International Sustainable Campus Network
Global University Leaders Forum

2011 Sustainable Campus Charter Report

Submitted by the
Massachusetts Institute of Technology
Cambridge, Massachusetts
U.S.A.
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Department of Facilities, Sustainability: mit.edu/facilities/environmental
MIT Energy Initiative, Campus Energy: mit.edu/mitei/campus
About This Report
This 2010-2011 ISCN-GULF Sustainable Campus Charter Report is MIT’s second submission to the Charter Secretariat. MIT President Susan Hockfield joined many of her colleagues in signing the founding Charter in January 2010. This report contains an overview of MIT and a spotlight on several key programs that highlight our commitment in action to the principles of the Sustainable Campus Charter and sustainability in all we do. The primary focus of this report is our main Cambridge, Massachusetts campus. We look forward to engaging with our ISCN-GULF colleagues as we articulate and report progress on additional goals in the years ahead.

University Overview

The Campus
Our 168 acre campus stretches more than a mile along the Cambridge banks of the Charles River in Cambridge, Massachusetts, USA. The central group of interconnecting buildings - featuring the domes and columns often associated with MIT - was designed in 1916 by architect W. Welles Bosworth (Class of 1889). He chose an open, flowing, flexible floor plan to encourage easy communication and intellectual exchange among schools and departments. As MIT grew, it carried forward this idea of openness and linkage, so that now many of our buildings are connected to each other, allowing passage from one to another.

Subsequent growth saw the construction of landmark buildings by leading architects including Alvar Aalto, I. M. Pei ‘40, Eero Saarinen and Eduardo Catalano. Through a new building campaign, the campus has recently gained signature structures from the drawing boards of Kevin Roche, Steven Holl, Frank Gehry and Fumihiko Maki.

One of the most ambitious building initiatives in the history of MIT has recently been completed. Over the last five years, more than ten major construction projects have transformed the campus and produced some of the campus’s highest performance and sustainable designs. The new facilities support what is unique about MIT: its ability to use leading-edge science and technology to tackle the world’s most challenging problems. Today, MIT encompasses 158 buildings in our academic portfolio (110 in Cambridge) comprising 12.8 million square feet, (12.1 million in Cambridge) with 7.7 million square feet devoted to academic purposes, 2.9 million square feet to residences, and 2.2 million square feet to supporting services.

Mission and Origins
The mission of MIT is to advance knowledge and educate students in science, technology, and other areas of scholarship that will best serve the nation and the world in the 21st century.

The Institute is committed to generating, disseminating, and preserving knowledge, and to working with others to bring this knowledge to bear on the world’s great challenges. MIT is dedicated to providing its students with an education that combines rigorous academic study and the excitement of discovery with the support and intellectual stimulation of a diverse
The Institute admitted its first students in 1865, four years after the approval of its founding charter. The opening marked the culmination of an extended effort by William Barton Rogers, a distinguished natural scientist, to establish a new kind of independent educational institution relevant to an increasingly industrialized America. Rogers stressed the pragmatic and practicable. He believed that professional competence is best fostered by coupling teaching and research and by focusing attention on real-world problems. Toward this end, he pioneered the development of the teaching laboratory – an approach we have extended to embrace our campus sustainability activities.

Today MIT is a world-class educational institution. Teaching and research – with relevance to the practical world as a guiding principle – continue to be its primary purpose. MIT is independent, coeducational, and privately endowed. Its five schools and one college encompass numerous academic departments, divisions, and degree-granting programs, as well as interdisciplinary centers, laboratories, and programs whose work cuts across traditional departmental boundaries.

Administrative Organization
The Institute's chief executive officer is the president. The provost, chancellor, executive vice president and treasurer, vice president for Institute affairs and secretary of the Corporation, vice president for resource development, and vice president and general counsel report directly to the president. The vice president for research, the associate provosts, the deans of the Institute's five schools, and the director of the MIT Libraries report to the provost. The vice chancellor and dean for graduate education, the dean for undergraduate education, and the dean for student life report to the chancellor. Reporting to the executive vice president are the vice presidents and directors responsible for finance; facilities construction and operations, engineering, utilities, campus planning; environment, health and safety; information services and technology; medical; police; human resources; and internal audit – an integrated structure that facilitates more rapid and large-scale implementation of sustainable practices.

The MIT Faculty determines the Institute's educational policy. The Faculty meets monthly and conducts much of its business through elected standing committees.

