

**BROWN UNIVERSITY
SUSTAINABILITY PROGRESS
REPORT**



**OFFICE OF SUSTAINABLE ENERGY AND
ENVIRONMENTAL INITIATIVES,
FACILITIES MANAGEMENT**

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Fall 2009

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I. Executive Summary

This report delineates the means by which Brown University has taken measures to promote and sustain environmentally conscious behavior on campus. Through energy conservation, carbon emissions reduction, recycling, and other sustainable practices across various university departments, Brown continues to reduce our environmental footprint in order to preserve natural resources on campus and our surrounding community.

Graphic Services attained Forest Stewardship Council Certification, ensuring paper products are supplied from sustainable practicing forests.

Facilities Management increased its recycle rate from 33% to 38%, a major improvement over any preceding year.

During our second year of the Greenhouse Gas reduction plan, Brown University reduced its energy-related carbon footprint by 18.8% as compared to a reduction goal of 8% from our FY07 baseline. This was accomplished by switching from carbon intensive #6 Fuel Oil to Natural Gas at our Central Heat Plant beyond our initial commitments, switching to a new, less carbon intensive electricity supplier and a continued focus on energy efficiency investments begun in FY08 to help meet future fiscal year reduction targets. Facilities Management's Planning Design and Construction office also implemented multiple projects under the High Performance Design goals for all new construction, major renovations and acquired facilities--minimum of Leadership in Energy and Environmental Design (LEED) Silver and at least 25% better than code in energy intensity.

Under the energy efficiency investment program, Facilities Management has close to 100 projects of various size and scope either completed, in progress or under development. Of completed projects we have spent approximately \$2.2 million dollars this past year to achieve a reduction of 2,800 metric tons of Carbon Dioxide Equivalent (MTCDE) or 3.8% reduction for our FY07 baseline of 73,000 MTCDE while saving approximately \$500,000 in annual energy expense.

II. Community Carbon Use Reduction at Brown (C-CURB)



With support from the Sidney E. Frank Foundation and the office of the president, Brown provided \$350,000 to support a pilot program designed to reduce greenhouse gas emissions in the greater Providence area. The Community Carbon Use Reduction at Brown (C-CURB) project will help catalyze local carbon emissions reductions through an investment of financial resources and development of collaborations of

community and civic groups with Brown students, faculty and staff on a diversity of activities. Projects that accomplish the dual goals of helping meet the needs of the greater Providence neighborhoods while reducing greenhouse gas emissions is the focus of these off-campus projects.

C-CURB Project Guidelines:

- * Maximize learning for project teams and community participants
- * Engage others as a means of furthering sustainability and maximizing impact
- * Support Brown's commitment to responsible community engagement
- * Produce a measurable net reduction of carbon use as a result of actions taken

