2018 SUSTAINABILITY REPORT
Harvard Medical School
HARVARD UNIVERSITY
SUSTAINABILITY PLAN

- Water Conservation Measures
- Longwood Reuse Room reopened!
- Freecycle and E-waste collection
- Waste diversion efforts
- Healthier Building Materials Academy

- Sustainable Meeting and Event Guide
- Bike Fair
- Take the Stairs Campaign

EMISSIONS AND ENERGY

- ... 
- HMS Facilities Energy Manager Green Hero recognition
- ULT Freezer preventative maintenance
- HMS Facilities external presentations

CAMPUS OPERATIONS

- Countway Community Garden
- Arnold Arboretum Tour

NATURE AND ECOSYSTEMS

- SEAM student org.
- Green Lab Certification
- Sustainable Student Event Fund
- Earth Month Sustainability Fair
- Commencement & White Coat Waste Diversion
- Lighting Fairs

HEALTH AND WELL-BEING

CULTURE AND LEARNING
Harvard University Announced Science-based climate goal

HARVARD’S CLIMATE ACTION PLAN:

FOSSIL FUEL-FREE BY 2050

FOSSIL FUEL-NEUTRAL BY 2026

green.harvard.edu/climate
Climate change threatens public health and doctors’ ability to provide care

Decarbonizing Health Care

*Harvard Medical School, teaching hospitals, clinical institutes sign joint commitment to reduce greenhouse gas emissions*
Harvard Medical School and HMS Affiliates Announced Decarbonization Commitment

Participating hospitals, groups and clinical institutes:

- Beth Israel Deaconess Medical Center (Signatory: Kevin Tabb, CEO, and Pete Healy)
- Partners Healthcare (Signatory: David Torchiana, CEO)
- Boston Children’s Hospital (Signatory: Sandra Fenwick, CEO)
- Cambridge Health Alliance (Signatory: Patrick Wardell, CEO)
- Dana-Farber Cancer Institute (Signatory: Laurie Glimcher, CEO)
- Joslin Diabetes Center (Signatory: Peter Amenta, CEO)
- Harvard Medical School (Signatory: George Q. Daley, Dean)
Emissions and Energy

HMS GREENHOUSE GAS EMISSIONS REDUCTION PROGRESS

HMS GHG Emissions by Category

Electricity  Fugitive Emissions  Stationary Combustion  Steam  Chilled Water  Mobile Combustion

2006 baseline to 2018: -23.7 %

*Metric Tonnes GHG = Metric Tons of Carbon Dioxide Equivalents
Fugitive Emissions - Pollutant released into air from leaks in equipment, pipe-lines, seals, valves, etc.
Stationary Combustion - A fixed-site producer of GHG, mainly power plants and other facilities using
## Emissions and Energy

**HMS ENERGY USAGE KBTU/FT² BY BUILDINGS**

<table>
<thead>
<tr>
<th>Buildings</th>
<th>KBTU/ft²</th>
<th>Buildings</th>
<th>KBTU/ft²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gordon Hall</td>
<td>146.57</td>
<td>LHRBB</td>
<td>317.03</td>
</tr>
<tr>
<td>Goldenson</td>
<td>247.47</td>
<td>Mudd</td>
<td>452.15</td>
</tr>
<tr>
<td>C Building</td>
<td>212.23</td>
<td>Warren Alpert</td>
<td>327.72</td>
</tr>
<tr>
<td>Armenise</td>
<td>208.05</td>
<td>Vanderbilt</td>
<td>102.63</td>
</tr>
<tr>
<td>Modell</td>
<td>260.17</td>
<td>Countway</td>
<td>178.67</td>
</tr>
<tr>
<td>TMEC</td>
<td>208.49</td>
<td>Dental total</td>
<td>303.56</td>
</tr>
<tr>
<td>180 Longwood</td>
<td>118.82</td>
<td>NRB</td>
<td>253.87</td>
</tr>
</tbody>
</table>

**Total** | **243.17**
## HMS energy savings
5 common/central strategies

<table>
<thead>
<tr>
<th></th>
<th>Energy Audits</th>
<th>Determine and evaluate opportunities</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Preventative Maintenance</td>
<td>Regular upkeep and performance enhancement of existing equipment</td>
</tr>
<tr>
<td>3</td>
<td>Corrective Maintenance</td>
<td>Remediation of faults or performance deficiencies that were identified</td>
</tr>
<tr>
<td>4</td>
<td>Energy Efficiency Upgrades</td>
<td>Larger-scale project with energy/resource savings – typically equipment upgrades or replacements</td>
</tr>
<tr>
<td>5</td>
<td>Data Management and Analytics</td>
<td>Improve troubleshooting and predictions of campus energy use</td>
</tr>
</tbody>
</table>
## ENERGY AUDITS

