

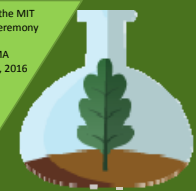


Green Lab Initiative in the Teaching Laboratory

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Introduction

In conjunction with the Green Lab program of MIT, we have been making steady progress in sustaining a greener practice in the Sub-Basement (SB) Teaching Laboratory, part of MIT's Chemical Engineering Department. The SB laboratory has similar infrastructure to research laboratories in the building, but is operated very differently. The SB Teaching Laboratory has two unusual characteristics:

1. Almost 100% turn-over in lab users (i.e., students and staff) three times a year, corresponding to the 3 courses taught there;
2. More than 75% of the benches and equipment are mobile and are rotated in and out of storage based on the course being taught, including process and analytical equipment each term.

These characteristics make the SB lab an especially fluid environment in which knowledge and practice of safety and green culture are challenging to sustain. However, reaching out to our students is an essential mission for the SB Laboratory, and having them learn chemical engineering practice along with sound EHS principles has been a major objective for us. As a result, we have joined MIT's Green Lab Initiative with enthusiasm and resolve.

Research and teaching laboratories consume significantly more energy than classrooms and office spaces, and it has become important to identify and reduce sources of waste. MIT's Green Lab initiative has become a very useful effort for reducing environmental impact and a vehicle of communication for implementing greener methods of operation.

Methods

Efforts in Waste Reduction

- Recycled and reused consumables: cuvettes, 96-well plates and tubing
- Created concentrated stock solutions to decrease sterilization volume and frequency to minimize on sterile filter use
- Implemented a glove recycling program that divides the stream of biologically contaminated gloves from recyclable non-contaminated gloves.

Energy Surveillance and Reduction

The monitoring of common instruments with the Modlet system (ThinkEco) was implemented by a UROP student. The technology allows real-time monitoring and remote control. A modlet can track two instruments at one time and sends energy usage data to a web based portal for analysis.



thinkeco

Figure 1. Modlet Outlet

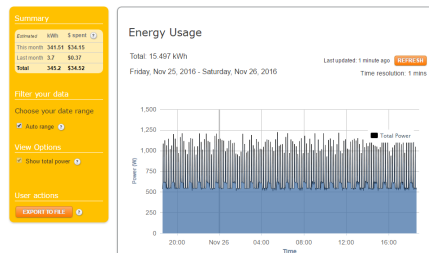


Figure 2. The online hub for Think Eco Modlet system. The display shows the current usage of an array of common instruments used in lab monitored by UROP Paige Omura.

Encouraging Student Involvement

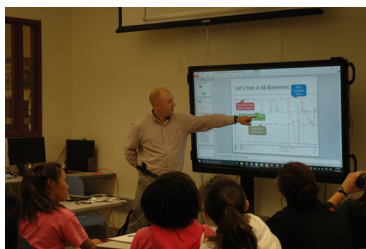


Figure 3. "Mr. Energy" Mark Mullins teaching the 10.28 class on the importance of energy monitoring.

Discussions on environment and energy have been initiated during the Chemical-Biological Engineering Laboratory course (10.28) to instill the idea that labs can be an environmentally friendly learning place and alert users that they can play an active role in designing and studying processes from the energy angle.

Conclusions

The Green programs implemented in the SB Teaching Lab this year have contributed to setting up a foundation of safe and environmentally-friendly processes and procedures. These programs have been presented to students and staff, and the 10.28 course students, in particular. While the lab was awarded Silver level certification in the inaugural year of the program, the most important achievement is in the form of the learning opportunity offered to students and staff using the lab, which should serve them well in their future career. We plan to continue our efforts to reduce our energy footprint, and pass on our results and experience to the next courses.

Acknowledgements

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