



Chapter 10

Environmental Sustainability

Introduction

This chapter presents an overview of the sustainable principles and goals guiding Boston College's long-term planning and the University's current activities and future plans for on-campus sustainable practices. It is divided into three sections: goals adopted by the University in various areas of sustainability, existing and planned sustainability practices and programs, and coordination with City agencies.

Implementation of the Boston College Master Plan provides an unparalleled opportunity to transform the campus into a model of sustainability. More than 500,000 square feet of outmoded, energy-inefficient buildings will be replaced by 1.5 million square feet of modern, energy-efficient facilities. Boston College has committed to developing a Sustainability Policy and Plan within one year, and to achieving Leadership in Energy and Environmental Design® (LEED) certification for all new buildings. It will also seek LEED Silver certification, or higher, where practicable. In addition, the University has committed to calculating its current and projected greenhouse gas emissions, and to develop a plan within two years to reduce those emissions.

Goals for Campus-wide Sustainability

Universities offer opportunities for green building and other sustainability strategies to contribute to the communities they serve. By implementing green design and development on a campus, environmental impacts can be reduced through the "greening" of construction and operation of multiple buildings. Incorporating ideas of sustainability into the everyday lives of students, faculty and staff allows thousands of people to become accustomed to these strategies, and they in turn can incorporate the strategies into their lives outside of the University.

Boston College recognizes that there are limits to the world's resources. To ensure the quality of life for future generations, Boston College seeks to demonstrate leadership in environmental stewardship and sustainability, living the motto "ever to excel." The University is committed to conserving resources and reducing the impact that its services and activities place on the environment.

A number of important goals have been established by Boston College, and further expanded goals will emerge through the development and adoption of a comprehensive sustainability policy and plan. This section provides details on the following areas related to sustainability goals embraced by the University:

- Leadership
- Social Justice
- Green Buildings
- Energy and Climate Change
- Water Conservation
- Waste Reduction and Recycling
- Air Quality
- Stormwater Management
- Landscape and Natural Features
- Transportation
- Education and Outreach
- Procurement
- Performance Standards and Indicators

Leadership

From formal commitments to the energetic activities of student-led groups, Boston College has engaged in a variety of initiatives to advance environmental sustainability. Development of the Boston College Sustainability Policy and Plan is integral to the University's Institutional Master Plan. To that end the University recently appointed a Director of Sustainability and Energy Management. Reporting to the Executive Vice President on sustainability programs and to the Vice President of Facilities Management on energy management programs, this position also works closely with the Office of the Provost on educational programs. The Director of Sustainability and Energy Management will lead campus activities regarding sustainability and work with an advisory panel of operations administrators and student representatives that recommends additional environmentally appropriate initiatives. This group will develop a comprehensive sustainability plan that includes goals, timetables and metrics for measuring and reporting progress. The University's commitment to its sustainability program will include appropriate budgetary allocations.

- *Goal*— Establishment of a broad-based advisory panel of stakeholders representing campus operations.
- *Goal*— Within one year, develop and adopt a Sustainability Policy and Plan.

Social Justice

The social justice aspects of sustainability are being viewed as increasingly important. Since its founding in 1863, Boston College has sought to integrate intellectual excellence and religious commitment, to be concerned with character as well as mind, and to embrace knowledge, values, community and service to others. As a Jesuit, Catholic university, Boston College holds fast to the ideals that inspired its Jesuit founders. The University remains focused on its broader social mission of helping students to develop their minds and talents while encouraging them to use their gifts and abilities as women and men in service to others.

- *Goal*— Continue to encourage the University community to contribute time and talent to the larger communities in which they live and work, including efforts in sustainability to ensure the quality of life for future generations.

Green Buildings

Sustainable building practices go beyond energy and water conservation. They incorporate environmentally sensitive site planning, resource-efficient building materials, indoor air filtration, and superior environmental quality. The University understands that the orientation, massing and enveloping of a building can affect its energy consumption, and it will consider multiple criteria when planning its projects.

As required by Article 37 of the Boston Zoning Code, Boston College will demonstrate that all buildings subject to Large Project Review will be LEED Certifiable as defined in the Code. Through its commitment to seek third-party validation for green building activities, Boston College will seek certification from the US Green Building Council and aim to achieve higher LEED levels as appropriate and feasible for various projects.

- *Goal*— The University will meet LEED Certified status and will strive to achieve LEED Silver status for any new construction project. Where economically feasible, higher LEED status will be sought when consistent with project program and design objectives.

Energy and Climate Change

Energy provision and conservation provide unique challenges and opportunities for university campuses. Boston College endeavors to successfully manage its energy consumption by focusing on ways to improve the efficiency of its existing buildings, and by investigating the ways in which new construction projects and major renovations can be designed with highly integrated building systems that provide appropriate monitoring and sophisticated controls. The University is also committed to investigating cogeneration using combined heat and power technology and economically feasible sources of on-site renewable energy such as geothermal.

Boston College will continue to address its greenhouse gas emissions.

- *Goal*— Continue to promote energy conservation and the installation of energy efficiency measures.
- *Goal*— Pursue opportunities for onsite renewable power and cogeneration.
- *Goal*— Conduct an inventory of greenhouse gas emissions on campus within one year.
- *Goal*— Within two years, develop a plan to reduce greenhouse gas emissions of the existing and proposed campus footprint.
- *Goal*— Conduct an inventory and condition assessment of trees on campus.

Water Conservation

Although the campus is located in a region with excellent water resources, water is still a precious and finite commodity. Boston College believes it prudent to investigate a comprehensive approach to water management, phasing in alternative water management systems over time as new buildings are constructed and infrastructure demands increase. These long-term efforts would contribute to safeguarding the quality and quantity of water resources available to the larger community. The University will evaluate rainwater harvesting, gray water reuse, and innovative techniques for water conservation.

- *Goal*— Continue to install low-flow or waterless fixtures.
- *Goal*— Enhance low water use irrigation systems with advanced control technology.

Waste Reduction and Recycling

While campuses generate large amounts of solid waste, they offer system-wide opportunities for improved management practices. Source reduction, recycling, and reuse represent different solutions for different waste streams. Recycling programs give everyone in the campus community a tangible way to get involved and connected, learn about the systems that support the campus and understand the ways

through which they can minimize their impact on the environment. Recycling programs also provide an unparalleled educational forum for students and others to learn about economics, energy, facilities management, communications and grassroots organizing. Boston College



wishes to harness this benefit and the environmental, financial and operational benefits of improving waste management practices. Based upon current successes, the University has established ambitious recycling goals.

- *Goal*— Recycle 75 percent of all waste materials generated in construction and renovation projects (C&D waste).
- *Goal*— Recycle at least half of non-C&D waste and continue to identify opportunities to implement programs to improve performance.
- *Goal*— Actively promote reuse of unneeded goods through the Clean Sweep initiative and other programs.

Air Quality

Air quality issues are generally less visible, but have the potential to directly affect human health and the environment. Boston College maintains good air quality on campus through a variety of programs, and will measure greenhouse gases as required by tracking fuel usage or by employing other methods used to measure success in meeting benchmarks, targets and goals.

A well-run indoor air quality (IAQ) management program yields substantial benefits for an institution, including its employees, faculty and students. In addition to the benefits of health and well-being, the expensive process of investigating and mitigating suspected IAQ problems can be reduced significantly or avoided entirely by employing good housekeeping and building maintenance practices, including during facilities improvement projects.

- *Goal*- Evaluate mobile source emissions generated on-campus.
- *Goal*- Explore the following best practice measures to reduce emissions from diesel construction equipment and vehicles, by requiring contractors to:
 - Install emissions control devices to reduce particulates and other tailpipe pollutants.
 - Burn only ultra-low sulfur diesel fuel.

Stormwater Management

Uncontrolled stormwater can cause flooding and habitat damage and waste of water. Through innovative approaches such as retention, treatment, and reuse, as well as groundwater recharge, properly managed stormwater can provide numerous benefits. Both stormwater quantity and quality must be managed. Among other programs, Boston College will support either stencils or castings at catch basins with the legend, “Don’t dump... drains to the Charles River.”

