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ASHRAE Releases New Research that Finds Thermal Energy Storage Can Increase Use of Renewable Energy Resources and Reduces Operating Costs for Building Owners

Findings explore how utilities can reach renewable penetration targets with Cool Thermal Energy Storage and increase energy utilization by 10 to 50 percent

A new research project by [ASHRAE](#), the American Society of Heating, Refrigerating and Air-Conditioning Engineers, is announcing the results of research project 1607 on Cool Thermal Energy Storage (CTES), a widely-implemented technology for building owners that, historically, has been used to shift when building air conditioning systems draw power from peak times to periods when electricity is less expensive. Renewed interest in the technology may now be driven by results from this project that show CTES can boost the utilization of renewable energy resources by as much as 50 percent and reduce owners' operating costs.

"There's increasing interest in renewable energy resources to not only meet renewable portfolio standards mandated by states but to also achieve net-zero energy performance for buildings. The transient nature of renewable electricity generation from intermittent sources like solar photovoltaic and wind turbines can create significant challenges for utilities that are obligated to meet the instantaneous demands of their customers with high reliability. Significant efforts have been expended to develop large-scale battery storage; however, CTES is a technology that is mature, reliable, cost-effective, and offers the potential of storing significant amounts of energy to better manage facility demands and enabling increased renewable energy generation," said Professor Reindl, one of the project's Principal Investigators. "The objective of this research project was to evaluate the potential of CTES as an enabling technology for increased penetration of renewable energy generation. We found that CTES' capability to shift away from times of high electricity usage as well as its ability to potentially match short-term variations in renewable energy production can provide additional value to the building owner and to the utility – in addition to being more cost-effective compared to alternative energy storage technologies."

Large buildings rely on electric chillers that operate to meet space cooling loads as they occur, but chillers are one of the major contributors to peak electrical demand, which results in grid congestion and high operating costs for building owners. Using CTES, building owners can benefit from its ability to reduce electricity costs by shifting energy-intensive chiller operation from high cost on-peak periods to low cost off-peak periods. CTES capacity is not dependent on the rate of charge, which allows variable load chillers charging CTES to follow the instantaneous production from renewable energy sources.

This project developed control strategies to more effectively utilize the generation of electricity from renewable energy resources. Overall, the results suggest that widespread implementation of CTES systems, in existing or new facilities will assist utilities in reaching their renewable penetration targets. The control strategies operate electricity-intensive chillers to charge thermal storage systems during periods of high renewable generation, followed by idling the chillers and discharging the storage to meet building cooling loads during periods of low renewable generation. The strategies aim to maximize the chiller energy consumption met by electricity generated from wind or solar. Additional CTES control strategies aim to maximize the net economic benefit of owning and operating a CTES system.

To view the full report, please visit the website.

About ASHRAE

ASHRAE, founded in 1894, is a global society advancing human well-being through sustainable technology for the built environment. The Society and its more than 56,000 members worldwide focus on building systems, energy efficiency, indoor air quality, refrigeration and sustainability. Through research, standards writing, publishing, certification and continuing education, ASHRAE shapes tomorrow's built environment today. More information can be found at www.ashrae.org/news.