The University of Texas at Austin

Green Labs Initiative

Summary Report

Summer, 2011

The University of Texas at Austin

What Starts Here Changes the World
Summary

For research universities, maintaining safe, reliable labs is a necessity and an operational and competitive priority. As energy costs and efficiency awareness increase, a new challenge has emerged – how to create “green labs” that continue to attract and support top level research while lowering the financial and resource costs. While there is no one definition of a green lab, they can have benefits to the researchers, to the operations staff, and to the institution as a whole.

In the fall of 2010, the UT-Austin Director of Sustainability and Director of Environmental Health and Safety collaborated to create the Green Labs Initiative (GLI), a several phase process to introduce the concept of green labs to UT-Austin and test whether such a program was desirable and had potential. After developing and testing a draft green lab checklist the GLI was presented to the Vice President of Operations and the Vice President of Research, and with their support, the Green Lab Initiative was launched in Spring 2011.

An invitation to participate in the wholly voluntary GLI pilot program was extended to 400 principal investigators with laboratories at UT-Austin. Ten labs indicated interest and completed a self-evaluation form and scheduled and in-person discussion at their lab to review the self-evaluation as well as to tour the lab for unique challenges and opportunities.

Both the evaluation forms and discussions yielded interesting trends and great insight across a range of areas, from greening basic lab operations to ideas for new, innovative cost saving programs. These key trends and ideas are summarized in the Lessons Learned section of this document. All ten pilot participants were recognized in the Daily Texan.

With this document, the Director of Sustainability and Director of Environmental Health and Safety are making several recommendations based on the Green Lab Initiative pilot program:

- Continue to refine the GLI. The GLI pilot program was a success for the principal investigators and lab managers who participated. There is a clear desire to further explore some of the lessons learned and a clear acknowledgement of the importance, and challenge, of trying to improve resource efficiency in UT-Austin research labs.
- Through the Fall 2011, focus on achieving several goals identified in the lessons learned:
  o Develop a video to celebrate existing green lab leaders and recruit additional participants
  o Create an inventory of least efficient major lab equipment (e.g., biosafety cabinets, freezers and refrigerators)
  o Add supporting information to the GLI self-evaluation form
  o Create a GLI recognition program (e.g., door sticker)
  o Work with the Office of Purchasing on the feasibility of a targeted green purchasing options for labs
- Repeat a second cycle of the GLI in Spring 2012, enrolling at least 25 labs.

ABOUT THIS DOCUMENT
This document was designed not to be printed and to be used as an online pdf with many active hyperlinks to additional information. Please consider not printing hard copies of this report.
Background

What are Green Labs? Why are they important?

For research universities, maintaining safe, reliable labs is a necessity and an operational and competitive priority. As energy costs and efficiency awareness increase, a new challenge has emerged – how to continue to attract and support top level research while lowering the financial and resource costs. A broad set of strategies is emerging under the general heading of “green labs” that help universities meet this challenge.

There is not a common industry or academic definition of a “green lab,” but there are common principles across the emerging descriptions. Common principles include:

- Using less hazardous materials (both in quantity and toxicity)
- Using energy and water efficient laboratory equipment
- Recycling and reuse
- Inventory control

All of these and additional principles and green strategies must be customized to a specific institutional, academic and individual lab setting.

From a research laboratory perspective, the green laboratory program provides faculty the potential to realize cost savings by reducing the amount of materials and equipment they would normally have to purchase thereby stretching their funding dollar. The program also serves as an outlet for researchers who want to conduct research but also reduce their environmental footprint.

From an operational perspective, while helping ensure a safe environment and reliable energy supply are the top priorities, pursuing green labs is a developing initiative as universities seek new opportunities to conserve resources and reduce costs. Traditionally, research labs have not been concerned with the resource efficiency related to their research (e.g., fume hoods, autoclaves, deep freezers, specialized water, chemical inventories, etc). Institutions have not focused on assessing the true total resource costs of research.

From an institution perspective, green labs are still an emerging initiative among only a handful of research universities, yet the broader movement of sustainability in higher education has clearly become a mainstream competitive necessity. As one of the largest research institutions in the country, and one whose example is followed, UT-Austin has an opportunity over the next several years to become a leader in this emerging field of resource efficiency in research operations.

How did this get started at UT-Austin?

The Director of Sustainability and Director of Environmental Health and Safety meet on a regular basis to coordinate on existing and new sustainability efforts. A recurring interest was to better connect the 1,300 research labs across the UT-Austin network to the general sustainability programs (e.g., recycling, purchasing, surplus property, etc) and to improve the operational efficiency within research labs. An
initial pilot project was conceived to be based on the already well known EHS lab safety self-evaluation checklist. EHS developed a green lab checklist based on similar green lab checklists already in use at Michigan State University and Harvard. The first version was emailed to researchers for comment on April 22, 2010. First responses were favorable.

After this initial favorable response, a more complete Green Labs Initiative (GLI) plan was drafted to initiate a voluntary pilot program to field the green lab checklist and use the findings to make recommendations on whether a broader green labs initiative was desired and appropriate at UT-Austin and what kind of strategies might be feasible.

