



Michigan Green Labs Initiative

Green Labs
Coordinator Packet

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Michigan Green Labs Initiative
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Table of Contents

- A. Michigan Green Labs Initiative (MGLI) Program Description
- B. MGLI Partner Sign-up Form
- C. How Start a Green Labs Program
- D. Program Summary for Distribution
- E. How to Recognize and Certify Green Labs
- F. Partner Inventory Form
- G. Results Measurement and Reporting Form
- H. Case Study: University of Michigan Sustainable Labs Certification Program

Michigan Green Labs Initiative
Green Labs Coordinator Packet
A. Michigan Green Labs Initiative Program Description

Introduction

Welcome to the Michigan Green Labs Initiative (MGLI). This packet is intended for a lead coordinator looking to pilot or expand a green labs initiative within an institution with laboratory operations. The coordinator may include personnel from facilities management, sustainability office, environmental health and safety, lab coordination, or any other area of the institution.

The MGLI is a project of the Michigan Department of Environmental Quality dedicated to promoting sustainability within laboratories. The University of Michigan is partnering on the grant project supported by a United States Environmental Protection Agency (U.S. EPA) pollution prevention grant. The MGLI focus is to facilitate the implementation of sustainability best practices and techniques without compromising the safety or integrity of laboratory research.

Purpose

Laboratories in campuses and institutions have been identified as a major opportunity for environmental improvement. For example, labs are energy intensive, using 5 to 10 times more energy per square foot than an average office building. Fortunately, there are ways to improve efficiency and reduce energy use. The U.S. EPA's [Laboratories for the 21st Century \(Labs21\)](#) Program estimates that most labs can reduce energy use by 30 to 50 percent. A key step towards identifying savings is to assess how efficiently your lab uses energy. This is a key principle behind the Michigan Green Labs Initiative – the self-assessment and continuous improvement process.

The overall purpose of the project is to jumpstart and enhance green labs programs in partner institutions, and also to have as many labs as possible working to implement green labs practices in their every day operation.

MGLI Principles:

- Source reduction and pollution prevention
- Material reuse and recycling
- Energy efficiency and water conservation
- Greener product sourcing
- Toxics use reduction and green chemistry
- Hazardous substance substitution
- Micro-scale analytics

A. Michigan Green Labs Initiative Program Description

Program Summary

The first goal of the program is to have institutions partner with the MGLI team. A partner sign-on document is located in this packet.

The bulk of the program is laboratory-focused. The primary goal is to transfer green labs best practices into individual laboratories as efficiently as possible, while tracking, estimating, and reporting results. Setting goals to incorporate best practices is an important part of the process. The transfer of practices into individual labs will be accomplished through a self-assessment process. The purpose of this laboratory self-assessment is to:

1. Identify environmental improvement opportunities.
2. Introduce best practices and methods for source reduction and efficient use of energy, water, chemicals, and materials.
3. Facilitate the implementation of recommended sustainability-focused techniques.

This MGLI packet contains recommended resources and tools to assess and, optionally, certify your labs as meeting the MGLI Green or Advanced level practices. Certification benefits for laboratories and institutions may include:

- Reduce pollution and a cleaner environment
- Achieve institutional sustainability goals
- Track and estimate environmental performance results
- Improve safety for laboratory personnel
- Reduce operational expenses
- Increase grant application competitiveness
- Community recognition

How to Participate

Section C of this packet demonstrates how to pilot and expand a green labs program at your institution. See this section for guidance and information. The essential components include: identifying a key institutional contact and coordinator, establishing a green labs team, piloting the project in key labs, and achieving buy-in from the individual lab all the way up to the institutional level.

Key Actions for Green Labs Coordinators

As you read through this packet, you will find methods and resources to create a program at your institution. The key actions you may take include:

1. Review coordinator packet
2. Review lab self-assessment packet

A. Michigan Green Labs Initiative Program Description

3. Take necessary steps to achieve buy-in and pilot the program in individual labs
4. Maintain communication with MGLI team and other institutions
5. Track, aggregate, and report results within institution and to MGLI team
6. Maintain a culture of continuous improvement in labs and institution

Contacts and Information

At any time, use the contacts and information below to help you with green lab practices or to answer questions.

