

HARVESTING
A NEW CROP OF
SUSTAINABILITY

CASE
STUDIES



Compiled by Steve Glazner

To celebrate the 2017 Smart and Sustainable Campuses Conference, held March 26-28 at the University of Maryland College Park, we are highlighting innovative and exciting sustainability initiatives at 27 educational institutions across North America. This is an increase from the 16 we featured last year and includes entries from 19 states and province, and from both private and public colleges and universities, as well as a preparatory academy.

You'll find a wealth of great programs and ideas here—from sustainability literacy to learning gardens, from bike strategies to recycling, and much in between. What is inspiring is that these two-dozen-plus case studies barely scratch the surface of the thousands of sustainability and energy initiatives that are planned or underway every day on our campuses.

To that end, APPA is planning to produce a compilation of as many campus case studies as we can highlight in an attractive publication that can serve as a valuable resource to your work. If you are interested in having your campus included, please contact Steve Glazner, APPA's director of knowledge management, at steve@appa.org, using the Subject line *Campus Case Studies*. We'll publish specific instructions later for submitting your entry.



BALL STATE UNIVERSITY

Muncie, Indiana

Submitted by Robert J. Koester, Professor of Architecture & Director, Center for Energy Research/Education/Service

GEOTHERMAL YIELDS CARBON-REDUCTION CREDITS

Since 2012 Ball State University has generated revenue by piloting and employing carbon market methodologies to transact the carbon-reduction credits associated with its district-scale geothermal project. This closed loop, ground source heat-pump-chiller cooling and heating system (which is the largest in the U.S.) enabled the university to not only replace its inefficient chiller plant equipment but also to take multiple coal-fired boilers offline; significantly eliminating Scope 1 and Scope 2 greenhouse gas emissions.

As the system has become more fully managed the university's total CO₂e emissions continue to fall. The geothermal system currently cools all 47 campus buildings and heats 37; when remaining connections are completed all 47 campus buildings will be online for both cooling and heating.

Through Second Nature's Carbon Credit and Purchasing Program, Ball State has been able to turn its Scope 1 and 2 emissions reductions into carbon credits, which are then sold for revenue on the voluntary carbon market. In addition to this carbon revenue, the project saves Ball State \$2 million annually in operational expense. The aggregated operational and carbon capital has enabled Ball State to advance its target of campus-wide carbon neutrality from 2050 to 2030. ➤



BRANDEIS UNIVERSITY

Waltham, Massachusetts

Submitted by Sarah Horn, Borrego Solar Systems

SOLAR ENERGY COMPANIES COLLABORATE TO INSTALL 1.3 MEGAWATT VIRTUAL-NET-METERED SOLAR ARRAY

Four solar project partners—Competitive Energy Services, Kenyon Energy, Borrego Solar Systems, and AEW Capital Management—have developed a collaboration with Brandeis University on a solar energy system that will directly reduce Brandeis' electricity costs. The system is expected to be operational in spring 2017.

Under the program, Brandeis will purchase solar energy from a 1.27 megawatt (MW) system installed on the roof of a property in Somerville, Massachusetts. Through the utility billing mechanism known as virtual net metering, Brandeis will receive credits on its utility bill for every kilowatt hour (kWh) produced by the remotely located installation.

“We hope this is the first of many opportunities to support new solar developments in Massachusetts, and hedge against the volatile, fossil fuel-based electricity market,” said Mary Fischer, Brandeis' sustainability manager. “While we continue to investigate long-term, on-site solar for our campus, this agreement is an immediate opportunity to demonstrate our commitment to sustainability and fiscal responsibility.” Fisher said that the system is expected to reduce Brandeis' energy bill by an estimated \$70,000 in the first year, and up to \$2 million over 20 years. ➤



COLLEGE OF CHARLESTON

Charleston, South Carolina

Submitted by Todd LaVasseur, Director, Quality Enhancement Plan



PROMOTING SUSTAINABILITY LITERACY

The College of Charleston is set to embark on an innovative campus-wide enhancement of student learning on sustainability literacy. Sustainability literacy is the entire focus of the college's forthcoming Quality Enhancement Plan (QEP), beginning in academic year 2017-2018, titled "Sustainability Literacy as a Bridge to Addressing 21st Century Problems." Part of the college's reaffirmation with the Southern Association of Colleges and Schools Commission on Colleges includes generating a new QEP. The college leadership's decision to support this QEP topic recognizes the importance of sustainability for navigating the many challenges that CofC graduates will have to address and solve in the coming years and decades.

