



BROWN



TENTH ANNUAL SUSTAINABILITY PROGRESS REPORT



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I. Executive Summary

This past fiscal year marked significant progress in broadening the spectrum of sustainability across the University. In particular, the Office of Energy and Environmental Initiatives (E&E) teamed up with the School of Public Health and the Environmental Health and Safety office to develop a new Strategic Sustainability Planning and Advisory Committee (SSPAC) Environmental Health and Wellness working group. This team evaluated environmental, health, and wellness best practices and will be presenting its findings and next steps this coming year. The SSPAC Energy and Water working group, along with the University Architect's staff, completed a stormwater master plan that has been approved by the Rhode Island Department of Environmental Protection and the Narragansett Bay Commission to help us reduce campus impacts on stormwater runoff into Narragansett Bay. Additionally, the E&E office expanded its reach across campus through our Departmental Sustainability Program, led by Jessica Berry. This program has created tailored sustainability strategies for departments located in the Jewelry District, including the School of Professional Studies and the Alpert Medical School. Lastly, we completed a complex design to convert the campus primary heating system from steam to lower temperature hot water.

Last year we set a waste diversion goal of 50% by 2020. Due to the success of the organics diversion from the main dining establishments, we have made significant progress in meeting this goal, increasing our diversion rate from 26.5% to 33.7%. Furthermore, the Office developed a campus-wide Waste Management Plan that provides a strategic framework for reaching the waste diversion goal and maximizing efficiencies of waste collection and disposal on campus. For example, the adoption of BigBelly trash and recycling stations across the campus grounds resulted in savings of hundreds of labor hours and allowed for Grounds staff to spend their time keeping Brown beautiful.

We continued to make progress on lowering our Greenhouse Gas (GHG) emissions and currently stand at 27.4% below 2007 levels, without new construction. This leaves us three years to meet our 2020 goal of 42% below 2007 levels. We are confident we can get there as long as we continue to make significant investments in energy efficiency. The new Thermal Efficiency Project, as discussed later in the report, will contribute much of what we need in GHG reductions to meet this goal along with planned Energy Conservation Initiative investments including unoccupied lab ventilation reduction and LED lighting retrofits.

The E&E office's undergraduate interns and campus environmental student groups were busy in FY 2017, providing passion, people power, and great ideas to further our sustainability efforts at Brown. The Academic and Student Engagement Coordinator, Erin Donnellan, led the E&E office interns, environmental student groups, and undergraduate volunteers collected and donated over 19,000 pounds of clothing and household goods during the Clean Break program to various community organizations throughout Rhode Island. EmPOWER, the umbrella environmental student group, organized another successful Earth Week that hosted events including a potted plant giveaway, a panel about fossil fuel infrastructure in Rhode Island, and a trash sort on one of the campus's main quads to promote awareness of better recycling.

Using the campus as a living lab model, the E&E office partnered with the C.V. Starr Program in Business, Entrepreneurship, and Organizations for the second consecutive year. E&E staff mentored a capstone team that looked at how the E&E office could best approach development of the Campus Metabolism Dashboard, which will enable easy access to energy and waste data for the Brown community. The group provided important, professional-level research and insight into how the E&E office can market the interface to the Brown and larger community.

We hope you enjoy the following report and encourage you to reach out to our office at brownis-green@brown.edu with any questions or comments.

II. Sustainability Strategic Planning Advisory Committee Overview in FY 2017

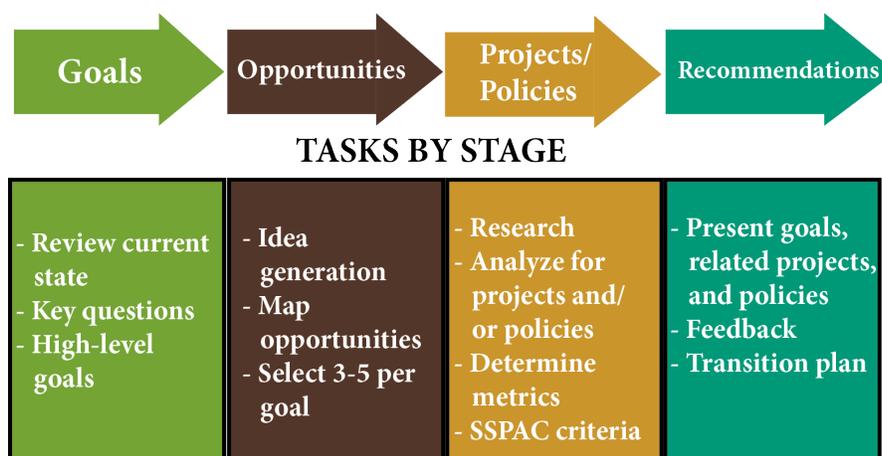
In March 2011 a group of undergraduate students presented to the Brown University Community Council to encourage the creation of a Sustainability Strategic Plan. In response, the Sustainability Strategic Planning Advisory Committee (SSPAC) was created in fall 2012. SSPAC was then charged by the Provost and the President to create a draft proposal for a Sustainability Strategic Plan for the university. The Sustainability Strategic Plan seeks to decrease the university’s environmental impacts, promote community engagement, and inspire innovation and excellence.

In November 2013 the Office of Energy and Environmental Initiatives (E&E) convened four SSPAC working groups: Food; Energy & Water; Transportation; and Waste & Recycling. Working groups were comprised of students, faculty, staff, and community members who were carefully selected based on their experience in the group’s specific focus area. Teams convened regularly for facilitated meetings with specific, measured outcomes.

In Phase I each working group used a framework of six criteria—academic integration, community inclusion, personal impact, metrics, communication, and structure and accountability—to develop high-level goals and recommend projects based on research into best practices. In FY 2016 the SSPAC working groups entered into Phase II, which identified the resources, support, and direction needed. These recommendations were presented to Barbara Chernow, executive vice president for finance and administration, who agreed to support and provide direction on projects and policies that would reduce Brown’s environmental impact. A sample of projects initiated in FY 2017 include: composting throughout campus dining facilities, redesign of Brown’s transportation website to promote alternative transportation, completion of a campus stormwater master plan, and design of the first phase of our thermal efficiency project.

To expand the mission of the SSPAC process, the E&E office partnered with the School of Public Health to develop the Environment, Health, and Wellness (EHW) working group. Throughout FY 2017, the EHW group was formed to include faculty, staff, and students representing the School of Public Health, Environmental Health & Safety, Facilities Management, the office of Energy and Environmental Initiatives, and the student body. Additionally, in FY 2017 the working group completed Phase I, including identifying goals, objectives, and projects.

Throughout the year, projects were identified to support these goals and include reducing workplace chemical exposure, addressing outdoor air and potable water quality, and developing a communication mechanism to educate and inform the community on topics and initiatives related to public health.



Example timeline for SSPAC working groups

III. Brown University Sustainability Timeline

SPRING 2006: Energy and Environmental Advisory Committee formed

WINTER 2008: GHG goals accepted by President Simmons

FALL 2012: SSPAC Convened by past Provost

SPRING 2014: Institute at Brown for Environment and Society (IBES) is launched

WINTER 2015: Compost programs piloted

SPRING 2015: Brown leads Providence Sustainability Roundtable

WINTER 2016: Departmental Sustainability Program (DSP) launches

WINTER 16/17: Completed campus thermal efficiency assessment and design

WINTER 16/17: Adoption of campus Stormwater Master Plan

WINTER 16/17: SSPAC Environment, Health, and Wellness group develop goals and projects

SPRING 2017: Campus-wide waste diversion plan developed

SPRING 2017: President's Letter re-affirms commitment to sustainability goals

IV. Brown is Green and the Office of Energy and Environmental Initiatives

Facilities Management's office of Energy and Environmental Initiatives is the operational division that hosts the Brown is Green (BiG) program. BiG is the E&E office's umbrella program that supports Campus as a Living Lab initiatives, community projects, and sustainability-related student groups. BiG is used as a tool to share sustainability-related academic information and research for the Brown community and to disseminate Brown University's sustainability programs and related goals.

The Office of Energy & Environmental Initiatives works to support Brown University's Energy and Environment Mission Statement:

In order to develop sustainable and equitable patterns of local and global resource use, Brown University will minimize its energy use, reduce negative environmental impacts, and promote environmental stewardship. Brown will use the opportunities created by these actions to further its educational, research, and service missions.

The E&E office is committed to achieving sustained energy and environmental performance. This requires an ongoing, integrated, and systematic approach to sustainability including assessing performance, setting goals, creating an action plan, and tracking and communicating results. Facilities Management has set energy and environmental goals and created the necessary processes, management systems, and communication tools to achieve these goals. The Office of Energy and Environment tracks progress towards meeting these goals and communicates results through the annual Sustainability Progress Report.



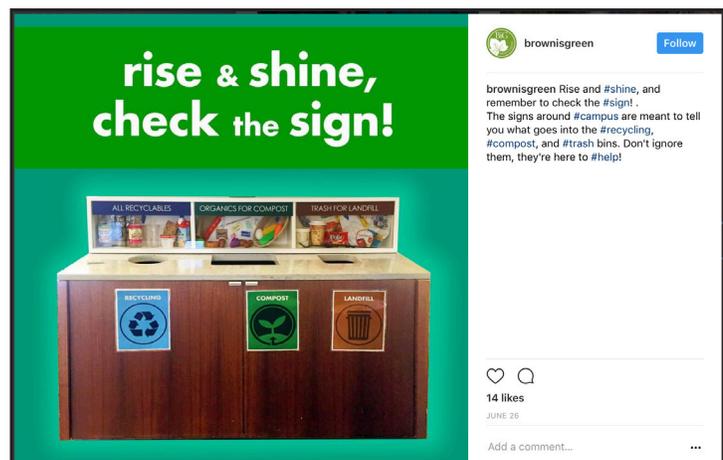
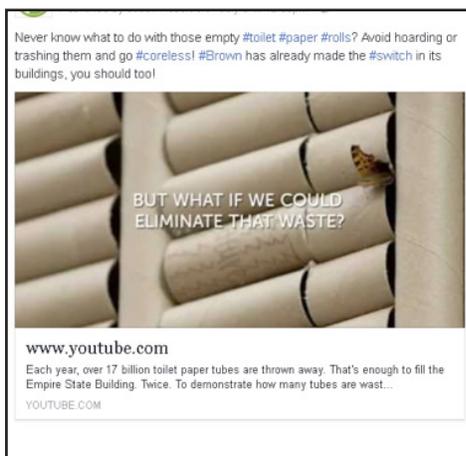
IV. Brown is Green and the Office of Energy and Environmental Initiatives

A. Communication Plan, Website, and Social Media

Recognizing the need to improve communication with the larger Brown community, the Office of Energy and Environmental Initiatives developed a strategic communication plan this past year that provides a systematic approach to disseminating information and building relationships across campus and the community. A large part of this plan was the redesign of the Brown is Green (BiG) website. The website focuses on accessibility of resources and information that will engage the Brown and greater community in sustainability efforts.

The E&E office uses social media platforms to engage the community on a more personal level. Posts feature information that relates to Brown and the Providence community about how to get involved in sustainability efforts and events.

Community members can find information and events related to sustainability on campus and in Providence by following the office website and social media @brownisgreen.



V. Facilities Management

The Department of Facilities Management is responsible for ensuring that the planning, design, construction, operation, and maintenance of all University facilities and grounds support the academic, research, and administrative functions of the University, while balancing financial and technical constraints with aesthetic and historical concerns.

