



Sustainability Case Study
Hall of Science



A LEADER IN SUSTAINABILITY

- Energy Efficiency
- Water Stewardship
- Waste Reduction
- Greenhouse Gas Reduction



Background

Owner / The American University
Architect + Engineer / Ballinger
Civil Engineer / Wiles Mensch Corporation
LEED / Sustainable Design Consulting
Contractor / Whiting Turner



**LEED
Gold**

The Hall of Science received LEED Gold certification under LEED version 2009. The three-story, 125,000 square foot Hall of Science is home to the departments of biology, environmental science, chemistry, and neuroscience. The building includes commons for casual seating, study rooms, collaboration space, the Pennie and Gary Abramson Discovery Hall, as well as the Hall of Science research labs. The building and its amenities were designed to support collaborative work and provide plenty of space for students to gather and study. The gathering spots throughout the building are designed to encourage interdisciplinary interaction and encourage partnerships. The Hall of Science creates space for symposia, workshops, lectures, and special events. The glass façade provides transparency to the labs on campus and allows passersby the opportunity to witness experiments in progress. The sciences are currently the fastest-growing area of undergraduate study—the College of Arts and Sciences faculty have recently grown their research funding by more than 100%, securing more than 50 unique awards from the National Institutes of Health and National Science Foundation and this new home will support that continued growth and expanding research.

Time-lapse of construction:

<https://app.oxblue.com/open/WT/Americanuni>





High-Performance Glazing

Allows visible light transmittance with reduced infrared heat gain enabling views onto nature from research labs.



Low Energy Lighting

LED lighting and daylight harvesting throughout



Integral Shading

Curtain wall designed to provide solar shading and reduce glare.

Site Redevelopment

Transforming former surface parking lot into the building and surrounding open space to reduce heat island effect and increase natural habitat



Daylight and Views

Thin floorplate allows balanced daylight penetration and ubiquitous views to the exterior



Dedicated Outdoor Air System Ventilation

Includes total energy recovery and chilled beam cooling



Bioswale

Landscape and roof stormwater captured on site. Native planting landscape eliminated the need for irrigation.



Outdoor Gathering Space

Design creates a microclimate for comfortable outdoor social spaces during shoulder seasons.

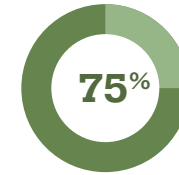
Electric Vehicle Charging Station

Encourage clean transportation





Sustainable Sites



shading and
green space
coverage

Located not far from the main quad on campus, the Hall of Science building lies on a former parking lot. Landscaping on the building site provides shade and green spaces across more than 75% of the space, which aids in decreasing the heat island effect. Heat islands are created when areas with limited vegetation and an abundance of roofs are hotter than the surrounding areas that do have vegetation. Additionally, overall parking on the campus was decreased with the addition of the building and an additional electric vehicle charging station was added to facilitate sustainable transportation. AU also operates a shuttle to the metro and several WMATA bus lines run through the campus which further increases access to public transit and decreases reliance on personal vehicles.

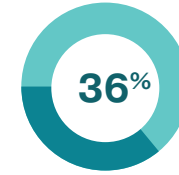
American University's campus is within easy walking distance to cafés, residence halls, the campus library, gym, UPS store, Kay Spiritual Life Center, cleaners, grocery, pharmacy, and university food options. Having easy access to daily necessities decreases reliance on cars and decreases pollution and greenhouse gas emissions from cars.

Exterior lighting helps to reduce light pollution through the use of fixtures that direct the light down toward the ground and do not allow excess light to point up to the sky.





Water

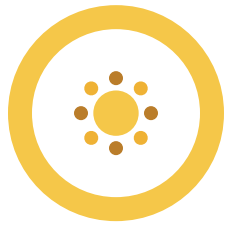


**less water
used than
an average
building**

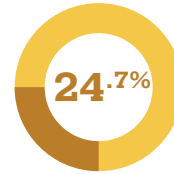
Thanks to efficient water management features in the building, including low flow taps and dual flush toilets, the Hall of Science uses 36% less water than a building with traditional water fixtures. These water conservation techniques reduce pressure on local freshwater sources and reduce the amount of wastewater that will require treatment after leaving campus.