- *Goal*— Seek to manage stormwater from future projects on site.

- *Goal*— Explore opportunities to minimize the use of salt, pesticides and chemical fertilizers.
- *Goal*— Explore groundwater recharge strategies, such as natural bioretention and infiltration areas.

Landscape and Natural Features

The University intends to pursue policies related to planning and land use that are compatible with the natural resources of the area, the fabric of surrounding neighborhoods, and the campuses' historic character for both the buildings and open spaces. Thoughtful creation of buildings and landscape features will take advantage of site conditions and context within the parameters of the established organizational framework of the campus.



- *Goal*— Conduct an inventory and condition assessment of trees on campus.
- *Goal*— Develop a plan to increase the number of trees on campus and replace any tree that is removed with at least two trees.
- *Goal*— Increase the use of native species.

Transportation

The University will continue to reduce the environmental and congestion impacts of transportation by managing transportation demand, providing alternative transportation options, and striving to encourage the use of alternative fuel and high efficiency vehicles while ensuring maximum campus access.

- *Goal*— Maintain the transportation demand management system.
- *Goal*— Expand the alternative fuel and high efficiency vehicle pilot program.

Education and Outreach

Education and outreach initiatives are only as successful as the awareness of them in the larger community. Students, staff, visitors, volunteers and local residents are all good candidates for outreach activities related to sustainable development strategies. All parties could be engaged and made aware of sustainability and how their behavior affects it as they

each contribute and relate to local environments in different ways. Sustainability, education and student formation are all interrelated critical aspects of the mission of Boston College.

- *Goal*— Publicize efforts through a new website devoted to sustainability.
- *Goal*— Publish an annual assessment of campus environmental sustainability progress.

Procurement

The provision of goods and services has a significant impact on the environment. Choices made by consumers can have positive or adverse results. Demand for sustainably harvested building materials, for example, has helped to create a market for new agricultural products. Buying products made with recycled content stimulates demand for recycling. Using less toxic cleaning products improves water quality and human health and safety.

- *Goal*— Develop a fiscally responsible procurement policy for the purchase of environmentally-preferable products and services within one year.

Performance Standards and Indicators

It is impossible to judge success in environmental sustainability without evaluation or measurement. Metrics play two important roles: provide an understanding of targets that helps clarify expectations and communicate those expectations to others; and provide a way to measure and evaluate the value and impact of a particular effort or set of measures. Appropriate metrics provide a means for establishing intentionality, accountability and monitoring. Boston College is committed to measurement of its environmental impacts for improved education and student formation.

- *Goal*— Commit to broad sustainability principles with specific performance standards and a system of indicators and metrics to track performance.
- *Goal*— Publish an annual assessment of campus environmental sustainability progress.

Sustainable Practices

This section provides a summary of Boston College's existing and planned sustainability practices and programs. The sustainable practice areas within the University include the following main sustainability topics:

- Leadership
- Social Justice
- Green Buildings
- Energy and Climate Change
- Water Conservation

- Waste Reduction and Recycling
- Bookstore and Reprographics
- Stormwater Management
- Landscape and Natural Features
- Air Quality
- Dining Services
- Environmental Health and Safety
- Procurement
- Transportation
- Education and Outreach

Leadership

Boston College has demonstrated leadership in sustainability through its on-campus programs and involvement in numerous organizations. The appointment of a Director of Sustainability and Energy Management is another manifestation of that commitment.

C2E2

The University is a founding member of the Campus Consortium for Environmental Excellence (C2E2), established in the late 1990s as an association of Environmental Health and Safety (EH&S) staff at New England colleges and universities. Boston College's Office of EH&S actively endorses C2E2's mission "to support the continued improvement of environmental performance in higher education through environmental professional networking, information exchange, the development of professional resources and tools, and the advancement of innovative regulatory models. Environmental performance includes campus regulatory compliance, environmental management, and sustainability initiatives." The organization currently has approximately 30 member institutions drawn from throughout the US. C2E2 has undertaken a number of projects over the last decade, such as developing posters and publications on environmental metrics, conducting benchmarking surveys, and associating with other professional organizations to promote regulatory changes that better fit the higher education sector. The group is currently working on the development of environmental management systems and best management practices for sustainability at colleges and universities.

Project XL

Boston College is also an integral member of Project XL, a group of three universities and three regulatory agencies to promote sustainable design specific to laboratory facilities. The other partners are:

- University of Massachusetts Boston (UMass Boston)
- University of Vermont (UVM)
- U.S. Environmental Protection Agency (EPA)
- Massachusetts Department of Environmental Protection (MADEP)

➤ Vermont Agency of Natural Resources (VANR)

Through this collaboration, which began in 1999, the university partners have implemented laboratory-specific environmental management plans. The goal of the project is to create a single comprehensive health and safety program for the laboratories that combines hazardous materials and hazardous waste management, rather than the current regulatory framework which divides the two issues into OSHA (Chemical Hygiene Plan) and EPA (RCRA) regulations. Project XL requires that participants reach beyond compliance and develop areas of enhanced environmental performance. The university partners have engaged in a number of activities designed to improve laboratory waste management practices including comprehensive training of lab workers, innovative waste labeling and identification procedures, and collection and reporting of detailed data about laboratory waste, in order to better identify pollution prevention opportunities. Because of this work, the Campus Safety Environmental Health Management Association (CSEHMA) awarded BC, UVM and UMass Boston an award of distinction in unique and innovative safety programming.

As Boston College learns more from institutional peers, particularly through its newest organizational memberships with the U.S. Green Building Council (USGBC) and the Association for Advancement of Sustainability in Higher Education (AASHE), University officials have become well-aware of growing opportunities to join peers in formal commitments to specific changes.

AASHE

AASHE is an association of colleges and universities in the U.S. and Canada working to create a sustainable future. It was founded in 2006 with a mission to promote sustainability in all sectors of higher education—from governance and operations to curriculum and outreach—through education, communication, research and professional development. Businesses, NGOs, and government agencies can participate as AASHE partner members. AASHE aims to advance the efforts of the entire campus sustainability community by uniting diverse initiatives and connecting practitioners to resources and professional development opportunities. The association also provides a professional home for campus sustainability coordinators and directors. AASHE defines sustainability in an inclusive way, encompassing human and ecological health, social justice, secure livelihoods and a better world for all generations.

USGBC

The U.S. Green Building Council (USGBC) is a non-profit organization committed to expanding sustainable building practices. USGBC is composed of more than 14,000 member organizations from across the building industry that are working to advance structures that are environmentally responsible, profitable and healthy places to live and work. Members include building owners, real estate developers, facility managers, architects, designers, engineers, general contractors, subcontractors, product and building system manufacturers, government agencies and nonprofits. The USGBC's mission is to transform the way

buildings and communities are designed, built and operated, enabling an environmentally and socially responsible, healthy and prosperous environment that improves the quality of life.

Director of Sustainability and Energy Management

To successfully foster and implement new policies or processes put forth by C2E2, Project XL, AASHE, USGBC, and the University's other memberships and affiliations, related sustainability initiatives require a clear stakeholder structure and rigorous methodology. In large institutions, such as universities, it is strategically advantageous to engage stakeholders at different levels and from different campus functions. A leader is needed who works in conjunction with representatives from across campus, to ensure appropriate feedback, support, marketing and outreach for sustainability efforts.

The administrative structure for making decisions about building a sustainable campus is ultimately led by Boston College's Provost and Executive Vice President with the approval of major expenditures by the Board of Trustees. On a daily basis, however, University leaders depend on the Director of the newly created Office of Sustainability and Energy Management. The Director coordinates all of the University's sustainability efforts, and reports to the Executive Vice President and the Vice President of Facilities Management.