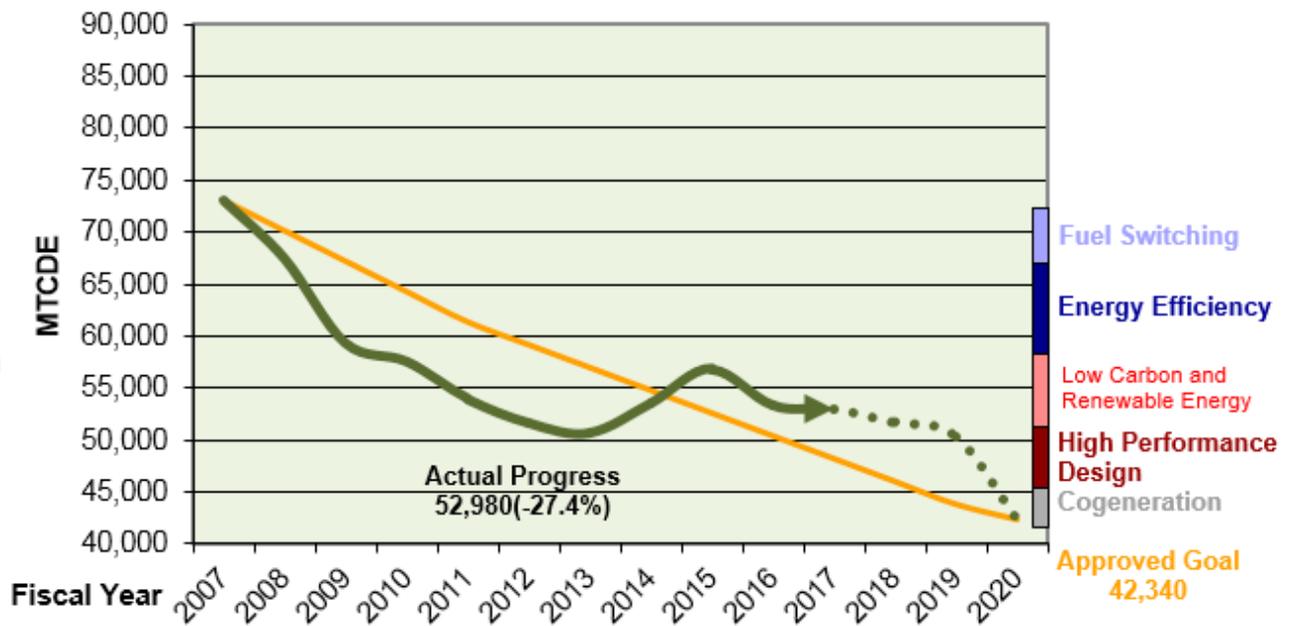
In Providence, the University owns and maintains 226 buildings, totaling approximately 6,800,000 gross square feet. In addition to the operations, maintenance and repair of these existing facilities, Facilities Management is responsible for the planning, design, and construction management of renovations and new facilities.

The mission of Facilities Management is to support the University by enhancing the quality of physical facilities. Facilities Management does this through planning, designing, engineering, and constructing. The Operations Department is responsible for maintaining the campus in a responsive, service-oriented, and effective way with environmentally conscious practices.

A. Energy

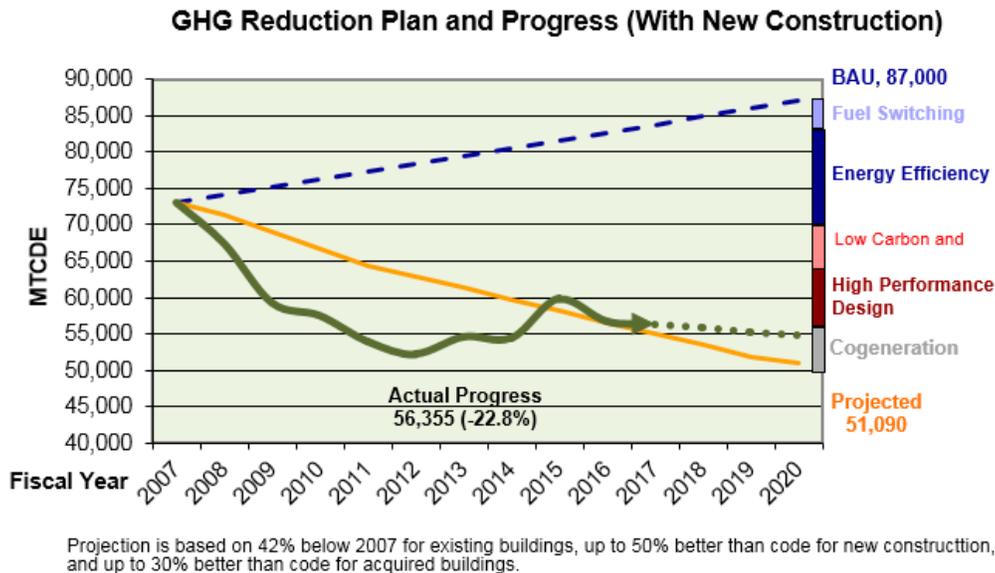
i. Greenhouse Gas Goals

GHG Reduction Plan and Progress (Without New Construction)



Approved Goal is based on 42% below 2007 for existing buildings.

V. Facilities Management ... Greenhouse Gas Goals and Energy



ii. Energy Efficiency Program

As part of our sustainability program, we are committed to reducing our greenhouse gas emissions by 42% below 2007 levels by 2020. The following projects were identified and implemented to help us reach this goal. For FY 2017, \$5 Million dollars was spent on efficiency improvements. This was offset by utility rebate payments totaling \$1.2 million dollars.

Lighting upgrades and lighting controls: Eleven major lighting projects were completed in FY 2017 involving retrofit light-emitting diode (LED) lighting and automation controls. Over \$3.5 million was spent in construction resulting in an estimated 2.3 gigawatt hours of electricity savings. Decreased lifetime maintenance for the Operations Department due to the significantly longer life expectancy of LEDs provided added value to the project. The buildings addressed include Barus & Holley, BioMed Grimshaw-Gudewicz, J. Walter Wilson, 295 Lloyd Avenue, MacMillan Hall, OMAC, Prince Lab, residence hall common areas, the Warren Alpert Medical School, Pizzitola, and 85 Waterman Street.

Unoccupied Laboratory ventilation reduction: Laboratory ventilation management and reduction projects were completed at the Warren Alpert Medical School, 85 Waterman Street, and BioMed Grimshaw-Gudewicz. The scope of work included advanced occupancy detection, automation controls improvements, and ventilation reductions with the potential for additional future reductions in ventilation rates during unoccupied hours.

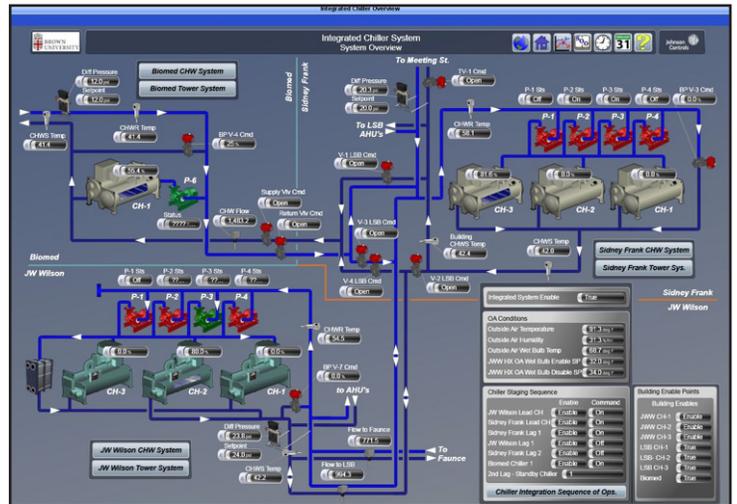
Warren Alpert Gross Anatomy Lab ventilation: The gross anatomy lab, of the Warren Alpert Medical Education Building, was identified as an ideal candidate for ventilation rate reductions during detected periods of no occupancy. The most critical component of the project was maintaining spaces within acceptable formaldehyde exposure limits. Ventilation rate testing was conducted at the conclusion of the project to assure compliance with industry standards. The net result was over \$13,000 in utilities savings and 34.4 metric tons of carbon dioxide emissions (MTCDE) annually.

V. Facilities Management ... Energy

J. Walter Wilson/BioMed integrated chilled water plant: Integrated plant programming reduced energy consumption while creating a more reliable operational state. Once again, a dashboard was created to provide better operational oversight.

70 Ship Street Chilled Water Plant: Improvements were made to the chilled water plant for 70 Ship Street under the RCx (retro-commissioning) program. Free cooling (use of outside air to cool the building instead of using mechanical means) was enabled. Control algorithms were employed to maximize efficiency at low ambient temperatures. These measures have saved \$25,000 in utility costs and provided over 50 MTCDE.

Insulation repairs: The E&E office engineers have continued to identify systems on campus where thermal insulation has been removed or damaged. This damage is typical of areas that had required abatement or emergency repair of piping systems. The remedial repairs are a collaboration between Facilities Management's Operations office and the E&E office as part of the Building Ongoing Commissioning (BOCx) process.



Controls graphic for the integrated chiller plant at J. Walter Wilson.



Examples of piping before and after insulation.

V. Facilities Management ... Energy

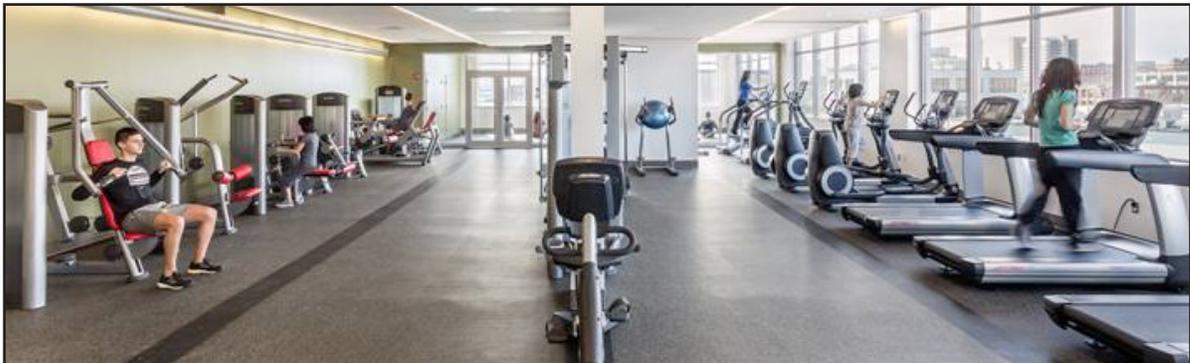
BMS (building management system) expansion: Building management systems are computer programs that monitor and control building energy use in real time. In FY 2017 we focused on adding BMS monitoring and controls to smaller buildings that would provide energy savings. Operational improvements include automated alarming, scheduling, and control for heating and cooling systems. Energy improvements are accomplished through infinitely customizable building programming, scheduling, data analytics, and historical data archiving.

High performance air conditioning equipment upgrades: Facilities Management has continued to invest in state of the art heating, ventilation, and air conditioning systems. The Graduate Center E building was upgraded with a high performance magnetic-bearing chiller and the associated equipment, resulting in heat pump system improved efficiency. Andrews House was outfitted with a variable flow refrigerant system that runs at a much higher efficiency than conventional systems, which provides effective heat into single-digit temperatures and cooling in the summer.



Left: VRF condenser installed at Andrews House. Right: High performance magnetic-bearing chiller installed at Graduate Center

Enhanced occupancy scheduling: Occupancy scheduling was customized and enhanced for several buildings to further reduce energy consumption during off-hours. For example, occupancy scheduling was extended to the fitness center serving the Warren Alpert Medical School. The net result was over \$6,000 in utilities savings and 32 MTCDE per year.



Fitness center at the Warren Alpert Medical School now has occupancy scheduling.

V. Facilities Management ... Energy

Building Ongoing Commissioning (BOCx) and analytics: BOCx is a program that identifies energy consuming systems that are not operating efficiently. BOCx analytics software supports BOCx by interrogating BMS data to identify these inefficiencies. In FY 2017 this program was further expanded to include an additional 43 buildings and 981,000 square feet of University-owned space. To date, the program has addressed 107 buildings and 4.9 million square feet of building space. This represents over 75% of the University's 6.5 million square feet of managed space. Future refinement of the analytics system will include incorporation of new buildings, renovations, laboratories, and maintenance of the system. This program is saving the University over \$575k annually.

Steam trap repairs: Steam trap repair and replacement continues on an annual basis and 141 traps were identified in FY 2017 as defective and repaired. Additional work involved identification and replacement of 54 defective thermostatic regulating valves (TRVs), and the installation of 47 trap insulating blankets.

Retro-Commissioning (RCx) for Existing Buildings: This program evaluates facilities both from an operational and system design perspective. RCx identifies efficiency opportunities by improving how existing systems are operated or through replacement of equipment. A majority of our large buildings have been evaluated under this program; this year 70 Ship Street was addressed.

Trades Training for Energy Efficiency: To integrate best energy conservation practices into routine maintenance operations, the E&E office and the Operations office continue to conduct a trades' training program. Originally this program focused on training BMS staff and has now been expanded to include other trades such as heating, ventilation, and air conditioning (HVAC); electrical; and plumbing staff. Shop personnel are invited to attend monthly training sessions to learn about best conservation practices, identification of wasteful energy conditions, and to review modifications to systems.

