHP) system. In this design methodology, annual cost including the annual operation cost and the annual initial cost is minimized. Based on calculations using this design methodology, it is found that scale economy increases the needed capacity of the gas engines. And a backup contract with the utility decreases the needed capacity of the largest gas engine and evens out the capacities of the gas engines. The thermal storage tank for space cooling and space heating is selected to minimize the use of auxiliary equipment such as a gas absorption chiller.