Through this QEP project, CofC students will be exposed to

systems thinking, interdisciplinary teaching and research centered upon the triple bottom line, and be provided a plethora of curricular and co-curricular opportunities to learn about sustainability and how to become advocates for resiliency. An exciting institutional innovation within which the QEP will be housed and administered is the creation of a Sustainability Literacy Institute (SLI). The college is excited to see how the SLI and the QEP help embed sustainability literacy as an academic pursuit at CofC. ➤

COLLEGE OF WILLIAM & MARY

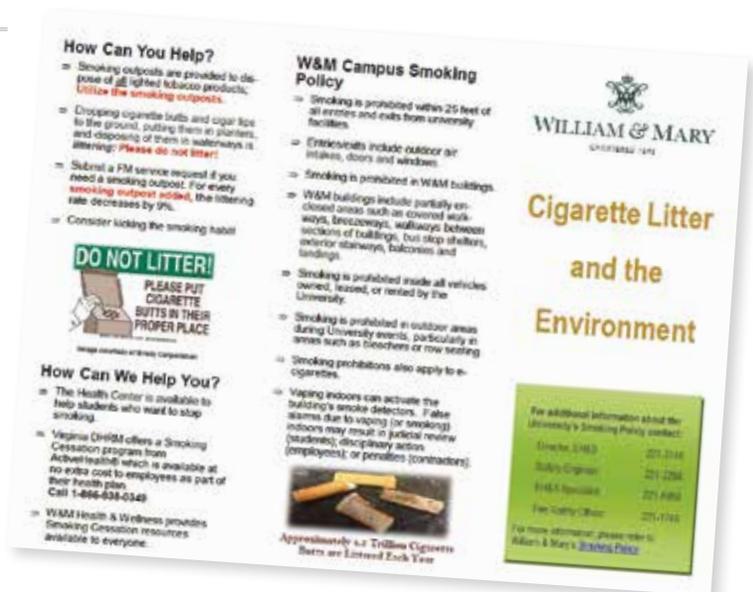
Williamsburg, Virginia

Submitted by Sandra Prior, Director Environment, Health & Safety

REDUCING HARMFUL ENVIRONMENTAL EFFECTS OF CIGARETTE-BUTT LITTER

William & Mary EcoAmbassador, Kacey Schwartz '16, worked with Facilities Management to mitigate the negative effects of cigarette-butt litter on campus. Schwartz's project supported W&M's stormwater management efforts in Public Education and Outreach by focusing on one of the university's high-priority areas—plastics diversion—because the filters consist primarily of cellulose acetate, a plastic that takes approximately 8 to 15 years to degrade. The filters also contain chemicals that leach into the local waterway and harm marine life because they mistake the filters for food.

The project began by creating a detailed map of campus smoking outposts followed by identifying those positioned less than the required 25 feet from university buildings and those needing replacement/repair. Schwartz then made recommendations for additional outposts and relocation of others to optimize their use. She also identified areas of excess litter, noting their proximity to existing outposts and contacted the Environment, Health and Safety Office to collect and recycle the cigarette-butt litter through TerraCycle's Cigarette Waste Brigade. Schwartz then developed an educational brochure to communicate cigarette-butt litter hazards and the university's prevention efforts. The outpost analysis and education outreach resulted in reducing campus cigarette-butt litter and identifying a sustainable solution for its disposition. ➤





COLORADO STATE UNIVERSITY

Fort Collins, Colorado

Submitted by Carol Dollard, Energy Engineer



COMMITTING TO CLIMATE REALITY AND RENEWABLE ELECTRICITY

Sustainability is a core tenant at Colorado State University. CSU has earned many accolades for our progress to date, including the distinction of being the only institution to attain a Platinum score through STARS (AASHE's Sustainability Tracking, Assessment & Rating System), the most recognized and comprehensive assessment of campus sustainability. While CSU has had a Climate Action Plan in place since 2010 and has committed to climate neutrality by 2050, we wondered, "How do we up our game?"

The answer? Colorado State University has become the first Research 1 University to sign the Climate Reality Project *100% Committed* Pledge to utilize 100 percent renewable electricity by 2030! This journey began with a student campaign. While the proposal was being vetted through the President's Sustainability Committee, the students submitted a petition with over 4,000 signatures.

Facilities Management staff supported the campaign with an analysis that weighed the positive financial and environmental impacts of renewable electricity. In a signing ceremony on January 25, 2017, CSU's President Dr. Tony Frank signed the Climate Reality Pledge alongside the students who had worked so hard for it. This pledge is not taken lightly and now, with renewed passion, we will work to realize this goal. Go RAMS! ➡

DREXEL UNIVERSITY

Philadelphia, Pennsylvania

Submitted by Rosemarie Fabien, Fabien Communications

PROMOTING SMART GROWTH AND COMMUNITY REVITALIZATION

Drexel University was the inaugural recipient of the Joanne Denworth Founders Award by the 10,000 Friends of Pennsylvania, a nonprofit organization supporting smart growth, public transit, urban infrastructure, and community revitalization that exemplifies sound land-use principles. Drexel President John A. Fry accepted the honor and delivered keynote remarks at the Commonwealth Awards celebration on the evening of January 24, 2017 at the Academy of Natural Sciences of Drexel University in Philadelphia.