Energy Efficiency Rebates & SEMP: The E&E office has for many years engaged in a strategic energy management plan (SEMP), which is a memorandum of understanding (MOU) with the local utility, National Grid, to streamline paperwork for all energy efficiency initiatives we undertake. The program allows the low-cost and high-value projects to be bundled to maximize energy efficiency rebate payments to Brown

University, increasing our rebate payments by 40 percent. The SEMP MOU also created streamlined administrative processes. The program is managed by Energy Engineer Patrick Cusick. National Grid has paid Brown University \$1.2 million in energy efficiency rebates in FY 2017.

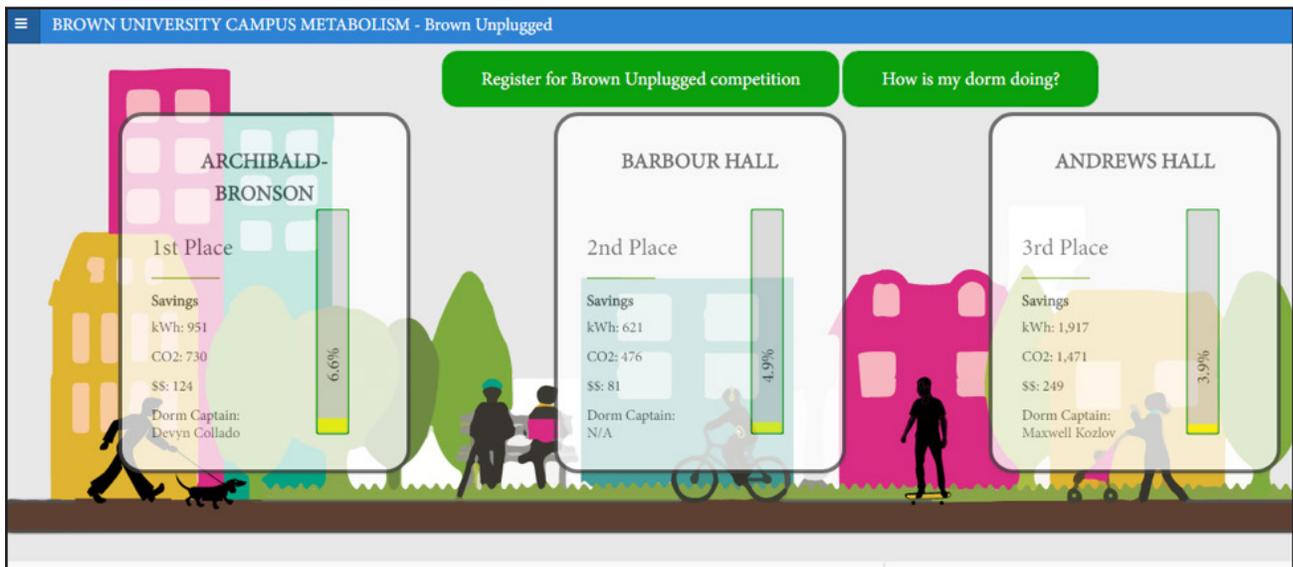


Left: Energy Engineer Rich Kasper plays a jeopardy game as part of training with the controls division. Above: 70 Ship Street.

V. Facilities Management ... Energy

iii. Brown Unplugged

In its seventh year, the Brown Unplugged competition has been successful in engaging students in energy conservation behavior on campus. The competition aims to educate students on the importance of electric conservation in their dorms and homes by providing tips, opportunities for engagement, and other resources. While the competition is hosted by the E&E office, a dedicated team of students within the emPOWER student organization arranges and manages communication, outreach, the competition platform, and website. This year, Brown created its own unique energy tracking page that will eventually be built into a larger campus metabolism platform to track energy, water, waste, and other metrics.



Campus Metabolism; Brown Unplugged Website: The website facilitates active engagement as student competitors are able to see real-time updates of building energy usage and trends. The website provides students with tips on how to conserve energy and hosts a variety of events including LED bulb swaps and promotional dodgeball events.

The 2017 winning dorm, Archibald-Bronson, reduced its energy usage by about 7%, or nearly 1000 kWh during the three week long competition. Winners were invited to a dinner hosted by the Brown Unplugged team, and they were all entered into a raffle to win refurbished bikes from Recycle-A-Bike and Spring Weekend tickets. Recycle-A-Bike is a volunteer-based community organization that connects people with refurbished bikes and provides practical bike knowledge.



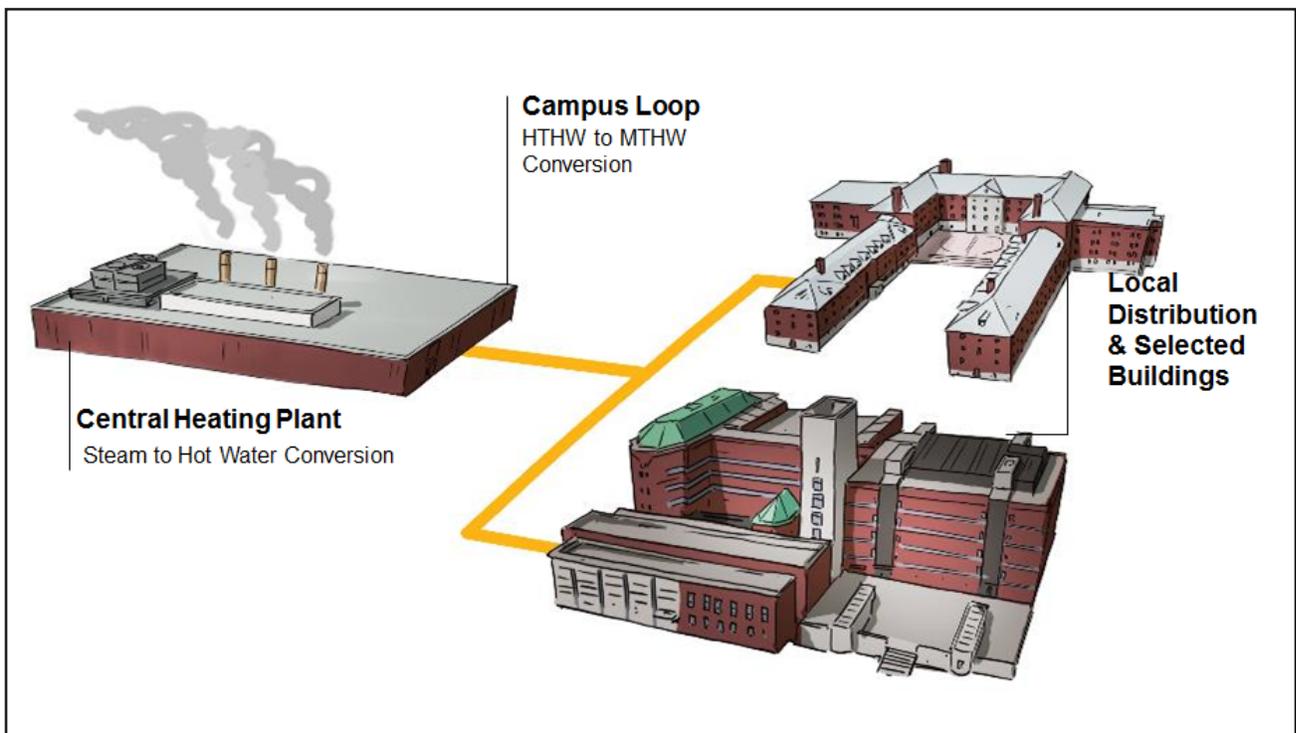
V. Facilities Management ... Energy

iv. Thermal Efficiency Project (TEP)

We have identified a major energy efficiency project that is required for Brown to meet our 2020 GHG goal of 42% below 2007 levels. The current central heating plant (CHP) on campus is a steam-powered high-temperature system (350F). This project will convert the CHP to a medium-temperature hot water (250F) distribution system and eliminate steam distribution. This conversion to medium-temperature hot water (MTHW) will markedly increase the thermal efficiency of the campus while creating the building blocks for future heat recovery projects and potentially moving to a low-temperature network that could substantially decrease our greenhouse gas emissions.

The existing campus heating system was designed to generate steam in the CHP and transfer the energy to High-Temperature Hot Water (HTHW) for distribution to the site. At many locations on campus the HTHW is again converted back to steam to supply building systems and processes. These conversions between steam and HTHW and back again have significant inherent system losses, which contribute to the low overall campus heating system efficiency. In addition, the CHP components are nearly 50 years old and inefficient, especially at warmer outdoor conditions (part load). During the moderate heating months (e.g., spring and fall), the heating load requirement is much lower than what the CHP was designed to support, causing an extreme loss in plant efficiency (below 50%). This project will solve this efficiency penalty.

Another consideration is the excessive maintenance required for steam systems. Elimination of the majority of steam traps, 10 steam hubs, and related equipment throughout campus will provide substantial operational savings in the long term. This is a \$24 million project that has been approved and is in the final stages of funding with a start in the 2017-2018 school year and is expected to be complete by October 2020.



Proposed plan for conversion to MTHW

V. Facilities Management ... Water and Stormwater

B. Water and Stormwater

Stormwater Management: Stormwater runoff is the leading cause of water quality degradation, adversely impacting the Providence area watershed. In an effort to minimize Brown University's stormwater impact, the university completed its first stormwater master plan. In coordination with the Rhode Island Department of Environmental Management, the City of Providence, and the Narragansett Bay Commission, the stormwater master plan was adopted into the University's institutional master plan. The goal of this plan is to create a mechanism to minimize the stormwater impact on a campus-wide basis versus a building project basis. This will allow Brown University to evaluate and improve the stormwater infrastructure, by implementing best management practices where they add the greatest value to the campus.

Water Conservation: In an effort to reduce water and sewer use, the E&E office hired a water systems consultant to evaluate our potable water systems and recommend best practices. These best practices identified 18 specific measures to implement throughout campus including:

- Installation of abatement meters for cooling tower makeup water units at nine locations;
- chilled water condensate recovery units at seven sites (including Sidney E. Frank Hall);
- replacement of water-cooled compressors serving BioMed and the Faculty Club;
- and the implementation of corrective measures to address miscellaneous but substantial water waste ("leaks") across campus.



V. Facilities Management ... Waste and Diversion

C. Waste and Diversion

In FY 2017, the E&E office began implementing programs that would work towards reaching the 50% diversion (not including construction and demolition) goal by 2020, that was set in FY 2016. Implementing composting at the main dining facilities on campus was one of the first steps in significantly increasing our diversion rate that sat at about 26.5% (not including construction and demolition) in FY 2016. The implementation of the compost program added about 485 tons of material to our diversion rate, resulting in about 1.13 million pounds of organic material that was composted, recycled, or donated.

The overall diversion rate for FY 2017 is 33.7% (not including construction and demolition), a 7.2 point increase over one year. Current diversion rates include a variety of methods such as recycling, donations, composting, and reuse. The University increased its student population by 3.5% while decreasing trash by 3.7%, or about 100 tons. The primary driver for the increase in diversion rates this year was the compost program and with continuous improvements over the next year, we aim to reduce contamination and look to capture compost at catered events and in office spaces.

Recycling: Brown's recycling rate is a reflection of total tonnage of recyclables collected by our waste hauling service, i.e., cardboard, paper, bottles, cans. In FY 2017, Brown University recycled paper, containers, and cardboard at a rate of 16.3% in comparison to FY 2016's rate of 15.6%. Without a significant increase in recycling annually Brown will not meet its 2020 goal. As regulations at recycling facilities get stricter, Brown must work toward improving recycling rates by focusing efforts on improved infrastructure, operations, education, and simplifying the separation process on campus. The benefit of these efforts would not only be reflected in recycling rates, but also opportunities to improve operational efficiencies and cost savings.

Organics Diversion: In FY 2017, several organic diversion streams were utilized including composting, food donations, and waste oil to biodiesel diversion. The following table reflect the pounds diverted in FY 2017:

FY 2017 Brown University Organics Diversion (lbs)	
Yard & Leaf Waste to Compost	160,000
Food Waste Oil	64,500
Compost	970,000
Food Donations	24,000
TOTAL	1,136,000

Special Materials Diversion and Donation: Special materials are waste products that are not recyclable as traditional glass, paper, metal, etc. These materials include e-waste, batteries, light bulbs, ballasts, computers, etc. In FY 2017 Brown properly disposed about 33.3 tons of special waste through secure and environmentally preferable methods with a company that is e-Stewards and National Association for Information Destruction (NAID) certified. Additionally, over 46 tons of furniture and clothing were collected and donated throughout the year.

