



GREEN LABS AT EMORY GUIDANCE DOCUMENT

#	Item Description	Suggested Action	Justification
1.0	ENERGY AND WATER EFFICIENCY AND CONSERVATION In our lab, we . . .		
1.1	Turn off equipment when it is not in use.	Utilize signage to encourage this practice. Some signage will be included in your Green Lab Certification Packet. You may request more equipment reminder clings from the Green Lab Team .	The energy used by lab “plug-in” equipment constitutes 10 to 50 percent of the total lab energy use (I2SL- Energy-Efficient Laboratory Equipment Wiki).
1.2	Unplug all lab equipment daily when it is not in use to reduce “vampire” loads (stir plates, vortexes, etc.).	Utilize signage to encourage this practice. Some signage will be included in your Green Lab Certification Packet. You may request more equipment reminder clings from the Green Lab Team .	A vampire load is the amount of energy an appliance uses while in “standby” mode or while switched “off” and still plugged in (EfficiencyVermont). This decreases energy consumption, thereby decreasing both costs and carbon dioxide emissions.
1.3	Keep cooling equipment full for maximum energy efficiency (refrigerators, freezers, dry ice coolers, etc.).	Notify other labs when freezer space is available. Reduce empty space by reusing ice packs and empty foam blocks from previous shipments. You can find these materials in stock rooms or your building’s recycling area.	A full freezer stays colder longer; it takes less energy to keep frozen items cold than to cool the air of empty space in a freezer (eHow).
1.4	Inventory our refrigerator and freezer contents to minimize the time the door is open while accessing materials.	Labs may designate this responsibility to a particular lab member and post an inventory listing on the exterior of freezers with the location of specific items (<i>see Appendix A for sample freezer inventory</i>).	Every time a freezer is opened, it requires extra energy to bring the temperature back down again, and the longer it is left open the more cold air is lost. (International Freezer Challenge - Good Management Practices)

GREEN LABS AT EMORY GUIDANCE DOCUMENT

1.5	Retire empty refrigerators and freezers when not in use.	Communicate with other labs to consolidate or share freezer space so that an empty or near empty freezer can be unplugged.	One -80°C freezer uses as much energy as a single family home each year (IS2L- CDC Cold Storage Efficiency).
1.6	Defrost our freezers annually for maximum energy efficiency.	Refrigerators and freezers should be cleaned out and defrosted annually, and a record of defrost dates should be maintained.	Defrosting is necessary because the buildup of ice prevents heat from transferring out of refrigerators and freezers and increases running costs (LABRepCo - Learn How To Defrost A Laboratory Freezer).
1.7	Place freezers in freezer farms or utilize the off-campus Bio-Bank, Akesogen.	Contact appropriate personnel in lab building to have freezers transferred to freezer farms, if applicable. Akesogen is Emory’s preferred off-campus Bio-Bank. Long-term storage of samples can be placed here. Upon request, samples are delivered back to your lab within 1-3 days.	Ultra-low freezers use a lot of energy and emit a lot of heat; putting them in a freezer farm makes them easier to monitor and regulate. Storing long-term samples in Bio-Banks reduces your labs’ total carbon footprint. (Brooks Life Sciences - Sustainable cold storage)
1.8	Adjust the set points of refrigerators and freezers to the highest possible temperature for the samples that are present and store samples at appropriate temperatures.	Instead of defaulting to the lowest possible setting on your lab’s cold storage equipment, raise the temperature to the lowest set point needed for your type of samples.	Ultra-low temperature freezers set to -70°C instead of -80°C uses up to 40% less energy (The Freezer Challenge). One -80°C freezer uses as much energy as a single family home each year (IS2L- CDC Cold Storage Efficiency). Many samples and reagents don’t need to be stored at -80°C. For example, store DNA in a standard -20°C instead (The Freezer Challenge).
1.9	Maintain equipment according to manufacturer instructions to optimize performance and efficiency. For example, freezer coils need to be cleaned/dusted 2-3 times per year to decrease	Labs may determine maintenance schedules based on their specific equipment. A clear and accessible record should be maintained. For example, freezer coils need to be cleaned/dusted 2-3 times per year to decrease energy consumption and increase longevity.	Following manufacturer recommendations will increase the lifespan of the equipment, prevent delays and inaccuracies in results, and ensure that equipment performs at maximum efficiency.