The Institute's board of trustees, known as the Corporation, includes approximately 70 distinguished leaders in education, industry, science, engineering, and other professions, and (ex officio) the MIT chairman, president, executive vice president and treasurer, secretary of the Corporation, president of the Alumni Association, and three representatives of the Commonwealth of Massachusetts. The Corporation also includes approximately 30 emeritus members.

Education
Spanning five schools – architecture and planning; engineering; humanities, arts, and social sciences; management; and science – and more than 30 departments and programs, an education at MIT covers more than just science and technology. Arts, business, foreign languages, health and more complete an education at MIT, and the Institute makes freely available its class lecture notes, exams and videos through MIT's OpenCourseware.
Research
Research at MIT aims to develop innovative solutions to the world’s most daunting challenges. From addressing the energy needs of tomorrow to improving cancer therapies, MIT’s research efforts are enhanced through creative collaborations with leading research institutes and consortia around the world.

Institute Initiatives
Institute research focuses on many topics – from biology and chemistry to political science, economics and linguistics – but when an issue is of global, immediate importance, MIT puts its effort where it is needed most. The MIT Energy Initiative and David H. Koch Institute for Integrative Cancer Research are just two ways that MIT is channeling its collective energies into solving large-scale problems.

Faculty and Staff
The MIT faculty instructs undergraduate and graduate students, and engages in research. There are 1,018 faculty members (professors of all ranks), including 217 women. In addition to professors, there are 720 additional teaching staff.

MIT employs about approximately 10,775 individuals on campus. In addition to faculty, there are research, library, and administrative staff, as well as many others who – directly or indirectly – support the teaching and research goals of the Institute.

Students
The Institute's 2010/11 student body of 10,894 is a highly diverse group. Students come from all 50 states, the District of Columbia, three territories and dependencies, and 116 foreign countries. Forty-six percent of the undergraduates and eighteen percent of graduate students are members of U.S. minority groups. The broad international student representation of 2,909 students makes up 10% of the undergraduate and 38% of the graduate population. In the fall of 2010, the student body was comprised of 4,384 undergraduates and 6,510 graduate students. Of the undergraduates, 45% are female and 55% male. Of the graduate students, 32% are female and 68% male.
Principle 1 – Sustainability Performance of Buildings on Campus

**Principle 1: To demonstrate respect for nature and society, sustainability considerations should be an integral part of planning, construction, renovation, and operation of buildings on campus.**

A sustainable campus infrastructure is governed by respect for natural resources and social responsibility, and embraces the principle of a low carbon economy. Concrete goals embodied in individual buildings can include minimizing environmental impacts (such as energy and water consumption or waste), furthering equal access (such as nondiscrimination of the disabled), and optimizing the integration of the built and natural environments. To ensure buildings on campus can meet these goals in the long term, and in a flexible manner, useful processes include participatory planning (integrating end-users such as faculty, staff, and students) and life-cycle costing (taking into account future cost-savings from sustainable construction).

Massachusetts Institute of Technology (MIT) Management Approach and Progress Towards Principle 1 Topics

**MIT’s Approach to Campus Sustainability**

MIT is committed to embodying excellence. As an institution, we are deeply engaged in intellectual endeavors related to environment, energy, and sustainability issues. The leadership we demonstrate in environment, energy, and sustainability related teaching and research carries over into our approach to managing our campus and operations. We are supported in these efforts by vast reserves of intellectual capital that enrich and inform our commitment to stewardship of the environment, and to the health and safety of our community. MIT leverages these resources in numerous ways – from high-level administrative groups to broad-based campus initiatives and far-reaching research and educational collaborations. MIT seeks to be a leader in integrating principles of sustainability and environmental stewardship into all aspects of MIT’s facilities, activities, and operations, in a manner that enhances the Institute’s core education and research mission. MIT works to continually advance this mission through broad participation of faculty, students, and staff.

In 2001, MIT’s Academic Council approved a comprehensive Environment, Health & Safety Policy that commits MIT to embracing strong environmental stewardship and pollution prevention – foundations of sustainability. This policy establishes a set of guiding principles, which help shape and set a foundation for embracing operational practices that are greener, cleaner, and more sustainable. We actively and continually seek to engage with and share our experience with both our local and global communities on the important issues surrounding campus sustainability.

