BROWN

NINTH ANNUAL SUSTAINABILITY PROGRESS REPORT

Office of Sustainable Energy and Environmental Initiatives,
Facilities Management

Prepared by the Energy and Environmental Team

Fall 2016

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I. Executive Summary

This year we moved forward with several new programs and initiatives including: preparing for organics diversion at the six main dining facilities; establishing a 50 percent waste diversion goal by 2020; obtaining approval and funding for a stormwater management plan; and securing two, full-year sustainable transportation internships with additional funding to develop an interactive transportation website focused on promoting alternative transportation. These were all recommendations that were developed by the Sustainability Strategic Planning and Advisory Committee (SSPAC), comprised of faculty, students, staff, and approved by Barbara Chernow, Executive Vice President for Finance and Administration.

As the Greenhouse Gas (GHG) emission reduction plan continues to be implemented through energy efficiency investments, we have completed a Campus Heating System thermal efficiency study. From this study we developed a significant and ambitious plan to convert our central heating system from a high temperature heating loop to a lower temperature heating loop, eliminating most steam heating systems from campus for a significant increase in thermal efficiency. This will enable further efficiency gains from installing energy recovery systems all of which will directly support our 42 percent GHG reduction goal by 2020. This will require significant investment whose financing needs to be determined before we can move ahead with this plan.

Our GHG emissions decreased from the previous year by more than 3,500 metric tons, leaving us at 27 percent below 2007 levels as compared to our interim target of 31 percent. This past year, we achieved the lowest energy use, an 11.5 percent reduction from 2007 levels, albeit helped by a warm winter. We are progressing towards reaching our goal of a 42 percent reduction in GHG emissions by 2020 from our 2007 baseline, as long as we continue to make energy efficient investments to reduce our overall energy consumption. Since inception of our GHG reduction plan, we have added new systems and equipment whose energy consumption is equivalent to 6,400 Metric Tons of Carbon Dioxide Equivalents (MTCDE), 9 percent of our 2007 baseline emissions. These systems and equipment will continue to grow as the campus meets its research, teaching, and quality of life missions. Since 2008, we have invested approximately $27 million, received over $5 million in energy efficiency incentives, and saved the university over $4 million.

We have reduced our carbon footprint by 19,723 MTCDE, which is slightly behind where we should be to meet our GHG goals, even though we are ahead of our energy efficiency target. This is solely due to our higher electric grid emissions, which we cannot control. Although opportunities for reductions continue to become harder to find, our recent thermal efficiency plan, as mentioned earlier, will help pave the way to our 2020 target as we continue to invest in innovative technologies and systems to help achieve our 42 percent goal.

Our staff includes two energy engineers, an academic and student engagement coordinator, and a sustainability manager dedicated to supporting and implementing the SSPAC recommendations. We welcomed Erin Donnellan this year as the academic and student engagement coordinator. She quickly settled in and received a letter of commendation from Goodwill Industries of Rhode Island for her dedication to the student move out event and collecting 13,365 lbs of donated material that otherwise would have gone to the landfill. Furthermore, the Office of Sustainable Energy and Environmental Initiatives (E&E) partnered with the Providence community and various Brown departments to spearheaded two highly successful composting pilots in preparation for the campus-wide program. Brown University continues to expand and evolve its sustainability efforts, building on past success and integrating its goals within a growing network of engaged members of the Brown community. Our office guides the university's contributions to the green jobs sector in Rhode Island. As noted in the Rhode Island Energy Efficiency and Resource Management Council 2016 Annual Report, the net result of expenditures is an increase of $4.20 in gross state product for each dollar invested.

The E&E office is proud to share this report with our partners and friends throughout the Brown University community and our peer institutions.

II. SSPAC Overview and Movement in FY 2016

In March 2011, a group of undergraduates presented to the Brown University Community Council to encourage the creation of a Sustainability Strategic Plan. In response, the 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 Sustainable Energy and Environmental Initiatives (E&E) convened four SSPAC working groups: Food, Energy & Water, Transportation, and Waste & Recycling. The Food working group, led by Peter Rossi, Director of Dining Services, includes representatives from Facilities Managment, Environmental Studies faculty, Campus Life & Student Services, and the undergraduate student body. The Waste & Recycling working group, led by Jessica Berry, Sustainability Manager – E&E Office, includes representatives from University Event and Conference Services, Environmental Health & Safety, Purchasing, and the undergraduate student body. The Transportation working group, led by Beth Gentry, Assistant Vice President, Business & Financial Services, includes representatives from the Anthropology faculty, Environmental Studies faculty, Purchasing, the City of Providence, Swearer Center for Public Service, and Bike@Brown student organization. Finally, the Energy & Water working group, led by Chris Powell, Assistant Vice President, Sustainable Energy and Environmental Initiatives, includes representatives from University Architects Office, Design and Construction, BioMed Facilities Planning & Operations, the School of Engineering, Computing & Information Services, and the undergraduate student body.

Members of each working group were carefully selected based on his or her experience in the group's specific focus area. Teams convene 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 recommended projects based on research into best practices. Over the past year the SSPAC working groups entered into Phase II which recommended goals and 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 to initiate movement that would reduce Brown's environmental impact. Supported projects include: bringing composting to six main dining facilities; stormwater assessment and planning; and two dedicated transportation internships and an interactive website to focus on increasing use of alternative transportation.

The SSPAC working groups continue to look at developing projects to support the mission. In the spring of 2016 SSPAC partnered with the School of Public Health. They will work throughout FY 2017 to establish areas for collaboration between researchers, students, and staff to identify best practices related to environmental health. This working group will be comprised of:

Joseph Braun - Public Health-Epidemiology
Joanne Michaud - Center for Gerontology and Health Care Research
Steve Morin - Environmental Health & Safety
Pat Cull - Environmental Health & Safety
Joanna Saltonstall - Facilities Management
Chris Powell - Sustainable Energy and Environmental Initiatives
Jessica Berry - Sustainable Energy and Environmental Initiatives

The working group will develop working group goals, objectives, and associated projects related to environmental health on campus. To start, the group will focus on chemicals of concern, particularly related to flame retardant chemicals, in the new construction at South Street Landing and the School of Engineering.

