



SHOWCASE PROJECT: UNIVERSITY OF SOUTH ALABAMA MEDICAL CENTER CAMPUS

SOLUTION OVERVIEW

University of South Alabama Medical Center's (USA Medical Center) campus in Mobile, Alabama consists of a 325,000-square-foot hospital and three mixed-use buildings with offices, outpatient clinics, laboratories, and research space totaling 200,000 square feet. In 2011, USA Medical Center installed the backbone of a building automation system (BAS) across the entire campus. The master plan was to allow better understanding of the campus' energy consumption and provide areas of opportunity to improve efficiency as funds became available.

This initial installation included controls and hardware for larger mechanical systems within the hospital with future opportunities to add additional controls and programming to other parts of the hospital as well as the balance of the campus.

In 2014, USA Medical Center sought out a financing opportunity for campus-wide energy efficiency projects to upgrade outdated technologies that were unable to address the variable needs of the mixed-use campus. USA Medical Center entered into a partnership with Alabama Power to oversee systematic energy upgrades. Alabama Power provided an on-bill financing structure to fund various projects and handled all engineering design and installation. The Director of Facilities Management at USA Medical Center developed a list of "low-hanging fruit" projects that could be implemented easily and reap big savings. In addition, Alabama Power conducted an energy audit of the campus to provide input on energy conservation measures that were eventually included in the final proposal.

SECTOR TYPE

Commercial

LOCATION

Mobile, Alabama

PROJECT SIZE

535,000 Square Feet

SOLUTIONS

Leveraging the partnership with Alabama Power, USA Medical Center implemented a variety of efficiency measures across the medical campus that benefited the bottom line, improved overall

energy and water efficiency, and maintained or improved patient and staff comfort.

The existing central chiller circulated chilled water to buildings on campus, including the hospital, with an average flow rate of 3,000 gallons per minute. The original circulation loop was unable to vary the flow rate based on the outdoor temperature or actual cooling needs for heat exchange at the individual chilled water coils in air handlers; it also circulated more chilled water than necessary on cooler days.

Alabama Power, in conjunction with Siemens energy efficiency engineers, conducted a chiller plant optimization analysis. The data was used to develop computer models to optimize the pump/motor functions to meet Btu heat exchange needs in real time, adjusting the amount of water supplied to the chilled water coils. This project involved measuring the necessary discharge air temperature and chilled water valve position, then provided that information to the BAS in order to adjust the amount of supplied water. The chiller plant optimization is a significant water- and energy-saving upgrade that is expected to reduce the medical center's energy bills by an annual average of \$90,000.

One clinical laboratory building on the campus had an outdated, extremely inefficient electric 240-ton chiller and gas boiler. Instead of replacing the equipment, the engineering team identified an innovative way to integrate the building into the main heat recovery chiller plant. The project connected the lab to the central plant to provide both chilled and hot water, eliminating the need for the existing chiller and boiler. As a precaution, the building's chiller and boiler were not removed in case they are needed to supplement the main plant's heating or cooling at any point in the future.

Additional cost-saving measures implemented across the medical campus include the following:

- Upgraded from fluorescent lamps and ballasts to LEDs for interior lights in common areas that operate 24/7.
- Upgraded from mercury vapor high pressure sodium metal halides to LEDs for exterior lights in parking lots and streets lights that operate 24/7.
- Replaced least-efficient electrical fan and pump motors with new high-efficiency motors.
- Installed variable frequency drives (VFDs) on the largest pumps and fans (3 HP – 150 HP) for air handling units, exhaust fans, and cooling towers, and connected the VFDs to the BAS.
- Replaced a 40-year-old boiler with a heat recovery chiller that extracts heat from the chilled water system to heat the building, completely eliminating natural gas expenses.
- Replaced a 30-year-old boiler with a small electric compact boiler (the building had direct expansion units for cooling) that is significantly more energy efficient.

All projects were completed over the course of the 2016 calendar year. With Alabama Power's on-bill financing structure, 20 percent of the anticipated \$280,000 in annual cost savings will be seen on USA Medical Center's bottom line and the remaining 80 percent will finance the debt of the efficiency projects. USA Medical Center originally anticipated the projects would be paid off in ten years, but after seeing the initial savings post-project completion, it is expected the payback will be much sooner.

OTHER BENEFITS

A major benefit of the equipment upgrades has been the significant reduction or elimination of annual maintenance costs due to improved efficiency and modernization. The annual maintenance and repair expenses for the 240-ton chiller and gas-fired boilers are minimal. The annual cost of labor and materials required for changing lamps and ballast in the interior and exterior lighting fixtures that were retrofitted with LED has been eliminated. New high-efficiency motors and VFDs will extend the life of systems throughout the campus.

Annual Energy Use

Baseline(2015)
137 kBtu/sq. ft.

Actual(2017)
122 kBtu/sq. ft.

Energy Savings

11%

Annual Energy Cost

Baseline(2015)
\$1,400,000

Actual(2017)
1,237,000

Cost Savings

\$163,000



University of South Alabama Medical Center entrance