MIT is guided by a set of long-range environmental goals designed to promote campus sustainability; these include:
- Conserve energy through reduced consumption and efficiency measures
- Reduce campus air emissions of greenhouse gases and regulated pollutants
- Reduce consumption, including office and laboratory supplies and water
- Reduce waste through increased conservation and increased recycling rates
- Increase the use of recycled-content products
• Reduce the volume and toxicity of our hazardous waste streams
• Improve our indoor environment, including indoor air quality and the comfort and productivity of our work and living spaces, by considering sustainability in our design, operations, and maintenance policies
• Improve the urban environment, including landscape quality and the site and pedestrian environment
• Contribute to the education of our students in sustainable concepts so that they may apply them in their professions
• Support community-wide and regional sustainability efforts
• Construct and renovate campus buildings to a high-level of sustainable design

MIT takes both a decentralized and Institute-wide approach to sustainability by embedding environmentally sound practices into campus operations with a goal of coordinating, empowering, and supporting all the diverse stakeholders and departments. To maximize the impact of this approach, the Sustainability Program of the EHS Headquarters Office serves as a guiding and coordinating mechanism that unifies Institute-wide initiatives, while supporting MIT’s rich and diverse community to develop and demonstrate its contributions and approaches to sustainability. The lead responsibility for the development and implementation of facilities-related sustainability programs is with our Department of Facilities in collaboration with other campus departments, including Housing, Campus Dining, Information Services and Technology and many others to support a vibrant campus sustainability community.

Our Department of Facilities, namely through its Systems Engineering, Campus Planning & Design, Operations, and Utilities units, works closely with the Sustainability Program and other units in guiding the development and implementation of our diverse sustainability initiatives. The EHS Headquarters Office and its Sustainability Program participates in environmental policymaking, coordinates MIT-wide environmental initiatives, and oversees the EHS Office, which supports initiatives that extend well beyond environmental compliance.

MIT has made finding the solutions to the challenges of energy, climate change, and sustainability a priority across campus – not only in our research laboratories and classrooms, but also in our own campus operations. For more than 20 years, MIT has made significant investments in energy and resource conservation and efficiency, including several major, award winning achievements:

• our 1992 campus-wide lighting retrofit program reducing 11 million kWh of electricity use and over 6,000 metric tons of greenhouse gas emissions a year;
• our 1995 $40 million investment in an advanced, gas-fired co-generation power facility to improve energy efficiency, increasing plant efficiency by over 18% and reducing MIT’s total greenhouse gas emissions at the time by 32%;
• water conservation projects started in the 1990s reducing MIT’s water use by over 60%, saving over 70,000,000 gallons a year; and
• our 2005 Community Solar Power Initiative supporting the installation of 25 solar photovoltaic installations on the campus and in the community bringing 75 kilowatts of installed capacity on-line and strengthening the local market for PV installations.

In this year’s report, we would like to highlight a few select programs and activities that we feel are important to share with the ISCN-GULF community. MIT has continued to build on earlier progress making MIT’s campus a model living laboratory to test and implement leading
approaches to advance sustainable practices in a large, energy-intensive institution. A hallmark of this past year’s progress has been the culmination of lessons learned in high-performance building design and construction; the movement of pilot-level projects to Institute-wide programs for significant impact; and the establishment of a stronger, more informed, diverse, and engaged sustainability community.

**MIT’s High-Performance Building Policy in Action**

MIT has adopted long-term environmental goals and standards for building construction and renovation, including energy and resource conservation and greenhouse gas emissions reductions. Many programs have grown to support these goals and to develop environmentally sound building standards for all new and renovated buildings on campus. MIT’s green building program – led by our Department of Facilities – embraces an integrated design process to maximize the opportunities for high-performance design, and considers the life-cycle costs of more sustainable options. In construction or renovation of campus buildings, MIT seeks to fundamentally integrate environmentally innovative and efficient technologies into building design. In 2011, MIT was able to demonstrate significant achievements towards sustainable building design by focusing on high-impact areas from the beginning of the design process. This focus on energy-related systems and integrated design resulted in significant energy use and emissions reductions in a highly cost-effective manner.

