Programs Emerged from R3 (Reduce, Reuse, Recycle) Concept in the Labs at the University of Michigan

Sudhakar G. Reddy, Ph.D.

University of Michigan Office of Campus Sustainability

redv@umich.edu

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Learning Objectives

- Sustainable Lab Recognition program and its success
- R3 programs emerged from the Sustainable Lab programs and how we developed?
- Some of the opportunities/challenges encountered and how we addressed?
- Metrics captured through this Program

An Ideal Sustainable Lab

An ideal Sustainable Lab would actively engage in the following:

- Pollution prevention
- Green Purchasing
- Green Chemistry
- Green Computing
- Energy and utilities
- **Reduce, Reuse & Recycle**
- Proper Disposal and Treatment
- Safety

Sustainable lab program - Results

Fiscal Year	Labs Engaged
2011	10
2012*	15
2013	35
2014	41
2015	40
2016	45
2017	45
TOTAL	231

* *Behavioral change model applied*

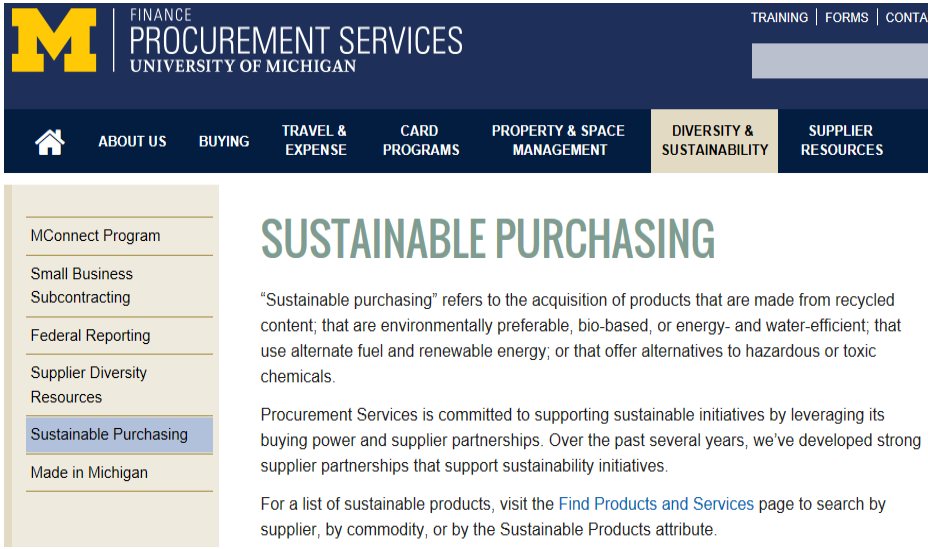
To date 231 labs and more than 10,000 people are engaged in this program

Waste Diversion in the Labs - R3 Approach

- Reduce:
  - Sustainable purchasing
- Recycle:
  - Pipet tip boxes
  - Water purification cartridges
  - Pens, markers etc.
  - Styrofoam boxes, Ice packs
  - Laser drums and inkjet cartridges
  - Cardboards, paper, packaging
- Reuse:
  - ChEM (Chemicals, Equipment and Materials) Reuse program

Reduce – Sustainable purchasing

- Procure items in limited quantities
- Look for local vendors
- Prefer products made from post consumer materials
- Reduce in packaging: Buy in bulk rather than individually packed products (e.g. pipets and pipet tips)
- Micro scaling experiments in teaching and research labs to reduce waste