GREEN LABS AT EMORY GUIDANCE DOCUMENT

	energy consumption and increase longevity.		
1.10	Use cleaning equipment only when full (dishwashers, autoclaves, etc.).	Labs may create a schedule for washing, autoclaving, and other cleaning duties and designate a lab member to ensure the schedule is followed.	Dishwashers and autoclaves use the same amount of water and energy whether they are empty or full, so waiting until they are full conserves these resources (Thermodynamic Realities of Medical-Grade Autoclaves).
1.11	Use task lighting rather than overhead artificial light whenever possible.	Take advantage of natural lighting whenever possible; turn off ambient lighting when task lighting is sufficient, and utilize signage to remind lab members to turn off lights. Light switch clings can be requested from the Green Lab Team .	Lighting energy intensity in labs is up to twice that of a typical office space and accounts for 8% to 25% of total electricity use (I2SL- Best Practice Guide).
1.12	Turn lights off when not in use, including task lighting.	Take advantage of natural lighting whenever possible; turn off ambient lighting when task lighting is sufficient, and utilize signage to remind lab members to turn off lights. Light switch clings can be requested from the Green Lab Team . Note: Laboratories in 1462 Clifton Road, Rollins Research Center, and the Math / Science building must leave their room lights on when using the fume hood. Fume hoods in these buildings are set back when lights are off.	Lighting energy intensity in labs is up to twice that of a typical office space and accounts for 8% to 25% of total electricity use (I2SL- Best Practice Guide).
1.13	Report any water leaks in pipes or sinks to Facilities Management.	Place signage above sinks with Facilities Management contact information. To request signage, contact the Green Labs Team .	A tap leaking at the rate of 1 drop per second can waste more than 3,000 gallons of water per year (US EPA - Fix a Leak Week).
1.14	Use water aspirators minimally.	Use vacuum systems in lieu of water aspirators.	A single water aspirator can consume and contaminate as much as 50,000 gallons of water in a year (Fisher Scientific - Examining the Costs and Environmental Impact of Water Aspirators).

GREEN LABS AT EMORY GUIDANCE DOCUMENT

1.15	Use tap water rather than deionized water whenever possible.	Deionized water only needs to be used as a final rinse when cleaning glassware. Initial cleaning can be done with tap water.	Unnecessarily utilizing deionized water increases energy consumption due to the power used during deionization. (Minimizing Environmental Impacts of Water Purification)
1.16	Lower the sash on the fume hoods and close biosafety cabinets when not in use, and install “shut the sash” stickers on all fume hoods.	Educate lab members on how to properly use the fume hood and apply a reminder sticker to reduce the energy burden that fume hoods place on facility HVAC systems. Contact your EHSO building liaison if your chemical fume hood does not have a “lower your sash” sticker.	Keeping a fume hood open when not in use can waste \$1,500 per year in energy costs (National Institute of Building Sciences).
1.17	Post signage encouraging energy savings throughout the laboratory.	Request energy-savings signage from the Green Labs Team .	Signs (ex: stickers over light switches) serve as visual cues to remind us to incorporate energy saving behaviors in our day-to-day lives.
2.0	RECYCLING & WASTE REDUCTION In our lab, we. . .		
#	Item Description	Suggested Action	Justification
2.1	Make recycling bins available to the laboratory and ensure non hazardous, clean materials are recycled.	To download Emory’s lab recycling and waste disposal protocol, click here or visit the Green Labs at Emory web page . To request bins, labels, or if you are unsure whether or not an item can be recycled, email greenlabs@emory.edu .	Emory’s lab recycling stream includes white paper, plastics and metals, all glass, mixed paper, and compost (Emory OSI- Lab Recycling). ➤ <i>Pyrex glass cannot be recycled!</i> Emory strives to divert 95% of campus waste from landfills. Read more about OSI’s zero landfill waste goals and waste minimization .
2.2	Print all materials double-sided and recycle printer cartridges in the Hard-to-Recycle station.	After hitting the “Print” button, go to the “Layout” tab under Print Settings. Click two-sided. You’re good to go! Used printer cartridges can be recycled in Hard-to-Recycle stations.	Printing double-sided saves paper and ink consumption, thereby minimizing costs. Additionally, printer cartridges do not degrade easily, taking up to 1000 years to completely decompose. (Riverside Technologies Inc - The Importance of Recycling Ink and Toner Cartridges)

