

Aircuity case study

Bristol Community College

Aircuity's solution helps achieve zero net energy while enhancing safety in the lab.

BRISTOL COMMUNITY COLLEGE (BCC) offers associates degrees and certificates in over 150 programs through its main campus in Fall River, Massachusetts and several satellite locations. With its growing number of students, BCC commissioned architect and engineering firms Sasaki Associates, Bard, Rao + Athanas Consulting Engineers (BR+A), and Haley & Aldrich to design the 50,000sf John J. Sbrega Health and Science Building based on standard high performance building design. A design was created to meet the state requirement of LEED® Silver Plus, which includes a minimum of 20% energy cost reduction compared to the ASHRAE 90.1-2007 baseline.



Image: Sasaki Associates.

The project was put on hold awaiting funding and in the meantime BCC increased commitment to their American College & University Presidents' Climate Commitment goal of achieving carbon neutrality by 2050 by initiating a site-based solar array. This commitment presented an opportunity for BR+A and Sasaki to reassess the "high performance design" and develop a zero net energy

(ZNE) design instead. With the large amount of lab and other energy intensive space, the firms needed to not only reduce energy use and eliminate the reliance on fossil fuels, but in order for the design to be truly successful, the space needed to be a safe and healthy environment for students and staff as well.

THE SOLUTION

The firms collaborated to create a ZNE design. One of the larger contributors to achieving net zero energy included a hybrid ground-source and air-source heat pump to avoid fossil fuels. Equally as important to the design was airside optimization to address the HVAC energy use—which typically accounts for 50-70% of the total energy consumption in a lab building. Optimizing the HVAC energy use in the building included designing in filter fume hoods, fan coil units, enthalpy wheels and Aircuity.

AIRCUITY'S TRIPLE PLAY

Aircuity was introduced to the design through channel partner Flow Tech, Inc. and produced a trifold of benefits. First, Aircuity allowed for a reduction in the baseline air change rates from 6ACH to 4 ACH during occupied times and 2 ACH during times when the space is typically unoccupied. Next, optimizing the amount of fresh air ventilation in the labs along with filtered fume hoods & fan coil units meant the air handler and ductwork could be sized for minimum air change rates, resulting in first cost savings. As a third benefit, including Aircuity in the design enhanced the environment for both students and staff and added an extra sense of safety to the space. When an event is sensed, such as a spill, ventilation rates are

automatically increased until the air is determined to be clean once again. Data on the indoor environmental quality of the space is accessible through Aircuity and can be tracked and measured as another way to oversee what is going on in the space.

ZNE MODEL: A WIN ON ALL FRONTS

Overall the ZNE design beat the original high performance design on all sides. It not only eliminated fossil fuel consumption, but it comparatively reduced overall energy consumption by a predicted 70%. The reconciled construction budget of the ZNE design resulted in a slight increase in cost. This increase was more than covered by the utility incentives and a Pathways to Zero Grant from the MA DOER. As shown in the chart below, the net life cycle cost savings of the building and power purchase agreement are estimated to be over \$4 million. “The silver lining is that the combined operating savings of \$230,000 per year is roughly equivalent to the annual tuition of 50 students at BCC,” said Jacob Knowles, Director of Sustainability Design at BR+A.

The outstanding results have earned attention and

accolades. The project received the three following awards and recognitions in 2014: MA DOER Leading by Example Award, ASHRAE Region 1 Award for Engineering Excellence and Community College Futures Assembly Bellwether Award Finalist 2014. In 2015 the project earned a National Association of College and University Business Officers Innovation Award. This demonstrates that with the right design, ZNE is achievable and the better choice based on energy use, project cost and the indoor environment.

ABOUT BRISTOL COMMUNITY COLLEGE

As the leading resource for education and workforce development in southeastern Massachusetts, Bristol Community College provides programs that promote individual opportunity and the region's economic health. The College has an undergraduate population of 12,514 (unduplicated headcount of credit students for 2013-14) and 19,256 in noncredit enrollments. Bristol Community College changes the world by changing lives, learner by learner. For more information visit

www.bristolcc.edu.

ABOUT AIRCUITY

Aircuity is the smart airside efficiency company providing building owners with sustained energy savings through its intelligent measurement solutions. By combining real-time sensing and continuous analysis of indoor environments, the company has helped commercial, institutional and lab building owners lower operating costs, improve safety and become more energy efficient. For additional information on the company and its solutions, please visit: <http://www.aircuity.com>.