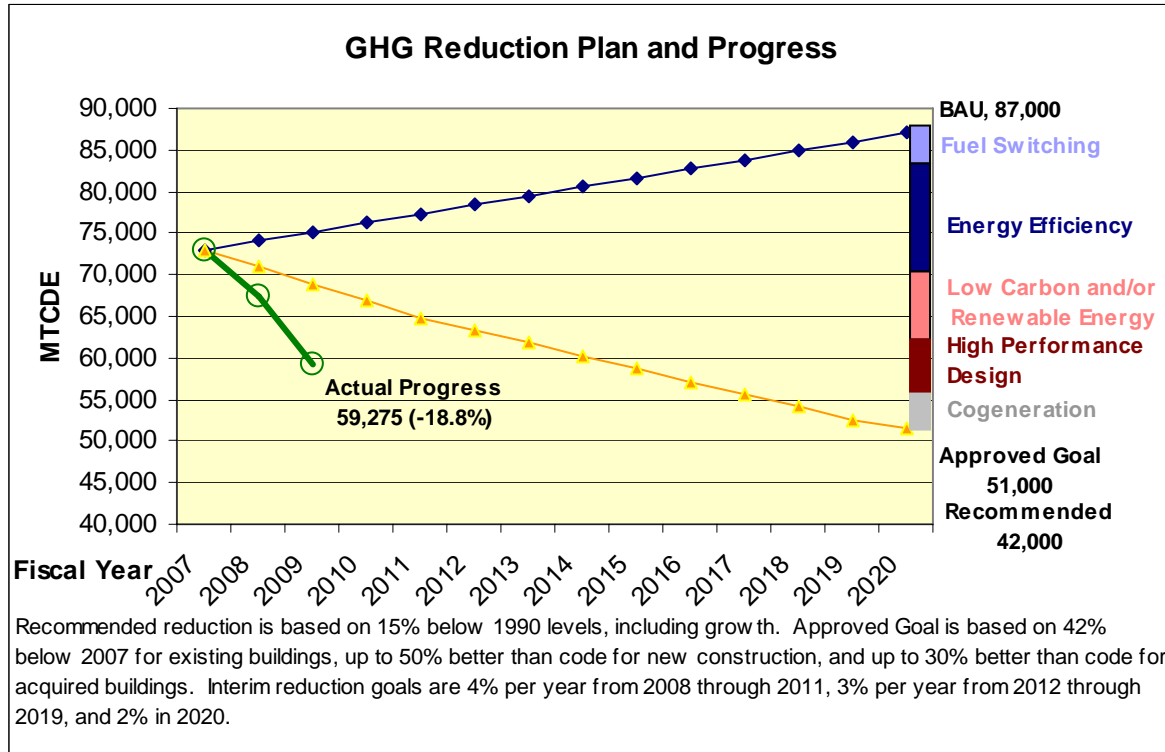
III. Facilities: Energy & Emissions

President Simmons announced Brown's first **Greenhouse Gas Goals** on January 24, 2008. The goals are as follows:

- For **Existing Buildings:**
Reduce greenhouse gas emissions to 42 percent below 2007 levels (equivalent to 15 percent below 1990 levels) for existing buildings. Initial interim cumulative goal of 4% per year is in place and monitored annually to meet 42% target by 2020.
- For **New Construction: for existing buildings by 2020:**
Limit greenhouse gas emissions by reducing energy consumption for all newly constructed facilities to between 25 percent and 50 percent below the standard required by state code. New construction will, **at a minimum**, meet a silver standard in Leadership in Energy and Environmental Design (LEED), furthering sustainability goals.

- For **Acquired Buildings**:
A reduction of greenhouse gas emissions for all newly acquired facilities by a minimum of 15 percent and as much as 30 percent.

A. Plan and Projections



KEY:

MTCDE = Metric Tons of Carbon Dioxide Equivalent

BAU = Business As Usual

The yellow line represents the level of CO₂ emissions approved by Goals.

The dark blue line indicates the level of CO₂ emissions that would be released if the Goals were not implemented on campus.

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

B. Progress

1) Existing Buildings: (6.4 million sq. ft.)

