Harvard Medical School

2022 Sustainability Report

HMS sustainability

October 2023

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Campus Planning & Facilities: Our Sustainability Mission

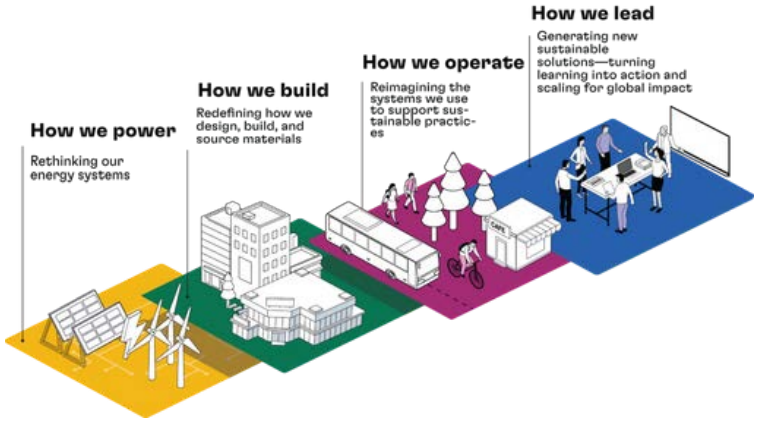
Harvard Medical School's Annual Campus Planning & Facilities (CP&F) 2022 Sustainability Report showcases departmental efforts to embrace sustainability while prioritizing the health and safety of our campus community.

This report outlines the Harvard University Sustainability Action Plan's objectives and how they apply to the School. We highlight ongoing efforts to mitigate the HMS carbon footprint, providing a detailed account of our progress on emissions reduction. This includes an overview and update of our strategies to decarbonize in the coming years, including the investigation of alternative energy sourcing.

It is clear that a vital aspect of our sustainability journey lies in optimizing campus energy usage. We present an array of energy projects completed in 2022 as part of the CP&F annual energy conservation plan, each aimed at reducing our overall energy consumption and fostering a greener, more efficient campus. We also provide an update on our waste disposal, water consumption, and other operational strategies for the year, also key components of the School's sustainability program. Campus Planning & Facilities remains dedicated to upholding University-wide sustainability pledges, reducing our environmental footprint, and supporting essential research operations.

HU Sustainability Action Plan

In May 2023, the Office for Sustainability released an update to the Harvard University Sustainability Action Plan, first adopted in 2014. The newly updated plan uses a new framework for sustainability, where all actions and priorities are centered holistically around three pillars: climate, equity, and health. Harvard's vision of sustainability strategies and solutions, focused on intergenerational wellbeing and equity, are divided into four critical areas: **how we power**, **how we build**, **how we operate**, and **how we lead**.



The plan's major objective remains "Goal Zero", which was established in 2018, aiming to completely phase out reliance on fossil fuels for heating, cooling, and powering buildings and vehicles campus-wide by 2050. This entails zero fossil fuel usage across campus, including both direct and indirect emissions, without any offsets. As an interim milestone towards this goal, Harvard has also committed to achieving fossil fuel neutrality by 2026. Meeting fossil fuel-neutral by 2026 will involve reducing fossil fuel consumption as much as possible and using renewable energy purchases and projects to completely eliminate remaining Scope 1 and Scope 2 emissions. These initiatives will consider not only the emissions, but also the health impacts associated with pollution resulting from fossil fuel usage.

The first step in this effort, especially in meeting the CY26 decarbonization goal, is to procure 100% fossil fuel-free electricity. Harvard University is contracting for renewable energy projects locally and elsewhere in the United States to reduce emissions and air pollution. The focus on power is supplemented by its Sustainable Building Standards, the use of environmentally friendly materials in construction, evaluating the broader impacts of goods and services purchased by the University, and integrating equity and well-being throughout.

While Goal Zero is only one aspect of the Sustainability Action Plan, it is one of the most substantial in confronting climate change and in reducing local impacts on greenhouse gases. It has broad impacts across the individual Schools, including Harvard Medical School. Meeting these goals will require a complete transition away from onsite fossil fuel consumption, including emissions from district energy systems, such as the one supporting HMS. Using this high-level framework, including its standards, objectives, and strategies presents a valuable opportunity for HMS Facilities to prioritize and strategize for embracing sustainability across all aspects of operations.

Read the plan here: https://sustainable.harvard.edu/our-plan/

Carbon Commitments and Regulations

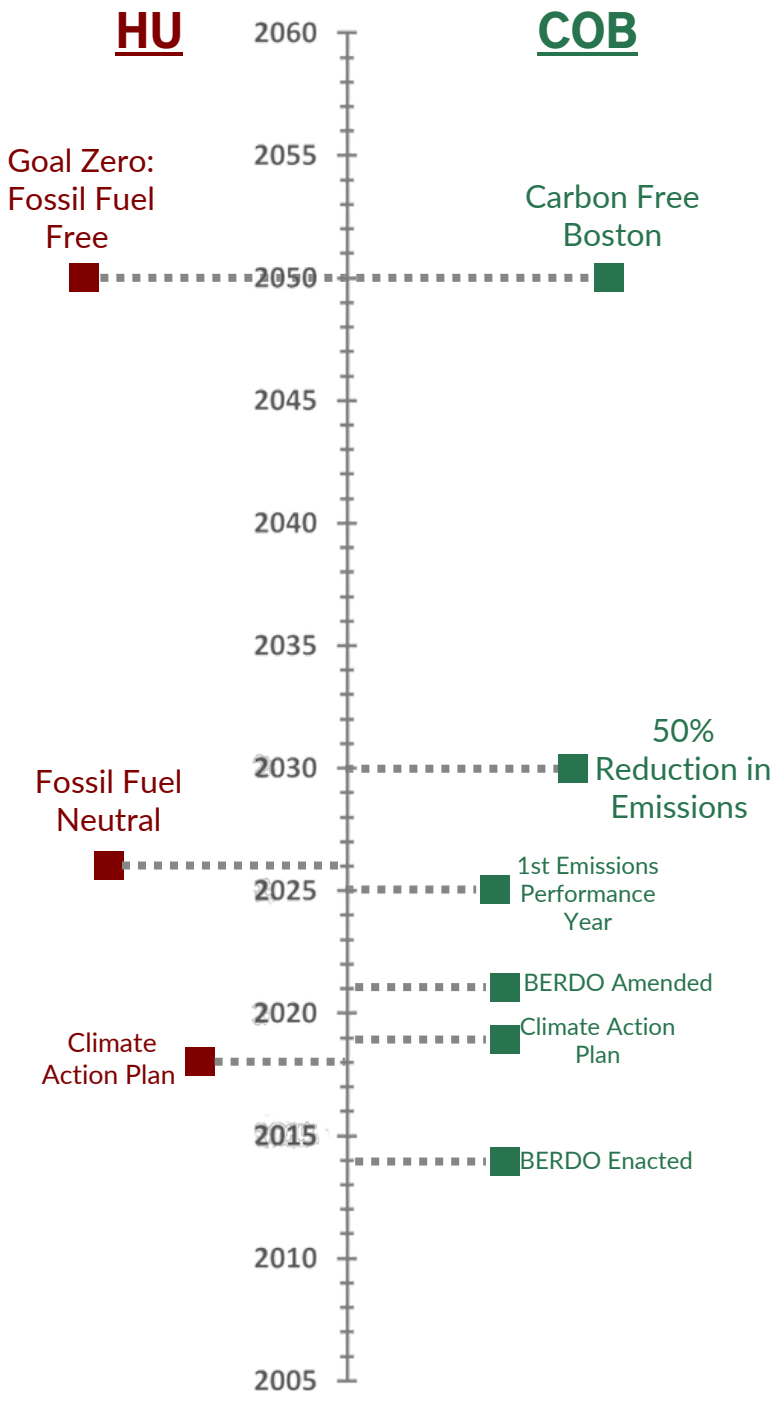
HMS is dedicated to assisting in achieving both Harvard University's Sustainability and Climate Action Plan commitments and fulfilling the City of Boston's carbon reduction requirements. Putting the two together produces the following timeline for HMS:

Harvard University's Sustainability Action Plan

In 2018, Harvard University committed to completely phase out its reliance on fossil fuels for heating, cooling, and powering buildings and vehicles across all campuses by the year 2050, now known as "Goal Zero". On the way towards the 2050 goal is an interim commitment in 2026 for achieving fossil fuel neutrality.

