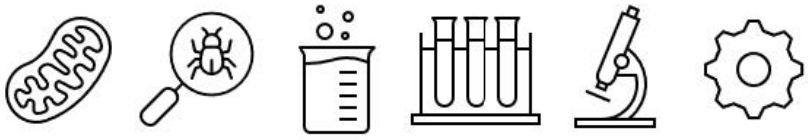
Northwestern | sustainNU

ENERGY STAR AWARD 2023
PARTNER OF THE YEAR
Sustained Excellence

Green Labs Certification Guide

A guide to help your lab implement the sustainable practices needed to become Green Labs Certified

Please complete this guide to achieve Green Labs Certification. At least 75% of the actions that apply to your lab must be completed to become certified. We understand that all actions will not apply to all labs. As a first step, cross out (via the highlight or strikethrough Adobe functions) any actions that do not apply to your lab (e.g., if your lab does not have a freezer, cross out all actions related to freezers). You can then complete and submit this document to the sustainNU team for review. If you have any questions, please contact sustainNU at sustainNU@northwestern.edu.



Energy Conservation and Efficiency

Northwestern lab equipment puts a substantial strain on energy consumption. Proper freezer maintenance, closing fume hood sashes, turning off/unplugging unused equipment that can be shut down, and using equipment efficiently will significantly lower your energy footprint.

Equipment Shut Down

☐ 1. **Where applicable, we turn equipment off (or place in standby/hibernate mode) at the end of each day and we place a shutdown checklist in a highly visible, centralized location.**

Become familiar with the shutdown settings of your equipment. If a piece of equipment can be shut off at the end of the day, be sure to manually turn if off or use timers to automatically power off. This will reduce energy use and often will increase the life of the equipment. Survey your lab space to identify places where signs or labels could be used to reinforce shutdowns. Post prompts and relevant information where appropriate.

Resources

Request ‘turn off’ reminder stickers and signage at sustainNU@northwestern.edu.

Fume Hoods

One open fume hood can use the same amount of energy as 3.5 homes each year.[1]
When not in use, fume hood sashes should be closed.

☐ 2. **We have a fume hood use policy that encourages lab members to shut the sash when not in use.**

By closing the sash, you can reduce energy loads resulting from pumping conditioned air out of the lab and provide a safer work environment by protecting lab users from lingering fume exposure.

Resources

Refer to Research Safety's Chemical Fume Hood Handbook for detailed fume hood practices on the Northwestern campuses: bit.ly/FumeHoodRS.

☐ 3. **We have "shut the sash" reminder stickers posted on the fume hood.**

Where appropriate, post reminders to shut the sash when a fume hood is not in use.

Resources

sustainNU can provide 'shut the sash' stickers upon request at sustainNU@northwestern.edu.

☐ 4. **We contact Facilities to report if a fume hood is not functioning properly or is not in use.**

Talk to Facilities about getting fume hoods that are not functioning properly or no longer used consistently turned off. If the hood remains in place, be sure to post a sign indicating that it is not functional and should not be used.

Resources

If you suspect that your fume hood is not operating correctly or needs to be turned off, please report to Facilities at bit.ly/facilitiesrequests.

[1] Aldred Cheek K and Wells NM (2020) Changing Behavior Through Design: A Lab Fume Hood Closure Experiment. Front. Built Environ. 5:146. doi: 10.3389/fbuil.2019.00146

Freezers

Ultra-low temperature (ULT) freezers are one of the biggest energy users in labs. Running an ULT freezer uses the same amount of energy as the average U.S. household.[2] Substantial reductions in energy consumption can be achieved when ULT freezers operate efficiently.

☐ 5. **We keep an inventory of items in our freezer.**

Keep your freezers organized through an inventory. Most of the energy a freezer uses is spent cooling the air that enters upon opening. An inventory can reduce how long a freezer door is open, saving energy and increasing the freezer's lifespan. Make sure items in the freezer do not block the grill ,vents, or obstruct airflow.