Green labs coordinators and practitioners in Michigan may find the following contacts useful for questions, advice, and sharing experiences to implement greener practices suggested by this document.

The MGLI home page and network on the Michigan Green Chemistry Clearinghouse, featuring materials download links, program information, and forum for sharing questions, practices, and results.

www.migreenchemistry.org/education/green-labs

Mr. Chris Affeldt, Michigan Department of Environmental Quality
MGLI Coordinator, Pollution Prevention Analyst

Affeldtc@michigan.gov

517-241-9505

Michigan Department of Environment Quality, Environmental Assistance Center
1-800-662-9278

University of Michigan Sustainable Labs home page

<http://www.ocs.umich.edu/labs.html>

Sudhakar Reddy, PhD,
University of Michigan Sustainable Labs Coordinator

redv@umich.edu

734-763-4615

Michigan Green Labs Initiative
Green Labs Coordinator Packet
B. MGLI Partner Sign-up Form

Michigan Green Labs Initiative Partner Sign-up

The Michigan Green Labs Initiative (MGLI) is an open, collaborative initiative to transfer and implement green labs best practices and create a network of green labs practitioners in Michigan. As a Michigan Green Labs partner, your institution will be recognized as incorporating sustainability values into operations and striving for continuous environmental improvement in laboratory practices.

As a Michigan Green Labs Initiative Partner, we voluntarily agree to:

1. Pilot MGLI materials in laboratories.
2. Consider creating a self-sustaining green labs initiative.
3. Provide feedback to MGLI team and participate in network to share and improve resources.
4. Estimate and track results, then report to MGLI team.

Partner Information:

Name of institution:

Address:

Website:

Green labs contact and coordinator:

Name:

Signature:

Address:

Email address:

Phone Number:

Authorizing Official:

Name:

Signature:

B. MGLI Partner Sign-up Form

Email a PDF version (with e-signature) to:

affeldtc@michigan.gov

Or

Print, Sign, and Mail the Hard Copy Application Form to:

Michigan Green Labs Initiative

Attn: Chris Affeldt

PO Box 30457

Lansing, MI 48909-7957

If you have any questions, contact Chris Affeldt, 517-241-9505, affeldtc@michigan.gov.

Please save a copy of this form for your records.

Michigan Green Labs Initiative

Green Labs Coordinator Packet

C. How to Start a Green Labs Program at Your Institution

As you consider how best to disseminate information and implement practices in your various laboratories, you can use this quick guide to find some key principles for starting and growing your program.

Step One: Identify a Coordinator or Team of Coordinators

Identify a coordinator or team of coordinators that can devote time to championing and piloting green labs practices in the institution.

Step Two: Achieve Buy-in and Create a Green Labs Team

It is crucial to achieve buy-in to gain support at the start of project - whether it is from lab coordinators, operations managers, sustainability directors, department heads, or others whose support and permission will be necessary for your success.

Below are some useful links to information on general principles for creating a green team. A strong team can help reinforce your project and open doors to new opportunities.

<http://greenschools.net/article.php?id=361>

<http://www.greenbiz.com/news/2009/05/05/how-build-green-team-first-step-sustainability>

Your Green Labs Team may include personnel from across various departments, students, and other interested individuals. Make sure to build a team interested in enhancing your cause and willing to support the project. It is important to define roles and responsibilities going forward to ensure you have every opportunity for a successful program. Determine a group leader, plan regular meetings, and define responsibilities of each member.

Step Three: Pilot Labs and Implement a Green Labs Program

Now that you have a coordinator and team in place, you can define a path to facilitate implementation of greener practices. You may choose to pilot the project in a few select labs, or you may approach departments in a more systematic way. Consider the best path to finding interested lab managers to help support your effort.

Step Four: Promote Program Successes and Achieve Expanded Buy-in

Set goals, targets, and timelines to stretch and advance the program where you desire. Consider new ways to achieve expanded institutional buy-in to grow, promote, and enhance green labs practices and programs in your campus laboratories. Find opportunities to promote initial successes to gain interest. Examples include: newsletter articles, student newspaper articles, bulletin board postings, institution web page highlights, and many other avenues. Another tactic for expansion is to encourage friendly competition between lab managers to see

C. How to Start a Green Labs Program at Your Institution

who can obtain the most certified labs and who can achieve the most significant reductions in environmental performance indicators.