"Under John's leadership, Drexel University is transforming our region," said Caroline Boyce, 10,000 Friends' Board Chair. "Through creative partnerships with the City of Philadelphia, University City District, and other development partners, the University is reshaping and revitalizing Philadelphia in bold, strategic ways. We are delighted to celebrate these game-changing, smart growth initiatives through the annual Commonwealth Awards program." ➡



FURMAN UNIVERSITY

Greenville, South Carolina

Submitted by Laura Bain, Associate Director of Sustainability Assessment

FURMAN'S LAKE RESTORATION PROJECT

The Furman University Lake Restoration Project is a tangible example of Furman's commitment to sustainability. This 28-acre campus centerpiece was constructed in the mid-1950s and provided a variety of recreational opportunities for many years. Over time, sediment accumulated, waterfowl populations multiplied, and stormwater runoff increased, all contributing to algal blooms and high bacteria counts. In 2006, Furman created a Lake Restoration Master Plan and began implementing changes designed to improve the quality of the lake, including vegetated buffers and rain gardens to slow stormwater, removal of excess waterfowl, and educational signage.

The next phase of restoration is underway, funded by a \$95,000 grant from Duke Energy's Water Resources Fund. A dike was removed and replaced with a pedestrian bridge, and a series of floating marsh islands was installed on either side of the bridge. The marsh islands will eventually take root, aiding in nutrient uptake while providing excellent wildlife habitat. The pedestrian bridge will include observation benches and educational signage for students and the surrounding community. The lake continues to serve as a living learning laboratory for Furman students, lending itself to an array of academic studies that highlight the effects of restoration efforts on water quality. ➤

Photo credit: Suresh Muthukrishnan



GEORGIA STATE UNIVERSITY

Atlanta, Georgia

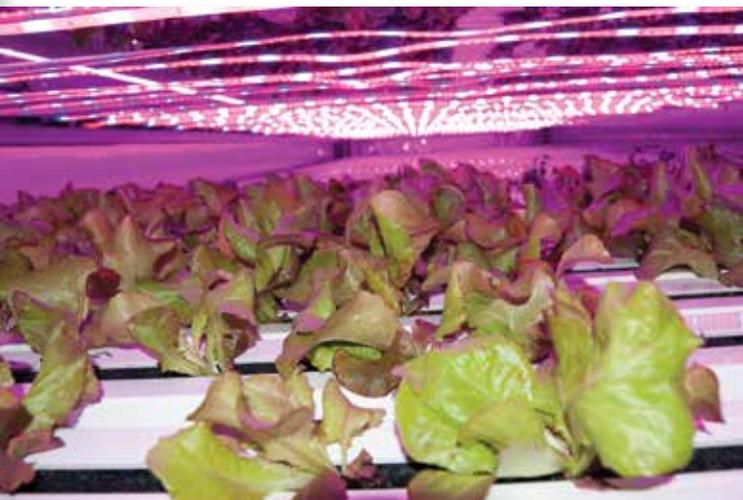
Submitted by Nicole M. Galonczyk, Public Relations Specialist, GSU PantherDining

HYDROPONIC PRODUCE AND THE LEAFY GREEN MACHINE

Growing sustainable produce at one of the largest urban campuses in the U.S. may seem like a daunting feat, but Georgia State's PantherDining was up for the challenge. Through sustainability fees, the university purchased a one-acre farm fashioned out of an upcycled shipping container, named the Leafy Green Machine, hailing from the Boston-based company Freight Farms.

Inside the futuristic farm is a series of environmental sensors measuring climate conditions that communicate with the in-farm controller to maintain optimal 365-days-per-year growing conditions. The windowless farm is also equipped with over 125 LED lighting strips that mimic the sun's natural light via growth-optimized blue and red hues. After three weeks in the seedling station, the plants are transplanted into vertical hydroponic growing towers where emitters drip nutrient-rich water down the vertical grow tower using only ten gallons of water daily to grow over 4,500 plants. The water that isn't consumed by the plant flows out the bottom of the tower and is then recirculated right back to the water tank.

Since its implementation in July 2016, PantherDining grows about 500 heads of lettuce per week—harvesting Green Leaf, Butterhead lettuce, wasabi arugula, basil, thyme, and Swiss Chard with no pesticides, bugs, or soil. The produce is then served at PantherDining's catering events and retail outlets, with plans in the future to serve it in its dining halls, giving patrons the ultimate farm-to-table dining experience. ➤





LOYOLA UNIVERSITY CHICAGO

Chicago, Illinois

Submitted by Aaron Durnbaugh, Director of Sustainability, LUC, and Patrick Brawley, Principal Landscape Architect, SmithGroupJJR

TURNING ST. IGNATIUS COMMUNITY PLAZA INTO A NET-ZERO WATER PEOPLE-STREET

Loyola is informing more sustainable global citizens by educating the university community of ways to conserve natural resources and build conservation practices into daily behaviors. As a neighbor to Lake Michigan, Loyola understands its responsibilities to the region's most precious resource, and is an exemplar in smart water management. The success of these initiatives have sparked the creation of a whole channel of the university dedicated to environmental stewardship, the Institute of Environmental Sustainability.

