Smart Energy Analytics Campaign – Fall 2019 Recognition

Lawrence Berkeley National Laboratory
November 20, 2019
Welcome!

Jessica Granderson
Staff Scientist, Deputy for Research Programs

Hannah Kramer
Technical Lead

Claire Curtin
Program Manager

Eliot Crowe
Technical Assistance Coordinator

Guanjing Lin
Senior Scientific Engineering Associate
Smart Energy Analytics Campaign

- Tech support for EMIS and MBCx
- Publish research on EMIS cost, savings, and use
- Recognition program
- Participation to date
  - 101 organizations
  - 5,900+ buildings
  - 520+M sq.ft.
  - 100+ supporting partners
- Deadline to sign up: December 31, 2019
- Campaign ends in Spring 2020 and transitions to Better Buildings Alliance EMIS Tech Team

smart-energy-analytics.org
Year 3 Results Now Available

Report: Synthesis of Year Three Outcomes in the Smart Energy Analytics Campaign
Webinar: Slides and Recording
Previous Campaign Participants Recognized
(smart-energy-analytics.org/success-stories)
New Installation of FDD in Healthcare – Swedish Medical Center in association with MacDonald-Miller Facility Solutions, Chris Sembroski, Senior Building Performance Specialist

New Installation of EIS, FDD, and ASO in Commercial Real Estate – LBA Realty: Michelle German, Director of Operations & Sustainability and Roman Gunther, Director of Engineering; Yardi Energy: CP Pitones

New Installation of FDD in Higher Education – Vanderbilt University: Darren Bevill, Campus Energy Manager

New Installation of FDD in Healthcare – Universal Health Services, in association with Grumman Butkus Associates, Fiona McCarthy, Project Manager
New Installation of FDD in Healthcare
Swedish Medical Center in association with MacDonald-Miller Facility Solutions

Quick Facts

Building type: Hospital campus
Floor area with EMIS: 2.8M sq ft
Total Campuses with EMIS: 3
MBCx Service Provider: MacDonald-Miller Facility Services
FDD Software: ICONICS

Highlights

- 5-year performance contract
- Management level reporting through integration with BI software
- Working to integrate FDD into CMMS
About Us

Swedish Medical Center is the largest nonprofit health provider in the Seattle area, operating five hospital campuses, regional ambulatory care centers, and a network of more than 100 primary-care and specialty clinics.
How did we choose the EMIS Platform?

- Competitive bid process managed by a third-party consultant.
  - Project Goals for Vendor/Partner
    - Improve financial performance by decreasing operation and utility costs
    - Reduce operational overhead
    - Extend the life of facility
    - Increase building efficiency through system optimization
    - Improve environmental quality for building occupants
    - Share in energy savings
    - Work with utility companies to identify and recoup refunds/savings for energy savings measures
  - Ideal Candidate Criteria
    - Health Care Specific Experience with Building Automation
    - Building Analytics Experience—Review programing, forensic engineering to identify root-cause, functional testing & reprogramming/calibration
    - Automated Fault Detection Experience in Healthcare
    - Ability to identify and develop plans to address inefficiencies
    - Construction Management and Operations experience in Healthcare
What the day to day looks like
What the day to day looks like
What the day to day looks like

<table>
<thead>
<tr>
<th>Customer</th>
<th>Site</th>
<th>Equipment</th>
<th>Fault</th>
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What the day to day looks like

Swedish First Hill Campus - 2019

Total Lost Opportunity YTD
Annual Avoided Cost Potential
YTD Avoided Costs

$108.8K
$53.8K

$100K
$50K
$0K

First Hill
Low
Medium
High

Fault Activity
0.4M
340.283
621.61
50.81

Total Lost Opportunity YTD by Building
South Building $13,954
Hesh Building $17,117
Southwest Tower $39,174
East Tower $39,669

Annual Projected Fault Cost if Faults are not Resolved
South Building $8,595
Hesh Building $16,133
Southwest Tower $36,109
East Tower $38,692

Total Faults by Building
South Building 10,510 (24.4%)
Southwest Tower 53,601 (11.1%)
East Tower 26,529 (59.3%)

Project Monthly Savings

Electricity
Gas
Steam
Monthly Total

$120K
$50K
$20K
$0K

Jan 2019
Feb 2019
Mar 2019
Apr 2019
May 2019
Jun 2019
Jul 2019
Aug 2019
Sep 2019

Electricity, Gas and Steam Energy compared to Base Year with EU/12-month Trend

Energy Efficiency

U.S. DEPARTMENT OF ENERGY
Highlights

- New Rhythm of Business
  - *Internal Maintenance Staff Support*
  - *Controls Vendor(s) Support*
  - *Major Projects Support*
    - *Mechanical Vendor(s)*
    - *Electrical Vendor(s)*
  - *Service Vendor Buy-in and Support*
- ROI projecting at 2.5 Years
- Pay for Performance utility program
- Compliance with Local Governance requirements
New Installation of EIS, FDD, ASO in Commercial Real Estate – LBA Realty

