



Smart Energy Analytics Campaign – Spring 2018 Recognition

Lawrence Berkeley National Laboratory
May 15, 2018

Welcome! We'll be starting shortly...

Welcome!



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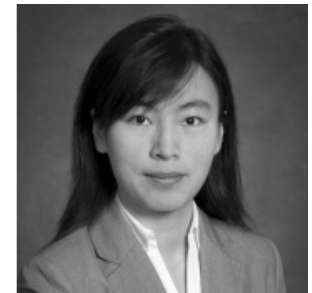
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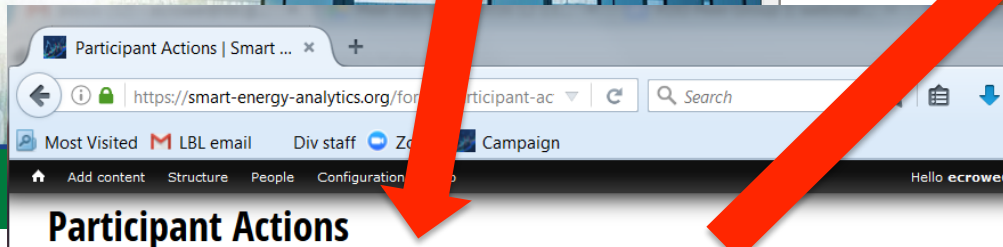
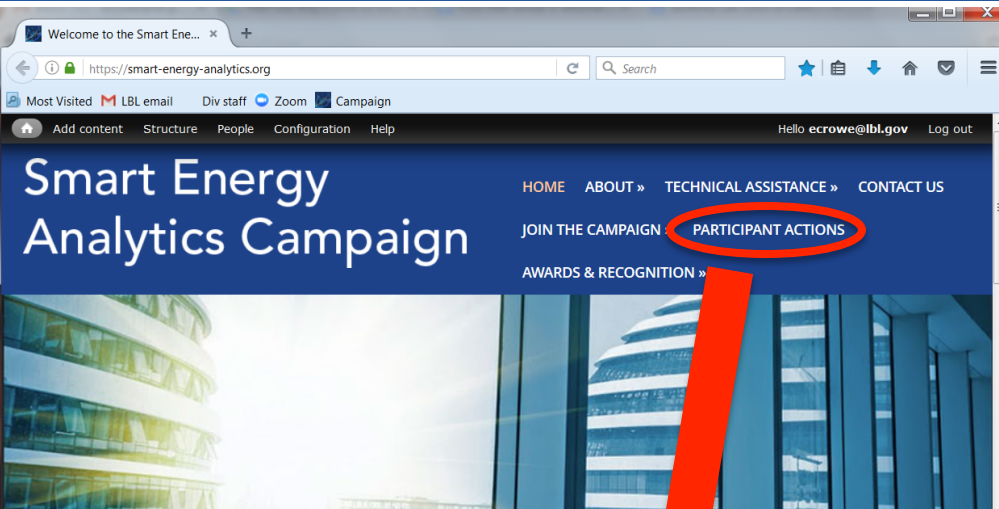


Smart Energy Analytics Campaign

- Buildings above 50,000 sq ft
 - Energy information systems
 - Fault detection and diagnostic systems
- Participation Update
 - 66 organizations
 - 4000+ buildings
 - 328 million sq ft
- Join us
 - Participant
 - Supporting Partner
- Benefits to participants
 - Technical Assistance
 - Recognition
 - Peer Networking



Participant Actions – update by June 15



To Enter/Update:

- EMIS costs
- 2017 annual energy use
- Updated floor area (if changed)
- Updated measures implemented

Spring 2018 Smart Energy Analytics Success Stories

smart-energy-analytics.org/success-stories

Building Analytics Success Story Commonwealth of Kentucky



Since a state-wide Executive Order in 2009 requiring utility data reporting, the Commonwealth of Kentucky has made energy management and the use of building data analytics the cornerstones of a comprehensive energy management program. Kentucky developed the Commonwealth Energy Management & Control System (CEMCS), a centralized repository of building data for analysis, which not only helps identify energy savings but also improves how each facility runs. In 2016 Kentucky connected 2.5 million sq. ft. of buildings to the CEMCS, which now covers over a thousand buildings totaling 20 million sq. ft.



