Harvard Divinity School

HARVARD UNIVERSITY | Sustainability

Andover Classrooms
45 Francis Avenue
Project Profile

LEED CI v2009
LEED Gold
2013

The HDS Andover Classroom project is a 2,939 square foot renovation of three existing classroom spaces within Andover Hall: Room 102, Room 103, and the Sperry Room. Andover Hall was built in 1911. It is the only building at Harvard built in the Collegiate Gothic style of architecture. The renovation was an opportunity to improve teaching boards, climate control, lighting, acoustics, architectural finishes, daylighting control, audio and visual equipment, and classroom layouts/furnishings.

In setting the sustainability goals to guide the project's design and operation, the project team utilized the Harvard University Green Building Standards for Fit-outs and the LEED-CI v2009 Certification requirements. The main sustainability goals for the project include the following.

- **Minimize the energy demand** by choosing high efficiency lighting options.
- **Eliminate** existing acoustics issues associated with the HVAC system.
- **Improve** occupant comfort by adding cooling to the spaces.

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LEED® Facts

Harvard University
Andover Classrooms

Location	Cambridge, MA
Rating System	LEED-CI v2009
Certification Anticipated	Gold
Total Points Anticipated	63/110
Sustainable Sites	15/21
Water Efficiency	0/11
Energy and Atmosphere	23/37
Materials and Resources	5/14
Indoor Environmental Quality	12/17
Innovation and Design	6/6
Regional Priority	2/4

Project Metrics

33% lighting power reduction when compared to ASHRAE 90.1-2007 baseline

84% waste diverted from landfill

30% material recycled content

13% regionally manufactured materials

100% EnergyStar rated equipment

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ENERGY EFFICIENCY AND INDOOR ENVIRONMENTAL QUALITY

MECHANICAL AND ELECTRICAL SYSTEMS

ECM 1: **Energy Recovery Unit** - This energy recovery unit (ERU) uses a device called an "enthalpy wheel" in order to extract the energy out of the exhaust air, which would typically be lost energy as the air is exhausted to the outdoors. The unit uses this energy to precool and dehumidify air in warmer weather, and preheat and humidify air in cooler weather. This reduces the mechanical system's energy consumption related to tempering the incoming outdoor air to meet the system's set points.

ECM 2: **Variable Frequency Drives** - Variable frequency drives (VFD) are able to adjust fan speed and torque by varying motor input frequency and voltage. In this space, VFDs adjust the supply and return fan speed of the energy recovery unit. This allows for significant energy savings as the fans have the ability to run at a lower speed if the demand isn't at full load.

ECM 3: **Electronic Communicated Motor** - Electronic communicated motors (ECM) are brushless direct current motors that contain a microprocessor, which controls the operation of the motor. These motors work at a greater efficiency when a lower speed is required making them 67% more efficient than their counterparts, permanent-split capacitor (PSC).

ECM 4: **Daylight Sensors** - The linear fluorescent fixtures in Room 102 and Room 103 have integrated daylight sensors. These sensors automatically dim the lights when a sufficient amount of natural daylight enters the space.

Photo: copyright Harvard Divinity School, 2013

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INDOOR ENVIRONMENTAL QUALITY

Low VOC - The project only uses low volatile organic compound (VOC) adhesives, paints, and coatings. This helps minimize off-gassing, which can be detrimental to the health of the space occupants. Off-gassing is the evaporation of volatile chemicals into the air. Off-gassing can continue for years after products are installed. Therefore, by only installing low VOC products, the design team helped provide a cleaner environment for space occupants.

Greenguard Furniture - The chairs and tables in Room 102 and Room 103 are Greenguard certified. Greenguard is a program that certifies furniture that has low chemical emissions. These chemicals in high doses can have negatively affect the health of building occupants. The fixed seating in the Sperry Room is certified under a similar low chemical emissions certification.

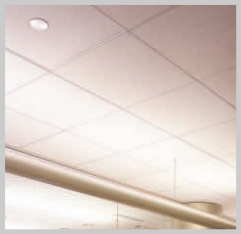
High Efficiency Air Filters - The efficiencies of air filters are commonly rated on a scale from 1-20 using the MERV rating system (minimum efficiency reporting value). The ERU installed as part of the project contains air filters with a MERV rating of 13. The filters in the air handler unit (AHU) providing outdoor air to Room 102 and Room 103 were replaced by the building management team with MERV 13 filters. The efficiency of MERV 13 filters goes above and beyond what is typically required for a classroom—these filter efficiencies are typically suggested for hospital and general surgery.

Lighting Controllability - Space occupants are able to control the lighting of each space using multi-circuit, dimming switches.

PRODUCTS AND MATERIALS

Highlights

- **30% recycled content** value as a percentage of total materials cost
- **19% regionally manufactured** (within 500 miles) value as a percentage of total materials cost
- **9% regionally extracted** (within 500 miles) value as a percentage of total materials cost
- **45% Forest Stewardship Council (FSC) certified wood** value as a percentage of new wood materials cost
- **Only low-VOC, or no-VOC** adhesives, sealants, paints, coatings, and furniture were used

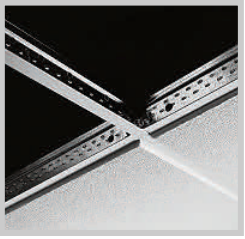


Certainteed Ceiling Tile
Armstrong

* 21% Post-consumer Recycled Content
* 19% Pre-consumer Recycled Content
* Regionally Manufactured and Extracted: Valley Forge, PA

Insulation Batts
Owens Corning

* 20% Post-consumer Recycled Content
* 30% Pre-consumer Recycled Content
* Regionally Manufactured: Toronto, ON, Canada



Suprafine XL
Armstrong

* 23% Post-consumer Recycled Content
* 7% Pre-consumer Recycled Content
* Regionally Manufactured: Aberdeen, MD

Metal Framing
ClarkDietrich

* 24.3% Post-consumer Recycled Content
* 9.4% Pre-consumer Recycled Content
* Regionally Manufactured: Bristol, CT
* Regionally Extracted: Fairless Hills, PA

White Oak Sheet Goods[1]
Robert Bury Panels, Inc.