The office oversees development and implementation of a comprehensive program for sustainability and energy management. It also leads efforts to integrate these principles and practices into campus operations and encourages support for and involvement in projects among students, faculty and staff. The Director is responsible for sustainability initiatives involving the operation of the University's capital projects management, facilities, information technology, dining, purchasing, and parking and transportation departments. The Director's long-term tasks are to develop and facilitate implementation and management of sustainability initiatives, and to report on the effectiveness of the initiatives through various tracking methods.

Energy Management

The Director of Sustainability and Energy Management also supports efficient and economic operation of the utility infrastructure, and oversees energy management programs, with a utility budget of more than \$20 million, assuring efficient operation of utility infrastructure, developing economic returns on investment where possible, and advocating for funding of sustainability initiatives. The Director acts as a liaison between all University departments and Facilities Management to promote and garner support for sustainability initiatives. The Director supervises and mentors an Energy Manager and various student employees, interns and volunteers. The Director's education and outreach duties also include performance of special projects that require knowledge of energy management, recycling and payback calculations; coordination of workshops, conferences, and presentations promoting sustainability; creation of marketing and outreach plans; distribution of instructional and promotional materials; and maintenance of a sustainability website with communication feedback capacity.

Campus Sustainability Advisory Panel

The Director of Sustainability and Energy Management chairs the Campus Sustainability Advisory Panel, which was formed to assure broad institutional coverage of interested parties during implementation of the Institutional Master Plan. The panel includes representatives from operating units such as Facilities Management, Environmental Health and Safety, Dining Services, Auxiliary Services, Capital Projects Management, Procurement Services and Governmental and Community Affairs. In addition to University administrators, students will serve on the panel. The Director also meets regularly with Sustain BC, a campus group which includes the Director of Boston College's Environmental Studies Program as well as other faculty, staff and student members (see Education and Outreach section later in this chapter for a description of Sustain BC).

Social Justice

Boston College is committed to maintaining and strengthening its Jesuit, Catholic mission, especially to integrating intellectual, personal, ethical and religious dimensions, and to linking high academic achievement with service to others.

Below is a representative sample of the many service groups and activities that incorporate principles of social and environmental justice.

- Volunteer and Service Learning Center
- Volunteer Opportunities
- Campus Organizations
 - Boston College Neighborhood Center
 - Campus Ministry (Justice Programs)
 - Career Center (Post Grad Volunteering)
 - Church Ministry Internships (Intersections Project)
 - Global Proficiency Program
 - Lynch School of Education (Outreach)
 - PULSE Program
 - Urban Catholic Teacher Corps
 - Urban Ecology Institute
 - Women's Resource Center
- Campus Ministry
 - Appalachia Volunteers
 - Arrupe International Service Trips Program
 - 4Boston
 - Urban Immersion
 - Ignatian Family Teach-In and School of the Americas Vigil

- Other Service & Immersion Programs
 - Bolivia Micro-Finance Service/Immersion trip
 - Brazil Service/Immersion Trip
 - Dominican Republic
 - El Salvador
 - Ghana Service & Immersion Trip
 - Haiti Service Project
 - Jamaica Mustard Seed Trip
 - Natchez Immersion Program
 - Navajo Nation Service Trip
 - Nicaragua Service Trip
 - Philippines Service & Immersion Trip to Daly City, CA

For additional information on social justice, including contributions to the community, please refer to the cultural events and programs, community outreach and employment statistics in Chapter 12, *Economic Development*, and the community benefits and service programs in Chapter 13, *Community Benefits and Service Programs*.

Green Buildings

Materials and products used in construction contribute to global and regional toxicity, resource depletion, pollution and solid waste production. The University will consider, when consistent with project program and design objectives, the use of sustainable building materials that possess some of the following characteristics – made from natural, rapidly renewable resources, recyclable or recycled content, harvested or manufactured locally, or non-toxic in use or disposal.

To start with a baseline assessment of the campus, Boston College has begun to review existing buildings through the U.S. EPA Energy Star Portfolio Manager program. After assessing energy performance candidates, the University is seeking an Energy Star Rating with at least one structure in the near-term, the 110 St. Thomas More building. The University's goal of green building certification follows the USGBC's widely used LEED standard.

The USGBC offers instructions and tools to guide project teams through the LEED certification process. By assembling an interdisciplinary team for each project that includes mechanical, ecological, engineering, architectural, landscape architectural, transportation, and other expertise, guidelines for everything from sustainable construction waste management to on-site power generation can be developed more efficiently and cost-effectively in the long-run. Goal-setting often occurs during a design charrette and includes all members of the project team.

The early planning process is also critical to successfully laying groundwork for green building certification because it brings decision-makers to the same table to assess whether under the

original design, prerequisite LEED credits and at least a minimum of the other credits are likely to be met. Early review of requirements helps to ensure that the project will remain on schedule. The LEED “checklist” consists of six credit categories, with many credit synergies (e.g., green roofs affect water, materials and energy). If the team is confident about the checklist, the next step is to register the project with the USGBC for the appropriate certification category. While LEED rating system versions include those for new construction (and major renovations) and also exist for homes, neighborhoods, interiors, buildings core and shell, schools and existing buildings, the overarching set of credit categories common to all include:

- *Site Selection* (e.g., land reuse/remediation, density, alternative transportation, habitat protection, stormwater management, light pollution and heat island reduction)
- *Water Efficiency* (e.g., minimum plumbing and landscaping irrigation efficiencies, wastewater reuse, conservation of potable water)
- *Energy & Atmosphere* (e.g., renewable power generation on-site or off-site purchases, Energy Star appliances and building ratings, automated building energy and airflow systems, system commissioning, CFLs/other high efficiency lamps, daylighting, insulation)
- *Materials & Resources* (e.g., life cycle analysis, recycling, composting, recycled/reused/rapidly renewable resource-content in material usage such as floors and walls, use of locally/regionally sourced resources)
- *Indoor Environmental Quality* (e.g., thermal comfort, outdoor air supply, particulates management, lighting controls, window views, green cleaning)
- *Innovation in Design* (e.g., car share services, education/outreach/awareness programs, sustainable food provisions, exceptional performance in other five credit categories)

The team can actively manage project information about the status of meeting credit goals via LEED-Online, which is enabled once the project is registered. Post-construction, and once the online templates and supporting documents are completed, the team submits the full set of application materials to the USGBC for review. The USGBC will contact the team to identify achieved points and provide comments about unachieved points which the team may amend (often through simply sending more detailed supporting documentation) for re-submission to the USGBC for final review. A LEED certified project approved by the USGBC may attain a Certified, Silver, Gold or Platinum level rating based upon how many total points were achieved; successful projects receive national recognition from the USGBC and the team may benchmark the project to similar projects on the campus or at peer institutions. The process of building LEED projects has been demonstrated to gain greater efficiency over time, with practice, in that project teams like those which will be assembled by Boston College gain experience and learn quickly about how to manage the LEED documentation; they also establish information tracking approaches and vendor relationships that can be common to similar future projects. A systematic green design approach to achieving energy efficiency and other environmental enhancements holds the potential for real and significant benefits for Boston College and the communities its serves.

Energy and Climate Change

Boston College has taken significant steps to improve energy efficiency. Annually, capital funds have been dedicated to the advancement of energy efficient projects. For example, the 2009 Capital Budget allocated 9 percent of spending to sustainability projects—over \$1.2 million. These projects addressed lighting, variable speed drives, energy management control systems, metering and efficient HVAC equipment. Recently, the commitment has been enhanced with additional funds, the hiring of an assistant energy manager and partnership with the student population to establish an energy efficient campus. Boston College's electricity purchase included 49 percent renewable energy by January 2007, a significant increase over prior years' portfolios.