GREEN LABS AT EMORY GUIDANCE DOCUMENT

2.3	Reuse envelopes, boxes, ice packs, and packaging materials whenever possible.	Organize an area to maintain packaging materials suitable for redistributing or repurposing. For example, repurposing ice packs for use in empty spaces within cold storage equipment will help distribute the cold air within more evenly, and decrease the overall load on the system.	Approximately one-third of the material in an average landfill is packaging material (EPA-Municipal Solid Waste).
2.4	Use rechargeable batteries when possible. If single-use batteries are necessary, they are recycled in the nearest Hard-to-Recycle station.	Learn more about proper battery recycling procedures on EHSO's Universal Waste Quick Facts . This site will also provide information on how to dispose of lamps, pesticides, and mercury-containing articles. Rechargeable batteries can be purchased from all stores that sell single-use batteries, and can be recycled in Hard-to-Sort Recycle Stations.	Batteries contain a number of heavy metals and toxic chemicals that can contaminate the soil and pollute waterways when sent to landfills. (Bernardes et al.- Recycling of Batteries: a review of current processes and technologies).
2.5	Replace aerosols with non-aerosol alternatives when possible. If aerosols are necessary, they are recycled in the nearest Hard-to-Recycle Station.	All aerosol cans, whether full or empty, need to be recycled in the nearest Hard-to-Recycle Station . For larger pickups, contact EHSO for disposal as chemical waste (Guidelines for Regulated Waste Disposal). Submit EHSO waste pickup requests to chemwaste@emory.edu .	Aerosol cans can present a unique hazard in that the pressurization of the container is often more dangerous than the compound within (Guidelines for Managing Used Aerosols).
2.6	Redistribute unused chemicals within the building through Quartzzy or other tools.	Follow EHSO's chemical disposal guidelines when disposing of chemicals (EHSO Waste Page). Quartzzy is an online resource that labs can use and easily inventory samples/materials. These inventories can easily be shared to other labs within your department to make material-sharing more accessible	Unused chemicals may constitute 40% or more of the hazardous waste stream generated in laboratories that have not emphasized waste minimization (ACS- Less is Better).

2.7	Offer redundant or non-used equipment for re-use by another lab or to recycle.	<p>For non-capital equipment (not grant-funded and below \$4,999 purchase value): place a work request with Campus Services for reuse or recycling.</p> <p>For capital equipment (grant-funded or at least \$4,999 purchase value): contact the Office of Grants and Contracts for appropriate guidance. If capital equipment has reached its end of life, OGC will remove it from your department’s asset list. Following this, complete a transfer form with Campus Services for pick-up and recycling of equipment.</p> <p>Communicate with other labs to determine an effective means of coordinating shared resource opportunities regarding unused supplies. Ask your EHSO building liaison to send a notice to all labs on campus about free supplies.</p>	Donating equipment reduces surplus equipment, supplies, and costs (Harvard- New Life for Lab Equipment).
3.0 CHEMICALS In our lab, we . . .			
#	Item Description	Suggested Action	Justification
3.1	Find alternative solutions to radioactive materials when possible.	MIT’s Green Chemical Alternatives Purchasing Wizard provides information on alternatives to hazardous chemicals or processes.	Radioactive materials accrue additional costs such as disposal, contamination surveying, and special training (NCBI- The Impact of Low Level Radioactive Waste Management Policy on Biomedical Research in the United States).
3.2	Review Quartzzy chemical inventory for lab floor/department prior to purchasing new chemicals	A current and accessible inventory should be maintained by lab personnel so that the department community can access it when necessary.	An inventory management system minimizes waste generated from old, partially used containers, and helps to reduce overall inventory and duplicate purchases (ACS- Less is Better).