Quick Facts

Building type: office
Floor area with EMIS: 1.2M sq ft
Total properties with EMIS: 4
MBCx Service Provider: Yardi
FDD Software: Yardi

Highlights

- Automated system optimization (ASO)
- Energy model for M&V and anomaly detection
- Comprehensive EIS, FDD, and ASO installation
Smart Energy Analytics Campaign
New Installation of FDD & Automated System Optimization
LBA’S SUSTAINABILITY STRATEGY

Who is LBA?
LBA is a full service real estate investment and management company with 56M SF of office and industrial properties in major markets throughout the U.S.

“Sensible” Sustainability Strategy
LBA’s strategy is to execute first and foremost on the business case for sustainability within our real estate portfolio. The business case for sustainability requires taking a strategic view - considering costs weighed against benefits in the context of improved financial performance, enhanced operating efficiency, employee recruitment and retention, risk mitigation, corporate identity, brand and leadership.

KPI’s & Goals
Focused around energy, water and waste efficiencies, renewable energy, clean tech, innovative technologies and health & wellness.

Long-term Commitment
DOE’s Better Buildings Challenge - 10 year commitment (2013 baseline) to improve energy intensity of the portfolio by at least 20% (on track to achieve goal with annual percentage improvement of 3.42%, or cumulative improvement in excess of 14% through 2018).

Results - 2018 weather normalized
- Site energy use reduction of 3.0% or 12.8M kBu
- Source energy use reduction of 4.7% or 49.8M kBu
WHY LBA SELECTED YARDI PULSE

- Unified platform
- Begin to turn targeted buildings into smart buildings
- Verified success story at Park Place
- Able to come to terms on a very strategic rollout
- Went above and beyond just providing real time data, but turns date into actionable item

<table>
<thead>
<tr>
<th>Property</th>
<th>Weather</th>
<th>Current Demand</th>
<th>Peak Demand</th>
<th>Consumption</th>
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<td></td>
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<td>kW</td>
<td>kW</td>
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IMPLEMENTATION & HIGHLIGHTS

PROGRAM IMPLEMENTED AT (4) PROPERTIES (1.2M SF)

• Park Place II – Irvine, CA (150K SF)
• Lakeview Corporate Center – Thousand Oaks, CA (260K SF)
• 4601 DTC – Denver, CO (250K SF)
• 20 East Thomas – Phoenix, AZ (586K SF)

IMPLEMENTATION SEQUENCE

• Phase I
  • Pulse Real-Time Metering (RTM)
  • Pulse Fault Detection & Diagnostics (FDD)
• Phase II
  • Pulse Active Energy Efficiency (AEE)
• Energy Services
  • Pulse Managed Service Support
  • Utility Program Advisors
  • System Consultants

2019 RESULTS

<table>
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<tr>
<th>Overall Portfolio Energy Savings (kWh)</th>
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</thead>
<tbody>
<tr>
<td>Projected</td>
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<tr>
<td>YTD Actual</td>
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</table>

Figure 1: Actual Performance vs. Projected Performance 2019

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<tr>
<th>Financial Summary</th>
<th>Actual</th>
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<td>Project Cost ($)</td>
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<td>Est. Incentives ($)</td>
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<td>Utility Savings ($)</td>
<td>$ 66,640</td>
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<td>Net Cash Flow ($)</td>
<td>$ 16,545</td>
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<td>ROI (%)</td>
<td>19.03%</td>
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Table 1: 2019 Program Financial Summary YTD
ASSET LEVEL RESULTS

4601 DTC – Denver, CO – 250K SF
- Projected Annual kWh Savings: 385,000
- Projected Annual Cost Savings: $42,350.00
- Carbon Footprint Reduction: 272

Lakeview Corporate Center – Thousand Oaks, CA – 260K SF
- Annual kWh Savings: 337,904
- Annual Electrical Cost Savings: $42,238.00
- Carbon Footprint Reduction: 239

Park Place II – Irvine, CA – 150K SF
- Annual kWh Savings: 296,651
- Annual Electrical Cost Savings: $50,431.00
- Carbon Footprint Reduction: 210

20 E Thomas – Phoenix AZ – 586K SF
- Projected Annual kWh Savings: 1,180,437
- Projected Annual Cost Savings: $114,502.38
- Carbon Footprint Reduction: 835
WHAT’S NEXT?

