



HARVARD
Office for Sustainability



HARVARD OFFICE FOR SUSTAINABILITY

SUSTAINABLE LAB GUIDE



INTRODUCTION TO HARVARD'S COMMITMENT TO SUSTAINABILITY

Harvard recently released its updated Sustainability Action Plan (SAP) which offers a high-level vision and framework defining our sustainability mission and addressing how the University is meeting its major climate goals to be fossil fuel-free by 2050 and fossil fuel-neutral by 2026. The Plan looks at sustainability through a lens of climate, equity, and health; and segments our work under four pillars: 1. How We Power, 2. How We Build, 3. How We Operate, and 4. How We Lead.

One way in which Harvard leads is through its world-renowned faculty and their research. That research requires the use of lab space and energy. Harvard's Office for Sustainability (OFS) collaborates with stakeholders including building managers, faculty, staff, and researchers to envision and implement sustainable practices and technologies to conserve resources in lab buildings across campus. Even so, labs currently account for close to 44% of energy use at the University despite only representing about 20% of the University's square footage.

The focus on making labs sustainable began in 2005, when Harvard became one of the first education institutions to commit to what was then called our Green Labs Program. Launched out of the Department of Chemistry and Chemical Biology (CCB), the Program began when fume hoods were upgraded to Variable Air Volume for energy savings. With the success of that initiative, CCB looked for more ways to promote sustainability in Harvard's labs.

By continuing its commitment to lab sustainability, Harvard is fostering healthier and safer labs, promoting resource efficiency, and supporting waste reduction strategies to minimize our environmental footprint even as we contribute to scientific advancement. However, due to the resource intensity of research, and the unique conditions in each individual lab, sustainability is approached at a lab-specific level in addition to at a building-wide perspective.

ENERGY EFFICIENCY & WAYS WE ARE MAKING A DIFFERENCE

Harvard has leveraged innovation and committed resources to a number of programs that support greater sustainability measures in our labs. Here are a few examples:



SHUT THE SASH: CHEMICAL FUME HOOD COMPETITION

The Shut the Sash chemical fume hood competition started in 2005 within Harvard's Department of Chemistry and Chemical Biology. It promotes keeping fume hoods closed when not in use to reduce high energy consumption. The initiative expanded to include 19 labs and over 350 researchers, resulting in substantial energy savings and improved lab safety, making it Harvard's most impactful behavioral change program for energy conservation.

LAB RE-USE AND WASTE REDUCTION

Harvard University's sustainable labs programs prioritize waste reduction efforts. These initiatives span various labs across the Faculty of Arts and Sciences and the Longwood Medical Area. The programs aim to promote the safe reuse of equipment and materials that are no longer needed. They address the common issue of abandoned and unused lab equipment caused by lab moves and evolving research requirements. Initiatives such as lab freecycles and Reuse Rooms help minimize surplus equipment, supplies, and expenses. They achieve this by facilitating item salvage and encouraging reuse of resources.



FREEZER PREVENTABLE MAINTENANCE PROGRAM

The Harvard Faculty of Arts and Sciences (FAS) Freezer Preventative Maintenance Program was initiated by the FAS Office for Physical Resources and Planning. It was established following a 2011 study that highlighted the energy-saving benefits of maintaining clean freezer coils and filters. The program offers a comprehensive contract for all -70/80 C freezers at FAS, ensuring consistent care and relieving labs from organizing maintenance. This initiative ultimately promotes energy conservation, creates a safer research sample environment, and benefits both research labs and facilities teams.

WATER CONSERVATION

Efficient lab operations and sustainable water practices are interconnected, as water-saving measures in laboratories contribute to long-term water sustainability goals. Actions taken include consolidating autoclave usage into fewer cycles and implementing waterless condensers. Prioritizing water sustainability in lab operations ensures that scientific research thrives in an environmentally responsible manner, contributing to the overall preservation of water resources.



ENERGY EFFICIENCY & WAYS WE ARE MAKING A DIFFERENCE

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THE LABORATORY VENTILATION MANAGEMENT PROGRAM (LVMP)

The Laboratory Ventilation Management Program (LVMP) was designed with the goal of maximizing health, safety, and energy efficiency of the laboratories through improved ventilation effectiveness. This is accomplished by integrating traditional methods of ventilation management with a quantitative Laboratory Inhalation Risk Assessment (LIRA) process that utilizes Fourier transform infrared spectroscopy (FTIR) for measurement and verification of lab air quality. The LVMP requires a partnership between students, staff, and faculty working in the labs, and the safety, facilities, and building system specialists operating the lab buildings.