Recycle – Pipet Tip Recycling Program

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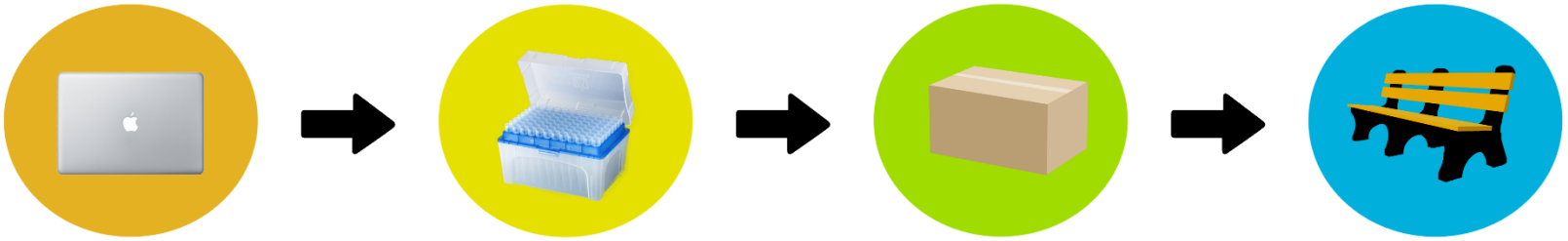
Fisher Scientific



CONTACT

the Office of Campus Sustainability to participate in this program.

ocs_contact@umich.edu

COLLECT

decontaminated plastic #5 pipet tip boxes and inserts in the box provided by OCS.

CALL

UPS or place the box in a designated pick up location FREE of charge.

CREATE

park benches and other items with the recycled boxes while making your lab more environmentally friendly.

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Plastic #5 Pipet tip boxes recycling program started in 2012 in collaboration with Fisher recycled *25,000 lbs (nearly 13 tons) in FY 2017* on our campus

Recycle – Cartridge Recycling Program

Water Purification Filter Recycling Program

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Remove cartridges from Millipore system

Allow cartridges to drain upside-down

Deposit cartridges in the drum located in the loading-dock of your building.

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MERCK MILLIPORE

Water purification cartridge recycling program initiated in collaboration with Millipore has potential to recycle *6,000 lbs (nearly 3 tons)* on our campus

Recycle – Styrofoam boxes

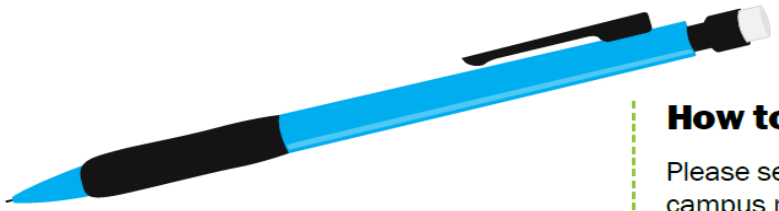
NEW ENGLAND BioLabs Inc.

MILLIPORE SIGMA

- Millipore and New England Bio Labs have a take back program. We return hundreds of them every week to these companies
- Dart Container Corporation, a local company picks them up once a week from our buildings. They are being cleaned to make alternative products, like picture frames, crown moldings etc.,

Recycle – Used Pens, Pencils etc.

Recycle Write!



Recycle Your Pens, Pencils and Markers!

The **Recycle Write! Program** allows U-M students, faculty and staff to dispose of pens, mechanical pencils and markers in an environmentally-responsible way.

What You Can Recycle Through Recycle Write!

- Pens
- Mechanical Pencils
- Highlighters
- Dry Erase Markers
- Markers
- Correction Tape (no fluids)
- Boxes, Blister pack (no cellophane)

How to Recycle

Please send items through campus mail to:

Recycle Write!

Madison Building

109 E. Madison St.

Campus zip: 2993

A few thousands of pounds of this solid waste stream per year is recycled

Recycle – Laser Drums and Ink Cartridges

Mikan Corp - When Quality, Cost, Sustainability & Michigan Matter

Mikan Corp Green Products & Services:

Remanufactured Toner Cartridges

Post Consumer Content 65% / Total Recycled Content 65%
Made In Washtenaw County Since 1990
100% Guaranteed
Direct from the manufacturer, UM contract pricing
Page Counts & Quality Equal to or Better Than OEM

MIKAN CORPORATION

With Mikan Corp, It is easy being Green!