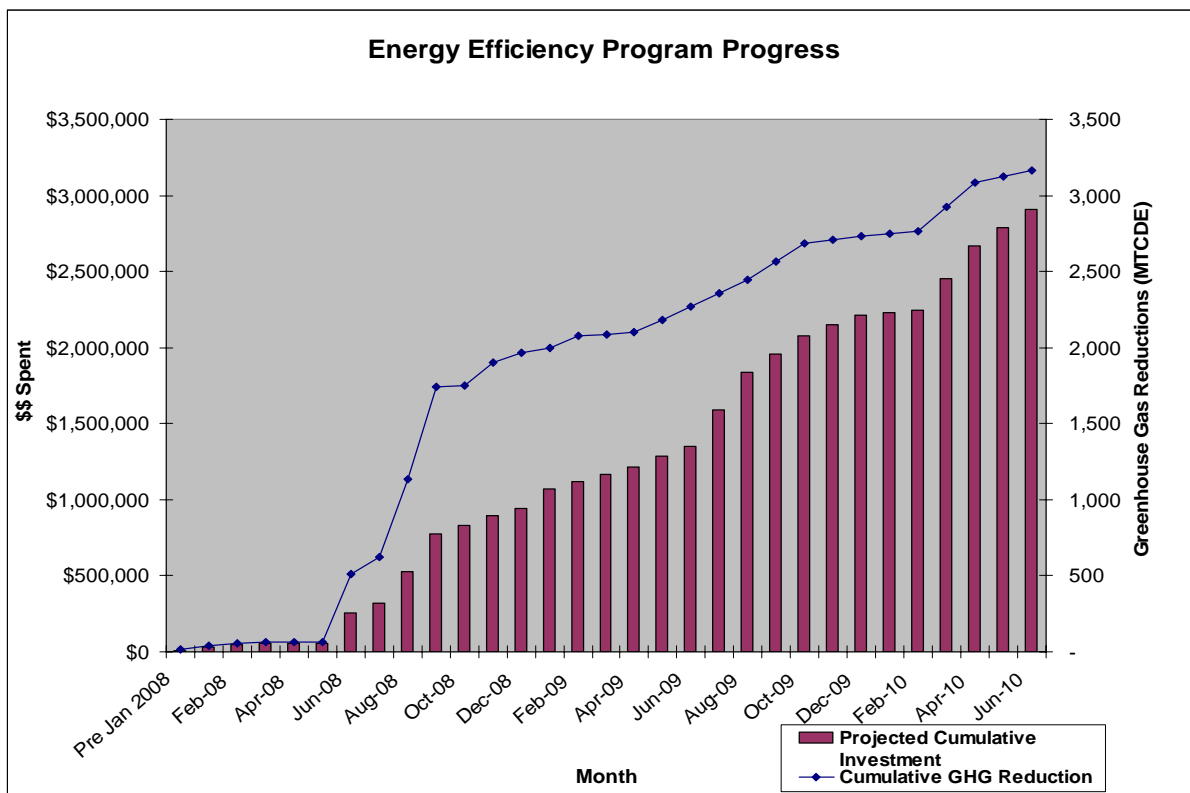
The initiatives to reduce emissions to meet this goal are as follows:

- a). Fuel Switching from Fuel Oil to Natural Gas in the Central Heat Plant when optimal. (~5-10% reduction target)

- In order to reduce the greenhouse gas emissions of fossil fuels Brown directly burns in the Central Heat Plant by a minimum of 30% starting in fiscal year (FY) 2008 and continuing through 2020.
- Brown University’s consumption of fossil fuel is dominated by “#6 Fuel Oil” a lower-cost fuel with high carbon emissions per unit heat.
- This fuel will be displaced by natural gas, a much less carbon-intensive fuel.
- ***This has been fully implemented and surpasses targeted reduction requirements by successfully implementing a new procurement plan that ensures Brown will be operating on Natural Gas throughout the entire heating season, unless interrupted by the local Natural Gas distribution company.***

b). In conjunction with the Energy and Environmental Advisory Committee, Facilities Management’s Sustainable Energy and Environmental Initiatives Office submitted and received approval from the administration for a long-term energy efficiency investment plan to support the greenhouse gas reduction targets by reducing **Brown’s energy consumption by approximately 20%** to achieve a 16,000 MTCDE reduction.

- Approved funding to-date: \$10 Million
- Estimated Near-Term Progress : 2,800 Metric Tons or 3.8% reduction



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

- Steam System Condensate: **Completed Mid FY 2009** (\$300,000 in energy savings and 2,000 MTCDE reduction, equivalent to ~3% reduction below 2007 GHG levels).
 - Steam trap and steam condensate return system. During this previous summer, we replaced one thousand four hundred (1400) steam traps throughout campus buildings to increase the efficiency of the overall heating systems and improve system performance. This project replaced all steam traps, condensate receivers and return pumps and valves as necessary while implementing an annual inspection and repair program thereafter to ensure failed traps are replaced, ensuring an efficient steam and high-temperature hot water (HTHW) distribution system operation.