MIT was one of the first colleges and universities in the U.S. to adopt comprehensive “green building design” standards. On campus, all new construction projects and major renovations will need to meet the Silver or better standards of the US Green Building Council’s (USBGC) Leadership in Energy and Environmental Design (LEED) program. Since the LEED design standards were adopted at MIT in 2001, MIT has made tremendous strides in designing and building high-performance “green” buildings that are far surpassing the minimum Silver level of sustainable design. The chart below indicates buildings registered through the LEED program.
In 2011, we were able to monitor nearly a full year of operation for several new high-performance buildings with a focus on measuring energy use and performance. The results have been very promising. For example:

- The new Sloan School of Management building, completed in summer 2010, is approximately 46% more energy efficient than a typical building of a similar size and use and uses many sustainable strategies including an integrated design process, high-performance curtain walls, use of “chilled beams”, demand controlled ventilation, heat recovery, a partial green roof, daylighting controls, and many more. In 2011, the new Sloan Building was awarded a LEED Gold rating. In metered operation, the building has met or exceeded the goals MIT set for the architect and engineers for peak loads: for every square foot of floor area, it uses 0.75 watts for lighting and 10 Btu per hour for heating, and for every 1,000 square feet, 1 ton of cooling. These figures are all about 50% of typical building design values for lighting, heating, and cooling.

- The Koch Institute for Integrative Cancer Research, completed in December 2010, includes many sustainable design elements, including tackling energy use head on and challenging current conventional rules for HVAC needs to improve system efficiencies. In 2011, the Koch Institute building was awarded a LEED Gold rating and has proven to be MIT’s most energy efficient laboratory building. After nearly a year in operation, the Koch Institute – a 357,000 gross square feet structure with more than 25 faculty labs and hundreds of researchers utilizing high-power equipment – consumes dramatically less energy during peak loads than predicted across the board: electrical peak demand, anticipated by engineers at 14.6 watts per square foot, landed at 3.8 watts per square foot; steam heat was forecast at 35,000 pounds per hour for the coldest days, and turned out to be around 20,000 pounds per hour; and the building's peak cooling demand is actually 2,354 tons of chilled water, compared to the engineers’ predicted 3,350 tons. The building reduces total energy

<table>
<thead>
<tr>
<th>Building</th>
<th>LEED Rating</th>
<th>Energy Savings Compared to Baseline Design Building</th>
<th>Building Size (Type)</th>
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</thead>
<tbody>
<tr>
<td>Sloan School of Business (E62)</td>
<td>Gold certified 2011</td>
<td>46%</td>
<td>215,000 gross square feet (gsf) (office)</td>
</tr>
<tr>
<td>Koch Institute (76)</td>
<td>Gold certified 2011</td>
<td>35%</td>
<td>357,000 gsf (lab)</td>
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<tr>
<td>Fariborz Maseeh Hall (W1)</td>
<td>Gold anticipated 2012</td>
<td>34%</td>
<td>160,000 gsf (dormitory)</td>
</tr>
<tr>
<td>Arthur D. Little (E60)</td>
<td>Gold anticipated 2012</td>
<td>33%</td>
<td>30,130 gsf (office)</td>
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use by about 35% as compared to a standard laboratory research building. Major strategies that contributed to the Koch Institute building’s superior energy performance include:

- challenging common heating and ventilation rules of thumb
- chilled beams and radiant panels
- heat recovery
- low air flow chemical fume hoods (80 feet per minute vs. 100 feet per minute)
- demand controlled ventilation

MIT also recognizes the importance of integrating sustainable design into major renovations of existing buildings as, collectively, these buildings comprise the vast majority of energy use on campus and provide the greatest opportunities for conservation and efficiency.

For example:

- In 2011, a major renovation and restoration project of Maseeh Hall residence hall - begun in spring 2009 - was completed and integrated a degree of sustainable design, including an energy efficient mechanical system, operable windows, efficient lighting, and sustainable finish materials. The building also uses an innovative new refrigeration compressor for cooling. Registered with the LEED program, energy models indicate the building is anticipated to use 34% less energy than a baseline building built only to required codes.

- In 2011, the historic Arthur D. Little building, built in 1916, received a complete renovation and restoration that integrated the latest in sustainable design strategies while preserving the historic qualities of this landmark building. It features heat recovery, chilled beams, low energy lighting, daylighting controls and high-performance spray foam insulation. The building is currently being considered for LEED certification. An innovative aspect of this renovation included the use of spray-on insulation in a masonry wall construction – an approach not common due to interior moisture concerns. To ensure no compromise due to moisture and to better understand the impact of such an application, an electronic moisture monitoring system in the masonry walls has been installed to provide timely data on current conditions.