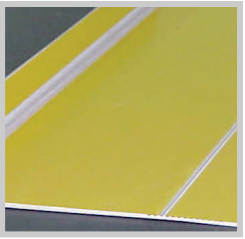
* Regionally Manufactured and Extracted
* 96% FSC Wood

Mediterra[1]
CapriCork

* 90% Pre-consumer Recycled Content
* 90% Rapidly Renewable Content
* FloorScore Certified

374 Eco Spec Eggshell
Benjamin Moore

* VOC Content = 0 g/L **vs.** VOC Limit = 50 g/L



PowerTape
Johnsonite

* VOC Content = 0 g/L **vs.** VOC Limit = 250 g/L

Fixed Seating
American Seating

* ANSI/BIFMA M7.1 and X7.1 Certified
* 40% Post-consumer Recycled Content
* 11% Pre-consumer Recycled Content

Everywhere Tables
Herman Miller, Inc.

* Greenguard certified

Unless otherwise indicated all product images are from the manufacturer's website.
1. Photo: copyright Harvard Divinity School, 2013.

Please note that while many products are described in this project profile, these are provided for informational purposes only, to show a representative sample of what was included in this project. Harvard University and its affiliates do not specifically endorse nor recommend any of the products listed in this project profile and this profile may not be used in commercial or political materials, advertisements, emails, products, promotions that in any way suggests approval or endorsement of Harvard University.

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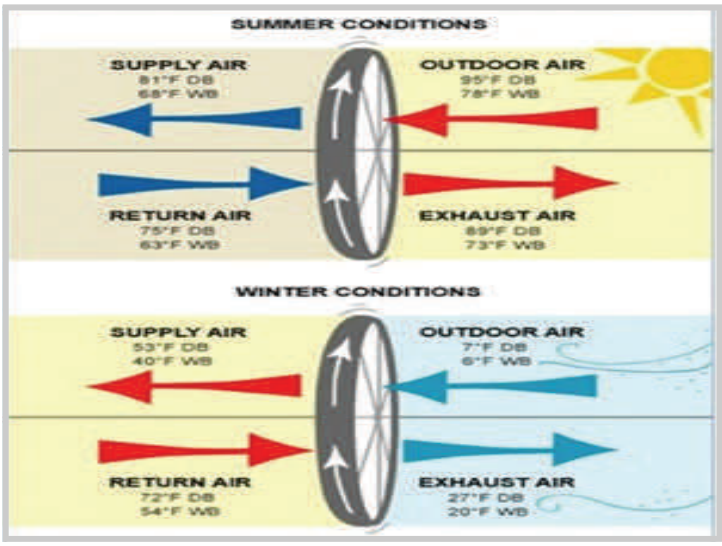
Energy Recovery - Enthalpy Wheel

An 100% outdoor air energy recovery unit (ERU) was installed as part of this project to provide heating, cooling, and ventilation to the Sperry Room. This unit has multiple sustainable benefits. First, by using 100% outdoor air (as opposed to mixing outdoor air with return air), indoor air quality is improved as less indoor pollutants are recirculated through the system. Furthermore, as the name suggests, ERUs recover energy from the return air. This energy would typically be lost as the air is exhausted to the outdoors. This particular unit has the ability to extract both sensible and latent heat from the return air using an enthalpy wheel. As the wheel rotates, it absorbs sensible energy and releases it into the colder air stream due to the difference in temperature between the supply and return air streams. This energy is used to preheat the supply air in the winter and precool the supply air in the summer. Latent heat is extracted from the return air using desiccants. In this case, the desiccant is a silica gel, which is more efficient than its counterpart, molecular sieve, in higher humidity environments. This energy is used to humidify air in the summer and dehumidify air in the winter. Recovering this energy helps reduce the energy consumption needed by the mechanical system to temper the supply air.



Graphic: Shiminski, Jim. "Typical of energy exchanged through an enthalpy wheel." Graphic. *DAC Sales*. 16 Jan. 2012. 27 Sept. 2013. <http://www.dac-hvac.com/energy-recovery/energy-recovery-wheels-what-is-an-enthalpy-wheel/ >

More Information

- Harvard Divinity School:
http://www.hds.harvard.edu/
- Sustainability at Harvard - HDS:
http://green.harvard.edu/hds
- Harvard - Green Building Resource
http://www.energyandfacilities.harvard.edu/green-building-resource
- Harvard - Green Building Services:
http://www.energyandfacilities.harvard.edu/project-technical-support/capital-projects/sustainable-design-support-services
- Harvard - Sustainability Plan:
http://green.harvard.edu/commitment/our-plan

Project Team

Owner	Harvard Divinity School
Project Manager	Roy Lauridsen
Architect	Ann Beha Architects
MEP Engineer	AHA Consulting Engineers
Contractor	Shawmut Design and Construction
Commissioning Authority	Harvard Green Building Services
Sustainability Consultant	Harvard Green Building Services