- Lighting and Lighting Controls
 - The remainder of buildings not completed as part of the previous \$2 million lighting efficiency initiative will be targeted for completion over the next year.
 - 50 additional buildings are in the process of lighting and lighting control audits. Fifty percent of these buildings have completed technical and financial evaluations and are in the process of being awarded to contractors, are scheduled for completion, or already completed.
 - Completed;
 - Pizzitola Sports Center (1st floor gym)
 - Olney Margolies Athletic Center
 - Power Street Garage
 - Prince Lab
 - Arnold Lab
 - 55 Power Street
 - Leung Gallery
 - University Hall
 - Alumnae Hall
 - Steinert Center
 - Orwig Music Building
 - Sciences Library
 - Sharpe Refectory
 - The Geological and Chemical Sciences Building
 - Dyer House
 - Nicholson House
 - Maddock Alumni Center
 - Hoppin House
 - Gerard House
 - Barus Hall
 - 180 & 182 George Street
 - Kassar-Gould

- In Progress;
 - Andrews House
 - Corliss Bracket
 - 8 Fones Alley
 - Pizzitola (remainder of Gym)
 - Lincoln Field
- In Planning Stage;
 - 2 Stimson
 - Shirley Miller House
 - Blistein House
 - Prospect House
 - Miller and Metcalf Halls
 - 25/67/155/163 George Street
 - Wilson Hall
 - Walter Hall
 - Maxcy Hall
 - 295 Lloyd Avenue
 - 37 Cooke Street
 - Sharpe Refectory
 - Hegeman Hall
 - Caswell Hall

- Retro-Commissioning (RCx) for Existing Buildings
 - This program will evaluate 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.
 - The following buildings have either had assessments completed or are in the process of being assessed by RCx consultants:
 - Bio-Molecular Research (70 Ship Street)
 - 55 Power Street
 - Barus and Holley
 - List Art
 - Meehan Auditorium
 - Watson/CIT
 - The Geological and Chemical Sciences Building
 - W. MacMillan Hall
 - Pizzitola Sports Center
 - In planning stages:
 - Sharpe Refectory
 - Sidney E. Frank Hall for Life Sciences
 - Rockefeller Library

- A cogeneration evaluation was conducted in 2007. The study indicated that replacing the existing small scale, “heating season only” cogeneration plant with a significantly larger system that would operate year round would be cost effective.
- A cogeneration system is one that generates electricity and utilizes the waste heat from this process to produce steam or hot water to heat the campus.
- A design schematic and pro forma analysis are nearing completion.

2) New Construction, High Performance Design (HPD) and Leadership in Energy and Environmental Design (LEED)

As Brown University constructs or rebuilds or expands its infrastructure, Facilities Management’s Planning Design and Construction office will be required to limit greenhouse gas emissions by reducing energy consumption for all newly constructed facilities to between 25 percent and 50 percent below the standard required by state code. New construction will, **at a minimum**, meet a silver standard in Leadership in Energy and Environmental Design (LEED), furthering sustainability goals.

a). Current or Future Proposed Buildings and Potential LEED levels:

- Mind Brain Behavior (Potential: LEED Silver Level)
- Perry and Marty Granoff Center for the Creative Arts (Potential: LEED Gold)
- Nelson Fitness Center and Aquatics Center (Potential: LEED Silver)
- Sidney E. Frank Life Sciences (achieved LEED Silver)
- Pembroke Hall (Potential: LEED CI Silver)
- Rhode Island Hall (Potential: LEED Silver)
- Medical Education Building (Potential: LEED Silver)

3) Acquired Facilities (High Performance Design; 15-30% better than Code Requirements)

- As Brown University acquires and occupies acquired buildings, Brown University will decrease their respective carbon footprint through energy efficiency, fuel switching or other available technologies to achieve at least a 15% reduction and as much as 30% if financially feasible. All acquired properties will be evaluated for energy improvements as plans for our use are developed.