III. Brown University Sustainability Timeline

Spring 2006: Energy and Environmental Advisory Committee formed

January 2008: GHG goals accepted by President Simmons

March 2012: Student SSPAC proposal to Brown University Community Counsel

Fall 2012: SSPAC Convened by past Provost

Nov 2013: Phase one of SSPAC convenes

Nov 2013: Brown attends UN Climate Change meeting

April 2014: Institute for Environment and Society is launched

Nov 2014: SSPAC working groups prioritize initiatives

Jan 2015: Compost programs piloted

Apr 2015: Brown leads Providence Sustainability Roundtable

May 2015: First Sustainable Commencement

July/August 2015: SSPAC Phase 2 review and approvals by Executive Vice President for Finances and Administration

February 2016: DSP launch (Departmental Sustainability Program)

Winter 2016: Completed campus thermal efficiency assessment

Winter 2016: Kicked off Green Labs Initiatives

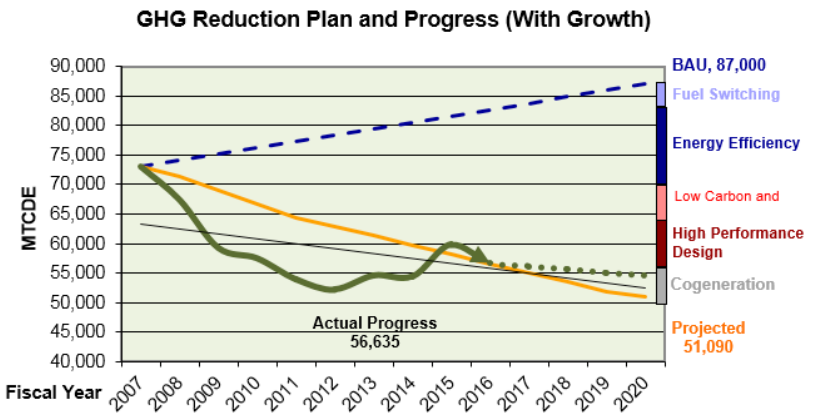
July 2016: Compost program starts

IV. Facilities Management

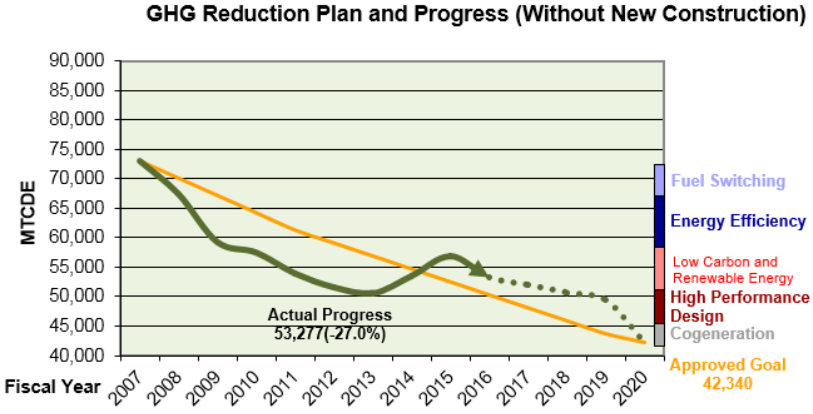
The Department of Facilities Management is responsible for ensuring that the planning, design, construction, operation, and maintenance of all University facilities and grounds support the academic, research, and administrative functions of the University, while balancing financial and technical constraints with aesthetic and historical concerns. In Rhode Island the University owns and maintains 234 buildings, totaling approximately 6,900,000 gross square feet. The mission of Facilities Management is to support the University by enhancing the quality of physical facilities. Facilities does this through planning, designing, engineering, constructing, and maintaining in a responsive, service-oriented, effective, and environmentally-conscious manner.

A. Energy

i. Greenhouse Gas Goals



Projection is based on 42% below 2007 for existing buildings, up to 50% better than code for new constructtion, and up to 30% better than code for acquired buildings.



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

KEY:

MTCDE = Metric Tons of Carbon Dioxide Equivalent

BAU = Business as Usual

"**With Growth**" = Newly constructed buildings post 2007
The yellow line represents the projected level of carbon dioxide (CO2) emissions reduced over time through the strategies listed on the right side of the chart and described in the report below.

The dark blue line indicates the level of CO2 emissions that would be released if greenhouse reduction goals were not implemented.

The green line indicates the actual decrease in CO2 emissions since implementing the strategies listed on the right hand side of the chart and described in the report on Page 2.

IV. Facilities Management ... Energy

ii. Energy Efficiency Program

The energy efficiency investments in existing buildings are being achieved by:

Steam System Condensate: Over 1,400 steam traps throughout campus builings were replaced along with other improvements to increase the efficiency of the overall heating systems and improve system performance.

Magnetic levitation chillers: Magnetic levitation chillers are currently the most efficient centrifugal compressor design available. Installed at Watson CIT to support cooling of the data center, these machines feature technology that suspends the compressor axle in a magnetic field eliminating the need to lubricate it. This results in increased efficiency and lower maintenance costs due to the elimination of frictional losses from convention bearings and the oil needed to lubricate them. Through careful updates to the district chilled water distribution, the two 300 ton machines are now the primary source of chilled water for all seasons in the Sciences Park block.

Lighting and Lighting Controls: A total of 93 buildings were upgraded between 2009 and 2014 with implementation costs of approximately $3 million and an estimated annual savings of $609,000 for an average payback of 5 years and an internal rate of return of 20 percent. We are currently beginning a new lighting initiative to convert campus lighting systems to LED systems with advanced controls.

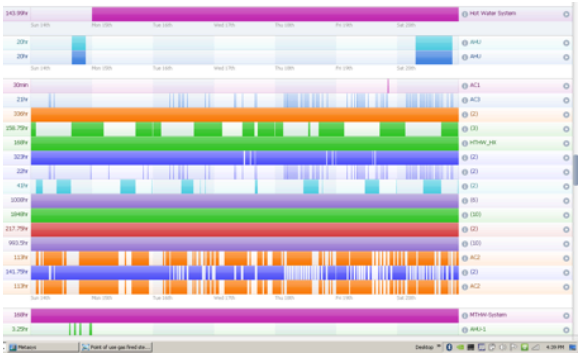
VRF systems: Variable refrigerant flow (VRF) heat pumps utilize adjustable speed scroll compressors to modulate the refrigerant flow versus a conventional single speed positive displacement compressor. This allows the machine to "turn down" and run continuously instead of constantly staging on and off at full power. These systems are now optimized to provide 100% heating effect down to single digit temperatures. The low initial cost makes this system a win for the University and the Center for Public Policy and American Institutions at 59 Charlesfield Street.

Retro-Commissioning (RCx) for Existing Buildings: This program evaluates facilities both from an operational and system design perspective, identifying efficiency opportunities through improving how existing systems are operated and/or through replacement of existing systems or equipment. A majority of our buildings have completed this phase.

IV. Facilities Management ... Energy

The energy efficiency investments in existing buildings are being achieved by:

Heat Recovery Systems: Developed and implemented our first heat recovery chiller system at MacMillan Hall. A heat recovery system takes the waste heat from an air conditioning system and recycles it for use in heating. This system is ideal when we have a simultaneous need for heating and cooling, as is the case in all of our lab facilities where we need dehumidification. We were able to eliminate two hot-water boilers from MacMillan Hall, reducing our carbon footprint and energy use.



Brown Ongoing Commissioning (BOCx): As part of the BOCx program, E&E has continued to deploy the SkySpark analytics platform to 38 additional buildings. The SkySpark software compares internet of things (IoT) historical data from our building sensor suite to normal conditions. It generates notifications or "Sparks" when an abnormal condition is detected.

