

BROWN UNIVERSITY
SUSTAINABILITY PROGRESS
REPORT



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

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I. Executive Summary

This report has been developed by Facilities Management (FM) in conjunction with Dining Services, Graphic Services and the Transportation Office at Brown to serve as a communication and working tool that 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 its environmental footprint in order to preserve natural resources on campus and to its surrounding community.

The various programs discussed in the reports include:

Community Carbon Use Reduction at Brown Program (C-CURB) - This program was established in 2008 by President Simmons with a \$350,000 fund. The C-CURB program received 25 proposals for projects this past year of which six were selected to receive funding. Two of the projects were feasibility studies and four of the projects involved working with the local community to implement home energy efficient measures.

Facilities: Energy & Emissions - In 2008 the University committed to reducing its Greenhouse Gas emission by 42 percent by 2020 or 31,000 Metric Tons of Carbon Dioxide Equivalents (MTCDE). During our first year with the new Greenhouse Gas reduction goals, Brown University reduced its energy-related carbon footprint by 7.7 percent as compared to an interim annual reduction goal of 4 percent from our fiscal year 2007 baseline of 73,000 MTCDE.

In 2008, a substantial energy efficiency investment program was initiated, with an initial loan from the University of \$5 million, to support meeting future fiscal year reduction targets while also implementing new high performance design goals for all new construction, major renovations and acquired facilities. Under the energy efficiency program, there are 24 projects of various size and scope either completed, in progress or under development. Of completed projects, \$1 million dollars has been spent this fiscal year to achieve a reduction of 2,000 (MTCDE) or ~3 percent reduction from our fiscal year 2007 baseline of 73,000 MTCDE with annual energy savings of approximately \$300,000.

In addition, the University adopted a new standard for all new construction projects to meet Leadership in Environmental Design (LEED) silver level at a minimum.

Recycling - The overall campus recycling rate, as compared to landfill waste, is 33 percent. This past year, a new initiative was incorporated into the recycle program to require the deconstruction of the Smith Swim Center to be recycled. The successful recycling of Smith Swim Center deconstruction raised the University overall recycling rate to 70 percent.

Transportation -The Transportation Office's partnership with Rhode Island Public Transit Authority's "UPASS" program has been met with enthusiasm by the Brown community. An average of 3,070 members, of the Brown Community, takes advantage of the free rides on the public transit system. This equates to approximately 258,504 trips, reducing carbon emissions while saving commuter costs.

Dining Services - Dining Services has increased the amount of fresh local produce served in the dining halls and is helping to fight the battle against hunger in Rhode Island by donating leftover food to the Rhode Island Community Food Bank. Food waste from Sharpe Refectory is either composted, or used as animal feed.

Graphic Services - The Graphic Services Department has been committed to sustainability for over ten years, when they switched to soy-based inks. Their most recent environmental success was achieving Forest Stewardship Council (FSC) Certification.

II. Community Carbon Use Reduction at Brown (CCURB)



With support from the Sidney E. Frank Foundation and the Office of the President, Brown has 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 (CCURB) 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 range of activities. Projects that accomplish the dual goals of helping meet the needs of the

greater Providence neighborhoods while reducing greenhouse gas emissions will be the focus of these off-campus projects.

CCURB 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.

CCURB Projects:

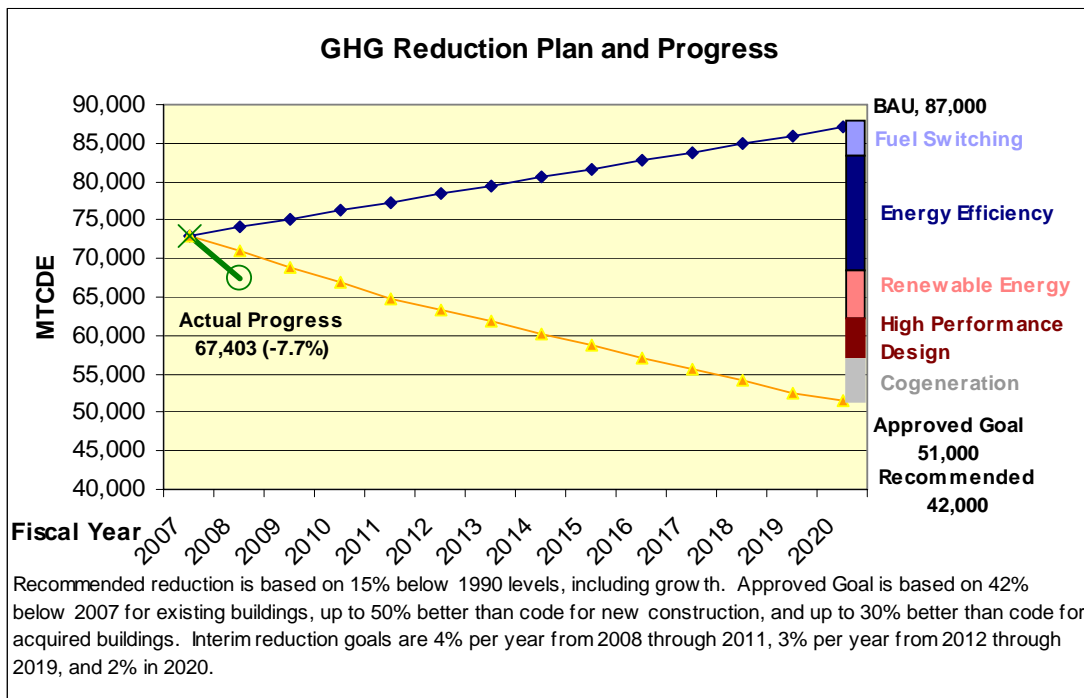
- Residential Energy Demand Side Management—Weatherization of Providence homes.
- Reducing energy usage and home heating costs with programmable thermostats.
- Sophia Academy: Empowerment through engagement—Fostering environmental stewardship in low-income, middle-school girls.
- Project 20/20—Promoting use of high efficiency lighting in low-income households.
- Feasibility study for Providence municipal bond Initiative.
- Feasibility study for purchasing local foods to reduce transportation impact.

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. Interim goals will be set as soon as possible and monitored annually. Interim Goals to meet 42% target
- 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:

1. MTCDE = Metric Tons of Carbon Dioxide Equivalent
2. BAU = Business As Usual
3. The yellow line represents the level of CO₂ emissions approved by Goals.
4. The dark blue line indicates the level of CO₂ emissions that would be released if the Goals were not implemented on campus.
5. 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

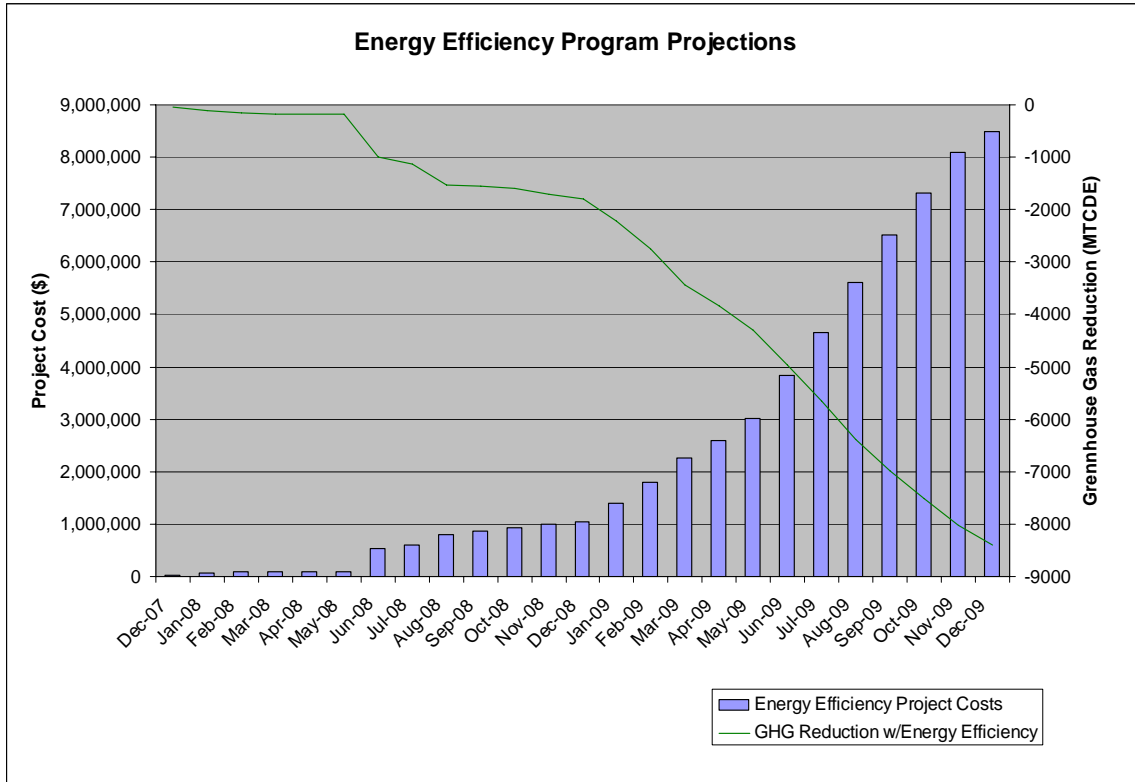
1. Existing Buildings: (6.4 Million Sq Ft)

