NIH FEMP Award for the Thermal Energy Storage System (TESS)

This month, we would like to highlight the NIH Office of Research Facilities, Division of Technical Resources (DTR) for their work on the Thermal Energy Storage System (TESS). This project recently received a 2020 Federal Energy Management Program (FEMP) award, one of the highest honors for a federal sustainability project. The system primarily consists of a 100-foot tall water tank capable of holding up to 8 million gallons of chilled water to bolster the efficiency of the NIH Bethesda campus Central Utility Plant (CUP). The TESS facility began operation on August 6, 2018; in the months leading up to its completion, many of us likely witnessed the construction of this project near the intersection of Lincoln Drive and Service Road West, across the street from the CUP.

The CUP produces chilled water that is used across the Bethesda campus for critical purposes such as building climate control, equipment cooling, and much more. The TESS water tank functions like a massive thermos for chilled water, keeping it at the appropriate temperature. The philosophy behind the system is that maintaining a ready supply of chilled water allows for more efficient production and distribution. The TESS can be filled with chilled water during off-peak hours (typically overnight), when electricity rates and ambient temperature are lower than peak hours (typically midday). When chilled water demand increases during peak hours, chilled water stored in the TESS can be distributed throughout the campus to augment the current plant production. This provides the CUP with the flexibility to produce chilled water in a more efficient and cost-effective manner. The TESS is also equipped with optimization software that uses weather forecasting for the next 36 hours to predict campus chilled water demand, which helps ensure the tank contains an optimal amount of chilled water for the near future.

Throughout the 2018-2019 fiscal year, TESS usage resulted in $1.3 million in cost savings. These savings are chiefly a result of the increased efficiency of chilled water production during off-peak hours. The TESS provides several other benefits in addition to cost savings, such as providing the NIH with a chilled water reservoir in case of a power outage. The TESS can also act as a supplementary chilled water source if demand during peak hours exceeds the capacity of the 12 chillers currently used by the CUP. Additionally, the TESS enables future chiller renovations or replacements, as it can provide chilled water while the chillers are offline. The versatility and the redundancy offered by the TESS has significantly improved the operational flexibility and efficiency of the CUP, and thereby the operation of the NIH as a whole. The TESS and all individuals responsible for this project are highly deserving of the prestigious recognition garnered from this FEMP award!