Daniella Leifer

Daniella Leifer is a recent graduate of the MBA program at the Zicklin School of Business at Baruch College and holds an undergraduate degree from Cornell University. She is the manager of training and compliance programs for the CUNY Building Performance Lab, preparing students for the changing needs of the building construction and management industries in NYC and beyond.

The presentation will describe the approach being taken by City University of New York’s Building Performance Lab and partners to the continuing education, training and certification of incumbent building operators for building system performance management. This approach is described as a significant departure for training of this target workforce segment, which traditionally has focused on component maintenance, failure diagnosis and repair.

The need for new skills is identified in market trends for “sustainable” commercial buildings that are required to meet performance standards. These new skills address systems-level management based on quantification, data acquisition and trend analysis, optimization of control sequences, and team-based improvement processes, such as strategic facility assessments, energy audits and retro-commissioning. New skills are built into the framework of the national Building Operator Certification (BOC), which emphasizes energy management as part of good O&M practice. Experience is reported in successive rounds of training, 2008 – 2010, for private sector owner/managers through a local training center of the International Union of Operating Engineers (IUOE) and for municipal building operators through the NYC Department of Citywide Administrative Services. Integration of the EnergyStar Portfolio Manager will be discussed as introduced into BOC training for the custodial engineers of the NYC public school system. BOC enhancements under a US Department of Energy curriculum development grant will be reviewed.

The presentation will show how a first-principles based approach enables an operator to provide the same systematic, data-based monitoring of any mechanical-electrical building system. This approach is based on analysis of the energy inputs and outputs against each other (efficiency) and against expected performance under variable conditions. Training encompasses interface with Building Automation Systems for data, data visualization, and fault-detection and diagnosis (FDD) analytics. Examples are provided of use in retro-commissioning, in testing and acceptance of new systems, and in the on-going operation of renewable energy systems.

While a large amount of attention has been paid to the standards-based training of solar energy installers, little has been paid to the long-term O&M of these systems. It is suggested that building operators need to be certified for the maintenance of solar thermal and solar electric systems’ performance and that this can be accomplished within the enhanced BOC framework.
Training for Performance Management of Conventional & Solar Energy Systems

Daniella Leifer
Building Performance Lab
City University of New York

IREC Clean Energy Workforce Development Conference Saratoga, NY
March 2011
Overview

1. What have building operators traditionally done?
   → Focus on component maintenance, failure diagnosis & repair.
   → Little focus on overall building performance.

2. What do we want building operators to do?
   New skills/behaviors/knowledge:
   → Data-based performance monitoring; systems-level management based on quantification, data acquisition & trend analysis; optimization of control sequences; etc.
   → Team-based improvement processes ie. strategic facility assessments, energy audits, retro-commissioning.

5. How does this apply to solar energy systems?
   → Lots of focus on standards-based training of solar energy installers; little on long-term O&M.
   → Enable operators to provide same systematic, data-based monitoring based on analysis of energy inputs & outputs (efficiency), and against expected performance under variable conditions.
BOC Training

“Building Operator Certification (BOC®) - Energy Efficiency Through Operator Training.”

Nationally recognized, competency-based training and certification program that offers facilities personnel the improved job skills and knowledge to transform workplaces to be more comfortable, energy-efficient and environmentally friendly”.

- Working with the NYC DOE, DCAS, IUOE Local 94, and SEIU 32BJ.
- BOC training & certification teaches performance-based building O&M.
- Incorporates energy management as part of the performance goals of good O&M practice.
New Paradigm for Building Operations

“Begin with the end in mind”
-Stephen Covey

What do we expect of Building Operating Engineers?
That they operate equipment, systems, buildings:

– Safely
– For Reliability and Extended Life
– Efficiently (ie - energy and water inputs)
– Effectively (ie - IEQ outputs)
<table>
<thead>
<tr>
<th>New Behaviors, Skills, &amp; Knowledge</th>
<th>High-Performance Outcomes</th>
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<tbody>
<tr>
<td>– Energy mgmt &amp; system optimization</td>
<td>– Low energy use</td>
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<tr>
<td>– Proactive indoor environment monitoring</td>
<td>– Superior IEQ</td>
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<tr>
<td>– Measurement and quantification</td>
<td>– Performance measured &amp; verified</td>
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Applying Lessons Learned
A Solar Thermal System
Operational Horror Story

Why were the panels clear & dry on a cloudy day following a snow storm?

...And why were the electric bills so high?
Performance Approach for PV Systems O&M - Considerations

- Output rated at peak solar condition. How do you know if array is working as specified?
- Need to know solar condition + system output

- No noise. How do you know if it’s working?
Performance Approach for Solar Installations (simplified version)

Why is ours here?

Solar input

Performance spec (mfr)

Ideal output

Electrical output
Summary & Conclusion

• Performance-based approach to O&M for buildings can be incorporated into education & training for building operators.
• Similar approach can be used in training for solar system O&M.
• For solar, as with other building Mech/Elec systems, the operator needs to monitor performance, and needs specific training to be able to do so.
• Only with such skills and mind-set can our energy-efficiency and renewable systems be operated long-term with persistent savings – really *sustainable*.
Thank you for your attention
Questions?

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