Laboratories are typically regarded as an energy intensive building typology. Many of these buildings have extended occupancy periods, energy intensive equipment and machinery, and in some cases, strict air quality code requirements (high air changes per hour). These factors contribute to a high average energy use intensity value (National Average EUI of 370 kBtu/SF/year). Additionally, some laboratories consume significant amounts of water through process and HVAC equipment use. Nevertheless, there are many strategies that can be employed to make laboratories more energy and water efficient as well as healthy and productive spaces with minimal environmental impact. The Cohen Lab is a great example of the successful implementation of these strategies.

The Cohen Lab project consisted of the renovation of the existing Cohen Laboratories and support spaces located on the first floor of the Edward Mallinckrodt Chemical Laboratory. The scope of work includes the total renovation of the first floor laboratories, including a new instrumentation facility, tissue culture room, biology lab, chemistry lab, optics labs and the renovation of the existing student write up spaces. Miscellaneous areas on the ground and basement levels are also included as part of this renovations in support of the main renovation on the first floor. The project’s goals were to create high performance lab spaces that optimize the indoor environment, reduce resource consumption, and reduce the overall impact on the environment.

The project team was committed to sustainability from the onset and followed the Harvard Green Building Standards to make more informed decisions. These standards led to the inclusion of a number of progressive design strategies to meet aggressive energy targets and reduce water use without significant additional cost. Cohen Lab achieved LEED-CI v2009 Gold certification in September 2015.
Project Highlights

Key Sustainability Features:
- Revitalizing an existing space
- Energy efficient HVAC systems
- Extensive energy efficient lighting and daylighting design strategy with occupancy sensors, efficient fixtures, and controls
- Healthy, productive, creative lab spaces

Project Team

<table>
<thead>
<tr>
<th>Role</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Owner</td>
<td>Harvard University</td>
</tr>
<tr>
<td>Project Manager</td>
<td>Harvard FAS Capital Project Management</td>
</tr>
<tr>
<td>Architect</td>
<td>Ellenzweig Associates</td>
</tr>
<tr>
<td>MEP Engineer</td>
<td>BR + A</td>
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<tr>
<td>Contractor</td>
<td>D.C. Beane and Associates</td>
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<tr>
<td>Commissioning Authority</td>
<td>Harvard Green Building Services</td>
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<tr>
<td>Sustainability Consultant</td>
<td>Harvard Green Building Services</td>
</tr>
</tbody>
</table>

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ENERGY EFFICIENCY AND INDOOR ENVIRONMENTAL QUALITY

MECHANICAL SYSTEMS

ECM 1: High Efficiency Fans and Motors
ECM 2: Occupancy Sensors
ECM 3: High Efficiency Fan Coil Units
ECM 4: Variable Air Volume Control (VAV)
ECM 5: Thermostat Controls
ECM 6: Operable Windows

The overall strategy of the HVAC system design was to reduce energy use through the installation of high efficiency equipment and controls. The fan coil units are controlled by electronically commutated motors and variable air volume (VAV) boxes are located downstream of the supply fans in order to provide ventilation. Occupancy sensors are interlocked with the VAV boxes in the laboratory areas to control the ventilation air and reduce HVAC system energy when these spaces are unoccupied. Additionally, a new 2,000 cfm, HEPA filtered, humidified air handling unit was installed to recirculate HEPA filtered air throughout the new optics lab.

LIGHTING AND ELECTRICAL SYSTEMS

The Cohen Lab space is expected to be occupied for extended periods throughout the year. Therefore, it is crucial the energy reduction strategies also focus on reducing lighting energy. The lighting system was designed to not only reduce energy use, but also to improve in the indoor environmental quality of the space and provide optimal lighting. Some of the strategies employed include:

- Reduce lighting power density by 18.77% below the ASHRAE 90.1-2007 baseline standard
- High performance T8 fluorescents & LEDs for lab, work spaces, and support rooms.
- Ceiling mounted occupancy sensors capable of managing lighting setbacks for lab, work spaces, and support rooms.
- Lighting controls with multiple lighting levels to provide adequate illumination for a higher indoor environmental quality

PLUMBING SYSTEMS AND POTABLE WATER USE REDUCTION

Decreasing the demand for potable water is the first step towards sustainable water management. Therefore, the plumbing system for the Cohen Lab was designed to reduce resource consumption, specifically potable water use. Potable water use was reduced by incorporating a low-flow fixture in the project space. In the Student Write-Up section, a 0.5 gpm kitchen sink was installed, reducing water use in the space by over 75% when compared to the baseline plumbing fixtures required by code.

