Harnessing the LEED-EB Process to Green Campus Operations: Lessons Learned from WMU’s CHHS

Pete J. Strazdas, Western Michigan University
Jim Nicolow, Lord, Aeck & Sargent Architecture

MiAPPA Winter Conference, February 9, 2010
Outline

- Total Cost of Ownership
- LEED-EB
- CHHS Case Study
- Lessons Learned
- Discussion
Asset Lifecycle Model for Total Cost of Ownership Management
Total Cost of Ownership

- Criticism of LEED-NC

**LEED risk management:**
Crossing the model/reality chasm

**LEED certified commercial buildings:** Are they really more efficient?
WMU Campus GHG Inventory

- Building Energy Use: 11,696
- Travel/Commuting: 29,769
- Other: 85,394

Practical Guide to Reducing the Campus Carbon Footprint
LEED RATING SYSTEMS
LEED Growth

**Commercial LEED Certified Projects (cumulative)**
*As of September 2009*

<table>
<thead>
<tr>
<th>Year</th>
<th>Projects</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td></td>
</tr>
<tr>
<td>2006</td>
<td></td>
</tr>
<tr>
<td>2007</td>
<td></td>
</tr>
<tr>
<td>2008</td>
<td></td>
</tr>
<tr>
<td>2009</td>
<td>3,855</td>
</tr>
</tbody>
</table>

**Square Footage of Commercial LEED Certified Projects (cumulative, in millions)**
*As of September 2009*

<table>
<thead>
<tr>
<th>Year</th>
<th>Square Footage</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td></td>
</tr>
<tr>
<td>2006</td>
<td></td>
</tr>
<tr>
<td>2007</td>
<td></td>
</tr>
<tr>
<td>2008</td>
<td></td>
</tr>
<tr>
<td>2009</td>
<td>613*</td>
</tr>
</tbody>
</table>

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LEED Rating Systems

- Homes
- Neighborhood Development (in pilot)
- Commercial Interiors
- Core & Shell
- New Construction
- Schools, Healthcare, Retail

Existing Buildings Operations & Maintenance

Building Lifecycle
- Design
- Construction
- Operations


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LEED Statistics

49,630 Total LEED Registered Projects

- Office: 25%
- Retail: 9%
- Higher Ed: 6%
- Other: 60%

* LEED v 1.0-2.2
LEED Statistics

49,630 Total LEED Registered

- LEED -NC 65%
- LEED -EB 12%
- Other 23%

3,012 Higher Ed LEED Registered

- LEED -NC 84%
- LEED -EB 8%
- Other 8%

LEED v2009 – 20% LEED-EBOM

* LEED v 1.0-2.2
LEED Statistics in Michigan

562 Total LEED Registered

- LEED-NC 70%
- LEED-EB 9%
- Other 21%

288 LEED Certified (2-5-10)

- LEED-NC 88%
- LEED-EB 1%
- Other 11%

4 LEED-EB projects
CHHS is only Higher Ed

* LEED v 1.0-2.2
LEED-EB Differences

- Policy-based (construction / renovation)
- Measured Performance
- Maintenance & Operations Procedures
- Purchasing
- Staff Education
- Green Cleaning
- 3-step Process
  1. Implementation
  2. Performance Period (3 months to 1 year)
  3. Certification Review
CHHS CERTIFICATION PROCESS
Project Timeline – 22 months

- Grant Awarded – Sept 2007
- Project Kick Off – October 2007
- Feasibility Study – Feb 2008
- Implementation – Feb-May 2008
- Performance Period – May-July 2008
Grant – Sept 2007

- State of Michigan $15,000 grant
# Feasibility Analysis – Feb 2008

## LEED-EB Version 2.0 Checklist - February 25, 2008

**Building Name:** College of Health and Human Services Building  
**Building Address:** Western Michigan University, Kalamazoo, Michigan

<table>
<thead>
<tr>
<th>Credit</th>
<th>Description</th>
<th>Point Value</th>
<th>Grant Application - Internal Review Notes</th>
<th>Remarks</th>
<th>Responsible</th>
<th>Cost?</th>
<th>Change?</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1</td>
<td>Plan for Green Site &amp; Building Exterior Management - 4 specific actions</td>
<td>1</td>
<td></td>
<td></td>
<td>Chris Pyzik</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>1.2</td>
<td>Plan for Green Site &amp; Building Exterior Management - 6 specific actions</td>
<td>1</td>
<td></td>
<td></td>
<td>Chris Pyzik</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>2.1</td>
<td>High Development Density Building &amp; Area</td>
<td>1</td>
<td>Original LEED-NC scorecard indicates compliance.</td>
<td></td>
<td>Carl Newton</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>3.1</td>
<td>Alternative Transportation - Public Transportation Access</td>
<td>1</td>
<td>Original LEED-NC scorecard indicates compliance.</td>
<td></td>
<td>Carl Newton</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>3.2</td>
<td>Alternative Transportation - Bicycle Storage &amp; Changing Rooms</td>
<td>1</td>
<td>Requires bike racks for 1% of FTE occupants, 1 shower per 8 bikes (can be met with on-campus showers).</td>
<td></td>
<td>Carl Newton</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