Note: Overall, HPD goals are projected to avoid 30-40% of the increase in Greenhouse Gas Emissions.

IV. Recycling

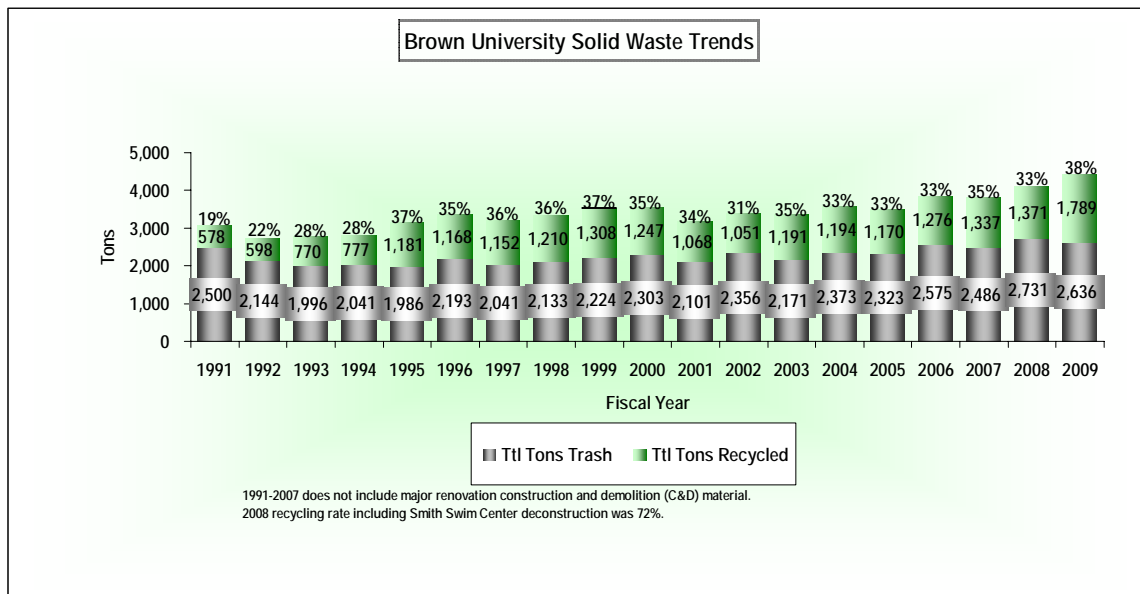
Recycling is an important part of Brown culture, and is shown through conscious efforts made by the students, faculty, and staff. Individuals are responsible for getting their recyclable materials to a collection container. Building custodians collect the materials and consolidate them at outdoor locations where an outside company picks them up and processes them for delivery to market.

In Fiscal Year 2009, Brown University recycled over thirty eight percent of its waste as a result of campus initiatives, 5 percent higher than FY08, and the highest recycling rate achieved in the history of the program.

Over 505 tons of curbside recycling was collected across campus. This number includes the bottles, cans, office paper, mixed paper, and cardboard for which there are receptacles found throughout the grounds. This is an increase (4%) of 43 tons collected over the same time period in fiscal year 2008. Collection of trash was reduced (7%) by 327 tons this year over last.

Behind the scenes, both Dining Services and Facilities Management have made efforts to reuse and recycle organic materials. Dining Services produces 600 tons of recycled waste from the Sharpe Refectory, and reduced food waste by an additional 93 tons for FY 09 by discontinuing tray service at Verney-Woolley. Additionally, Facilities Management has maintained its efforts in recycling yard waste, sending over 120 tons of leaf and yard waste to compost at the Rhode Island Resource Recovery Corporation in Johnston, RI, representing a 26 percent increase over FY 08.