Outside the building, runoff is reduced through several features. A large on-site basin captures site runoff including half of the runoff from the roof. The basin is located underground and is covered with natural landscaping. Additionally, curb cuts along the road adjacent to the building allow runoff to flow from the road into bioretention areas where the water can seep back into the ground rather than flowing directly into storm drains. The site landscaping features native and adaptive species which do not require any irrigation.

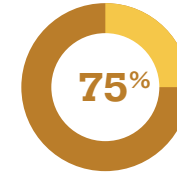




Energy



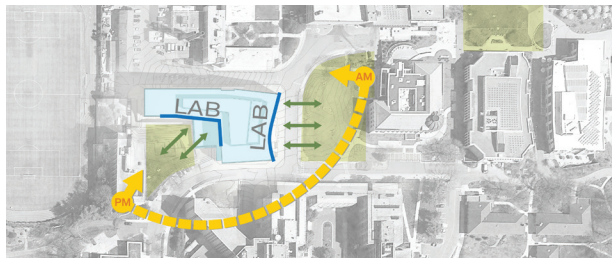
less energy used than an average building



shading and green space coverage

The building uses 24.7% less energy than the average building its size due to several factors. Chilled beam technology provides efficient heating and cooling to the building. Dual enthalpy energy wheel technology allows the building to conserve energy despite that laboratories require more airflow than a typical building. The energy wheels allow incoming air to be preheated or cooled by capturing heat energy from the outgoing air and transferring it to the incoming air. The glass façade on the building uses insulated glass technology and special high-performance solar control coating which reduces solar energy entering the space by 75% and blocks UV light.

Additional energy savings came from fundamental and enhanced commissioning which ensures that all systems in a building are operating as efficiently as possible. All of American University, including the Hall of Science, uses green power through a combination of on and off-campus solar and Renewable Energy Credits or RECs. American University has been carbon neutral since 2018. This achievement is the result of efficiency, behavior change, green power, and carbon offsets.

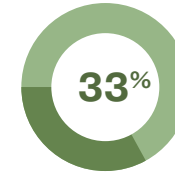




Materials



recycled
materials



locally sourced
materials

Careful consideration of materials procurement and waste management on the construction site can reduce environmental impacts in multiple ways. Throughout the construction process, 87% of construction waste was diverted from landfills. The building also includes zero waste stations throughout which align with AU's campus zero waste goals by providing recycling, compost, and trash bins across campus.

Through the use of recycled materials, the building used less virgin material which decreased the impacts of extraction and processing for raw materials. About 18% of the building materials (by cost) are recycled. Roughly 33% of the building materials were locally sourced which reduces environmental impacts from transporting materials. 95% of the wood used in the Hall of Science is Forestry Stewardship Council certified, ensuring that the wood products are sourced from forests that are properly managed and are manufactured responsibly.





Indoor Environmental Quality (IEQ)

Creating healthy indoor environments requires attention to building airflow, exposure to pollutants, and the use of healthy building materials. University policy prohibits smoking on campus, which prevents exposure of campus guests to secondhand smoke. Campus visitors therefore have less exposure to known carcinogens produced by the burning of cigarettes, pipes, or cigars which pose health risks such as lung disease, cancer, and heart disease.

The installation of a carbon dioxide monitoring system ensures that the ventilation system maintains appropriate levels of airflow depending on room occupancy.

Low VOC adhesives, sealants, paints, floor systems, and composite wood limits occupant exposure to irritating VOCs. Walk-off mats at each entrance are at least 10 feet long which helps capture particulate matter from shoes preventing it from creating dust in the space.

The building also provides controls for both lighting and thermal comfort that occupants can adjust.