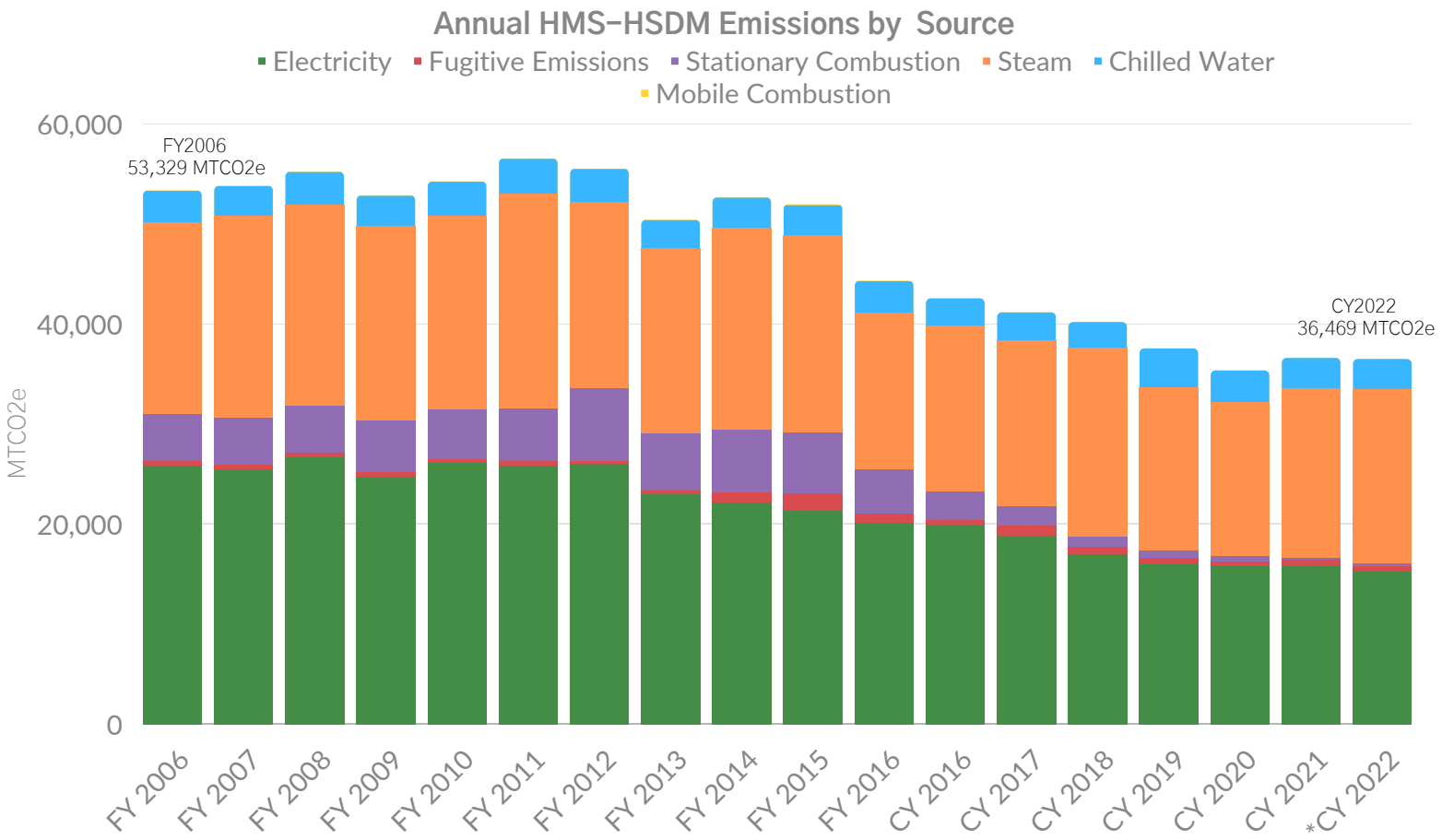
City of Boston

The City of Boston's Climate Action Plan pledges to achieve a 50% reduction in emissions by 2030 and carbon neutrality by 2050. A pivotal tool in this endeavor is the Building Energy and Reporting Disclosure Ordinance (BERDO). Originally established in 2014 for energy reporting, BERDO evolved into BERDO 2.0 in 2021, mandating building owners to not only report energy consumption but also demonstrate quantifiable reductions in emissions intensity. These reduction targets commence in 2025, escalating every five years and culminating in zero net emissions by 2050.

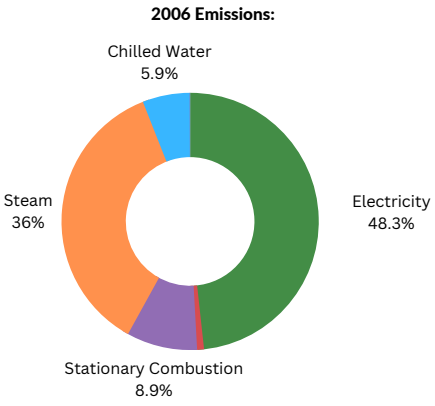


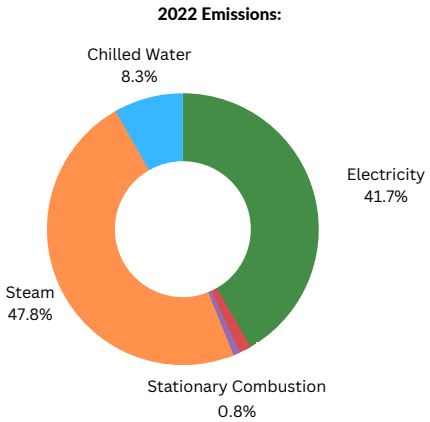
CY22

School Greenhouse Gas Emissions



**Note: CY2022 greenhouse gas emissions factors are based on preliminary data and may undergo revisions as finalized figures become available.*

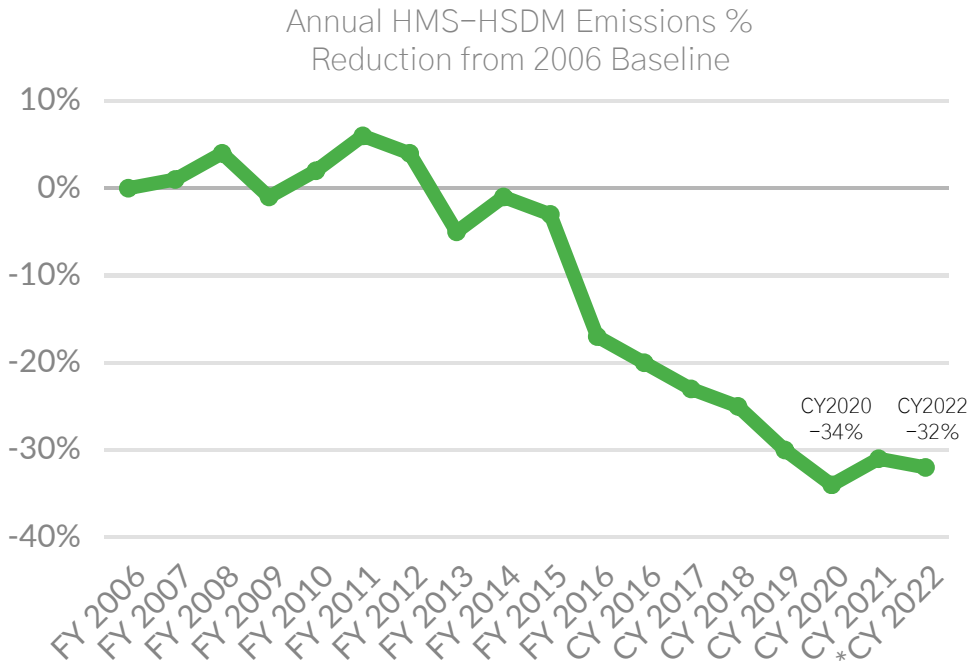




Helpful definitions:

- MTCO2e: metric tons of carbon dioxide equivalent. Equivalent carbon dioxide is a metric that accounts for various greenhouse gases' respective capacities to heat the Earth's atmosphere.
- Fugitive Emissions: Pollutant released into air from leaks in equipment, pipe lines, seals, valves, etc.
- Stationary Combustion: A fixed-site producer of GHG, at HMS, these are mainly facilities using natural gas boilers.