**Notes:**

- **Credit 1.1:** Requires that the WMU has in place or develops an approved erosion control management plan for site work.
- **Credit 1.2:** Requires low-impact site management plan addressing (pick four for 1 point, 8 for 2 points): Maintenance equipment, Plantings, Animal and vegetation pest control, landscape waste, Irrigation management, fertilizer use, snow removal, cleaning of building exterior, exterior points & receptacles, and/or other maintenance of building exterior.
- **Credit 2.1:** Original LEED-NC scorecard indicates compliance. We would need to confirm 60,000 sf/acre development density (looks like lower density to us).
- **Credit 3.1:** Original LEED-NC scorecard indicates compliance. 2 of our public transit buses available within 1/4 mile of site.
- **Credit 3.2:** Requires bike racks for 1% of FTE occupants, 1 shower per 8 bikes (can be met with on-campus showers).
Feasibility Analysis – Feb 2008

14 prerequisites:

- 10 met
- 1 required policy change (erosion control)
- 1 required operational adj. (ventilation)
- 2 required additional analysis (energy & mercury in lights)
Feasibility Analysis – Feb 2008

48 points targeted (silver + 8):

- 29 met
- 11 required policy change or minor building changes
- 8 required additional analysis

WMU Approval to Proceed
Grant Variance Approved
IMPLEMENTATION
LEED Categories

- Sustainable Sites
- Water Efficiency
- Energy & Atmosphere
- Materials & Resources
- Indoor Environmental Quality
- Innovation, Operations & Maintenance
Sustainable Sites

- Erosion & Sedimentation Control
  - Policy in place
  - Prereq

- Age of Building
  - > 2 years
  - Prereq

- Plan for Green Site and Building Exterior Management
  - Policy addressing
    - Maintenance equipment
    - Plantings
    - Animal and vegetation
    - Landscape water
    - Irrigation management
    - Fertilizer use
    - Snow removal
    - Cleaning of building exterior
  - 2 Points
Sustainable Sites

- **Alternative Transportation**
  - Proximity to public transportation
  - Bicycle Storage & Changing Rooms
  - Alternative Fuel Vehicles
  - Car Pooling & Telecommuting
  - 4 points

- **Reduced Site Disturbance**
  - Asylum Lake
  - 2 points

11 Earned/ 14 Possible
Sustainable Sites

- **Stormwater Management**
  - Mitigation of at least 50% of the annual stormwater
  - 2 points

- **Light Pollution Reduction**
  - Shield all outdoor luminaries > 50 watts
  - 1 point

11 Earned/ 14 Possible
Water Efficiency

- **Minimal Water Efficiency**
  - Prereq

- **Discharge Water Compliance**
  - Prereq

- **Water Efficient Landscape**
  - 1 point

- **Water Use Reduction**
  - Dual flush toilets/aerators
  - 2 points

3 Earned/ 5 Possible
Energy & Atmosphere

- **Existing Building Commissioning**
  - Prereq

- **Minimum Energy Performance**
  - Baseline measurement
  - Historical consumption
  - Prereq
  - 3 points

- **Ozone Protection**
  - Prereq
  - 1 point

10 Earned/23 Possible
Commissioning Sidebar

30,000 square foot office building
July ‘08 and “is still a work in progress operationally”
  • Faulty sensors
  • Errors in equipment installation & setup
  • System control interface problems
  • Non-optimized operating sequences and schedules
  • Equipment failures and leaks
Commissioning Sidebar

February ‘09 down 22%
New glitch in control programming
make up air unit, continuous 20kW
30% further to match predicted
Energy & Atmosphere

- Building Operation & Maintenance
  - Staff education
  - Best practices monitoring & maintenance
  - 3 points
- Performance Measurement
  - Enhanced metering
    - Domestic water
    - Irrigation system
    - Process water (Cooling tower)
    - Cooling load (Steam absorption)
    - Boiler efficiency
  - Emissions reduction
  - 2 points
- Building Cost Impacts
  - Operating costs of all aspects
  - 1 point

