Guide to the Green Lab Certification Checklist

Section 1: Management and Training

1a. Prerequisite - Lab participates in self assessment and sustainability innovation.
Use the Green Lab Certification Checklist as a self-assessment guide to consider your lab's energy conservation and sustainability practices and to identify areas requiring change in order to be certified. If applicable, please note in Section 9 sustainability issues unique to your lab and any novel solutions you develop.

1b. Prerequisite - A lab representative takes part in Green Labs at Duke.
The representative can participate in various ways: 1) through attendance at Green Labs at Duke meetings, 2) by participating in Green Lab at Duke projects or 3) contributing to online discussions through the greenlabs@duke.edu mailing list.

1c. A lab representative communicates sustainability principles and policies to PI, staff, and students on regular basis (at least yearly).
Use the time of re-certification to review your lab's sustainability policies and make sure they are communicated effectively to everyone in the lab. Being a Green Lab means a commitment on the part of all lab members and requires everyone's participation.

Section 2: Energy Conservation

2a. Prerequisite - Fume hood sash remains closed when hood is not in active use.
Keeping fume hood sashes fully closed is not only an important safety practice, it also conserves energy. Fume hoods are typically large energy consumers and can consume the same amount of energy as 3.5 average sized houses per year. Closing the sash on a variable speed hood can reduce energy consumption by up to 60%. **Sashes should be fully closed** when not in use and, if applicable, sliding glass panels overlapping and fully closed.

2b. Prerequisite - Fume hood has been certified within last 13 months.
Fume hood inspection insures the hood is functioning properly. As required by Duke's Occupational and Environmental Safety Office, all labs should have their fume hoods certified annually.

2c. Freezers and fridges have a regular maintenance schedule.
In a typical lab, refrigerators and freezers are a large component of the total energy consumption. Keeping freezers free of ice build-up is an easy way to reduce waste in your lab. When an ice layer builds, covering the coils, the compressor must run longer to maintain cold temperatures. If the ice is more than one inch thick, then it needs to be defrosted. Defrosting regularly will save energy and possibly extend its life. Also, minimizing ice buildup will maximize your storage space, and boxes and racks will sit flat instead of precariously perched on lumpy icy surfaces.

Annual maintenance schedule	Refrigerator	Freezer	Ultra low

Check ice buildup, defrost if ice layer > ¼ in		✔	
Clean coils	✔	✔	
Check seal around door for leaks	✔	✔	
Keep frost buildup to a minimum around door seals			✔

- **Suggestion:** Make a regular defrost schedule and post. Organize freezer defrost days for your lab and get everyone involved.
- **Suggestion:** For your ultra low freezers, consider the Preventative Maintenance Service offered through Duke University. They will ensure your ultra low is running efficiently (they check the door seal, the coils, and clean if necessary, and the condenser filter, and change if necessary).

2d. Compact freezers / fridges limited to one per two bays (4 benches).
Compact freezers and fridges **use more energy per cubic foot** than full sized ones. This is especially true for non-Energy Star and/or older models (more than 5 years old). For some labs that need very little freezer or refrigerator space, a compact is the most appropriate size. However, using multiple compacts in place of full sized freezers or refrigerators is not as efficient, especially if the compacts are opened and closed often, as the cold air is rapidly displaced.

- **Suggestion:** Consolidate compact freezers/fridges into as few as possible and unplug ones not in use.

2e. Freezer and fridge contents are associated with active users or have specific archival purpose.
Freezers and refrigerators are essential to many labs for storing and preserving reagents and samples. Cold space is always at a premium, but to reduce energy use, it should also be used wisely to reduce the need for more freezers or refrigerators. Regularly clean out and organize cold spaces to use them the most efficiently and to more easily locate samples, minimizing time spent with the door open.

- **Suggestion:** To reduce the storage of old chemicals/reagents always date them when they are received. Chemicals/reagents too old to use should be thrown out or collected for hazard waste pick-up.
- **Suggestion:** All stored samples should be correctly labeled and easily associated with a researcher/experiment. Any mystery boxes/tubes that are unknown and not useful to anyone and should be discarded.
- **Suggestion:** When someone leaves the lab, go over the stored samples they leave behind to 1) consolidate into properly labeled boxes/racks, 2) keep only relevant samples.
- **Suggestion:** Regularly inventory/clean out your freezer/fridge spaces to use them efficiently.
- **Suggestion:** Use/fill freezers to capacity before purchasing another one.