HMS Greenhouse Gas Emissions



As of 2022, HMS has achieved a 32% reduction in emissions from the FY2006 baseline year.

**Note: CY2022 greenhouse gas emissions factors are based on preliminary data and may undergo revisions as finalized figures become available.*

CY2020 greenhouse gas emissions data for the school show a reduction in emissions of 34% from the 2006 baseline data. This reduction reflects the impacts of the COVID-19 pandemic which reduced campus density and disrupted operations. GHG emissions have risen slightly from this decrease as operations began to normalize in 2021 from the disruption, and then resumed to a full campus reopening in 2022. However, despite the return to on-campus teaching and operations, emissions have not returned to pre-pandemic levels, aided by the significant number of energy conservation measures completed on campus in 2021 and 2022. As of 2022, HMS has achieved a 32% reduction in emissions from the FY2006 baseline year.

Looking ahead, the School has scheduled several major energy conservation projects to be completed through CY24 that will achieve additional substantial emissions reductions. projects support other aspects of HMS's emissions reduction strategy working towards HU's 2026 Fossil Fuel Neutrality goal, improving local air quality, and increasing building resiliency in preparing for the effects of climate change. HMS anticipates an additional reduction in building energy consumption of ~10% through 2030 due to the enactment of a campus-wide energy conservation program initiated in early 2021.

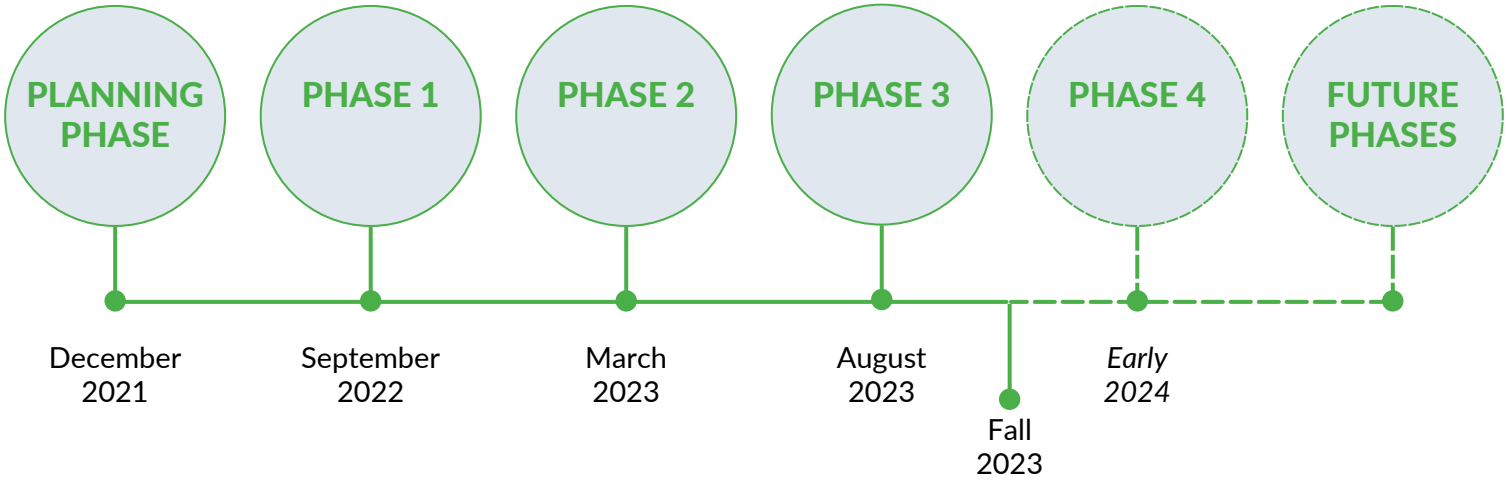
Getting to Goal Zero

HMS Facilities is employing and planning the following efforts to continue the reduction of Scope 1 and Scope 2 greenhouse gas emissions:

- Strategic Energy Management Plan
  - Continue Seeking opportunities for efficiency
  - Energy conservation measures and strategic energy projects with focus on lab environments
  - Operational/Maintenance efficiency
  - Focus on Energy Efficient Design and resiliency measures
- Utility Master Plan
  - Improvements of utility distribution and supply system
  - Implementation of technological advances and alternative energy sources
  - Electrification of heating hot water and steam utility systems
- Decarbonization Compliance Plan
  - Ensure continued compliance with commitments and regulations
- Reduction of carbon intensity of utilities
- Procurement of Renewable Energy Certificates (RECs) to meaningfully invest in renewable electricity and reduce electricity emissions
- Purchase of Carbon Offsets

Utility Master Plan

To meet sustainability and carbon reduction commitments, Facilities is continuing its energy conservation programs, seeking opportunities for further efficiency in its existing buildings, as well as embarking on larger scale investigations for decarbonization solutions. This includes an ongoing Utility Master Plan study initiated in 2022, serving as a comprehensive and actionable planning tool to address HMS's energy consumption and sourcing. The study is split into three phases, with the end goal of enhancing the resiliency of HMS's utility infrastructure and reducing energy consumption through large scale efficiency projects and alternative energy sourcing and decarbonization technologies. **Phases 1**, **2**, and **3** are complete and **Phase 4** is expected to commence in late 2023, with completion in 2024. To meet sustainability and carbon reduction commitments, Facilities is continuing its energy conservation programs, seeking opportunities for further efficiency in its existing buildings, as well as embarking on larger scale investigations for decarbonization solutions.



Phase 1 (complete) involved a thorough assessment of existing campus utility infrastructure and its potential limitations as well as the development of energy models to forecast future demands, supporting business continuity, climate resilience, and campus expansion.

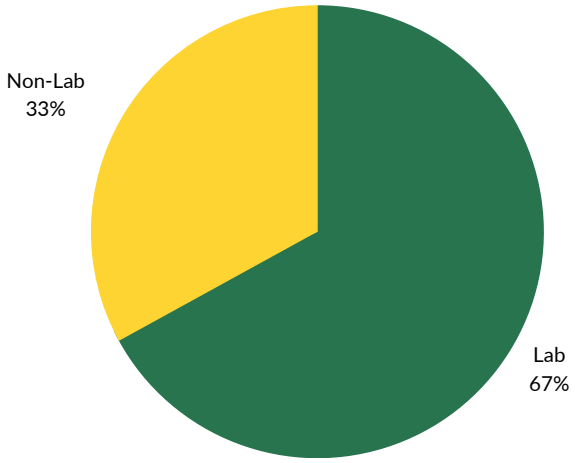
In **Phase 2 (complete)**, the investigation evaluated the technical feasibility of switching from steam heating to low temperature hot water heating via industrial-scale heat pumps. Additional analyses were conducted to project the impact of doing in-building conversions to support this shift.

The deliverables of **Phase 3 (complete)** were to develop recommendations for mitigating cooling shortages on campus, anticipating increased demand due to the heat impacts of climate change.

As of Fall 2023, Facilities is in the process of selecting an engineering consultant for **Phase 4** . This phase will explore additional energy and decarbonization technologies not previously considered during the first three phases. For each scenario, the study will analyze all capital and operating costs, expected greenhouse gas emissions, and resiliency outcomes. The final Phase 4 report, expected in early 2024, will compare scenarios and provide recommendations. Based on the results of Phase 4, future Utility Master Plan phases may be considered for further research and evaluation of decarbonization and resiliency strategies.