Boston College has engaged in a number of practices to reduce its electrical consumption:

- Last year, the University invested more than \$500,000, about 2.5 percent of the utility budget, on energy conservation measures, including:
 - Programmable intelligent lighting systems in Higgins Hall (235,000 sf)
 - An ongoing project to install motion sensor lighting in restrooms, trash rooms, laundry rooms, conference rooms, lounges and classrooms
- Lighting retrofits were made in the Recreation Complex and the Library, and variable speed drives and energy efficient air compressors were installed in various buildings on campus.
- The use of a campus energy management system has been expanded to 45 buildings and continues to provide energy savings.
- The University has created a pilot project to sub-meter electricity in residence halls.
- The University has engaged in a campus-wide energy savings campaign with student input. Students are always seeking new ways to increase campus awareness and promote active participation in sustainability efforts, such as the "Bulb Brigade" designed to increase the use of compact fluorescent light bulbs instead of incandescent bulbs around the campus.

Boston College's Department for Information Technology Services (ITS) has employed several different measures at the campuses' main data center to reduce electricity usage, including use of the following power efficiencies:

- Virtualization to run more systems on less hardware.
- Power efficient blade server technology (results in fewer, more efficient power supplies).
- "Denser" storage devices whereby storage capacity increases can be made without a linear increase in power consumption.

Elevators

Boston College is evaluating the use of more energy-efficient and environmentally friendly elevators, such as the Otis Gen2 and Kone systems. New elevator systems set the standard for elevator performance, efficiency and comfort.

Combined Heat and Power

The University is currently evaluating the feasibility, as well as the environmental and economic benefit, of combined heat and power (CHP) technology. Several locations, configurations and load profiles are being assessed on the BC campus.

Geothermal Heat Exchange Wells

Geothermal systems are scalable and can be constructed in a distributed fashion. As such, they are effective to support multi-year phased renovation and new construction in different areas of the campus as part of the University's IMP. The University is currently evaluating the campus geologic and groundwater conditions to assess the feasibility of geothermal installations as part of the proposed campus development.

Greenhouse Gases

On the issue of climate change, the American College and University Presidents Climate Commitment (ACUPCC) has developed a comprehensive, timeline-based action plan for campus climate neutrality that has received a great deal of visibility. Boston College recognizes the need to build support for sustainability among college and university administrations across America and has seriously considered the ACUPCC commitment. Similar to decisions reached by Harvard University and Tufts University (schools which also support Energy Star building, green building standards, transportation demand management, clean power, waste minimization, and most of the ACUPCC's other recommended strategies), Boston College has determined to not become a signatory to the ACUPCC. The University will develop its own program better tailored to its needs.

The University has taken steps toward assessing its annual GHG baseline and begun the process of calculating its carbon inventory; it commits to, within two years, developing a plan to reduce its greenhouse gas emissions.

Water Conservation

Several measures have been undertaken to reduce water consumption at Boston College's facilities:

- Low-flow toilets and shower heads as well as faucet aerators have been installed in a number of the residence halls, and will be used in new student living areas being created through renovation projects in Upper Campus and Newton Campus residence halls.

- Retrofitted autoclaves were installed in Merkert Chemistry Center, saving approximately 400,000 gallons of water per year.
- Installation of waterless systems for Merkert Chemistry Center's vacuum pumps is in progress. Projected savings are approximately 1 million gallons of water per year.
- Water-saving and energy-efficient laundry equipment has been installed in 26 residence halls. New high-efficiency, front-load washers installed in August 2006 use 8.8 gallons less water per load, on average. The University uses a website that allows remote user monitoring of washing and drying status that also helps reduce impact on the environment. It is estimated that Boston College has saved more than 3 million gallons of water in less than 2 years with this equipment.
- Four waterless urinals were installed on campus as a pilot project.

Dining Services

Boston College Dining Services has made a number of efforts to ensure water quality and conservation:

- Dining Services continually researches energy and water-efficient technologies when replacing foodservice equipment and purchases Energy Star or equivalent rated replacement equipment. Recently, two dish machines were replaced, cutting water consumption by 50 percent.
- Specifically, the newly installed dishwashers are designed to cut water and energy usage, yet provide effective cleaning and meet sanitizing requirements. Insulated doors also reduce heat loss. The unit's 1.9 gallons per minute rinse flow rate (the lowest in the industry on a standard height machine) saves both water and the energy to heat it.
- Dish machines are only run when full, to conserve utilities and cleaning products.

Grounds & Athletic Maintenance Department

Boston College also employs a variety of grounds-related water efficiency strategies. Strategies include:

- An underground sprinkler system across campus that targets specific green space and reduces evaporative loss of water.
- Water quality considerations in choosing road/walkway deicing materials. The University has begun a pre-treatment approach in some areas using a liquid blended product with calcium chloride, sodium chloride and sugar beet extract, which more naturally acts to prevent ice formation on concrete and results in less use of bagged salt products in these areas.
- A web-based irrigation system will be installed on the Chestnut Hill and Newton campuses within the next two years. The system will allow the University to control irrigation timer clocks via computer and will include rain sensors. Significant water savings are projected.

- The University is researching the planting of increased ratios of native plants, which typically reduce the amount of water necessary for landscaping. The University is also implementing a small demonstration xeriscape garden in the same location as the organic garden.
- The Grounds & Athletic Maintenance Department has plans to maintain five acres of the Brighton Campus with organic fertilizer as a pilot program to evaluate the effectiveness of this approach.



Any concerns about water inefficiencies on the campus can be reported to Facilities Management personnel online via the University's new sustainability page and a link to an electric work-order filing system. The portal also features a breadth of resources and tips for learning more about water conservation practices.

Waste Reduction and Recycling

Boston College has undertaken a number of measures to reduce waste through recycling and reuse:

- Through the Institution Recycling Network (IRN), the University recycled the following amounts in Fiscal Years 2005 through 2007:
 - 62.1 tons mixed electronics
 - 27.9 tons wood
 - 26.4 tons mixed metal
 - 15.2 tons mixed metal appliances
 - 85.6 tons surplus property
 - 5.8 tons universal waste (batteries and fluorescent lamps)
- The University increased number and distribution of outdoor recycling containers across campus.
- Housekeeping Services provides recycling bins for campus events.
- In-room residence hall recycling debuted in fall 2007 in all freshmen areas, and the University will expand the program to all residence halls this fall.
- Battery and ink cartridge recycling bins are located in 25 locations in residence halls and at five central locations throughout the campus.



- Maroon and green recycling toppers are located under "BC Recycles" signs at designated areas in each hall.
- Ample information about these locations and sorting guidance is displayed on posters throughout the buildings, as well as provided on the Housekeeping webpage. Further education about the recycling program is available through their web link to recycling videos and external resources.
- Since 2003, the University has provided co-mingled can and glass recycling containers in classrooms and administration buildings and has increased the number of dumpsters for cardboard, carpets, wood, metal and yard waste. Last year, 55 percent of waste was recycled.
- Through the Save That Stuff recycling program, the University has saved the following from 2005 through 2007:
 - 308 tons cardboard
 - 8 tons wood
 - 6 tons metal
 - 163 tons yard waste
 - 146 tons mixed paper
 - 41 tons commingled
- Another waste program that benefits the environment was the purchase and installation of three Big Belly Cordless Trash Compaction Systems in time for Earth Day, 2008. The compactors were installed on the Boston College Campus in high trash-flow areas, and have significantly reduced litter and trash collections. These units represent the first installation of renewable power on campus, as they are solar powered.

Student Initiatives

Students at Boston College actively volunteer to support University waste reduction, reuse and recycling. For example, one of the most extraordinary efforts is the Clean Sweep Program, now in its fifteenth year. Student, alumni and employee volunteers collect household items, clothing, food and appliances donated at the end of each academic year. These items are then distributed for reuse by approximately 100 non-profit organizations, community agencies, churches and schools in Boston and other local communities.

Students have also joined in the campaign to reduce the consumption of bottled water. Ecopledge, a campus group, hosted Harvest Fest, a fall Earth Day event, to increase campus awareness of environmental issues, and had a table dedicated to water conservation and the use of tap water as an alternative to bottled water. Reduced use of bottled water saves energy and materials through reduced processing, transportation, and demand for glass and plastics.

