Welcome to Planet Blue

• Recap of last presentation
  – Introduced three Planet Blue teams
  – Unveiled the Planet Blue theme
  – Provided schedule for Pilot Buildings

Planet Blue – A New Energy Conservation Initiative at U of M: Tools and Initial Results

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The University of Michigan
University of Michigan
Ann Arbor Campus

- Established 1817
- 3,070 acres
- 41,000 students
- 37,000 faculty and staff
- 380 buildings
- 31 million square feet
History of Energy Management

- 1965 Converted CPP to Natural Gas
- 1992 APPA Innovative ECM Funding
- 1997 Green Lights
- 2004 EPA Energy Star Partner of the Year
- 2005 EPA Combined Heat & Power Award for CPP
- 2005 EPA Best Workplaces for Commuters
- 2006 Hospitals for a Healthy Environment
- 2007 Climate Savers Initiative
- 2007 Space Utilization Initiative
After many years of success behind the walls and above the ceiling…

*How do we engage the people of this campus?*
ISR Study

Behavioral Aspects of Energy Conservation & Sustainability: A Pilot Study
ISR Study

“…three key policy questions would be addressed.”

1. How effective are current policies and implementation strategies in achieving the goal of cost reduction?
2. Should the same set of policies be applied across campus? To all members of the UM community?
3. Should implementation strategies be applied uniformly in all settings within the university?
ISR Study
Selected Key Findings

Leadership
• Develop a marketing campaign built around initiative and targets.
• Leadership support is key to long term success.

Better & Clearer Information
• Provide feedback to building occupants on energy use

Motivating Individual & Units
• Establish an Energy Advocate Program (EAP) within buildings to encourage and support appropriate behaviors (EA could be the facility manager)

www.isr.umich.edu/energpilot
6 Point
Environmental and Energy Initiative

#1 Annual Environmental Report
#2 Renewable Energy
#3 Alternative Transportation
#4 Green Purchasing
#5 New Construction/Renovation Projects
#6 Planet Blue
A three-year project designed to engage building occupants in energy efficiency and environmental awareness in 90 major buildings.
Why Planet Blue?

U of M Energy Consumption (All Funds: Exc. UM-D & UM-F)
Total Cost vs. BTU's/sq.ft.

(Source: U of M Annual Report of Utilities - Numerical)
U-M Total Energy Use

FY04–FY08
Energy decreased 4%
Space increased 10%
Population increased 7%

Source: Utilities and Plant Engineering, Annual Utilities Purchases
Mission of Planet Blue

*Actively engage* the U of M community to conserve utilities and increase recycling, thereby saving money and benefiting the environment.
Our Motto

Save Energy, Save Money, Save the Planet

Work in Buildings

Engage People
What’s New?

Actively Engage **ALL** Building Occupants

- Departmental Leadership
- Faculty and Staff
- Students
- Facility Manager
- Maintenance Personnel
- Building Services
How Planet Blue Operates

Assess the building

Leadership meeting

Planet Blue Team (for each building)

Open House Event

Outreach, Education and Provide Tools

Implement ECMs

Celebrate Graduation
Assess the Building

Past and Current:
- Utilities consumption
- Past ECMs
- Recommissioning (e.g. SWAT, air balancing)
- Thermo graphics
- ‘Hot Button’ issues
- Fan schedules
- Fume hoods
- Panel PPCL report
- Building Control Systems
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Open House – Festive Event

- Educate about how the building works
- Tours of mechanical systems
- Energy conservation best practices
  - Green purchasing
  - Climate Savers
  - OSEH
- Sign up to be ‘citizens’ of Planet Blue
How Planet Blue Operates

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Outreach, Education and Provide Tools

Implement ECMs

Celebrate Graduation
My Planet Blue

- Citizen engagement
  - Serves as a constant reminder of the simple acts
  - Allows users to interact with each other
  - Portal to submit ideas on energy conservation
Tools

- Fan run time report
- Thermostat labels
- Motion-sensing power strips
- Task lamps (pilot)
How Planet Blue Operates

Assess the building
Leadership meeting
Planet Blue Team (for each building)
Open House Event
Outreach, Education and Provide Tools
Implement ECMs
Celebrate Graduation
Potential Energy Conservation Measures

- Occupancy sensors for classrooms
- Options for natural lighting
- Control system upgrades
- Pump and fan modifications
- Insulation improvements
- Water-efficient lavatory equipment
- Others from energy audits
The sensor controls both the lights . . .

and the fume hoods
Commissioning the people

- Everyone is instructed how to operate new technology
- Provide equipment “cut-sheets”
- Provide signage and labeling where necessary
How Planet Blue Operates