☐ 6. **We host annual freezer clean outs to remove unused samples.**

Plan an annual freezer clean out to eliminate samples that are expired, mislabeled, or unidentifiable and allow your freezer to run more efficiently.

Resources

Be sure to follow Research Safety guidelines when disposing of biological or hazardous waste, which can be found at bit.ly/RSGuidelines2. On the Chicago Campus, Research Safety has -80 and -20 freezers, 2 wet/dry vacuums, and 2 large ice chests available for short term use located in the basement of the Ward Building. On the Evanston Campus, Research Safety has one ice chest and one wet/dry vacuum available in the Tech building, in NG71. Reach out to researchsafety@northwestern.edu to reserve.

☐ 7. **We remove ice buildup and clean the freezer filter every other month.**

Ice buildup and clogged filters in freezers restrict air circulation and requires the device to use more energy. Remove ice buildup and clean filters regularly to increase freezer efficiency.

Resources

Process for removing ice:

1. Assemble insulated foam gloves, an ice scraper with a soft brush, and towel.
2. Put on your protective foam gloves and lay a towel on the floor to collect ice and water.
3. Use your ice scraper to remove ice, starting with the seal on and around the freezer door (not the rubber perimeter), working your way to the inside cabinet doors.
4. Clean the outside rubber perimeter (gaskets) with a soft brush to maintain a good seal.

Process for cleaning freezer filters:

1. Locate the freezer filter (typically located at the bottom of the freezer).
2. Using protective gloves, open the grill and remove the filter.
3. Rinse the filter in clean water.
4. Wait for the filter to dry, then put it back in place.

[2] U.S. Department of Energy Efficiency & Renewable Energy (2022). Federal Energy Management Program.

☐ 8. **We raise the temperature in all ULT freezers from -80 to -70 Celsius.**
Most lab samples (nucleic acids, most proteins, bacteria, viruses) are safe to store at -70C rather than -80C. Raising the freezer temperature by 10C can reduce energy consumption by 30-40% (equivalent to the impact of planting 2.4 acres of U.S. forest) and prolong the life of the device.[3]

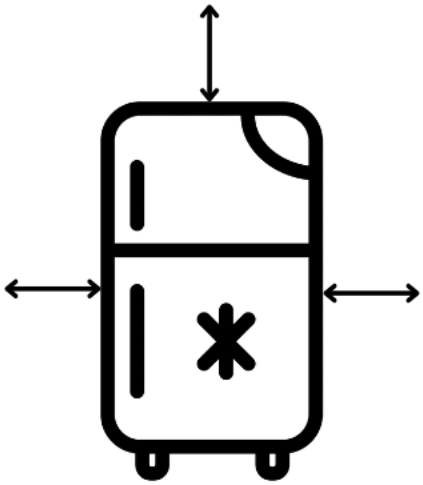
Resources

For evidence on the effectiveness of -70C preservation of lab materials, see the My Green Labs publication guide at bit.ly/Evidence-70.

For information on the energy savings associated with lowering the ULT freezer setpoint, see the Emerging Technologies Coordinating Council ULT Freezer report at bit.ly/ULTFreezer.

☐ 9. **We share freezer space with another lab.**
If you only need a small amount of freezer space, share a freezer with a neighboring lab instead of buying or using your own.

☐ 10. **We store our freezers in well ventilated locations.**
Make sure your ULT freezer is in a well-ventilated area and out of direct sunlight. If space allows, keep 6" of space around the device to allow for adequate ventilation and more efficient cooling.



☐ 11. **We arrange to have the freezer inspected if we suspect inefficiencies.**
Make sure your freezer reaches its temperature setting. If the gaskets and rubber seals around the freezer door are broken or if the compressor is always running, it is not operating efficiently.