GREEN LABS AT EMORY GUIDANCE DOCUMENT

	when we need small quantities of chemicals.	Quartzy is an online resource that labs can use and easily inventory samples/materials. These inventories can easily be shared to other labs within your department to make material-sharing more accessible.	
3.3	Utilize green chemistry methods, including computer simulations and micro-scale chemistry techniques when applicable.	MIT's Green Chemical Alternatives Purchasing Wizard provides information on alternatives to hazardous chemicals or processes. The EPA provides 12 principles for green chemistry .	Green chemistry consists of chemical products and processes that reduce or eliminate the use or generation of hazardous substances (EPA- Green Chemistry).
3.4	Substitute mercury-containing equipment with other alternatives when possible.	Try using alcohol-based thermometers instead of mercury thermometers. Work with equipment suppliers to see if non-mercury-containing equipment is available. Mercury-containing equipment (including thermometers) must be disposed of through EHSO. A waste pickup request should be submitted to chemwaste@emory.edu .	Mercury is a toxic and volatile chemical that produces indoor air contamination when leaked or spilled (NIH- Mercury Hazard Reduction Campaign).
4.0	PROCUREMENT In our lab, we . . .		
#	Item Description	Suggested Action	Justification
4.1	Purchase products made from recycled materials whenever possible.	Look for items designated as being made of recycled materials by vendors.	Purchasing recycled products reduces landfill waste, conserves natural resources and energy, and promotes the market for recycled products (EPA- Waste Wise Tip Sheet).
4.2	Prioritize purchasing Energy Star equipment.	Look for Energy Star designation on vendor websites.	Energy Star products are part of a U.S. EPA program that helps businesses and individuals save money and reduce energy consumption through purchasing high-energy efficiency products (Energy Star).

GREEN LABS AT EMORY GUIDANCE DOCUMENT

4.3	Utilize previously purchased materials and stock solutions before purchasing new materials (micro-scaling).	When possible, reduce chemical use to the lowest level at which experiments can be effectively performed (NHDES- Microscale).	Micro scaling reduces chemical use, improves lab safety, saves money, and reduces experiment time (Microscale Chemistry and Green Chemistry: Complementary Pedagogies).
4.4	Make bulk orders for materials that won't expire.	Consider volume ordering for materials that won't expire.	Bulk ordering requires fewer transport deliveries, meaning fewer transport emissions. Bulk sizes can also reduce required packaging (Eco Office Supplies- Eco-tips).
4.5	Request take-back programs from suppliers (i.e. ice packs, foam coolers, and packaging waste) and reduce these single-use items when possible.	Request information from vendors for details of available take-back programs.	Take-back programs can be used for surplus supplies, Styrofoam coolers, ink & toner cartridges , and/or packaging materials.
4.6	Borrow and share equipment with other researchers before purchasing new.	Contact members of other lab groups in your department who do similar work, especially when purchasing equipment or chemicals.	Packing and shipping new equipment is not only time consuming, but also produces harmful emissions. Borrowing and sharing equipment is an easy way to cut costs, get necessary supplies quickly, and incorporate sustainability into the lab. (Lab Manager: Building a Culture of Sustainability)
5.0	ENGAGEMENT In our lab, we . . .		
#	Item Description	Suggested Action	Justification
5.1	Inform and ask lab members to agree to follow the applicable actions on this checklist.	Present the Green Labs checklist results and action steps in lab meetings.	We recommend acquiring agreement from at least 75% of lab members for maximum success.
5.2	Share information about our Green Lab certification with all new employees and	Engage lab members when completing the annual recertification and share Green Labs tips relevant to lab members' roles.	

GREEN LABS AT EMORY GUIDANCE DOCUMENT

	encourage them to get involved.		
5.3	Discuss sustainability and the progress of our Green Lab certification at lab meetings.	Make lab sustainability efforts a regular agenda item for lab meetings.	
5.4	Have at least one lab representative on the Office of Sustainability Initiatives e-mail list serv , and redistribute relevant information to lab members.	Please sign up for the OSI listserv here .	
5.5	Know who our building's Sustainability Representative is and communicate with them about any related inquiries and ideas.	Find your building's Sustainability Representative here .	
5.6	Promote and provide resources for sustainable transportation options, such as public transit, biking, carpooling, etc.	For information on available commute alternatives, visit the Transportation and Parking Services website here .	10% of Emory's CO2 emissions come from faculty, staff, and student commuting. Choosing an alternative helps Emory reach its goals to reduce greenhouse gas emissions 45% by 2030 and reach net zero emissions by 2050. For more information on climate solutions that Emory is implementing, visit OSI's Climate Solutions page .
5.7	Have 50% of our lab staff participating in Emory's Sustainability Pledge.	Locate and take or renew your Sustainability Pledge here .	