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

- a. 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 percent starting in fiscal year 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.
 - A procurement plan has been adopted allowing Facilities Management to continue this practice indefinitely while at cost-effective rates and providing future budget certainty.
- 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 percent to achieve a 16,000 MTCDE reduction.
 - Approved funding to-date: \$5 million.
 - Estimated near-term progress through March 2009: 3,300 Metric Tons or 4.5 percent reduction.



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 through reducing Brown's energy consumption by approximately 20 percent or 16,000 MTCDE.

\$5 million in investments to increase energy efficiency has been appropriated for completion of projects in 2009 and \$15-\$20 million is being planned in the coming years.

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 percent reduction below 2007 GHG levels).
 - Steam Trap and Steam condensate return system. During this past summer, we replaced one thousand four hundred (1,400) 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.
 - Fifty 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 or in progress:
 - Pizzitola Sports Center
 - Olney Margoles Athletic Center
 - Power Street Garage
 - Prince Lab
 - Arnold Lab
 - 55 Power Street
 - Leung Gallery
 - University Hall
 - Alumni Hall
 - Steinert Center
 - Orwig Music Building
 - Sciences Library
- 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: Assessment and implementation of all approved energy efficiency measures has been completed.
 - Barus and Holley
 - List Art
 - Meehan Auditorium
 - Watson/CIT
 - The Geological and Chemical Sciences Building
 - W. MacMillan Hall
 - Pizzitola Sports Center

- Miscellaneous Energy Efficiency Improvements
 - A number of energy efficiency projects have previously been identified and just lacked funding to move them forward.
 - Small to medium sized projects.
 - Projects that have been awarded to-date:
 - Direct Digital Controls for ensuring heating system switchover via the central energy-management system at Facilities Management.
- Energy Efficiency Opportunities for Major Renovations
 - There are many instances where, due to budget constraints, many value-adding energy efficient upgrades are unable to be funded especially when the latest state-of-the-art equipment costs are above the typical project budgeting practices.
 - As part of the energy efficiency investment loan, funds have been made available to all major renovations, additions of new equipment or replacement of significant energy-using equipment for increased energy efficiency beyond code requirements, when outside of the scope of the project or when new, innovative technologies can be incorporated into construction.
 - Current Projects:
 - Minden Hall (individual room thermostats)

c. Rhode Island Renewable Energy Standard (~5 percent GHG reduction expectation)

- The State of Rhode Island passed legislation that requires all electricity suppliers to acquire renewable energy at specified percentages. Brown's purchased electricity will inevitably be less carbon intensive based on this requirement.

d. Cogeneration (~5-10 percent GHG reduction target)

- 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)
- a. Current or future proposed buildings and potential LEED levels:
- Mind Brain Behavior (Potential LEED platinum level)
 - Creative Arts Center (Potential LEED gold level)
 - Nelson Fitness Center and University Swim Center (Potential LEED gold level)
 - Life Sciences Building (LEED certified)
 - Pembroke Hall (Potential LEED certified)
 - Rhode Island Hall (Potential LEED gold level)
 - Medical Education Building (Potential LEED platinum level)
3. Acquired facilities (High Performance Design—15-30 percent better than code requirements)
- As Brown University acquires and occupies acquired buildings, the University will decrease its respective carbon footprint through energy efficiency, fuel switching, or other available technologies to achieve at least a 15 percent reduction and as much as 30 percent if financially feasible. All acquired properties will be evaluated for energy improvements as plans for our use are developed.

Note: High performance design goals are projected to avoid 30-40 percent 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.

