



Smart Energy Analytics Campaign – Fall 2019 Recognition

Lawrence Berkeley National Laboratory
November 20, 2019

Welcome!



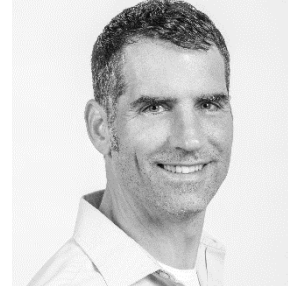
Jessica
Granderson
Staff Scientist,
Deputy for
Research
Programs



Hannah
Kramer
Technical
Lead



Claire
Curtin
Program
Manager



Eliot
Crowe
Technical
Assistance
Coordinator



Guanjing
Lin
Senior
Scientific
Engineering
Associate



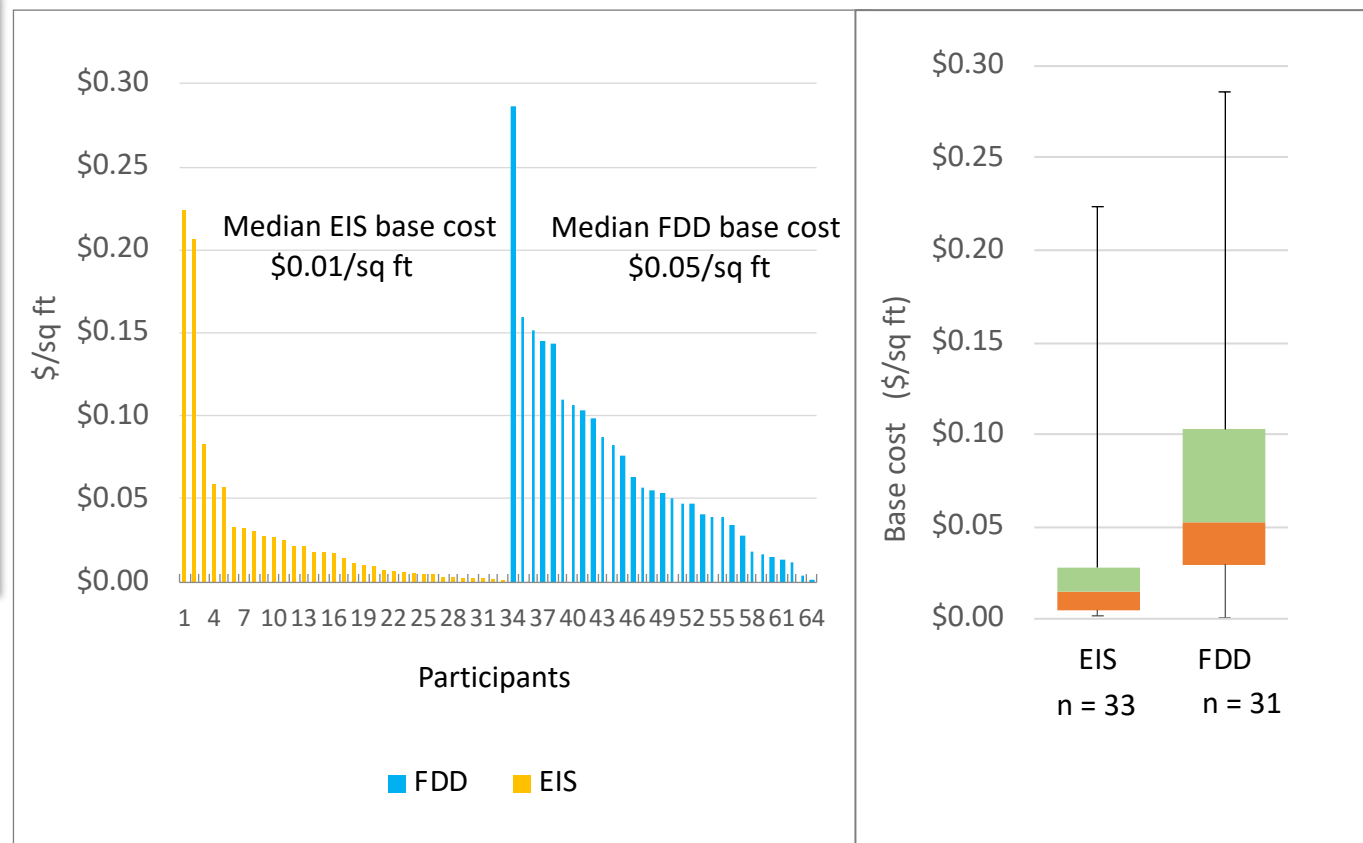
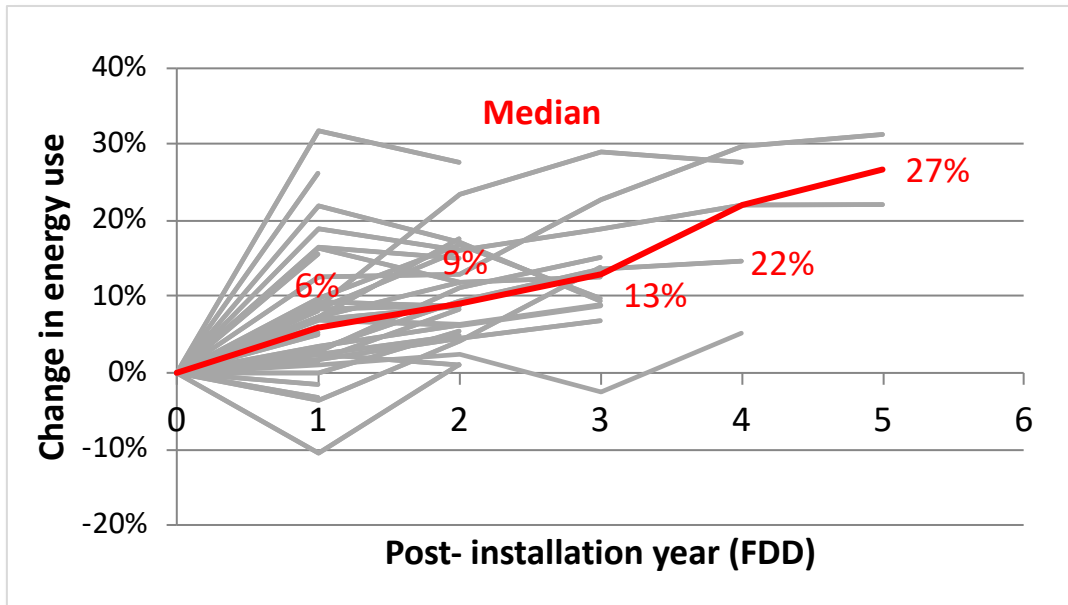
Smart Energy Analytics Campaign