2f. Regularly verify that space in incubators and other equipment is used efficiently.
In addition to freezers and refrigerators, consider how your lab can use other equipment efficiently.

- **Suggestion:** If you have only one item to incubate at 37ºC see if your lab neighbor has an incubator at 37ºC currently in use.

2g. Equipment is turned off when not in use (heat blocks, electrophoretic power sources, water baths, incubators, etc.).
Most labs house a variety of equipment for research. And while some instruments must be left powered on all the time, others are left on for convenience or lab culture ("That's just how we've always done it"). Most heat blocks, water baths, drying ovens, and incubators reach the desired temperature fairly quickly and can be left off when not in use. To measure the energy consumption of equipment in your own lab, **Green Labs at Duke** **has several energy use meters available.** We encourage lab members to check these out

and see how much power individual pieces of equipment draw, even when only on and not in use. For example, some gel electrophoresis power pacs still use a considerable amount of energy when not running gels. Because the type and number of equipment will vary greatly by lab, points for the Green Lab's Certification Checklist are given based on the percent of total equipment powered off when not in use:

- 50% of equipment in a lab powered off when not in use = 1 point
- 75% of equipment in a lab powered off when not in use = 2 points
- 100% of equipment in a lab powered off when not in use = 3 points

- **Suggestion:** Check out our energy consumption meters to measure your own labs' equipment.
- **Suggestion:** Make a checklist of items to turn off at night and post.

2h. Lights are turned off when not in use.
The last person that leaves for the day should turn off the lights to the labs and office areas. If there are auxiliary rooms in the lab not being used during working hours, then the lights can be left off in those rooms.

- **Suggestion:** Post a reminder by the door.

2i. All computers set to sleep when not active.
Set your computer to sleep and hibernate after 5-10 minutes when not in use for energy savings up to 95%.

- **Suggestion:** Don't forget to consider computers in the lab used with lab equipment.

2j. Printers set to duplex as default.
Conserve paper and save money by printing on both sides. A great alternative is the use of eprint stations which save paper and toner by eliminating inadvertent printing.

Section 3: Water Conservation

3a. No single pass equipment cooling.
Many instruments and processes require water for cooling. Consider running a recirculating loop through a cold water bath, or moving the process to a cold room, as an alternative to running water down the drain.

3b. No water powered aspirators.
Aspirators should be powered by the house vacuum or a vacuum pump in lieu of running water.

3c. DI water used appropriately.
Depending on the system used, it can take a surprising amount of water to make DI water. Do not use DI water where tap water will do.

3d. Water leaks reported immediately.
A dripping faucet can waste more than 600 gallons a year and a running toilet can waste more than 131,000 gallons. Please contact your maintenance department (see numbers below) to report dripping faucets in the lab or wherever else you see them. Do not assume someone else will make the call.

- In University buildings, call Facilities Management Department (FMD) at 684-2122.
- In Medical Center buildings (including Duke Hospital and Duke Clinic complex), call Engineering and Operations (E&O) at 684-3232 or enter your maintenance request online (http://eo.mc.duke.edu/Corrective%20Maintenance%20Requests/cmrequests.htm).

Section 4: Chemical storage and use

4a. Prerequisite - OESO lab audit within past 13 months.
If your lab is not already on the annual safety audit schedule, contact Duke's Occupational & Environmental Safety Office at (http://www.safety.duke.edu).

4b. Up-to-date chemical inventory.
A current and detailed chemical inventory prevents redundant ordering, provides a great resource for sharing chemicals between nearby labs, and also may serve to highlight chemicals no longer in active use.

4c. Demonstrate effort to use fewer / less hazardous chemicals.
By purchasing only the needed amounts of chemicals and/or by using less hazardous alternatives one can reduce the quantity of hazardous materials that come into your lab.

- **Suggestion:** Look for less hazardous chemical alternatives by consulting MIT's Green Chemical Wizard at (http://ehs.mit.edu/greenchem) or visiting the EPA site (http://www.epa.gov/greenchemistry/index.html).

4d. No storage of obsolete chemicals.
Chemicals should be disposed of when no longer useful. Hazardous chemicals are removed by Duke OESO's Environmental Programs Division (http://www.safety.duke.edu/EnvPrograms/) following university guidelines.