Our labs recycle laser drums through a local company, Mikan Corporation. Products from Konica and HP are being sent back to them by return mail

Reuse – ChEM (Chemicals, Equipment & Materials) Reuse Program

Hazardous Waste

- Request Collection and Supplies
- Spill Response
- Chemical Waste
- Radioactive Waste
- Biological Waste
- Other Waste
- Sanitary Drain Disposal
- Waste Minimization
- ChEM Reuse Program

ChEM Reuse Program

The Chemical, Equipment, and Materials (ChEM) Reuse program, a University of Michigan (U-M) sustainability initiative, is a repository of unexpired and unused chemicals, equipment, or materials that are available to you for use in U-M research and teaching laboratories located on the Ann Arbor campus. The ChEM Reuse Program cannot guarantee if or when items will be available to research or teaching laboratories. The ChEM program:

- Protects the environment by reducing the overall volume of hazardous waste sent for disposal
- Reduces the cost of purchasing new materials if those in the repository are acceptable for your research or teaching needs

The program enables U-M research and teaching laboratories to:

- Obtain available chemicals, equipment, and materials free of charge
- Donate surplus chemicals, equipment, and materials into this program for redistribution to others who may find a need

Requesting Chemicals, Equipment, and Materials

Click the appropriate link below and within each order form you will see a list of the available chemicals, equipment, or materials. The available items are distributed on a first come, first serve basis. After you are in the order form, complete the requestor information and then scroll down and select items you are interested in. **NOTE:** After you are in the order form, if you press **Ctrl** + **F** a search box will display to assist you in looking for a specific item.

- Chemical
- Equipment
- Material

Can be accessed from U-M EHS or Campus Sustainability websites

ChEM Reuse Program - History

- 2001: A chemical redistribution program initiated
  - Commercial software employed
  - Restricted to medical campus; no EPA license
  - Suspended the program due to limited success and technical difficulties in 2005
- 2011: Restored the program with defined objectives
  - Started with MS Access database but later moved to Google docs
  - EPA licenses obtained to move the chemicals throughout the campus

ChEM Reuse Program - How it Started?

- **2010: Called in for a lab move out to check on the chemical compatibility**
  - Found unopened 12 of 4L bottles of acetonitrile, 4 gallons of 140 proof ethanol and 20L of acetone metal container
  - Requested Hazmat to hold on to them
  - Redistributed them through personal contacts to the teaching and research labs

- **2011: Program Restored with defined objectives**

ChEM Reuse Program – How we Marketed?

- Sustainable Lab program
- Sustainable Lab newsletter
- Flyers on bulletin boards in the buildings
- Planet Blue newsletter
- Presentations
- Communication with building managers
- Word of mouth communication

ChEM Reuse Program - How do we get them?

- Lab close outs: Units involved work with us
- Individual donations by researchers
- Wrong items received
  - Acetonitrile ordered but acetone received
  - Water purification cartridges: vendor doesn't take back
  - Buffers for life sciences labs
  - Acids: wrong conc. received
- Research focus changed and ChEMs are no longer needed

ChEMs – Representative Items

- **Chemicals**
  - Unexpired chemicals
  - Solvents, buffers
- **Equipment**
  - Ovens
  - Flammable cabinets
  - Water baths, hot plates
  - Centrifuges, vortexes etc.
- **Materials**
  - Pipetting accessories
  - Glassware
  - Plastic ware

ChEM Reuse Program - How Order is Placed?

Request Chemicals (ChEM Reuse)

The ChEM (Chemical, Equipment, and Materials) Reuse program provides research/teaching labs an opportunity to obtain desired chemicals and solvents free of charge. We store the unused and unopened surplus chemicals in our repository for redistribution. However, we may have some opened bottles. This program was developed as one of U-M's sustainability initiatives and is expected to significantly reduce university expenses in both purchasing and waste disposal. The ChEM Reuse Program emphasizes our institution's commitment to protect the environment by reducing the overall volume of hazardous waste generated.

This program is intended to serve the U-M Ann Arbor community only. Upon receiving the necessary information from a donor or requester, OSEH staff will contact you to make arrangements for delivery and/or collection.

U-M does not guarantee the integrity of the chemicals distributed under this program, especially with opened bottles. Although we expect these chemicals to be pure and obtained from known sources, you accept them at your own risk.