If something goes wrong, we have the data to make the case to get it fixed and verify the result.

- Andrew Carter, CEMCS Program Manager

CEMCS Features and Benefits

The CEMCS incorporates over 188,000 trends captured from building automation systems (BAS), as well as data from 1,350 meters. Kentucky uses a combination of automated CEMCS analysis and engineer review to evaluate central plant HVAC, air handler, and individual zone data. Online reports rank energy performance at each facility by applying a score of 1–10 based on space temperatures, scheduling, and damper/valve operation. Hyperlinks connect to individual system trends for further diagnostics. Mechanical and control drawings are also loaded into the CEMCS platform.

What is MBCx?

Monitoring-based commissioning (MBCx) is an ongoing commissioning process that focuses on analyzing large amounts of data on a continuous basis to improve and maintain building energy performance and comfort.

With this comprehensive aggregation of data, Kentucky's CEMCS Program Manager can prioritize efforts and track performance parameters across the state's buildings. The CEMCS also incorporates regression-based energy models for meter data, to help track weather-normalized energy savings.

Quick Facts

Location: Kentucky (statewide)

Building types: Office, Higher Education, Healthcare, and Food Service

Gross floor area covered by EMIS: 20 million sq. ft.

Buildings with EMIS: 1,145 buildings connected to an energy information system (EIS) and 118 buildings with fault detection & diagnostics (FDD)

Energy savings: 8% savings (based on data from 136 buildings)

MBCx Service Provider:
Interval Data Systems, Inc. (IDS)

EMIS Tool: Commonwealth Energy Management and Control System (CEMCS), built on IDS's EnergyWitness platform with custom modules.

Smart Energy Analytics Campaign: Recognition for Expansion of EMIS

The Commonwealth of Kentucky was recognized by campaign partners during Smart Cities Week in October 2017, acknowledging its exemplary work to save energy through the use of an expanded EMIS.

Kentucky Energy Savings Dashboard

Welcome to the Commonwealth Energy Management and Control System (CEMCS) public dashboard. This dashboard tracks the progress of energy and cost savings initiatives for buildings throughout Kentucky.

The CEMCS is an innovative software application which is integrated to utility company billing, building automation systems and statewide accounting systems.

The data collected from these sources enables the identification of energy-saving opportunities and verification of corrective actions that reduce energy use, and thus allows the Commonwealth to operate as much as 25% more efficiently in integrated facilities.



Utility Savings

9.4%

On track to meet 2025 goal of 25%

Current energy consumption compared to historic baseline, normalized for variations in weather.



Annual Utility Cost Savings

\$4,805,265

All utilities (energy + water) compared to historic baseline, weather normalized.

Total Buildings
624

Total Square Footage
14,218,805

Total Occupants
25,571

Total Annual Utility Cost
\$27,050,829

Kentucky's EIS dashboard is used to engage the public, compare building benchmarks, and track energy and cost savings.

Key Management Practices

Kentucky uses the CEMCS to drive three key approaches to energy management:

- **Routine data review:** CEMCS analytics are reviewed weekly, with the MBCx service provider supplying recommendations for improvements.
- **Work order management:** Connection of the CEMCS to the state's work order management system supports follow-up and implementation of findings.
- **Savings tracking:** Implemented projects are displayed in the CEMCS to correlate completion with savings.

Beyond the internal management approach, Kentucky also provides a comprehensive public dashboard displaying energy consumption, costs, and savings.

Systems-Based Approach

Kentucky's analytics approach is to monitor system summary metrics, then drill down to equipment details as problems are uncovered. This approach helps avoid the overload that can happen when tracking multiple fault types across all systems in over a thousand buildings. While some buildings will need new equipment, the first goal is to optimize existing equipment and controls by improving sequences of operation and automation, and upgrading equipment when retrofits are cost-effective.

Bringing CEMCS to New Construction

Kentucky brings new construction projects into the CEMCS as early as possible, to get detailed information on how the building is running so corrective actions can be taken during the warranty period. They have also established a standard for data collection for all new BAS installation work to ensure that CEMCS data input needs are met. The standard addresses BAS points that must be trended, point naming conventions, and data collection frequency. The goal is to have a better specification leading to streamlined controls delivery, recognizing the first year of operation will shake out the problems which are identified quickly using the CEMCS.