10 Earned/ 23 Possible
Materials & Resources

- **Source Reduction & Waste Management**
  - Waste stream audit
  - Storage and collection of recyclables
  - Occupant recycling
  - 2 prereqs
  - 3 points

- **Toxic Material Source Reduction**
  - Mercury in light bulbs
  - Prereq
  - 1 point

- **Construction, Demolition and Renovation Waste Management**
  - 1 point

- **Sustainable Cleaning Products and Materials**
  - 3 points

8 Earned/ 16 Possible
Indoor Environmental Quality

- Outside Air and Exhaust
  - Increased ventilation
  - Prereq
- Tobacco, Asbestos and PCB free
  - 3 prereqs
- Outdoor Air Delivery Monitoring
  - 1 point
- Increased Ventilation
  - 1 point
- Construction IAQ Management Plan
  - 1 point

13 Earned/ 22 Possible
Indoor Environmental Quality

- Indoor Chemical and Pollutant Source Control
  - ≥ MERV 13
  - 1 point
- Controllability of lighting
  - 1 point
- Thermal comfort
  - ASHRAE 55
  - 1 point
- Day lighting & views
  - 2 points
- Green cleaning
  - Entryway systems
  - Pest control
  - Equipment
  - Policy
  - 5 points

13 Earned/ 22 Possible
Innovation, Operations & Maintenance

- Asylum Lake
- Water Reduction
- Bronco Bio-diesel
- Dolphin fountain treatment
- LEED Accredited professional

5 Earned/5 Possible
# Performance Period

## CHHS LEED Certification

### Performance Period Task List

**May 1st - July 31st**

<table>
<thead>
<tr>
<th>Responsible Party</th>
<th>Credit</th>
<th>Description</th>
<th>Time Period</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Tim Hoigsz</td>
<td>SS41</td>
<td>Log showing sedimentation control measures have been followed, photos documenting any correction of problems</td>
<td>Monthly</td>
<td>May, June, July</td>
</tr>
<tr>
<td></td>
<td>SS51</td>
<td>Track compliance with Green Site &amp; Exterior Management Plan measures</td>
<td>Monthly</td>
<td>May, June, July</td>
</tr>
<tr>
<td></td>
<td>SS631</td>
<td>Track compliance with adequacy of public transit access</td>
<td>Monthly</td>
<td>May, June, July</td>
</tr>
<tr>
<td></td>
<td>SS632</td>
<td>Track compliance with adequacy of bicycle storage and changing facilities</td>
<td>Monthly</td>
<td>May, June, July</td>
</tr>
<tr>
<td></td>
<td>SS634</td>
<td>Track compliance daily or weekly demonstrating reduction of commuting frequency by 20% for 20% or more of building occupants on an average basis</td>
<td>Weekly</td>
<td>May, June, July</td>
</tr>
<tr>
<td></td>
<td>EA51 EA54</td>
<td>Track utilization during performance period, LARS to perform calculations at end of Performance Period</td>
<td>Monthly</td>
<td>May, June, July</td>
</tr>
<tr>
<td></td>
<td>EA56</td>
<td>Track change in building operating costs during performance period</td>
<td>Monthly</td>
<td>May, June, July</td>
</tr>
<tr>
<td></td>
<td>MF102 MF103</td>
<td>Track light bulb purchases</td>
<td>Monthly</td>
<td>May, June, July</td>
</tr>
<tr>
<td>Carl Newton</td>
<td>SS633</td>
<td>Track compliance with adequacy of AFF parking spaces</td>
<td>Monthly</td>
<td>May, June, July</td>
</tr>
<tr>
<td></td>
<td>SS65</td>
<td>Quarterly inspection to confirm stormwater management is functioning as intended</td>
<td>Quarterly</td>
<td>May, June, July</td>
</tr>
<tr>
<td></td>
<td>WE61 WE62</td>
<td>Track building water usage</td>
<td>Weekly</td>
<td>May, June, July</td>
</tr>
<tr>
<td></td>
<td>WE62</td>
<td>Track irrigation water usage</td>
<td>Monthly</td>
<td>May, June, July</td>
</tr>
<tr>
<td></td>
<td>EA631</td>
<td>Track staff training</td>
<td>Monthly</td>
<td>May, June, July</td>
</tr>
<tr>
<td></td>
<td>EA632</td>
<td>Track equipment preventive maintenance</td>
<td>Quarterly</td>
<td>May, June, July</td>
</tr>
<tr>
<td></td>
<td>EA65</td>
<td>Track metered data gathered, report card on performance, one day example of all data recorded, description of how data is used to improve performance</td>
<td>Quarterly</td>
<td>May, June, July</td>
</tr>
<tr>
<td>Anand Sankey</td>
<td>SS633</td>
<td>Track compliance with adequacy of AFF parking spaces</td>
<td>Monthly</td>
<td>May, June, July</td>
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<td>May, June, July</td>
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</tbody>
</table>
Submittal – October 2008