ROAD MAP (3.1M ADDITIONAL SF)

- Denver Place, Denver CO – Downtown high rise office (892K SF)
- The Esplanade, Phoenix AZ – Office campus (1M SF)
- One Culver, Los Angeles CA – High rise office (372K SF)
- South Park Center, Los Angeles CA – Downtown High rise office (870K SF)

"With Active EE working as artificial intelligence software, we are fulfilling our vision of bringing intelligent buildings to life."

PERRY SCHONFELD
Principal, LBA Realty
Quick Facts

Building types: University campus

Floor area with EMIS: 1.1M sq ft

Total buildings with EMIS: 9

MBCx Service Provider: BuildingLogix

FDD Software: BuildingLogix

Highlights

- MBCx Provider detailed study for new install, then quarterly review
- Scorecard view can help less experienced users
- Chilled water plant optimization dashboard
Vanderbilt Utilities: Data Warehouse & FD&D Platform

**Challenges:**
- 7M+ SQFT of facilities to optimize
- Manpower & Analytical Expertise

**Objectives with FD&D:**
- Performance Commissioning
- Consolidate and manage operational data
- Generate Actionable Intelligence

- Contracted with a vendor partner to implement FD&D in a single building test application, to include the system setup and a 30-day summary report.
- Implementing FD&D in (2) additional facilities approximately every (3) months.
- Added a prorated service agreement for quarterly analysis, formal reports and analytical support from our vendor partner

**Vanderbilt FDD Projects:**
- (9) Buildings 1.1M sqft, (1) Chiller Plant
Challenges:
• 7M+ SQFT of facilities to optimize
• Manpower & Analytical Expertise

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<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
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<td>Air System Scorecard</td>
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## BuildingLogiX™ Reports

### Scorecard View

The image shows a_scorecard_view_ in a BuildingLogiX™ Reports dashboard. The interface is divided into sections for new reports and saved reports. The new reports section includes options like 'Water Cooled Chiller Scorecard', 'Wind Turbine Scorecard', and 'Hot Water System Scorecard'. The saved reports section lists various reports under headings such as 'Alumni Air System Scorecard', 'Alumni Hall Air Handler Unit Scorecard', 'Alumni Hall VAV Scorecard', 'Buttrick Hall AHUs', 'Buttrick Hall Basement Air System', and others.

The table displayed in the main area of the dashboard contains data for different devices, with columns for Device Name, Overall, Efficiency, Heat Gain Assistance in Cooling, Reheat Effectiveness, Space Temperature Control, Zone Minimum Airflow, and Supply Airflow Control. The data is color-coded, indicating performance levels.
Vanderbilt: Peabody Commons

Daily Combined Electric, Chilled Water & Steam (kBTU)
**Vanderbilt: Peabody Commons**

**Completed**
- Recommissioned and enhanced 5) AHU supply air temperature reset sequences
- Numerous VAV repairs and re-calibration around the airflow and reheat
- Demand control ventilation reconfiguration
- Economizer improvements

**In-progress**
- Static Pressure sequence changes
- Steam supply valve PID improvements
- Implemented unoccupied scheduling

**26% Reduction in Total Energy**

**What’s Next for Vanderbilt …..**
- Continue adding FD&D to existing VU facilities
- Integrate FD&D to new facilities
- Working with our vendor partner to develop FD&D applications for chiller plants

Daily Combined Electric, Chilled Water & Steam (kBTU)
Vanderbilt FD&D: Plant Watch, Chiller Plant Efficiency
New Installation – Universal Health Services (represented by Grumman/Butkus Associates)

Quick Facts

**Building Types:** Acute care hospitals

**Current FDD installations:** 7 (2 in progress)

**Current EIS installations:** 7 (7 in progress)

**RCx provider/program manager:** Grumman/Butkus Associates

**FDD Software:** CopperTree Analytics Kaizen platform

**EIS Software:** Lucid BuildingOS

**Program goals:** 20% HVAC energy cost savings

**Criteria:** 4 year blended simple payback including program, platforms, installation, and verification costs

Highlights

- Corporate support and funding for energy program
- Program manager for analysis, design, implementation, Cx, and verification
- Consistent platforms across all sites
New Installation – Universal Health Services (represented by Grumman/Butkus Associates)

**UHS**
- American Fortune 500 company
- 350+ acute care hospitals, behavioral health facilities, and ambulatory care centers
- “Quality healthcare if our passion, improving lives is our reward”