V. Facilities Management ... Waste and Diversion

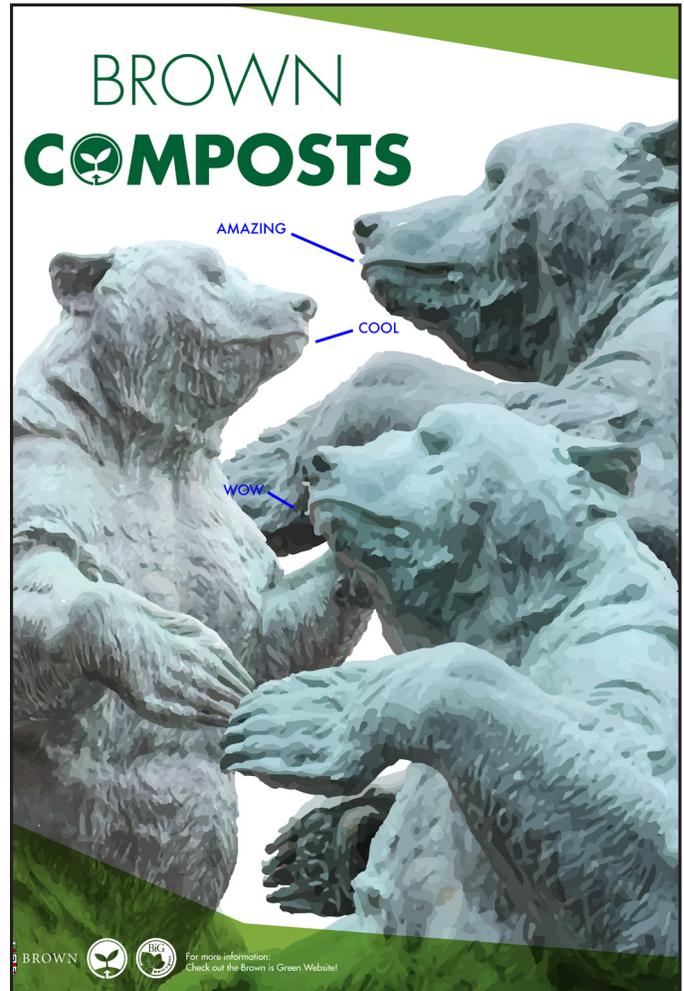
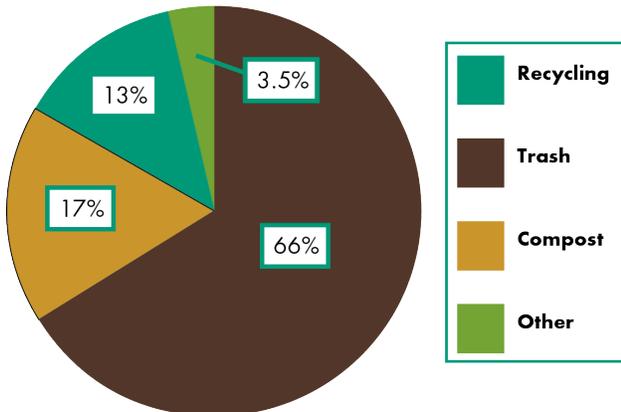
Residential Life: With continuous upgrades and renovations across campus residential halls, there is a regular stream of furniture and mattresses that need to be cycled out on an annual basis. Residential Life developed and implemented a furniture and mattress donation and recycling program that resulted in over 86,000 lbs of items that were either recycled or donated to Habitat for Humanity, Mass Coalition for the Homeless, or overseas organizations.

i. Organics Diversion

Composting is the process of transforming organic materials such as food waste into a nutrient-rich, natural fertilizer. Composting has many benefits, including enriched soils, reduced contributions to landfills, and decreased release of greenhouse gases into the atmosphere. As such, composting is an essential part of Brown's commitment to sustainability. In FY 2015, the E&E office, in collaboration with Brown Dining Services and the Facilities' Custodial office, piloted two organics collection programs. The pilots provided valuable information on best practices with regard to bin placement, training, communications, product choice, and operations.

In FY 2016, best practices were applied to develop a plan for organics collection in six of the main dining facilities to begin in FY 2017. Over the past year, full-scale implementation of organics collection in all food prep areas (back-of-house operations) and/or dining areas (front-of-house) at Andrews, Sharpe, Verney Woolley, Josiah's, Faculty Club, and Blue Room resulted in over 470 tons of organic material diverted from the landfill. The successful implementation of the new compost program in Brown's dining halls can be attributed in large part to the many student interns and volunteers who dedicated their time to marketing, training, and education efforts.

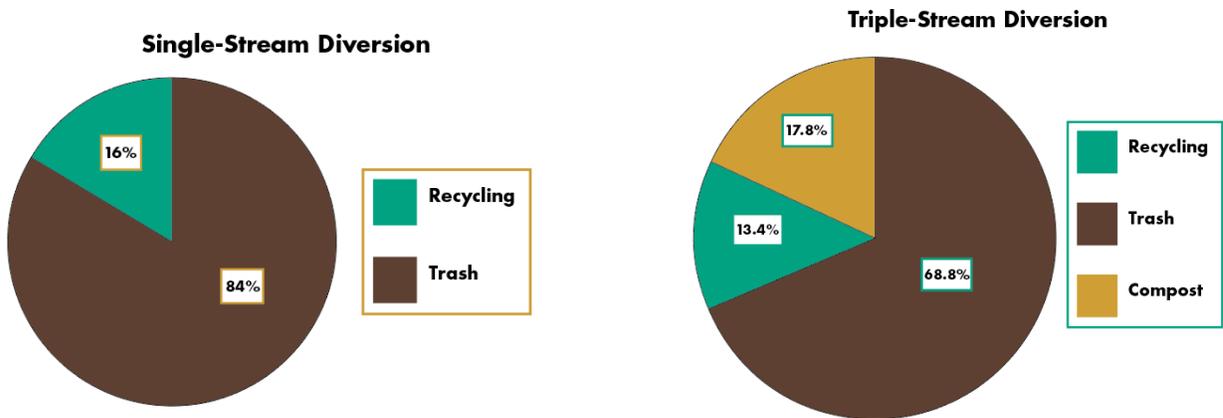
Comprehensive Diversion Rate



V. Facilities Management ... Waste and Diversion

E&E office interns and emPOWER member students provided an important voice at the table when decisions were made about how to approach waste sorting communications. Most importantly, students helped create compost and recycling training for professional and student dining staff, custodial staff, residential life student leaders, and the community in general. Led by Megan Kelly, a graduate of the 2017 class, over 50 volunteers staffed the compost station in each dining hall at the beginning of each semester in order to ensure that community members understood what compost is and how it should be sorted.

Brown is a leader among Rhode Island institutions in its commitment to not only comply with the state's 2014 "Compost Law," but also to make a significant investment in reducing the University's environmental footprint. In this upcoming year, we will continue to implement processes and outreach programs to reduce the amount of contamination, (including plastic, wax-lined paper, and metal), and increase diversion of organics from the landfill.



V. Facilities Management ... Waste and Diversion

ii. Bigbelly Trash and Recycling Stations

As its first step in the campus-wide plan to move forward with single-stream recycling, Facilities Management placed 73 Bigbelly units across campus in 2016. Each outdoor waste station now has a single recycling Bigbelly that can accept all recyclables. This single-stream approach makes recycling easier and less confusing, and has been shown to result in higher diversion rates.

These efficient waste stations are outfitted with solar panels that power a compactor mechanism to allow five times more trash and recycling to fit in the stations. The Bigbelly stations feed into a wireless network to transmit data on the fullness of each bin, which means that staff get updates when stations need to be emptied. This has significantly reduced the time spent checking stations throughout campus, reducing fuel use and enabling Grounds staff to focus additional time and resources on more productive activities. In its first year of deployment, the Bigbelly program has saved about 298 hours of regular labor and 32 overtime hours, which was redirected to other grounds projects to maintain the campus.

iii. Post-Landfill Action Network (PLAN)

In the spring of 2017, the E&E office and emPOWER began working with the Post-Landfill Action Network (PLAN). PLAN's mission is to "cultivate, educate, and inspire the student-led zero waste movement". PLAN informs students about the waste crisis and equip them with the necessary skills and resources to implement solutions to waste in their campus communities.

With Brown's goal of reaching 50% waste diversion from the landfill by 2020, PLAN provides an additional resource that helps students identify new opportunities. Students are utilizing PLAN's workshops and manuals on everything from how to decrease plastic usage on campus to creating donation days.



V. Facilities Management ... Waste and Diversion

iv. Events

Brown University has a variety of large, high-profile events each year that have significant environmental impacts in terms of resource use, waste generation, and public attention. The conscious reduction and diversion of waste at these events, showcases Brown's commitment to sustainability at the University and in the Providence community. The E&E office partnered with various stakeholders to identify and implement waste reduction and diversion strategies at these events. The E&E office and student groups work together to provide training and host events that educate the community on waste reduction and diversion.

Green Move-In: The E&E office organized a team of Green Move-in volunteers to educate new and returning students as they moved into their dorms this past fall. Volunteers educated parents and students about proper waste sorting - ensuring that cardboard and other recyclable materials were diverted from the landfill. The team provided students with sustainability tips and opportunities to become engaged on campus, all while ensuring that move-in ran as smoothly as possible.

To further the opportunity to discuss the importance of waste diversion, volunteers handed out reusable water bottles to every first-year student during key pick-up. Born from the Beyond the Bottle student initiative, started in 2013, this effort helps Brown to reduce the amount of plastic water bottles and waste the University creates.

Below: Green Move-in volunteers recycling cardboard boxes



V. Facilities Management ... Waste and Diversion

Game Day Recycling Challenge: The Game Day Recycling Challenge is a national competition between colleges and universities that encourages waste diversion at campus sporting events. This year, volunteers went all out in their efforts to educate Brown tailgaters about proper recycling. Volunteers from the EcoReps student group staffed a “sustainability tent” full of information and give-aways, monitored trash and recycling receptacles at the stadium, and engaged tailgaters in recycling education. This year volunteers were happy to see little to no waste left on the grounds after the tailgate - a direct result of their efforts to empower tailgaters to properly recycle.



Clean Break: Donations play a big role in Brown achieving its goal of diverting 50% of ‘waste’ from the landfill by 2020. This year, the month-long donation program, Clean Break, diverted 19,621 pounds of material from the landfill. The program expanded its partnerships this year. Partners included: Goodwill, the Rhode Island Community Food Bank, Brown’s First Generation, Big Brothers Big Sisters of the Ocean State, the Providence Animal Rescue League (PARL), and Mount Hope Library. The bulk of the donations were sent to Goodwill; however 548 pounds of food was collected by the food bank, and PARL received 320 pounds of blankets, towels, and cleaning supplies. The addition of more organizations to the program this year resulted in higher diversion rates, from 13,815 pounds in 2016 to 19,621 in 2017, as Brown was able to collect a more diverse assortment of goods.

Managed by a devoted team of student volunteers, Clean Break is a partnership between the E&E office, Residential Life, Custodial Services, and our waste hauler. The program runs through the month of May and encourages students to donate clothing, houseware items, food, and other miscellaneous materials to not only improve our diversion goals, but also to support local groups and charities. Student donations support Goodwill’s job training programs in Rhode Island for youth and adults with disabilities and other barriers to employment, Big Brothers and Big Sisters mentoring program, local library operations, and more.



V. Facilities Management ... Waste and Diversion

Commencement: Each May, Brown University confers honorary, graduate, medical, and undergraduate degrees on Commencement day—the culmination of a campus-wide weekend celebration. It is a time of great ceremony, pageantry, and celebration, with much of it representing centuries-old traditions. Commencement is open to families, alumni, and the general public and hosts about 10,000 participants on Sunday alone.

In the past, large events like Commencement have struggled with large volumes of waste coupled with challenging waste management conditions. Beginning in FY 2015, Brown chose to take a proactive approach to waste reduction during Commencement. The University eliminated the sale and distribution of plastic water bottles and began providing three large scale water stations where participants and guests are able to fill personal bottles and reduce the event's overall waste footprint. This work continues and was expanded in 2017 to include a fourth water station.

Other efforts to reduce the use of printed paper included: reducing the number of printed programs and brochures by approximately 20% in an effort to minimize paper waste; an electronic invitation sent to families via email instead of a traditional paper postcard; signage was redesigned to be reused on an annual basis; and a Commencement Guidebook App was created to provide information electronically that was traditionally distributed as paper brochures, programs, and flyers. Moving forward, more emphasis will be placed on reducing printed paper to guests.