The following chart illustrates our rate of recycling compared to landfill trash disposal since 1998:



V. Transportation

Brown's University's Transportation Office provides resources and information to the Brown Community promoting convenient, safe, and environmentally friendly ways to move around the campus, to travel to and from Brown, and to reduce traffic congestion on College Hill. The Transportation Office is working as hard as possible to find environmentally friendly and effective means of helping the Brown community find its way from point A to point B. As a result, 90 percent of student trips to and from campus are through alternative transportation.

Public Transportation:

Brown University is making great strides toward increasing the availability of public transportation. With the Rhode Island Public Transportation Authority (RIPTA) U-Pass program in its second full year, all Brown University ID holders may ride any RIPTA bus or trolley free of charge anywhere in the state of Rhode Island. The average number of RIPTA rides per month includes 2,216 students (35%), 647 staff members (14%), and 198 faculty members (29%).

Carpooling:

The Transportation Office also maintains an online carpool forum. By carpooling, faculty and staff can receive perks such as a free, one-day parking permit per year, and significantly lower parking costs. Carpooling also cuts down carbon emissions significantly.

Zip Cars:

Brown University has partnered with ZIPCAR to offer Brown community members an alternative to driving or bringing a car to campus. ZIPCAR is an internet-based service that allows you to rent a car for an hour or two or for an entire day. It is a turnkey program that includes everything – vehicles parked right on campus, on-line reservation system, gasoline, insurance coverage, and billing. Brown University students, faculty and staff pay an annual \$30 fee. The \$25 one-time application fee is waived for members of the Brown community. Hourly rates range from \$8.00 to \$9.25 depending on the type of vehicle reserved.

In FY 09, the Transportation Office:

- Increased the number of vehicles from five to fourteen
- Increased membership from 360 to 733

Bicycle Sharing:

Brown has bicycle racks in convenient places all around campus, offers bicycle registration to discourage theft, and is working with various civic groups to help promote cycling in the city. Cyclists can also contact Bike to Brown, an independent group of cyclists who are interested in all of the aspects of using a

bicycle as alternate transportation. Members of the Brown Outing Club, a student group, launched a bike-sharing program in March 2009 utilizing university funds to purchase three new Schwinn Cruisers and four Mongoose mountain bikes. The bikes, which come with a key lock, are available from an office in the university student center and can be signed out for a day by students who pay a \$5 yearly membership fee.

VI. Brown Dining Services (BuDS)

Brown Dining strives to purchase locally grown and fairly traded foods through its Community Harvest Program. They prioritize local support for state agriculture and business through purchasing directly from farmers and local businesses over a singular focus on organic products. Dining Services has increased its efforts toward sustainable food service and disposal in recent years. It works closely with local farmers through the Community Harvest Program and farmers' markets in order to offer fresh, local fruits and vegetables to students in the dining halls. Additionally, BuDS has an After the Harvest program which seeks to reduce hunger in Rhode Island by offering leftover food to the Rhode Island Community Food Bank. All together, about 600 tons of food waste is recycled from the Sharpe Refectory; the waste is sent to After the Harvest, composted by local farmers, or is sent to a pig farmer as feed.

Local Purchasing:

BuDS currently partners with more than 20 local farms and 31 local processors. BuDS relationships with these farms include the purchase of local products. In addition we provide farmers with production waste from BuDS scratch kitchens for composting. Since 2003, we have organized and hosted a local farmer's market on campus which begins in late August and runs through early November. This mid-week market provides local items for the Brown and surrounding communities and is part of Rhode Island's network of weekly farmers markets. Additionally, BuDS purchases from five produce distributors that also source locally grown products.