The entire CEMCS effort has changed how Kentucky handles construction and controls implementation.

-Andrew Carter, CEMCS Program Manager

Developing a comprehensive EMIS incorporating BAS trends, meter data, a public dashboard, and connection to a work order system is a significant achievement. Now that the 2016 expansion is fully operational, Kentucky is planning further expansion of the CEMCS.

The Smart Energy Analytics Campaign is a public-private sector partnership program focused on commercially available Energy Management and Information Systems (EMIS) and monitoring-based commissioning practices. The campaign couples technical assistance with qualitative and quantitative data collection to inform research, development, and field study priorities. Partnering participants are encouraged to share their progress and may receive national recognition for implementations that demonstrate exemplary practices.

Smart Energy Analytics Campaign Participants Recognized for Exemplary Use of EMIS

Spring 2017
(Use of Existing EMIS)



MGM RESORTS
INTERNATIONAL™



EMORY
UNIVERSITY



UC DAVIS

smart-energy-analytics.org/success-stories

Fall 2017
(New or expanded EMIS
installation)



Carleton



**CENTRAL PIEDMONT
COMMUNITY COLLEGE**

Spring 2018 Smart Energy Analytics Campaign Recognition

Best Practices in the Use of FDD – University of Iowa;
Katie Rossmann, Data Analytics and Cx Manager



Energy Performance in a Portfolio – U.S. General Services Administration; Chip Pierpont, GSA Facility Technologies



Energy Performance in a Single Site – The Franklin; Jerry Burin, Sieben Energy Associates accepting on behalf of The Franklin



Largest Portfolio Using EMIS – District of Columbia, Department of General Services; Zach Dobelbower, Associate Director for Sustainability and Energy



Innovation in the Use of EMIS – California State University Dominguez Hills; Kenny Seeton, Energy Manager



Best Practice in the Use of FDD

University of Iowa

Quick Facts

Floor area with EMIS: 2,700,000 sq ft

Total buildings with EMIS: 20 buildings, currently adding 29 more buildings

Energy reduction since EMIS: 5% whole building

MBCx Service provider: KGS Clockworks

FDD Software: KGS Clockworks Building Analytics

EIS Software: OSIsoft PI



Key Success Factors

- Refined scope through a pilot
- Fault response workflow
- Service provider installed FDD and integrated with work order management
- Analytic Response Group meets daily

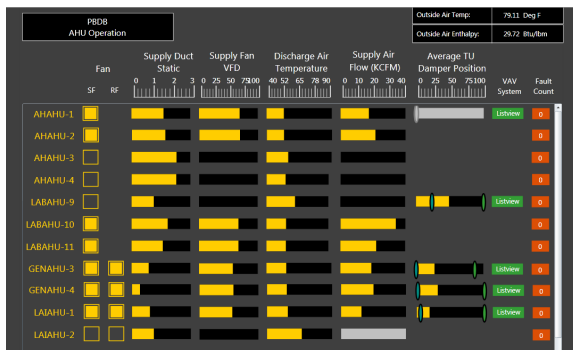
Learning Lessons through a Pilot

In September of 2014, began a two year pilot in a large lab building. This created a specialized learning environment to enable the team avoid potential pitfalls.

Leveraged these lessons learned to generate an RFP and select an FDD partner who could help us accomplish newly refined goals.



- Enhance existing infrastructure-Don't duplicate!
- Understand the skills available to you in-house and find opportunities to partner with an integrator or software provider to supplement the rest.
- IT involvement at the early stages is critical
- The software is only a tool-the key to success will be in the processes you develop to utilize the tool.



What's Next?

In the immediate future...

- Half way through onboarding an additional 29 buildings to the Clockworks/Building Analytics platform.

Ongoing improvement...

- Always improving our processes to build Fault Detection into our existing maintenance practices through expanded training and workflow improvement.

Coming Soon...

- Implementing FDD in a new construction environment for improved commissioning outcomes and warranty management (Easier said than done in the real world of construction schedules and contracts!)