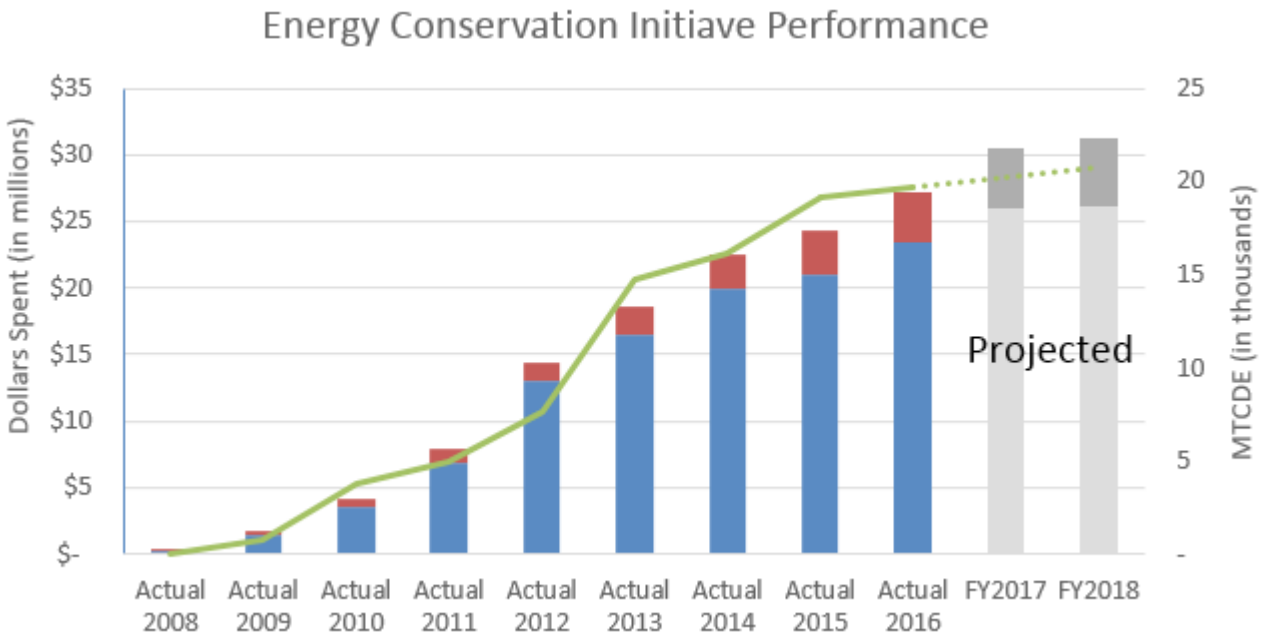
Steam trap blankets: E&E, in cooperation with the Operations department, proceeded to install almost 700 insulation blankets on steam traps in conjunction with associated repairs throughout the campus. This will reduce convection heat loss from the steam systems and increase building efficiency. The result is an estimated $20,000 in annual savings.

Point of use gas fired equipment (Sharpe Refectory): In order to address a shortage in the summer steam capacity at Sharpe Refectory, E&E proposed replacing the failing kitchen steamers, fed from the 1982 vintage boilers, with higher-efficiency point-of-use gas fired steamers. This efficiency measure will help to unload the overworked building systems while upgrading kitchen equipment, and increasing the kitchen efficiency.

Trades Training For Energy Efficiency

To integrate best energy conservation practices into routine maintenance operations, the E&E office, in cooperation with Facilities Management's Operations department, initiated a trades training program. Primarily directed at our controls (building automation systems) staff, the program has been expanded to include other trades such as Heating Ventilation and Air Conditioning (HVAC), electrical, and plumbing. 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 the E&E office has implemented to reduce energy consumption.

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



IV. Facilities Management ... Energy

iii. Brown Unplugged

In its sixth year, the Brown Unplugged competition has become a successful way to engage students in energy conservation behavior on campus. While the competition is hosted by E&E, the entire program is student organized. A dedicated team of students within the emPOWER student organization, manage the competition platform and website, ensuring that electric meter data is being displayed correctly. The website facilitates active engagement as student competitors are able to see real-time updates of building energy usage and trends. The team also provides students with tips on how to conserve energy and it hosts a variety of events including LED bulb swaps and promotional dodgeball events.

The 2016 winning dorm, Hope College, reduced their energy use by 12.8 percent, or 1,687 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 Recycle-a-Bike gift certificates and Spring Weekend tickets.

Overall during the competition, students achieved a dorm-wide energy reduction of 11,215 kWh and averted emitting 10,215 pounds of Carbon Dioxide into the atmosphere.

Above: Members of the Brown Unplugged team during a promotional dodgeball event

IV. Facilities Management

B. Water and Stormwater

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.

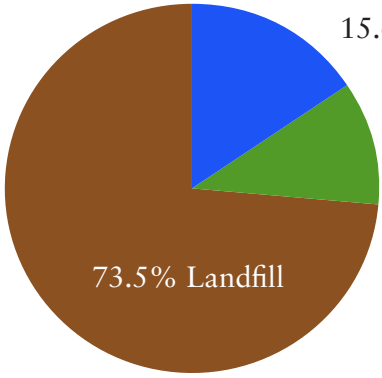
These measures will be implemented in FY 2017 and will generate $200,000 in annual savings.

C. Waste and Diversion

In FY 2016, the E&E office took a major step in waste reduction and diversion by setting an aggressive goal of a waste diversion rate of 50 percent by 2020. Along with this commitment came a series of recommendations and ways forward to achieve this goal. The first, and perhaps most significant, was to initiate a compost program at the six main dining facilities and several offices. Dining waste audit projections show approximately 600 tons of organic material could be collected annually and diverted to a compost facility. Second, the replacement of about 120 outdoor trash and recycling bins were replaced by 73 streamlined Bigbelly Solar Compactor units. These units are expected to: increase recycling rates due to better communication and ease of use; will save the University significant staff time; and reduce GHG emissions as they alert the Grounds department when they are full and eliminate the need for staff to drive and check each location.

The diversion rate for FY 2016 was 26.5 percent of total waste, not including construction and demolition - a 3 point increase in one year. Current diversion rates include a variety of methods such as recycling, donations, composting, and reuse. The primary drivers for the increase in diversion rates this year was a large amount of furniture donated from residential halls, partial conversion to single stream recycling, and two significant organics collection pilots. Brown will continue to work toward improving recycling rates by focusing efforts on a larger organics collection program and campus-wide single stream recycling.

FY16 Waste Diversion Rates:



Recycling: Brown's recycling rate is a reflection of total tonnage of recyclables through our waste hauling service, i.e. cardboard, paper, bottles, cans. In FY 2016, Brown University recycled paper, containers and cardboard at a rate of 15.6 percent.

Organics Diversion: In FY 2016 several organic diversion streams were utilized including composting, food donations, waste oil to biodiesel, and pre-consumer piggery diversion. The following reflect the pounds diverted in FY 2015:

FY 2015 Brown University Organics Diversion (lbs)	
Yard & Leaf Waste to Compost	176,000
Food Waste Oil	59,840
Pig Farmer	160,000
Compost	59,820
Food Donations	73,200
TOTAL	**386,476**

Books: The library system partners with Better World Books to dispense unwanted and unneeded textbooks and other collegiate literature for resale. A portion of the proceeds are donated to charities. Books that cannot be sold are donated to soldiers serving overseas and to school programs.

Special Materials Diversion and Donation: Special materials are waste products that are not recyclable as traditional glass, paper, metal, etc. These wastes include e-waste, batteries, light bulbs, ballasts, computers etc. In FY 2016 Brown properly disposed about 21.6 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 61 tons of furniture and clothing were collected and donated throughout the year.

