HARVARD Campus Services

GREEN is the new Crimson

BLACKSTONE SOUTH OFFICE BUILDING
46 Blackstone Street, Cambridge, MA 02139
PROJECT PROFILE

LEED FOR EXISTING BUILDINGS V3
LEED PLATINUM
JANUARY 2012

In January 2011, Harvard University Campus Services began the process of attaining a LEED for Existing Buildings: Operations and Maintenance (LEED-EB) rating for their office building at 46 Blackstone Street. One year later this facility achieved Platinum certification, the highest rating possible within the LEED system. This facility underwent a major renovation in 2006 and at that time pursued certification under the LEED for New Construction system, for which it also earned a Platinum rating. As a single building receiving Platinum certification under two rating systems, Blackstone South is in select company. According to the U.S. Green Building Council it is the first building in New England, the first in the Ivy League, and only the fifth building in the world to achieve such a distinction.

Photo: copyright Bruner/Cott Architects and Planners 2007

After construction was completed in 2006, the Campus Services department was particularly interested in ensuring that the building was performing to its rigorous design specifications, most specifically the energy consumption targets as predicted in the building's energy model. A 40% reduction in summer energy use compared to an ASHRAE 90.1 baseline was specified in the original design. When the building was first occupied the facility was consuming 30% more energy than the model predicted, but an ongoing commissioning and management process has improved it to the point that the facility is now consuming 20% *less* than the original model predicted. Once the energy consumption of Blackstone was reconciled to levels below the energy model predictions, a decision was made to pursue LEED-EB certification.

In addition to energy use, the LEED-EB rating system evaluates the full profile of environmental impacts from a wide range of building programs including the scheduled maintenance of mechanical equipment, recycling and composting, purchasing of sustainable office supplies and paper products, and elimination of chemicals for cleaning and landscaping. During the project's performance period, Harvard reviewed each operational practice of the building, ranging from commuting practices to the source and recycled content of the printer cartridges purchased for the facility. As a result a number of important changes occurred, including updates to the preventive maintenance routines and adjustments to the source of ongoing consumables.

LEED® Facts

46 Blackstone Street South
Harvard Campus Services

Location	Cambridge, MA
Rating System	LEED-EBOM v2009
Certification Achieved	Platinum
Total Points Achieved	81/110
Sustainable Sites	20/26
Water Efficiency	11/12
Energy and Atmosphere	26/35
Materials and Resources	3/10
Indoor Environmental Quality	12/15
Innovation and Design	6/6
Regional Priority	3/4

PROJECT METRICS

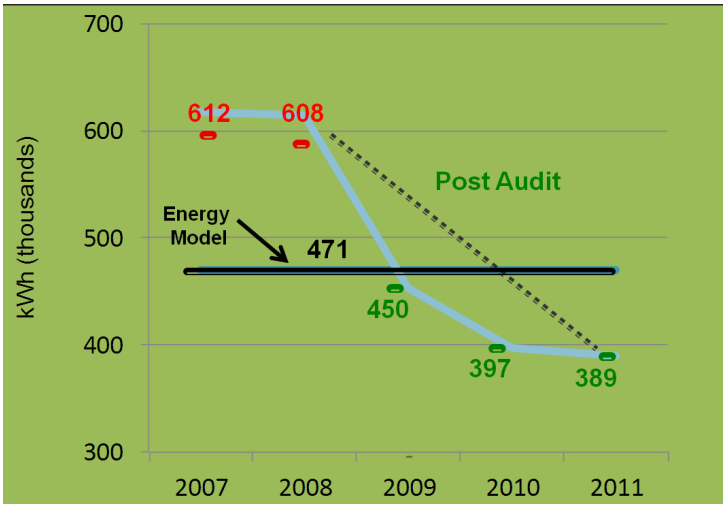
96	ENERGY STAR score for the facility
30%	reduction in potable water consumption compared to a building using code-maximum fixtures
100%	reduction in potable water consumption for irrigation
100%	of the project's perimeter day lit spaces include daylight sensors
3%	reduction in energy consumption occurred during the performance period as a result of implementing identified energy conservation measures
20%	reduction in energy consumption since construction completion in 2007
2	APPA custodial cleaning rating (on a scale of 1-4, with 1 being the best) for the facility as documented by a third party verification auditor

PROJECT HIGHLIGHTS AND LESSONS LEARNED

The project incorporated a number of sustainability features in the original design that not only produced an attractive and efficient office building but also contributed to the LEED-EB certification. A full case study on the LEED-NC project can be found on the Harvard Green Building Resource. Additionally, Harvard underwent an extensive measurement and verification process to ensure ongoing efficiency that is described in this case study.

