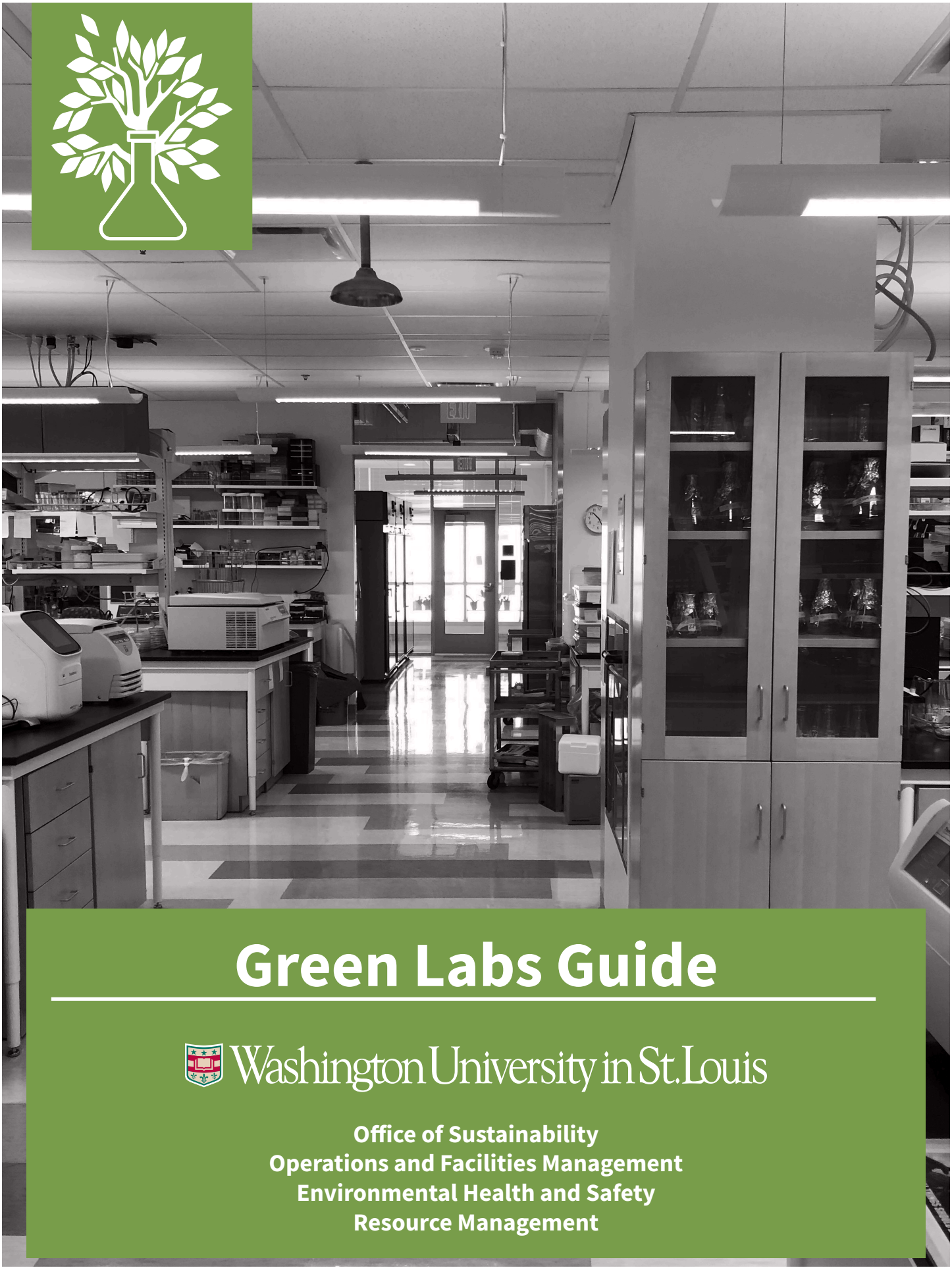

Green Labs Guide

Washington University in St. Louis

Office of Sustainability
Operations and Facilities Management
Environmental Health and Safety
Resource Management