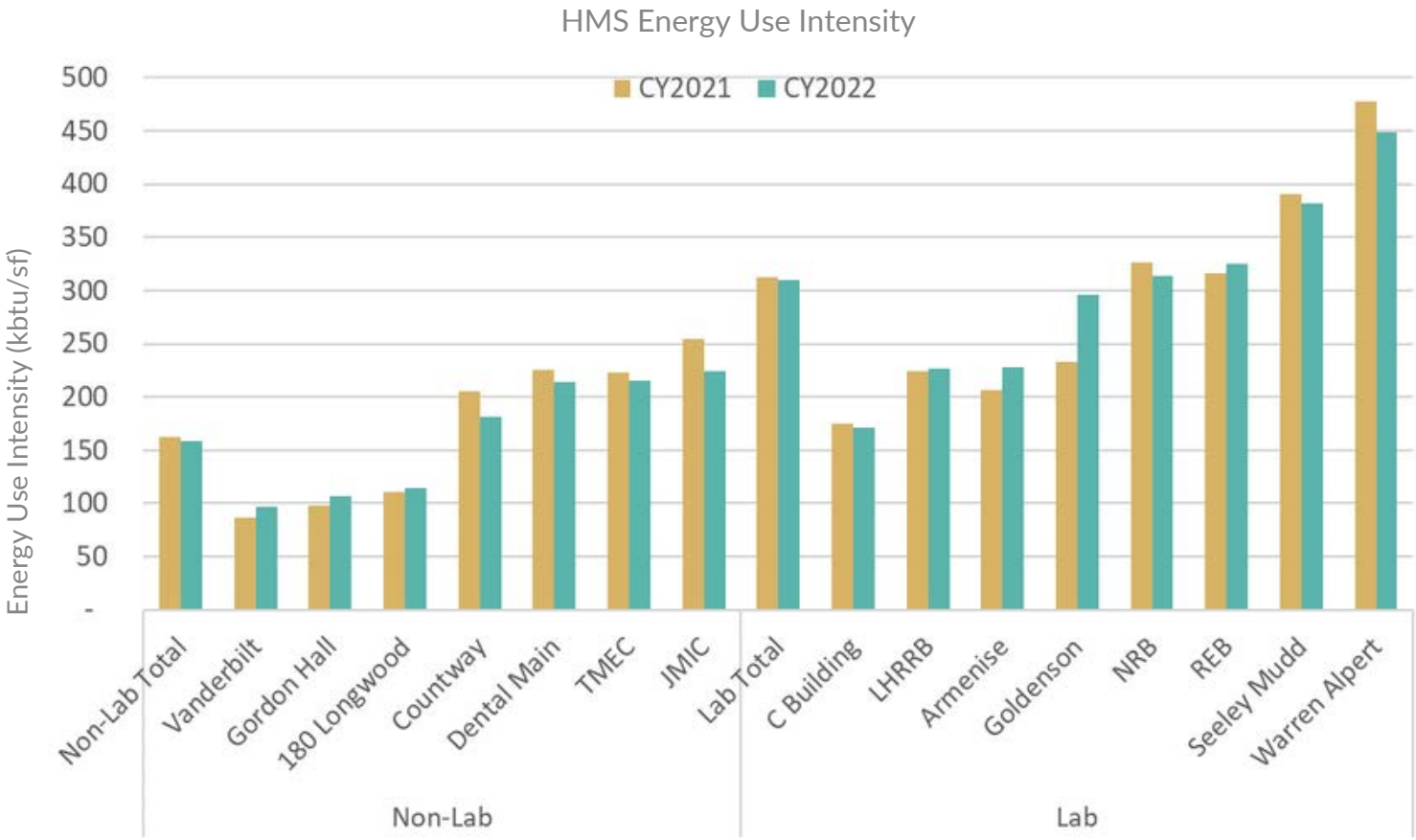
Focus on Laboratory Environments

The challenge of meeting emissions goals is much higher for research-focused organizations face as they seek to reduce their emissions footprint in such energy intensive spaces. Laboratories are the focus of energy conservation measures and strategic energy projects at HMS, where a large proportion of space belongs to labs (67%), which are responsible for over 80% of the campus's total annual energy consumption. Sustainability and efficiency achievements on campus must keep up with the expansion of research, increased building population density, and the continued introduction of delicate, energy intensive equipment.



Focus on Laboratory Environments

Which buildings are most intensive on the HMS Campus?

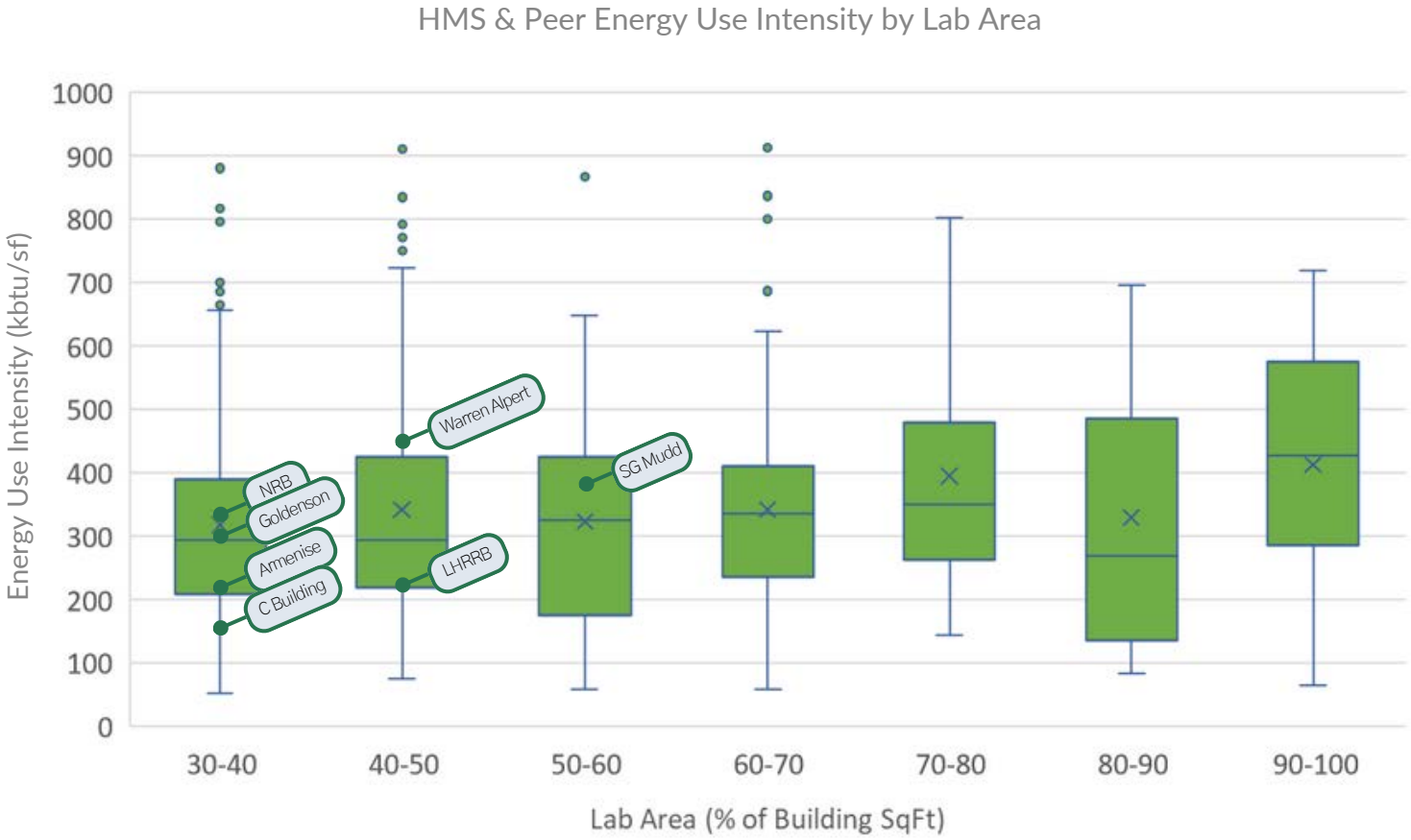


The chart above highlights the performance of HMS's buildings in calendar year 2022 compared to 2021 using their **Energy Use Intensity** (EUI). EUI is a metric that divides a building's energy consumption by its area (gross square feet). This metric is useful for normalizing and directly comparing the energy consumption of buildings, despite their potential size differences. Both lab buildings and non-lab buildings experienced decreased EUIs in 2022 compared to 2021. There was an overall decrease in EUI at the campus level as well(257 in 2022 and 261 in 2021).