Top Left: Commencement volunteers staffing a water station. Above: Clean Break volunteers moving donations. Left: Volunteer surveying donations from Grad Center.

V. Facilities Management ... New Construction, High Performance Design & LEED

D. New Construction, High Performance Design & Leadership in Energy and Environmental Design (LEED®)

Facilities Management's Design & Construction office is required to limit greenhouse gas emissions by reducing energy consumption for all newly constructed or renovated facilities by a minimum of 25%, with a goal of 50% below the standard required by state energy code. The University's new construction projects are designed to meet a minimum of a silver certification level in the U.S. Green Building Council LEED® certification program. The standards of LEED® certification are silver, gold, and platinum, and points toward certification are earned by meeting requirements in categories of sustainable sites, water efficiency, energy and atmosphere, materials and resources, indoor environmental quality, and innovation and design. Projects at Brown that have achieved LEED® or are designed and registered to achieve LEED® certification can be viewed at the interactive campus map on the Facilities Management website.

Achieved Gold:

- Rhode Island Hall, 2010
- Stephen Robert '62 Campus Center, 2012
- Warren Alpert Medical School, 2012
- Perry and Marty Granoff Center for the Creative Arts, 2012
- 315 Thayer Street, 2013
- Miller Residence Hall, 2014
- Metcalf Residence Hall, 2014
- Nelson Fitness Center, 2014
- Metcalf Research Complex, 2014
- 85 Waterman Street, 2015

Achieved Silver:

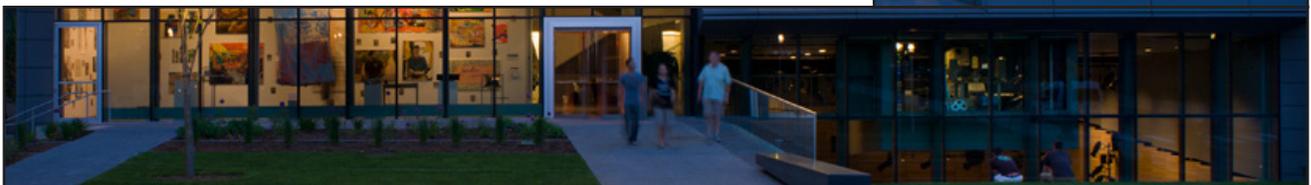
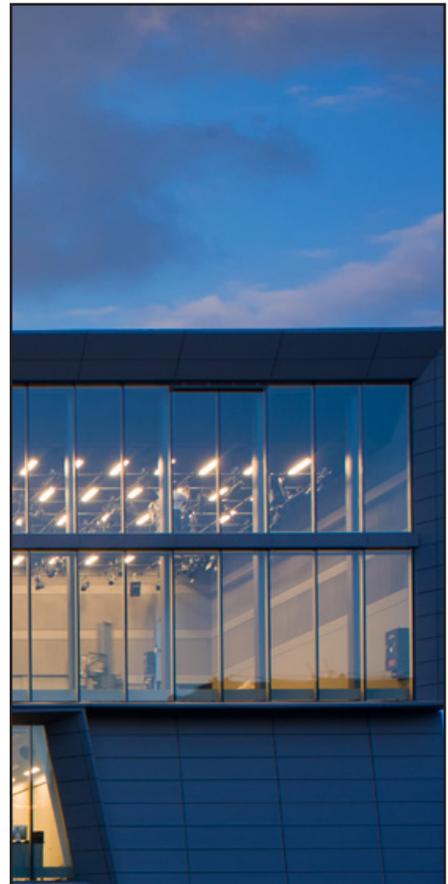
- Sidney E. Frank Hall for Life Sciences, 2009

Targeted to Gold:

- School of Engineering (under construction)
- Division of Applied Math (awaiting certification)

Targeted to Silver:

- Watson Institute Expansion (under renovation)
- Wilson Hall (under renovation)



V. Facilities Management ... Grounds and Custodial

E. Grounds Division

The Grounds division manages over 113 acres of open space, parking lots, landscaped spaces, and athletic facilities. In FY 2017, 85% of the fertilizers used were organic, representing a 10% increase in organic fertilizers since 2012. Also in FY 2017, Grounds delivered about 80 tons of yard waste to urban farmers in Providence, Johnston, Cranston, and Seekonk. Grounds continues to make wood pallets available to Brown community members for reuse instead of adding them to our landfill. Grounds maintains three green roofs located at the Granoff Center, the Warren Alpert Medical School, and the Sciences Library, and three rain gardens located at Applied Math, 85 Waterman Street, and Granoff Center. These features not only add to the beauty of campus but mitigate stormwater runoff.

The Grounds division has been a key player in collaborating with the E&E office. They have helped to improve large event clean-ups, encourage appropriate waste diversion and disposal, track and measure Brown's nitrogen footprint, and participate in the Sustainability Strategic Planning Advisory Committee. During this fiscal year, Grounds planted trees along many of Brown's streets to help mitigate stormwater runoff, as well as improve the campus aesthetic. New street trees were added along the length of Young Orchard Avenue while four were planted along 383 Benefit Street and around the Jewelry District. The athletic fields are maintained with organic materials.



Left: Grounds division delivers organic waste to local farm. Right: Grounds staff member plants new street trees.



F. Custodial Services Office

Over the course of this year, Custodial Services has implemented new sustainability initiatives and collaborated with other departments to improve Brown's sustainability services. Most notably during the 2017 winter break, Brown converted over 233 of its buildings to coreless toilet paper. This switch provides a 30% increase in product-per-roll and has thus far diverted approximately 60,000 total cardboard rolls from the waste stream.

V. Facilities Management ... Custodial & Internship Program

The University began using green cleaning products in 2004 when the custodial office partnered with cleaning industry manufacturers to replace current cleaning chemicals with more environmentally-friendly alternatives. Research and testing led to the purchase of green-seal-approved and nontoxic chemicals, use of microfiber cloths and applicator mops, non-acid bathroom products, and hydrogen peroxide products. Brown is committed to green, sustainable products that do a superior job of cleaning all surface types. Each product considered must meet the challenge of being an effective agent while not adding labor, remaining cost-effective, and not damaging historical surfaces. Each product is rigorously tested prior to deployment; if it passes, it becomes a part of our green-cleaning inventory. Alongside this, Custodial Services is now using new floor buffing pads made from plant-based materials which reduce our floor cleaning carbon footprint by 60%.

Custodians and supervisors are essential partners in campus sustainability efforts thanks to their knowledge about recycling and composting, which makes them integral partners in our student initiatives — including Green Events, the compost program, and Clean Break. Custodial Services partnered with the E&E office and Dining Services to implement composting stations in all dining halls on campus this past summer. Custodians are on the front lines in ensuring that our compost is handled correctly and remains uncontaminated. All custodial supervisors and managers worked with E&E office staff and volunteers to collect donations in all residential halls on Brown's campus — culminating in a total donation of 9.8 tons of clothing, textiles, and other materials.



G. Energy and Environmental Internship Program

The backbone of the Office of Energy and Environmental Initiatives is its robust internship program that offers paid positions to at least 13 interns every year. Interns contribute significantly to major initiatives including composting education, Departmental Sustainability Programs, the development of a new campus Energy & Environmental Metabolism interface, and a variety of other projects. The internship program allows the E&E office to tackle a greater number of projects and to effectively reach the student body. The office also believes that real world experience that incorporates the use of campus as a living lab is essential to student learning. Interns regularly work with staff at all levels, faculty, and community organizations. Students learn to work in teams, conduct themselves as professionals, and use creativity and ingenuity to create sustainable and effective solutions.

V. Facilities Management ... Internship Program & DSP

New Intern Projects: This year, E&E office interns were responsible for new projects that helped expand Brown's sustainability initiatives. Interns began to focus on food waste and electronic/hazardous waste to improve education on the importance of diverting troublesome waste from our landfill. The E&E office partnered with the Humanity Centered Robotics Initiative to explore ways that technology can help the University improve efficiency and cut down on carbon emissions. The office's compost intern took on new projects — training staff, recruiting and managing compost education volunteers, and leading the charge with signage and marketing development. Finally, two interns took on the task of developing an official Sustainability Tour that will be promoted through Admissions and led by the E&E office. The tour will launch in October 2017.



H. Departmental Sustainability Program

The Departmental Sustainability Program (DSP) is a project led by the Office of Energy and Environmental Initiatives (E&E). Through this initiative, the E&E office's interns work with Brown's academic and administrative departments to engage the Brown community in sustainability initiatives. The goal of this project is to foster a culture of sustainability within individual departments, offices, and schools by providing baseline and trend data, and then providing recommendations on how community members can improve their commitment to sustainability.

The program is designed to supplement overall campus sustainability goals and to create a forum to determine best practices. In addition, the DSP can provide healthier and more comfortable working environments for students, faculty, and staff through programs such as lighting (LED) retrofits, temperature management, and improvement of air quality. Finally, integrating sustainability goals on a departmental level will help encourage employees to implement sustainability practices in both their professional and personal lives.

There is a strategic framework for the program's implementation. First, the E&E office forms partnerships with individual schools or departments to agree upon targeted sustainability strategies. The agreed upon plan tracks and measures a variety of departmental data, including energy use, waste diversion rates, alternative forms of transportation, and workplace wellbeing. Next, the plan identifies baseline data, options for integrating sustainability initiatives, and data on post-implementation.

Thus far, the DSP has been initiated at the School of Professional Studies' 200 Dyer Street location and the Warren Alpert Medical School. We have observed enthusiasm and a willingness to engage in sustainability initiatives from students and staff participating in our program. This includes a willingness to make important behavioral changes and a commitment to sustainability overall. In the future, we hope this program can be adopted by a wide variety of departments, schools, and offices at Brown.

V. Facilities Management ... Orientation

I. Orientation

This past year, the E&E office increased its presence during orientation and move-in. In partnership with Residential Life, the office developed training for Residential Peer Leaders (RPLs) that focused on providing the student leaders with sustainability information that they could pass on to their residents. It is important to empower sustainability champions on campus with proper recycling and composting techniques, the rules and best practices of biking and public transportation, how students can get involved, and more. Brown RPLs happily took on this role, engaging with E&E office staff and interns to learn how they could become sustainability leaders on campus.

Meiklejohns, who are student peer advisors, and Brown University Dining Services (BUDS) student supervisors are another group of leaders on campus who serve as resources for students. E&E office interns attended the Meiklejohn resource fair for the first time this past summer to provide the students with information and physical resources to share with their peers. Similarly, BUDS supervisors underwent a comprehensive compost and recycling training to ensure that new staff were educated on proper sorting both inside and outside the dining halls.

This coming year, the E&E office team will be working with Residential Life again to provide RPLs with waste sorting workshops that will include a demonstration, games, prizes, and resources that RPLs can bring back to their residents. Interns will continue to train Meiklejohns and BUDS staff; and for the first time, the E&E office will lead a first-year orientation workshop that will take students on a tour around campus.

COMPOSTING

Why Compost?

1. **It slows down landfill usage.** It may not seem like much when you throw out your leftovers, but food is actually the largest contributor to landfills. At the current rate, Rhode Island's landfill will be full by 2038.
2. **It helps fight climate change.** Composted food releases significantly less methane (a greenhouse gas that traps up to 100 times more heat than carbon dioxide over a 5 year period) than food in a landfill.

What to Compost?

All organic material can be composted. This includes fruits, veggies, meat, dairy, bones, edible liquids, paper napkins, wooden coffee stirrers, small paper scraps and more.

What Not to Compost?

NO plastics of any kind, chip bags and wrappers, metal, disposable coffee cups, or synthetic material.

How to Compost

Just dump your food scraps into the compost bins in the Sharpe Refectory, Andrews, the Blue Room, and the Ivy Room.



RECYCLING

Did you know that Brown participates in single-stream recycling? This means that all recyclable glass, cardboard, and plastic containers can be recycled in the same bin in dining halls, dorms, and classrooms... and anywhere else on campus.

Be sure to recycle even in your own dorm (you can call facilities if you don't have a recycling bin in your room).

Rhode Island's Plastic Rule: *Only plastic containers can be recycled (so no flat plastic such as utensils, straws, or lids can be recycled by themselves).*

If you're ever unsure of how to dispose of an item, remember: "When in doubt, throw it out".

ALL RECYCLABLES



Questions ?
Visit the Brown is Green Website!