Additional Resources:

Case Study: University of Michigan Sustainable Labs Recognition Program

A case study of the University of Michigan program is included later in this packet.

Other Green Labs Programs

The reference document in the Lab Assessment Packet contains links to green labs programs at various institutions.

Michigan Green Labs Initiative
Green Labs Coordinator Packet
D. Program Summary for Distribution to Labs

Welcome to the Michigan Green Labs Initiative (MGLI).

Purpose

Laboratories have been identified as a major opportunity for environmental improvement on campuses and in institutions. For example, labs are energy intensive, using 5 to 10 times more energy per square foot than an average office building (reference). Fortunately, there are ways to improve efficiency and reduce energy use. The U.S. EPA's [Laboratories for the 21st Century \(Labs21\)](#) Program estimates that most labs can reduce energy use by 30 to 50 percent. A key step towards identifying savings is to assess how efficiently your lab uses energy. This is a key principle behind the Michigan Green Labs Initiative – the self-assessment and continuous improvement process.

The overall purpose of the project is to jumpstart green labs programs in partner institutions, and also to have as many labs as possible working to implement green labs practices in their everyday operation.

MGLI Principles:

- Source reduction and pollution prevention
- Material reuse and recycling
- Energy efficiency and water conservation
- Greener product sourcing
- Toxics use reduction and green chemistry
- Hazardous substance substitution
- Micro-scale analytics

The MGLI focuses to facilitate the implementation of pollution prevention and energy conservation best practices and techniques without compromising the safety or integrity of laboratory research.

Program Summary

The goal is to transfer green labs best practices into individual laboratories as efficiently as possible, while tracking, estimating, and reporting results. Setting goals to incorporate best practices is an important part of the process. The transfer of practices into individual labs will be accomplished through a self-assessment process. The purpose of this laboratory self-assessment is to:

1. Identify environmental improvement opportunities.
2. Introduce best practices and methods for source reduction and efficient use of energy, water, chemicals, and materials.
3. Facilitate the implementation of recommended sustainability-focused techniques.

D. Program Summary for Distribution to Labs

Why Should You Participate?

Certification benefits for laboratories and institutions may include:

- Reduce pollution and a cleaner environment
- Achieve institutional sustainability goals
- Track and estimate environmental performance results
- Improve safety for laboratory personnel
- Reduce operational expenses
- Increase grant application competitiveness
- Community recognition

Contacts and Information

(insert Green Labs Coordinator contact information)

Michigan Green Labs Initiative
Green Labs Coordinator Packet
E. How to Recognize and Certify Green Labs

When you have piloted the MGLI self-assessment in one or more labs, you may use the following process to recognize and certify your labs as Green Labs according to the principles defined in the assessment.

Define Process

Define a process for initiating a lab self-assessment in your labs. Key questions: Who will you recommend to carry out the self-assessment? Which department and staff will serve as coordinator and reference for the assessment? What will your evaluation process be after a lab has finished the self-assessment process?

Make sure to have a relatively consistent process to be able to define the process and expectations for participants.

Determine Levels of Recognition

When the self-assessment form is complete, review for completion and make sure that the total number of “Yes”, “No”, and “N/A” check boxes are recorded for both Essential and Advanced items. This is suggested as the basis for recognition and certification of your labs as implementing more sustainable practices.

Use the following formula to determine the percentage of applicable practices being implemented by the lab in question:

Total number of “Yes” / (Total number of “Yes” + Total number of “No”) x 100 = percentage “Yes” items

The Self-Assessment form has two sets of items: Essential Items and Advanced Items. It is suggested that labs reach at least an 80 percent “Yes” rate in Essential and Advanced items before they are certified as a Green Lab or Advanced Green Lab, respectively.

