Proceedings of the Annual General Donald R. Keith Memorial Conference
West Point, New York, USA
May 2, 2019
A Regional Conference of the Society for Industrial and Systems Engineering

Decision Support System for a Chilled Water System

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Author Note: The authors of this project are part of GMU's senior capstone program enrolled in the senior design class at GMU. Kayla Corey endorsed the project to the professor due to her employment at NIH showing her the need for system engineering principles to be enacted. Professor Donohue has provided ample and invaluable guidance on the project.

Abstract: National Institutes of Health (NIH), Bethesda Campus, utilities a chilled water system to provide chilled water to its campus. The chilled water system has a maximum initialed cooling capacity of 60,000 Tons of Refrigeration and is comprised of 12 chillers, 4 heat exchangers, and an 8.7 million gallon Thermal Energy Storage System (TESS). The current decision making is based on individual preference without concern for optimal system performance. In daily operations, decisions are made that affect the reliability, performance, and maintenance of the system. The decisions are made for each component and include when and how to operate the component. In an effort to increase reliability and efficiency of the system, a Decision Support System (DSS) was created to implement the stochastic optimizations. Optimization results predict an estimated $3 million in savings annually, and the implementation of an active DSS estimated to be over $3.5 million in savings.

Keywords: HVAC, DSS, Optimization

ISBN: 97819384961-6-5