Contact Dr. Sudhakar Reddy (734-763-4615) or Ken Keeler (734-936-6663), or email sustainable-labs@umich.edu if you have questions about this program.

* Required

Name *

UMID # *

Email *

Phone # *

Building *

Room *

Has your lab participated in the Sustainable Lab Certification Program? *
(This does not effect your eligibility to request chemicals)

ChEM Reuse Proaram – How it works?

CHEM REUSE PROGRAM

1

Chemicals, Equipment, and Materials (ChEM) that are no longer needed are donated to the program from labs.

2

The donated ChEMs are logged into a catalog that is accessible to the University of Michigan - Ann Arbor community.

3

A ChEM request is placed by a lab user and an order is prepared by the Office of Campus Sustainability.

4

OCS staff coordinates deliveries to the lab in collaboration with the OSEH Hazardous Materials Management Group.

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For more information, visit: OSEH.umich.edu/hazmatz/chem-reuse.shtml
or email ChEMReuse@umich.edu

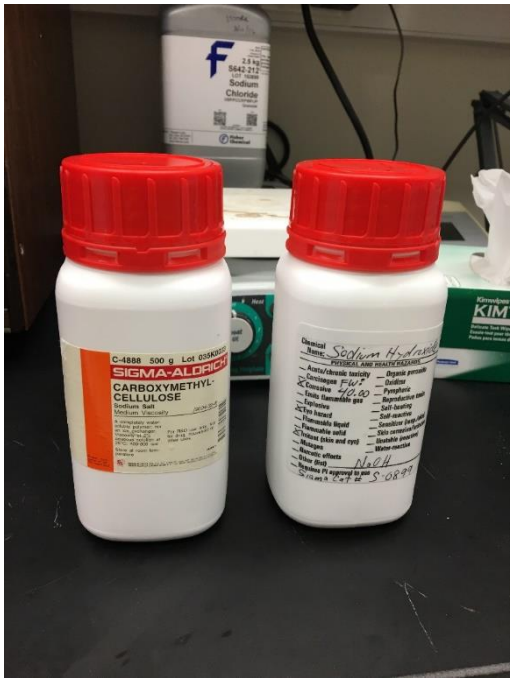
How Large Equipment moved?

- **Communicated via email**
  - List serve has 250 lab contacts
  - Free on first come first serve basis
  - Move from donor location at their expense

ChEM Reuse Program – Values Noted

- Equipment being expensive
- Chemicals – on back order
- Ethanol – Takes time to receive due to DOT regulations
- New faculty – save on seed amount
- **Chemicals repacking**