This project enriches the campus and community with an environment that embraces walkable communities with pedestrian safety and transportation options. An existing roadway was transformed into an open pedestrian mall to provide unimpeded access to academic buildings, student housing, and café market spaces. More importantly, the plaza helps divert 1.2 million gallons of rainwater away from the city sewer each year.

Using signage at its Lake Shore Campus and a comprehensive sustainability website, the project communicates to students, staff, neighbors, and visitors the value and responsibilities of their proximity to Lake Michigan, and the steps Loyola University is taking to make sustainable development a keystone to the creation of a 21st century campus. ➤



MONTANA STATE UNIVERSITY

Bozeman, Montana

Submitted by Susan Borda, Digital Technologies Development Librarian, and Aurélien Mazurie, Bioinformatics Specialist

STUDENT DATA COMPETITION PROVIDES INPUT ON BIKE PARKING ISSUES

Bicycle parking is a challenge on any university campus. Along with stakeholders in the offices of Sustainability, Facilities Services, and Campus Planning Design & Construction, we found a unique way to address bike parking issues at MSU. We designed a competition in which students used available data about bikes on campus to analyze the parking issues and propose solutions.

The competition team chose the bicycle-parking theme in spring 2016 and spent the following summer collecting datasets including digital campus maps and an earlier census of bike rack usage. Forty contestants worked as individuals or groups on their solutions for two weeks following a kick-off session in early October. All were required to submit a 5-page document and 5-minute video detailing their solution. The competition designers reviewed all the submissions and announced the winners at an awards ceremony in November. Three winning teams shared \$2,000 in cash prizes.

Overall the organizers were pleased with the level of participation and the outcomes of the competition. "While there were many good individual solutions, the challenge also revealed consensus that an organized and intentional approach not only increases functionality but also acts as a tool to change culture and, therefore, behavior and support," said E.J. Hook of Facilities Services. ➤



NORTH CAROLINA STATE UNIVERSITY

Raleigh, North Carolina

Submitted by Carla Davis, Communications Coordinator, University Sustainability Office

BUILDING DECONSTRUCTION DIVERTS 95% OF WASTE

An intentional waste diversion strategy resulted in an impressive 95 percent diversion rate of non-hazardous materials during the 2016 deconstruction of a 123,000-square-foot building on NC State University's campus. The deconstruction of 55-year-old Harrelson Hall, the first circular building on a college campus, came after studies determined the building was too costly to renovate and bring up to current code.

The goal was to divert 90 percent of building waste through recycling and salvage, including saving reusable items for another use on campus or donating to Habitat for Humanity. These items include desks, chairs, chalkboards and whiteboards, doors, security cameras, and some electric metering and fire protection equipment. All other non-hazardous building material went to a local facility that specializes in construction and demolition waste and recycling.

Hazardous materials within the structure—including asbestos, which was widely used around the time of the building's construction—were abated and properly disposed of prior to deconstruction.

After deconstruction, the footprint of the building transitioned into green space and footpaths, which will improve stormwater management in the area. A new classroom building, which is already on the university's list of potential capital projects, could be Harrelson's ultimate replacement. ➤



OHIO STATE UNIVERSITY

Columbus, Ohio

Submitted by James Filipovich, Abby Whaley & Scott Holmes, Department of Recreational Sports

CLEANING SOLUTION REDUCES HARMFUL CHEMICALS INTO ENVIRONMENT

The Department of Recreational Sports and Office of Student Life at OSU has adopted Orbio, which uses on-site generation technology to create an effective cleaning and antimicrobial solution. Water, electricity, and salt are all that is needed to create the products used on all fitness equipment and facility spaces at different buildings. One of the benefits of moving to this product is that it has allowed the department to reduce the number of different cleaning products purchased.



In addition to simplifying the number of products, this also simplifies training and reducing storage space. After the initial investment to purchase the equipment for on-site generation, the only product needed is salt—so significant annual cost savings are seen. Most importantly, the environmental impact is reduced as the solutions created by Orbio offer equal or better results without the harmful health effects (i.e., VOCs) and deterioration of equipment (i.e., surfactants) that are seen in many conventional cleaners. ➤



PORTLAND STATE UNIVERSITY

Portland, Oregon

Submitted by Jenny McNamara, Sustainability Manager

PORTLAND STATE UNIVERSITY TRAVEL OFFSET PROGRAM

At Portland State, business travel is responsible for approximately 6,009 metric tons of carbon emissions, or 1,265 cars on the road, each year. Acknowledging that travel is mission critical and is not likely to decrease, PSU's Campus Sustainability Office created an offset program designed to mitigate this notoriously difficult source of emissions for universities.