TRANSPORTATION

Walking

Providence is a great place to explore! Key landmarks like India Point Park, Wickenden Street, Downtown Providence, and Wayland Square are all within walking distance from Brown's Campus.

If you are walking around campus at night, you can request a Safewalk by calling 401-863-1079 or by asking a Safewalk team when you see them on campus. Safewalk is a program staffed by student employees who provide point-to-point walking escorts for their fellow community members on Brown's campus. You can identify Safewalk by their neon green vests! The program operates Sunday through Thursday from 9pm to 2:15am during the school year.

Biking

Biking around Brown is quick and easy, and having a bike is a great way to explore Providence. Google maps will help you plan a route with less elevation (avoid steep hills on your way Downtown!), and help you find your way around the area.



Bikes@Brown rents out bikes and will help fix your bike for free!
Register your bike with Brown DPS, and use a ULock to keep it secure.

VI. Student Groups and Initiatives

A. EmPOWER

EmPOWER is Brown's student environmental umbrella organization. Within the organization are groups that focus on everything from political activism to community composting. Groups work together to bring awareness about different sustainability topics to the community —whether that be through workshops, clothing swaps, bike maintenance classes, or fundraisers. EmPOWER is an inclusive group that strives to be representative of the Brown community. The following student groups are included under emPOWER:



Bikes at Brown strives to facilitate and encourage bike usage on Brown's campus and throughout the Ocean State. The organization provides full-service bicycle repairs and week-long bike rentals, all for free, out of their shop in the garage of the Urban Environmental Lab. Through these services, in addition to frequent organized rides, bike safety and maintenance workshops, and a collaboration with DPS to prevent campus bike thefts, Bikes at Brown is actively working to cultivate a cycling culture on campus.

In **Climate Action League**, students identify and lead projects and research to reduce Brown University's resource use and carbon footprint. Past projects include residence hall low-flow shower head retrofits, photovoltaic solar array additions, Thayer Street recycling stations, waste station signage for Andrews Dining, partnership with the J.T. Owens Park green infrastructure outreach project, community outreach on rising electricity prices in Rhode Island, and an energy audit program to promote energy savings in dorms. In spring of 2017, the group worked with Facilities Management to coordinate the installation of solar panels onto an Environmental Program House, and will continue this partnership in addressing further energy-saving projects on Brown's campus.

EcoReps work with Facilities Management to help foster a campus culture that embraces environmental conservation and sustainable resource management. EcoReps are passionate, environmentally-minded individuals who work to raise environmental awareness within the Brown community. In addition to encouraging sustainability in day-to-day life EcoReps plan many popular annual events such as Game Day Recycling, Brown Unplugged, Earth Week, and Clean Break. This year the group helped rollout the new Brown Unplugged reporting site, increased the frequency of clothing swap events, and held a trash audit on the Wriston Quad during Earth Week.

Green Events was started as a final project for an environmental stewardship class in Spring 2012. This student driven initiative promotes and facilitates sustainable event planning at Brown. Green Event provides a simple framework for event planners to reduce waste, lowering the event's carbon footprint, and support local businesses, and educate customers. This year, the group focused on redeveloping its mission, its certification framework, and its services, which aim to educate event managers instead of solely providing volunteers to manage waste stations. This change will help Brown to achieve greater sustainability in the future.

VI. Student Groups and Initiatives ... Empower

The **Healthy Housing Hub's** (HHH) mission is to align the resources of Brown University, local nonprofits, and community members to address energy efficiency, sustainable living, and primary environmental health concerns in order to improve the state of healthy housing in Rhode Island. Currently, the HHH coordinates the Green and Healthy Homes Summer Research Institute and maintains a “healthy housing database” that is accessible to the public.



Rhode Island Student Climate Coalition (RISCC) is a statewide alliance of students and youth working to promote social and environmental justice by transitioning away from fossil fuel use. Some of RISCC's projects include helping to pass the 2014 Resilient Rhode Island Act, transporting 400 Rhode Islanders to the 2015 People's Climate March in New York City, helping draft and advance the Energize Rhode Island Carbon Pricing Act, organizing the 2016 Rhode Island People's Climate Mobilization in Providence, which turned out over 400 people, and continuing to show up at hearings and rallies to oppose the construction of fossil fuel infrastructure within the state.

SCRAP, Brown's student composting initiative, is working towards creating a zero-waste food cycle and making composting accessible for students, faculty, and local community members. This mission is two-fold: Firstly, the group provides a convenient avenue to compost by taking in food waste from all over Providence and turning it in SCRAP's homemade compost system. Secondly, SCRAP prioritizes education to encourage sustainable practices on and off campus. Additionally, the interest from residents and community organizations has made SCRAP focus on outreach and volunteer events, rejuvenate communication and educational techniques, and promote the 'famous' green compost bucket giveaways. Popular events such as composting open hours, (where community members get to see exactly what happens to their food waste), and compost giveaways, serve to connect Brown with Providence and act as invaluable educational tools. Currently, there is a single system located at the corner of Charlesfield and Hope streets that processed 1.5 metric tons of food waste this year alone. With the growing interest in compost, SCRAP has decided to add a second compost system to its program in FY 2018.

VI. Student Groups and Initiatives ... Empower

The **Sustainable Food Initiative** (SuFI) is a student group working with Brown and its surrounding community to provide local, organic food options to community members. It does this by managing an on-campus, student-run garden and organizing food-related workshops. SuFI works with Brown's many sustainable food groups, such as Market Shares, the Brown Vegetarian Society, the Student/Farmworker Alliance, Food Recovery Network, and Challah for Hunger.

The **Food Recovery Network** (FRN) is a national effort to redirect potentially wasted food to those in need. In 2011, Food Recovery Network at Brown (FRN@Brown) was the second chapter of FRN to be founded, started by four Brown undergraduates. Since then, the group has flourished and now includes approximately 50 student volunteers. FRN partners with Brown Dining Services to recover food from campus eateries and local Providence restaurants every day. In six years, FRN@Brown has recovered over 76,000 pounds of food. Recovered food is redistributed to food-insecure members of the Rhode Island community through partners such as We Share Hope.

Above all, FRN@Brown aims to support food justice communities both on and off College Hill. These efforts have won the organization various awards and accolades, such as the Brown Student Agencies Inspire Grant and the National Association of College and University Food Services' Gold Medal in Outreach and Education for its annual Apple Gleaning event.



VI. Student Groups and Initiatives ... Additional Environmental Student Groups

B. Additional Environmental Student Groups

In addition to emPOWER, the following student initiatives had a strong campus presence in FY 2017.

The **Brown Market Shares** program is a student-run, campus-based food distribution program. Due to its low cost, Market Shares is highly accessible to all members of the Brown community. Inspired by the Community Supported Agriculture (CSA) model, the program partners with regional farmers to bring fresh, local, and sustainable produce, bread, eggs, dairy, and meat to the university community. The program is supported almost entirely by volunteers and is directed by a six-person coordinating team. Market Shares partners with the following local farms and bakeries:

- Big Train Farm
- Allen Farms
- Freedom Food Farm
- Hill Orchards
- Wishing Stone Farm
- Langwater Farm
- Pak Express Farm
- Pat's Pastured
- Narragansett Creamery
- Rhody Fresh
- Sweet & Salty Farm
- Seven Stars Bakery



Pictures courtesy of Brown Market Shares

VI. Student Groups and Initiatives ... Spotlight

C. Student Initiative Spotlight: SCRAP

With only six to twelve members at any given time and a decentralized leadership structure, SCRAP has carved a path for campus and community composting. After five years of operation, the group keeps two main goals in mind: educating students, staff, faculty, and other community members about the benefits of composting and; providing an outlet for people to participate in composting. SCRAP's partnership with the E&E office and Brown University Dining Services has improved the community's understanding of compost, waste sorting, as well as increased access to waste diverting opportunities. The group played an important role in staffing compost volunteer shifts at dining halls, providing education on food waste during the Clean Plate Challenge, and providing insight as the E&E office developed signage and marketing for the new compost program.

Stationed by the student-run garden near the Young Orchard residential halls, the SCRAP team provides members with a personal bucket for collecting compost, a location for compost drop off, meetings to physically turn the compost bins, and general information about compost. The system near Young Orchard operates on a three-bucket system line and can hold approximately 100 gallons of compost material (equal to 20 gallons of new compost material per week). SCRAP members maintain the system through weekly small-system turns and less often, full-system turns. They have initiated the process for incorporating and managing the West House compost system, which will increase SCRAP's total capacity.

SCRAP communicates using a two-fold approach - communication within their member-base and communication to the greater community. They operate one listserv for students interested in the group itself and another, called the Bucketlist, for contacting the list of people with buckets. The Bucketlist reaches 700 members; all of whom receive composting tips and education.

The group's next steps include continuing to support the E&E office and Dining Service's compost operations, revamping their communication systems, communicating with the Warren Alpert Medical School to expand their outreach, improving their systems to support more compost, organizing educational events to the general community, and looking into new ways to augment their membership numbers.

SCRAP is always looking for new members and clients. To find out how you can get a bucket and participate in community composting, you can email SCRAP at compost.with.scrap@gmail.com for information. The group is very welcoming, hosting social gatherings titled Scrapy Hour, creating and wearing SCRAP apparel, and rotating leadership positions for every meeting.



VI. Student Groups and Initiatives ... Earth Week Initiative

D. Earth Week Initiative

Every year Brown's umbrella environmental group, emPOWER, hosts Earth Week. Earth Week falls on and around Earth Day every year. It features events and activities that highlight sustainability efforts on campus and engages students in sustainable behavior. From campus gardens, bike share programs, energy initiatives and more, Brown students drive the momentum and success of this week long program.

In 2017, Earth Week featured events organized and promoted by emPOWER student groups, the E&E office, and Dining Services. Some of the highlighted events included the Earth Day dinner hosted by the Sharpe Refectory, the Clean Plate Challenge that educated diners about reducing the amount of food waste they produce, and a panel on Fossil Fuel Infrastructure that was organized by the Brown chapter of the Rhode Island Student Climate Coalition (RISCC). Overall the week featured twelve events and touched on topics related to compost, food waste, renewable energy, sustainable transportation, sustainable gardening, activism, and reuse.



VII. Research and Teaching in Sustainability

A. Institute at Brown for the Environment and Society (IBES)

While sustainability learning outcomes are integrated within various departments and championed by faculty and leadership throughout the University, official undergraduate concentrations in Environmental Studies and Environmental Science are housed within IBES, the Institute at Brown for Environment and Society. IBES organizes research into four interdisciplinary thematic areas, each centered on an organizing question and led by a faculty member with expertise in the area: Natural Systems, Food and Water, Human Health and Well-Being, and Equity and Governance. IBES is housed in 85 Waterman Street, home to the Climate Development Lab, run by Professor Timmons Roberts, which was recognized at the UN Climate Talks in Marrakesh, Morocco in 2016. The Urban Environmental Lab at 135 Angell Street, home to the Environmental Studies program, hosts a community garden and integrated space for student engagement in environmental consciousness and urban self-sufficiency.



IBES students stayed busy during the 2016-2017 academic year with the completion of impactful projects and theses. Environmental Studies concentrators Viraj Sikand and Maya Faulstich-Hon formed Kulisha, a project focused on sustainable animal feed made from Black Soldier flies. This innovative approach propagates protein rich flies by feeding them organic waste material from restaurants and breweries. The flies are then harvested and fed to livestock. This approach tackles socio-economic and environmental issues associated with organic wastes and animal feed.

Jessica O'Dell and Thomas Pettengill of IBES both received Brown University Distinguished Thesis prizes for their theses on the political influence on fisheries in the United States and a natural history model of New England marsh die-off, respectively.

IBES expanded its reach this year by developing new tracks and creating partnerships with new community organizations. Throughout the year, faculty and students within IBES worked together to create a new Environment and Inequality track. Two undergraduate students sat on a committee with faculty and led the collaborative effort to draft the plan for this track and solicit feedback from other concentrators. The new track became available to students in the spring of 2017. This year's summer internship program grew as the department formed partnerships with Audubon Society of RI, City of Providence Office of Sustainability, Rhode Island Nature Conservancy, and the University of Miami School of Law Center for Ethics.

Four professors were added to the IBES faculty in the 2016-2017 academic year. Former Regional Administrator of EPA Region 1 New England, Curtis Spalding will be adding experience in environmental protection advocacy, policy, and administration. Tyler Kartzinel, Assistant Professor of Environment and Society & Ecology and Evolutionary Biology focuses on the way species interact with one another and how these interactions can guide efforts in addressing and adapting to global change. Professor Brian Lander brings a history focus to IBES and explores the consequences of gradual colonization of South China's wetlands by migrants from North China. And finally, Visiting Professor Samiah Moustafa will work with students on understanding the cryosphere, hydrology, climatology, remote sensing and surface albedo.