ChEM Reuse Program – Chemical Repacking



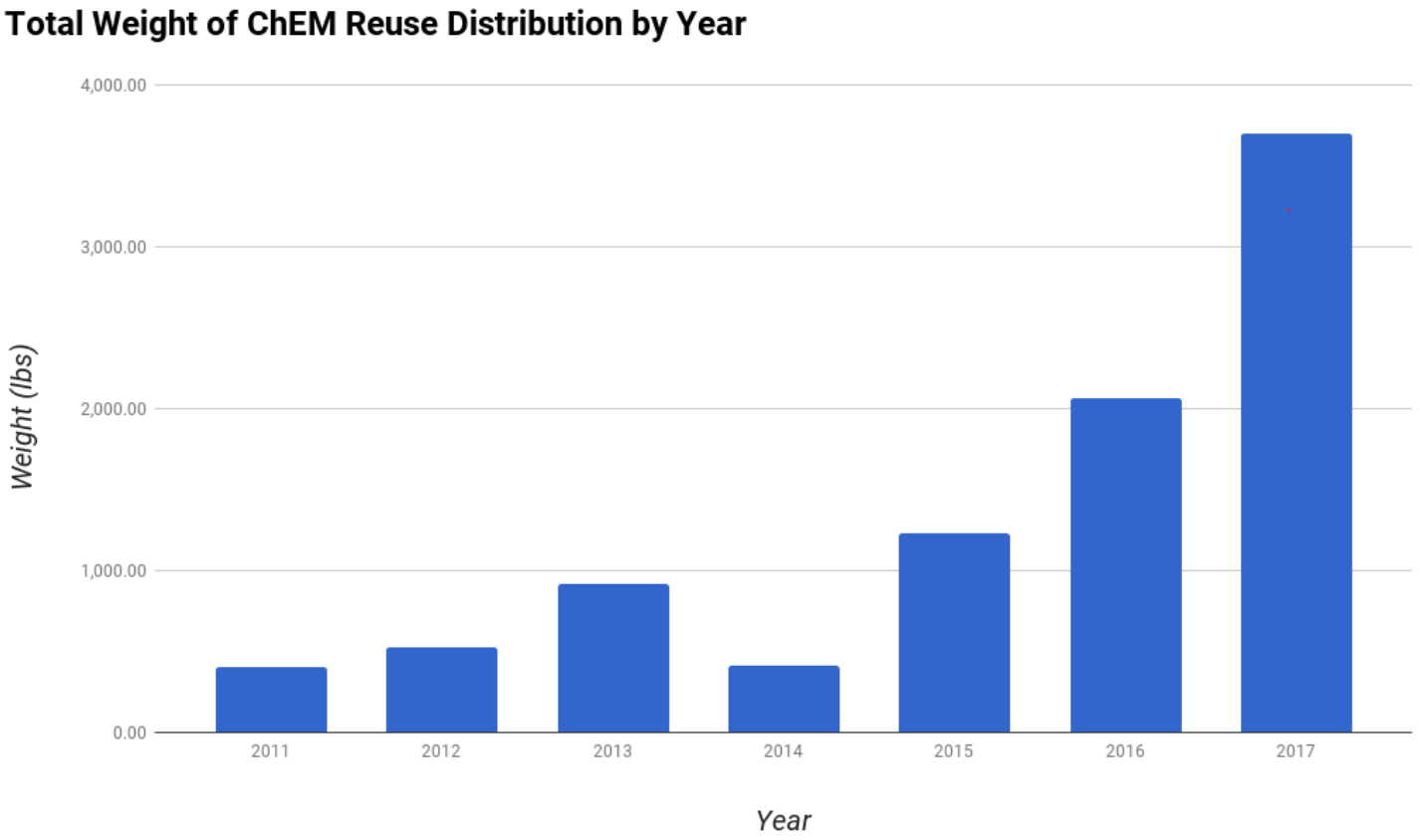
In collaboration with Sigma Millipore we are repacking chemicals into new containers

