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Qualcomm Institute to Save Nearly Half a Million Dollars Per Year with Energy Efficiency Measures

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San Diego, Calif., Oct. 5, 2017— The Qualcomm Institute at the University of California San Diego will save more than $486,650 per year in energy costs thanks to a series of energy-efficiency improvements to Atkinson Hall, where QI is headquartered.

Atkinson Hall

The improvements, which were mainly made to systems in the building that maintain air flow and air cooling and heating, amount to a 39 percent annual energy savings due to reduced electricity use and use of both chilled and hot water. UC spent less than $40,000 in project costs to make the improvements. For their work, QI Facilities Manager Timothy Beach and QI Facilities Coordinator Rene Real were awarded a Best Practice Award for HVAC Design/Retrofit and Commissioning by the California Higher Education Sustainability Conference.

San Diego Gas and Electric approached the leadership of the Qualcomm Institute after it was determined that Atkinson Hall, which was completed in 2005, “was consuming more energy than some of the older buildings at UC San Diego that didn’t have energy-saving devices,” notes Real.

In collaboration with representatives from the energy intelligence company ENERNOC, Real and Beach completed a nearly three-year overhaul of the entire building, running probes and testing every fan, cooling coil and system component to determine which areas in the building

were the biggest energy consumers.

“In the beginning,” recalls Real, “it was more like an Easter egg hunt, where you’re going through trying to find the biggest energy draw and making the correction. Tim was here when the building was constructed so he knew where all the problem areas were and what could be potential problems in the future. It took two to three weeks to assess the building, but it took three years to get everything fixed and put right.”

Atkinson Hall’s unique combination of laboratory and office space posed a significant challenge: Finding a way to keep the building’s computer servers, laboratory equipment and other machinery cool while not freezing out the building’s occupants.

The Photonics Lab on the sixth floor of Atkinson Hall is a prime example. Normally, facilities managers will put air handlers (devices used to circulate and regulate air) on a schedule that allows them to be turned off at night when the building is vacant.

“But the Photonics Lab has server racks, photonics tables and a bunch of equipment running 24/7 when they have experiments underway,” adds Real. “It it starts overheating, it will ruin their experiments. We were also having to run the air temperature near the lab almost five degrees cooler to accommodate the lab’s heat load, which makes the rest of the building cold in that area.”

Their solution was to put a fan coil unit in a storage room near the laboratory to run at night, allowing Real and Beach to schedule the building’s other air handler to turn off between 10 p.m. and 4 a.m. Better yet, the fan they put to use had been sitting idle for 10 years on blocks outside the building, where it was slotted for removal. As luck would have it, it had enough capacity to be put into service, which meant more money saved.

Replacing a series of tiny rubber caps—all 286 of them— proved to be the source of additional energy savings for the Qualcomm Institute. The caps were located on the terminal units of VAV boxes in the building, which are also known as variable air volume terminal units and are used to condition the air after it enters the building via a fan.

“The VAV box has a heating valve that is controlled by a thermostat,” explains Real, “and the campus likes to standardize the temperature in buildings at between 72-74 degrees. The problem was these rubber caps had started to fail and would send false signals to the VAV boxes saying they were at 100 percent constant volume or 100 percent closed, which means

certain parts of the building were getting no air at all, while in other parts of the building it was like a hurricane." A crew of six technicians spent four weekends removing all 286 rubber caps and replacing them with more robust brass caps.

Additional cost savings came from decommissioning and relocating a number of computer servers that were previously housed in Atkinson Hall, which resulted in in an additional energy savings of 64 kw—nearly half the previous consumption.

QI Director Ramesh Rao notes that "high performance networking and remote management tools have enabled colocation of computers in facilities designed for such use. QI successfully completed just such a project."

Other energy efficiency measures in the building included:

- Relocating differential pressure sensors from the building's basement to the sixth floor (to facilitate more accurate readings of air volume in the building) ;
- Switching to economizer dampers, which allows the air handler to run more efficiently by bringing in cool air from outside instead of having to use chilled water to cool air;
- Installing motion sensors in perimeter offices and in conference rooms to control lighting (as well as scheduling lighting in the remainder of the building to turn off at 10 p.m. and on at 7 a.m.);
- Implementing static air pressure sensors to control air pressure in the building, which keeps outside doors from either slamming shut or remaining open when they shouldn't (a potential security risk).

"I'd say that the primary driver for success in this project was engaging and coordinating closely with the facilities staff from day one and throughout the project," says Grace Junge, an energy engineer from ENERNOC who worked with Beach and Real. "This allowed us to make sure that our project didn't just save energy, but also met the functional needs of the building. Feedback from Tim and Rene helped us to catch and rectify unexpected side effects from the various energy efficiency measures quickly, and identify problem areas up front. These efforts ensured that when the project was over, we left Tim and Rene with a building that worked better than when we started while using significantly less energy."

Says Real: "What people should take from this, if anything, is that it should be the standard for all campuses and even all cities to go through and implement this fine tuning of buildings. Changing just a little bit will have a huge impact on our resources. Even though there are some

big hurdles to overcome, in the long run it will save energy, and that makes your building run more efficiently and last longer. We will continue to try to take out what's old and implement new technology that will make it run better than it did 10 years ago."

The moral of the story: Energy savings is an ongoing process, So what's one thing Real wishes people in Atkinson Hall would do to keep the momentum going?

"Turn off your computer monitors when you're not using them," he says. "You don't have to shut the computer itself down, but if everyone in the building turned off their monitors, we'd save a lot of money just by doing that."

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