Resources

If you suspect that your freezer is not operating correctly due to an issue with the electric or water connection, please report to Facilities at bit.ly/facilitiesrequests. If the operating issue is related to the appliance, reach out to the freezer vendor.

[3] U.S. Environmental Protection Agency (2022). Greenhouse Gas Equivalencies Calculator.

Lighting

☐ 12. **If the lab does not have motioned censored lighting installed, we maximize the use of natural and task lighting instead of overhead lights.**

Open blinds to use daylighting in place of overhead lighting. Small task lights at desks are generally more energy efficient than full overhead lighting. Where needed, provide desk lamps equipped with LED bulbs and encourage staff to use individual task lighting rather than full overhead lighting when possible. When purchasing task lighting, look for products that are ENERGY STAR certified.

Resources

Find energy efficient lighting options at energy.gov/energysaver/lighting-choices-save-you-money.

☐ 13. **If the lab does not have motioned censored lighting installed, we take responsibility for turning off lights and place reminder stickers on switches.**

Check that lights are turned off when not in use. Where appropriate, post reminders to turn off lights.

Resources

sustainNU can provide stickers upon request at sustainNU@northwestern.edu.

Computers and Other Electronics

☐ 14. **We use Research Safety approved smart power strips to reduce standby power usage.**

Many devices use standby or "vampire" power even when turned off or in sleep mode. Use smart power strips to reduce standby power use – turning off the strip at the end of the day will easily switch off all items plugged into it. Be sure to only use smart power strips on equipment that can be shut off at the end of the day (e.g. do not attach a fridge or freezer).

Resources

Research Safety requires labs to select power strips that meet the Underwriters Laboratories Safety Standard for Surge Protection Devices (UL 14449).

Read more about choosing smart power strips at bit.ly/PWRSTRIP.

Learn about standby power at standby.lbl.gov.

☐ 15. **We use energy efficient settings for computers, printers, copiers, and other devices.**

Use the Northwestern IT Energy Efficient Computing guide to implement energy saving settings for computers, copiers, and printers.

Resources

Refer to the energy efficient computing guide for Northwestern at it.northwestern.edu/policies/energy.html.

Read more about power management at it.northwestern.edu/hardware/eco/myth.html.

Climate Control

☐ 16. **In accordance with University policy, we do not have personal space heaters in our lab.**

Work with your coworkers and Facilities to address temperature issues. If you find staff are opening windows due to excessive heating during the winter or compensating for low temperatures, report the issue to Facilities.

Resources

Report temperature issues and request service at bit.ly/facilitiesrequests.

☐ 17. **If the lab has windows, we keep windows closed when heating or air conditioning is running.**

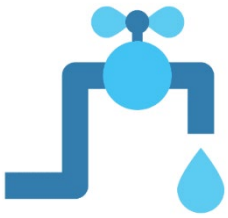
Ensure windows are closed when heating or air conditioning systems are operating. Inspect windows to make sure they are properly sealed. If damage is found, contact Facilities to fix.

Resources

Report issues and request service at bit.ly/facilitiesrequests.

Water Conservation and Efficiency

Lab equipment can contribute to significant water use. Autoclaves alone can use as much as 60 gallons of water per cycle. Use these techniques for reducing your lab's water consumption.



☐ 18. **We report water leaks to Facilities.**

Check for leaky faucets or leaks in other water fixtures and report any issues to Facilities.

Resources

Request service at bit.ly/facilitiesrequests.

☐ 19. **We take responsibility for turning off water fixtures when not in use.**

Where appropriate, post reminders to turn off water fixtures.

Resources

sustainNU can provide stickers and signage upon request at sustainNU@northwestern.edu.

☐ 20. **We follow Research Safety guidelines for hazardous waste disposal.**

Do not use the sinks or surrounding areas for handling or storing hazardous chemicals and do not dispose of hazardous chemicals via the sink. If a fluid is contaminated with infectious agents or biological toxins, it must be decontaminated by chemical disinfection or steam sterilization before sink disposal.