Goldenson's notable increase in EUI is primarily due to its new gnotobiotics lab, a good example of the continual intensification of research at HMS. NRB's decrease in EUI is chiefly to lighting upgrades in the building which significantly reduced electric load in the building (see pg. 25).

Focus on Laboratory Environments

How does HMS compare to its peers?



Displayed above is a boxplot showing the relationship between lab space (as % of total building area) and Energy Use Intensity (EUI) in lab buildings. Each bin represents a range for the proportion of square footage in each building dedicated to lab research, with labels denoting the placement of HMS EUIs. The comparative data is sourced from the International Institute for Sustainable Laboratories' (I2SL) Lab Benchmarking Tool (LBT) - a database containing energy, emissions, and operational metrics from 900+ peer facilities. Notably, the HMS labels predominantly align with its peers, within the Q1 and Q3 of each boxplot, which illustrate the distribution of EUIs. Only one building, Warren Alpert Building, exceeds the Q3 of its range, higher than most buildings in the dataset with lab areas between 40-50%.

Energy Conservation Measures and Strategic Energy Projects

The following section showcases the energy management strategy employed by Facilities in CY22, exploring the essential projects that played a significant role in continuing to lower the campus's carbon footprint. These projects encompass streamlining operational processes, upgrading equipment, and implementing fault detection software, all efforts to boost efficiency in buildings on campus.

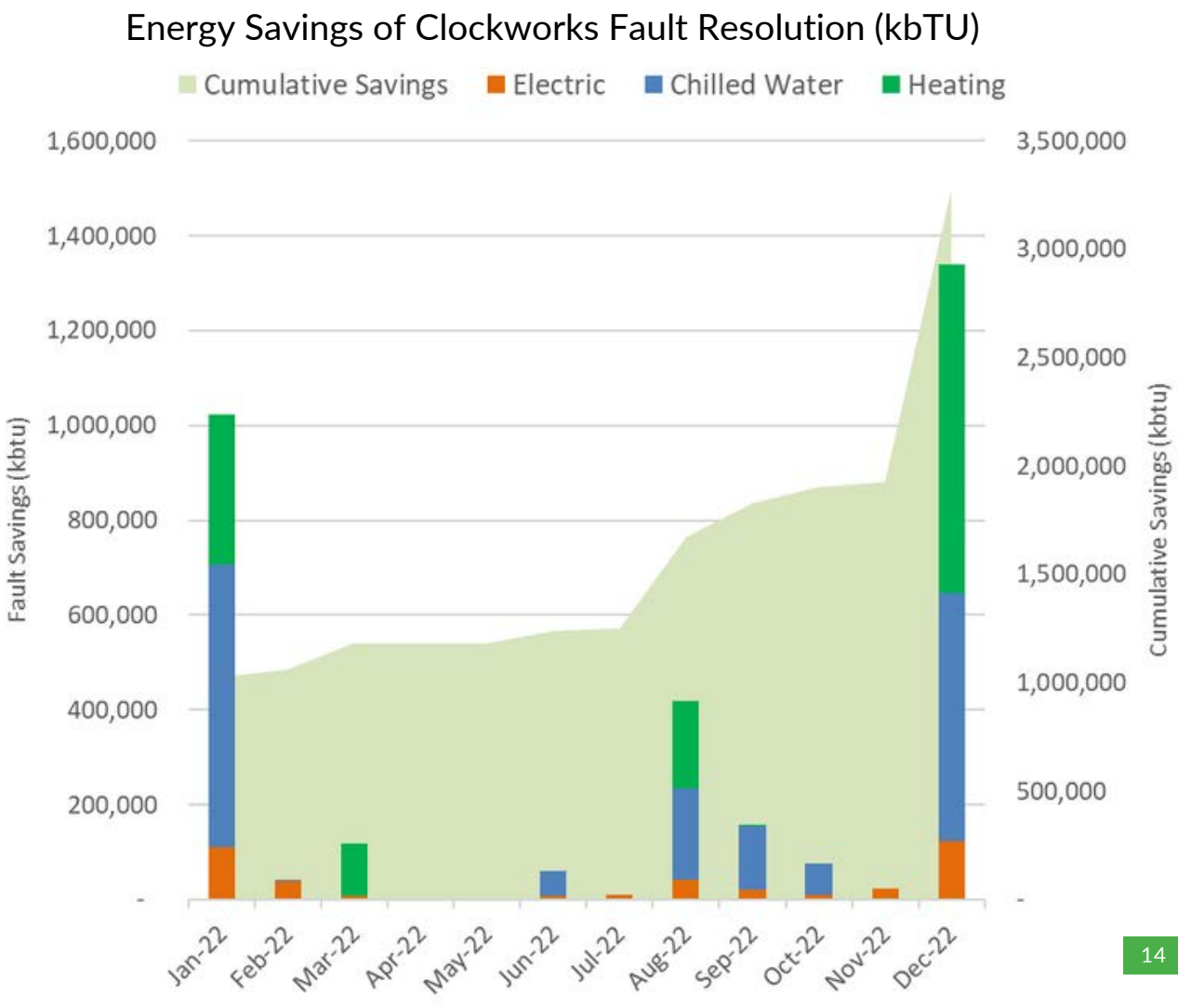
- Fault Detection Software
- Energy Retrofits and Retro-commissioning Projects
- Thermal Imaging Survey of Tunnel Steam Piping
- Compressed Air System Survey
- NRB & WAB HCCM Ventilation Optimization
- Campus Lighting LED Upgrades by Greener U

CY22

Fault Detection Software

HMS's fault detection software, Clockworks Analytics, plays a crucial role in furthering energy efficiency efforts of operations. The software functions by continuously monitoring all mechanical and HVAC equipment, by extracting and analyzing trends from the Building Automation System (BAS), the centralized hub for all buildings' essential systems. The Clockworks platform is implemented across the entirety of the campus, and is used to check performance of major and essential equipment, including air handling units, chillers, boilers, pumps, fan coil units, exhaust fans, and terminal units. By leveraging this software, the energy group is able to proactively identify and rectify any potential faults in the operation of these critical systems, ensuring their most efficient performance.

In 2022, HMS resolved 20 major issues identified by Clockworks, encompassing simultaneous heating and cooling, sensor failures, pneumatic controls errors, and others. Beyond the benefits of extending the life of equipment requiring fault correction this approach resulted in energy savings equivalent to 3 million kBTU, about $116,000 in energy costs.



Energy Retrofits and Retro-Commissioning

Energy retrofits and retro-commissioning are key to enhancing energy efficiency within campus facilities. **Retro-commissioning** involves assessing and fine-tuning existing building systems to ensure they operate at peak efficiency. This includes recalibrating HVAC systems, identifying and rectifying inefficiencies, and optimizing controls to align with current building requirements. By contrast, **energy retrofits** focus on upgrading and modernizing existing systems and equipment to make them more energy-efficient. This typically involves replacing outdated components, optimizing controls, and implementing advanced technologies. Though energy retrofits and retro-commissioning have distinct definitions, they often complement one another when the primary goal is to enhance energy efficiency. Both retro-commissioning and energy retrofits play a pivotal role in not only reducing energy consumption and carbon emissions, it also assists Facilities in improving the longevity of mechanical and electrical equipment, lowering operational expenses.