Building Systems

Heating: Hot water from steam
Cooling: Ground source heat pumps (GSHP)
Ventilation: Decoupled from heating and cooling and equipped with an energy recovery wheel
Special systems: Dedicated Liebert cooling unit for the Operations Center with 5 months of free cooling (operates 24/7/365)



Actual Energy Use (kWh) 2007-2009, Facilities Maintenance Operations

Lessons Learned

Metering: The direct digital control system and metering system is critical to ongoing measurement and verification. The building's mechanical equipment was designed to be controlled via a computer program with a fine level of granularity. With most of the building equipment controlled through the building automation system (even including ceiling fans), it was relatively simple to determine which energy end use components were performing unexpectedly. Having the equipment separately metered and controlled through the automation system enabled building management to quickly identify the problems and implement solutions. However, electric sub-meters weren't installed during the first two years, which made pinpointing early problems difficult. Sub-metering is invaluable for evaluating performance.

Energy Model: A building's energy model requires careful scrutiny both during design and operations. After the first two years of occupancy, the building was performing 30% worse than the energy model predicted (which predicted a 40% energy use reduction in summer compared to an ASHRAE baseline). The energy model undervalued the electric consumption of the Operations Center by 62,000 kWh annually. After this measurement and verification process, the building is now performing 20% better than predicted in the model.

New Technologies: The building management had no prior experience with GSHPs or energy recovery wheels. There were some immediate challenges with the GSHP and the wheels which were overcome through careful analysis of operating patterns.

Original vs Corrected Energy Model Baseline
Blackstone South Baseline Energy Consumption (kWh)
Based on ASHRAE 90.1

Systems	Original Design Energy Model	Corrected Baseline Model
Operations Center	Incl. in plug load	74,460
Plug Loads	169,160	157,221
Lighting Loads	143,420	143,420
Mechanical	95,759	95,759
Total Building	**408,339**	**470,720**

Design Assumptions: The original design didn't include free cooling, and 24-hour operation of the air handling unit was unnecessary.

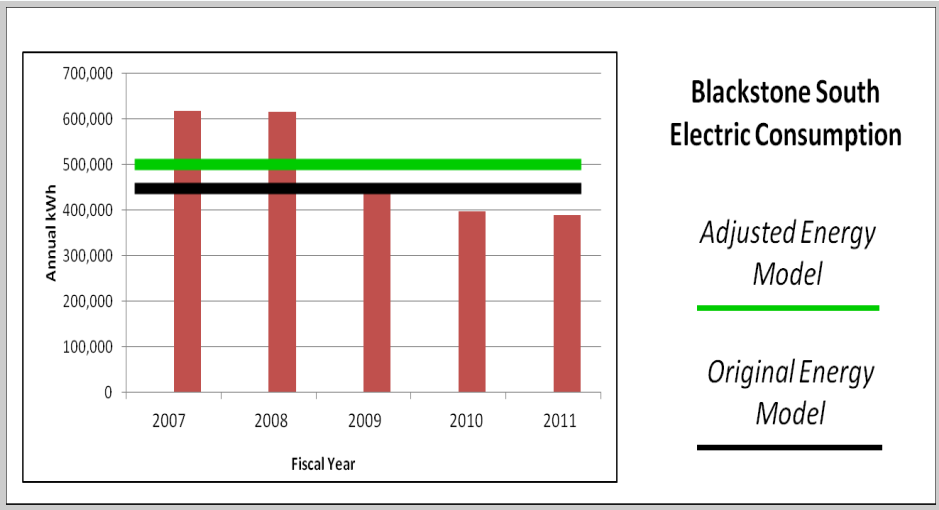
Systematic Review: Improvement comes from systematic review. Benefit from the experience of others, and share your results.