RecycleMania, another program led by Ecopledge and Facilities Services, is an annual national competition among universities to reduce their waste generation through recycling, and campus results are ranked. In this year's competition, Boston College placed 12th in the nation, first among ACC schools, and second in Massachusetts, with a cumulative recycling

rate of 38 percent and a weekly recycling rate of 45 percent. Students are recycling approximately 2.6 pounds per week. RecycleMania is supported by the U.S. EPA and the National Recycling Coalition as a project of the College and University Recycling Council.

Another student effort to increase enthusiasm about sustainability, led with support from the University, is the Undergraduate Government of Boston College's (UGBC) new partnership for recycling with Boston College's Athletics Department and the Boston Red Sox. UGBC has proposed increased distribution and visibility of recycling receptacles at Conte Forum and Alumni stadium. Given the large amount of refreshment containers disposed of at sporting venues, the UGBC also recently announced that it is recruiting Boston College students to be on a Green Team organized by the Red Sox. Under the agreement, approximately 150 volunteers, in addition to many from other local schools, make a commitment to attend scheduled meetings to learn about recycling. Education also entails posters and 'A to Z' handouts (provided by the NRDC) about sustainability practices.

Students from Ecopledge also partnered with Facilities Services to institute recycling outside football games this past fall. The program was well received by tailgaters and students alike.

Bookstore and Reprographics

The Bookstore and Reprographic facilities reuse and conserve a large amount of material:

- An average of approximately 40,000 used text books are brought back each year to the Bookstore for resale by Boston College or through distributors.
- Cardboard boxes are retained and reused for returning unsold books.
- Waste reduction measures through quantifying book recycling and increasing trash management are under development.
- A new student printing policy began in 2007 which limits the number of pages students can print for free. Any student who exceeds the limit is charged 3 cents per page.

Stormwater Management

In an effort to improve its existing stormwater infrastructure, Boston College is working with a team that is developing a campus-wide analytical stormwater model of both existing conditions and full build-out of projects presented in the Institutional Master Plan. The goal of the modeling effort is to identify specific improvements that will both alleviate current problems and create opportunities for innovative stormwater management.

Inherent in the modeling effort, best management practices (BMPs) and Low Impact Development (LID) techniques have enabled the University to prioritize sustainability in the development of its stormwater management plan through the full build-out of the IMP. Boston College's Director of Sustainability and Energy Management will work with the

Facilities Management Department and others on campus to identify particular LID strategies that can be applied to both existing infrastructure improvements and the development of new projects.

Their evaluation of sustainable on-site stormwater management will include the following:

- Each building site is being evaluated to be a “net-zero” contributor to additional campus storm drainage. Further, each site will be viewed as an opportunity to mitigate peak stormwater flows.
- For some of the proposed future projects in this IMP, the total amount of impervious area will be reduced. The reduction in impervious areas, coupled with the construction of subsurface infiltration/retention areas with individual projects, will help alleviate some of the existing drainage issues on campus.
- Evaluations performed by various consultants to Boston College indicate the prime contributors to flooding problems include runoff from surrounding elevated areas and the confluence of flows from these surrounding areas to a single discharge point from the campus. The University will implement stormwater management techniques on a sub-watershed level to minimize pollutant loads and runoff volumes from the individual sites.
- Preventative techniques to reduce runoff accumulation that are being considered include rain gardens, constructed wetland enhancements and bioswale retention areas that are able to absorb, hold and filter stormwater.
- The University will also evaluate individual site and economic feasibility of structural retention installations. These may include rainwater harvesting configurations such as sub-surface detention tanks and rain barrels to capture roof runoff. Captured water is not potable but will be redirected toward grounds maintenance irrigation needs, equipment/surface washing and similar needs. It may otherwise be directed to natural retention areas for groundwater recharge.
- Boston College plans to assess potential pilot locations for vegetated or “green” roof installations that include native species, control runoff flows and reduce building energy needs. Locations are limited due to structural concerns at many of the existing, historic buildings, but new construction projects will be targeted for these opportunities.
- In low to moderate traffic areas such as pathways, porous pavement/concrete products and loose material cover such as mulching, packed dirt and gravel, are considered as viable alternatives to traditional, impervious asphalt pavement.
- In addition to managing stormwater quantity on-site, the University will continue stormwater quality improvement measures, such as reducing the use of salt, pesticides and chemical fertilizers.
- The University will purchase either stencils or castings at catch basins with the legend, “Don’t dump... drains to the Charles River.” This is an important part of everyday operations on the campus, in addition to Construction Stormwater Management protocol

for capital projects and helps control stockpiling, washing and risk management for other drained materials.

The University's stormwater infrastructure is also discussed in Chapter 8, *Utilities and Infrastructure*.

Ongoing improvements to Boston College's stormwater collection system are primarily related to improving the existing on-campus conditions, and to mitigating impacts of future development. The design of new facilities necessitating connection to the municipal stormwater systems will require review by BWSC, under its Site Plan Review Process, on a project-by-project basis. Stormwater management controls, including a Stormwater Pollution Prevention Plan (SWPPP), will be established in compliance with BWSC standards and the Massachusetts DEP Stormwater Management Policy.



Landscape and Natural Features

Grounds and athletic facility maintenance responsibilities at campuses largely consist of ensuring the usability, health and aesthetic quality of common areas outdoors. Landscape practices directly affect student recruitment and athletic field playability, but also have environmental impacts. Open space areas are often heavily worn by the campus community and general public and require application of energy, care and resources. At Boston College, the Grounds and Athletic Maintenance group provides services to the campus community in three functional areas: Grounds Maintenance, Athletic Maintenance and Fleet Maintenance. The group's goal is to provide a welcoming environment by maintaining a safe, secure and attractive campus and workplace that reflects the University's pride in its operation and sensitivity to the community's needs. For general upkeep of athletic facilities and other campus grounds, including lawns and gardens, Boston College regularly tests and applies new landscaping practices to introduce and protect native species, protect waterways and minimize chemical applications, particularly through the use of alternatives like biological controls or organic products where feasible. It has a growing cadre of irrigation reduction strategies like xeriscaping.

Xeriscaping began principally as a concept aimed to design gardens and landscapes in such a way that the use of water is minimized. Boston College is reviewing the practices of xeriscaping in its ground efforts in the form of natural landscaping and will implement a pilot garden this summer. Natural landscaping is based on six principles for gardening:

- *Planning and Design* – Adjust the placement of plants to consider yearlong color, evaporation from the sun and wind, runoff and water tolerance of the plant.

- *Practical Turf Area* – Different plants prefer different soils, so testing the soil’s pH levels, compaction, nutrient quality and absorptive capacity before planting is important. Planting is then tailored accordingly based on the results, or the soil is prepared before planting to accommodate the needs of the plant.
- *Appropriate Plant Selection* – Native vegetation is part of a community that has co-evolved with many species over a long period of time. Once established, native vegetation is not only better adapted to withstand local climate conditions, it also provides the habitat necessary for local species. Thus, local geological, hydrological and climate conditions are taken into account when selecting vegetation.
- *Efficient Irrigation* – Plants that are less water efficient are grouped together such that, if needed, water can be effectively applied. Layout is designed to minimize runoff and opportunities for evaporation.
- *Use of Mulches* – Mulch is meant to help retain soil, reduce evaporation and the presence of weeds. Peat mulch is avoided since it can actually pull water up from soil when it dries.
- *Appropriate Maintenance* – Weeding and pruning is still necessary for a garden that uses natural landscaping.

A campus-wide tree inventory will be undertaken by the University in summer 2008. The measurement and data collection will be overseen by an employee trained by BC’s Urban Ecology Institute to assess tree health. This inventory will complement calculation of the school’s carbon footprint by computing tree carbon sequestration from Boston College’s campuses.