**4 HMS buildings**

<table>
<thead>
<tr>
<th>COUNTWAY LIBRARY</th>
<th>GORDON HALL</th>
</tr>
</thead>
<tbody>
<tr>
<td>GOLDENSON</td>
<td>NEW RESEARCH BUILDING</td>
</tr>
</tbody>
</table>

- **40** energy conservation measures (ECM) identified
- **$19k** average utility cost savings per ECM
- **$775k** total estimated utility cost savings
- **4.4yrs** average simple payback
EMISSIONS AND ENERGY

ENERGY AUDITS

4 HMS buildings

COUNTWAY LIBRARY
GOLDENSON

GORDON HALL
NEW RESEARCH BUILDING

Potential savings

3,255,000 electricity (kWh)

3,325 steam (mmBTU)

175,000 chilled water (ton-hours)

393,000 water and sewer saved (cubic feet)

*Estimated savings if all ECMs fully implemented as proposed.
*Estimates based on EPA GHG equivalencies calculator
EMISSIONS AND ENERGY

ENERGY CONSERVATION
PREVENTATIVE MAINTENANCE PROGRAMS
STEAM TRAP TESTING

1,288 steam traps surveyed
82.4% steam traps in good working order
<4% leaking, blowing, or plugged traps

3,970,000 estimated pounds of steam lost annually

153 days return on investment (ROI) if all are repaired
HMS Facilities continued a preventative maintenance (PM) program on Harvard-owned Ultra-Low-Temperature (ULT) freezers operating below -65.

In 2018 the program included 268 freezers. PM included replacement of air filters and conditional assessment of the gaskets, condenser coils, evaporators, and temperature alarm points and backup batteries, which are replaced on a 2-3 year timeframe.

Energy savings are associated with keeping freezer coils and filters free of dust, allowing for proper heat exchange. The PM program saves energy while providing a more secure environment for research samples.
## Identified opportunities

<table>
<thead>
<tr>
<th>Number</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>66</td>
<td>Compressed air</td>
<td>Leaks in a compressed air system can waste <strong>20-30%</strong> of the compressor’s</td>
</tr>
<tr>
<td></td>
<td>leaks</td>
<td>output and lead to unnecessary cycling and increased run time.</td>
</tr>
<tr>
<td>5</td>
<td>Steam leaks</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Helium leak</td>
<td>Addressing leaks can increase service life and decrease necessary</td>
</tr>
<tr>
<td></td>
<td></td>
<td>maintenance of equipment.</td>
</tr>
<tr>
<td>1</td>
<td>Nitrogen leak</td>
<td></td>
</tr>
<tr>
<td>1.3</td>
<td>ROI (years)</td>
<td></td>
</tr>
</tbody>
</table>

## Issues remaining

<table>
<thead>
<tr>
<th>Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>
ENERGY EFFICIENCY UPGRADES

SEELEY MUDD VENTILATION OPTIMIZATION

160,000  Total space impacted (sqft)

Annual Savings

10,000  Ventilation (CFM)

42,800  Electricity (kWh)

66,900  Chilled Water (ton-hr)

1,200  Steam (kLB)

The volume of outdoor air being conditioned for the building was optimized.

Flow stations on constant volume air handlers were recalibrated

VFD sequence of operations was modified to maintain ventilation targets.
COUNTWAY LIBRARY VENTILATION OPTIMIZATION

160,000  Total space impacted (sqft)

Annual Savings

30,000  Ventilation (CFM)

41,000  Electricity (kWh)

22,800  Chilled Water (ton-hr)

600  Steam (mmBTU)

The volume of outdoor air being conditioned for the building was optimized.
New minimum CFM settings established for ~210 VAV terminals between floors L1 - 5
“Occupied/Unoccupied” airflow rates were recalibrated and are determined by occupancy sensors or schedule, depending on location.
# Emissions and Energy

## Energy Efficiency Upgrades

### Warren Alpert Ventilation Optimization

<table>
<thead>
<tr>
<th>Quantity</th>
<th>Description</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>286,000</td>
<td>Total space impacted</td>
<td>(sqft)</td>
</tr>
<tr>
<td></td>
<td>Average ventilation redux</td>
<td>(CFM)</td>
</tr>
<tr>
<td>13,000</td>
<td>Electricity</td>
<td>(kWh)</td>
</tr>
<tr>
<td>41,000</td>
<td>Chilled Water</td>
<td>(ton-hr)</td>
</tr>
<tr>
<td>94,000</td>
<td>Steam</td>
<td>(mmBTU)</td>
</tr>
<tr>
<td>1,400</td>
<td>Humidification water</td>
<td>(Gals)</td>
</tr>
</tbody>
</table>

The volume of outdoor air being conditioned for the building was optimized. New minimum CFM settings established for ~120 VAV terminals between floors 1 - 5. “Occupied/Unoccupied” airflow rates were recalibrated and are determined by occupancy sensors or schedule, depending on location.
HMS rolled out new energy dashboards to facilitate operational improvements and transparency to the HMS community.