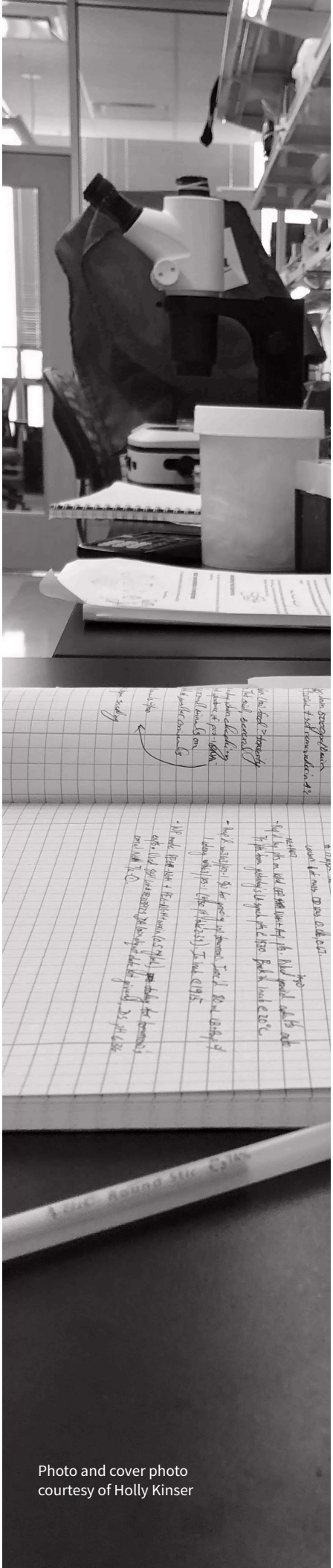

Photo and cover photo courtesy of Holly Kinser

CONTENTS

INTRODUCTION

Labs account for nearly 1.6 million square feet of space on the Washington University campuses and they all require significant resources to run effectively. Lab spaces across the university range from classrooms and small labs to large medical research facilities. Many labs have large equipment requiring substantial energy, multiple sources of water with varying degrees of purity for experimental success, natural gas sources, vacuum pumps, and many other systems, all of which rely on energy or other resources to operate. This provides our researchers an important opportunity to reduce the need for natural resources, lessen the impacts on our environment, and promote local and sustainable purchasing habits.

The Green Labs program at Washington University is a voluntary process for reducing energy, water, waste, and chemical use in the laboratory setting while upholding the priorities of research integrity, education, and safety. These recommendations are a result of a collaboration between the School of Medicine Operations and Facilities Management Department, The Office of Sustainability, Environmental Health & Safety, and Resource Management. This guide and the associated resources have been developed specifically for our Washington University faculty, staff, and students. The program will undergo continuous updates and improvements to ensure relevant information and actionable items are provided. This program supports the direction of the University's Strategic Plan for Sustainable Operations (2015-2020) and the School of Medicine Sustainable Operations Strategic Plan (2018-2025).

Welcome to the Washington University in St. Louis Green Labs Program!

Photo courtesy of Washington University Office of Public Affairs

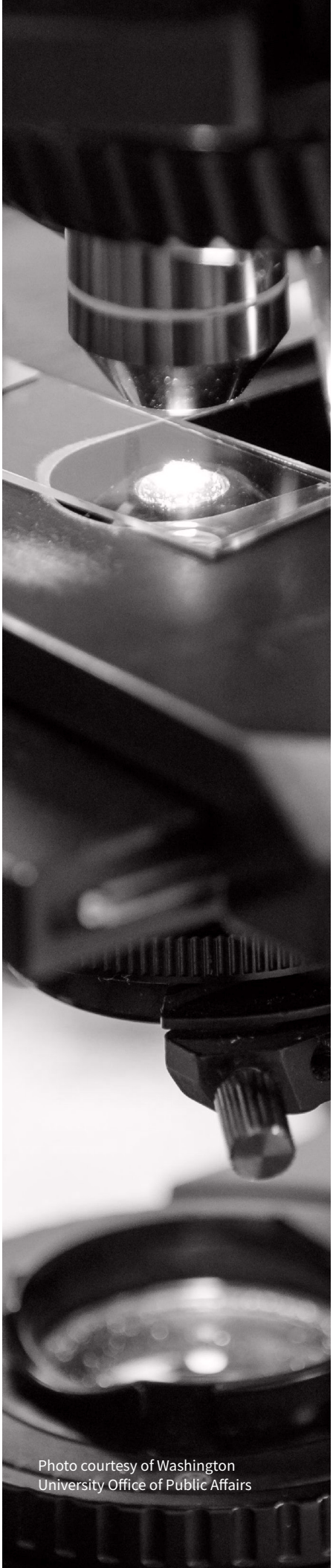

Photo courtesy of Washington University Office of Public Affairs

ENERGY

Energy reduction strategies are a vital component of greening your lab space. Labs account for a significant portion of the square footage on WashU campuses and typically have large equipment running continuously. By turning things off, switching out older equipment for newer high-efficiency models, and swapping incandescent bulbs for LED lightbulbs, you can have a significant impact on energy use in the lab.