LEED-EB PROJECT TEAM

Owner	Harvard University Campus Services
Building Management	Harvard Facilities Maintenance Operations
Sustainability Consultant	Harvard Green Building Services

ENERGY CONSERVATION MEASURES

This graph shows the annual electrical consumption at 46 Blackstone since 2007. As the graph shows, the building was consuming excessive electricity in comparison to the energy model's predictions. In 2007 and 2008, actual consumption was 40% greater than predicted in the energy model. In 2008, the building underwent an extensive measurement and verification and energy audit process that identified six low or no measures that were implemented immediately. In implementing these low or no cost measures the building expected to capture half of the necessary electricity savings to meet the results of the energy model.



2008 Energy Audit Process

Plug Loads: A portable meter was used to measure actual wattage at specific devices (computers/office equipment, coffee makers, refrigerators, and soda machines). Data was trended over 24 hours. The Operations Center alone included 27 computers, 51 monitors, and 4 large flat panel monitors (400 watts/hour). For every workstation (computer and monitor) shut off when not in use, consumption was reduced by 121 watts/hour.

Lighting Systems: Confirmed that all occupancy sensors were operating properly, disconnected unnecessary track lights, reset timers on exterior lights to cut use by four hours per day during summer daylight hours.

Mechanical Systems: The building was designed to operate 24/7, but only the Operations Center is continuously occupied. As a result, that space was equipped with a dedicated Liebert unit allowing setbacks for the rest of the HVAC equipment. The ventilation AHU was changed from running 24/7 to a schedule of only 6 am—6 pm on weekdays, and measured CO_2 levels confirmed acceptable pollutant levels. The energy recovery wheel was malfunctioning—losing an opportunity to save 50,000 KWh annually, and was repaired under warranty following the audit. Previously both GSHPs were running when only one pump needed to meet winter cooling loads. As a result, these pumps were reprogrammed.

System	Energy Conservation Measures (Implemented in May 2008)	kWh Savings	$$$ Savings
Ops Center	Turned off four flat panel monitors (consume 400 watts/hour each)	11,863	$1,957
Plug Loads	Instructed building occupants (via email) to turn off all computing equipment before leaving for the day. Removed soda machine, excess refrigerators and coffee machines	23,361	$3,020
Plug Loads	Installed shutoff timers (6 p.m.- 6 a.m. and weekends) on coffee machines (exception of Operations Center 24/7 staff)	1,141	$188
Lighting	Reprogrammed exterior lights to activate at 8 p.m. for summer season.	5,000	$800
Mechanical	Repaired energy recovery wheel	50,000	$8,000
Mechanical	Reprogrammed BMS to shutdown AHU (6 p.m. - 6 a.m. and weekends)	42,822	$7,065
Mechanical	Reprogrammed BMS to operate only one well water pump during non-peak seasons (6 months).	15,081	$1,993
	Total	**149,268**	**$24,379**

ENERGY CONSERVATION MEASURES (CONT.)

As part of the 2008 energy audit process, a capital renovation project was implemented to further improve efficiency. The upgrade removed the Operations Center, which includes its own data center, from the base building cooling system in order to allow the building's ventilation system and geothermal heat pumps to shut down during nighttime hours when the rest of the building was unoccupied. Building management installed an air-side economizer cooling system that provides free cooling five months of the year. Removing this space from the base building cooling system significantly reduced the load on the well heat rejection system, and as a result 46 Blackstone did not have to bleed their well system any longer. This helped to both stabilize the temperature profiles of the wells and ease issues with permitting. As a result of implementing this change, the building's energy consumption was reduced significantly and improved Blackstone's performance to levels predicted in its energy model.

Photos: © Facilities Maintenance Operations, 2009

A plate and frame heat exchanger was added to isolate brackish water and consequently eliminate corrosion in heat pump equipment. A slight reduction in overall efficiency was offset by large savings in maintenance expenses. More lessons learned from the ground source heat pump system can be found here. Building management also established new building optimization protocols, such as occupant control of solar gain, equipment operating strategies (cycling/ sequencing), revised space temperature set points.

In 2011, Blackstone conducted another energy audit that identified seven measures with the potential to further reduce the building's energy consumption by 3%, with a simple payback period of 1.4 years. These measures were implemented as part of the LEED-EB process. As a result of these audits, the building is now operating at levels even lower than those predicted in the energy model.