- The original Sloan of School of Management building (E52) is planned to undergo a complete renovation, and LEED strategies are being aggressively pursued. A fundamental aspect of the planned renovation is a focus on decreasing energy consumption through a whole-building design that includes a high performance exterior and thoughtful HVAC design and operation.

- An interior renovation in our Whittaker College of Health Sciences and Technologies building (E25) is anticipating a LEED certification as our first LEED Commercial Interiors project.

Energy Conservation and Efficiency
A priority for MIT for the past several years continues to be developing a robust, fiscally disciplined program targeting energy conservation investments across campus. Emphasis has been placed on measures that have a substantial impact on energy consumption and greenhouse gas emissions and at the same time offer positive economic return. Each project is being monitored to establish the best available data concerning actual energy savings as well as capital costs.
From fiscal year 2007 through fiscal year 2011 (ending June 30), MIT has successfully accumulated over 160,000 MMBTU (million BTUs) of documented annual energy savings from thermal and electrical projects resulting in over $3.5 million cumulative annual savings. This represents an annual reduction of more than 5% of MIT’s total energy use. In FY2011 alone, MIT successfully reduced over 14 million kWh in electricity use, which included work accomplished through our 2010 Efficiency Forward program and additional work completed in FY2011. Of the total 160,000 MMBTU saved since 2007, 52,000 MMBTU were saved in FY2011. In addition to the savings stated above, MIT’s Information Services and Technology office (IS&T) has fostered use of more efficient equipment and operating practices.

MIT continued in calendar year 2011 to make strong progress towards its energy goals within its ground-breaking, multi-million dollar collaborative energy conservation and efficiency program in collaboration with its utility NSTAR, MIT Efficiency Forward. MIT and NSTAR designed Efficiency Forward to create a new model for enhanced utility efficiency programs to support the Massachusetts Green Communities Act and the state’s desire to make efficiency competitive with new source generation. This unique partnership is the single largest energy efficiency program NSTAR has developed with a customer. Over three years, MIT and NSTAR are investing nearly $14 million to improve energy efficiency on campus. The program employs an innovative funding strategy that leverages funds from MIT, NSTAR incentive payments, and reinvestment of energy savings. MIT has committed to a goal of reducing annual electrical use on campus by 34 million kilowatt hours within three years – equivalent to 15% of MIT’s current electrical use. The total estimated savings over the lifetime of the efficiency measures is in excess of $50 million.

In the program’s first year concluding in December 2010, MIT was able to surpass its first year goal of achieving 10 million kWh of energy savings by over 30%. In the second year of the program concluding December 2011, MIT is pleased to report it surpassed its cumulative two year goal of reducing electricity use by 22,000,000 kWh. In calendar year 2011, MIT successfully reduced its electricity use by approximately 10,142,000 kWh.

This year’s electricity savings goal was met through the following efficiency strategies:
- Lighting retrofits achieved approximately 5.5 million kWh savings (50% of total),
- Mechanical and operational improvements on heating, ventilation and air conditioning (HVAC) systems through monitoring-based building commissioning (25%),
- High-performance new construction (20%), and
- Other strategies (5%)

By the end of 2011, energy efficiency investments on campus have touched a majority of buildings on campus as indicated in the chart below.
Recognition
As our campus energy programs become established and results are demonstrated, MIT has been recognized for its accomplishments nationally, regionally, and locally.

MIT accepted an invitation by the US Department of Energy (DOE) Secretary Stephen Chu to be the only university to pilot the Global Superior Energy Performance (GSEP) Partnership - a new DOE-supported, public-private partnership designed to accelerate energy efficiency improvements in commercial buildings and industrial facilities. Recognizing MIT’s leadership in campus energy management, DOE chose MIT to pilot GSEP’s international certification program to affirm facilities that adopt approved energy management systems and achieve significant and independently validated efficiency improvements over time. MIT’s campus energy program was also recognized by the DOE with the award of a technical assistance grant to participate in its Commercial Building Partnerships program that seeks to leverage national energy laboratory expertise in identifying significant energy efficiency strategies on campus. Our Department of Facilities is leading these DOE collaborations.