ACTION ITEMS AND RECOMMENDATIONS:

- ☐ Shut The Sash - Fume hood and biosafety cabinet sashes should be closed at all times except during active use. This is best for safety of lab occupants and for energy consumption. An open fume hood uses as much energy as 3.5 homes.
- ☐ In most lab spaces, it is actually most energy efficient to keep thermostats set as low as comfortable. Generally, air supplied to spaces on campus needs to be heated up to reach temperatures above 55F. Even in the summer, keeping lab temperatures in the 60s, rather than 70s, uses less energy. (This recommendation does not apply to offices.)
- ☐ Turn off equipment when not in use. Adhere “power down” stickers to all equipment to provide the correct instruction to all lab members. Request stickers online.
- ☐ Unplug infrequently used equipment. Anything that is plugged in, whether it is powered on or off, draws energy from the electrical outlet. Avoid this energy loss by unplugging equipment that is not used regularly.
- ☐ Keep doors on autoclaves, incubators, refrigerators, and freezers closed to maintain internal temperatures and avoid excess heat loss or gain.

ENERGY

ACTION ITEMS AND RECOMMENDATIONS CONTINUED:

- ☐ Keep freezers full for maximum efficiency. Inventory freezer stocks annually and dispose of anything no longer needed. Share freezer space with another lab instead of buying another unit when possible.
- ☐ Raise "-80" freezer temperatures to run at -70°C to reduce energy use by up to 40%. Check to see if your samples can be safely stored at -70°C at freezerchallenge.org
- ☐ Keep charts of freezer stocks and sample locations to avoid leaving the freezer door open while you search for a sample.
- ☐ Set computers and printers to automatically enter sleep mode when not in use.
- ☐ Turn off the lights when you are leaving the lab for more than 5 minutes or opt for natural light whenever possible.
- ☐ Switch out task lighting bulbs with more efficient LED bulbs. Contact facilities regarding permanent fixtures in need of an upgrade.
- ☐ Turn off Bunsen burners and vacuum valves when not in use.
- ☐ Turn off incubators, ovens, and water baths overnight and on weekends, if possible.
- ☐ Close window blinds to reduce heat loss or gain, especially overnight and on weekends.

Request "Power Down" and "Shut the Sash" stickers at *sustainability.wustl.edu/greenlabs*

ENERGY

Photo courtesy of Washington University Office of Public Affairs

Did you know that many samples can be safely stored at -70˚C instead of -80˚C? By making this temperature change, ULT freezers can consume up to 40% less energy! Check freezerchallenge.org for a database of samples that can be safely stored at -70˚C.

Photo courtesy of Washington University Office of Public Affairs

Shut the sash! When open, a fume hood can consume as much energy as 3.5 average households! When you are stepping away from the hood or have completed your work, close the sash to prevent unnecessary energy use and to promote a safe working environment.

Photo courtesy of Holly Kinser

All lab equipment is drawing energy whether it is in use, on, or even off and plugged in. Be sure to add “power down” instruction stickers to all equipment to advise lab members whether to leave on, power down, or unplug each machine after it is done being used. Anything that is plugged into an electrical outlet is drawing energy - the best choice is to unplug items when they are not in use or use a power strip for multiple items. Then, turn the power strip off at the end of the day to stop energy flow to multiple appliances!

ENERGY

Equipment energy demand varies greatly by brand, model, and usage. The corresponding greenhouse gas emissions also differ by geographical region and power provider. Below are energy draw and CO_2 emissions estimates for common pieces of equipment and how these same emissions can be represented as miles driven in an average gasoline-powered vehicle. The CO_2 emissions estimated are based on the electrical grid in Missouri.