- With labs accounting for 23% of our built-environment and over 50% of the energy and emissions, the LVMP achieves safer, healthier, labs while also reducing greenhouse gas emissions from the research sector by 10-20%.
- The Science & Engineering Complex (SEC) was the first building at Harvard designed to be fully integrated with the LVMP, and the Program significantly boosts the energy performance of the building and keeps the air



HARVARD CHEMICAL INVENTORY PROGRAM

Harvard Chemical Inventory Program was first initiated by the Department of Environmental Health & Safety (EH&S) and the Office for Sustainability (OFS) through the Clever Chemical partnership.

- Supported by the President's Administrative Innovation Fund (PAIF), the goal of Clever Chemical was to identify, pilot, and scale a chemical inventory management system specifically tailored to the needs of Harvard.
- The success of the Clever Chemical collaboration led to the implementation of the EH&S-led Chemical Inventory Program. This Program aligns with the Harvard Healthier Buildings Academy in its goal to reduce and eliminate toxic chemicals from the built-environment, by identifying and measuring the chemicals and chemical procurement activities associated with academic research.
- The ability to measure and track chemicals is an essential component of laboratory sustainability and keeps our labs healthier and safer. It also reduces the amount of chemicals associated with academic research by facilitating the sharing of research chemicals between lab groups.



TOOLS, TIPS & RESOURCES



Our goal is to expand the concept of our campus as a “living lab” by utilizing the passion of Harvard’s laboratory community to operate more sustainable labs that serve as a model for others to emulate inside and outside of our walls.

You can help by adhering to the tips in this Sustainable Labs Guide.

Purchase Sustainably

- Make energy efficient purchasing choices and purchase Energy Star certified equipment
- Before you buy: Check out the BioLabs Reuse Room
- Host an annual lab cleanout or spring cleaning
- Use healthier, green cleaning products
- Explore the philosophy of Green Chemistry and browse MIT’s Green Chemical Alternatives Wizard
- Ditch the 5-gallon bubblers in your kitchens and switch to a water filtration system
- Purchase recycled content paper and paper towels
- Use GelRed/GelGreen or SybrSafe instead of Ethidium Bromide



TOOLS, TIPS & RESOURCES

Save Energy

- Shut fume hoods when not in use
- Turn off lights when leaving a room
- Label equipment with “turn me off” stickers
- Turn off small appliances when not in use
- Explore purchasing an energy efficient incentivized Ultra Low Temperature (ULT) freezer
- Use a power strip so that groups of appliances can be powered down when not in use
- Keep appliances and frequently used equipment on a routine timer schedule
- Turn off computers (or put in standby/hibernate mode) at the end of each day



Maintain Lab Freezers

- Keep your freezers organized; by limiting door openings you will save energy and increase the life of your freezer
- Host an annual freezer cleanout
- Service your equipment on a routine basis to keep it running optimally and prevent breaks
- Participate in the FAS Freezer Preventative Maintenance Program to get two free cleanings and one full inspection/year
- Clear away any ice buildup on your -80 freezer with a soft cloth or rubber mallet which can be provided by the FAS and Longwood Green Labs Programs
- Keep your -20 freezers free of ice by defrosting at least once per year and by clearing ice from the gaskets periodically



TOOLS, TIPS & RESOURCES

Reduce Waste

- Clarify recycling procedures; label bins and hang signs
- Participate in a lab freecycle or the Green Labs Reuse Room
- Recycle broken or unusable equipment
- Properly collect and recycle electronic waste (e-waste)
- Use double sided printing as the default on computers
- Place a scrap paper bin near the printer(s)
- Set up a compost bin and assign a compost captain
- Collect water purification cartridges for recycling through take-back program
- Minimize hazardous waste by applying Green Chemistry concepts to your research
- Report maintenance issues to Building Manager ASAP



Conserve Resources

- Share freezer space and equipment with neighbors instead of buying your own
- Learn how to operate the autoclave more efficiently
- Reduce autoclaving needs by introducing a two-streamed process where only required items are autoclaved and others go through the dishwasher
- Consider purchasing a solvent recycler for your lab space or sharing one among neighboring labs
- Use reusable dishes in the common room/break area
- Explore the philosophy of Green Chemistry as it may apply to your research