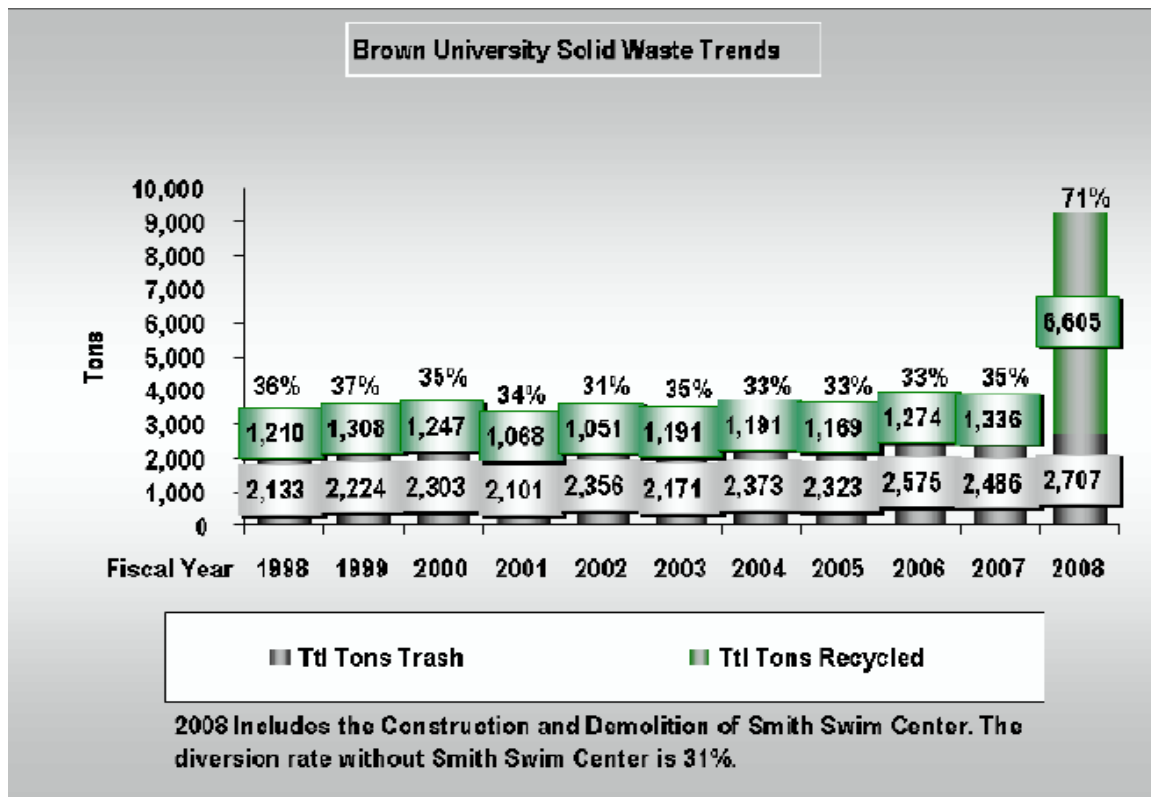
By the end of 2008, over 500 tons of curbside recycling was collected across campus. This number includes the bottles, cans, and mixed paper for which there are receptacles found throughout the grounds.

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, which is detailed below (see "Dining Services"). Additionally, Facilities Management has maintained its efforts in recycling yard waste, sending over 70 tons of leaf and

yard waste to compost at the Rhode Island Resource Recovery Corporation in Johnston, Rhode Island.

This past year, Brown recycled in total over 70 percent of its waste as a result of campus initiatives and the Smith Swim Center's deconstruction (98 percent of the building was recycled).

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



V. Transportation

Brown's Transportation Office provides resources and information to the Brown Community promoting convenient, safe, and environmentally friendly ways to move around the campus, travel to and from Brown, and reduce traffic congestion on College Hill.

Brown is making great strides toward increasing the availability of public transportation. With the RIPTA U-Pass program implemented this past year, all Brown University identification card holders may ride any Rhode Island Public Transit Authority bus or trolley free of charge anywhere in the state of Rhode Island. At a cost of \$165,000 for fiscal year 2007-2008, this program has seen participation increase with rising fuel costs.

The Transportation Office also maintains an online carpool forum that can be found here: [http://www.brown.edu/Administration/Finance and Admin/transportation/carforum/](http://www.brown.edu/Administration/Finance_and_Admin/transportation/carforum/). By carpooling, faculty and staff can receive perks such as a free one-day parking permit per year; and parking costs are lowered significantly. Carpooling also helps to significantly reduce carbon

emissions. Parking has always been an issue both at Brown and in Providence as a whole and 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.

VI. Brown Dining Services (BUDS)

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.

All coffee and tea on campus is Fair-Trade certified, which means that growers are paid at above-market prices to produce beans or leaves to ensure sustainable farming. Additionally, Dining continues to offer its Mug Refill Program, which discounts coffee and tea to only one dollar if students bring in a mug themselves as a "thank you" for saving paper cups. Dining continues to sell mugs this school year with a new design.

In addition, Dining has purchased Greenwave containers, which are biodegradable to-go containers.

VII. Graphic Services

Graphic Services tailors resources to serve the graphic design, print, and 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, Graphics 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 achieved Forest Stewardship Council (FSC) Certification this year. 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 other 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.