Synthetic Playing Surfaces

Boston College is proposing the installation of a synthetic playing surface for the baseball field and softball field at the Brighton Athletics Center. The installation of a synthetic infill surface in areas specified in Chapter 7, *Athletic Facilities*, of this report will enable the baseball and softball programs to maximize their opportunities to practice and compete without the frequent delays and postponements associated with New England weather, and with potentially fewer injuries. From an environmental perspective, a synthetic playing surface requires less maintenance, negates the need for pesticides or herbicides as on natural grass, and results in far less water usage by reducing irrigation.

The primary environmental concern, currently under debate, relates to the potential leaching of heavy metals from the recycled styrene-butadiene rubber (SBR) that is used as a component in the infill system. The rubber is mixed with sand and “infilled” into the polyethylene “grass” blades to mimic the feel of natural soil and to provide a resilient surface for the athlete. According to the materials reviewed by the University, including studies

prepared by Helen Liu, a leading researcher at the University of Massachusetts¹, leachate resulting from SBR derived from scrap tires and chemicals from the other components of the synthetic surface system (sand, polyolefin fibers and acrylic backings) meet current environmental standards and should not be considered hazardous.

Studies indicate that leachate from the SBR is only problematic at extreme pH levels. Organic compounds can be leached at highly acidic pH levels and metals at highly basic pH levels. Soil and rainwater pH in the greater Boston area is generally close to neutral (7.0 being neutral). The studies indicate that significant leaching of metals does not occur until the level drops into the 2.0 to 3.5 range. There is no reason to believe that soil or rainwater levels on the Brighton Campus would reach these extreme levels. Therefore significant leaching of pollutants is not expected as a result of the proposed construction of the new synthetic turf baseball and softball fields. Based on available research the University believes that the installation of synthetic playing surfaces is a wise investment, provides significant benefit to users, conserves water and results in no significant environmental or health impacts.

Air Quality

Boston College seeks to maintain good air quality on campus through the following:

- Calculation of greenhouse gases, including CO₂ emissions, by tracking fuel usage or by employing other methods used to measure success in meeting benchmarks, targets and goals.
- Boston College is exploring the following best practice measures to reduce emissions from diesel construction equipment and vehicles, requiring contractors to:
 - Install emissions control devices to reduce particulates and other tailpipe pollutants.
 - Burn only ultra-low sulfur diesel fuel.
 - Follow applicable anti-idling laws.

Boston College recognizes that indoor environmental quality has a great effect on the health and well being of its students, faculty and staff, and the community-at-large. The University will consider aspects of air quality, acoustics, thermal comfort, composition of building materials and daylighting, among others, when designing and constructing new or renovated facilities.

Dining Services

Boston College Dining Services administration places a high priority on sustainability and has made great strides to integrate sustainable efforts of local vendors and manufacturers and sustainable products into the department and University systems. Dining Services

¹ H.Liu, et.al., Environmental Impacts of Recycled Rubber in Light Fill Applications; Summary & Evaluation of Existing Literature, 1998.

fosters a culture in which the interwoven benefits of growing, cooking and sharing food become an integral part of the University's community experience. The University fosters working relationships with local growers, manufacturers and vendors who respect and promote ecologically sensitive agricultural practices, and with food distributors who can trace their products to responsible sources.

The Dining Service Department's accomplishments and initiatives include:

- Purchase Certified Fair Trade and Fairly Traded coffee at all restaurants.
- Provide 100 percent rBST-hormone free milk.
- Develop seasonal menus and food procurement guidelines that give priority to seasonal foods and local and regional foods.
- Support student sustainable initiatives through open communication to raise awareness about food waste and advance the reduction of food and solid waste in dining halls.
- Provide recycling of glass, plastic, metal, cardboard and mixed paper, grease, and other materials. Sorting is done by employees at each dining location to ensure that only recyclable items are placed in the correct bins.
- Incorporate sustainable criteria in Requests for Proposals (RFPs) for vendor analysis and selection.
- Research energy and water efficient technologies when replacing food service equipment and purchase Energy Star or equivalent equipment when possible.
- Added can compactors to the three largest operations to increase the recycling of cans used in food production.
- Added two new cardboard compactors.
- Instituted more efficient recycling of cooking grease with a switch from drum waste to an enclosed system.
- Provide an à la carte meal plan which reduces food waste (people pay for what they eat instead of all-you-can-eat for a single price).
- Offer reusable dinnerware that is strategically placed to be the primary choice for users whenever possible.
- Offer refillable fountain beverage containers as well as hot to-go cups that offer a moderate price reduction for reuse.
- Recycle cardboard packaging from Athletic Department concessions.
- One hundred recycling containers were added this past spring for Commencement, Alumni Reunion and other outdoor events.

Composting and Organics

A successful pilot food composting program in Corcoran Commons Dining Hall was implemented in the summer of 2007. Following on that success, in January 2008, a new sorting system that includes organic waste was installed at the McElroy Dining Hall as a collaborative effort between Dining Services and campus members of Ecopledge to make students aware of the amount of waste they produce in a day and how to reduce that through the use of a new designated recycling area. The program also included an educational component to reduce the use of “to go” containers.

The system was first successfully tested in Stuart Dining Hall on the Newton Campus. Students now separate their dishes and food waste from recyclable cans, plastic containers and bottles, in addition to stacking plastic containers instead of throwing them out, which reduces trash volume. This program will be expanded to additional dining facilities.

Student groups are also involved in campus food choices, including Real Food BC, which strives for the establishment of a more sustainable food system. It was started as a part of the nation-wide Real Food Challenge. The group promotes the purchase of food from local, green, humane sources in order to support localized food production and reduce carbon emissions that result from long distance food shipments. Dining Services has already taken the initial steps towards more sustainable food procurement; for example, Dining Services initiated a fall farmers market in 2007. The program was a success and projects are being designed to further incorporate the use of local produce to support small farmers within the dining halls. Real Food BC supports these steps by raising student awareness about the major impact of their food choices, including leadership hosting a food awareness week in April 2008. Events on food, diversity and culture were organized and the Dining Services director participated on a panel with leaders in the movement for food sustainability. The group is also working to create a "green cafe" on campus that would procure 100 percent of its food from local, sustainable sources.

In addition, Ecopledge was recently awarded a venture grant to start an organic garden on campus. If the pilot project on the 32 x 50 foot plot is successful, surplus produce will be provided to community agencies. Ecopledge volunteers will also work on an adjacent garden using drought tolerant plantings to highlight the beauty and sustainability of xeriscaping.

Environmental Health and Safety

Boston College's Office of Environmental Health and Safety (EH&S) manages the institution's local, state and federal environmental compliance requirements, as well as association membership with the Campus Consortium for Environmental Excellence (C2E2). It advocates for better environmental performance through sustainability initiatives and public education such as developing posters and publications on environmental metrics, conducting benchmarking surveys and associating with peer entities in promoting regulatory changes that better fit the higher education sector.

A formal Waste Management Program at Boston College coordinated by Facilities Management and the Office of EH&S oversees the collection and disposal of a number of waste streams from facilities, studios, residences and laboratories. The program manages regulated hazardous wastes – chemicals, oils, paints and paint thinners, pesticides and cleaners - and assists in the disposal of biohazard wastes, photographic wastes, gas cylinders and recyclable wastes such as batteries and electronic equipment. Many of the EH&S practices are outlined in Boston College’s Environmental Management Plan, which specifies best management practices and regulation compliance guidelines for handling such materials.