Since there are no flush fixtures installed as part of the project scope and there are no flush fixtures located within the tenant space, tenants must utilize bathrooms in close proximity to the Cohen Lab. The bathroom which is used by the project tenants has installed a water closet with a GPF of 1.27 and a lavatory faucet metered at 0.1 GPM. Project tenants also have access to a shower which has a fixture GPM of 1.5. With the addition of these calculations, the overall percent reduction of water use in all fixtures is just over 32%.
Products and Materials

Lighting and Controls

- 18% reduction in lighting power density (watts/square foot)

Energy Efficient Appliances & Water Efficiency

- 100% of the equipment purchased for the project is ENERGY STAR RATED (by rated power).
- 32% reduction in annual water use when compared to EPAct 1992 baseline standard.

Low-emitting Materials

- 100% of the project’s adhesives, sealants, paints, coatings, and flooring systems are low-emitting.

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.
Project Scorecard

LEED FOR COMMERCIAL INTERIORS (V2009)

ATTEMPTED: 79, DENIED: 2, PENDING: 0, AWARDED: 76 OF 110 POINTS

INDOOR ENVIRONMENTAL QUALITY

- IEQ1: Minimum AQI Performance
- IEQ2: Environmental Tobacco Smoke (ETS) Control
- IEQ3: Outdoor Air Delivery Monitoring
- IEQ4: Increased Ventilation
- IEQ5: Construction & O&M Mgmt Plan During Construction
- IEQ6: Construction & O&M Mgmt Plan Before Occupancy
- IEQ7: Low-Emitting Materials-Absorbing and Sealants
- IEQ8: Low-Emitting Materials-Paints and Coatings
- IEQ9: Low-Emitting Materials-Floors and Fixtures
- IEQ10: Low-Emitting Materials-Composite Wood and Agglutinant Products
- IEQ11: Low-Emitting Materials-Latex Paints and Coatings
- IEQ12: Low-Emitting Materials-Surface Finishes and Fabrics
- IEQ13: Low-Emitting Materials-Project and Building"n"- 1/1

WATER EFFICIENCY

- W2c1: Water Use Reduction-20% Reduction
- W2c2: Water Use Reduction-10% Reduction

ENERGY AND ATMOSPHERE

- EAI: Fundamental Commissioning of the Building Energy Systems
- EAP2: Minimum Energy Performance
- EAP3: Fundamental Refrigerant Mgmt
- EAC1: Optimize Energy Performance-Lighting Power
- EAC2: Optimize Energy Performance-Lighting Controls
- EAC3: Optimize Energy Performance-HVAC
- EAC4: Optimize Energy Performance-Occupancy Sensors
- EAC5: Enhanced Commissioning

MATERIALS AND RESOURCES

- MR1: Storage and Collection of Recyclables
- MR2: Tenant Space Long-Term Commitment
- MR3: Construction Waste Mgmt
- MR4: Materials Reuse-Furniture and Furnishings
- MR5: Regional Materials
- MR6: Rapidly Renewable Materials
- MR7: Certified Wood

REGIONAL PRIORITY CREDITS

- MR3: Alternative Transportation-Bicycle Storage and Changing Room
- MR4: Water Use Reduction
- MR5: Materials Reuse
- MR6: Regional Materials

TOTAL

76 OF 110

More Information

- Harvard Faculty of Arts and Sciences: [http://www.fas.harvard.edu/home/](http://www.fas.harvard.edu/home/)
- Sustainability at Harvard: [http://green.harvard.edu/](http://green.harvard.edu/)