Energy Performance in a Portfolio – US General Services Administration (GSA)

Quick Facts

Building type: Offices, courthouses, other federal facilities

Gross floor area: 52,300,000 sq ft

Total buildings with EMIS: 85 (140,000 points)

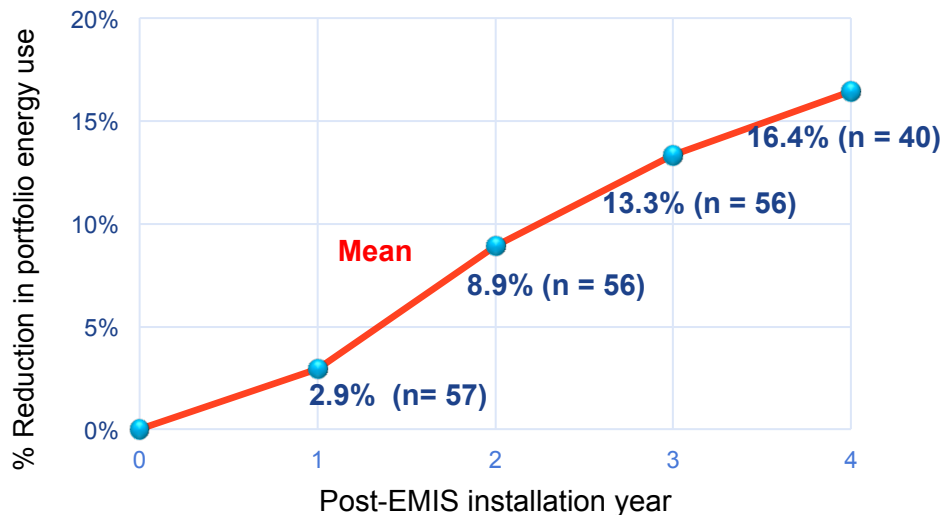
Energy reduction since EMIS installed: 14% whole building energy reduction for 57 buildings