The voluntary travel offset program directly supports the goals of PSU's Climate Action Plan. It works by assessing a 2 percent fee to travel expenses for participating departments. Contributions are then routed to the Green Revolving Fund, which finances campus energy efficiency projects, reducing our carbon footprint and offsetting travel impacts.

Many organizations purchase third-party carbon offsets to address travel emissions, costing anywhere from \$10 to \$50 per ton of carbon emissions. These prices are estimates of what it costs to reduce an equivalent amount of emissions through carbon reductions or sequestration elsewhere. The 2 percent in PSU's travel offset represents a charge of approximately \$30 per ton, based on recent

travel emissions. PSU's travel offset is an innovative, homegrown solution that further solidifies a commitment to climate action. Offsetting travel impacts is pivotal to reducing carbon emissions and creating a more resilient and sustainable PSU. ➤

PRINCETON UNIVERSITY

Princeton, New Jersey

Submitted by Caroline Savage, Campus as Lab Manager, Office of Sustainability

CAMPUS AS LAB

Students Ben Sorkin '17 and Kirk Robinson '17 knew that there had to be a more sustainable option for the Princeton University crew team's fleet of coach boats. Inspired by the auto industry's desire to reduce fossil fuel emissions through fleet electrification, Sorkin and Robinson tapped into Princeton's Campus as Lab program to seek funding and support for bringing their concept of a long-range electric motor boat to life. The student researchers have since produced a model that can achieve 47mph and is "performance capable, robust, low-maintenance, safe, and reliable," says Robinson.

This project is one of many supported by Princeton's Campus as Lab program, which engages students, faculty, and staff in solving real-world sustainability problems using Princeton's physical campus as a learning tool. The Campus as a Living Lab approach is defined as the campus-based intersection of operational, educational, and research activities that result in the advancement of sustainability problem-solving. "How can we use the physical campus as a way to engage the academic community in research about big global problems?" asks Shana Weber, director of the Office of Sustainability.

"Campus as Lab really shows us the difference between doing research for academia versus doing research for applications that can make a tangible difference in whatever environment in which you are working," said Sorkin. ➤



SLIPPERY ROCK UNIVERSITY

Slippery Rock, Pennsylvania

Submitted by Scott Albert, Assistant Vice President, Facilities & Planning, and Paul Scanlon, Director of Sustainability

COOPERATION CREATES GIS MAP PROMOTING SUSTAINABLE CAMPUS FEATURES

As part of a class project, a Parks and Recreation faculty member wanted to create a map of campus hiking trails, only to find multiple campus groups had “taken over” undeveloped areas, causing conflicts among different outdoor activities and damage to environmentally sensitive areas. The Sustainability Office wanted to promote sustainable features of our campus, including 150+ acres of Audubon Sanctuaries and sensitive wetlands. Facilities staff wanted the ability to quantify basic campus grounds information, and the Geography, Geology, and the Environment faculty were looking for real-life experiences for its GIS mapping class students.

The result? Cooperation among these entities yielded a “Campus Sustainable Features Map” promoting sustainable features on campus, with descriptions of each type of feature and its benefits to SRU and the environment printed on the backside. The map also serves to remind campus users of environmentally sensitive areas that require a land-use approval. Facilities received multiple layers of data that can be used to quantify mowing and snow removal areas, and to analyze potential steep-slope no-mow zones, among many other applications. Student workers gained valuable experience, and campus departments can now access map layers that locate specimen trees, outdoor classrooms, and more.

The next step—creating a smartphone app to allow users to view sustainability-related information as they walk the campus. ➤



THAYER ACADEMY

Braintree, Massachusetts

Submitted by Emily Schweitzer, Senior Project Manager, Coalesce

WEIGH THE WASTE CAMPAIGN

Food waste diversion is a priority at Thayer Academy, an independent co-ed day school located in Braintree, Massachusetts. Thayer's Sustainability Committee implemented a composting program in the Dining Hall in spring 2016. At the onset of the project, the committee recognized that student and employee education and engagement were critical to the program's success. Therefore, a week-long “Weigh the Waste Campaign” was organized, during which all who ate in the Dining Hall sorted food waste into uneaten food, compostable waste, and landfill, then weighed each, and reported findings to the entire school.