Equipment	Energy Usage (watts)	Metric Tons of CO_2 emitted per year	Equivalent Miles Driven
Cryostat	550	3.4	8336
Incubator	155	1	2445
Biosafety Cabinet	82.5	0.5	1222
Thermal Cycler	50	0.3	733
Thermal Centrifuge	45	0.3	733
Heating Block	40	0.3	733
Water Bath	40	0.3	733
Microscope	20	0.1	244

Timers

Many pieces of equipment can be placed on timers to reduce their overall energy consumption, particularly so they can be programmed to shut off at night. Possible candidates for this include: incubators, centrifuges, heating blocks, water baths, imagers, plate washers, and plate readers. In a recent study at Stanford University, simply placing a heating block on a timer reduced energy consumption by 80kWh per year. Adding "power down" stickers can also help remind people to turn things off and conserve energy. A request form for these stickers can be found at sustainability.wustl.edu/greenlabs

Purchasing

When looking to purchase new items, consider the needs of your lab. Do not select a model that is larger or provides more than what is needed to meet your needs. When possible, select ENERGY STAR certified products for your lab. These are pieces of equipment that have been recognized by the EPA and DOE for their efficient energy utilization. The program certifies a wide range of items, including electronics, lights, refrigerators, and freezers. The first blood storage refrigerator was recently certified. Speak with sales representatives about energy efficient equipment, look for the blue certification label when viewing product information, and consult energystar.gov for a complete list of ENERGY STAR products.

Photo courtesy of Alicia Hubert

EQUIPMENT

Autoclaves are critical pieces of lab equipment. They are also large consumers of energy and water. A recent study by UC Riverside found that an autoclave uses an average of 45 gallons of water per cycle and 16,000kWh of energy per year. This is nearly 1.5 times the energy use of an entire house. WashU has approximately 150 autoclave units, each requiring this high amount of energy and water.

ACTION ITEMS AND RECOMMENDATIONS:

- ☐ Only autoclave items that absolutely require it.
- ☐ Set up a schedule to combine items from multiple users or labs. Avoid autoclaving 1 or 2 small things at a time, only run full loads.
- ☐ Make sure to turn off equipment when not in use (overnight and on weekends) or set up an automated schedule to power down units during off-peak hours (see below).
- ☐ Keep autoclave doors closed at all times, besides during loading and unloading, to avoid heat loss.
- ☐ Be sure to select the correct setting for the items you are autoclaving to avoid running a second cycle to correct a mistake. Do not operate an autoclave without proper training.

Contact a maintenance professional for the following equipment changes and efficiency upgrades:

- ☐ Set up an automatic schedule to always power down overnight and on weekends.
- ☐ Consider installing a storage water tank for drain water to avoid excessive water use through the cooling process.

EQUIPMENT

Ultra-Low Temperature (ULT) Freezers use a significant amount of energy and are responsible for a considerable amount of greenhouse gas emissions. An average ULT freezer at WashU uses nearly as much electricity each year as an average US home. WashU operates over 900 ULT freezers, which use 10.5 million kilowatt-hours of energy each year, resulting in an estimated 8,000 metric tons of CO_2 emissions. Standard ULT freezers also use refrigerants with a global warming potential (GWP) that is 12,000 times as potent as carbon dioxide.

High-efficiency (HE) ULT freezers can consume up to 50% less energy than non-HE models and use natural refrigerants that do not contribute to global warming. By switching to HE ULT freezers, Washington University can reduce its CO_2 emissions by ~2,000 metric tons per year. Many models also have "EcoMode" which consumes an additional 15% less energy.

A CO_2 or liquid nitrogen back-up system can be installed on any freezer to provide approximately 8 hours of temperature stabilization if a compressor unit fails. Combined with remote monitoring systems, these units have excellent reliability and have a lower price point than a dual-compressor unit.

ACTION ITEMS AND RECOMMENDATIONS:

- ☐ Reduce the need for ULT freezer capacity where possible by cleaning out an existing unit or sharing with another lab.
- ☐ Washington University has a high-efficiency ULT freezer purchasing policy requiring that all newly purchased ULT freezers must be high-efficiency and use natural refrigerants.
- ☐ Follow regular preventative maintenance schedules to ensure efficiency.
- ☐ Regularly remove ice build up inside the doors and on the seals to ensure proper temperature control. Contact your maintenance provider for a tutorial.
- ☐ UTLs older than 10 years should be decommissioned as soon as possible and properly recycled by the EH&S Department. Do not repurpose old freezers within the lab or donate elsewhere.
- ☐ Consider replacing non-HE freezers between 5-10 years old because these units are nearing their end-of-life and are likely running inefficiently. Non-HE freezers less than 5 years old should be replaced with HE models as soon as funds become available.