- 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)



In Partnership with



MACALESTER



Fall 2019 Smart Energy Analytics Campaign Recognition

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

New Installation of FDD in Healthcare – Swedish Medical Center



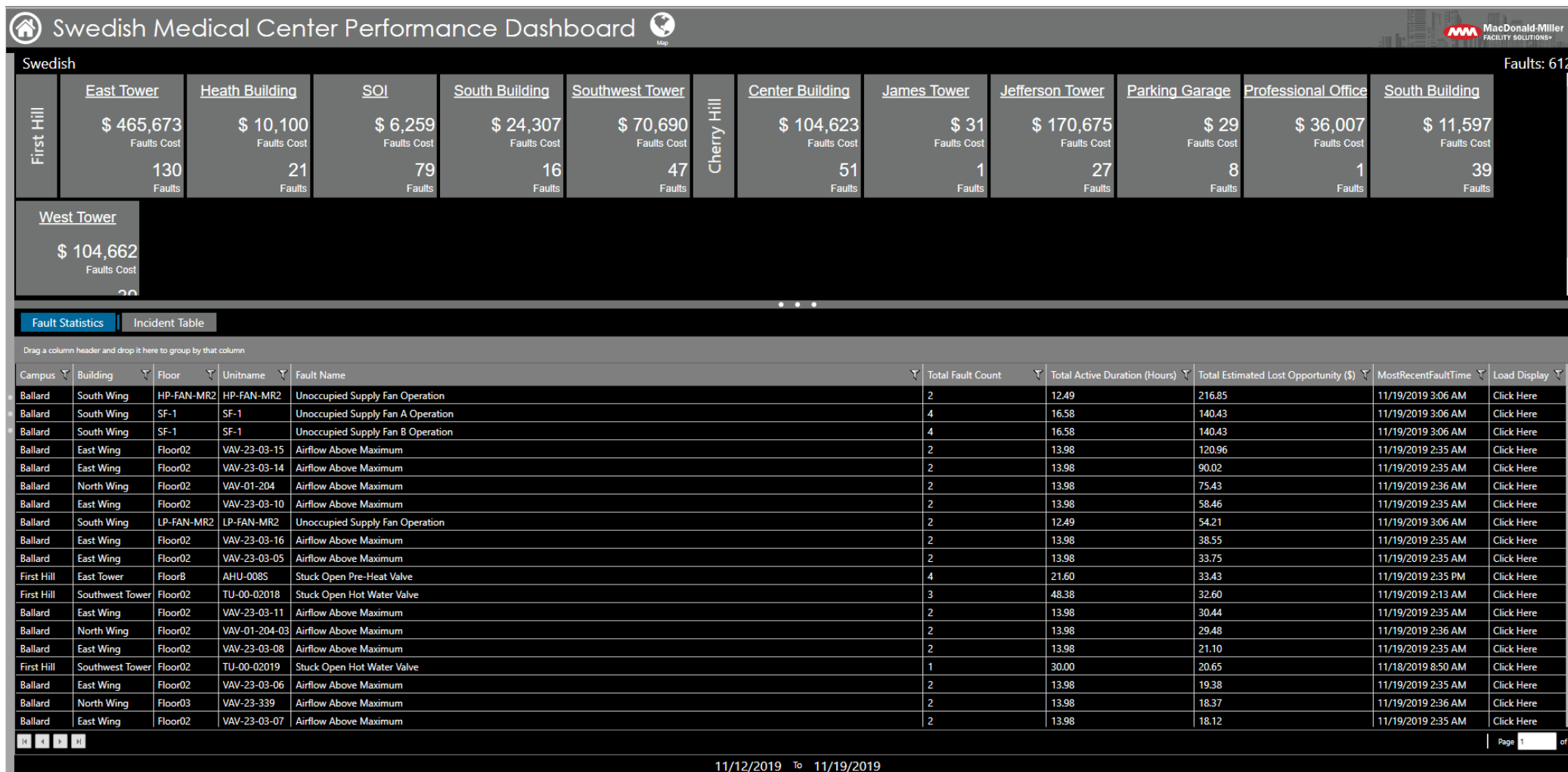
About Us

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.

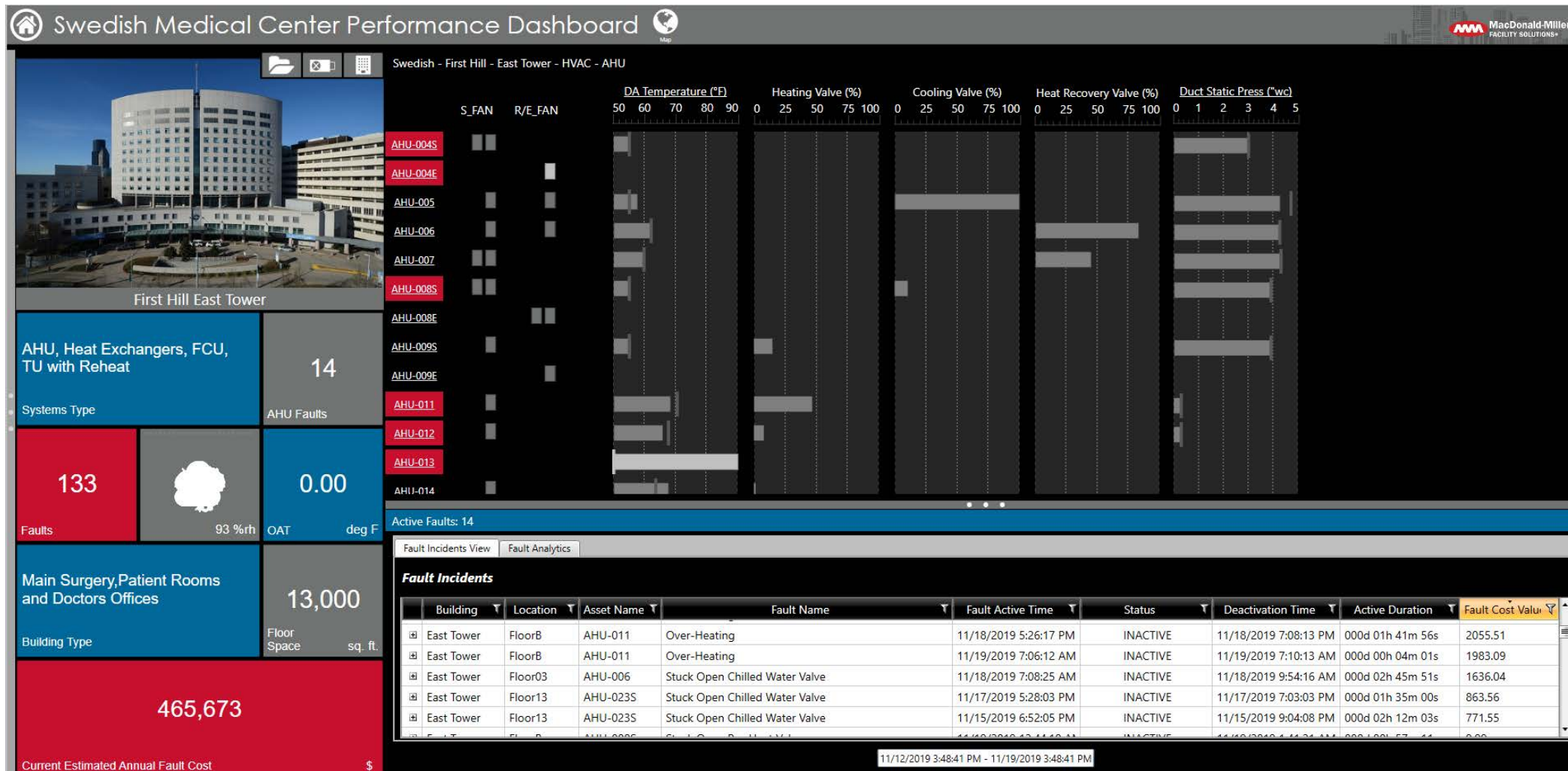
How did we choose the EMIS Platform?