Provide Recognition and Certification

It is recommended that a system of recognition and/or certification is put in place for a lab that has gone through the self-assessment process and achieved a Green Lab or Advanced Green Lab level. Recognition can include activities like listing on a web site, featuring in an article, or holding a small event on-site. Recognition will help to reaffirm the continuous environmental improvement mindset. You may also consider certifying labs using the above criteria and issuing a certificate to the lab. A template certificate is available for download on the MGLI website.

E. How to Recognize and Certify Green Labs

Recertification and Future Evaluation

You should consider how you would like to provide follow-up in the future with labs that have gone through the self-assessment process. You may wish to reevaluate labs after a set time period or you may also wish to certify after only the initial evaluation. You should also think about how you will revisit labs that did not score high enough but would like to redo the self-assessment at a future date to meet recognition levels. The Performance Measurements and Tracking document will help those labs set goals to answer “Yes” on checklist items in the future. Also, keep in mind that the best way to receive performance results is to have a system of checking in with previously assessed labs.

Michigan Green Labs Initiative
Green Labs Coordinator Packet
G. Results Measurement and Reporting Form

Instructions

This form should be utilized to inventory and quantify the actions and successes of your green labs participants on site and measure the effectiveness of your pollution prevention activities. This information will not only highlight the achievements of your labs, but will also serve as a valuable measurement of overall effectiveness of green lab practices. Please review each of the following categories below and summarize results. Please indicate an N/A for those areas that are not applicable to your operations. (Insert additional rows or attach additional sheets as needed).

Step 1: Collect Results Measurement Forms from individual labs or groups of labs over a defined time period, such as calendar year, school year, or other time period.

Step 2: Aggregate results into the form below. Add rows as needed to capture information reported by labs.

Step 3: Submit Aggregated Results Form to MGLI team to report and compare with other institutions. Contact Mr. Chris Affeldt at affeldtc@michigan.gov for more information or to submit information.

Note: Data will only be published if approved; otherwise, it will be aggregated anonymously.

Laboratory Details

Institution:

Number of laboratories reporting:

Time period (calendar/school year/other):

<u>Performance Indicator</u>	<u>Results</u>
Energy Conservation (Equipment and Operations, Refrigeration, Utilities)	
Energy Efficiency	<i>Example: 50,000 kWh actual or estimated reduction</i>

Water Conservation	
Water Use Efficiency	<i>Example: 140,000 gallons reduction in water consumption</i>
Pollution Prevention and Waste Minimization	
Hazardous Waste Reduction	<i>Example: 1,350 pounds reduced</i>
Solid Waste Reduction	<i>Example: 2,600 pounds of cardboard, paper, and plastic recycled</i>
Green Purchasing and Alternative Sources	
Materials Use Efficiency	<i>Example: 100 pounds of solvent reduced; Example 2: Substituted A, B, C substances for X, Y, and Z in the following volumes: __</i>

G. Results Measurement and Reporting Form

Green Labs Program Influences and Behaviors – Aggregated Responses

Do you have a:

Green Labs Checklist: ____

Green Team: ____

Has your involvement with Green Labs led to:

Increased awareness and knowledge of pollution prevention?

Explain:

Implementation of new green labs initiatives/technologies?

Explain:

Implementation of a green purchasing program?

Explain:

The implementation of energy and water conservation programs?

Explain:

Has your involvement with MGLI been beneficial to your lab?

Yes No

Why?

Testimonials/Quotes/Photos:

Michigan Green Labs Initiative

Green Labs Coordinator Packet

H. Case Study: University of Michigan Sustainable Labs Certification Program

According to U.S. EPA estimates, laboratories consume 4 to 10 times the amount of energy per square foot as compared to an office environment or classroom. At U of M our labs consume 5 to 8 times more energy compared to a classroom environment. It is due to conditioning of lab air, presence of chemical fume hoods, equipment, and other operations in these laboratories, providing rich opportunities to save on both energy and resources.

The Office of Campus Sustainability (OCS) spearheaded a unique program, the Sustainable Laboratory Certification Program, to promote and practice sustainable operations in a more standardized manner in teaching and research laboratories across the campus.