VII. Research and Teaching in Sustainability ... Collaborations

B. Stormwater Master Plan Academic Collaboration

In the fall of 2016, Facilities Management partnered with Dawn King's ENVS 0110 Humans, Nature, and the Environment class to collect information that would inform Brown University's first strategic stormwater master plan. The introductory class splits into smaller sections to work on different projects with Brown offices and community organizations. Led by teaching assistant, Thomas Culver, one section learned about stormwater issues in Providence and researched best practices for managing runoff and flooding around Brown. To improve their understanding of stormwater, students worked with Brown's University Architect and Planning office, the Office of Energy and Environmental Initiatives, and Facilities Management's Computer Assisted Design team. The students then mapped and created a database of permeable and impermeable surfaces on campus, identifying program areas, and then making suggestions on how Brown could address these areas.

What is stormwater?

- Water from heavy rain or snow that typically "runs-off" across the land, making its way to lower water sources.

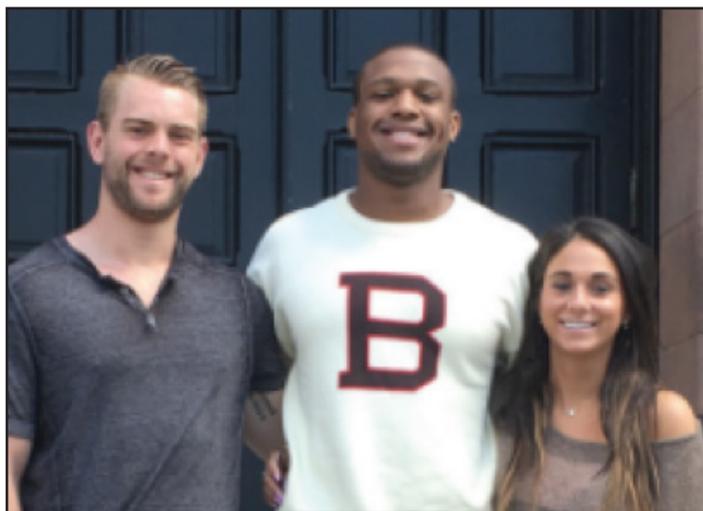


C. C.V. Starr Program in Business, Entrepreneurship and Organizations (BEO)

The E&E office partnered with the C.V. Starr Program in Business, Entrepreneurship and Organizations (BEO) again during the 2016-2017 academic year. BEO requires a senior capstone project that provides a synergistic experience for BEO seniors. Most projects are two-semester commitments and seniors are placed on projects best aligned with their preferences and skills. A faculty advisor supervises project teams, usually comprised of five students and a "mentor" from the sponsor organization who provides project context, advice, and access to data and resources.

VII. Research and Teaching in Sustainability ... Collaborations

In FY 2017, Associate Director, Brendan McNally served as the BEO Project Advisor and the E&E office served as the mentor for Assessing Brown's Campus Metabolism Platform capstone. This project evaluated the E&E office's idea of creating a platform for the community to engage in campus energy, food, waste, and other data. The BEO students reviewed primary and secondary literature, held focus groups to get an understanding of how the community would like to see data displayed and how the E&E office could market and incentivize use of the platform. The students provided helpful feedback on everything from color schemes, image and metric use for the site, and methods the office could use to engage the community through competitions, rewards, and social media.



Since the partnership with BEO was so successful, the E&E office will continue to serve during this coming year as a mentor for at least two new BEO capstone groups.

VIII. Departmental Reporting

A. Brown Dining Services

The E&E office works closely with Brown Dining Services to explore sustainability issues within dining. Dining at Brown is a part of the experience of visiting, attending, or working at the University. The University is committed to sustainability in regard to dining by supporting local food systems and farmers, reducing food waste, and purchasing fairly-traded, sustainably-sourced and environmentally-friendly foods. The following initiatives demonstrate the University's commitment to sustainability in dining.

Green Restaurant Association Certifications: Brown University is the first organization in Rhode Island to become Green Restaurant Association Certified. The *Sharpe Refectory*, *Verney-Woolley*, and *Josiah's* dining halls earned 3-Star Certified Green Restaurant® status. The *Blue Room* is 2-Star Certified Green Restaurant® and *Andrews Commons* is a 1-Star Certified Green Restaurant®. These locations have been recognized for implementing sustainable practices in food, water, waste, energy, chemicals, disposables, and building materials. Some of the attributes leading these certifications include annual water savings of about 572,000 gallons and about 200,000 kWh of electricity saved.

The Green Restaurant Association (GRA) is a national non-profit organization that provides the only official Certified Green Restaurants® mark in the country. For 25 years, the GRA has pioneered the Green Restaurant® movement and has been the leading voice within the industry encouraging restaurants to listen to consumer demand and green their operations using transparent, science-based certification standards. The GRA has made it easy for thousands of restaurants to become more environmentally sustainable in a profitable manner. The GRA is endorsed by scores of national environmental organizations such as National Resources Defense Council (NRDC) and esteemed trade organizations including the New York State Restaurant Association, Orange County Restaurant Association, and America Public Garden Association.

VIII. Departmental Reporting ... Dining Services

Clean Plate Challenge: Brown University Dining Services (BUDS) partnered with the university's waste vendor to host six Clean Plate Challenge events at the Sharpe Refectory between October and May. These events helped drive food waste reduction through providing educational materials, visuals, and waste weigh-ins to inform the Brown student body about food waste.

Earth Day: Brown Dining Services recognizes Earth Day as a fun way to showcase sustainable initiatives and delicious foods aimed at creating awareness and fostering sustainable practices. This year, Brown Dining celebrated with a full week of special events held at Andrews Commons, the Blue Room, Ivy Room, Verney-Woolley, and Sharpe Refectory. Andrews Commons showcased our partnership with local vendors by providing a new menu item each day focusing on ingredients from a different local vendor. The Blue Room featured meat-free grain bowls – specially packed with plant-based foods, the Ivy Room featured a cheese stuffed mushroom burger made with local mushrooms from RI Mushroom Company, and Verney-Woolley hosted a local food breakfast on Earth Day.

In support of Earth Week events, the Sharpe Refectory hosted an Earth Day dinner with a menu crafted to best showcase Brown Dining Services' regular suppliers of local and sustainable foods. BUDS partnered with student volunteers from SCRAP, Brown's compost student group, to track the volume of compost diverted from the landfill. Students also had the opportunity to meet with representatives from The Compost Plant, We Share Hope, and Newport Biodiesel, while receiving free local honey from Mello's Farm Stand. They could then venture over to our 16-foot wall mounted Earth Day Tree showcasing Brown Dining's sustainability initiatives, while sampling fruit smoothies created by a blender bike hosted by the Food Recovery Network.

Community Harvest: The Community Harvest program began in September 2002 as an



initiative to increase Brown's support of food producers in the Rhode Island region. The program, now in its 16th year focuses on sustainable purchasing at the local level. Community Harvest supports local growers, food producers, processors, and practices artisanal craftsmanship through food. Additionally, the program contributes to strengthening the local food system through educational programs and by providing a large-scale, steady purchaser from local farms.

The After the Harvest initiative, part of the Community Harvest program, began during Hunger and Homelessness

week in 2005. BUDS has successfully coordinated efforts to both reduce food waste and reroute overproduced food appropriate for donation to local hunger relief programs through our relationship with We Share Hope.

Farmer Partnerships: BUDS has developed and maintained committed relationships with the farmers who've been part of the original initiative to bring fresh, local produce to the dining halls. Brown Dining Services aims to expand the program each year and currently works with a network of over 50 local farms. BUDS also works with many producers, processors, and distributors of local food and dairy products, including continued support of the Rhode Island Dairy Farms Cooperative, a group of eight dairy farms located throughout the state.

VIII. Departmental Reporting ... Dining Services

Farm Fresh Rhode Island: Brown University Dining Services (BUDS) is a founding partner of Farm Fresh Rhode Island (FFRI), an organization that started in 2004 as a collaboration between the Center for Environmental Studies, the Rhode Island Foundation, the Rhode Island Division of Agriculture, and BUDS. FFRI is a non-profit organization whose mission is to strengthen the local Rhode Island food system by creating stronger, healthier connections between producers, consumers, and the environment.

Currently, FFRI manages eight urban farmers' markets in the greater Providence area, and with BUDS, co-manages a weekly market held on Brown's campus during the months of September and October. The market enables students to foster community food values as they gain convenient access to regionally grown fresh produce, freshly baked breads and ready-to-eat items. The market also provides an opportunity for students to connect with the growers themselves and better understand the products and supply partners of Brown Dining Services. Each year ten to fifteen vendors are represented.

The following vendors participated in the 2016 Farmers Markets:



- The Farm
- Mello's Farm Stand
- Seven Stars
- Two Little Buns
- Hill Orchard
- Barden Family Orchard
- Knead Donuts
- Farm Fresh's Harvest Kitchen
- Sacred Cow Granola

The Market Mobile, a FFRI initiative developed in the winter of 2008-09, provides a centralized distribution system for Rhode Island farmers. Each week farmers post prices for their available products through a central online price list. Local restaurants and institutions view the list and place orders. The Market Mobile picks up farmers' weekly deliveries from one central location and delivers them according to a scheduled route.

The Real Food Initiative: In 2009, as a result of a grassroots effort by a group of students, BUDS launched the *Real Food Challenge* at Brown and it continues today. The goal was to create a process through which all food purchasing decisions consider four main criteria: whether foods are local, ecological, fair, and humane. Additionally, students worked towards the capability to trace and track food purchases to determine how they stacked up to the *Real Food Calculator*. Student intern positions were created to assist BUDS with this process and in moving the campaign forward.

Brown Dining Services was one of the first institutions in the nation to pilot the Real Food Calculator to track and assess its purchases. Today, BUDS is one of several hundred colleges and high schools nationwide that supports just and sustainable agricultural systems. The Calculator has enabled BUDS to assess how well food purchases measure up against the criteria. Areas of focus have included milk, cage-free eggs, beef, fish, shellfish, and coffee. BUDS has already surpassed the Real Food Challenge's goal of 20% Real Food by 2020, standing now at 23%, and received the the Pioneer Award from the Real Food Challenge for its work on this initiative.

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More information about how the four main criteria of the challenge were met are as follows:

Local – BUDS currently sources 28% of its food locally, including 61% of its seafood and 84% of its cage-free eggs. BUDS is also among a limited number of universities that operates its own bake shop and butcher shop, which are counted in the local category.

Fair Trade – BUDS currently sources 3% of its food fair-trade, including 100% of its coffee and 15% of its other beverages.

Ecologically Sound – BUDS currently sources 8% of its food ecologically sound, including 100% of its coffee and 15% of its eggs.

Humane – BUDS currently sources 14% of its food humanely, including 82% cage-free eggs and 73% of its meat.

Green Catering: In addition to the sustainable purchasing decisions found in the Real Food Criteria, Brown Catering Services has developed options for sustainable catering. These meals serve sustainably sourced items and focus on local, seasonal ingredients that consider minimal packaging and waste. Brown Catering Services works with over 100 local farms and vendors and Catering features signage with information about local vendors.



Food Donations: Since 2005, BUDS has donated over *176,000 pounds* of food to local organizations including The Rhode Island Community Food Bank, Providence Rescue Mission, McCauley House, City Year, and Camp Street Ministries.

In 2012, Brown Dining Services furthered this effort by partnering with We Share Hope, a local organization committed to recovering unused food from manufacturers, restaurants, hospitals, and colleges in Rhode Island and Southern Massachusetts for distribution to organizations that serve those in need. During the 2016-17 academic year, Brown Dining Services was able to donate about *18,500 pounds of food* to this worthwhile program.

BUDS became Food Recovery Network Certified in 2016 and re-certified in 2017. This certification means that Brown Dining Services is recognized and rewarded for efforts taken to fight waste and feed people through food recovery. Through this certification process, a third party verifies that Brown donates surplus food at least once per month to hunger fighting non-profits.