Resources

Research Saftey guidelines can be found at bit.ly/RSGuidelines2.

Learn about the impact of biological waste minimization on the environment through Research Safety's informative video at vimeo.com/313049658.

☐ 21. **We follow best practices for autoclave use.**

For labs with small desktop autoclaves and those operating centralized autoclaves, consolidate loads and only run the machine when it is full. Be sure to switch off the autoclave when not in use and close the door after removing items to prevent heat and steam loss. When possible, reuse reverse osmosis (RO) reject/ wastewater for quenching to reduce domestic water use.

Resources

Learn more about best practices for sustainable autoclave use at mygreenlab.org/autoclaves.html.

☐ 22. **We review our rinsing procedures regularly.**

Ensure rinsing procedures meet safety requirements, while not using unnecessary amounts of water. Be sure to check waste levels on instrument that do not get used often to prevent the build up of waste materials.

Resources

Research Saftey Guidelines can be found at bit.ly/RSGuidelines2.

Materials Management

Due to resource intensity and diversity in materials used, labs generate large amounts waste. Below are tips to help lower various waste streams in lab spaces.

Paper and Office Supplies

☐ 23. **We save paper by distributing materials electronically and using double-sided printing.**

Set printer and computer defaults to double-sided printing. Distribute materials (e.g., meeting agendas) electronically when possible and print only when necessary. Consider switching from paper to electronic data collection when possible. Unsubscribe from any unnecessary bulk mail subscriptions and sign up for digital mailing lists instead.

☐ 24. **We reuse scrap paper and office supplies.**

Set up a designated area for staff to share office supplies that can be reused, such as scrap paper, binders, file folders, desk organizers, and paper clips.

Recycling

☐ 25. **We encourage recycling by ensuring proper placement and labeling of bins.**

Ensure that recycling bins are available at all workstations and in common areas such as kitchens, conference rooms, and break rooms. Recycling bins should be clearly labeled and should always be paired with trash cans. Where needed, post signs to explain what should be placed in bins.

Resources

sustainNU can provide recycling bins, labels, and signs if needed. Learn more about recycling at bit.ly/NUrecycle.

☐ 26. **We recycle e-waste through the Northwestern eCycling program.**

Inform your staff about the proper methods for disposing of electronic waste through Northwestern's electronics recycling program. If electronics are still useable, investigate methods of donation including the Northwestern Surplus Property Exchange.

Resources

Learn more about Northwestern's electronics recycling program at bit.ly/ecyclingNU. Visit the Northwestern Surplus Property Exchange at northwestern.edu/procurement/about/surplusproperty.

Chemical Use and Disposal

☐ 27. **We follow the guidelines for hazardous waste minimization and disposal set by Research Safety.**

Research Safety ensures compliance with federal, state, and local safety and environmental regulations in the collection and proper disposal of chemical, radioactive, and biological waste generated by research, teaching, and clinical operations. All lab members working with hazardous waste should read and be familiar with the Research Safety Hazardous Waste Disposal Guide.

Resources

Review the Northwestern Research Safety Hazardous Waste Disposal Guide at bit.ly/ResearchSafetyNU.

Learn about the impact of biological waste minimization on the environment through Research Safety's informative video at vimeo.com/313049658.

☐ 28. **We apply the Hierarchy of Controls model for minimizing or eliminating hazards.**

The Hierarchy of Controls model minimizes or eliminates hazards to prevent pollution at all possible points. From the elimination of toxic chemicals to improved workflows preventing contact with hazardous materals, the Hierarchy of Controls encourages labs to minimize the amount of pollution they generate.

Resources

Learn about Hierarchy of Controls model at bit.ly/ofControls.

☐ 29. **We avoid purchasing unnecessarily hazardous materials.**

Our lab does not purchase instruments containing mercury. We do not purchase Ethidium Bromide, and instead use alternatives such as SYBR Green.