The program generated great excitement; however, compost bins were not able to be installed for a few months, leading to a bit of confusion around the status of the program. Lessons learned: logistics of installing the compost bins must be timely, and communication with the waste hauler around frequency of pickups, number of compost totes needed, and the cleaning of the totes is critical. A clear and shared understanding of the management of food waste and cleaning of totes ensures longevity of the program. Thayer continues to divert food waste from its Dining Hall and kitchen and engage students in the improvement of this initiative. ➤





UNIVERSITY AT ALBANY

Albany, New York

Submitted by Mary Ellen Malia, Director of Sustainability, and Indumathi Lnu, Energy Officer

BALANCING CARBON REDUCTIONS WITH ACADEMIC NEEDS

The university, like many of its counterparts, has expanded its built environment and increased staff and student enrollment. Despite an 8.5 percent increase in square feet growth, we have been able to reduce our overall carbon emissions by 14 percent since 2005. This reduction increases to 27 percent when adjusted for the increased space. This achievement is mainly a result of a decline in heating by 11 percent and electricity by 9 percent.

The key to success in realizing carbon reduction despite growth is instituting a systems thinking approach to building renovations, new construction and efficiency measures. This includes:

- Establishing high-performance building guidelines ensuring that new construction and major renovations achieve LEED certification with an emphasis on energy efficiency, quality building envelopes, and sustainable HVAC and lighting systems.
- Enacting key conservation measures including temperature set points, behavioral campaigns, and aligning building system schedules to class schedules.
- Simultaneously pursuing efficiency projects that counteract the carbon effect of new buildings. For example, the electrical savings realized from the upgrades to our main library air handlers offset 100 percent of the new School of Business' annual electricity usage.
- Pursuing alternative energy options where feasible, including solar photovoltaic and geothermal systems.

Moving forward, the university is striving to meet a 20 percent carbon reduction goal by 2020 through the implementation of a comprehensive energy master plan that includes combined heat and power, large-scale efficiency, and renewable energy projects. ➡



UNIVERSITY OF ALBERTA

Edmonton, Alberta, Canada

Submitted by Lauren Hall, Sustainability Coordinator



UNIVERSITY OF ALBERTA LAUNCHES PILOT TO TACKLE PLUG LOADS

About a third of energy use for an average office building is the energy used by devices powered by AC plugs, known as plug load. A significant portion of that energy use occurs during evenings and weekends, often when equipment isn't being used. To learn more, the Energy Management and Sustainable Operations department launched a pilot project to determine the potential effectiveness of a plug load management platform on campus.

At the end of October 2016, 23 devices were installed in the General Services Building to measure plug loads and remotely schedule off hours for periods of non-use. Devices were installed on a variety of equipment including workstation computers, multi-function devices, smart classroom equipment, and television displays. Baseline electricity

use data was collected for two weeks, and then for the following two weeks we implemented a schedule for monitored equipment.

Extrapolated data shows that the implementation of a plug load management platform for the equipment included in the pilot alone could save 2.7 million kWh of electricity and \$198,494 in utility costs annually, which is a 46 percent reduction from the pilot baseline. After this successful pilot, plans are in the works to expand the implementation of this technology on campus, as there is the potential for substantial energy savings. ➡

UNIVERSITY OF GEORGIA

Athens, Georgia

Submitted by Andrew Lentini, Communications & Outreach, Office of Sustainability



(RE)CYCLE: BICYCLE REFURBISHING AND REDISTRIBUTION

“Sometimes, there are just too many bikes locked to a bike rack,” says Jason Perry, UGA sustainability specialist. This is usually a great problem to have...but some of these bikes are in long-term disrepair. Well-intentioned students bring bikes to campus and discover they do not prefer to ride them.

A partnership between Transportation and Parking Services, Facilities Management Division, and the University Police reduces the amount of dilapidated bikes chained to campus racks. Once a bike is identified, a tag is affixed to the bike for 90 days, letting the owner know that UGA believes it to be abandoned. When the 90-day period has passed, the bike is impounded for an additional 90 days. After this 180-day period, any unclaimed bicycles that still have life left in them are separated from those that are destined to become scrap metal.

UGA employees strip the useful bikes of broken parts and rebuild. A campus agency refers UGA students and staff in need of affordable transportation and, after a short application process, those individuals are gifted with a refurbished bicycle.

The University of Georgia tackles the most pressing issues of our time, inspiring those who will lead, discover, and serve on a relentless pursuit to improve our world. The (re)CYCLE Program is one way the University of Georgia takes care of its family and meets strategic sustainability goals. ➤

UNIVERSITY OF NEBRASKA OMAHA

Omaha, Nebraska

Submitted by Farrah Grant, Project Coordinator, Center for Urban Sustainability

CAMPUS BIORETENTION GARDEN: A LIVING LABORATORY OPPORTUNITY

The UNO Welcome Center Bioretention Garden is a result of collaboration amongst biology professor and landscape architect Steve Rodie, UNO staff and students, a local landscape architecture firm (Big Muddy Workshop), and the City of Omaha Stormwater Management Program. The garden functions as a stormwater best management practice and since its inception, has provided ongoing hands-on educational opportunities for design and environmental studies students. Completed in the fall of 2012, the garden is maintained by UNO Landscape Services and has shown significant plant maturity in four years.