Right: Blue Room compost station

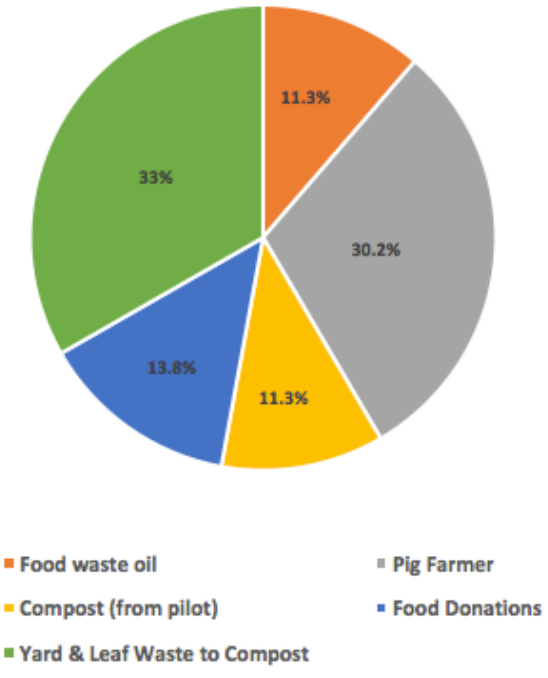
IV. Facilities Management ... Waste and Diversion

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. Students have shown themselves to be open to composting. In FY 2015, the E&E office, in collaboration with Brown Dining Services and the Custodial department, piloted two organics collection programs. The first in Sharpe Refectory back-of-house and the second in Andrews Dining Hall back and front-of-house. The pilots ran for about 10 weeks and provided valuable information on best practices in regard to bin placement, training, communications, product choice, and operations. This year we took these best practices and developed a plan for organics collection in six of the main dining facilities to begin in FY 2017. Additionally, the E&E office created the Departmental Sustainability Program (DSP) in late FY 2016 that works provide a forum for departments to engage in taking ownership in their environmental footprint. Departmental sustainability assessment and recommendations are developed in collaboration with the department and the E&E office. The two DSP pilots, one at the School of Professional Studies and the other at Facilities Management included adding organics collection stations in the building's kitchen areas. These pilots have proved to be extremely successful and well received.

Brown is a leader among Rhode Island institutions in its commitment to not only comply with the state's 2014 "Compost Law" but to make a significant investment in reducing the University's environmental footprint. The upcoming year will be exciting on campus with the adoption of an organics collection on campus. There is an expected cultural shift that will bring environmental stewardship to the forefront of life on campus. The environmental impact of a campus-wide organics collection program will be significant. It is projected that in FY 2017, 600 tons of organic material, out of the annual approximate 2400 tons of trash will be diverted. This addition, to our diversion program, will get us one step closer to our diversion goal of 50 percent by 2020.

FY 2016 Brown University Organics Diversion (lbs.)



IV. Facilities Management ... Waste and Diversion

ii. Bigbelly Launch

As it's first step in the campus-wide plan to move forward with single stream recycling, Facilities Management placed 73 Bigbelly units across campus. Each outdoor waste station now has a single recycling Bigbelly that can accept all recyclables and one trash Bigbelly. 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 bins. The Bigbellies feed into a wireless network to transmit data on the fullness of each bin, which means that staff get updates when bins need to be emptied. This has significantly reduced the time spent checking bins throughout campus and grounds staff are now able to focus their time and energy on more productive projects.

To celebrate the introduction of Bigbellies on campus, the E&E office and emPOWER students held an educational event to teach students about proper recycling. The event featured a Jenga trivia game, recycling posters, a trash sort, delicious food, and service dogs!

Above: EcoReps tell students about the new efficient Bigbelly trash compactors on campus

IV. Facilities Management ... Waste and Diversion

iii. Residential Life

The Clean Break program is a month long program in May aimed at encouraging and aiding students in the donation of clothing, appliances, bedding, food, and other miscellaneous items. This helps Brown achieve two major goals: to divert waste from our landfill and to support community and local organizations. The program relies on the support of student volunteers who sort, bag, and carry donations every day for pick-up by Goodwill. Labeled toters are placed at entrances and in lobbies of each residence hall, and with the collaboration between the Office of Residential Life, Custodial Services, and the volunteers, students have the option of donating their unwanted items instead of throwing them in the trash.

This year Brown donated 13,365 pounds of clothing, textiles, and other materials to Goodwill. Ninety percent of this material was set aside to be sold back to the community and the proceeds will directly fund the organization's job training programs for Rhode Island youth and adults with disabilities and other barriers to employment. The other 10 percent of donations will be recycled and used mainly in lower-income countries, with the proceeds again funding Goodwill programs.

This was the first year that Brown accepted food donations during Clean Break and an an unexpected 450 pounds of food was sent to the Rhode Island Community Food Bank. The Clean Break program also partnered with Habitat for Humanity, the Providence Animal Rescue League (PARL), and the Brown First Gen Program for the first time. Eleven mini fridges were donated to Habitat for Humanity, four bags full of blankets and cleaning supplies was donated to PARL, and over fifty cold weather clothing items and twenty-five textbooks were donated to the First Gen Program.

Above, Right: Student volunteers and Goodwill staff have fun during Clean Break

IV. Facilities Management ... Waste and Diversion

iv. Events

Brown University has a variety of large, high-profile events each year that have significant impacts in terms of resource use, waste generation, and public attention. The conscious reduction and diversion of waste at these events has the ability to showcase Brown's commitment to sustainability at the University and as part of the Providence community. The E&E office partnered with various stakeholders to identify and implement waste reduction and diversion strategies at these events.

a. Game Day Recycling Challenge
The Game Day Recycling Challenge is an annual event at the beginning of the school year. This year volunteers assisted tailgaters in diverting their recyclables at the home games against Princeton and UPenn. Sixteen volunteers worked the tailgate, handing out bags for recyclables and encouraging football guests to sort their waste.

b. Commencement: Brown Eliminates Sale and Distribution of Plastic Water Bottles
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, much of it representing traditions that are centuries old. Commencement is open to families, alumni, and the general public and hosts about 10,000 participants on Sunday.

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 provided reusable, pre-filled and chilled, water bottles to graduating seniors and alumni. Additionally, three large scale water stations were provided for patrons to refill personal bottles and reduce the event's overall waste footprint. This year the program's success grew to a requested 2800 reusable, pre-filled and chilled, water bottles to distribute to even more attendees.

Left: EcoReps pose during the annual Game Day Recycling event

IV. Facilities Management …

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 percent with a goal of 50 percent 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 FM website.