- 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

Submit Work Order Request Dashboard
Home
Configure


MacDonald-Miller
FACILITY SOLUTIONS®

jeremy.richmond@macmiller.com
Sign out

Customer

Swedish First Hill

✕

Site

East Tower

✕

Equipment Type

VAV

✕

Floor

Any

✕

Equipment

✕

Create Work Order

Faults

Selection

Word Orders

Customer	Site	Equipment	Fault	Count	Most Recent	Total Duration	Max Annual Cost	
<input type="checkbox"/> Swedish First Hill	East Tower	TU-08-C29	Stuck Open Hot Water Valve	54	10/14/2019, 3:41:34 AM	21d 01h 48m 50s	\$18,583	
<input type="checkbox"/> Swedish First Hill	East Tower	TU-00-04429	Stuck Open Hot Water Valve	5	11/13/2019, 12:00:18 PM	8d 06h 44m 15s	\$16,160	
<input type="checkbox"/> Swedish First Hill	East Tower	TU-21-0804	Stuck Open Hot Water Valve	31	11/7/2019, 6:51:09 AM	20d 10h 09m 15s	\$15,650	
<input type="checkbox"/> Swedish First Hill	East Tower	TU-21-0507A	Stuck Open Hot Water Valve	90	11/19/2019, 12:58:08 PM	19h 07m 56s	\$13,438	
<input type="checkbox"/> Swedish First Hill	East Tower	TU-20-0503	Stuck Open Hot Water Valve	270	11/17/2019, 5:20:17 PM	40d 10h 51m 22s	\$8,554	
<input type="checkbox"/> Swedish First Hill	East Tower	TU-04-0414	Stuck Open Hot Water Valve	26	11/15/2019, 10:37:31 AM	3d 18h 48m 07s	\$8,491	
<input type="checkbox"/> Swedish First Hill	East Tower	TU-08-C27	Stuck Open Hot Water Valve	11	10/18/2019, 3:40:16 AM	2d 12h 07m 24s	\$7,077	
<input type="checkbox"/> Swedish First Hill	East Tower	TU-07-0015	Stuck Open Hot Water Valve	5	10/18/2019, 4:00:41 AM	1d 05h 15m 21s	\$6,874	
<input type="checkbox"/> Swedish First Hill	East Tower	TU-23-1207	Stuck Open Hot Water Valve	210	11/17/2019, 8:32:17 PM	39d 04h 54m 28s	\$6,467	
<input type="checkbox"/> Swedish First Hill	East Tower	TU-06-0061	Stuck Open Hot Water Valve	82	11/19/2019, 2:14:11 AM	49d 04h 43m 19s	\$6,039	
<input type="checkbox"/> Swedish First Hill	East Tower	TU-24-0423	Stuck Open Hot Water Valve	29	9/26/2019, 9:37:53 AM	24d 13h 25m 07s	\$6,013	
<input type="checkbox"/> Swedish First Hill	East Tower	TU-04-0402	Stuck Open Hot Water Valve	167	11/7/2019, 9:04:25 AM	45d 14h 41m 39s	\$5,850	
<input type="checkbox"/> Swedish First Hill	East Tower	TU-04-0408	Stuck Open Hot Water Valve	334	10/22/2019, 5:48:32 AM	11d 14h 07m 37s	\$5,684	
<input type="checkbox"/> Swedish First Hill	East Tower	TU-22-0611A	Stuck Open Hot Water Valve	26	11/6/2019, 7:02:19 PM	1d 19h 27m 54s	\$5,605	
<input type="checkbox"/> Swedish First Hill	East Tower	TU-21-0607	Stuck Open Hot Water Valve	28	11/2/2019, 12:29:16 PM	09h 20m 52s	\$5,434	
<input type="checkbox"/> Swedish First Hill	East Tower	TU-04-0407	Stuck Open Hot Water Valve	222	11/19/2019, 2:14:11 AM	88d 22h 16m 18s	\$5,295	
<input type="checkbox"/> Swedish First Hill	East Tower	TU-24-0401A	Stuck Open Hot Water Valve	100	11/14/2019, 1:01:09 PM	11d 09h 25m 15s	\$5,177	

