University of Pennsylvania

Dedicated to Achieving a Sustainable Campus

Today Penn is home to a diverse undergraduate student body of over 10,000, hailing from every state in the U.S. and all around the globe. Penn consistently ranks among the top 10 universities in the country. Another 10,000 students are enrolled in Penn's 12 graduate and professional schools. Penn's campus is comprised of over 13 million square feet and 135 buildings.

In 2007, the University of Pennsylvania's President Amy Gutmann signed the American College and University Presidents' Climate Commitment (ACUPCC). This pledge committed Penn to developing plans for significant (18% in 5 years) reduction of its emissions of climate-altering greenhouse gasses. The Climate Action Plan lays out the strategies that will be adopted by the University of Pennsylvania to achieve these goals, as well as the means to track and communicate progress to the Penn community and external audiences.

> "Aircuity has been critical to helping the University achieve our sustainability goals, ultimately granting a scorecard rating of "A" for our energy and CO2 reduction results."
>
> Dan Garofalo – Environmental Sustainability Coordinator
> **University of Pennsylvania**

Dan Garofalo, Environmental Sustainability Coordinator and Joe Monahan, Principal Planning Engineer conducted an extensive analysis of over 30 energy efficiency potential measures, and determined that an Aircuity campus wide program would be the single most beneficial measure they could pursue. Typical for most campuses, their lab and research buildings were determined to be the highest energy users and thus

account for over 40% of the total campus emissions. The analysis concluded that Aircuity's OptiNet system could generate savings which would exceed over 2 million dollars annually with typical ROI of less than 3 years.

START: HILL & LYNCH "PHASE 1" PROJECTS

Penn began working with Aircuity and their local representative, The Kirkman Oliver Company, in 2006. The team chose a teaching lab and a vivarium project, and began the process of involving the largest number of constituents including: Director of Sustainability, EHR&S, Vetranarian staff, Facilities and Senior Management.

It was decided that two projects (Hill and Lynch) would be installed and then monitored for a period of 1 year to validate the technology, gain user approval and prove energy savings estimates through and exhaustive measurement and verification (M&V) process.

PROJECT TIME LINE AND RESULTS

Project funding was approved in early 2008 and the final installation completed during the summer of 2008. Baseline data was measured prior to putting the OptiNet system into operation. The full M&V process began in the fall of 2008 and concluded in full during the fall of

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Aircuity case study

2009. Savings projections were met and/or exceeded for both projects and all parties concluded that the technology could benefit Penn in a campus wide approach.

EHR&S

As with many of Aircuity's clients, EHR&S was intimately involved in the decision to both move forward and test these two pilot projects. EHR&S at Penn was initially skeptical but open to the concept, if proven to work effectively.

During the 'test' phase of this project, EHR&S began

> "From our validation of Aircuity's OptiNet system for critical environments, the University now considers the technology a 'safety' system with significant energy savings benefits…"
>
> Joe Monahan – Principal Planning Engineer
> **University of Pennsylvania**

seeing various benefits of data output of the system. In one instance, a researcher was improperly venting his mass-spectrometer into a local snorkel exhaust and a TVOC event was occurring each day at the same time. EHR&S was able to correct this researchers' harmful

practice and has since realized on several occasions the system's safety benefits. The University has since labeled the system a "safety intelligence system that also creates energy savings".

MOVING FORWARD

Following the overall acceptance of the OptiNet system, Penn has since deployed the technology into (5) buildings on campus, including two non-lab classroom style buildings, one new construction lab and vivarium project, Translational Research building and completion of Hill and Lynch.

BUILDINGS

FISHER TRANSLATIONAL RESEARCH (300,000SQ.FT.)
Building Use: Scientific Research
Application: Lab & Vivarium DCV & IEQ Monitoring

CAROLYN HOFF LYNCH LIFE SCIENCES (110,000SQ.FT.)
Building Use: Scientific Education
Application: Lab DCV & IEQ Monitoring

VERNON & SHIRLEY HILL PAVILION (125,000SQ.FT.)
Building Use: Common Computer Lab for Student Use & Classrooms
Application: Vivarium DCV & IEQ Monitoring

LAW SCHOOL BUILDING (85,000SQ.FT.)
Building Use: Classrooms
Application: IEQ Monitoring, DCV, Differential Enthalpy Control

WILLIAMS HALL (50,000SQ.FT.)
Building Use: Classrooms
Application: IEQ Monitoring, DCV, Differential Enthalpy Control