Achieved Gold:

Rhode Island Hall, 2010
Stephen Robert '62 Campus Center, 2011
Medical Education Building, 2012
Perry and Marty Granoff Center for the Creative Arts, 2012
315 Thayer Street, 2013
Miller and Metcalf Residence Hall, 2014
Nelson Fitness Center, 2014
85 Waterman Street, 2014

Achieved Silver:

Sidney E. Frank Hall for Life Sciences, 2009
Metcalf Complex, 2013

Designed to Gold:

School of Engineering (under construction)
Division of Applied Math (awaiting certification)
South Street Landing (under construction)

Designed to Silver:

Watson Institute Expansion (in design)

Above: Division of Applied Math Building

Above: Future view of the school of Engineering
Architect: Kieran Timberlake
Contractor: Shawmut Design and Construction
Scheduled Project Completion: January 2018

IV. Facilities Management …

E. Custodial and Grounds

The Grounds division manages over 113 acres of open space, parking lots, landscaped spaces, and athletic facilities. Grounds is committed to maintaining the highest standards of aesthetic and healthy landscapes. In FY 2016, 85 percent of the fertilizers used were organic, representing a 10 percent increase in organic fertilizers since 2012. In FY 2014, the Grounds office launched the Keep Brown Clean initiative, aimed at educating students and staff about cleaning up and taking ownership of communal campus spaces. This program has proven to be highly successful in its now third year. Grounds maintains three green roofs located at fhe Granoff Center, Alpert Medical School, and the Sciences Library, and three rain gardens located at Applied Math, 85 Waterman, 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 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.

In this fiscal year, the Grounds Division has made two significant improvements to its operations. First, about 88 tons of yard waste was delivered to urban farmers in Providence, Johnston, Cranston, and Seekonk which continued to support our diversion goal. Second, wood pallets are now available for reuse by staff instead of adding to the waste filling our landfill.

Above: Green roof on top of the Granoff Center

Brown University began using green cleaning products in 2004, when the custodial office reached out to local vendors to replace current cleaning agents with more environmentally friendly alternatives. Research and testing led to the purchase of "green seal approved" chemicals, use of microfiber applications, non-acid bathroom products, and products that do not contain hydrogen peroxide.

Brown is committed to green, sustainable products that do a superior job of cleaning surfaces and removing or neutralizing infectious bacteria. Each product considered for use must meet the challenge of being an effective agent while not adding labor or damaging historic surfaces. Products are rigorously tested prior to deploying across campus. If the product passes the testing phase, it becomes a part of our green cleaning arsenal. Custodians are essential in campus sustainability efforts due to their recycling knowledge and dedication to helping student initiatives, including Green Events and Clean Break.

In this fiscal year, Custodial Services began a new process for polishing stone floors. Stone floors are no longer stripped and refinished. The new two-pad process employs a high-speed buffering technique that effectively polishes Brown's floors while reducing labor and eliminating the the need for chemicals and water. Custodial Services is researching new floor buffing pads that use plant based materials, which could reduce our floor cleaning carbon footprint by 60%.

Above: Areas worked on by the Grounds Division

IV. Facilities Management ...

F. Energy and Environmental Internship Program

Above: Interns in the Office of Energy and Environmental Initiatives table the mid-year Activities Fair to share information about sustainability programs on campus

The backbone of the Office of Energy and Environmental Initiatives is its robust internship program that offers paid positions to 12-15 interns every year. Interns contribute significantly to major initiatives including the introduction of compost on campus, single-stream recycling efforts, 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.

Diversity: In response to student interests and a growing need for an inclusive approach, the E&E office established a new diversity & inclusion internship. The internship is designed to approach issues of diversity and inclusivity within student groups, the Institute at Brown for Environment and Society (IBES), and the E&E internship program. The diversity intern has been tasked with finding ways to connect students with different backgrounds, including but not limited to academic concentration, race, religion, gender identity, and sex in an effort to engage all students in conversations about sustainability, environmental justice, and environmental health.

V. Student Groups and Initiatives

A. EmPOWER

EmPOWER is Brown's student environmental umbrella organization. EmPOWER's common meeting time and collaborative structure create a strong sense of community among member groups that address a wide variety of sustainability issues. To further its goal of inclusivity, this past year emPOWER developed a diversity committee to look at ways in which the group could better connect and engage with a more diverse student population, spanning concentrations, sex, gender, race, etc. The group held a series of town hall meetings, open to all emPOWER members, where students discussed goals and ideas on how to improve its diversity. The following student groups are included under emPOWER:

i. Bikes@Brown strives to facilitate and encourage bike usage on Brown's campus and throughout the Ocean State. The organization runs a free, full-service bicycle repair and rental shop in the basement of the Urban Environmental Lab. Bikes@Brown also seeks to cultivate a cycling culture on campus by organizing bike rides, promoting bike safety, and volunteering at Recycle-a-Bike, a local non profit bike shop.

ii. In **Climate Action League**, students think of and lead projects and research to reduce Brown University's resource use and carbon footprint. Past projects include residence hall low-flow showerhead retrofits, photovoltaic solar array additions, Thayer Street recycling bins, waste station signage for Andrews Dining, partnership with the J.T. Owens Park green infrastructure outreach project, and community outreach on rising electricity prices in Rhode Island. In the 2015-2016 academic year, the group focused on creating an energy audit program to educate on campus students about the ways in which they can save energy in their dorms, and a proposal for an on-campus rain garden.

iii. EcoReps work with the department of 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 GameDay Recycling, Brown Unplugged, America Recycles Day, Earth Week, and Clean Break.

iv. Fossil Free Brown (formerly Brown Divest Coal) is a campaign that is demanding Brown to divest from 200 companies with the greatest fossil fuel reserves. Since the group's conception in 2012, the Brown community has shown strong support for divestment. Although the Brown Corporation voted against divestment in October 2013, Fossil Free continues to push the University to commit to more socially responsible investment practices.

v. Green Events, a student-driven initiative to promote and facilitate sustainable event planning at Brown, started as a final project for an environmental stewardship class in Spring 2012. In 2015-2016, Green Event was requested for over 50 events, from which 800 pounds of compost was collected. Green Event Certification provides a simple framework for reducing waste, lowering our carbon footprint, supporting local businesses, and educating consumers. This year, the group focused on creating a sustainable framework aimed at educating event managers instead of solely providing volunteers to manage waste stations. This change will help Brown to achieve greater sustainability in the future.

vi. The Healthy Housing Hub (HHH) aims 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.

vii. Rhode Island Student Climate Coalition (RISCC) is a political action group and statewide alliance of students and youth working toward a clean, safe, and just future for all. Some of RISCC's projects include helping to pass the 2014 Resilient Rhode Island Act, transporting 400 Rhode Islanders to the People's Climate March in New York City, and opposing the construction of fossil fuel infrastructure within the state.

viii. SCRAP, Brown's Student Composting Initiative, is working toward creating a zero-waste food cycle and making composting easily accessible at Brown University. Its mission is to expand composting awareness and practice through an improved campus-wide composting system. SCRAP has gained recognition on campus over the years by distributing its "famous" composting buckets to Brown community members. These bins can be emptied at two different campus locations. During the 2015-2016 school year, the mission of SCRAP began to shift to reflect new responsibilities linked to institutional composting at Brown. SCRAP has been involved in the logistics of starting up the dining hall compost program and educating students, faculty, and dining workers. Educating community members has also become a larger priority, leading to plans for major updates on the community compost system (located off of Hope and Charlesfield). Most notably of these updates will be educational materials in the form of leaflets and increased signage abutting the system.

ix. The Sustainable Food Initiative (SuFI) is a student group working with Brown and its surrounding community to provide local, organic food options. It does this by managing an on-campus, student-run garden and organizing food-related workshops. SuFI serves as an umbrella organization for 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.