46 Blackstone Energy Conservation Measures (Implemented in 2011)

ECM Title	Reason for Evaluation	Annual Building Savings	Net Costs	Simple Pay-back (Years)
Replace 32W T8 lamps with 25W alternative	Inefficient Lighting	$383	$548	1.4
Replace 24W stair sconces with 18W bulbs	Inefficient Lighting	$492	$506	1.0
Replace 32W CFL bulbs in pendant lighting with 26W alternative	Inefficient Lighting	$93	$510	5.5
Install occupancy sensors in basement open office area to control lighting	Inefficient Lighting Controls	$269	$750	2.8
Implement programming to put computers into standby after 20 minutes of inactivity	Excessive Plug Load Use	$429	$500	1.2
Reduce computer monitor brightness	Excessive Plug Load Use	$82	$50	0.6
Reduce outside air supply rate to 30% over ASHRAE standards and program to increase ventilation based on CO_2 readings	Inefficient HVAC Design	$925	$800	0.9
	Total	**$2,672**	**$3,663**	**1.4**

Waste Reduction

Waste auditing is another key component of the LEED-EB process, and a team of Harvard employees rooted through over 100 pounds of the building's trash and recycling to evaluate how well occupants of 46 Blackstone are diverting materials from landfills. The building features a mix of trash, recycling, and composting bins, all of which were collected over a 24-hour period and then sorted into groups (e.g. metals, plastics, compostables, landfill waste, etc.) to determine the percentage of materials placed in their proper collection bins.

Photos: Harvard Green Building Services, 2010

The audit demonstrated that over 42% of the total waste by weight was properly diverted from the landfill. According to Rob Gogan, Manager of Harvard FMO Recycling Services, this is about average for waste audits at Harvard that do not include landscaping materials. This exercise identified that there is still a lot of room for improvement, as an additional 46% of the waste could have been diverted but was improperly disposed of, e.g. food placed in the trash instead of the compost bin. Compostable materials, specifically paper towels and napkins, represented the largest potential for improvement, with nearly 80% of these items being placed in the trash rather than compost bin.

The next step will be to specifically target and refine the building's existing educational campaigns to determine optimal means of diverting more compostable waste from the trash, such as evaluating the location and number of bins, the size of bins, and the signage. Paper towels are often citied as a key opportunity to reduce waste. According to Gogan:

> "Paper towels are the #1 product in the waste stream of all office buildings on campus. If Blackstone wanted to adopt a more sustainable materials management system, building staff would promote reusables such as the 'People's Towel,' or use its Green Teamers to encourage individuals to tote their napkins and towels to the compost. Another option, though noisy, is hand dryers, which save energy and reduce custodial pickup costs. The really nasty thing about paper towels is that they burp methane in the landfill—a greenhouse gas 20 times worse than CO_2. It is not sustainable to put paper products of any kind into a landfill."

Full waste audit results can be found here: Waste Audit Results and Waste Audit Report

LEED-EBOM scorecard: A full LEED EBOM scorecard, outlining 46 Blackstone's other LEED EBOM policies, practices, and achievements can be found on page six of this case study. Examples of documentation will be posted on the Harvard Green Building Resource—such as the Building Exterior and Hardscape Management Plan, integrated Pest Management Plan, Sustainable Purchasing Policy, Solid Waste Management Policy, and the Green Cleaning Policy.

More Information

- **46 Blackstone LEED for New Construction Case Study:** http://green.harvard.edu/theresource/case-studies
- **Harvard Green Building Resource:** http://green.harvard.edu/theresource
- **Harvard Green Building Services:** http://green.harvard.edu/green-building-services
- **Harvard Campus Services:** http://campusservices.harvard.edu
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Blackstone South LEED EB v.2009 Scorecard