What the day to day looks like

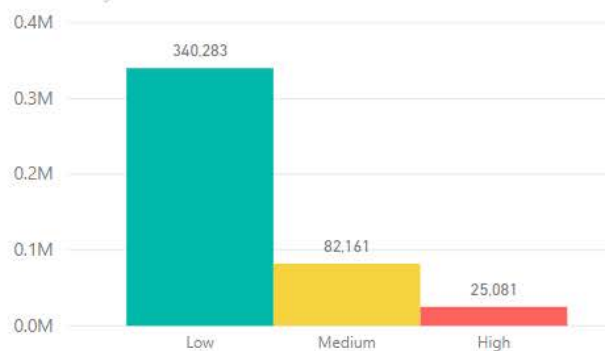
Swedish First Hill Campus - 2019



● Total Lost Opportunity YTD ● Annual Avoided Cost Potential ● YTD Avoided Costs



Fault Activity



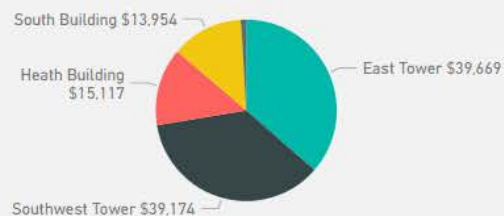
\$192,143

2019 YTD Utility Savings

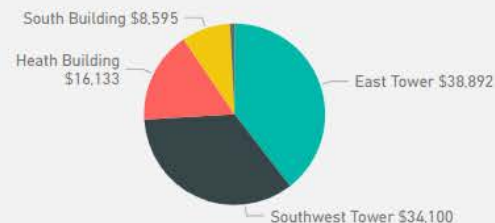
447,525

Total Faults Year-to-Date

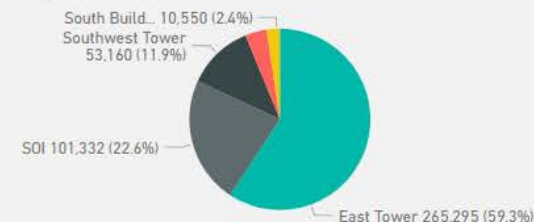
Total Lost Opportunity YTD by Building



Annual Projected Fault Cost if Faults are not Resolved



Total Faults by Building

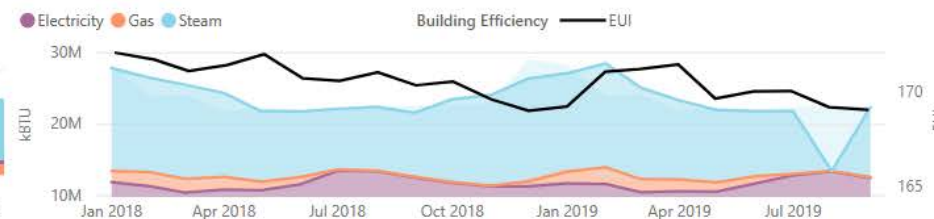


Project Monthly Savings

● Electricity ● Gas ● Steam ● Monthly Total



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



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



LBALogistics



Yardi Pulse

Smart Energy Analytics Campaign New Installation of FDD & Automated System Optimization

PRESENTED BY:

Michelle German

Director of Operations & Sustainability
LBA Realty & LBA Logistics



Roman Gunther

Director of Engineering
LBA Realty & LBA Logistics



CP Pitones

National Account Executive
Yardi Energy



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 kBtu
- Source energy use reduction of 4.7% or 49.8M kBtu

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 data into actionable item

Property	Weather	Current Demand	Peak Demand		Consumption	
		kW	kW	W/ft ²	MWh	kWh/ft ² ↕
 20 East Thomas ⓘ LBA Realty	☁ 79 °F 🔥 17%	1,199.0	1,199.0	2.04	417.1 —	0.71 —
 4601 DTC ⓘ LBA Realty	☁ 58 °F 🔥 31%	845.6	1,043.9 ↓ 9%	4.27 ↓ 9%	189.4 —	0.77 —
 Denver Place ⓘ LBA Realty	☁ 58 °F 🔥 31%	18,198.8	18,198.8 ↓ 9%	20.41 ↓ 9%	6,337.5 —	7.11 —
 Park Place ⓘ LBA Realty	☀ 67 °F 🔥 59%	5,210.1	5,424.7 ↓ 4%	3.34 ↓ 4%	1,277.4 ↓ 14%	0.79 ↓ 14%
 3121 Michelson ⓘ LBA Realty	☀ 67 °F 🔥 59%	208.1	405.4 ↓ 1%	3.69 ↓ 1%	57.4 ↓ 31%	0.52 ↓ 31%
 Lakeview Corporate Ctr ⓘ LBA Realty	☀ 59 °F 🔥 89%	642.7	788.5 ↓ 5%	3.04 ↓ 5%	171.5 ↓ 0%	0.66 ↓ 0%

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

Overall Portfolio Energy Savings (kWh)