Photo courtesy of Alicia Hubert

WATER

Laboratories are one of the highest consumers of water on campus. Water is an essential component of lab practices for direct use in research, cleaning, and equipment operations.

ACTION ITEMS AND RECOMMENDATIONS:

- ☐ Use the lowest purity water (tap water) for non-experimental tasks like washing glassware and your hands. It can take roughly 3 gallons of water to purify 1 gallon of deionized water.
- ☐ Use melted ice for non-sterile procedures like filling water baths.
- ☐ Install low-flow aerators on faucets.
- ☐ Report any leaking faucets to the facilities department or your building manager for immediate repair.
- ☐ Reduce single pass cooling in ice makers, autoclaves, and for other cooling processes by upgrading equipment.
- ☐ Install timers on critical or continuous water users.
- ☐ Always turn OFF vacuum pumps when not in use. Leaving vacuum pumps running continuously leads to pump failure and excess water use for cooling.
- ☐ Install water misers or cooling tanks on autoclaves.
- ☐ Use autoclaves efficiently by combining multiple items or setting up a schedule to combine loads from multiple people. (See page 8 for more details on autoclave usage.)
- ☐ Use a waterless “water bath” or a bead bath as an alternative to a traditional water bath to reduce water use, energy use, and bacteria growth.
- ☐ Recycle and reuse paper. By purchasing paper with recycled content, water consumption to make the paper is reduced by nearly 60%.

WATER


Photo courtesy of Washington University Office of Public Affairs

High purity water, such as deionized and distilled, require additional time and resources to produce. It can take roughly 3 gallons of water to purify 1 gallon of deionized water. Use the tap water faucet for washing hands and rinsing glassware and then select progressively purer water as needed for experiments.

Photo courtesy of Lab Armor

Lab Armor beads can be used as an alternative to ice and water baths. The beads create temperature uniformity and a stable surface for samples. They also reduce risk of microbial growth and sample contamination from water baths or melting ice.


Photo courtesy of Alicia Hubert

Unnecessary use of potable water depletes resources and increases utility costs. The simplest way to reduce water usage is to turn off faucets when they aren't needed, like when scrubbing lab ware, washing your hands, or when the water is not actually in use. Be sure to report any dripping or leaking faucets to the facilities department for immediate repair.

Photo courtesy of Kimberly Brendel

WASTE

Single-use, or disposable, products are often necessary in lab procedures to prevent contamination, allow for multiple experimental replications, and to speed up processes. However, they are also a huge component of a lab's waste portfolio and are almost exclusively sent to landfills or incinerated. In order to minimize the harmful environmental impacts of incineration and landfilling, the mindset of reduce, reuse, recycle should be adopted where possible.

ACTION ITEMS AND RECOMMENDATIONS:

- ☐ Reduce overall product use where possible to reduce waste and the resources required to produce those materials. Consuming less is always the first priority.
- ☐ Focus on acquiring durable goods versus disposable.
- ☐ Avoid purchasing lab equipment and chemicals that are not necessary. If only a small amount of a resource is required, attempt to borrow from another lab.
- ☐ Buy commonly used lab supplies from one of the on-campus stockrooms to avoid packaging and shipping products that are already readily available.
- ☐ When purchasing, consolidate orders where possible to minimize packaging and shipping emissions.
- ☐ Identify ways to reuse non-contaminated products throughout the lab, such as using tip boxes to hold eppitubes or other small items.
- ☐ Consider replacing plastics with glass where applicable.
- ☐ Opt for reloadable pipette tip systems (or fill boxes by hand and autoclave) to reduce the number of pipette tip boxes that you recycle.