Metrics Captured

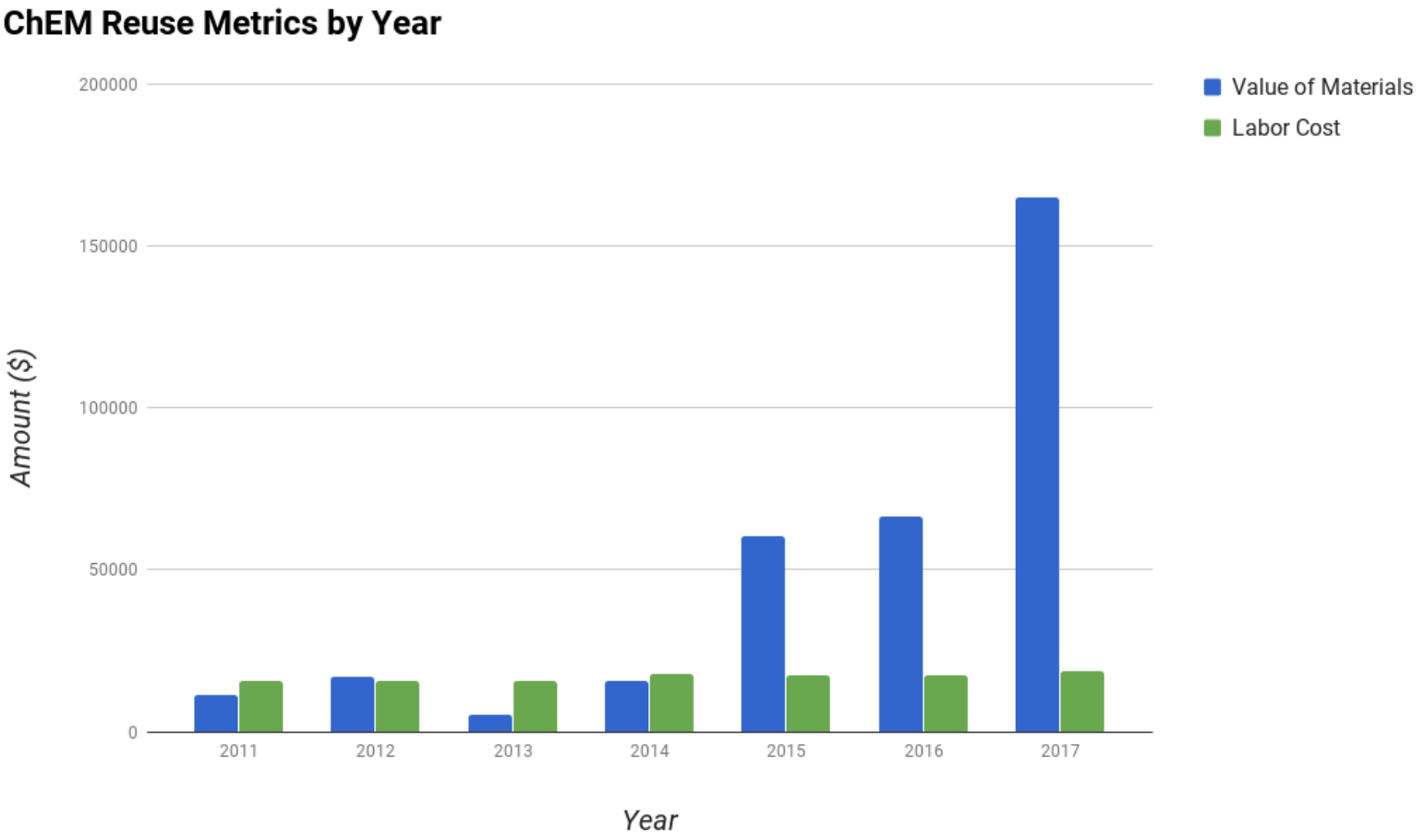
Recycling Programs - Metrics

- **Pipet tip box Recycling program**
  - Recycled **25,000 lbs** in FY 2017
- **Styrofoam boxes**
  - **75%** recycled through Dart Corp and return programs
- **Water purification cartridges**
  - Pilot is running. This program has potential to recycle **6000 lbs/year**
- **Pens, pencils, markers etc.,**
  - Program going well to recycle thousands of pounds a year
- **Laser drums and ink cartridges**
  - **80%** recycled through Mikan corporation and return program

ChEM Reuse Program – Metrics by Weight



ChEM Reuse Program – Metrics by Value



Overall Recycling Rate on our Campus FY 2017

37.96%

….and growing!

aashe

The Association for the Advancement of Sustainability in Higher Education

Holding Gold recognition

In summary

- We engaged 230+ labs in the Sustainable Lab Recognition program and the number growing!
- Many programs emerged from R3 concept to reuse and recycle items encountered in the labs
- ChEM Reuse program is one among them drew attention with an added value to lab users
- We will continue to invest in these programs to divert waste from entering into our landfills

Acknowledgements

- Green Chemistry Task Force Members
  - Ingrid Walstad (*EHS, Operations Safety*)
  - Gregory Marquis (EHS, *Hazardous Materials Management*)
  - Ken Keeler(*Office of Campus Sustainability)*
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- Raquel Huffman, EHS, Research Health and Safety
- Andrew Berki, Director, Office of Campus Sustainability
- Henry Baier, Executive Vice President, Facilities and Operations
- Deans, Directors and Facility Managers and
- PIs, Managers and Participants of the program

Thank you…..

www.sustainability.umich.edu

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redv@umich.edu
734-763-4615