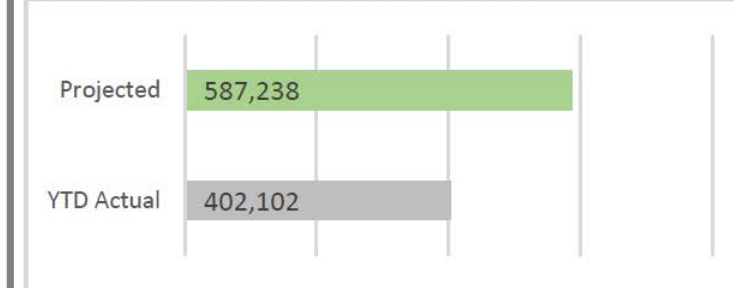


Figure 1: Actual Performance vs. Projected Performance 2019

Financial Summary

	Actual
Project Cost (\$)	\$ 86,948
Est. Incentives (\$)	\$ 36,853
Utility Savings (\$)	\$ 66,640
Net Cash Flow (\$)	\$ 16,545
ROI (%)	19.03%

Table 1: 2019 Program Financial Summary YTD

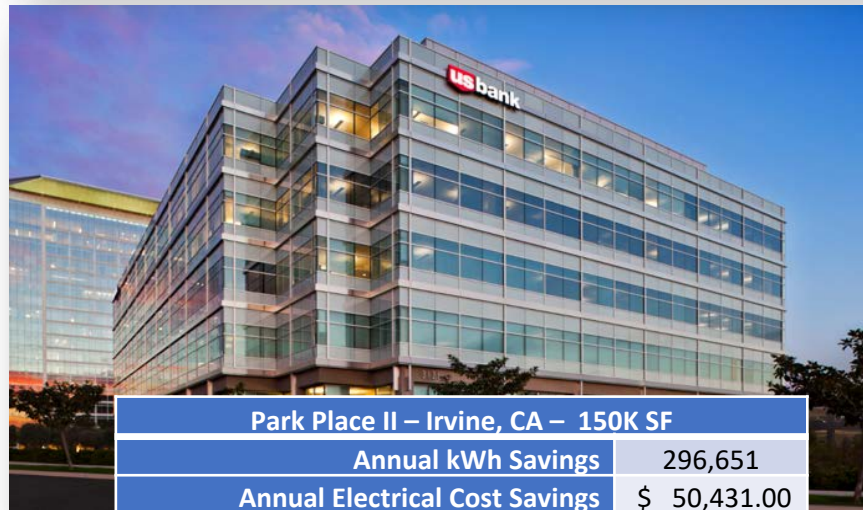
ASSET LEVEL RESULTS



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)

2020 PORTFOLIO PROJECTIONS

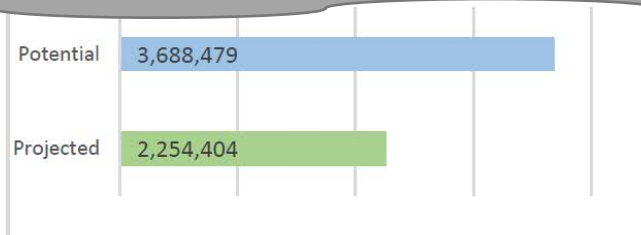


Figure 2: Projected Performance vs. Potential
Performance 2020

	Projected
Project Cost (\$)	\$ 123,693
Est. Incentives (\$)	\$ 0
Utility Savings (\$)	\$ 254,188
Net Cash Flow (\$)	\$ 130,495
ROI (%)	105.5%

Table 2: 2020 Program Financial Summary Projection

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

PERRY SCHONFELD
Principal, LBA Realty



LBALogistics 

New Installation of FDD in Higher Education - Vanderbilt University

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



The screenshot displays the BuildingLogiX Building Portal interface. The main header shows the date range from 1/2/2019 to 2/1/2019. The left sidebar lists various buildings, with 'The Commons Center' highlighted. The main content area provides detailed information for this building, including its address (230 Appleton Place, Nashville, TN 37212), square footage (114,054 sq ft), and utility rates (Electric: 0.08 \$/kWh, Fuel: 5.85 \$/MMBTU). It also lists assigned components like AHU Stacked Return, Economizer, Boiler, Damper, Electric Meter, Exhaust Fan, Resource Meter, VAV, Valve, Water Pump, and Weather, along with their counts. A schedule table shows operating hours from 5:00 to 22:59 for all days of the week. A map shows the building's location in Nashville. A large image of the building is at the bottom.