In addition, MIT received the following awards in FY 2011:

- City of Cambridge GoGreen Award in the Energy Category (and Transportation in 2009)
- Massachusetts Interfaith Power and Light for “Leading By Example”
- MA Dept. of Transportation ECO Award for Excellence in Commuter Options
Principle 2 – Campus-Wide Master Planning and Target Setting

**Principle 2: To ensure long-term sustainable campus development, campus-wide master planning and target-setting should include environmental and social goals.**

Sustainable campus development needs to rely on forward-looking planning processes that consider the campus as a whole, and not just individual buildings. These processes can include comprehensive master planning with goals for impact management (for example, limiting use of land and other natural resources and protecting ecosystems), responsible operation (for example encouraging environmentally compatible transport modes and efficiently managing urban flows), and social integration (ensuring user diversity, creating indoor and outdoor spaces for social exchange and shared learning, and supporting ease of access to commerce and services). Such integrated planning can profit from including users and neighbors, and can be strengthened by organization-wide target setting (for example greenhouse gas emission goals). Existing low-carbon lifestyles and practices within individual campuses that foster sustainability, such as easy access for pedestrians, grey water recycling and low levels of resource use and waste generation, need to be identified, expanded and disseminated widely.

Massachusetts Institute of Technology (MIT) Management Approach and Progress Towards Principle 2 Topics

**Campus-Wide Planning: Renovation & Revitalization**

After a decade of strong growth and new construction, planning efforts on the MIT academic campus are currently centered on renovation and revitalization – an approach essential for complimenting the strong sustainability work we have done in our new construction, utility, and energy conservation and efficiency programs.

**MIT 2030**

MIT 2030 is a framework that helps the Institute make thoughtful, well-informed choices about its physical development and renewal, to serve MIT’s mission and evolving needs. Sustainability, as one theme of 2030, will be a guiding principle that overlays all 2030 initiatives. The basis of much of the assessment in developing MIT 2030 was academic visioning done by our Deans and senior leadership that considered future academic and research needs and how they could be accommodated on an aging campus. Integrated planning for the renovation and revitalization of existing building resources is considered together with prioritizing new construction needs. MIT 2030 will support annual internal evaluation of the needs of the campus and, as a result, will continue to evolve. Through embedding guiding principles for sustainability into the planning process and allowing a variety of future scenarios to be considered, we will be able to adapt our sustainability strategies to have the maximum positive impact.

MIT 2030 provides a framework to consider topics ranging from current space utilization, future space needs analysis, capital renewal analysis, transportation demand management, utilities and infrastructure planning, and future regional transportation plans – all areas rich in opportunities for embedding best practices for energy and resource efficiency and sustainable design.
Transportation Planning
Recognized as a national “Best Workplace for Commuters” by the Environmental Protection Agency (EPA), a MassRides Gold Partner, and a 2010 GoGreen winner by the City of Cambridge, in 2011, MIT deepened its leading programs to promote more sustainable travel options for its 20,000 faculty, staff, and students. MIT’s transportation demand management planning and supporting programs are designed to simultaneously reduce the environmental impacts associated with our community travel while enhancing users’ experience of taking alternative forms of transportation. A key metric for measuring transportation program success have shown strong improvements through 2011: MIT’s proportion of single occupant vehicle trips, or “SOV rate,” remains at 19%, a rate significantly below the state and national average. MIT has been a long-time partner with the community car-share company ZipCar, which seeks to reduce automobile traffic in urban areas. In 2011, the number of ZipsCars MIT hosts on campus grew nearly 60% to 20 and MIT is participating in a pilot program that brought one of the first plug-in electric hybrid ZipCar vehicles to the car-sharing market.

Facilitating the adoption of electric vehicles was a priority of transportation planning initiatives in 2011. In addition to piloting one of ZipCar’s first plug-in electric hybrid vehicles, MIT also introduced its first all electric cargo van for mail services. The Azure Dynamics/Ford Transit Connect utilizes an advanced lithium-ion battery and can achieve a range of 50-80 miles and has a top speed of 75 mph. The battery is rechargeable using either a 240-volt or standard 120-volt outlet. MIT will be using the vehicle to explore possible expansion opportunities for all-electric vehicles on campus.

In 2011, MIT also partnered with the City of Cambridge to begin installation of two advanced electric vehicle charging stations on campus and available to the public. The stations are part of a regional program to promote the infrastructure requirements to support expansion of use of all-electric vehicles.

Working with the City of Boston to expand the city’s local commercial bike-share program, MIT is working to install two bike share stations for commercial bicycle rentals to bring the popular program into the City of Cambridge.

This past year continued improvements to one of MIT’s and the City of Cambridge’s transportation priorities: enhancing biking programs and facilities. In 2011, MIT created a total of 1042 new and replacement bike parking spaces at existing high demand locations.