WASTE

ACTION ITEMS AND RECOMMENDATIONS CONTINUED:

- ☐ Several vendors have a Styrofoam return program for their delivery packaging. See purchasing on pages 17-18 for more information on reducing your waste output through your purchasing habits.
- ☐ After reducing and reusing, the remaining waste should be properly sorted into recyclables, landfill, and hazardous unwanted material.
- ☐ As a general rule, cardboard, empty/clean plastic containers, and paper that are not contaminated with radioactive, chemical, or infectious material can be recycled.
- ☐ #6 plastics, such as styrofoam, are not recyclable.
- ☐ Film plastics, like bubble wrap and plastic bags, cannot be disposed in the single-stream recycling. However, many local grocery stores have a recycling bin for them.
- ☐ Refer to page 15 for more detailed information on plastic recycling in the lab.
- ☐ Contact the facilities department to request extra recycling bins.
- ☐ Label existing recycling bins and hang recycling posters to remind people of guidelines.
- ☐ Utilize campus-wide toner and printer cartridge recycling programs, consult https://resourcemanagement.wustl.edu/purchasing-services/environmental/toner-and-ink-cartridge-recycling-programs/
- ☐ Unsubscribe from unwanted catalogs, magazines, and junk mail or request electronic versions.

Photo courtesy of Washington University Office of Public Affairs

WASTE


Photo courtesy of Washington University Office of Public Affairs

Invest in durable goods instead of disposable or single-use items as much as possible. Be sure to only reuse bottles or items that are not contaminated and have been properly sterilized. Add a new label to containers when changing the contents.


Photo courtesy of Washington University Office of Public Affairs

Share equipment and supplies. If you only need a small amount of a resource or have items leftover after an experiment, work with other labs to share goods. Reducing equipment purchases eliminates packaging and other resources that would be used for the new item.

Photo courtesy of Washington University Office of Public Affairs

Gloves are a huge component of a research lab's contribution to the landfill. To address this, Kimberly-Clark (and other brands) have launched the RightCycle program to recycle its nitrile gloves, garments, and eyewear. This program is only applicable in select situations. If your lab is interested, please contact greenlabs@wustl.edu for pricing information and logistical details.


Photo courtesy of Holly Kinser

Optimize your experimental design to reduce the resources required. Opt for a computer simulation if large numbers of replicates are needed for your desired outcome.

Request Lab Recycling Posters now at *sustainability.wustl.edu/greenlabs*

WASTE

Reducing Plastic Use in the Lab

Plastic use is virtually unavoidable because there are often plastic versions of everything available. Disposable plastics have become preferred over using durable products that can be cleaned and reused because of the momentary convenience of throwing something away when no longer needed. Some disposable plastic use is necessary in many situations, but the goal is to thoughtfully examine how much plastic your lab uses and what situations can be transitioned to a reusable alternative.

By selecting the right size tube, vial, plate or multiwell plate for your experiment, you can avoid wasting unnecessary plastic. If you are using a disposable tube for the temporary storage of purified water or solutions, opt for a glass bottle instead. Glass bottles can be washed and autoclaved for repeated use for many years.

Recycle all eligible plastics - request a recycling poster for clear guidelines and contact greenlabs@wustl.edu with questions. Not all plastics are made the same. There are a variety of base materials that effect the durability and disposal process of the product. The different types are distinguishable by the number below their "recycling symbol."

Type of plastic	Common lab items made from this plastic	Recyclable in the single stream?
#1 (PET)	clear bottles	Recyclable.
#2 (HDPE)	lids for tubes and plastic bags	#2 plastic containers are recyclable, plastic film/bags must be collected separately and taken to a store for recycling.
#3 (PVC)	clear tubing	#3 plastic is recyclable, but clear tubing is considered a "tangler" because it gets tangled in machinery at the recycling facility - do not recycle tubing.
#4 (LDPE)	lids for tubes and plastic bags	#4 plastic containers are recyclable, plastic film/bags must be collected separately and taken to a store for recycling.
#5 (PP)	centrifuge tubes and hard plastic trays that can be autoclaved	Recyclable with a few exceptions.
#6 (PS)	petri dishes, pipettes, plates, and styrofoam coolers and packaging	Not recyclable.
#7/Other	N/A	Not recyclable.