6.0 SAFE, HEALTHY, AND JUST ENVIRONMENT In our lab, we ...			
#	Item Description	Suggested Action	Justification
6.1	Have at least 50% of lab faculty and staff trained through Safe Space Training , Creating an Environment of Courtesy and Respect Training , or similar Diversity & Equity training , within the last two years.	To attend a Safe Space training, register through the Emory Learning Management System . Once logging in, search for Safe Space (course number 247000), and available sessions will be listed. Find contact information to schedule a Creating an Environment of Courtesy and Respect Training here .	Members of the LGBTQ and black communities are at a higher risk for experiencing harassment and career limitations in the STEM field. Studies show that students learn and perform better on college campuses when they feel validated, accepted, and safe.
6.2	Have at least 50% of the lab faculty and staff listed as Safe Space Allies .	To be listed as a Safe Space Ally, you must complete Safe Space Training and choose to have your name added to the list.	Implementing a program to visibly identify Safe Space Allies benefits LGBTQ professors and students by making them feel validated and accepted. (Finding Queer Allies: The Impact of Ally Training and Safe Zone Stickers on Campus Climate)
6.3	Have developed a statement on equity and diversity that has incorporated feedback from the Office of Diversity, Equity, and Inclusion and is publicly available on the lab website.	After developing a statement on equity and diversity, use this Contact List to get it reviewed by the Office of Diversity, Equity, and Inclusion.	Having a publicly accessible equity and diversity statement will create accountability for all lab members, demonstrate the lab’s commitment to equity and diversity, and keep lab members mindful of their actions, words, and attitudes towards those different from them.
6.4	Have reviewed external communications (e.g. website content, publications, etc.) to ensure they contain inclusive language such as gender-neutral pronouns.	See this Guide to Gender-Inclusive/Non-Sexist Language from the University of Pittsburgh to revise your external communications.	The United Nations encourages the use of gender-neutral language when possible in keeping with Sustainable Development Goal 5 , Gender Equality, which embodies the goal to eliminate discrimination and empower people of all gender identities.
6.5	Have reviewed and updated internal policies and practices – both written and unwritten – to eliminate standards of	See this document with Tools for Addressing White Dominant Culture to better understand inequities normalized by white	Especially in predominantly white spaces like universities, aspects of white dominant culture can easily become the prevailing standard, making members of minority groups

GREEN LABS AT EMORY GUIDANCE DOCUMENT

	white dominant culture and support a more inclusive work environment.	dominant culture and get ideas for changes that can be made to eliminate them.	feel marginalized and out of place. Often, white dominant culture seeps into workplaces subconsciously, so it is important to take intentional action to eliminate it.
6.6	Provide space or share resources regarding other spaces on campus that support an inclusive work environment such as gender-neutral restrooms, lactations rooms, and reflection rooms.	Find a map of gender neutral restrooms at Emory as well as additional information about creating an inclusive environment for LGBTQ+ students here . Find a map and list of Emory lactation rooms here . See information about Emory’s reflection room here .	
7.0	<p>INNOVATION In our lab, we . . . Please consider innovations relating to reducing single-use plastics, reducing packaging waste of ice packs and foam coolers, and sharing equipment, in addition to any other sustainable practices you have made in your lab.</p>		
#	Item Description	Suggested Action	Justification
7.1	Encourage innovative ideas from our employees regarding lab-wide sustainability initiatives. Please provide some examples in the “Comments” section.	Labs can earn additional points for actions that are not listed in the checklist. Initiatives and corresponding points awarded are subject to committee approval.	
7.2	What are some other sustainable implementations in your lab that are not in this Checklist? Please provide some examples in the “Comments” section.		This allows us to see innovation projects your lab is implementing, and also provides us with new ideas on how to improve the current Green Labs checklist.

Appendix A- Freezer Inventory Template

Sample Name	Owner	Date	Freezer Name	Shelf	Rack	Box	Space in Box