☐ 30. **We make surplus chemicals that meet Research Safety requirements available to other labs for use.**

See if others in your department might need your surplus chemicals that meet Research Safety requirements before disposing of them.

Resources

Review Research Safety requirements at bit.ly/RSSurplusChem.

Green Purchasing

☐ 31. **We keep a detailed inventory of lab supplies.**

Keeping an inventory of items available to the lab avoids instances of unnecessary purchasing. Aim to check and update the inventory at least annually.

☐ 32. **We follow sustainable purchasing practices when considering and making purchases.**

Before making a purchase, first consider whether it is actually necessary to buy the new material. Is it possible to purchase replacement parts rather than an entire unit? Can you share equipment with a neighboring lab? If the purchase is necessary, seek out durable materials that follow guidance for sustainable purchasing. Look for companies that use renewable energy sources, have zero-waste manufacturing facilities, minimize packaging when shipping, and design products that can be easily recycled or offer take-back programs at the end of a product's life.

Sustainable Purchasing Guidance

Chemicals

Keep a detailed chemical inventory to refer to before purchasing additional supplies. Review the ACT Database and the Green Chemical Alternatives Wizard for sustainability information on lab equipment and materials.

Kitchen and Office Supplies

Purchase reusable products (dishes, coffee pods, refillable pens over disposable whenever possible. Do not provide bottled water and encourage the use of water bottle filling stations (sinks, dispensers, and water pitchers. Look for paper products made from recycled content (oftentimes labeled as a post-consumer product). Note that recycled and reusable products do not necessarily cost more than their alternatives.

Freezers

Avoid purchasing a new freezer if possible. Instead see if you can make space in your existing unit or share freezer space with a neighboring lab. If a new freezer is necessary, choose an ENERGY STAR rated one.

Autoclaves

Before purchasing an autoclave, consider whether your lab can use the centralized autoclaves available to most departments. If a new autoclave is necessary, consider a typical load size and right-size the device accordingly. Cylindrical autoclaves tend to be more energy efficient than their rectangular counterparts. Additionally, temperature actuated valves measure the temperature of effluent water and allow cold water for quenching only when needed. This prevents water from running consistently.

Electronics

Purchase computers and electronics that are U.S. EPA ENERGY STAR or Global Electronics Council EPEAT certified. Both certifications review products that meet strict energy-efficiency specifications. The ENERGY STAR Rebate Finder can assist in identifying rebates available to your lab.

☐ 33. **We explore alternatives before purchasing new products.**

Consider sharing unused supplies and reusing items rather than buying new products. Use the Northwestern Surplus Property Exchange to post your unused items or check for available items.

Resources

Visit the Surplus Property Exchange at northwestern.edu/procurement/about/surplusproperty.

☐ 34. **We factor sustainability efficiency into our grant requests.**

Review the Bringing Efficiency to Research Grants website for ideas on incorporating energy efficiency into your grant proposals. Help make your grant proposal stand out and show sponsors that you will maximize the impact of their research money.

Resources

Check out the Bringing Efficiency to Research Grants toolkit at betrgrants.weebly.com/participate.html.

Communications and Engagement

Maintaining sustainable practices and bolstering Northwestern's culture of sustainability involves the entire community. Communicating your lab's commitments and engaging with your community ensures consistency over time and magnifies your impact.

☐ 35. **We have an active Green Lab Team.**

Organize a Green Lab Team to lead lab sustainability initiatives. After the certification process is complete, the Green Team should continue to meet regularly to maintain and implement new Green Lab practices.

The Green Team is encouraged to share the Green Labs program with uncertified labs to encourage others to engage in sustainability. If your lab is too small to form a team, appoint a Green Lab leader who will continue to foster sustainability in the lab.

Resources

If you haven't already, email a list of members who are on your Green Lab Team to sustainNU@northwestern.edu.