The current Campus Energy Consumption dashboard depicts actual and historical energy consumption that can be displayed in a variety of equivalent energy units (i.e. oil, trees, cars).

The new Campus Energy Heat Map is used to efficiently convey energy performance to building operators, letting them know if buildings are within-expected range or trending higher, thereby instigating investigation.
HMS Facilities presented to an array of audiences at several venues:

- International Institute for Sustainable Laboratories (I2SL)
- Nanyang Technical University, Singapore
- Cambridge Compact
- Harvard’s Energy and Sustainability Professionals Network (ESPN)
- Harvard’s Sustainability and Energy Management Council
HMS Facilities Energy Manager Received Harvard Hero for Commitment to Sustainability

Don has since taken on a role as the Facilities Operations Leader at the new Bill and Melinda Gates Medical Research Institute based in Cambridge. We wish him and the organization the best in achieving their mission!
HEALTHIER BUILDING MATERIALS STRATEGY

Teams from HMS and HSPH joined presentations by faculty researchers and campus sustainability leaders regarding strategies to eliminate potentially hazardous chemicals from building materials and finishes.

Capital projects and construction teams begin implementing healthier building materials strategies by purchasing Healthier Hospital Initiative compliant furniture and evaluating existing product lines to evaluate compliance and identify potential alternatives where products were non-compliant.

HMS Labs began piloting low-flow lab-faucet aerators

HMS is investigating sterilizer and glass washing efficiency measures.
HMS continues to implement waste bin standardization across the campus.

Compost was expanded to bathrooms across campus, allowing paper towels to be diverted from the waste stream.

Global markets impacted recycling guidelines, restricting laboratory plastics to trash. Facilities and Custodial teams continue to engage labs and the HMS community to minimize contamination.

WE’VE GOT A GOAL to reduce waste per capita 50% by 2020 from a 2006 baseline, with the aspirational goal of becoming a zero-waste campus.
HARVARD GREEN IT STANDARDS RELEASED

HARVARD UNIVERSITY SUSTAINABLE IT STANDARDS

December 2017

For more information:
https://green.harvard.edu/sites/green.harvard.edu/files/SustainableITStandards.pdf
FREECYCLE AND E-WASTE COLLECTION CAMPAIGN

HMS hosted bi-annual freecycles, organized by EcoOpportunity, where lab, office, and personal items are made available for reuse to all members of the community.

The Longwood Campus also participated in a University-wide effort in collaboration with IT Security to collect personal and University electronic waste for free.

Over 9,000lbs of e-waste was collected across Harvard – a substantial amount of which came from the Longwood campus.

Secure + Sustainable
Free Electronics Recycling

Safely and securely recycle personal and University electronics for free. No limits. Any location. Certificate of Secure Destruction available.

April 25 11:00 - 1:30 Chan SPH Kresge Building Atrium
April 26 8:30 - 3:00 HMS Courtyard Café

Computer equipment | routers | keyboards | mouse | printers | scanners | fax machines | credit card machines | telephones | mobile phones | answering systems | cameras | surveillance equipment | stereos | video equipment | gaming equipment | cables | power cords | wiring capacitors | diodes | resistors | transistors and more

Not accepted: refrigerators, washing machines, dryers, AC units, CRT monitors, televisions, loose batteries
REOPENED LONGWOOD CAMPUS REUSE ROOM!

LONGWOOD CAMPUS REUSE ROOM

REOPENING NOVEMBER, 2018!
OPEN TO HARVARD’S LONGWOOD COMMUNITY

Help green your lab, office, and life by REUSING AND SHARING equipment!

SPH Bldg.1 Loading Dock – Room SB-01
Open Wednesdays from 12:30-2pm

WE’VE GOT A GOAL to reduce waste per capita 50% by 2020 from a 2006 baseline, with the aspirational goal of becoming a zero-waste campus.