More information on lab plastics can be found at:

https://www.labdepotinc.com/articles/laboratory-plastics.html

Photo courtesy of Washington University Office of Public Affairs

CHEMICALS

Many labs require the use of chemicals and other hazardous materials for experiments. It is critical to follow all storage and use recommendations from Environmental Health & Safety when using these substances. The misuse of chemicals can result in adverse effects not only to human health and the environment, but it can also present additional complications for the university (regulatory compliance, disposal training, insurance and remediation). In some cases, you can find functionally equivalent and greener alternatives for commonly used chemicals:

MIT Green Chemical Alternatives Wizard

MilliporeSigma DOZN

EPA Safer Choice

Some chemical compounds do not have alternatives. In these situations, it is recommended that labs purchase the smallest amount possible to meet their research needs and avoid storing large volumes for extended periods of time. Always be sure to follow all EH&S guidelines and keep your chemical inventory updated.

ELIMINATING MERCURY FROM THE LAB:

- ☐ Always contact Environmental Health & Safety immediately if a mercury spill occurs from a broken thermometer, shattered bulb, or other source.
- ☐ Switch any microscope bulbs that contain mercury with LED bulbs, solid state devices, or light engines.
- ☐ Switch mercury thermometers with other types of thermometers that can meet the temperature needs of your lab. Many are equal in performance and responsiveness and do not pose an environmental risk.

PURCHASING

WashU labs have significant buying power in our regional economy and beyond. By making a few simple changes to your purchasing habits, it is possible to significantly reduce the amount of packaging waste that enters your lab and greenhouse gas emissions from the shipping process. Many of our main suppliers and vendors have greener options for commonly used products.

ACTION ITEMS AND RECOMMENDATIONS:

- ☐ If your department has a stock room on campus, select items that are offered there to reduce additional shipments and packaging.
- ☐ When purchasing appliances (freezers, refrigerators, etc.) opt for ENERGY STAR certified products. These certified goods are required to meet energy efficiency standards.
- ☐ Buy in bulk when possible. Aside from hazardous chemicals, try to purchase large quantities of commonly used items to reduce packaging and multiple shipments.

Office Supplies:

- ☐ Before purchasing office supplies for lab members, check out the Office Supply Exchange to potentially get items for free through campus mail. You can also donate surplus office supplies to the supply exchange, also through campus mail. Search for “Office Supply Exchange” on sustainability.wustl.edu for more information.
- ☐ Office Essentials is one of the local suppliers for office supplies. “Green” items are flagged on their webpage to indicate sustainably-made products.

Photo courtesy of Alicia Hubert

PURCHASING

Photo courtesy of Soumya Ravindran

ACTION ITEMS AND RECOMMENDATIONS CONTINUED:

General Lab Supply Vendors:

- ☐ ThermoFisher offers a recyclable paper cooler for many of their products to decrease the use of polystyrene coolers. They have committed to reducing packaging and environmental impacts from their processes. They also offer greener product alternatives.
- ☐ Promega offers sustainable product options and they have committed to reducing packaging and waste generated from their products and processes.
- ☐ MidSci and VWR are local vendors. By shopping local it reduces greenhouse gas emissions from shipping products long distances.
- ☐ MilliporeSigma offers a "Greener Alternatives" database of products and chemicals. They also have a Polystyrene cooler return program. Follow these steps to return a cooler:
    - After you receive your order from Sigma-Aldrich, remove the product from the cooler, then make sure to leave the empty cooler in the box.
    - Put the cooler lid back on the container and then flip the flaps of the box so the pre-paid postage stamp is on the outside of the container. Seal the container using shipping tape.
    - Drop off the box at any location where the United States Postal Service picks up mail.
- ☐ Other companies that offer styrofoam cooler return programs include: New England Biolabs, Promega, Plastilite, and Corning. Contact your vendor directly if you are unsure if they accept returned coolers.

BEYOND THE LAB

The strategies and recommendations outlined throughout this guide contain universal tips for reducing your overall carbon footprint. Continuing the practice of making environmentally-conscious decisions beyond the lab is critically important.

ACTION ITEMS AND RECOMMENDATIONS:

Travel and Transportation

- ☐ Consider telecommuting and video conferencing to reduce emissions associated with travel.
- ☐ Consider a train, bus, or driving as an alternative to short flights. When flying is necessary, take direct flights to reduce travel emissions.
- ☐ Consolidate trips if you need to go to the same area multiple times and carpool with other lab members.
- ☐ Ride your bike or carpool to campus, if possible.
- ☐ Explore hybrid and electric cars when purchasing your next vehicle.
- ☐ Use the free STL Metro U-pass offered to all WashU faculty, staff, and students.