Y	N		
20	1	**SUSTAINABLE SITES**	**Notes**
4		**SSc1 LEED Certified Design and Construction**	In 2007, Blackstone South Office Building was certified LEED for New Construction Platinum. As a result of that certification, the project earned 4 points under the Existing Building rating system.
1		**SSc2 Building Exterior and Hardscape Mgmt Plan***	The intent of this credit is to implement an environmentally sensitive, low impact, building exterior and hardscape management plan. The scope of the plan extends to 46 Blackstone and its associated grounds. The use of low decibel landscaping equipment, de-icing agents containing magnesium chloride, and low VOC paints and sealants, helped achieve this credit.
1		**SSc3 Integrated Pest Mgmt, Erosion Control, and Landscape**	The intent of this management plan is to reduce harmful chemical use, energy and water waste, air pollution, solid waste and chemical runoff on the project site, while protecting its natural components. Regular inspections, pest population monitoring, use of non toxic and non chemical controlling methods, are implemented 100% of the time at Blackstone.
10	1	**SSc4 Alternative Commuting Transportation 10%**	The goal of this plan was to promote and document the use of an alternative commuting program whether its through carpooling, public transportation, biking/walking, or a shared ride/drop off program. The occupants of 46 Blackstone averaged a weekly AVR (Average Vehicle Ridership) of 2.
1		**SSc5 Reduced Site Disturbance - Protect or Restore Open Space**	The intent of this management plan is to conserve existing natural site areas and restore damaged site areas to provide habitat and promote biodiversity. It is required to cover a minimum of 25% of the total site area. Through the planting of two native tree species, the Acer Rubrum and Betula Nigra, 46 Blackstone satisfied these requirements.
1		**SSc6 Stormwater Quality Control***	The intent of this plan aimed to limit the disruption of natural hydrology by reducing impervious cover, increasing on-site infiltration, and reducing pollution from stormwater runoff. With the implementation and upkeep of a bioswale, which filters the stormwater run-off from the site, the stormwater management plan has resulted in a 12.97% decrease in site imperviousness
1		**SSc7.2 Heat Island Reduction : Roof**	The intent of the Heat Island Reduction plan is to minimize impacts of microclimates on human and wildlife habitats. Through the bi-annual cleaning of 46 Blackstone's roof, which has a high solar reflectance index (SRI), the project site will reduce its heat island effect.
1		**SSc8 Light Pollution Reduction**	The intent of this plan aims to minimize light trespass from the building and site, reduce sky glow to increase night sky access, and improve nighttime visibility through glare reduction. With the installation of occupancy sensors, 46 Blackstone is saving a significant amount of electrical energy both during and after operational hours of the day.
11	0	**WATER EFFICIENCY**	**Notes**
Y		**WEp1 Min Indoor Plumbing Fixture and Fitting Efficiency**	The intent of this plan is to reduce indoor fixture and fitting water use within buildings to reduce the burdens on potable water supply and wastewater systems. With the installation of efficient fixtures and fittings during construction, 46 Blackstone was able to reduce its water use by 44.85%.
1		**WEc1.1 Water Performance Measurement: Whole Building Metering**	The goal of this plan is to measure building water performance over time to understand consumption patterns and identify additional opportunities for water savings. In 46 Blackstone's Basement, a water meter is actively reporting domestic water use. The municipality notifies occupants of any abnormalities of water use in order to ensure a reduction in water consumption.
5		**WEc2 Additional Indoor Plumbing Fixture and Fitting Efficiency**	The intent of this plan is to reduce indoor fixture and fitting water use within buildings to reduce the burdens on potable water supply and wastewater systems. With the installation of efficient fixtures and fittings during construction, 46 Blackstone was able to reduce its water use by 44.85%.
5		**WEc3 Water Efficient Landscaping**	The intent of this plan is to reduce or eliminate the use of potable water for landscape irrigation. By taking advantage of the native vegetation, no permanent irrigation systems are required on the project site.
26	1	**ENERGY & ATMOSPHERE**	**Notes**
Y		**EAp1 Energy Efficiency Best Mgmt Practices**	The intents of this plan promotes a continuity of information to ensure that energy efficient operating strategies are maintained and provide a foundation for training and system analysis. Since 2007, 46 Blackstone has implemented a comprehensive preventive maintenance plan for all of the building's mechanical, electrical, and plumbing equipment. The buildings mechanical equipment and a portion of its electrical equipment is constantly monitored and controlled through the building automation system.