MBCx Service provider: CBRE|ESI

EIS Software: Schneider ION

FDD Software: SkySpark by SkyFoundry

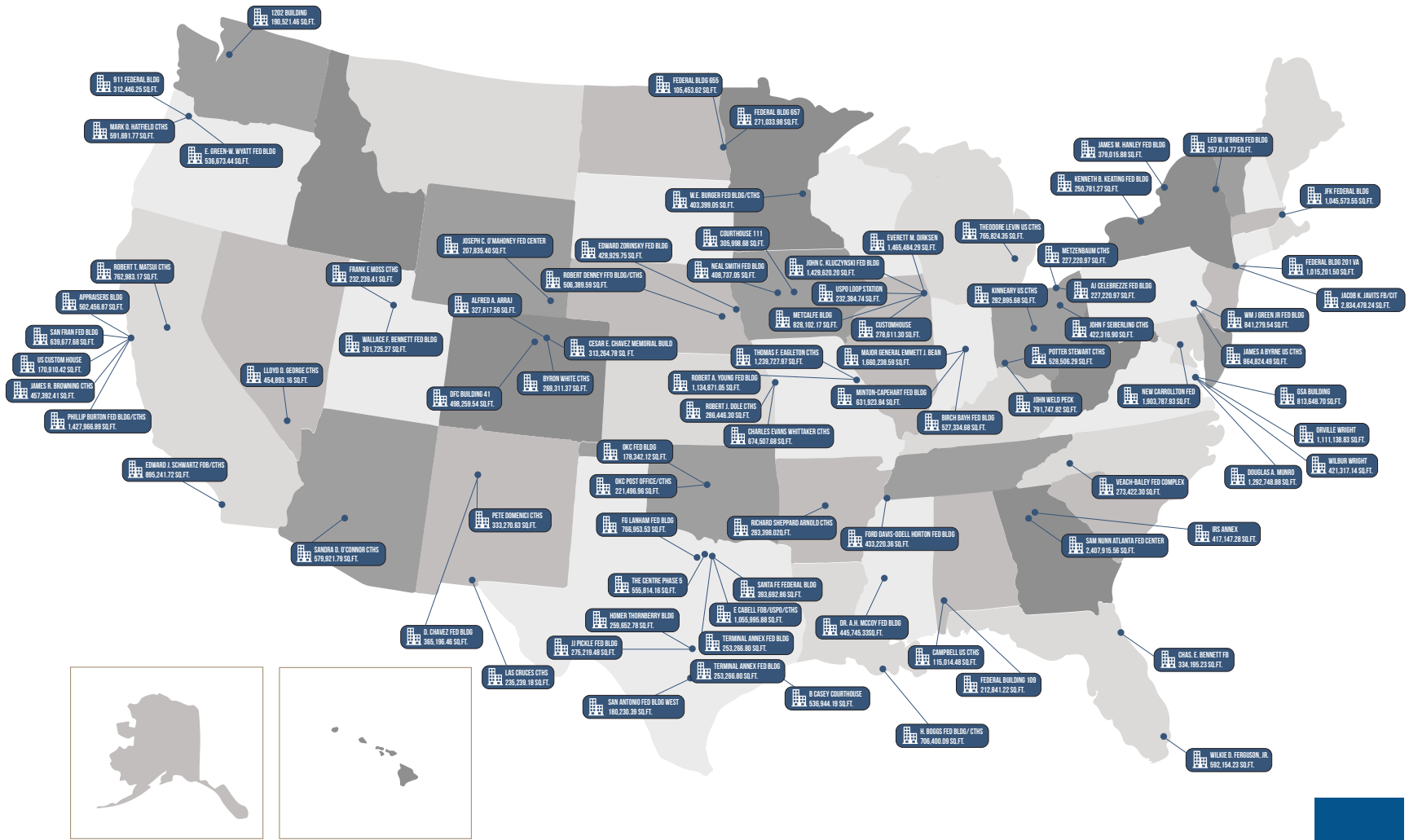
Maintenance Management System: Maximo



Key Success Factors

- FDD connected to work order system: categorized, prioritized, resolution tracked
- Centralized support center helps facility managers with analytics
- Planned their EMIS to be able to scale to entire portfolio
- Use mix of in-house staff and MBCx service provider

Energy Performance in a Portfolio - GSA



Energy Performance in a Site – The Franklin

Quick Facts

Property Manager: Tishman Speyer

Building type: Multi-Tenant Office

Gross floor area: 2,480,000 square feet

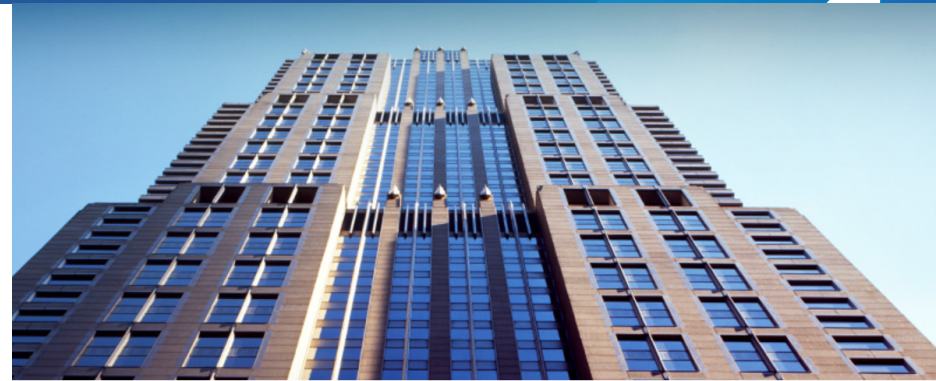
Total buildings: 2

Energy Reduction since EMIS: 9% whole building energy reduction

MBCx Service provider: Sieben Energy Associates

FDD Software: SkySpark by SkyFoundry;