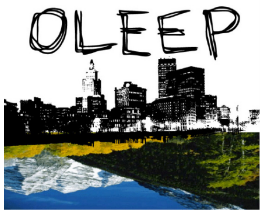
V. Student Groups and Initiatives ...

B. Other Groups

In addition to emPOWER, the following student initiatives had a strong campus presence in FY 2016.

i. 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.

ii. West House (91 Brown St) and North House (111 Brown St) are Brown's Environmental Program Houses. The houses are open to visitors every Friday for Open Dinner at 6:30 pm. All food prepared in the houses is vegetarian or vegan, and the students who live there strive to purchase local and sustainable food whenever possible. Each resident has a house job, such as coordinating environmental initiatives or managing the backyard compost system. Both houses present the opportunity to live with others who also care deeply about environmentalism and food ethics.



iii. Outdoor Leadership Environmental Education Project (OLEEP) is an environmental mentoring program for Metropolitan Regional Career and Technical Center (Met) high school students that is run through the Swearer Center. Brown volunteers engage with Met students through one-on-one mentoring relationships, weekly educational environmental science workshops, and camping and backpacking trips. OLEEP strives to foster individual environmental awareness, experiential science education, personal challenge, and leadership skills in Brown and Met students as they learn from each other.

v. A Better World by Design (BWxD) is an annual student-organized collaboration between Brown and the Rhode Island School of Design that brings innovators from across the globe to Providence to bridge disciplines for a common goal: building a better world. Presenters share engaging stories, workshops teach creative skills, and discussions re-frame perspectives. BWxD is an immersive experience that deepens our understanding of the power of design and technology to engage communities and sustain the environment.

V. Student Groups and Initiatives ...

C. Student Initiative Spotlight: Food Recovery Network (FRN)

In the United States, 40% of food goes uneaten - equivalent to 6.4 billion pounds of food per month. Meanwhile, 1 in 6 Americans (53.2 million people) are food insecure. Completely redistributing these food resources would eliminate food insecurity in America, and reducing these losses by just 15% could pull over 25 million Americans out of food insecurity. Food Recovery Network (FRN) is a national effort to redirect potentially wasted food to those in need. FRN is a student-run nonprofit organization founded at the University of Maryland. 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 five years, FRN@Brown has recovered over 70,000 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 BSA Inspire Grant and the National Associations of College and University Food Services' Gold Medal in Outreach and Education for our annual Apple Gleaning event.

FRN@Brown is a network of students at Brown volunteering to recover the surplus food from six different campus dining facilities and Thayer Street businesses such as Blue State Coffee. Food is then carried to a centralized storage facility in the Sharpe Refectory and then regularly brought to in-need Rhode Islanders through community partners such as Crossroads Rhode Island and the Women's Center of Rhode Island.

Above: Students in Food Recovery Network relax after collecting many pounds of apples at their apple gleaning event

V. Student Groups and Initiatives ...

D. Earth Week Initiative

Every year Brown's umbrella environmental group, emPOWER, hosts Earth Week. Earth Week falls around Earth Day and it features events and activities that highlight sustainability efforts on campus and engage students in sustainable behavior. From campus gardens, bike share programs, conferences, energy initiatives and more, Brown students drive our momentum and success.

Above: Members of Sustainable Food Initiative share information with students during the Earth Week Sustainability Fair

Above: EcoReps don hazmat suits as they sort through trash to look at residence hall recyclying contamination rates

VI. Research & 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, 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 Paris. Professor Roberts also worked with students throughout the year on the EnergizeRI.org effort which aims to pass carbon pricing legislation in RI. The Urban Environmental Lab at 135 Angell Street hosts a community garden and integrated space for student engagement in environmental consciousness and urban self sufficiency. A group of Brown students attended the U.N. climate change negotiations in Paris as part of an environmental studies course.

i. Brown Nitrogen Footprint: IBES, in collaboration with the E&E office, initiated the Brown University Nitrogen Footprint Project, a venture spearheaded by faculty researchers to analyze nitrogen emissions at institutions. Brown University was selected as one of approximately 10 institutions to test the first Institutional Nitrogen Footprint tool. This project was a collaboration by a team of faculty scientists, undergraduate students, and sustainability staff from across campus, and entailed gathering, organizing, and analyzing a wide range of data across many sectors of the University. Once the baseline nitrogen footprint is calculated, scenarios for pollution reduction can be tested within the tool. Nitrogen is released into the environment through activities such as food production and consumption, transportation, waste management, and utilities. The calculations in FY 2015 led to an understanding about the campus's nitrogen footprint; activities on campus contribute to the release of 126,000 kilograms of nitrogen per year to the environment. As expected, food production is the biggest contributor to the University's nitrogen footprint (78 percent of the total). Production of meat, dairy and eggs are the most significant contributor to the university's nitrogen footprint. Other contributors to the overall nitrogen footprint includes the use of fossil fuels for utilities and transportation (9 percent total), use of research animals (8 percent), food consumption (4 percent), and the use of fertilizer on campus (1 percent). In FY 2016 E&E staff worked with researchers to refine the calculator and begin planning for annual analysis, goal setting and initiatives that will directly reduce Brown's nitrogen footprint.

Right: Brown Students attend Paris Climate Talks and call for an end to the fossil fuel era

VI. Research & Teaching in Sustainability …

B. C.V Starr Program in Businesss, Entrepreneurship and Organization (BEO)

The E&E office partnered with the C.V. Starr Program in Business, Entrepreneurship and Organizations(BEO). The 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.

In FY 2016, Associate Director, Brendan McNally served as the BEO Project Advisor and the E&E office, in cooperation with Brown's Transportation office, served as the mentor for Assessing Brown's "Transportation Footprint" capstone. This project analyzed the commuting habits of students, faculty, and staff across campus through surveys and analysis. The students provided essential baseline data for assessing the greenhouse gas emissions associated with commuter habits and provided recommendations for reducing those emissions. The partnership was so successful the E&E office will serve this coming year as a mentor for BEO Phase II of the Assessing Brown's "Transportation Footprint"capstone. Additionally, E&E worked with BEO to develop a second capstone project to perform market research, analysis, and consultation on the emerging Campus Sustainability Metabolism tool that is in development.

Left: BEO presentation team members

VII. Departmental Reporting

A. Brown Dining Services (BDS)

BDS is committed to improving the local food system through sustainable initiatives, which work to support local farmers, reduce waste output, and purchase fairly-traded, sustainably-sourced and environmentally-friendly foods.

The following initiatives demonstrate BDS's commitment to sustainability:

i. Green Restaurant Association Certifications: Brown University is the first organization to become Green Restaurant Association Certified in Rhode Island. Both the Sharpe Refectory and Verney-Woolley dining halls have earned 3-Star Certified Green Restaurant® status. Blue Room and Josiah's are now 2-Star Certified Green Restaurant® and Andrews Commons is a Level 1 Certified Green Restaurant®. These locations have been recognized for implementing sustainable practices in food, water, waste, energy, chemicals, disposables, and building materials.