Y		**EAp2 Minimum Energy Efficiency Performance - ENERGY STAR Rating of 69**	The goal of this plan is to establish a minimum level of operating energy efficiency performance, relative to typical buildings of similar use. Since 2007, building management has improved the building's energy performance from an ENERGY STAR rating of 52 to 94 through the use of the building's energy model created during construction, and comparing its predictions to the consumption reported by building's sub-meters.
Y		**EAp3 Refrigerant Mgmt - Ozone Protection**	The intent of this plan is to help reduce stratospheric ozone depletion by specifying HVAC equipment that does not use of CFC (chlorofluorocarbon) based refrigerants.
17	1	**EAc1 Optimize Energy Efficiency Performance**	As a result of improving the building's energy consumption patterns and documenting its performance through ENERGY STAR's Portfolio Manager, Blackstone achieved a rating of 94. As a result, this contributed 17 points to its LEED certification total.
2		**EAc2.1 Existing Building Commissioning - Investigation and Analysis**	The intent of this plan is to develop an understanding of the buildings major energy using systems, and evaluate options for optimizing energy performance. 46 Blackstone has installed several submeters that monitor all of the electric sub systems and help track the savings that have been implemented through energy conservation recommendations identified through energy audits. Examples of these savings were found in replacing incandescent lighting with more efficient alternatives and installing occupancy sensors.
2		**EAc2.2 Existing Building Commissioning - Implementation**	The goal of this credit is to implement the measures identified in EAc2.1. Moreover, any implemented changes need to be reviewed with building management in order to ensure the building continues to function at its most efficient and sustainable level.
1		**EAc3.1 Performance Measurement - Building Automation System**	The intent of the building automation system (BAS) is to provide information to support the ongoing accountability and optimization of building energy performance. 46 Blackstone has a Siemens system which controls all the major systems in the building including space heating, space cooling, and ventilation. In order to achieve this credit, the Team implemented a preventive maintenance plan for the BAS that is being performed by in-house mechanical technicians.
2		**EAc3.2 Performance Measurement - System-Level Metering 40%**	With system-level metering, one is able to first compare actual energy consumption by end use to the levels predicted in the energy model. Second, it helps verify changes that have been made to the building to see if they have produced the anticipated energy saving results. Sub-metering data was incredibly helpful during the two energy audit processes conducted at the building.
1		**EAc5 Refrigerant Mgmt**	The intent of this plan is to reduce depletion of the ozone by using refrigerants with a minimal impact on ozone depletion and global warming. Through the use of environmentally-preferable refrigerants like R-134a, 46 Blackstone is successfully helping protect the ozone layer and reducing the amount of green house gases being released into the atmosphere.
1		**EAc6 Emissions Reduction Reporting**	The goal of this plan is to track and record emissions reduction produced through energy efficient measures in 46 Blackstone. As the building reported its energy consumption with Portfolio Manager, greenhouse gas data was producted for the facility.
3	0	**MATERIALS & RESOURCES**	**Notes**
Y		**MRp1 Sustainable Purchasing Policy**	The purpose of this policy is to reduce the environmental impacts of materials acquired for use in the operations, maintenance, and upgrades of buildings. Within Blackstone, consumer goods like paper toner and paper towels, durable goods like electric tools, and furniture are monitored and analyzed to optimize efficiency.
Y		**MRp2 Solid Waste Mgmt Policy**	The intent of this plan is to facilitate the reduction of waste generated by building occupants that is hauled to and disposed of in landfills . Blackstone's facility manager oversees the daily recycling of consumer goods, durable goods, construction waste, and any mercury-containing lamps. Through 2 waste stream audits a year, Blackstone hopes to cut ongoing consumables, durable goods, and mercury containing light bulbs by 100% and facility alteration waste by 75%.
1		**MRc2.2 Sustainable Purchasing - Durable Goods, furniture**	The intent of this plan aims to reduce the environmental and air quality impacts of the materials acquired for use in the operations and maintenance of the building. In an effort to follow through with this plan, 46 Blackstone recently purchased MIRRA office chairs which have zero carbon footprint, zero landfill, zero hazardous waste generation, and zero VOC's. These chairs contributed to a sustainable purchasing program of items that are replaced infrequently and/or may require capital program outlays to purchase.
1		**MRc4.1 Sustainable Purchasing - Reduced Mercury in Lamps**	The intent of this plan is to establish and maintain a toxic material source reduction program to reduce the amount of mercury brought onto the building site through purchases of lamps. Through a specific purchasing period, Blackstone acquired various low mercury bulbs and installed them throughout the building.