In CY22, Facilities completed four major campus-wide energy retro-commissioning and retrofits:

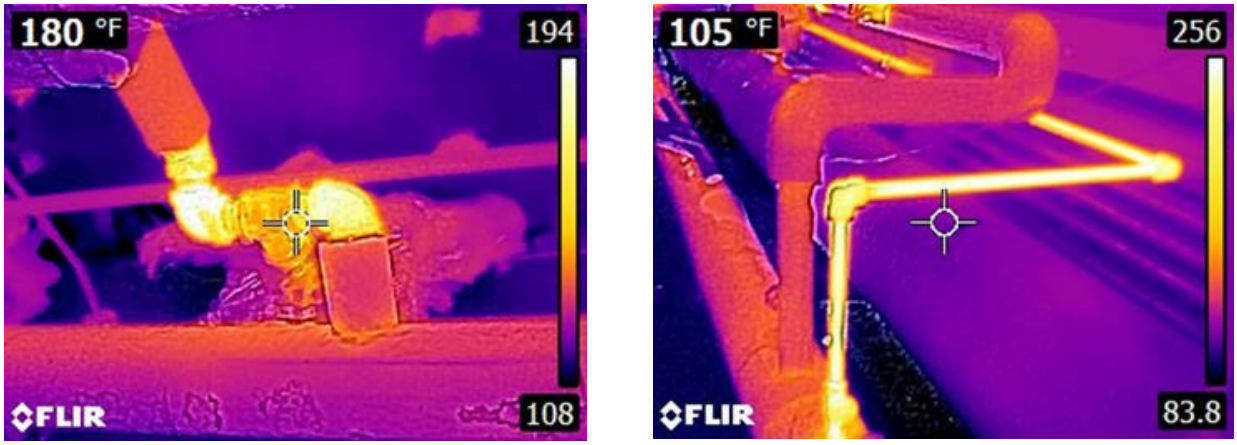
- Improve air handling units' (AHUs) operation and reduce simultaneous heating and cooling by replacing failed valves, dampers and actuators
- Armenise AHUs 1, 4 & 5 valve replacements
- Compressed air leak detection survey & repairs across entire campus
- Re-programming for optimization of mechanical heating, ventilation, and air conditioning equipment

Ultrasonic leak detector helps identify CA leaks

New steam control valve on air handling unit

Thermal Imaging of Steam Piping in Campus Tunnels

Facilities conducted thermal imaging of steam piping located underground in the campus tunnels during the winter in order to find uninsulated piping on steam and other hot pipe runs. Uninsulated or poorly insulated piping results in energy loss and elevated temperatures in the tunnel spaces. Thermal imaging allowed for the identification of high temperature areas and any insulation deficiencies, allowing the team to create a scope for insulating bare pipes and replacing older insulation.



Thermal images taken during the study with visible high temperature, uninsulated piping.

Compressed Air System Survey

Facilities conducted a comprehensive assessment of the campus's centralized compressed air system to enhance energy efficiency, as well as lower operation and maintenance expenses. Compressed air is used in various applications, from running tools and equipment to supporting HVAC systems. However, while it plays a critical role, producing and maintaining compressed air can be resource intensive, making the identification of inefficiencies critical to energy efficiency efforts.

This survey effort involved evaluating how individual buildings use compressed air and identifying and repairing leaks. The team also compiled an inventory of pneumatic devices and components like thermostats, actuators, and valves, as well as specialized lab equipment reliant on compressed air, like air tables.

Using the information from this survey, HMS will move to replace pneumatic devices with digital/electronic devices across HMS with the ultimate aim of reducing our reliance on compressed air. This initiative is part of our ongoing commitment to sustainable and cost-effective campus operations.

Compressed air leaks identified with green tags on equipment.

NRB & WAB HCCM Ventilation Optimization

Adequate ventilation and air changes rates (ACH) are crucial to maintaining a safe and comfortable environment for occupants of lab spaces. However, the energy-intensive nature of high ACH makes optimization that accounts for variables within each space like occupancy, equipment, and other environmental requirements, crucial to energy efficiency on campus.

HMS Standard is 6 ACH in occupied spaces and 4 in unoccupied areas. However, variations in equipment and space requirements can affect these rates. HMS Facilities partnered with a third party commissioning firm to evaluate existing airflow and pressure conditions in HCCM spaces to ensure optimal ventilation and ACH. The team conducted measurements in 38 HCCM related spaces in Warren Alpert Building (17) and NRB (21).The assessment considered specific equipment in each space, such as biosafety cabinets and cage washers.

The study revealed that some spaces exceeded HMS standard for ACH, while others fell below. To ensure both safety and energy efficiency, Facilities adjusted all spaces to the appropriate ACH range, considering the unique equipment and pressurization requirements of each area.

Savings for this project were estimated at ~2,739 cubic feet per minute. This optimization saved approximately $10,956 in energy costs, with a simple payback of 4.5 years.

A balometer, or a flow hood, takes supply air readings.

Greener U Lighting & Controls Upgrades

As part of HMS's broader Energy Conservation Program, HMS Facilities established a Master Service Agreement (MSA) in late 2020 with consulting firm GreenerU to provide services centered around the reduction of energy use. Three separate investment grade audit (IGA) contracts were put in place that include lighting upgrades, ventilation optimization, heat recovery improvements and installation of variable frequency drives (VFDs) on HVAC and/or water systems around the campus. The lighting upgrades (IGA #1) were the first effort to be implemented with GreenerU. The projects began in NRB in late 2021, moved across the campus, and completed in 2022.

LED's use significantly less electricity than traditional incandescent bulbs, up to 80%. The lifespan of LED's also significantly longer than traditional bulbs, reducing maintaince requirements, as well as the physical waste generated by replacements. The upgrades, completed in 8 of HMS's most energy intensive buildings, achieved over 2.7 million kWh in electricity savings.

CY2022 LED Upgrades	**Electricity Savings (kWh)**
NRB (Began work 2021, completed Spring 2022)	1,841,665
Warren Alpert	440,340
Armenise	101,275
Goldenson	144,333
LHRRB	56,660
C Building	33,701
TMEC	128,500
Seeley Mudd	36,946
Campus	**2,783,420**

Greener U Lighting & Controls Upgrades

Armenise

Lighting upgrades in Armenise included labs, offices, conference rooms, mechanical spaces, and common areas. This project yielded savings of 101,275 kWh.

Before

After

Greener U Lighting & Controls Upgrades

C Building

GreenerU completed LED lighting upgrades in C Building on Floors 2 and 4 including in labs, offices, conference rooms, mechanical spaces, and common areas. This project yielded savings of 33,701 kWh.

Before

After

Greener U Lighting & Controls Upgrades

C Building

GreenerU completed LED lighting upgrades in Goldenson which included labs, offices, conference rooms, mechanical spaces, and common areas. The scope did not include Floors 2 and 3. This project yielded savings of 144,333 kWh, a 4% reduction in electricity consumption for the building.

Amber lighting was installed to filter out specific light waves (under 500nm) for the lab's experiments.

Before

After

Greener U Lighting & Controls Upgrades

LHRRB

GreenerU completed LED lighting upgrades in LHRRB which included labs, offices, conference rooms, mechanical spaces, and common areas. This project yielded savings of 56,660 kWh.
Below shows a lab before and after the lighting upgrade.

Before

After

Greener U Lighting & Controls Upgrades

Seeley G. Mudd

GreenerU completed LED lighting upgrades in Mudd which included labs, offices, conference rooms, mechanical spaces, and common areas on the first floor. This project yielded savings of 36,946 kWh.
Below shows a classroom before and after the lighting upgrade.

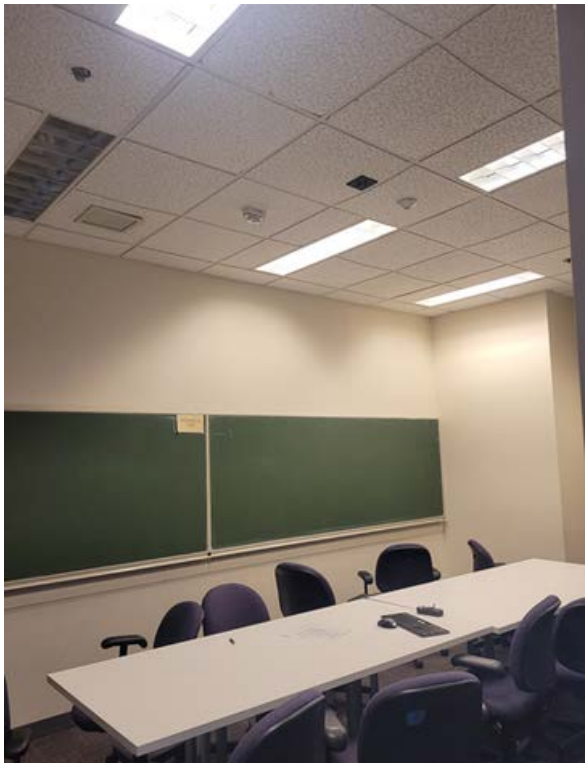
Classroom before.