Recently, soil moisture sensors, temperature sensors, data loggers, and cameras were installed. The sensors will provide a better understanding of how moisture moves through the soil during a given year and over the long term. Two live web cameras will provide insights into how the garden performs during a rain event and also provide a visual assessment of how the plants perform within the garden. Collected data will be displayed online as well as on a real-time kiosk to be installed in the Durham Science Building and online. Multiple classes will also utilize the data to understand the functional attributes of green infrastructure and stormwater management in general. ➤





UNIVERSITY OF NEW MEXICO

Albuquerque, New Mexico

Submitted by Matt Cherrin, Energy Conservation Specialist, Lobo Energy, Inc.

IN-HOUSE PROGRAMMING OF BAS CONTROLS SAVES THOUSANDS

The University of New Mexico has building automation controls installed throughout six campuses across the state in order to ensure the most optimal learning and working environment for students, staff, and faculty. UNM primarily uses Delta Controls and Automated Logic Controls, with a few buildings still with INET-7.

While many organizations have building automation systems installed in their buildings, UNM is unique in that a team from the Physical Plant Energy Services Department installs and programs all of the systems in house, which has saved the university thousands of dollars in expenses. The Energy Services Department also has a team that commissions HVAC and lighting controls regularly to ensure that all the systems are running the way they were originally designed.

Without these efforts, the university would not be able to implement many of the energy conservation measures that have helped lead to a 23.3 percent cost avoidance in utility expenses since May 2008. Energy Services help resolve comfort complaints and equipment malfunctions in efficient time periods that help optimize maintenance response time and minimize operations inefficiencies. They are also responsible for implementing building-setback schedules that helps reduce energy consumption when buildings are unoccupied. ➤



Photo credit: Tommy Taloya

UNIVERSITY OF TENNESSEE KNOXVILLE

Knoxville, Tennessee

Submitted by Preston Jacobsen, Sustainability Manager

SUSTAINABILITY FOCUSED EXPERIENCE LEARNING: A MARRIAGE OF ACADEMICS AND OPERATIONS

UT Knoxville has a rich history of operational sustainability dating back to 2007 with an ever-growing infusion into academics, be it research, internships, or hands-on learning. This evolving collaboration with academics has benefited sustainability efforts on campus and the surrounding community, with an emphasis on energy efficiency technologies that provide economic and GHG emission reductions.

The Office of Sustainability adopted the experience learning model in 2014, using student environmental initiatives fees to deploy the Student Design & Research Fund, which provides monies to students and faculty to conduct sustainability focused projects that

have an economic and/or GHG emission reduction benefit to UT. Projects range from a 3D Energy Model for all campus buildings to battery storage technology research focused on reducing peak energy charges. The projects allow students to conduct research using a hands-on approach, and through this model Facilities Services is exposed to leading-edge technology solutions that will inevitably reduce operating cost, increase efficiencies, and provide a never before seen insight into our campus operations.

In tandem with behavior change programs, UT has avoided over \$5 million of energy cost since fiscal year 2009 by adopting the experience learning model, and there seems to be no end in sight. We look forward to future proposals and are proud to serve our student population in a manner that makes UT a more sustainable place to live, learn, and work. ➤



VILLANOVA UNIVERSITY

Villanova, Pennsylvania

Submitted by Liesel Schwartz, Sustainability Manager

CONSOLIDATING EFFECTIVE RECYCLING CENTERS

Recently, Villanova University took steps to improve its recycling problem. It was common practice to have only trash bins in the classroom and recycle centers in the hallway. The best way to encourage recycling is to always have the two bins next to each other. Adding more bins to our classrooms was a non-starter with the custodians, as it would double their daily workload. After hearing of a successful program that pulled trash bins out of the classroom and increased recycling centers in public spaces, we decided to test the idea ourselves.

Working with a senior environmental science student, we outlined a two-phase implementation plan across the College of Engineering. This would allow us to test the program's effectiveness before rolling out the improvements across campus.

The new program was implemented in two of the three engineering buildings at the start of the 2015-16 academic year. After two months of use, a waste audit was conducted by the environmental science senior as part of her thesis work. The audit showed a 7- to 12-point improvement in the recycling rate from the control building. The program has now been implemented across all of Villanova's academic buildings. 🍃



VIRGINIA COMMONWEALTH UNIVERSITY

Richmond, Virginia

Submitted by Erin Stanforth, Director of Sustainability



THE VCU LEARNING GARDEN

The VCU Learning Garden works to combat food insecurity for both the city of Richmond and VCU students and works to improve access to fresh food. One of two gardens maintained by the Office of Sustainability, donated nearly 500 pounds of fruits and vegetables from its first growing season to our partners at on-campus food pantry RamPantry and the Center for Healthy Hearts, a local nonprofit that provides healthcare to low-income, at-risk individuals. The Garden also welcomed over 300 volunteers, some of whom participated in garden work as part of service-learning coursework.