1		**MRc6 Solid Waste Mgmt - Waste Stream Audit**	The intent of this plan is to facilitate the reduction of ongoing waste and toxins generated by building occupants and building operations that are hauled to and disposed of in landfills or incineration facilities. Through an audit in which 46 Blackstone analyzed the entire buildings waste stream, it was discovered that compost accounted for about 35% of the daily waste but was also the most common type of waste being improperly disposed. As a result of the audit, various improvements were made in the waste and recycling process.
12	0	**INDOOR ENVIRONMENTAL QUALITY**	**Notes**
Y		**EQp1 Outdoor Air Introduction and Exhaust Systems**	The intent of this plan is to establish minimum indoor air quality performance to enhance indoor air quality in buildings, thus contributing to the health and well-being of the occupants. 46 Blackstone has a 100% outside air air-handling unit.
Y		**EQp2 ETS Control**	The intent of this plan is to prevent or minimize exposure of building occupants, indoor systems and surfaces to environmental tobacco smoke (ETS). 46 Blackstone has a no smoking policy inside or on the surrounding grounds, keeping any ETS away from the occupants and their workspaces.
Y		**EQp3 Green Cleaning Policy**	The intent of this plan aims to reduce the exposure of building occupants and maintenance personnel to potentially hazardous chemical, biological and particulate contaminants. At Blackstone, a minimum of 20% of all cleaning products used in the building are "Green Cleaning Chemicals" and annual Green Cleaning training programs are implemented at 46 Blackstone.
1		**EQc1.1 IAQ Best Mgmt Practices - IAQ Mgmt Program**	The intent of this plan aims to enhance indoor air quality by optimizing practices to prevent the development of indoor air quality problems in the building, correcting indoor air quality problems when they occur and maintain the well-being of the occupants. During the performance period, building management completed the IBEAM assessment of the building's exterior, interior, and HVAC system, documented the issues from the audit, and addressed the no-cost issues.
1		**EQc1.4 IAQ Best Mgmt Practices - Reduce Particulates in Air Distribution***	The intent of this plan is to reduce exposure of building occupants and maintenance personnel to potentially hazardous particulate contaminants. 46 Blackstone has Varicel and Green Pleat air filters that exceed the LEED required rating of 13 minimum efficiency reporting value (MERV) with 14. These filters are changed twice per year with a comprehensive Preventative Maintenance in April and a filter change test and inspection in July.
1		**EQc1.5 IAQ Best Mgmt Practices - IAQ Mgmt During Construction**	The intent of this plan is to prevent indoor air quality problems resulting from any construction or renovation projects to help sustain the comfort and well being of construction workers and building occupants. In order to satisfy these standards, any future construction or renovation at 46 Blackstone will adhere to certain guides; Isolating and ventilating exhaust fumes from toxic materials, specifying low VOC finish materials, isolating occupied work areas, and coordinating construction activities to minimize disruption of operations in the occupied portions of the building.
1		**EQc2.2 Controllability of Systems: Lighting**	The intent of this plan is to provide a high level of lighting system control by individual occupants or groups in multi occupant spaces to promote the productivity, comfort and well-being of building occupants. 46 Blackstone provides task lighting, controllable at the desire of the user, at all work desks and conference areas.
1		**EQc2.3 Occupant Comfort - Thermal Comfort Monitoring**	The intent of this plan is to support the appropriate operations and maintenance of buildings and building systems so that they continue to meet target building performance goals. Blackstone undergoes a measurement analysis every 12 months in which air speed and mean radiant temperature readings are recorded in all occupied spaces in order to ensure a comfortable environment is being kept.
1		**EQc2.4 Occupant Comfort - Daylight and Views, 50% Daylight / 45% Views**	As a result of the original construction, over 90% of workspaces are provided with ample daylight and views to the outdoors.
1		**EQc3.1 Green Cleaning - High Performance Cleaning Program**	The intent of this plan is to reduce the exposure of building occupants and maintenance personnel to potentially hazardous chemical, biological and particulate contaminants, which adversely affect air quality, human health, building finishes, building systems and the environment. 46 Blackstone incorporates an extensive maintenance and cleaning program that uses low environmental impact cleaning materials according to Green Seal standards. Maintenance also uses micro-fiber technology where possible, disposable janitorial paper products and trash bags, and records logs of their cleaning schedules to ensure a consistently clean and healthy environment.