EIS Software: Business Energy Analyzer from ComEd



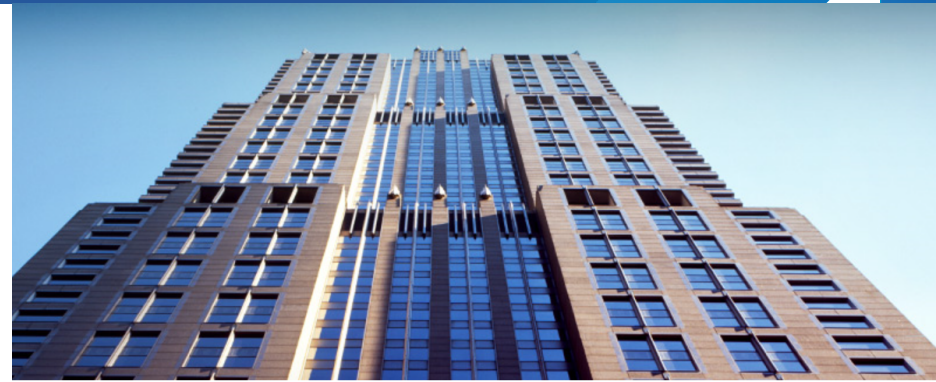
Key Success Factors

- Use of FDD to identify operating anomalies and monitor savings persistence
- Combined use of EIS for the big picture and FDD for detailed analysis
- Added 282 wireless sensors to monitor fan-powered VAV box power draw
- Incentives from ComEd MBCx Program

Energy Performance in a Site – The Franklin

Additional Information

- Project timeframe from June 2015 to present
- Excellent collaboration with building engineering team
- Dashboard access for property team
- Monthly project meetings



Other HVAC System Optimization

- Fan system scheduling
- Optimize damper position during unoccupied hours
- Optimize plenum heater setpoint
- Discharge air temp reset
- Repair pump VFDs; reduce differential pressure setpoint

Largest Portfolio Using an EMIS— District of Columbia Dept. of General Services

Quick Facts

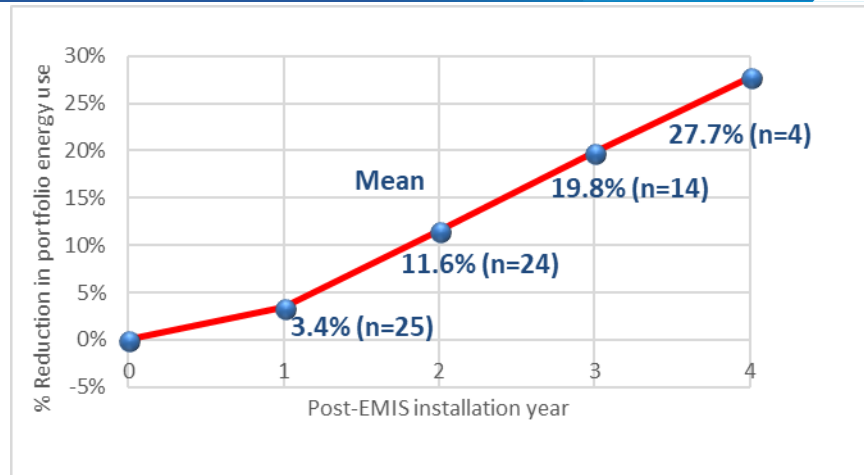
Building types: Office buildings, schools, parks & recreation buildings and libraries

EMIS installed:

- BuildsmartDC (375 buildings, 30 million sq ft)
- Enteliweb (56 buildings, 10 million sq ft)
- BuildingIQ (6 buildings, 2.2 million sq ft)

Energy reduction since EMIS installed:
17% whole building savings for 25 buildings

Service providers: New City Energy, Intellimation, Reluminati



Key Success Factors

- Top level support for carbon reduction
- Centralized network operations center for analysis of BAS data
- Implemented standardized retuning process as a part of MBCx
- Energy data transparency for portfolio through public website: buildsmartdc.com



Innovation in the Use of EMIS

California State University – Dominguez Hills

Quick Facts

Building type: University Campus

Floor area: 1.2 million sq ft

Total buildings with EMIS: 22

MBCx Service provider: EcoVox, Inc.

FDD Software: SkySpark by SkyFoundry

EIS Software: Developed campus-wide energy dashboard using Tableau visualization software



Key Success Factors

- Steady build-out of system over 4 years
- Data transparency led to innovative project opportunities
- Ongoing support from FDD service provider

Q&A

Please submit your questions for the award recipients using the chat box



Thank you

Next Steps:

Join the Campaign or Refer a colleague to the Campaign
Submit Participant Actions webforms by June 15



<https://twitter.com/SEACampaign>



<https://www.facebook.com/SEACampaign>



<https://www.linkedin.com/groups/13560773>, or search for Smart Energy Analytics Campaign

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