Reliability, Sustainability, and Savings for Campbell University

The John W. Pope Jr. Convocation Center at Campbell University is an important resource for the college, as well as for the community of Buies Creek and Harnett County, North Carolina. Students and residents alike enjoy watching college hoops in the center's 3,200-seat Gore Arena. This large arena also hosts graduation ceremonies for the university and several local high schools, concerts, banquets, and other large-venue events. The center includes a smaller practice gymnasium that is also used to host banquets, meetings, and other events. Add to these uses the university athletics offices and you have an invaluable multi-use facility.

Challenge

The Convocation Center is more than 109,000 square feet under-roof. The size of the facility and the diversity of its uses present a unique operational challenge. A large cooling load is needed when the Gore Arena is in use, but a small fraction of that cooling is necessary at most other times. The original 500-ton chiller could easily handle the cooling needs of a full-house arena event, but was much less effective—and very inefficient—for other uses. During routine daily use of the center, the large chiller did not cycle properly at such low demand, causing noise issues and unreliable temperature control. In fact, extensive use of pre-heat was required to increase cooling loads to run the large chiller during the cooler spring and fall months. As Randall Johnson, Associate Facilities Director, describes the situation: "That was a waste of both electricity and natural gas and still didn't provide the temperature control we needed."

The university knew an effective solution was needed for this important resource. They called on Brady to evaluate the facility's HVAC system and develop a plan to address the challenges.

"Continued energy savings means the total project cost will be recouped in less than six years"

Solution

Brady began with an energy audit of the Convocation Center. They gathered information and data on equipment conditions and operating parameters, chiller sizing and cooling load profile, and monthly operational costs. The information was used to identify specific problems and develop a plan to address those problems, keeping in mind the

university's goals of increased reliability and reduced operational costs. Mr. Johnson was "very impressed with the engineering that Brady put into the design of the improvements," and appreciated their consistent communication with the facilities managers as the project plan was developed. Brady then presented their findings and recommendations to the university administration, demonstrating how operations could be simplified, significant energy savings achieved, and reliability improved throughout the year.

The improvements centered on the installation of a new 200-ton air-cooled "pony" chiller to provide for low cooling loads, reserving the 500-ton chiller for high-load events. The chillers and other equipment were integrated using new automated controls and the operational sequence of the system was reconfigured to enable three cooling modes: free cooling, low-load cooling, and high-load cooling. Based on the Convocation Center's event schedule, the new system will use free cooling 37% of the time, the 200-ton chiller 61% of the time, and the 500-ton chiller only 2% of the time. Brady included a backup cooling strategy within the new system in case a catastrophic failure occurred. Emergency chiller connections were installed and integrated into the controls system to ensure operational continuity even during such an event. Johnson once again expressed his appreciation for Brady's excellent communication with him during all phases of the project, including the project management team and technicians.

Brady implemented other energy-saving measures at the facility as well. Air handling units (AHU) were fitted with electronic control valves and damper actuators to replace pneumatics and VFDs were installed to convert single-zone constant volume AHUs to variable volume operation. Lighting improvements included high-bay LED fixtures in the practice gym, LED fixtures for general lighting throughout the facility, and occupancy control sensors to conserve energy when lighting was not needed.

The project modifications qualified the university to receive utility rebates through the Duke Energy Smart $aver™ program. Brady has helped many clients take advantage of the Duke incentives program, so they are thoroughly familiar with the forms, information, and timing needed to receive a maximum rebate. "Brady was a big help to us in applying for the rebate and following up once our application was submitted to Duke," reports Johnson.

Results

Campbell University and the community are now enjoying the many rewards of their undertaking. Students, staff, and visitors experience a consistently comfortable indoor environment when at the Convocation Center, no matter the outside temperature. The facilities team enjoys the reliability of the new system as it adapts for each unique use and event at the center, and the backup cooling system provides them with additional peace of mind.

The college is also realizing monetary rewards for their efforts. The college received a $132,785 utility rebate from Duke Energy for the following:

- $9,000 for the energy audit
- $33,120 for the LED lighting
- $26,612 for the high efficiency chiller
- $64,053 for the HVAC system optimization

During the first year of system operation, Campbell saved $125,938 in energy costs thanks to the reduction in electricity and natural gas use at the Convocation Center. Adding these savings to the utility rebate results in a $258,723 first-year offset of the $837,831 total project cost—a 31% payback the first year! Continued energy savings means the total project cost will be recouped in less than six years, providing a 22% internal rate of return thanks to the modernized system. That's an astounding rate of return anyone would be happy to receive!

The university is finding other benefits of their new system beyond the energy cost savings. The reduction in cooling tower run time has resulted in water and sewer cost savings. The facilities staff are spending less time on lighting maintenance

thanks to the long-life LED fixtures and less time on AHU maintenance thanks to the new electronic controls. The college is also happy to be furthering its sustainability efforts thanks to the improvements. Reduced energy use reduces their carbon footprint, and the use of non-hazardous LED bulbs eliminates the mercury-containing fluorescent and CFL bulbs.

Brady—the expertise and commitment to service needed for advanced building operations and tangible savings.