Classroom after.

Greener U Lighting & Controls Upgrades

TMEC

LED lighting upgrades in TMEC included labs, offices, conference rooms, mechanical spaces, and common areas. This project yielded savings of 128,500 kWh, equating to approximately a 6% reduction in the building's electricity consumption.



Classroom before.

Classroom after.

Greener U Lighting & Controls Upgrades

WAB

GreenerU completed LED lighting upgrades in Warren Alpert Building which included labs, offices, conference rooms, mechanical spaces, and common areas. This project yielded substantial savings of 440,340 kWh, ~6% of the building's electrical load.
Below shows a stairwell before and after the upgrade.

Stairwell from below, before upgrade.

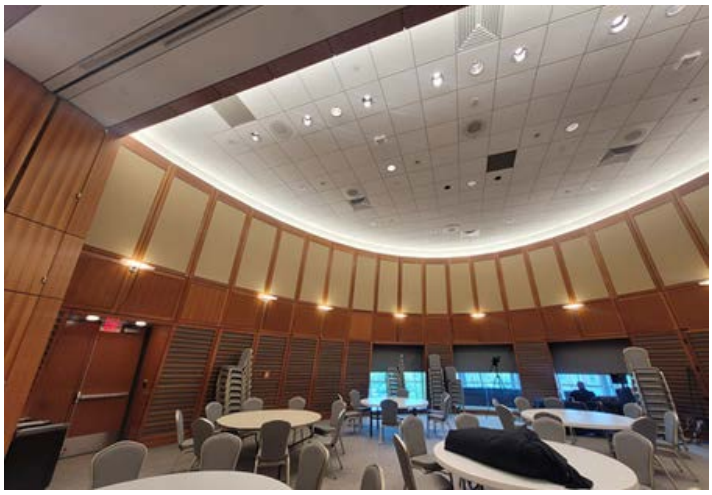
After upgrade.

Greener U Lighting & Controls Upgrades

NRB

Home to more than 800 researchers, graduate students, and laboratory staff, and responsible for ~50% of campus annual energy consumption, NRB was a crucial space for these upgrades. GreenerU was able to design a lighting retrofit project that refreshed the look of the building, standardized fixture and retrofit product lines, color temperatures, and lighting levels. Following the design phase, GreenerU initiated a communication campaign to apprise the entire staff of the impending changes. As a result of these initiatives, GreenerU was able to complete almost all work in the building during the first shift, which in turn resulted in a quicker installation schedule and reduced installation costs. LED lighting upgrades in NRB included labs, offices, conference rooms, parking garage, mechanical spaces, common areas and animal control labs. This project yielded savings of 1,841,665 kWh, a reduction of approximately 8% of total building electrical consumption.

Conference center, before.

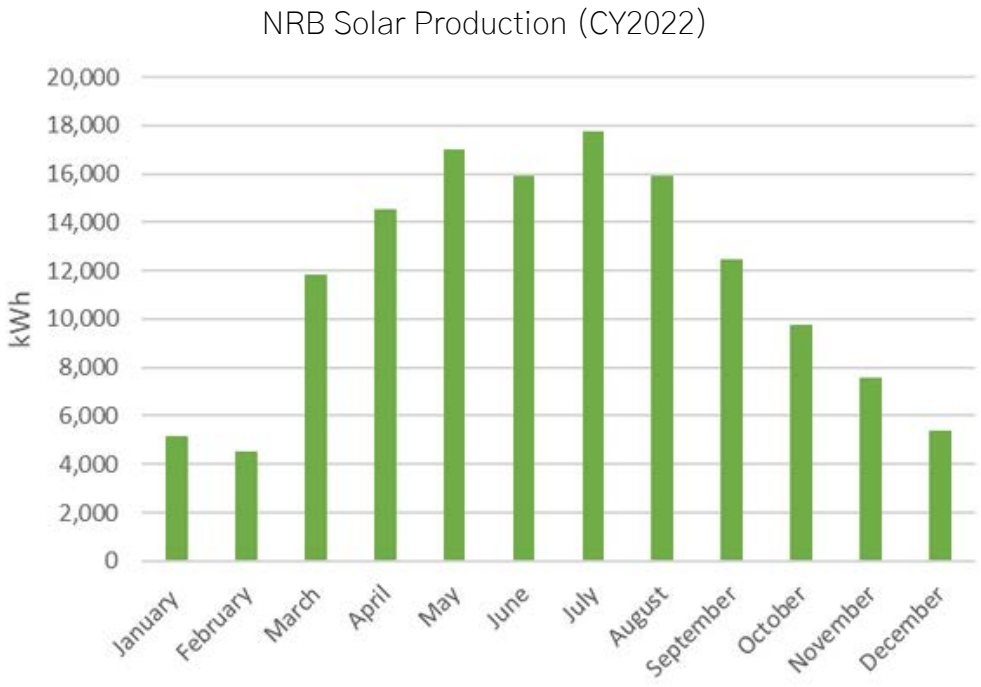


Conference center, after.

NRB Solar Array

Below is the monthly production of electricity from the 380 solar panels on the roof of NRB in 2022. This electricity supplements power provided by Eversource. Every kWh generated by the solar panels contributes to the relative reduction of GHG emissions that would otherwise be generated by Eversource.

Production Stats CY2022:
~138 MWh generated (compared to ~121 MWh in CY2021)
~41 MT CO2e emissions avoided



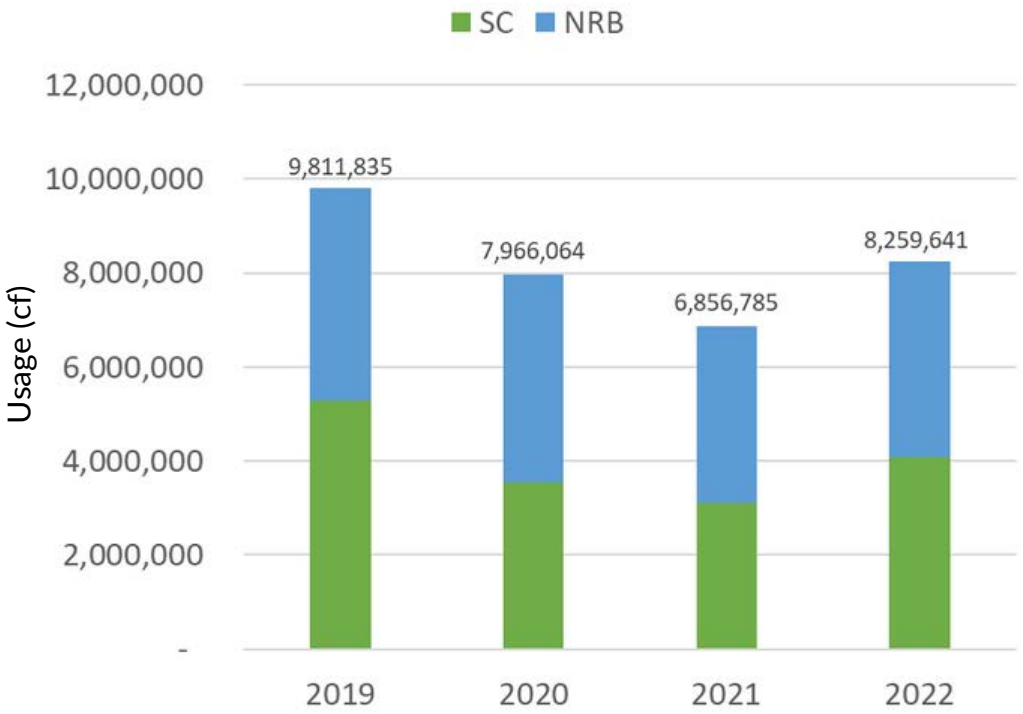
Water Consumption

Analysis of 2022 water consumption data for HMS reveals notable changes in water usage from previous years. In 2022, consumption on campus increased from totals observed in 2020 and 2021, although it remained lower than the levels recorded in 2019, particularly on the South Campus. This reduction reflects the impacts of the COVID-19 pandemic, which significantly reduced campus density and disrupted operations. Despite the return to normal operations in 2022, water consumption has not yet rebounded to pre-pandemic levels. This is partially due to a number of water conservation measures completed on campus in 2021 and 2022, as well as hybrid work models in administrative buildings.