Hazardous Materials

An overview of measures employed by the University to safely manage and reduce hazardous materials includes:

- Used ink and toner cartridges are sent back to the manufacturer for recycling. Most manufacturers are including return boxes for shipment with orders and campus members may direct questions on disposal to the distributor, manufacturer or EH&S.
- From research activities that generate medical waste, the University ships approximately 2,200 pounds per year from laboratories and Health Services for safe disposal off-campus.
- To help prevent the release of these toxic materials to the environment, the Mercury Containing and Rechargeable Battery Management Act was put into effect. This Act is a major step forward in the recycling of batteries and in phasing out the use of mercury in batteries.
 - In accordance with this Act, the Office of EH&S collects batteries used on campus for proper management and disposal to an off-site recycling facility.
 - Batteries can be dropped off at small (6- to 10-gallon) labeled recycling containers at locations that include a library, administrative offices and all residence hall laundry rooms.
- Several automotive materials are recycled including car batteries, tires, parts-cleaning solution (approximately 1,800 pounds per year), antifreeze and waste oil (approximately 1,600 pounds per year).
- Nearly 50 percent of lab solvents are re-used as fuel at resource recovery facilities; the other half is not suitable due to insufficient BTU value.
- There has been a major reduction in radioactive waste since 1998 through improvements in management of the approval process and how wastes are generated and stored.
- All initial waste training and refresher training for campus staff includes a segment on chemical purchase and waste minimization.
- The phosphor powder found inside fluorescent lamps contains mercury. These lamps are handled and disposed of by qualified University employees and sent off site for recycling.

- Disposal of photographic chemicals is managed by EH&S.

Electronic Equipment

Boston College collects irreparable and obsolete electronic equipment, including CRTs and other computer-related equipment, from the campus community for recycling.

Procurement

A fiscally responsible procurement policy for the purchase of environmentally-preferable products will be developed by the Campus Sustainability Advisory Panel. The University has taken the following steps to reduce the impacts associated with its purchases of goods and services.

- Procurement Services' most recent contract for lamps specifies lower mercury content.
- Boston College's main office supply vendor offers "earth friendly" products.

Purchasing Requirements

Procurement Services now includes the following statement in selected RFPs and contracts:

"SUSTAINABILITY - Boston College promotes the use of 'green' initiatives throughout the campus. As a vendor for Boston College, we require suppliers to utilize environmentally friendly practices when it is deemed efficient and effective by the University. We expect our vendors to aid us in bringing green initiatives to our attention and to promote those initiatives on campus."

Other purchasing requirements include:

- For equipment: As vendors are selected for equipment purchases for Boston College computer replacement, the RFPs include a section requesting vendor data on the energy rating/consumption of each unit, and RFPs for new products request energy saving measures. The RFPs for PCs and laptops specifically request products that are Energy Star rated.
- For office products: The blanket contract contains information promoting recycled toners and requests all the recycled options, including paper.
- For printing: Bid requests ask for recycled paper options and encourage the use of FSC Certified print vendors.
- For furniture: Deliveries that have any packaging or pallets must be removed by the trucking company from the campus. Use of campus dumpsters is not permitted.
- For vehicles: Purchase/lease of hybrid electric and high efficiency vehicles is being strongly encouraged.

- For appliances: All appliances purchased through blanket contracts must be Energy Star rated.
- For paints: The use of low VOC paints is strongly encouraged.
- For other products: RFPs request any options that could be included in any sustainability or recycling quantification.

Recycling Requirements

Purchasing also includes recycling requirements in selected Requests for Proposals (RFPs) and contracts:

- Vendors are required to remove their waste, including pallets and packaging. The personal computer replacement contract includes removal of old computers by each vendor for recycling.

Purchasing supports the Facilities group as they expand the recycling program on campus by utilizing the Institutional Recycling Network (IRN) whenever possible. IRN is included in bids for Boston College's trash and recycling contract, and used when a building is being renovated. If there is a large amount of copper, porcelain or slate, a separate dumpster is contracted. The IRN then attempts to locate a buyer for the items being recycled. Twenty-one tons of surplus equipment and furniture have been donated to international agencies when new equipment and furniture have been purchased.

Transportation

To even more effectively manage traffic and parking, as well as to reduce the amount of automobile emissions, Boston College is promoting carpooling and other alternative forms of transportation by students and employees. In 2002, the University appointed a full-time Transportation Manager and distributed a survey to University commuters to gain a better understanding of their travel routines and needs. The Transportation Manager, an administrator in the Office of Program Management under Auxiliary Services, serves as a liaison to campus transportation services such as campus and special event parking, busing services and Environmental Protection Agency compliance. The Transportation Manager also works with the offices of Governmental and Community Affairs, and Public Affairs to help communicate information on University-related transportation issues.

The survey was distributed to randomly selected employees and students living off-campus. Survey recipients are asked to detail their commuting habits, including how often they drive to campus, what forms of public transportation they use and what time of day they typically travel to and from campus. While the survey was part of the University's requirement under the Clean Air Act to report to the Massachusetts Department of Environmental Protection about commuting habits, collecting information about transportation has enabled Boston College to set compliance-surpassing policies that are both environmentally friendly and fair to students and employees.

Boston College actively promotes the use of alternative transportation and minimization of environmental impacts through the following measures:

- Operation of a free shuttle bus between the Chestnut Hill Campus, Newton Campus, and into Brighton, where it serves two Green Line stops at Cleveland Circle on the C Branch and at the Reservoir stop on the D Branch. The Green Line B Branch ends at the northeast corner of the Chestnut Hill Campus and just west of the Brighton Campus.
- Compliance with Massachusetts Ride Share regulations through increasing on-campus housing resources and usage, thus reducing the number of daily ride-alone trips by students to and from campus.
- Purchase of an alternative fuel vehicle as a pilot program for additional usage on campus. The Office of Environmental Health & Safety recently purchased a hybrid vehicle.
- Boston College recently acquired six Pathway electric-powered cars which are smaller, lighter and cleaner than diesel/gasoline-powered vehicles, helping staff from Facilities Management, the Boston College Police Department and Residential Life with light duties. With a top speed of 21 miles per hour, the vehicles feature a 3.2 horsepower motor and 48-volt battery and an on board-computer. Boston College acquired the vehicles through a program sponsored by the manufacturer, Pathway Research, in conjunction with General Motors.
- On-campus parking for a Zipcar vehicle to augment more than seven other locations that the car-share service operates in proximity to the campus. Under a new partnership, Zipcar offers Boston College employees and students a discounted annual membership of \$25, a savings of \$150.
- In addition to discounted semester T-passes for students, the University provides a list of online resources for the community to learn about other modes of reducing single occupant vehicle (SOV) use on- and off-campus in Boston.
- Faculty and staff are strongly encouraged to consider carpooling to and from the University to help reduce traffic and pollutants. In 2002, Boston College began working with Caravan for Commuters, a non-profit organization that assists public and private employers in promoting carpools, vanpools, public transportation and shuttle buses.
- Many commuters like the idea of using public transportation or ridesharing, but are afraid of being stranded during an emergency. Boston College realizes these complexities in the daily life of the working family and therefore offers a Guaranteed Ride Home (GRH) for registered Rideshare Program employee participants.
- Carpoolers are guaranteed a prime parking location on campus. Additionally, as of fall 2007 the carpool permit rate was reduced to \$100 (previously \$200), providing an even greater incentive for carpool use.
- Vanpools are also an encouraged commuting practice.

- A Massachusetts statewide commuter services organization, MassRIDES, provides assistance to Boston College's employees by linking commuters for ridesharing.
- The University offers many services to encourage bicycle commuting. There are several storage locations and locker areas with showers throughout campus. Boston College promotes "Bike to Work" week to increase bicycle safety, awareness and use. Many Boston College Police officers patrol on bicycles instead of motor vehicles.

The University will continue to manage transportation demand, provide alternative transportation options, and encourage the use of alternative fuel vehicles while ensuring maximum campus access. Additional transportation and parking issues are discussed in Chapter 9, *Transportation and Parking*, which covers SOV use reductions through pedestrian and bicycle circulation improvements, shuttle planning and car-sharing. Boston College will evaluate related and further options to improve campus sustainability, including the following:

- Regularly review free campus shuttle services to maximize ridership.
- Implement pre-tax sales of MBTA passes to full-time staff and faculty by end of 2008.
- Purchase/lease additional alternative fuel vehicles, including biodiesel fuel, electric carts or hybrid vehicles.
- Solicit and provide for additional vehicle-share parking spaces, expanding upon current Zipcar affiliation.
- Consider requiring Boston College's bus management vendor, Boston Coach, to switch to biodiesel fuel.