The Green Restaurant Association 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. With their turnkey certification system, the GRA has made it easy for thousands of restaurants to become more environmentally sustainable in a profitable manner. Operating in 47 States and Canada, the GRA works with restaurants, manufacturers, and distributors to green the restaurant industry.

ii. National Association of College & University Food Services Gold Sustainability Award in Outreach and Education – FRN & BDS Gleaning Event: The NACUFS Sustainability Awards annually recognize and honor member institutions that have demonstrated outstanding leadership in the promotion and implementation of environmental sustainability, specifically as it relates to campus dining operations. The NACUFS Sustainability Awards support the globally accepted triple bottom line philosophy, a method of evaluating operational performance by measuring financial success as well as environmental sustainability and social responsibility—also known as "people, planet, profit."

In November 2015 the Food Recovery Network at Brown (FRN) – a nationally recognized student group dedicated to preventing food waste and hunger through waste diversion – partnered with Brown Dining

Services to host an Apple Gleaning Event. The FRN volunteers harvested 200 pounds of apples that would have otherwise gone to waste from a local orchard and transported them to Brown Dining Services. The volunteers, along with our Assistant Chef, Aaron Fitzsenry, then peeled, cooked and dished out apple compote, with a side of fun and food waste education to students. In addition, we provided a recipe card at the event with instructions on how to recreate the apple compote using ingredients and tools in the dining hall. We included contact information for the Dietitian and a message from her about the healthfulness of the dish.

The goal of this event was to highlight Brown Dining's sustainability efforts by spreading the message of sustainable food sourcing and consumption. The event also energized students to take a more active role in food waste reduction on campus and beyond.

iii. Brown Dining celebrates Earth Day: Brown Dining 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 the Blue Room, Andrews Commons, and Sharpe Refectory. The Blue Room featured meat-free Grain Bowls – specially packed with plant-based superfoods. Andrews Commons featured a different local ingredient and supplier every night at dinner. Students were able to enjoy regular menus with the added value of learning about the local and sustainable ingredients regularly used in menu items.

The largest event occurred at the Sharpe Refectory. The menu for this event was crafted to best showcase Brown Dining's regular suppliers of local and sustainable foods in a single, delicious meal. During the meal volunteers from SCRAP, Brown's compost student group, helped weigh and report food scraps to illustrate the amounts of food regularly collected by The Compost Plant. Also, students sampled fruit smoothies created by a blender bike manned by the Food Recovery Network.

Above: Earth Week dinner at the Sharpe Refectory

iv. 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 14th 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 as well as by providing a large-scale, steady purchaser for local farms.

v. Farmer Partnerships: BDS 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. BDS aims to expand the program each year and currently works with a network of over 50 local farms. Dining Services 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.

vi. Farm Fresh Rhode Island: BDS 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 BDS. 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.

2015 Farmer's Market: Currently, FFRI manages eight urban farmers' markets in the greater Providence area, and with BDS, 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 that can be easily stored and enjoyed. 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. Each year ten to fifteen vendors are represented.

vii. 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.

viii. The Real Food Initiative: In 2009, as a result of a grassroots effort by a group of students, BDS met the Real Food Challenge. 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. A student intern position was created to assist BDS with this process and in moving the campaign forward.

a. Brown Dining was one of the first institutions in the nation to pilot the Real Food Calculator to track and assess its purchases. Today, BDS is one of over 235 institutions nationwide that supports just and sustainable agricultural systems. The Calculator has enabled BDS 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.

b. Local and Community-Based: – BDS currently sources **35 percent** of its food locally, including **97 percent** of its seafood and **95 percent** of its cage-free eggs. BDS is also among a limited number of universities that operates its own Bake Shop and Butcher Shop.

c. Fair – BDS currently sources 3 percent of its food fair-trade, including **100 percent** of its coffee and **15 percent** of its other beverages.

d. Ecologically Sound – BDS currently sources 8 percent of its food ecologically sound, including **100 percent** of its coffee, **76 percent** of its meat and **42 percent** of its seafood.

e. Humane – BDS currently sources 6 percent of its food humanely, including **95 percent** of its cage-free eggs and **78 percent** of its meat.

f. BDS has already surpassed the Real Food Challenge's goal of **20 percent** Real Food by 2020, standing now at **22 percent**. BDS received the Pioneer Award from the Real Food Challenge for its work on this initiative.

ix. Green Catering: Brown Catering Services has developed options for sustainable catering that include meals focused on local, seasonal ingredients and that consider minimal packaging and waste. These meals are served with sustainably sourced items and feature signage with information on local vendors.

x. After the Harvest and Waste Reduction Strategies: The After the Harvest (AtH) initiative, part of the Community Harvest initiative, began during Hunger and Homelessness week in 2005. BDS 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.

xi. Food Donations: Since 2005, BDS has donated over 158,000 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 2015-16 academic year, Dining Services was able to donate 73,197 pounds of food and water to this worthwhile program.

2016 Food Recovery Network Certification - BDS became Food Recovery Network Certified in 2016. The Food Recovery Network, in partnership with the Brown Dining Services and We Share Hope, had a record semester donation total of 11,104 lbs for the Spring 2016 semester.

VII. Departmental Reporting ... Brown Dining Services (BDS)

xii. Recycling & Reusables: Brown Dining Services assists with Brown University's waste diversion through the following initiatives: In the spring of 2010, BDS implemented Eco To-Go, a reusable takeout container program. Besides offering the container, BDS also worked to educate students about landfill waste and the benefits of re-use. A YouTube video was produced by a BDS intern and made available through the Dining Services web page. BDS also sells reusable mugs in its retail units and beverages purchased in a reusable mug receive a discount.

xiii. Newport Biodiesel: BDS 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, renewable, sustainable fuel. Four dining locations participate in the program: Verney-Woolley, Sharpe Refectory, Josiah's, and the Faculty Club. Between the four locations, they have donated 29,669 gallons of oil and grease since 2010. During the 2015-16 academic year, Dining Services was able to donate 7,160 gallons to this worthwhile program.

xiv. Trayless Dining: In 2008, Brown Dining implemented trayless dining in Verney-Woolley (VW) dining hall. VW customer counts range from 250 to over 1,000 per meal. Trayless dining conserves one-third to a half gallon of heated water per person by eliminating the need to wash those 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 energy use and has been shown to reduce the amount of food that is taken and not eaten.

xv. Beyond the Bottle, reducing bottled water on-campus: Beyond the Bottle (BtB) 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 a three-year campaign, single-use bottled water purchases by Dining Services have been reduced by 99.96 percent since the inception of the initiative, exceeding the FY 2012 goal of 80 percent and meeting the aspirational goals for FY 2013 one year early.

Left: Chef Aaron Fitzsenry and Dietitian Jessie Curran host our monthly Supper Club

VII. Departmental Reporting ...

B. Transportation & Parking Services

i. 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 seventh 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.

ii. 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 $15 fee. 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 Zipcard.

iii. Electronic Vehicle Charging Station: Brown University now 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.

iv. Bicycle Racks: Brown has bicycle racks in convenient places across campus; it offers bicycle registration to discourage theft; and it is working with various civic groups to help promote cycling in the city. All new construction and major renovations are required to install racks as part of their projects.

v. Bicycle Sharing: Bikes@Brown, a student initiative, launched a bike-sharing program in March 2009 utilizing Brown University funds to purchase three new Schwinn Cruisers and four Mongoose mountain bikes. They now have a fleet of thirty-two bicycles, which can be signed out for a week at a time at no charge and for no deposit. In the most recent fiscal year, Brown has established a bike share committee that is tasked with developing a proposal to implement a campus-wide bike share program.