The Commons Center	
230 Appleton Place Nashville, TN 37212	
114,054 square ft	
Utility Rates	
Electric:	0.08 (\$/kWh)
Fuel:	5.85 (\$/MMBTU)
Assigned Components	
AHU Stacked Return	6
Economizer	1
Boiler	12
Damper	1
Electric Meter	14
Exhaust Fan	3
Resource Meter	129
VAV	7
Valve	4
Water Pump	2
Weather	
Schedule	
Sunday	5:00 - 22:59
Monday	5:00 - 22:59
Tuesday	5:00 - 22:59
Wednesday	5:00 - 22:59
Thursday	5:00 - 22:59
Friday	5:00 - 22:59
Saturday	5:00 - 22:59
Location	
Map showing the location of The Commons Center in Nashville, TN.	

Vanderbilt FDD Projects:
(9) Buildings 1.1M sqft, (1) Chiller Plant



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





Scorecard View

New Reports

- [VAV Scorecard](#)
- [Blower Coil Scorecard](#)
- [Air Handler Unit Scorecard](#)
- [Air Cooled Chiller Scorecard](#)
- [Boiler Scorecard](#)
- [ORVAV Scorecard](#)
- [Export Data](#)
- [Heat Pump Scorecard](#)
- [Light Commercial Roof Top Unit Scorecard](#)
- [Large Rooftop Unit Scorecard](#)
- [Water Cooled Chiller Scorecard](#)
- [Building Scorecard](#)
- [Hot Water System Scorecard](#)
- [Fan Coil Scorecard](#)
- [Unit Vent Scorecard](#)
- [Air System Scorecard](#)
- [VRF Unit Scorecard](#)
- [Chilled Water System Scorecard](#)
- [Aggregation Report](#)

Saved Reports

Scorecards Other Reports

(1 of 2) 1 2 20

Name ↕	Type ↕	Run for time period	Actions
Alumni Air System Scorecard	Air System Scorecard	1 Week 2 Weeks 30 Days 60 Days 90 Days 6 Mo 12 Mo YTD	
Alumni Hall Air Handler Unit Scorecard	Air Handler Unit Scorecard	1 Week 2 Weeks 30 Days 60 Days 90 Days 6 Mo 12 Mo YTD	
Alumni Hall Building Scorecard	Building Scorecard	1 Week 2 Weeks 30 Days 60 Days 90 Days 6 Mo 12 Mo YTD	
Alumni Hall VAV Scorecard	VAV Scorecard	1 Week 2 Weeks 30 Days 60 Days 90 Days 6 Mo 12 Mo YTD	
Alumni Hall VRF Unit Scorecard	VRF Unit Scorecard	1 Week 2 Weeks 30 Days 60 Days 90 Days 6 Mo 12 Mo YTD	
Buttrick_Hall_AHUs	Air Handler Unit Scorecard	1 Week 2 Weeks 30 Days 60 Days 90 Days 6 Mo 12 Mo YTD	
Buttrick_Hall_Basement_Air_System	Air System Scorecard	1 Week 2 Weeks 30 Days 60 Days 90 Days 6 Mo 12 Mo YTD	
Buttrick_Hall_Basement_VAVs	VAV Scorecard	1 Week 2 Weeks 30 Days 60 Days 90 Days 6 Mo 12 Mo YTD	
Buttrick_Hall_Basement_VAVs_Expanded	VAV Scorecard	1 Week 2 Weeks 30 Days 60 Days 90 Days 6 Mo 12 Mo YTD	
Buttrick_Hall_Boiler	Boiler Scorecard	1 Week 2 Weeks 30 Days 60 Days 90 Days 6 Mo 12 Mo YTD	
Buttrick_Hall_Fan_Coils	Fan Coil Scorecard	1 Week 2 Weeks 30 Days 60 Days 90 Days 6 Mo 12 Mo YTD	
Buttrick_Hall_Floor_1_VAVs	VAV Scorecard	1 Week 2 Weeks 30 Days 60 Days 90 Days 6 Mo 12 Mo YTD	
Buttrick_Hall_Floor_2_VAVs	VAV Scorecard	1 Week 2 Weeks 30 Days 60 Days 90 Days 6 Mo 12 Mo YTD	
Buttrick_Hall_Floor_3_VAVs	VAV Scorecard	1 Week 2 Weeks 30 Days 60 Days 90 Days 6 Mo 12 Mo YTD	
Buttrick_Hall_Floor_4_VAVs	VAV Scorecard	1 Week 2 Weeks 30 Days 60 Days 90 Days 6 Mo 12 Mo YTD	
Buttrick_Hall_Main_Air_System	Air System Scorecard	1 Week 2 Weeks 30 Days 60 Days 90 Days 6 Mo 12 Mo YTD	
Commons Air Handler Unit Scorecard	Air Handler Unit Scorecard	1 Week 2 Weeks 30 Days 60 Days 90 Days 6 Mo 12 Mo YTD	
Commons Air System Scorecard	Air System Scorecard	1 Week 2 Weeks 30 Days 60 Days 90 Days 6 Mo 12 Mo YTD	
Commons Building Scorecard	Building Scorecard	1 Week 2 Weeks 30 Days 60 Days 90 Days 6 Mo 12 Mo YTD	
Commons VAV Scorecard	VAV Scorecard	1 Week 2 Weeks 30 Days 60 Days 90 Days 6 Mo 12 Mo YTD	