Fieldwork

- ☐ Do not leave any trash or supplies at field sites.
- ☐ Use biodegradable stakes and flags to mark study sites.
- ☐ Use reusable containers to transport supplies.

Daily Practices

- ☐ Reduce your use of single-use plastics such as water bottles, bags, and utensils.
- ☐ Reduce meat consumption. Explore the Green Monday pledge and the Sustainable Food Guide for information on how your food choices impact the environment.
- ☐ Consider how your research connects to climate change.

Photo courtesy of Alicia Hubert

CHECKLIST

Energy and Equipment:

- ☐ Affix “Shut the Sash” stickers on all fume hoods.
- ☐ Affix “Power Down Stickers” to all applicable lab equipment.
- ☐ Hang an “Autoclave Best Practices” poster in all autoclave rooms.
- ☐ Set up a schedule for running the autoclave to combine loads with other researchers.
- ☐ Create and maintain detailed sample inventories for all freezers to minimize time spent with the door open while searching for samples.
- ☐ Keep up with annual preventative maintenance and defrosting for all refrigerators and freezers.
- ☐ Raise -80 freezers to -70 if your samples can be safely stored at a slightly warmer temperature.
- ☐ Replace older (10 years+) freezers with new, high-efficiency models. Recycle old freezers through EH&S.
- ☐ Participate in the annual freezer challenge (freezerchallenge.org)
- ☐ Set computers and printers to automatically sleep or power down overnight and on weekends.

Water:

- ☐ Add water signs to all sink areas with tap and deionized water faucets.
- ☐ Install low-flow aerators on faucets, where possible.
- ☐ Switch traditional water and ice baths out for reusable bead bath systems.
- ☐ Install timers on equipment that continually use water.
- ☐ Recycle and reuse paper. Purchase paper with recycled content.

Waste:

- ☐ Keep inventories of all supplies to avoid buying excess goods.
- ☐ Buy commonly used lab supplies from on-campus stock rooms or local companies to avoid excess packaging.
- ☐ Opt for a reloadable pipette tip system instead of tips in a disposable box.
- ☐ Find ways to reuse non-contaminated products in the lab.
- ☐ Return all Styrofoam coolers back to the vendor.
- ☐ Hang a lab recycling poster on/near all waste containers.
- ☐ Recycle toner and printer cartridges through the mail back programs offered by vendors.
- ☐ Unsubscribe from unwanted catalogs, journals, and magazines.
- ☐ If your lab throws a large amount of gloves away in the landfill can (non-hazardous gloves), contact greenlabs@wustl.edu for information and pricing for glove recycling.

CHECKLIST

Chemicals:

- ☐ Keep your chemical inventory up-to-date.
- ☐ Use the laboratory cleanout process through EH&S when disposing of chemical bottles in bulk.
- ☐ Purchase the smallest amount of a product needed for an experiment, with the exception of commonly used nonhazardous material – these types of chemicals can be purchased in bulk if possible.
- ☐ Switch out all mercury thermometers with non-mercury alternatives.
- ☐ Switch out all mercury lightbulbs (in microscopes) with non-mercury alternatives.
- ☐ Search for greener alternatives to hazardous chemicals before planning for experimental needs.

Purchasing:

- ☐ Buy commonly used lab supplies from on-campus stock rooms or local companies to avoid excess packaging.
- ☐ Consolidate orders to reduce packaging and shipping emissions.
- ☐ Buy ENERGY STAR certified equipment and appliances.
- ☐ Utilize the Office Supply Exchange and Rheaply to find supplies and goods available on campus before buying something new.
- ☐ Find greener alternatives for supplies and chemicals.
- ☐ Return all Styrofoam coolers back to the vendor. Each vendor has specifications to follow for this process.

Beyond the lab:

- ☐ Utilize alternative transportation to get to work/school.
- ☐ Consider telecommuting instead of traveling long distances for conferences, or use a train or bus instead of a plane.
- ☐ Be mindful of your practices when working in the field. Do not litter or create excess waste.
- ☐ Reduce your use of single-use products and plastics.
- ☐ Take the Green Monday Pledge and explore how your food choices impact the environment through the Sustainable Food Guide.

Request signage and resources at *sustainability.wustl.edu/greenlabs*


Washington University in St. Louis