Intelligent Buildings: Optimize Portfolio-Wide Efficiency with Data Analytics

Monday, June 10, 2013 • 1:00 pm – 2:15 pm, Garden Salon One, 2nd Fl.

Presented by:
Dick Mink, Director of the Division of Facility Efficiency, Kentucky Finance & Administration Cabinet
Beth Studley, Senior Vice President, Holder Construction

The software and building systems industries are converging with solutions that yield real savings for state facility owners. The enhanced control and visibility from intelligent buildings optimizes energy and water efficiency through data analytics. This session will highlight the technology, integration and options for statewide adoption. The Commonwealth of Kentucky won the 2012 Innovation Award for their forward-thinking approach at portfolio-wide control and visibility to optimize energy efficiency. With a year of data they will share the real-savings, and continuous improvement of their custom developed Commonwealth Energy Management and Control System (CEMCS) system. Through benchmarking of all state facilities, rate structure analysis, error free monthly billing and improvements to interval data response the Commonwealth yielded a 20% energy savings in the first year.

ABOUT THE SPEAKERS

DICK MINK has 20 years of experience in the utility industry and 13 years in facilities management. He currently serves the Commonwealth as the Director of the Division of Facility Efficiency. As the Commonwealth Energy Management and Control System (CEMCS) project manager, Dick had both an extraordinary team and a unique point of view on the invention of many one of a kind processes, and integrations that are the CEMCS. Dick will lead the state wide implementation going forward.

BETH STUDLEY is a Senior Vice President with Holder Construction Company. At Holder she provides executive leadership to several business units including Business Development, Creative Services, Corporate Philanthropy and Sustainable Services. Beth started her career with Holder in 1995 as a preconstruction engineer, transitioning to business development in 2001.

Beth has maintained active membership in NASFA since 2001 and has served on both the Membership Committee and Communications Committee. She is the current co-chair for the 2012-2013 Communications and Technology Committee. Beth is the past Chairwoman for US Green Building Council Atlanta Chapter and served on the Board of Directors from 2002-2009. She led the Chapter through a consolidation setting a model for USGBC across the country. Beth is currently part of the 2013 Greenbuild Working Committee. She is also on the Community Foundation of Atlanta’s “Grants to Green” Advisory Board and Southern Polytechnic State University’s Construction Management Department Advisory Board. She has served on Southface Energy Institute’s Board of Directors and Georgia Southern’s Allen E. Paulson School of Science and Technology Advisory Board.

Beth graduated from the University of Florida in 1995 with a degree in Building Construction. She is a LEED accredited professional with a specialty in building design and construction.
Intelligent Buildings

Will we ever get there?

NASFA National Conference
June 9-13\textsuperscript{th}, 2013
Overview

• What are “Intelligent Buildings”

• Differences between Efficient and Intelligent

• Commonwealth of Kentucky Energy Management & Control System

• Discussion on Barriers & Next Steps
What is an intelligent building?

- Networked energy infrastructure through sensors, controls and meters
- Aggregated data
- Optimized performance based on data analytics
How Are You Optimizing Energy?

- Modeling & Design
- Existing Building Retrofits
- Commissioning & Controls
- Monitoring & Visibility
- Analyzing & Managing Data
Connecting the Sources

Optimize all Sources

- Systems
- Building Equipment
- IT Plug Load
- Employee Plug Load
Smart Grid Ecosystem
# Meter, Monitor, Analyze/Manage

## Meter
Collect Connect all Components in IP Addressable Format
(Equipment, Systems, IT, Plug Load)

## Monitor
Visibility & Control
Aggregate energy data from all sources
Aggregate ghg data from all sources

## Analyze
Strategic Alignment
Real-time benchmarking to enterprise targets
40%-50% energy savings
Meter

Building

Equipment

Workspace
Visibility
Analytics & Management

Save Energy & Focus Resources

- Fault detection & Diagnosis
- Alarm Management
- Energy Management

- Continuous Commissioning
- Prioritization of Notifications
- Building & Base Load Analysis and Optimization
- Plug Load Benchmarking & Dashboarding

Source: Case for Smart Buildings Microsoft Whitepaper
Analytic Software addresses.....

- HVAC equipment: failed sensor resulting in simultaneous heating & cooling
- Technicians addressing low priority or false alarms about building issues
- Configuration of equipment running at suboptimal setpoints because not rechecked after initial configuration
- Lack of visibility into energy waste, especially for workspace plug load
Commonwealth of Kentucky
Energy Management and Control
Four Major Areas of Focus

• Utility Monitoring and Analysis
  ▫ Monthly bill analysis, interval data, rate structure verification.

• Building Automation Integration and Diagnostics
  ▫ BAS output data in SQL Server or a flat file (csv) will be analyzed for sequence of operation efficiencies.
  ▫ **Custom Subscriptions** are available to each user for equipment status. This feature is loaded with value to facility operators.

• Automated Utility Bill Paying (Centralized?)
  ▫ Electronic Data Interchange (EDI) will be developed by Utility providers and fed into CEMCS for usage and payment. (3 largest Utilities are shipping EDI in our test environment)

• Work Order Generation and Tracking
  ▫ Each agency may have different CMMS; CEMCS will notify designated contacts of issues that need attention.
Program

- 3.6 million Square Feet monitored
- Plans to expand to 20,000,000 additional in the next budget cycle.
- Overall Benefits from System
  - Reliable actual energy spend data
  - Detailed building benchmark
  - Specific performance detection
- System integration
  - Purchased utility EDI
  - AP systems-Peoplesoft
  - BAS trend and interval data
  - Work order system
Architecture Diagram
Automated Utility Bill Paying

Manual data entry forms

EDI data feed

EnergyWitness DB Server

Approve for Payment

Approval rules vary by agency

eMARS (accounts payable)
BAS Interface to CEMCS—Data Collection
Building Automation Integration and Diagnostics

- Consistent views of fault detection and diagnostics, regardless of BAS
- Consume 1000s of data points at a glance
Work Order Generation and Tracking: Capture Issue

- Observations captured in Comments system
- Organized by building, equipment, & user
- Categorized, prioritized
Welcome to the Commonwealth Energy Management and Control System (CEMCS) energy dashboard, where you can view real-time energy and dollar savings in state-owned buildings. Utilizing an innovative energy management and control software system, CEMCS reduces energy usage by up to 40 percent, saving hundreds of thousands of dollars each year in utility costs. Currently the system is active at 23 sites across the state in this pilot phase. This website allows...

Total Buildings: 23
Square Footage: 1,962,976
Total Occupants: 7,104

Percentage Energy Savings: 13.5%
Cumulative Dollar Savings: $1,338,035

Compared to baseline year (2000), normalized for violations in weather.

Details

http://kyenergydashboard.ky.gov/
Lessons Learned

- Sequence of Operations Evaluation
- Focus on data flows
- Collaboration between IT/Facilities/Energy Team
- Engage data analyst
Implementation Barriers
Key Principles for Adoption

- Identify, collect, aggregate relevant data
- Employ industry-leading analytics to identify savings
- Present results in consumable actionable format
- Centralize monitoring operations
- Engage the organization
- Avoid disruptive change
Implementation Barriers

• Alignment of Facilities / IT / Sustainability
• Energy not strategic to organization....yet
• Lack of innovation to automate
• New technology not easily taught to old dogs