MIT has launched a number of transportation demand management strategies over the past year specifically targeted at bicyclists. The MIT Bicycle Commuter Benefit Program continues to be a popular Transportation Demand Management (TDM) strategy. Full-time employees are eligible to participate in the program, which provides reimbursement of $20/month ($240/year) for the purchase, improvements, repair or storage of a bicycle used for commuting to MIT. Additionally, bicycle commuters who need to drive to campus a few times per month have the option of enrolling in a pre-paid, post-tax occasional parking permit. Eighty-eight cyclists signed up for the benefit in 2011 year, and increased enrollment is anticipated with the recent launch of the “MIT Commuter Connections” advertising campaign.

The MIT shuttle buses serving the campus community have been upgraded to take advantage of the cleanest diesel technologies commercially available that significantly reduce harmful diesel emissions. In addition, continuing in 2011, the shuttle fleet is making use of a cleaner biodiesel blended fuel.
Principle 3 – Integration of Facilities, Research, and Education

Principle 3: To align the organization’s core mission with sustainable development, facilities, research, and education should be linked to create a “living laboratory” for sustainability.

On a sustainable campus, the built environment, operational systems, research, scholarship, and education are linked as a “living laboratory” for sustainability. Users (such as students, faculty, and staff) have access to research, teaching, and learning opportunities on connections between environmental, social, and economic issues. Campus sustainability programs have concrete goals and can bring together campus residents with external partners, such as industry, government, or organized civil society. Beyond exploring a sustainable future in general, such programs can address issues pertinent to research and higher education (such as environmental impacts of research facilities, participatory teaching, or research that transcends disciplines). Institutional commitments (such as a sustainability policy) and dedicated resources (such as a person or team in the administration focused on this task) contribute to success.

Massachusetts Institute of Technology (MIT) Management Approach and Progress Towards Principle 3 Topics

Integration with Our Academic Mission

MIT’s core mission is to advance knowledge through education and research. Our administrative units at MIT work to integrate research and learning opportunities into our campus sustainability activities by partnering with our students and faculty. Students and faculty study MIT’s campus as a living, learning laboratory, where students can test new skills and sustainable solutions. Through the integration of campus sustainability and education and learning opportunities, students, faculty, and staff have many opportunities to work together to discover better solutions for energy and environmental problems on and off campus.

In the fall of 2006, we launched the MIT Energy Initiative (MITEI) – committing the Institute’s expertise and capabilities to help meet the world’s energy challenges through research, education, campus energy management, and outreach. In 2011, we celebrated the Initiative’s fifth anniversary. By design, MITEI’s research, analysis, and education activities have focused both on innovations for conventional energy sources and on new technologies that could help transform global energy systems. This dual, adaptive approach has been essential to MITEI’s success, promoting the development of high-impact energy technology options in a persistently evolving landscape. Significant areas of focus include advanced solar, energy storage, hydrocarbons, nanotechnology, modeling and simulation of complex systems, and many more. Almost 300 MIT faculty and senior researchers are now engaged in this research—a powerful concentration of intellect, creativity, vision, and commitment.

MITEI serves as an integrating platform where campus sustainability programs, faculty, students and academic departments work as synergistic partners.

MIT has seized many opportunities available to engage faculty and students in tackling energy and environmental problems and their solutions. MIT has successfully integrated sustainability into project-based classes, undergraduate research opportunities, and undergraduate and
graduate theses. The Campus Energy Task Force, established by MITEI, has faculty representatives from all 5 schools and functions as an Institute-wide coordinating mechanism for campus energy and sustainability work.

Student Learning, Research, and Engagement
Catalyzing student knowledge and enthusiasm to solve technologically, socially, and politically challenging problems is a central component of the MITEI program. Education is closely integrated with MIT’s energy research and with campus energy management activities.

By 2011, the undergraduate Energy Minor launched in 2010 has become one of the largest at MIT and is attracting more and more students each year. The Minor allows students to balance their intense focus on a major area of study, from chemistry to mechanical engineering to economics, with an informed appreciation of the multidisciplinary questions that define the world of energy.