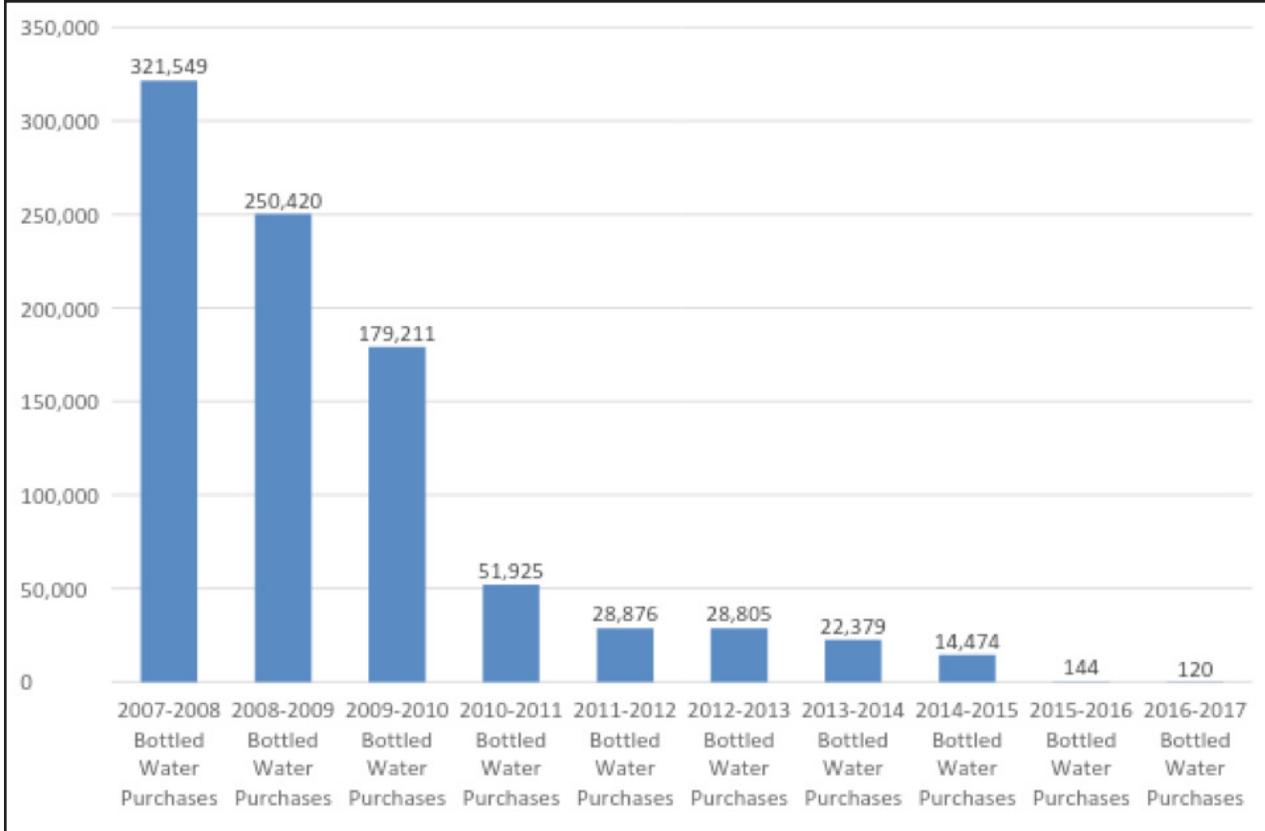
Recycling & Reusables: In the spring of 2010, BUDS implemented Eco-To-Go, a reusable takeout container program. Besides offering the container, BUDS also worked to educate students about landfill waste and the benefits of re-use. BUDS sells reusable mugs in its retail units and beverages purchased in a reusable mug receive a discount.

VIII. Departmental Reporting ... Dining Services

Newport Biodiesel: BUDS has partnered with Newport Biodiesel, a local company that takes used fry-oil and turns it into usable fuel for diesel engines and home heating. Brown's donated oil, combined with oil from other local food establishments, goes through a refining process before it is ready to be used as a recycled fuel source. Four dining locations participate in the program: Verney-Woolley, Sharpe Refectory, Josiah's, and the Faculty Club. Between the four locations, about 37,000 gallons of oil and grease have been donated since 2010; 7,800 gallons during the 2016-17 academic year.

Trayless Dining: In October 2008, BUDS committed to trayless dining in the Verney-Woolley dining hall by eliminating trays at that location. Verney-Woolley customer counts range from 250 to over 1,000 per mealtime. Trayless dining conserves one-third to a half gallon of heated water per person by eliminating the need to wash trays. A savings of over 4,800 gallons of water per week and 155,000 gallons per school year has been achieved. Trayless dining also reduces the energy that would otherwise be used to heat the water and decreases the use of detergents. Studies suggest that in 'all you can eat' facilities, trayless dining may reduce the amount of food diners put on their trays, thereby decreasing the potential for high rates of food waste.

Beyond the Bottle: Beyond the Bottle is an initiative started by students in February 2008 with the goal of reducing the supply and demand of single-use bottled water at Brown. As a result of the campaign, single-use bottled water purchases have been reduced by 99.96% since the inception of the initiative. This exceeds the FY 2012 goal of 80% and met the aspirational goal of 90% by FY 2013 one year early.



VIII. Departmental Reporting ... Purchasing Services

B. Purchasing Services

Over the past year, Purchasing Services has taken steps to support and promote, through its strategic sourcing initiatives, consistent sustainable practices across campus regarding procuring goods and services. The strategic sourcing team has focused on establishing relationships with departments with the goal of understanding their business needs and providing direction and guidance to address those needs, while supporting Brown's sustainability goals. Purchasing Services assists departments to make more informed and cost-effective decisions, and ensuring the process is more streamlined and sustainable by reducing the number of shipments to campus.

Purchasing Services has established relationships and negotiated contracts with preferred suppliers for the best cost, quality, service, and sustainability practices. One such example is working with and developing a contract with a preferred coffee supplier to ensure consistent pricing and service and to assist in encouraging departments to switch from plastic k-cups to compostable coffee pods.

To help with this process, Purchasing Services implemented a University Amazon Business account that provides complete spend visibility and insight into buying habits and trends across campus. In addition, departments gain more control over inventory with the ability to create their own inventory lists.

The department is working toward promoting a reduction of printers and printing on campus. In another effort to reduce paper waste, Purchasing has a contract with a local document management company to convert and scan paper to digital files.

Purchasing Services focuses on the complete 'supply chain' process including assessment of alternative materials, vendor sourcing and selection, and ultimate disposal of waste and surplus. Brown strongly recommends that appliances, building products, computers, electronics, heating and cooling, lighting, fans, and plumbing equipment meet or exceed the ENERGY STAR® rating. The Brown Community is strongly encouraged to reach out to Purchasing Services for information pertaining to preferred suppliers and to be proactive in identifying and examining opportunities to procure environmentally-friendly materials and equipment.



VIII. Departmental Reporting ... Transportation and Parking Services

C. Transportation and Parking Services

Public Transportation: Brown University has made great strides toward increasing the availability of public transportation. With the Rhode Island Public Transportation Authority (RIPTA) U-Pass program in its eighth year, all Brown University ID holders (faculty, staff, and students) may ride any RIPTA bus or trolley free of charge anywhere in the state of Rhode Island.

Zipcars: The University partners with Zipcar to offer Brown community members an alternative to driving to campus. Brown University students, faculty and staff pay an annual fee of \$15. Hourly rates range from \$7.25 to \$11.00 depending on the type of vehicle reserved. Nine of the 25 vehicles are hybrids and 2,700 Brown-related members use them to travel 30,000 miles a month. In addition, discounts at Providence retail establishments are available by using the Zipcar. The Brown Outing Club won the students with drive Zipcar contest this year. Prizes included free Zipcar hours of drive time for the group and scholarships.

Electronic Vehicle Charging Station: Brown University has two plug-in electric vehicle charging stations available for public use. One is located in Lot #44 on Brook Street, behind Minden Hall. The other is in the Richmond Street parking garage, entrance on Eddy Street, adjacent to the Warren Alpert Medical School.

Brown University Shuttle: The University provides five different shuttle services to facilitate greater safety and accessibility for students, faculty, and staff of Brown and its hospital affiliates who have a Brown ID. The daytime shuttle is a scheduled, fixed-route daytime service with 13 stops that runs on weekdays and provides transportation between Brown/RISD and the hospitals via downtown and the Jewelry District. The evening shuttle provides a similar fixed-route service in the evening, only around Brown Campus. Students can track the locations of either the daytime or evening shuttles at brownshuttle.com or via an iPhone/Android app. The onCall Shuttle provides point-to-point transportation for all Brown community members to or from nearby off-campus areas during evening hours to ensure safe transportation at night. Students, faculty, and staff can request a ride by phone or online. The shuttle runs every evening of the week. The SEAS onCall Shuttle service is primarily reservation-based and serves members of the Brown community with disabilities who need assistance getting around campus (on weekdays only). The South Main Street express shuttle provides express service in the morning and afternoon between the Warren Alpert Medical School and 121 South Main Street.



IX. FY 2017 Awards and Certifications

- Princeton Review's "Guide to Green Colleges"
- Sierra Club "Cool Schools" by the Sierra Club
- An 'A' rating on the PETA Vegan Report Card
- Green Restaurant Association Certifications; 1st organization in Rhode Island to become certified:
 - 3-Stars: Refectory, VW, & Josiah's
 - 2-Stars: Blue Room
 - Level 1: Andrews
- The Daily Meal's Top 52 Best Colleges for Food



X. Ways Forward for Brown's Sustainability

In FY 2017, we made great efforts at assessing the future vision of sustainability at Brown. The SSPAC working groups identified issues of concern, recommendations for improvement, and best practices for stormwater, and environment, health, and wellness, to be considered by the administration. Additionally, we completed the design and negotiated a performance contract to begin a three-year implementation plan for the Thermal Efficiency Project.

In Spring 2017, President Christina Paxson announced the newly created Task Force on Climate Change and Business and Investment Practices. The President believes that in supporting research and education, it's important that Brown's commitment to sustainability is reflected in its business and investment practices. This new Task Force will serve as an advisory body to make recommendations to the President on ways Brown's business operations can fully reflect the University's commitment to environmental sustainability, with emphasis on addressing climate change. Additionally, President Paxson charged a Sustainability Study Committee which will focus on campus-wide sustainability--in particular developing recommendations and establishing strategies for the 2035 campus sustainability goals. These committees began work in the Fall of 2017 and will continue work through Spring of 2018.

In addition to planning the future of our GHG goals, over the next year, we will implement recommendations outlined in the Campus-wide Waste Management Plan that will get us one step closer to our 50% waste diversion by 2020 goal. This will include: reducing, streamlining, and standardizing waste stations on campus; providing centralized special and e-waste stations across campus; and enhancing the resident hall waste rooms to encourage proper waste sorting.

Transportation and Parking Services began FY 2018 with assessing and operationalizing enhanced shuttle routes that will provide more options for commuting to campus and travel between the Jewelry District and College Hill. In early FY 2018, Transportation and Parking Services, Office of University Communications, and the E&E office worked with the city to provide input for a city-wide BikeShare program. The city has moved forward with a BikeShare program and there will be a collaborative effort to promote and encourage participation, and make the program accessible to all Brown community members. Additionally, after over a year of planning and development, Transportation and Parking Services will have a new and interactive website that provides essential information while also providing the community tools and resources to choose alternative modes of commuting and getting around campus. Lastly, a fleet assessment will begin in FY 2018 to identify opportunities to reduce emissions associated with Brown-owned or leased vehicles and maintenance equipment.

As sustainability continues to be a priority in supporting Brown's 10-year strategic plan, Building on Distinction, University departments, offices, and schools will continue to collaborate on efforts to foster sustainability while providing learning and research opportunities for students and faculty.

XI. Acknowledgements

The E&E office would like to, first and foremost, acknowledge the contributions and efforts of the E&E office interns, EcoReps, and EmPower students without whom it would not be possible for Brown University to continue to expand its commitment to sustainability. In FY 2017 the E&E office interns alone spent a cumulative 4,000 hours laying the groundwork, supporting, and driving projects forward. These projects directly impacted the quality of life on campus while reducing the environmental impact Brown University has on the greater community. The E&E office would like to thank the many departments and staff that directly contributed to sustainability efforts across campus in FY 2017 including:



- Office of Transportation and Parking Services
- Brown Dining Services
- School of Professional Studies
- Warren Alpert Medical School of Brown University
- Office of University Communications
- Government Relations and Community Affairs
- C.V. Starr Program in Business, Entrepreneurship and Organizations
- Residential Life
- The School of Public Health
- Facilities Management
- Institute at Brown for Environment and Society (IBES)