☐ 36. **We include information on lab sustainability practices in lab orientation.**

Anytime a new member joins the lab, orient them to the sustainability practices your lab committed to through this certification. Provide a one-pager that can be sent electronically during the onboarding process to share these practices over time.

☐ 37. **Like safety, we discuss sustainability during lab meetings by making it part of the standing agenda.**

Include green lab updates and reminders in staff meetings and regular staff communications (for example, alongside safety moments). Attending virtual green lab conferences and local events, and subscribing to newsletters and publications focused on lab sustainability can help your lab adhere to emerging best practices for sustainability.

Resources

Subscribe to the sustainNU newsletter at northwestern.edu/sustainability to receive updates and tips you can share with your coworkers and follow @sustainNU on Twitter and Instagram.

The International Institute for Sustainable Laboratories (I^2SL) is dedicated to engaging stakeholders in advancing the safety and sustainability of laboratories globally. I^2SL offers an annual conference, training and educational materials, and local chapters for people interested in lab sustainability. My Green Lab, a non-profit focused on engaging lab stakeholders in creating a global culture of sustainability in science, also offers a variety of programs and an annual conference. The ACS Green Chemistry Institute focuses on green chemistry and engineering, and provides an array of meetings, resources, and a newsletter.

Social Sustainability

Human health is intertwined with the health of our planet. As such, the wellness of individuals is integral to fostering sustainable communities at Northwestern and beyond.

Lab Culture

☐ 38. **We encourage low-carbon modes of transportation for lab members.**

Provide your team with information about Northwestern's alternative transportation incentive programs and encourage the use of public transit for travel to work and meetings.

When possible, encourage staff to walk or bike when traveling short distances. Provide resources for cyclists such as information on the University's discounted Divvy bike share program and on Northwestern's bike registration program (which includes a free helmet and light). Northwestern consistently places in the annual Bike Commuter Challenge each June, an event organized by the Active Transportation Alliance to encourage the use of bike commuting. Encourage lab staff to participate in this yearly challenge.

Resources

Learn more about traveling sustainably at bit.ly/NUGreenTravel.

Learn more about discounted Divvy memberships through Wildcard Advantage and Divvy for Everyone at bit.ly/DivvyWildcats & bit.ly/D4EProgram.

Find Northwestern biking resources at bit.ly/NUBikeResources.

Follow @sustainNU on Twitter and Instagram to stay up to date on the Bike Commuter Challenge and other sustainability initiatives at Northwestern.

☐ 39. **We encourage staff to take advantage of health and wellness programs offered through Human Resources.**

Lab members are encouraged to sign up for the YourLife Wellness Mailing List to receive updates on the current wellbeing programs available. Members are also made aware of and reminded of the wellbeing programs available to them -- from 15- and 30-minute virtual sessions offering stretching, meditation, kickboxing and more to free consultations with a registered dietitian.

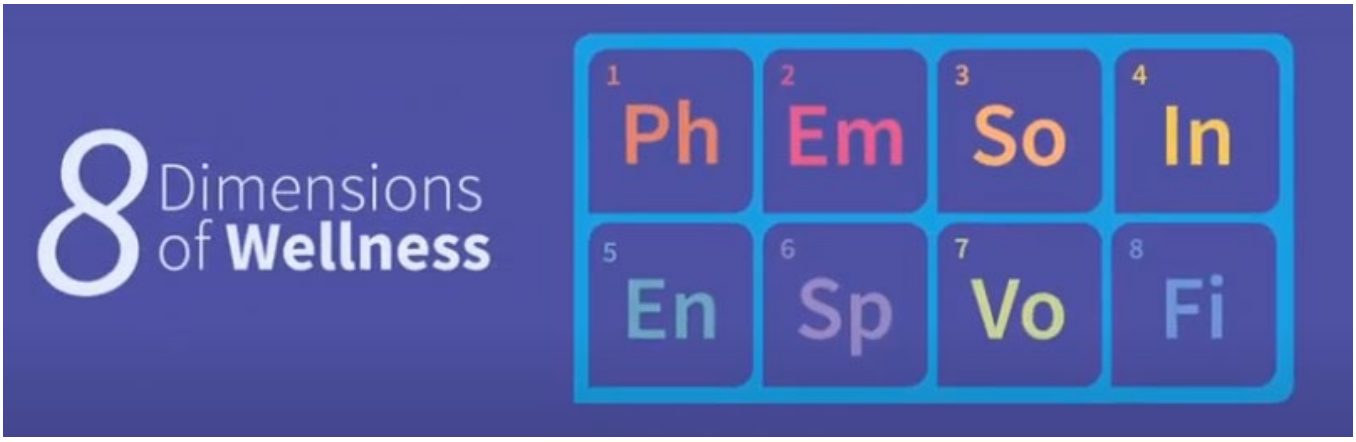
Resources:

Sign up for the YourLife Wellness Mailing list at bit.ly/YourLifeMailList.

The YourLife Wellness Grants through Human Resources offer funding for wellness activities, events, and/or additions to the lab space at bit.ly/WellnessGrants5.

Visit the Well-being HR page for information on free physical, emotional, and financial wellbeing programs offered to all staff and faculty at northwestern.edu/hr/benefits/well-being.

Listen to the Well-being playlist offered through myHR Learn at bit.ly/myHRWellbeing.



Environmental Justice

☐ 40. **We encourage lab members to review environmental justice and anti-racism resources.**

Unequal exposure to environmental risks and disparate access to environmental benefits occurs along racial and economic lines. Sustainability must benefit all people. We ask that program participants review and share the National Resources Defense Council overview of environmental justice (or an equivalent resource) as well as at least two anti-racism resources from the below list.

Resources:

View the Natural Resources Defense Council Video *What is Environmental Justice* at bit.ly/EJVideo5.

The Chicago Environmental Justice Network is a great source for information on environmental justice issues impacting the Greater Chicago area (Twitter and Instagram).

Review at least two anti-racism resources from the following lists of materials:

- The Northwestern Libraries Anti-Racism Resources Guide
- The myHR Learn Diversity, Equity, and Inclusion Playlists
- The Association for the Advancement of Sustainability in Higher Education No Sustainability Without Justice Anthology

☐ 41. **We encourage lab members to learn about the Indigenous People native to the land on which Northwestern sits.**

Northwestern is situated within a network of historical and contemporary relationships with Native tribes, communities, parents, students, and alumni. The Northwestern campus sits on the traditional homelands of the people of the Council of Three Fires, the Ojibwe, Potawatomi, and Odawa as well as the Menominee, Miami, and Ho-Chunk nations. Indigenous People are the original stewards of the land that Northwestern occupies, and Indigenous People today are leaders in the sustainability movement through activism, research, and the sharing of traditional ecological knowledge.

Resources:

Review Northwestern's Land Acknowledge Statement and the reasoning behind this statement at bit.ly/NULandAckn.

Learn about the Sand Creek Massacre via resources compiled by Northwestern's John Evans Study Committee at bit.ly/SankCreekMassacre.

Become acquainted with Indigenous groups native to places that are important to you at native-land.ca.

Innovations

☐ 42. **We do something innovative, implementing measures that go above and beyond the sustainability practices listed here.**
If your lab has undertaken any sustainable activities that are not included in this guide, please provide a brief description, either below or in a word document. Your ideas could be incorporated into future campus-wide sustainable certification efforts. In addition, labs and teams that make an extra effort to improve sustainability in the workplace could be eligible for special recognition.

Number of Actions Applicable to Lab:
Number of Actions Completed or Committed to:
Percentage of Completed Applicable Actions
(must be at least 75%):

Thank you and congratulations on your efforts!