Section 5: Green Purchasing

5a. Prerequisite - All new appliances are Energy Star when available.
Duke's ENERGY STAR policy states that: "In all areas for which ENERGY STAR ratings exist, the products that Duke purchases will be ENERGY STAR certified or meet the performance requirements for ENERGY STAR certification. In areas for which guidelines are not available, Duke will seek energy efficient products."

Sterling Ultralow freezers offer 50% energy savings over competing brands. This is the only model freezer that can be purchased by Arts and Sciences departments. Arts and Sciences currently offers a $3000 rebate for their purchase.

5b. Coordinate ordering of supplies and reagents to minimize shipping containers.
When feasible, ordering should be planned so as to minimize waste of shipping materials, saving time and money in the process.

- **Suggestion:** Pick a day of the week to order from frequently used vendors or to place orders in general and communicate to lab personnel.

5c. Order from vendors that promote recycling and provide recycled content or packaging.
When options are available, sustainability should be considered when making purchasing decisions. Follow Duke's Environmentally Preferable Purchasing Guidelines and use the EcoOffice labels on Staples Advantage to select eco-friendly products.

- **Suggestion:** Make Green Labs at Duke aware of vendors who are promoting sustainability and those who are not. Your input can influence vendor practices.

Section 6: Recycling and Waste Reduction

6a. Prerequisite - Recycle plastics #1-7, glass, aluminum, and batteries.
Recycling containers for plastics, glass, and aluminum are located in convenient locations. Recycling areas for batteries are listed here (http://www.safety.duke.edu/EnvPrograms/Docs/Battery%20Recycling%20Locations.pdf). The location of recycling receptacles as well as the importance of recycling should be communicated to all staff members.

6b. Prerequisite - Recycle cardboard.
Cardboard should be broken down and stacked neatly in collection areas for housekeeping to pick up. The location of collection areas as well as the importance of recycling should be communicated to all staff members.

6c. Prerequisite - Recycle and / or dispose of electronics properly.
Electronic equipment purchased by Duke should be recycled through the Duke Surplus program (http://finance.duke.edu/procurement/surplus/index.php). Faculty/Staff can recycle personal electronics free of charge at county recycling sites.

6d. Prerequisite - Recycle paper.
Recycling containers for paper are located in convenient locations. The location of recycling receptacles as well as the importance of recycling should be communicated to all staff members.

6e. Recycle EPS (Styrofoam).
As this material is not commonly recycled at Duke, it is recommend to work with Green Labs at Duke in setting this up. To achieve this criteria, recycling containers for EPS must be located in convenient locations. The location of recycling receptacles as well as the importance of recycling should be communicated to all staff members.

6f. Recycle lab plastics.
Duke is actively seeking to expand its lab plastic recycling, but currently only specific items are accepted, such as tip boxes and tip racking plastics. Specific vendors have pick-up locations, and in French and BioScience, there are pick-up locations which accept tip boxes and racks from all vendors.

6g. Recycle plastic film.
Currently available only in French Family Science Center and Biological Sciences.

6h. Electronic journals and junk mail.
Subscribe to electronic subscriptions for professional journals rather than paper journals where available. Take your name off mailing lists of unwanted mail.

6i. Recycle ink cartridges.
Recycle all ink cartridges used in printers. Staples will take them.

6j. Washable dishware and utensils.
If you have a designated sink area for food prep, keep reusable plates, glasses, mugs and utensils available to avoid using disposable items.

Section 7: Field Work

7a. Prerequisite -Recover flagging.

Discarded materials are litter. They pose a potential hazard to wildlife and detract from natural beauty.

7b. Prerequisite -Recover batteries and electronics.
Discarded batteries and electronics pose a heavy metal pollution hazard. Bring them back to the lab and recycle properly. See 6a and 6c above.

7c. Reuse or recycle staking material.
Reusing material eliminates the need for additional resources to produce more stakes and flags.

7d. Reuse or recycle sample containers.
Reusing containers eliminates the need for additional resources to produce more containers.

Section 8: Meeting and Conference Travel

8a. Reduce travel impact.
If allowed under funding source, carbon offsets for business travel can be purchased through The Duke Carbon Offset Initiative.

Section 9: Self-assessment / Innovation notes.

This area should be used to record issues of sustainability which might be specific to your lab and/or are encountered when completing the self-assessment. Special attention should be paid to current sustainability efforts and areas with or needing novel sustainability solutions. It is also the place to record that great sustainability idea your lab implemented for a bonus point.