Left: Bikes@Brown informational poster

vi. Brown University Shuttle: The University provides five different shuttle services to facilitate greater safety and accessibility for students, faculty and staff of Brown and 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, but 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 Alpert Medical School and 121 South Main Street.

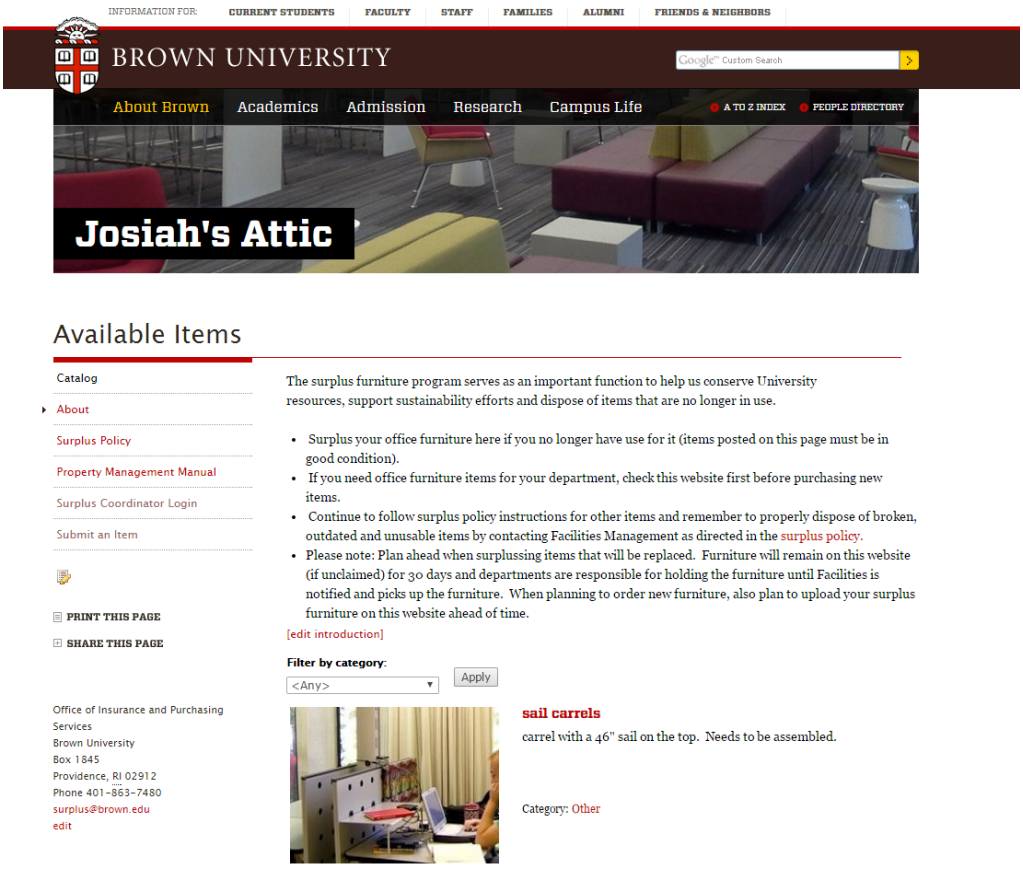
vii. Next Steps: Sustainable transportation on campus is an issue directly addressed by Brown's Sustainability Strategic Planning Advisory Committee (SSPAC) through its transportation subcommittee. Objectives of the SSPAC transportation team include: creating a more economically efficient and equitable transportation portfolio, expanding Providence's "Complete Streets" program, decreasing the University's transportation-based carbon footprint.

Above: Brown University Shuttle

VII. Departmental Reporting ...

C. Purchasing Services

Faculty, staff, and students are strongly encouraged to be proactive in identifying and examining opportunities to procure "environmental friendly" materials/equipment. This effort focuses along the complete "supply chain" process including assessment of alternative materials, vendor sourcing and selection, and ultimate disposal of waste/surplus. Brown strongly recommended that appliances, building products, computers, electronics, heating and cooling, lighting, fans, and plumbing equipment meet or exceed the ENERGY STAR® rating. Purchasing Services manages a surplus program with a goal to repurpose Brown-owned furniture after it has been used for its original purpose. The surplus program went online this year in February. This interface allows departments to procure previously used items from other departments in a "Craig's List" type forum. Items not absorbed back into campus are open for donation to authorized local organizations – thereby promoting Brown's commitment to support Providence public schools and local organizations. Since February 2016, 112 items were posted, 22 of which were absorbed by other Brown departments and 66 went to local non-profits.



Above: The new Brown Surplus website

VIII. 2016 Awards and Certifications

- Princeton Review's "Guide to Green Colleges"
- Sierra Club "Cool Schools"
- An 'A" rating on the 2016 PETA Vegan Report Card
- Green Restaurant Association Certifications
- National Association of College & University Food Services Gold Sustainability Award in Outreach & Education Category
- National Association of College & University Food Services 'Cutting Edge Menu Item'
- Food Recovery Network.org Certified

IX. Ways Forward for Brown's Sustainability

The E&E office and the Sustainability Strategic Planning and Advisory Committee (SSPAC) continue to seek out new ways to develop and enhance the university's social and environmental impact while incorporating student learning and development in fields that contribute to global well-being. FY 2016 proved to be a significant stepping stone in the University's sustainability efforts due to the commitment of our student interns,volunteers, staff, and leadership. Over the next year we will implement the approved recommendations to continue forward movement in reducing emissions, diverting waste, increasing alternative transportation use, understanding the University's stormwater footprint, and planning the Central Heat Plant conversion from high temperature hot water to medium temperature hot water. Additionally, we will move forward with a robust data tracking tool that will help Brown with better tracking and reporting of metrics and related goals. Over this coming year we look forward to continue working with departments, students, and faculty; peer institutions; and our surrounding community to collectively progress our campus' commitment to social and environmental responsibility. Please feel free to contact the E&E office at brownisgreen@brown.edu for further information.

X. Acknowledgments

The E&E Office would like to, first and foremost, acknowledge the contributions and efforts of the E&E interns, EcoReps, and emPOWER students without whom it would not be possible for Brown University to continue its commitment to sustainability. In FY 2016 the E&E interns alone spent a cumulative 4,000 hours laying the groundwork, supporting, and driving projects forward that directly impacted the quality of life on campus while reducing the environmental impact Brown University has on the greater community. E&E would also like to thank the many departments and staff that directly contributed to sustainability efforts across campus in FY 2016 including:

- Office of Transportation and Parking Services
- Brown Dining Services
- School of Professional Studies
- Office of University Communications
- Government Relations and Community Affairs
- C.V. Starr Program in Business, Entrepreneurship and Organizations
- Residential Life
- Sustainability Strategic Planning and Advisory Committee
- Facilities Management