ACCEPTED ITEMS

- LAB EQUIPMENT
- ELECTRONICS
- OFFICE SUPPLIES
- HOME ITEMS
NATURE AND ECOSYSTEMS

COUNTWAY COMMUNITY GARDEN

- Increased programming and budgetary support from HMS.
- Purchased new garden beds.
- Annual Fall Harvest festival
- Annual Summer Garden Gathering

For more information:
https://www.hsph.harvard.edu/news/features/countway-harvest/
BI-ANNUAL TOUR OF HARVARD’S ARNOLD ARBORETUM
Healthy Eating: Nutrition and Sustainability

**HEALTHY EATING PLATE**

- **HEALTHY OILS**
  - Use healthy oils (like olive and canola oil) for cooking, on salad, and at the table. Limit butter. Avoid trans fat.

- **VEGETABLES**
  - The more veggies – and the greater the variety – the better. Potatoes and French fries don’t count.

- **WHOLE GRAINS**
  - Eat a variety of whole grains (like whole-wheat bread, whole-grain pasta, and brown rice). Limit refined grains (like white rice and white bread).

- **FRUITS**
  - Eat plenty of fruits of all colors.

- **HEALTHY PROTEIN**
  - Choose fish, poultry, beans, and nuts; limit red meat and cheese; avoid bacon, cold cuts, and other processed meats.

- **WATER**
  - Drink water, tea, or coffee (with little or no sugar). Limit milk/dairy (1-2 servings/day) and juice (1 small glass/day). Avoid sugary drinks.

**STAY ACTIVE!**

© Harvard University

Harvard T.H. Chan School of Public Health
The Nutrition Source
www.hsph.harvard.edu/nutritionsource

Harvard Medical School
Harvard Health Publications
www.health.harvard.edu

Sustainable and Healthful Food Standards Working Group

Participation in MASCO’s Farm to LMA

Sustainable food sourcing through Restaurant Associates

Harvard #FoodBetter Conference
Healthy Eating: Nutrition and Sustainability

Sustainable Meeting and Event Guide Launched

HMS Dining Services’ catering menu includes a variety of compliant menu options for any meeting or event.

For more information: https://green.harvard.edu/campaign/sustainable-meeting-and-event-guide
**Take the Stairs**

TAKE THE STAIRS CONTINUED ACROSS HARVARD UNIVERSITY
INCLUDED CLIMBERS FROM ALL 13 SCHOOLS AND INSTITUTIONS AT HARVARD

- **2016:** 577 Participants | 58 teams reached Meru’s summit!
- **2017:** 1,128 Participants | 229 teams reached Pierce Peak 4x
- **2018:** 617 Participants | 114 teams traversed NH’s Presidential Range

Refreshed the TtS website

Participants engaged on social media from across the world!

**1.37 flights or 20 million feet “climbed”**
The Longwood Campus has over **900 bike racks**!

The Harvard Longwood Bicyclists engages stakeholders across the Longwood Campus with **over 1,500 members**. The group advocates for advancement in bike-friendly infrastructure and parking, provides safety and learn-to-bike lessons for the Harvard community,

- New bike racks in bike cages
- Annual Bike Fair
LAUNCHED: Harvard Green Lab Certification

https://green.harvard.edu/news/green-lab-certification-program-launches-longwood-medical-campus
Green Lab Certification

- Systematic, self-directed assessment
- Designed for all lab-types
- Engages all lab members
- Tiered Certification (Leaf 1-4)

https://green.harvard.edu/news/green-lab-certification-program-launches-longwood-medical-campus
Green Lab Certification

3 HMS labs certified as of 12/18

- ICCB-L – Leaf 4
- Genetics Media Prep and Glass Washing – Leaf 4
- Harper Lab, Cell-Bio – Leaf 3

https://green.harvard.edu/news/green-lab-certification-program-launches-longwood-medical-campus
HMS Students for Environmental Awareness in Medicine (SEAM)

“We have a moral obligation to mobilize and address climate change, as we treat and will continue to treat patients impacted by it.” – Shadaab Kazi, HMS ‘21

Environmental medicine brings climate change to forefront

https://news.harvard.edu/gazette/story/2018/05/medical-school-students-address-environmental-issues-from-physicians-perspective/
HMS Students for Environmental Awareness in Medicine (SEAM)

At a panel discussion at the Medical School, members of Students for Environmental Awareness in Medicine, including event planner Shadaab Kazi, gave the physicians' perspective on how environmental issues will impact human health. Photos by Kris Snibbe/Harvard Staff Photographer

https://green.harvard.edu/news/green-lab-certification-program-launches-longwood-medical-campus
EcoOp’s Sustainable Student Event Fund Launched Fall ’18

The fund provides supplemental funding to student organizations towards meetings or events that wish to comply with the Sustainable Meeting and Event Guide and/or are focused on topics pertaining to climate, sustainability, and health.