Innovation in Design

American University's Hall of Science received additional recognition under the innovation in design and regional priority sections of LEED. The project earned exemplary performance for public transportation access. Located along several bus routes and because AU operates a shuttle, the Hall of Science offers at least four times the amount of public transit required by LEED which has shown to double ridership on transit. Exemplary performance was also awarded for using 100% renewable energy. The building lighting is completely LED, which allowed the project to earn an innovation in design credit for reduced mercury in lamps. Construction and demolition recycling rates were verified earning a pilot credit for the project as well. Finally, an exhaust dispersion analysis was performed to ensure that exhaust exiting the building was not reentering through intakes, earning a final innovation in design credit. In addition, the Hall of Science also received two regional priority credits for protecting or restoring habitat and for stormwater quantity control.





LEED Scorecard



Sustainable Sites

23/26

SSp1	Construction activity pollution prevention	0 / 0
SSc1	Site selection	1 / 1
SSc2	Development density and community connectivity	5 / 5
SSc3	Brownfield redevelopment	1 / 1
SSc4.1	Alternative transportation - public transportation access	6 / 6
SSc4.2	Alternative transportation - bicycle storage and changing rooms	0 / 1
SSc4.3	Alternative transportation - low-emitting and fuel-efficient vehicles	3 / 3
SSc4.4	Alternative transportation - parking capacity	2 / 2
SSc5.1	Site development - protect or restore habitat	1 / 1
SSc5.2	Site development - maximize open space	1 / 1
SSc6.1	Stormwater design - quantity control	1 / 1
SSc6.2	Stormwater design - quality control	0 / 1
SSc7.1	Heat island effect - nonroof	1 / 1
SSc7.2	Heat island effect - roof	0 / 1
SSc8	Light pollution reduction	1 / 1



Water

7/10

WEp1	Water use reduction	0 / 0
WEc1	Water efficient landscaping	4 / 4
WEc2	Innovative wastewater technologies	0 / 2
WEc3	Water use reduction	3 / 4



Energy

13/35

EAp1	Fundamental commissioning of building energy systems	0 / 0
EAp2	Minimum energy performance	0 / 0
EAp3	Fundamental refrigerant management	0 / 0
EAc1	Optimize energy performance	8 / 19
EAc2	On-site renewable energy	0 / 7
EAc3	Enhanced commissioning	2 / 2
EAc4	Enhanced refrigerant management	0 / 2
EAc5	Measurement and verification	1 / 3
EAc6	Green power	2 / 2



Materials

6/14

MRp1	Storage and collection of recyclables	0 / 0
MRC1.1	Building reuse - maintain existing walls, floors and roof	0 / 3
MRC1.2	Building reuse - maintain interior nonstructural elements	0 / 1
MRC2	Construction waste management	2 / 2
MRC3	Materials reuse	0 / 2
MRc4	Recycled content	1 / 2
MRC5	Regional materials	2 / 2
MRc6	Rapidly renewable materials	0 / 1
MRc7	Certified wood	1 / 1



Indoor Environmental Quality (IEQ)

13/15

EQp1	Minimum indoor air quality performance	0 / 0
EQp2	Environmental Tobacco Smoke (ETS) control	0 / 0
EQc1	Outdoor air delivery monitoring	1 / 1
EQc2	Increased ventilation	1 / 1
EQc3.1	Construction IAQ management plan - during construction	1 / 1
EQc3.2	Construction IAQ management plan - before occupancy	1 / 1
EQc4.1	Low-emitting materials - adhesives and sealants	1 / 1
EQc4.2	Low-emitting materials - paints and coatings	1 / 1
EQc4.3	Low-emitting materials - flooring systems	1 / 1
EQc4.4	Low-emitting materials - composite wood and agrifiber products	1 / 1
EQc5	Indoor chemical and pollutant source control	1 / 1
EQc6.1	Controllability of systems - lighting	1 / 1
EQc6.2	Controllability of systems - thermal comfort	1 / 1
EQc7.1	Thermal comfort - design	1 / 1
EQc7.2	Thermal comfort - verification	1 / 1
EQc8.1	Daylight and views - daylight	0 / 1
EQc8.2	Daylight and views - views	0 / 1



Innovation

6/6

IDc1	Innovation in design	+ 5
IDc2	LEED Accredited Professional	+ 1



Regional Priority Credits

2/4

SSc5.1	Site development - protect or restore habitat	+ 1
SSc6.1	Stormwater design - quantity control	+ 1