MIT’s campus operations are being used as a living laboratory – through Undergraduate Research Opportunities (UROPs), special classes, internships, and research projects – to foster students’ emerging technical and leadership skills to help define and solve our own energy challenges. In the past 5 years, over thirty UROPs and internships focused on campus energy issues were supported by Campus Energy Task Force members in partnerships between academic and administrative units. For example, one campus sustainability UROP worked with the EHS Headquarters Office, Vice President for Finance Office, MIT Center for Transportation and Logistics and Staples, Inc. to assess the MIT community’s interest and preferences in purchasing environmentally preferable office supplies from Staples. Also through the Center for Transportation Logistics, two master’s in supply chain management students researched and designed a reusable delivery tote system for Staples to pilot on the MIT campus to reduce resource use on campus.

Through the MITEI Student Campus Energy Project Fund, MIT has supported 45 student projects on campus that engage our students and advance our campus energy objectives while simultaneously providing rich learning opportunities. Recent student campus projects supported include a compact fluorescent bulbs exchange program, outreach material for the MIT Solar Electric Vehicle Team, dorm electricity competitions, and graduate dorm metering and monitoring systems.

Administrative units, including the Department of Facilities and EHS Headquarters Office, continue to support curricular, project-based learning activities by developing and advising campus energy-related projects, including ones for the new cross-department listed Re-Energizing MIT course, which will be exclusively examining campus-based sustainability issues; Industrial Ecology; and Freshman Pre-Orientation Program (FPOP).

Our Campus Energy Task Force faculty members have integrated coursework to address important issues confronting our campus. For example, a Media Lab class, “MIT Living Labs: Our campus as a testbed for mobility, energy, and housing innovations,” was a strong example of opening our campus as a living laboratory to find synergies between emerging research ideas for sustainability and our campus operations.

A Building Technology Program course developed several class projects to measure and assess different energy efficiency strategies that could be considered for use on MIT’s campus.
Engaging the Entire Community

In 2009, the Task Force launched the “greeningMIT” campaign to further integrate campus energy activities with the entire MIT community. “greeningMIT” is an initiative to engage all students, staff, and faculty in taking action to make the MIT campus more sustainable and energy efficient. Education and awareness campaigns were launched across campus that encourage the MIT community to consider the energy impacts of everyday choices and activities.

The Green Ambassadors Program was established in 2009 to create and empower a network of individuals interested in taking action in their own lab, office, or dormitory to promote more sustainable practices at MIT. Areas of focus include energy conservation, resource efficiency, green purchasing, alternative transportation, awareness, and outreach. By 2011, the Green Ambassador Program has grown to include over 400 staff, faculty, and student volunteers to model and promote the Institute’s energy and environmental stewardship objectives. The Campus Energy Task Force members have supported this popular initiative by providing information resources, outreach material, and networking support to share best practices and by hosting workshops. A focus on developing building-level occupant engagement programs is now underway.

MIT also actively partners with our local, regional and state communities to both learn from and share the knowledge developed on campus. For example, in early 2011, MIT President Susan Hockfield and regional utility company NSTAR CEO Tom May hosted “Efficiency Forward: Partnering for Success,” a forum to recognize the important role energy efficiency plays in Massachusetts’s clean energy economy and to celebrate the strong progress of the MIT and NSTAR collaboration. A key feature of the Forum held on the MIT campus was a workshop attended by over 100 local business, community, and university leaders to review accomplishments and outline strategies to foster support broader adoption of large-scale, energy efficiency programs in Massachusetts.

MIT has a long history of partnering with our local municipal government, the City of Cambridge on energy and sustainability issues. Our efforts to embrace sustainability in all we do have been enriched by our many collaborations with the City in this area including serving on the City’s Climate Protection Action Committee, Green Building/Zoning Task Force, Climate Congress, Cambridge Recycling Advisory Committee, and advising members of the School Committee on issues of sustainable design, to name just a few.

In 2011, MIT expanded its sustainability collaborations in the community on several fronts. MIT has partnered with the City of Boston to be a member of the Boston Green Ribbon Commission to assist the city in implementing their bold climate action plan. MIT is also working with the City of Cambridge to advance a regional program to support electric vehicle charging infrastructure by installing two advanced electric vehicle charging stations on campus. In addition, MIT is working with the City of Boston to expand the city’s local commercial bike-share program by installing two bike share stations for bicycle rentals to bring the popular program into the City of Cambridge.
For questions regarding this report or other information related to our campus sustainability activities, please contact:

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Web resources:
EHS Headquarters Office, Sustainability Program: ehs.mit.edu/site/sustainability
Department of Facilities, Sustainability: mit.edu/facilities/environmental
MIT Energy Initiative, Campus Energy: mit.edu/mitei/campus