The garden was funded in part by a grant from the VCU Division of Community Engagement, and hosts 10 raised garden beds constructed entirely from reclaimed materials. Plans to expand the garden include the addition of wheelchair accessible,

table-top style beds, an outdoor classroom pavilion and a rain barrel water catchment system.

In addition to its Learning Garden, VCU maintains an on-campus community garden close to its student center. Any VCU student, staff, or faculty member—or a group of them—can rent a plot for a semester or the entire year for growing food and flowers for personal use.

Increasing student and community engagement with both gardens is one of the 17 goals articulated in VCU's Sustainability Plan. The plan was developed in 2015 with input from VCU stakeholders at two town hall events and from community members involved in five neighborhood associations. 🍃



VOLUNTEER STATE COMMUNITY COLLEGE

Gallatin, Tennessee

Submitted by William J. Newman, Senior Director of Plant Operations

SEEING THE LIGHT: LED OUTDOOR UPGRADES

Ensuring effective and efficient projects that support real sustainability efforts is difficult at times. Each college and university must ask themselves, what sustainable initiatives result in actual cost savings and support long-term sustainability efforts? At Volunteer State Community College, each campus improvement project is reviewed in an effort to ensure that sustainability is taken into consideration.

Recently the college elected to replace existing high-pressure sodium lamps with more efficient LED fixtures. The old fixtures were over 30 years old. Overtime they had been retrofitted and repaired but they were very inefficient. Each lamp was 150W and used a coil ballast that required 1.25amps. The expected life of the lamp was less than 24K hours.

The new LED fixtures were matched to the campuses long-term site plans. Maximizing efficiency while not compromising safety and security was paramount. The LED selected was a 65W lamp that had a 50K-hour life. It used only .23amps per fixture, and the foot candle output was nearly double that of the old fixtures.

Once installed, the nightly kWh consumption was monitored to verify results. The areas where the LEDs were installed saw an immediate 46 percent reduction in kWh. The replacement of just 62 fixtures is projected to save \$4,000 the first year! We plan to complete the second phase of LED upgrades over the next two years. Once complete, the college is projected to save nearly \$12,000 per year in site lighting. ➤



WAKE FOREST UNIVERSITY

Winston-Salem, North Carolina

Submitted by Daniel S. Fogel, Director, Sustainability Graduate Programs and Graduate Research Professor in Sustainability

SUSTAINABILITY GRADUATE PROGRAMS

The Center for Energy, Environment and Sustainability and the WFU Graduate School of Arts and Sciences offer sustainability graduate programs to working professionals and exceptional recent undergraduates. The Master of Arts in Sustainability is an innovative and distinctive one-year program allowing students to emerge as sustainability change agents. Further extending the program's reach, two dual-degree options with the School of Divinity and School of Law are offered. WFU also offers students the opportunity to earn a Graduate Certificate in Sustainability by completing four sustainability foundation courses.

The Sustainability Graduate Program seeks to educate the next generation of leaders in sustainability. Through coursework and research with faculty experts across disciplines, students graduate equipped to tackle some of the world's most intractable problems.

CEES and the Sustainability Graduate Programs place significant value on experiential learning opportunities tailored to specific student need and interest. By developing immersive experiential learning opportunities, our program empowers students to engage with committed partners both local and global. For example, students have developed approaches to sustainable cotton sourcing for Wrangler Jeans, energy models for Walmart, and master plans for wildflower preserves managed by land conservancies. With a keen focus on career enhancement, the program provides contact with sustainability practitioners and experts in a small, intimate setting. This focus on career readiness, experiential learning, top-tier research, and academics is exemplified by a one-to-one student-to-faculty ratio. ➤



WESTERN MICHIGAN UNIVERSITY

Kalamazoo, Michigan

Submitted by Chris Caprara, Energy Administration Specialist

UPGRADED STEAM METERING AT WESTERN MICHIGAN UNIVERSITY

Knowing how and where energy is used is fundamental to any successful energy management program. This is especially true when balancing the energy needs of an 8 million square foot campus and facilitating accurate utility chargebacks between departments.

While electric metering has been in place for decades on Western Michigan's campus, steam has been a more challenging utility to accurately meter. Steam flow metering historically required multiple meters and generous upstream and downstream straight runs of pipe. Both of these challenges proved to be either financially or technically infeasible in many existing facilities.

Due to these challenges condensate return metering using magnetic flow meters became the primary form of thermal metering on campus for two decades. However, this presented its own challenges such as dumped condensate, direct steam humidification, and existing pipping issues.

Through the use of the Veris Accelebar, a flow meter that combines two differential pressure technologies, WMU has been able to install steam meters in both new and existing facilities that accurately and reliably measure steam flow over a wide range of turn downs and require no upstream or downstream straight run piping. The meters are also able to be remotely monitored and data logged through the existing building automation infrastructure with several common communication protocols. ➡



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