Fair Trade:

The coffee and teas sold at our retail venues and cafes are both organic and Certified Fair Trade. BuDS purchases certified organic and fair trade coffee, tea, and chocolate from Equal Exchange, a local worker-owned co-op based in West Bridgewater, MA. The Brown Dining convenience stores also sell Fair Trade Certified choice organic teas.

Biodegradable To-Go Containers:

BuDS current to-go containers are comprised of cornstarch, bamboo, and sugar. They are predicted to biodegrade (in appropriate conditions) in as little as two years. Reusable grocery bags and mugs are sold at all retail locations. In the fall of 2008, BuDS plastic tee-shirt bags were eliminated. As an incentive to use mugs, coffee and tea are discounted to \$1.10 at all retail units.

BuDS eliminated the use of Styrofoam in 1997. Further, in addition to biodegradable to-go containers and corn based biodegradable cold cups BuDS stopped using napkin dispensers and now only use baskets on dining tables to eliminate the "grab-a-handful" of napkins by customers and only use non-bleached napkins made from recycled paper.

Food Waste:

In 1994 BuDS removed all garbage disposal units in dining services and contracted with a local pig farmer to remove all pre- and post-consumer waste that would normally be ground and sent into the waste stream via these disposals. Additionally, and at the same time, BuDS installed Grease Reduction Units (GRU's) on all significant drain lines in an effort to eliminate oil based solids in the waste water. In 2006 BuDS began a composting program with a local orchard. In the last year we have diverted approximately 180,000 pounds of pre-consumer food waste to this farm specifically for composting.

Between 2005 and 2008, BuDS donated nearly 8,000 pounds of food to local organizations as part of BuDS commitment to fight local hunger. Some of the places we have donated to include: Providence Rescue Mission, Boys & Girls Club, Mary House, The Rhode Island Community Food Bank, Pawtucket Soup Kitchen, and Crossroads Family Center.

Tray-less Dining: On October 15th, 2008, the Verney-Woolley Dining Hall went tray-less during an inaugural "Waste Not, Want Not" themed dinner. This dining hall serves from 230 to over 1,000 people per meal and tray-less dining conserves 155,000 gallons of water per school year and avoids approximately 25% food waste in that operation. None of the eight retail operations use trays.

BioDiesel: Brown Dining Services has partnered with Newport Biodiesel to help turn our used fry-oil into usable fuel for diesel engines and home heating. On average, Newport Biodiesel takes 100 gallons per week from the Sharpe Refectory and 150-200 gallons per week from the Verney-Woolley Dining Hall to convert into clean, sustainable fuel. They also pick up the used fry-oil from Josiah's in addition to taking approximately 1,200 pounds of meat scraps per month from Brown Dining, which is then composted at Earthcare Farms in Charlestown, RI.

VII. Graphic Services

Graphic Services tailors resources to serve the graphic design, print, mailing needs and requirements of the Brown community.

It has been invested in environmental sustainability for over ten years, when it switched to a new 28" offset alcohol-free press, which uses soy-based inks. Since then, it has moved further in the direction of reducing hazardous waste by moving to a direct-to-plate system four years ago. This means that Graphic Services no longer needs to process film and therefore does not have to perform silver recovery. The new process generates no hazardous waste and the printing plates are recycled. All waste paper generated by the printing service is recycled as well.

Graphic Services attained Forest Stewardship Council (FSC) Certification in FY09 through Scientific Certification Systems. FSC paper is derived from forests that have been evaluated for management and activity based on certain criteria and regional U.S. standards. When there are tasks that cannot be performed in-house, Graphic Services sends jobs to FSC certified printers.

Additionally, Graphic Services is reviewed and audited by the Narragansett Bay Commission, which assesses how the printers dispose of hazardous material. The Commission standards are higher than U.S. Environmental Protection Agency (EPA) standards for hazardous waste.

VIII. Computer Information Services

In an effort to reduce paper consumption Computer Information Services is in the process of moving all the paper-based access forms to an online format. As a result, 80% of their forms are now paperless.