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Outreach, Education and Provide Tools

Implement ECMs

Celebrate Graduation
How do we measure our impact?
Measurement and Analysis

- Tool used: **Regression Analysis**
  - Estimates energy use in existing buildings based on past performance
  - Verifies ECM impact post-project
  - Flags “out-of-range” utility use or metering problems
  - Incorporates weather data
Regression Analysis

- U-M CSCAR: Center for Statistical Consultation and Research (unit within OVPR)
- UPE (U-M Utilities and Plant Engineering) and CSCAR have been collaborating since Feb. 2007 on developing and refining regression methods for building energy applications
- Approach is built on the foundation of ASHRAE Guideline 14 “Measurement of Energy and Demand Savings”
Rackham Monthly Steam Usage
Includes Steam Energy Only

Monthly Energy Usage (Million BTUs)

Baseline Period
Post Retrofit Period

ECM Installation
Area represents reduction in consumption

Actual energy usage
Baseline Regression Model
## Pilot Outcomes

Validated annual cost savings: $480K  
Reduced energy consumption: 11%

<table>
<thead>
<tr>
<th>Building</th>
<th>Projected Net BTU savings (MMBTU)</th>
<th>Measured Net BTU savings (MMBtu)</th>
<th>Annualized Savings (Dollars)</th>
</tr>
</thead>
</table>
| Fleming           | 35.4%                             | (Steam: 29% increase)<sup>1</sup>  
                     | Electricity: 25%                         | N/A                          |
| Chemistry         | 14.2%                             | Steam: 11%  
                     | (Electricity: 19% Increase)<sup>2</sup>      | $88k                         |
| ISR – Thompson    | 13.2%                             | 38%                                             | $174k                        |
| Rackham           | 9.4%                              | 35%                                             | $220k                        |
| Space Research    | 6.0%                              | 17%                                             | $62k                         |

<sup>1</sup> Increase due to existing steam trap failures.  
<sup>2</sup> Apparent increase due to replacement of analog meter that drifted out of calibration and is not reflective of a change in building consumption patterns.
Other Successes

- 4000-plus registered Planet Blue citizens

- Over 100,000 website hits annually
CASE STUDY  
Chemistry - Pipette Tip Box Recycling Program  

Situation:  
- Researchers use thousands of pipette tips for various experiments.  
- **Issue:** The boxes which hold these pipette tips were thrown away because they could not be recycled in the normal recycling stream.  

Solution:  
- The facility manager for the chemistry building was concerned about the large number of pipette tip boxes that were discarded. He worked with U-M Recycling and the vendor to create a recycling program.  
- Fisher Scientific set up the program where they provided pre-labeled and postage paid containers to collect the pipette tip boxes and inserts. When filled, the containers were mailed back to the vendor at no cost to the University.  

Results:  
- Reduced waste streams for Chemistry building and the University.  
- Efficient use of resources for the University and Fisher Scientific.
CASE STUDY
Rackham – Reading Rooms and Alcove Lighting

Situation:
– **Issue**: Lights (chandeliers and wall sconces) in reading rooms were turned on daily at 6:00 a.m. and off at 11:00 p.m. to make stately reading rooms warm and inviting. Some on 24/7. Rooms were seldom occupied for extended lengths of time.

Solution:
– Occupancy and daylight sensors were installed to take advantage of ambient daylight and periods of inactivity.
– Team worked with bldg. mgr. & users to pilot alcove room to verify the ambience of the room was maintained.
– Signage was also installed to educate occupants.

Results:
– Lights on for ~35 hrs wk, down from (up to) 168 hrs/wk
– Electricity savings: 278,560 kWh/yr
– Annual Savings: $21,310
– Project Cost: $59,321
– Payback: 2.7 yrs
– No complaints from customers!
Lessons Learned

- Strong Occupant desire to conserve
- Excellent participation from staff, students and faculty
- Strong brand recognition due to interest in program
- Savings results exceeding expectations—low fruit keeps growing
- Better building environmental conditions
Lessons Learned

- Utility rates include capital and maintenance, resulting in fixed costs that will be spread over a smaller base.
- Sense of pride that U-M is at forefront in sustainability effort.
- Enjoy being part of the solution.
- Surveys have indicated positive outreach from Plant Operations staff.
Lessons Learned

- *Hand Offs* between Plant Operations staff cumbersome - leads to new procedures
- Long-standing building problems being addressed and solved
- Plant Operations re-organization efforts currently underway

*Some processes just work better than others*