For more information: https://green.harvard.edu/longwoodeventfund
EcoOpportunity, Longwood’s green team, led efforts throughout the year that engaged the entire Longwood campus community.

HMS Commencement & White Coat Ceremony
Waste Ambassadors
HMS: 50 attendees participated, that purchased 708 products. In addition, we also raised $215 for the Mass Fallen Hero Campaign.

HSPH: 42 attendees participated, that purchased 646 products. In addition, we also raised $215 for the Mass Fallen Hero Campaign.
<table>
<thead>
<tr>
<th>Event Description</th>
<th>Plan Focus Area</th>
<th>Date</th>
<th># of attendees</th>
</tr>
</thead>
<tbody>
<tr>
<td>Summer Garden Gathering</td>
<td>Nature &amp; Eco., Culture &amp; Learning</td>
<td>June 2018</td>
<td>200 Community Members</td>
</tr>
<tr>
<td>Commencement 2018, White Coat Ceremony</td>
<td>Campus Operations</td>
<td>May 2018</td>
<td>20 Waste Diversion Ambassadors</td>
</tr>
<tr>
<td>Take the Stairs</td>
<td>Health &amp; Wellbeing</td>
<td>April 2018</td>
<td>+600 Community members, + 1.4 million flights of stairs</td>
</tr>
<tr>
<td>Earth Day Sustainability Fairs</td>
<td>Culture &amp; Learning</td>
<td>April 2018</td>
<td>+250 Community members</td>
</tr>
<tr>
<td>Longwood Bicyclist Events: Bike Breakfast, Maintenance Classes</td>
<td>Health &amp; Wellbeing</td>
<td>Sept. 2017, Sept. 2018</td>
<td>+300 Community members</td>
</tr>
<tr>
<td>Annual Campus Bike Fair</td>
<td>Campus Operations</td>
<td>September 2017, 2018</td>
<td>+300 Community members</td>
</tr>
<tr>
<td>Countway Garden Harvest Festival</td>
<td>Nature &amp; Ecosystems</td>
<td>September 2017, 2018</td>
<td>150 Community members</td>
</tr>
<tr>
<td>EcoOpportunity Monthly Meetings</td>
<td>Culture &amp; Learning</td>
<td>Monthly</td>
<td>5-10 participants monthly</td>
</tr>
</tbody>
</table>
Spring 2018 Freecycles at HMS and HSPH

greenharvard • Following
Harvard Medical School

greenharvard You never know what you’ll find at a Harvard Freecycle! At today’s @harvardmed event, Willy Lensch, Dean Daley’s Chief of Staff, who has his PhD in Molecular and Medical Genetics, found this book on Eponymous Syndromes and Diseases.

#GreenHarvard #Harvard #harvardmedicalschool #sustainability #freecycle #reuse #reducewaste #anothermanstrashisanothermanstreuasure

willy.lensch I was THRILLED to find this BOOK!

APRIL 26, 2018

Liked by harvardchansph and 140 others
Fall 2018 Freecycles at HMS and HSPH

greenharvard There were lots of great finds and smiling faces at today's @harvardchansph freecycle! #Reuse events like this are held across Harvard throughout the year in offices, dorms and labs to encourage people to donate items to be rediscovered by others rather than ending up in the trash.

wellwithmike Love it! How often do you all hold events like these and where do you advertise them?

adamjmeier @wellwithmike generally they're held twice/year - once during fall and once during spring semesters. HMS and HSPH hold them on back-to-back days.

adamjmeier @wellwithmike we also reopened the Longwood Reuse Room in HSPH Bldg. 1 loading dock. open Wed.

OCTOBER 24, 2018

Add a comment...
HMS Facilities, Green Office Re-Certification, May 2018

greenharvard Shout out to our friends in the @HarvardMed Facilities Department on their re-certification of Leaf 4 Green Office, the highest level of achievement!

Thank you for all you do to encourage sustainability on the HMS campus, and for "practicing what you preach" in your own offices.

#GreenHarvard #Harvard #HarvardMed #GreenOffice #Sustainability #LearnItLivelIt #SaveEnergy #ReduceWaste #ActOnClimate
HMS External Education, October 2018

Congratulations to @harvardmed Office for External Education for achieving Green Office Leaf Level Two recognition! They are now working on a green team video to educate their colleagues about waste reduction.
green.harvard.edu

@GreenHarvard

EcoOpportunity: goo.gl/ke8u1m

Sustainability Plan
www.green.harvard.edu/plan

Sustainability Report
www.green.harvard.edu/report

Living lab
www.green.harvard.edu/livinglab