The plan was approved by Dr. Pat Clubb, Vice president of University Operations and Dr. Juan Sanchez, Vice President of Research in Fall 2010. The GLI pilot program was launched in Spring 2011.

**Pilot Program**

**Process**

The GLI pilot program was conceived as a joint effort between the Office of Sustainability (OS) and Environmental Health and Safety (EHS) and had three basic phases:

- Invitation to voluntarily participate extended to all principal investigators at UT-Austin with opportunity review the GLI and help shape it before agreeing to participate;
- Completion of both a lab self-evaluation form to provide some consistent data on what was happening in different labs and a in-person discussion at the physical location of the lab about the unique green challenges and opportunities for that lab;
- The production of this summary report with recommendations.

The role of the OS was to present the necessity of the GLI and to provide information on how the GLI fit into the broader context of sustainability at UT-Austin. The role of EHS was to provide expertise on specific lab practices and possible alternatives. EHS also clearly already had working relationships established with principal investigators and lab managers – a key factor in building initial buy-in.

The GLI also began with several key messages:

- The GLI was unrelated in any way to compliance;
- The GLI was not intended to hinder or burden research priorities or safety practices;
- The GLI sought to identify new practices and strategies that could be voluntarily applied;
- The initial participants were assumed to be ‘early adopters’ and would be engaged more as two-way partners in designing the GLI than as one-way clients of the GLI.

The initial invitation to participate was sent out on January 24th. Twelve lab groups responded with interest and ten labs eventually participated (below). Dr. Villareal at the Marine Science Institute participated in completing the checklist, but was not visited. Meetings at each lab were held between March 29th and May 6, 2011. The in-person discussions were rich with ideas and insight from greening basic lab functions to new, innovative programs.
## Participating Labs - Spring 2011

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<th>Title</th>
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<tr>
<td>Dr.</td>
<td>Jay Banner</td>
<td>Geosciences</td>
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<td>Dr.</td>
<td>Angelique Brunt</td>
<td>University Health Services</td>
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<td>Dr.</td>
<td>Shelly Prozzi</td>
<td>Engineering</td>
<td>Molecular Genetics and Microbiology</td>
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<td>Dean</td>
<td>Mary Ann Rankin</td>
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<td>Civil, Architectural and Environmental</td>
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<tr>
<td>Dr.</td>
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<td>Dr.</td>
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The eleven participating labs were recognized in a Daily Texan advertisement that ran May 5 and 6, 2011. Particular recognition has also been earned by Dennis Nolan, Assistant Director, Environmental Health and Safety, who committed extensive time and expertise to the GLI effort.
Lessons Learned

One of the main takeaways from the GLI pilot program was the enthusiastic response. These ‘early adopters’ had already initiated many green lab practices well before the GLI existed. There was support of the broader goals and importance to the institution to be innovative in seeking new creative ways of partnering with campus stakeholders, such as principal investigators and lab managers, to reduce institutional and lab-level financial and environmental impacts.

The following are key ideas and insights heard from over 30 participants.

Make Green Lab Purchasing Easy

One idea that came from meeting with researchers was to make purchasing energy efficient equipment and other green lab supplies as easy as possible. Researchers will not participate if they have to research these materials.

Meet with Fisher and Thermo Scientific (Fisher Scientific operates several stores on campus for laboratory supplies) representatives about stocking green supplies in their storerooms in Welch/NHB/NMS.

The Office of Purchasing often makes the final decision regarding the purchasing of lab equipment. The Office should be actively engaged in promoting “green lab materials.” Provide purchasing with readily accessible information regarding energy efficient equipment and green lab supplies.

A short training program can be developed and delivered to purchasing staff within departments.

Develop a Green Equipment Rebate Program

None of the researchers we spoke with considered energy efficiency in their decision to purchase lab equipment. Energy efficient equipment can often be 10-20% more expensive than conventional units. Several researchers suggested a rebate program for supplementing the purchase of more efficient equipment.

Develop a targeted equipment rebate (i.e., cash for clunkers targeted at old freezers). Combine with new requirements (e.g., all break room refrigerators will be Energy Star).

Provide simulated electric bill to buildings so principal investigators and department administrators can know how much they are using and hopefully saving. Consider methods for share any financial savings with departments.

Develop an Online Program to Share Chemical, Lab Supplies and Equipment

When a researcher exits the University, they sometimes notify fellow faculty in the department that they have leftover materials available for faculty to have. When researchers purchase new equipment, they will sometimes stick the old equipment in a hallway. Some of this equipment has been in the hallway for years. In one College they have a hallway used by faculty for this purpose. It would be helpful for researchers to have the ability to list their surplus supplies and equipment college or campus wide to reduce waste.
One research lab commented that the new surplus requirements made it more difficult to obtain surplus equipment.

Develop a “Craigslist” for low hazard chemicals, consumables and equipment. Create a “need” list and a “have” list. Allow selected viewing within Departments or College.