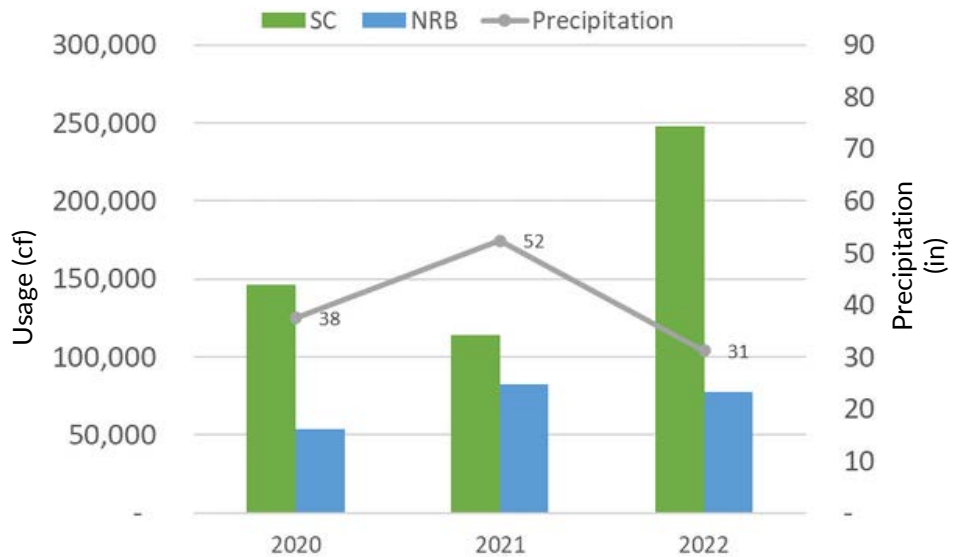
Notably, water consumption at the NRB remained relatively steady throughout the pandemic. This consistency could be attributed to the research-focused nature of the building, which largely remained entirely in-person during the pandemic.

Furthermore, water consumption for irrigation increased in 2022. In 2021, Boston experienced one of its rainiest seasons on record, accumulating over 52 inches of rain throughout the year. However, 2022 was comparatively drier, with several months of drought conditions, leading to increased need for campus irrigation.

HMS Water Consumption (2019-2022)



HMS Irrigation (2020-2022)



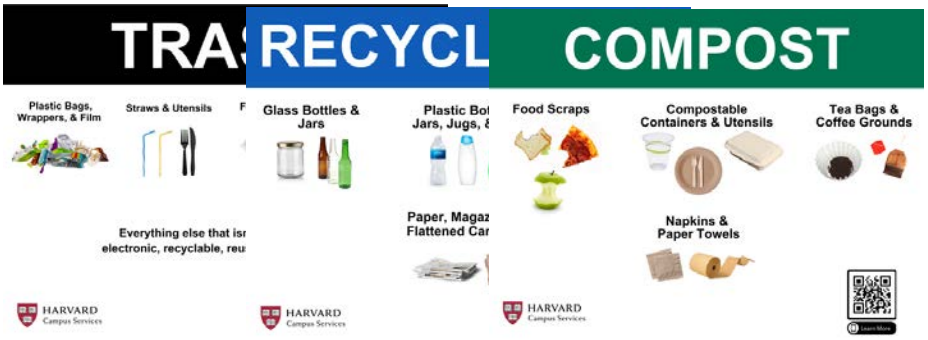
Waste Disposal

In the wake of COVID-19 reopening measures, there has been a notable increase in waste totals from the previous years. The data for CY2021 shows a rise in waste generation compared to CY2020, reflecting the gradual return to pre-pandemic levels of activity and operations. In CY2022, with the adoption of additional hybrid work models and increased on-campus presence for both academic and administrative activities, as well as a return to more in-person events, waste totals saw a further increase.

Efforts to educate the campus community on proper waste disposal have intensified, aiming to minimize contamination of recycling and compost streams. Campaigns and initiatives to raise awareness about proper waste sorting and disposal are ongoing.

For detailed information on accepted materials, sorting guidelines, informative posters, and additional resources to aid proper waste disposal, please visit the HU Recycling & Waste Management webpage. Be sure check out the Waste Wizard tool to find the right disposal method for any item on campus!

Campus Regular Waste (Tons)	Municipal Solid Waste (Trash)	Single Stream Recycling	Compost	Total Waste
CY2020*	380.7	190.2	126.3	697.2
CY2021*	402.0	223.4	158.1	783.5
CY2022	**548.4**	**246.9**	**183.9**	**979.2**



Access and download these posters on accepted items from the webpage linked above.

*Previously reported data for CY2020 and CY2021, available in historic sustainability reports, was based on a methodology that estimated waste weights using the billed capacity for each waste stream. However, the data provided above for all years uses an updated methodology that includes actual weights for compactors, while estimates for other streams are based on the capacity billed.

The new methodology is an attempt to more accurately estimate waste weights. However, it's important to note that these estimates are still based on the assumption that the containers are at full capacity, which may not always be the case due to varying levels of waste accumulation.

Waste Disposal

Biowaste

While regulated medical waste presents inherent challenges for sustainable resource recovery and eco-friendly disposal due to its hazardous nature, HMS Facilities prioritizes safety and environmental regulations in our management approach of bio-waste on campus.

HMS Regulated Medical Waste

Weight (lbs)	CY2020	CY2021	CY2022
South Campus	116,342	127,588	117,327
NRB	133,654	159,121	154,461
Total	249,996	286,709	271,788

Waste Disposal

Pipette Tip Box Recycling

Pipette tip box recycling with GreenLabs Recycling has continued to expand on HMS's campus since its expansion from a pilot in 2019 to full campus availability in August 2020. In CY2022, GreenLabs Recycling picked up 20,738 lbs of tip boxes from the HMS campus, over 9 metric tons of waste diverted from landfills. HMS offers many pick up locations across most floors of NRB, WAB, Seeley G Mudd and C-Building. The tip boxes, polypropylene plastic, are granulated and re-used by local manufacturers.

Total (lbs)	**CY21**	**CY22**
NRB	10,301	11,204
South Campus	7,738	9,174
Total Diverted from Landfill	**18,039**	**20,378**

Grounds

CY22 Achievements and Projects

- Organic fertilizer
  - Consistent soil testing, all fertilizer use limited
- Expansion of irrigation clocks & rain sensors
  - Automatic shutoffs reduce overconsumption of water
- Switch from diesel to electric utility cart
  - Electric utility cart: Carryall 700
- Drought tolerant turf species for reduced irrigation
- OMRI listed products used across all grounds operations

Incoming in CY23:

- Update to Standard Operating Procedure for sustainable snow and and ice management
  - Establishing limited salt zones and non chloride product zones
  - Vegetable brine solution for pretreatment
  - Key Performance Indicator tracking: lbs of salt per square foot

Electric utility cart

Get in touch

HMS is expanding its sustainability outreach in CY23 including the commencement of its Green Lab Certification Program, increased waste education and resources, semi-annual sustainability events, and more. For more information about sustainability initiatives and how you can get involved, please visit our website, scan the QR code below, or email us directly.

sustainability@hms.harvard.edu

https://campusplanning.hms.harvard.edu/energy-sustainability