Education and Outreach

Several education and outreach initiatives are currently underway at Boston College. One notable initiative developed over the past year that provides a foundation for a more holistic effort is a Boston College website dedicated to sustainability. The website (www.bc.edu/sustainability) was launched to coincide with Earth Day, 2008. The website describes many of the sustainability efforts discussed throughout this chapter and also provides links to contacts, meeting notes and organizations related to campus and student environmental awareness initiatives. Most importantly, it provides information on how individuals can participate from home, work or school.

Boston College supports dozens of active student clubs that conduct campus awareness activities and educational efforts in the local community. Students are an integral part of Boston College's original campus conservation campaign, BConserves, and are highly active throughout the campus. Many sustainability events, publicized online and elsewhere, are organized and supported by Boston College's environmental clubs such as Ecopledge and the Environmental Law Society, as well as by the Undergraduate Government of Boston College

(UGBC). Sustain BC is a faculty- and student-led group that advocates for initiatives and policies that benefit the environment.

Academic

Environmental Scholars

The Environmental Scholars Program provides a combined internship and advanced research program for Boston College students during a year-long, six-credit course. Environmental Scholars work with the Environmental Studies Program, the Lynch School of Education and the Urban Ecology Institute (UEI) on a combined multi-year research project to measure the impacts of human development on urban and suburban ecosystems. Each year scholars choose to work in one of three groups: Field Biology, Environmental Education or Environmental Policy. Field Biology Scholars conduct research at Boston College's Field Station on Cape Cod and on projects in the Greater Boston area. Policy Scholars collaborate with UEI's Sustainable Cities Program, working with attorneys and staff on innovative methods for managing environmental impacts on natural resources in urban and suburban areas, or assessing urban residents' priorities for urban environmental transformation and supporting community members towards their goals. Education Scholars participate in UEI's Education Program, providing support to public middle and high school teachers and students at urban field sites, both on and off their school campuses. These programs are creating a national model for research and protection of urban ecosystems. The completed projects may be eligible for additional credit within the Scholars' home departments through such programs as Departmental Honors or Scholars of the College.

Environmental Studies Department

Boston College also has a dedicated Environmental Studies (ES) Program Director, and the ES Minor is one of the University's largest interdisciplinary programs, with over 100 undergraduates each year. Eligible courses offered for credit to students at Boston College include the following, with new courses added annually:

Environmental Science - Foundation Courses:

Sustaining the Biosphere
 Ecology of a Dynamic Planet
 BI200 Introductory Biology I
 BI202 Introductory Biology II
 The Genetic Century
 Environmental Geosciences I: Resources/Pollution
 Environmental Geosciences II: Earth Processes and Risk
 Earth Under Siege
 Understanding Urban Ecosystems
 Environmental Biology
 Aquatic Ecology
 Principles of Ecology
 Coastal Field Ecology

Animal Behavior
Marine Biology
Methods in Environmental Field Research
Exploring the Earth I: Origin and Systems
Exploring the Earth II: Structures and Internal Processes
Origin and Evolution of Life
Oceanography I
Rivers and the Environment
Weather, Climate and the Environment
Geoscience, Global Warming and Public Policy
Earth Materials
Environmental Geology
Environmental Hydrology
Environmental Geophysics
Application of Geographical Information Systems
Hydrogeology
Watershed Geomorphology
Environmental Oceanography
Statistical Analysis of Scientific Data
Site Characterization, Remediation and Long Term Monitoring for Hazardous Waste Sites

Environmental Policy - Foundation Courses:

Environmental Management
Environmental Law and Policy
Nature in American Culture
Understanding Urban Ecosystems
Environmental Economics
Literary Themes
Literature and Ecology
American Nature Writing
Geology of National Parks
Environmental History
Organizational Behavior: “Green Version”
Negotiation
Health Science: East and West
Planet in Peril: Environmental Issues in Society
Environmental Policy

Urban Ecology Institute

The Urban Ecology Institute (UEI) is a Boston College program that helps urban communities build healthy and vibrant cities by educating urban residents about the ecology of their environment and engaging them in the transformation of their communities. UEI is committed to developing national models for the use and protection of urban environmental resources and currently operates two programs, the Sustainable Cities Program and the

Education Program. The Sustainable Cities Program works together with community-based partners to strengthen urban communities by transforming vacant lots into green spaces, increasing urban tree canopy cover and creating urban watershed restoration plans. The Education Program engages students from urban public schools in the scientific process on their school grounds and in their neighborhoods. More information can be found on their website at urbaneco.org.

Outreach

Environmental Law Society

The Boston College Environmental Law Society (ELS) is a community of students, faculty, alumni and friends who share a social consciousness regarding important environmental issues. The group offers a variety of educational and service-oriented opportunities for students to become active toward the pursuit of a better and healthier environment. ELS sponsors a variety of opportunities for students to learn about environmental issues. Students testify at public hearings on environmental issues, work with the environmental justice organization based at the BC Law School, work with Alternatives for Community and Environment (ACE) and conduct legal research for several non-profit environmental groups. The ELS, working with professors and alumni, organizes speaker panels and educational seminars. At these seminars, practitioners and academics, representing various environmentally related legal professions, discuss their career paths, as well as teach mini-seminars on related topics such as environmental law, land use, urban planning and administrative law. Additionally, ELS sponsors activities such as fall foliage hikes, canoeing, clean-ups, and Earth Day events.

Ecopledge

Ecopledge, a student-led organization, has risen to the challenge of galvanizing environmental enthusiasm on campus. Ecopledge educates the Boston College community about environmental issues by showing films, presenting lectures, and hosting annual celebratory events, such as Harvest Fest and Earth Day. Through the leadership of Ecopledge members, Boston College has participated annually in RecycleMania, a national intercollegiate recycling competition, and the Better Off Contest, a two-month energy conservation contest among the residential halls. Ecopledge also runs campus-wide campaigns to promote water and energy conservation, and an increase in commingled plastic, paper and food waste recycling. Ecopledge members often go beyond the campus, participating in local community clean-ups, national environmental conferences, and hiking and camping outings throughout New England. Ecopledge also collaborates with faculty, staff and fellow students in campaigning for a more sustainable campus. In 2007, for example, in partnership with Facilities Management, Dining Services, and the Office of Residential Life, Ecopledge focused on improving recycling in the residential halls, performing an incandescent light bulb switch-out, as well as campaigning for administration-level sustainability positions and on-campus clean energy production. Ecopledge is a two-time winner of the Massachusetts Lottery Community Champions Award and the 2008 recipient of the “Ever to Excel” Award from the University’s Office for the Dean for Student Development. The Co-President of Ecopledge won

Boston College's 2008 Leadership Award and, along with the other senior leaders of Ecopledge, was named "Person of the Year" by the *Heights*, BC's student newspaper.

Sustain BC

Sustain BC is composed of students, faculty and staff dedicated to promoting greater campus sustainability. Sustain BC provides opportunities for students to collaborate with administrators and faculty interested in the environment at Boston College. This committee helps sponsor events and uses its leadership role to enact real change towards sustainability at Boston College. It maintains momentum through monthly meetings, an email listserv and distribution of meeting minutes. Sustain BC collaborates closely with campus services and other groups like the UGBC and Ecopledge to advocate for specific improvements at Boston College, ranging from climate goal commitments and overheating surveys, to Earth Day rallies. It is currently launching a campus survey to identify ideas for and individuals interested in developing curricula with sustainability and environmental themes.

Coordination with City Agencies

Boston College met with City agencies including the Boston Redevelopment Authority, the Boston Environment Department and representatives of the Green Roundtable on Earth Day, April 22, 2008, to discuss its sustainability policies and programs. The University had previously engaged the Green Roundtable in 2005 to undertake sustainability planning work, including the establishment of baseline information. During the recent April 22nd meeting, BC delivered an overview of its IMP and presented its current campus sustainability activities. These discussions also helped shape and produce plans outlined in this document.