**Grumman/Butkus Associates**
- Founded by Dave Grumman in 1973
- Energy consultants
- Original firm name: ENERCON Ltd.
- Today….
  - Full-service MEP firm
  - 108 employees in five offices (IL, WI, NY, FL)
  - Design, CA, Cx, RCx, MBCx, studies, and turn-key solutions
UHS RCx/MBCx Program Process

Program goals:
20% HVAC energy cost savings

Criteria:
4 year blended simple payback including program, platforms, installation, and verification costs
New Installation – Universal Health Services (represented by Grumman/Butkus Associates)

Ongoing Commissioning/MBCx Phase

- Leverage CopperTree (fault detection and diagnostics / FDD) and Lucid (energy information system / EIS) software platforms to provide ongoing identification of additional energy savings measures and performance verification of implemented measures
- Investigate / implement/ M&V additional measures
- Optimize and fine-tune the building automation controls system (BAS) based on building performance feedback

MBCx ≈ 12 Months
New Installation – Universal Health Services (represented by Grumman/Butkus Associates)

MBCx Platform – CopperTree Kaizen

$5,163/year

ENERGY STAR® Score from Portfolio Manager

Energy STAR Score: 97

On a 1 to 100 scale.
For the 12-month period ending May 2019.
Gross Area: 445,800 square feet.
New Installation – Universal Health Services (represented by Grumman/Butkus Associates)

MBCx Platform – CopperTree Kaizen

- High/Medium faults – specific equipment
  - 40 to 925 faults identified
- Low faults – terminal unit level
  - 500 to 1,000 faults identified
- Savings range from $1,000 - $55,000
New Installation – Universal Health Services (represented by Grumman/Butkus Associates)

- Dining AHU – implemented AHU static pressure reset and terminal unit night setback
- Red line – OAT, Blue line – Return fan, Pink line – Supply fan
- Measure savings ~ $22,000
New Installation – Universal Health Services (represented by Grumman/Butkus Associates)

- Dining AHU – implemented AHU static pressure reset and terminal unit night setback
- Red line – OAT, Blue line – Return fan, Pink line – Supply fan
- Measure savings ~ $22,000

Static pressure reset savings
New Installation – Universal Health Services (represented by Grumman/Butkus Associates)

- Dining AHU – implemented AHU static pressure reset and terminal unit night setback
- Red line – OAT, Blue line – Return fan, Pink line – Supply fan
- Measure savings ~ $22,000

Terminal unit setback savings
New Installation – Universal Health Services (represented by Grumman/Butkus Associates)

- Automated utility bill integration
- Compare 7 facilities for EUI and EUI cost.
- Additional metrics include electric, gas, water, and sewer per site and at the portfolio level.
New Installation – Universal Health Services (represented by Grumman/Butkus Associates)

MBCx and EIS platforms integrated to track verified energy savings

**Project Verified Savings (Calculated) / Jan 1-Dec 31, 2017**

- **Total** 1254 MBTU
- **Min** 302,037 MMBTU
- **Max** 220 MMBTU

**Project Verified Gas Savings / Jan 1-Dec 31, 2017**

- **Total** 88,934 tmm
- **Min** 2,038 tmm
- **Max** 19,434 tmm

**Project Verified Electric Savings / Jan 1-Dec 31, 2017**

- **Total** 1.077 MWh
- **Min** 26,226 kWH
- **Max** 135,543 kWH
New Installation – Universal Health Services (represented by Grumman/Butkus Associates)

Hourly data integration from Kaizen
New Installation – Universal Health Services (represented by Grumman/Butkus Associates)

Program results and next steps:

- Over $9 million under contract at 14 sites
- $2.5 million estimated savings
  - 4 sites wrapping up RCx phase, 2 year MBCx phase on-going
  - 5 sites in RCx implementation and MBCx on-boarding
  - 5 sites in RCx investigation phase
- 6 additional sites in planning phase/modified approach
- Program end date 2020 with MBCx/EIS through 2021
“Once we had the data available, it was much easier for senior leaders to support our proposition to further expand our FDD installation across the company.”

Mark Campbell, Executive Director of Sustainability, MGM Resorts International
Submit your questions through chat icon on lower left of screen

Type your question here and hit Send.
Thank you

Next Steps

• Join the Campaign or make a referral – new participants accepted until December 31, 2019
• For Building Owner/Operators - if not already in Better Buildings Alliance, join [here](http://smart-energy-analytics.org), and select Energy Management and Information Systems checkbox

Questions, please contact:
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