Make Surplus Property easier to use (e.g., shouldn’t have to make two trips to obtain equipment, one for paperwork and another to pick-up). Requiring a UT vehicle to pick up surplus is discouraging use. Consider posting lab equipment in surplus on the web.

**Develop a Robust UT Green Lab Website**

Several researchers wanted a centralized location for green lab information. One group suggested a way for researchers to leave their own “tips”. This website must be easy to use and navigate through.

Develop resources for researchers to easily identify energy efficient lab equipment. Expand Green Labs webpage with best practices; allow researchers to add suggestions.

**Prepare a Green Lab Video**

As a way to promote the Green Laboratory Initiative, it was suggested to develop a video to further generate interest.

Prepare a high quality Green Labs video in cooperation with Public Affairs profiling three of the Pilot Project principal researchers from three different Schools.

**Improve Green Lab Marketing**

Prepare green labs info (brochure) to new faculty at orientation. Provide tips on obtaining surplus equipment, purchasing green equipment, etc.

Promote the program through the Environmental Science Institute.

Get Green labs program mentioned on UT main homepage.

Create competition among labs and departments. (e.g., greenest lab, power usage between buildings).

Restart a Sustainability Newsletter and have a Green Labs page.

Advertise the program with posters or have EHS lab inspectors hand out flyers.

Develop a recognition/incentives program including:
- Letter from VPR/University Operations/Provost
- Green Lab “seal” on lab signs or window decal
- Publish findings on Sustainability website
- Accelerated service response from Facilities for Green Labs

**Develop Green Lab training module for lab personnel**

Develop online training module for lab personnel on how they can make their lab greener.
Prepare Guidance or “Green Lab Tips”

Green “tips” were developed from meeting with researchers. Recommend incorporating these into the next Green Labs guide and checklist.

Prepare a comprehensive guide for green labs with a range of resources and “tips” including:
- Labs purchasing “smart” equipment that automatically powers down when not in use
- SybrSafe eliminates need for UV; can be disposed as non-hazardous (instead of Ethidium bromide)
- Lab uses 12 hour timers to turn off equipment
- Lab uses community chemicals. Last person who uses has to initial
- Lab manager has developed closeout form for exiting staff, also transfer of chemicals/biologicals to staff replacement instead of throwing away and re-purchasing
- Regenerate dessicant (Drierite) by heating in oven (instead of throwing away)
- Clean refrigerator and freezer air filters and coils to improve efficiency
- Carpooling when conducting field research
- Check if equipment can be programmed to go into hibernation mode and set appropriately.

EHS Initiatives

There were several tasks that came out of these meetings that EHS is pursuing.

Promote periodic chemical cleanouts (e.g., to prevent researchers hoarding carbon tetrachloride).

Create report of fume hoods with excessive face velocities (> 150 fpm at 18”).

Reprint fume hood sash stickers for “Keep Sash Down”; ensure on all hoods.

Advertise mercury thermometer exchange program in next EHS newsletter.

PHR house lab air (Is it dirty?) Labs don’t want to use it and buy compressed air. Check for contamination

Green Lab Research Initiatives

Based on the meetings with researchers, there are several topics that need to be further researched that could benefit the University. For example one research group uses a pipette washer for 8 hours to clean their pipettes. While this recycles pipettes, it also uses over 1,400 gallons of water. Another research group uses half the time to wash their pipettes. This research could be listed on the Green Labs webpage.

Research pipette washer alternatives/procedures.

Anesthetic gases vary in impact on environment (e.g., isoflurane releases chlorine, nitrous oxide releases nitrogen oxides and absorb radiation). Isoflurane is preferred. Work with ARC on gas recommendation

Research efficiency of turning off water baths (better to leave on than reheat?).

Energy efficient Biological Safety Cabinets.

Improve glass recycling.

High energy equipment survey would be useful to identify outdated equipment.

Conduct phantom load survey of equipment.
Recommendations

The following recommendations are made by the Director of Sustainability and the Director of Environmental Health and Safety.

Continue to Refine the Green Labs Initiative

The GLI pilot program was a success for the principal investigators and lab managers who participated. There is a clear desire to further explore some of the lessons learned and an acknowledgement of the importance of trying to improve resource efficiency in UT-Austin research labs.

Summer - Fall 2011

- To further promote green lab practices, the OS and EHS will work with the Office of Public Affairs to create a video of several of the GLI pilot participants to highlight their voluntary green efforts and show how the university is leading in the common purpose of connecting operational efficiency with research priorities.

- Energy savings is an obvious and practical next step. The OS and EHS will collaboratively identify a cost effective way to expand the university’s existing inventory of lab equipment in the interests of identifying very low efficiency appliances and phantom energy loads that may be easy to manage.

- The OS and EHS will refine the GLI self-evaluation checklist and add supporting information to each checklist item.

- To build recognition, the OS and EHS will design a GLI recognition sign or sticker appropriate for display on a lab door for all GLI participants.

- The OS and EHS will work with various purchasing officers and the UT-Austin Purchasing Office on the feasibility of green purchasing options targeted at common research lab purchases.

Spring 2012

- The OS and EHS will launch the second year of the GLI, extending the invitation again to all research labs.