Program:

The program is administered in a phased manner with participation from lab personnel. To start, the participating lab would complete a questionnaire giving detail on the nature of the work they do, as well as chemicals and equipment used in their operations. After reviewing the questionnaire, the evaluating team will visit the participating laboratory and evaluate in the following areas of operation:

- Green Chemistry & Engineering
- Green Purchasing
- Micro Scale Operations
- Reuse and Recycle
- Pollution Prevention
- Energy and Utilities
- Treatment
- Disposal

Following the evaluations, recommendations are provided to a laboratory. Laboratory personnel work with the OCS staff on achieving the recommendations. Each participating lab is rated, based on their commitment and level of achievement in fulfilling the recommendations. Once the recommendations have been implemented, the lab will be formally recognized as a U of M Sustainable Laboratory, and will be presented with a certificate, a decal, and other recognition items. Laboratories recognized through this program are featured on our website.

To date, we have successfully evaluated and certified more than 50 labs through this program. The participating labs are encouraged to express their opinion about the program, and they are captured on the U of M OCS web page. For details visit: <http://www.ocs.umich.edu/labs.html>

Achievements/Metrics:

Green Chemistry & Engineering:

- Look for opportunities to introduce Green Chemistry and Engineering principles into operations:

The OCS has been successful in substituting toxic chemicals and solvents with safer alternatives. For example, the OCS has introduced non-toxic DNA gel staining agent Gel-Red in place of toxic ethidium bromide in our Life Sciences and Biochemistry labs. A few Chemistry and Engineering labs have considered methyl tetrahydrofuran and cyclopentyl methyl ether as safer solvents to replace toxic solvents like ether, chloroform, and dichloromethane in extractions and other applications.

H. Case Study: University of Michigan Sustainable Labs Certification Program

Green Purchasing:

- Educate lab users about the program and encourage them to participate in procuring green products for their use.
- Promote micro-scale operations in teaching labs to reduce waste and save on budget.

Working with our Procurement department we have identified vendors who supply 'Green' products or products manufactured from post-consumer materials.

Energy and Utilities: We have designed a 'Shut the Sash' magnetic sticker and placed one on every chemical fume hood that we have on our campus. We have nearly 2500 fume hoods on our campus and through this campaign we expect to save a significant amount of money while reducing carbon foot print. We have also designed and produced 'Turn off lights' stickers and placed them on light switches to remind lab users to turn off lights before leaving their labs. Through this program we identified equipment such as ovens, hot plates, and water baths that consume vampire power when not in use. 'Timers' were installed to save on energy. We also campaign to raise the ultralow (ULT) freezer temperature from -80° to -70° F to save 15 percent on energy. Use of recirculating chillers for rotavapors and reflux condensers save on water consumption, and payback period has been calculated at 2.2 years. Local PIAB systems have been installed in place of aspirators to generate lab vacuum for filtration purposes to significantly reduce water usage.

Recycle and Reuse: Every opportunity to recycle and reuse material is being implemented in our labs. Through a Chemical Reuse Program we are redistributing nearly 400 lbs. of surplus chemicals a year to those in need free of cost. Also, we encourage our lab users to install recycling units to recycle solvents such as acetone, xylene, formalin, and alcohol, to save on purchasing costs for new solvent and to reduce disposal costs. The metrics from this activity are tracked to include in the U of M Annual Environmental Report.

Waste Reduction thorough Treatment and Disposal: While generation of hazardous waste in the labs is unavoidable, some sustainable measures can be implemented to address waste reduction. Some specific waste streams generated from instruments like HPLC (high pressure liquid chromatograph) and IC (ion chromatograph) can be treated with a mild acid or base to create a neutral pH which can be discarded down the drain. Several hundreds of gallons of waste can be reduced this way. Halogenated waste can be segregated from non-halogenated waste to reduce costs on disposal.

Benefits:

Benefits that can be achieved through this program include:

- Reduced consumption of energy and utilities.
- Reduction in use and generation of hazardous materials.
- Increase in reuse and recycling.
- Green chemistry and engineering practices.
- Improved safety for lab faculty, staff and students.

The Sustainable Lab Certification Program not only received great attention among our U of M community, but also raised a level of awareness on lab operations through sustainability leading to safety and reduced impact on the environment.

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