LEED-EB 2.0 Letter Template
WE Credit 3.1 - Water Use Reduction

Metered monthly usage during school year (2-11-09 to 3-12-09, bill attached):
conversion to gallons

Month usage in gallons

Average Annual Water Use

200 cubic meters
264 gallons/cubic meter
52,834 gallons/month

I have provided the following to support LEED Credit 3.1:

- Documentation (photographs, fixture calculation) for use per LEED-EB v.2.0
- Annual water meter data for total water use
- LEED-EB v.2.0 Input Form

LEED-EB v.2.0 Letter Template
WE Credit 3.1 - Water Use Reduction

Project Name: College of Health & Human Services

Credit: WE Credit 3.1 (1 point)

WE Credit 3.1 (1 point)
Water Use Reduction, 10% Reduction

WE Credit 3.2 (1 additional point)
Water Use Reduction, 20% Reduction

Photos:

- Photograph of fixtures
- Photograph of water meter

Saved by:

- John Doe
- Jane Smith
- John_Jane_1234@wmich.edu

LiveCycle

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Certification Process (7 months)

- Submittal – Oct 2008
- Preliminary Review – January 2009
- Clarification – March 2009
- Final Review – April 2009
  - Additional information requested
- Preliminary Certification – May 2009
- Appeal – May 2009
  - Water efficiency and mercury in lights
- Gold Certification – May 2009
CHHS Points Earned

50/92

- Innovation, Operations & Maintenance
- Indoor Environmental Quality
- Materials & Resources
- Energy & Atmosphere
- Water Efficiency
- Sustainable Sites

CHHS Points

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Lessons Learned

- Architect: Better understanding of operations & maintenance issues & TCO
- Involve Operating Staff
  - Part of process / ownership
  - Collaboration between departments
LEED-EB Team

- Umair Ahmad
- Jim Burns
- Dan Brimmer
- Jeffrey Carr
- David Dakin
- Carol Dedow
- Kirk Dillery
- John Dunn
- Evan Escamilla
- Denise Forman
- Harold Glasser
- John Goes
- Deborah Goostrey
- Polly Graham
- Shelly Grant
- Michael Hodgkinson
- Pat Holton
- Tim Holysz
- George Jervis
- Brennen Kartes
- Scott Keeler
- Kris Kenz
- Ryan Kerrigan
- Raymond Kezenius
- Daniel List
- Jeffrey Long
- Carl Newton
- Jim Nicolow
- Carolyn Noack
- Yogesh Patel
- Patricia Pettinga
- Wayne Pushie
- Chris Pyzik
- Lowell Rinker
- Greg Roseboom
- Nicholas Rouch
- Anand Sankey
- John Satterfield
- Peter Strazdas
- Cathi Walter
- George Wilson
- Traci Young
Lessons Learned

- Transformative
  - Campus-wide changes
    - Custodial Policies
    - Life-Cycle Design Guide
  - Focus on Data
    - CO2 Sensor Deployment
    - Daylighting Controls
  - Awareness = occupants & staff feel good about selves and the building
Lessons Learned

- Outside consulting expertise =
  - LEED-EB Certification
  - plus Best Operating Practices
- Health & Productivity v. Energy Efficiency
- Worthwhile Investment
- Public Relations Benefit
Higher education leads the way in building green

By Olivia Pulsinelli | Business Review West...
June 01, 2009, 8:00AM

Colleges and universities are leading the way in many communities when it comes to building green.

Kalamazoo had two recent LEED firsts, both on campuses of higher education. The College of Health and Human Services building at Western Michigan University last month received Gold-level certification for LEED for Existing Buildings -- the first Gold-level LEED building in Kalamazoo and the first Gold LEED EB for a higher-education building in the country. Kalamazoo College's Hicks Student Center became the first LEED-Silver project in Kalamazoo this past February.
Closing Thoughts

The College of Health & Human Services now has reserved parking for drivers of alternative fuel vehicles in WMU's continual effort to promote a GREEN CAMPUS.

Alternative Fuel Vehicles!

Burning fossil fuels creates greenhouse gases that contribute to global warming.
DISCUSSION