1		**EQc3.2 Custodial Effectiveness Assessment, <3**	The intent of this plan is to reduce the exposure of building occupants and maintenance personnel to potentially hazardous chemical, biological and particulate contaminants, which adversely affect air quality, human health, building finishes, building systems and the environment. In accordance to the APPA Leadership in Educational Facilities, 46 Blackstone must average a score equal to or less than 3 under the "Custodial Staffing Guidelines". Within Blackstone, the washroom, public circulation areas, offices spaces with carpet, and the multi purpose room all scored a 2, resulting in an overall facility appearance level of 2.
1		**EQc3.3 Green Cleaning - Sustainable Cleaning Products, 30%**	The intent of this plan is to reduce the environmental impacts of cleaning products, disposable janitorial paper products and trash bags. Through sustainable purchasing, 43% of Blackstone's total cleaning costs are used towards products like ECOsoft and Delta that ensure low environmental impact and healthy work spaces.
1		**EQc3.4 Green Cleaning - Sustainable Cleaning Equipment**	The intent of this plan is to reduce the exposure of building occupants and maintenance personnel to potentially hazardous chemical, biological and particulate contaminants. The janitorial and maintenance staff at 46 Blackstone only use equipment that is CRI Green Label tested and operate with less than 90 dBA. All equipment is routinely maintained and all 7 equipment products meet the sustainability criteria as defined by LEED.
1		**EQc3.5 Green Cleaning - Indoor Chemical and Pollutant Source Control**	The intent of this plan is to reduce the exposure of building occupants and maintenance personnel to potentially hazardous chemical, biological and particulate contaminants. Routine procedures for maintaining entryways and walkways on the site of 46 Blackstone have been consistently implemented. 12 to 20 feet of matting has been placed at all entryways in order to capture any dirt or particles and prevent them from entering the building. Along with this, regular inspections of the entry and walkways are conducted to ensure cleanliness.
1		**EQc3.6 Green Cleaning - Indoor Integrated Pest Management**	To reduce the exposure of building occupants and maintenance personnel to potentially hazardous chemical, biological and particulate contaminants. The IPM (Integrated Pest Management) plan has ensured that no pesticide applications are used and a log describing what job was done with which product is kept. Communication between maintenance and the building occupants is also stressed so any occupants are aware 72 hours before any pesticide are applied.
6	0	**INNOVATION AND DESIGN PROCESS**	**Notes**
1		**IDc1.1: Innovation in Operations: Water Use Reduction**	The project earned this innovation credit as a result of documenting a reduction in water use by 44.85%. These strategies help protect the natural water cycle and save water recourses for future generations. With an average potable water reduction over the LEED requirement of 35%, exemplary performance was achievable.
1		**IDc1.2: Innovation in Operations: Daylight and Views**	The project earned this innovation credit by providing ample daylight and views in over 90% of its occupied spaces.
1		**IDc1.3: Innovation in Operations: Durable Goods - Furniture**	Project teams can earn 1 additional point by increasing sustainable purchases of furniture to 80% of total furniture purchases. 46 Blackstone meets this requirement, with its sustainable furniture purchases of 100% during the performance period.
1		**IDc1.4: Innovation in Operations: Corporation-wide greenhouse gas emission plan**	Harvard has a goal of reducing GHG emissions 30 percent below the University's fiscal year 2006 baseline by FY2016, including growth. In the period between FY2006 and FY2009, Harvard has reduced its green house gas production by 7%, keeping well on track for their goal of 30% by FY2016. As this is a formal goal of the University that goes beyond the scope of emissions at the building level, the project earned an innovation credit.
1		**IDc2 LEED AP**	The intent of this plan is to support and encourage the operations, maintenance, upgrade and project team integration required by LEED to streamline the application and certification process. Kevin Bright fulfills this requirement as a certified LEED Accredited Professional (AP).
1		**IDc3 Documenting Sustainable Building Cost Impacts**	The intent of this plan is to document sustainable building cost impacts. 46 Blackstone has provided documentation from July of 2007 to the current date showing all building operating expenses.
3	0	**Regional Priority Credits**	**Notes**
1		**RPc1.1: Regional Priority Credit: Building Exterior and Hardscape Management**	As a result of earning SSc2, the project earned a regional priority credit.
1		**RPc1.2: Regional Priority Credit: Stormwater Quality Control**	As a result of earning SSc6, the project earned a regional priority credit.
1		**RPc1.3: Regional Priority Credit: Reduce Particulates in Air Distribution**	As a result of earning IEQc1.4, the project earned a regional priority credit.
81		**TOTAL**	

Certified 40-49 points **Silver** 50-59 points **Gold** 60-79 points **Platinum** 80+ points