(1 of 2) 1 2 20



BDX Report Selector

Scorecard View

New Reports

- [VAV Scorecard](#)
[Blower Coil Scorecard](#)
[Air Handler Unit Scorecard](#)
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[Boiler Scorecard](#)
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[Air System Scorecard](#)
[VRF Unit Scorecard](#)

Saved Reports

Scorecards Other Reports

Name ↕
Alumni Air System Scorecard
Alumni Hall Air Handler Unit Scorecard
Alumni Hall Building Scorecard
Alumni Hall VAV Scorecard
Alumni Hall VRF Unit Scorecard
Buttrick_Hall_AHUs
Buttrick_Hall_Basement_Air_System
Buttrick_Hall_Basement_VAVs
Buttrick_Hall_Basement_VAVs_Expanded
Buttrick_Hall_Boiler
Buttrick_Hall_Fan_Coils
Buttrick_Hall_Floor_1_VAVs
Buttrick_Hall_Floor_2_VAVs
Buttrick_Hall_Floor_3_VAVs
Buttrick_Hall_Floor_4_VAVs
Buttrick_Hall_Main_Air_System
Commons Air Handler Unit Scorecard
Commons Air System Scorecard
Commons Building Scorecard
Commons VAV Scorecard

VANDERBILT

BuildingLogiX™ Reports

Applications ▾ BDX ▾

Commons VAV Scorecard

Reporting Period From: 1/1/19 To: 1/31/19 Save As: Commons VAV Scorecard Analysis Scorecard

Columns Colors

Report Results (129 of 129)

Export to Excel

	Device Name	Overall	Efficiency	Heat Gain Avoidance in Cooling	Reheat Effectiveness	Space Temperature Control	Zone Minimum Airflow	Supply Airflow Control
	VAV_07_09	4.4	5.8	8.7	7.3	9.2	0.0	2.2
	VAV_05_12	4.4	7.9	N.E.	9.5	9.4	0.0	0.0
	VAV_01_07	7.7	6.0	N.E.	0.1	0.0	9.9	9.9
	VAV_02_09	7.8	6.0	N.E.	0.0	0.0	10.0	10.0
	VAV_01_13	8.0	4.9	0.0	N.E.	4.8	9.9	9.8
	VAV_01_15	8.1	7.5	N.E.	N.E.	0.0	9.9	9.9
	VAV_05_31	8.4	8.0	0.0	10.0	10.0	5.8	9.7
	VAV_03_08	8.4	8.0	8.7	9.7	1.6	9.9	9.9
	VAV_07_17	8.4	7.4	8.2	7.1	9.2	10.0	6.5
	VAV_03_03	8.5	7.9	1.9	10.0	2.6	9.9	9.9
	VAV_03_05	8.6	6.7	5.8	9.4	6.3	9.9	9.9
	VAV_07_37	8.7	7.0	5.5	6.7	5.1	10.0	10.0
	VAV_01_04	8.7	8.0	0.0	10.0	3.7	9.9	9.9
	VAV_01_20	8.7	5.5	0.0	2.7	9.0	9.9	9.9
	VAV_03_04	8.7	6.1	8.2	0.2	8.2	9.9	9.9
	VAV_05_10	8.8	6.0	0.1	N.E.	10.0	10.0	9.0
	VAV_02_02	8.8	6.6	0.0	10.0	6.9	10.0	10.0
	VAV_02_11	8.8	5.5	7.4	5.5	9.6	10.0	9.7
	VAV_04_09	8.8	5.6	0.1	9.4	10.0	9.7	9.8
	VAV_01_14	8.8	6.4	8.6	6.3	7.8	9.9	9.9
	VAV_02_04	8.8	5.9	9.8	1.6	8.5	10.0	10.0
	VAV_04_06	8.8	5.7	10.0	0.2	10.0	9.7	9.8
	VAV_01_06	8.8	6.0	0.0	N.E.	8.9	9.9	9.9
	VAV_04_02	8.9	6.3	0.0	10.0	10.0	9.6	9.7
	VAV_04_07	8.9	6.3	0.0	N.E.	9.9	9.6	9.7
	VAV_04_11	8.9	6.3	0.0	N.E.	10.0	9.7	9.7
	VAV_01_18	8.9	7.8	9.0	N.E.	8.6	9.9	8.7
	VAV_05_24	9.0	6.8	6.7	8.8	9.6	10.0	9.2

VAV Scorecard

1 Week 2 Weeks 30 Days 60 Days 90 Days 6 Mo 12 Mo YTD

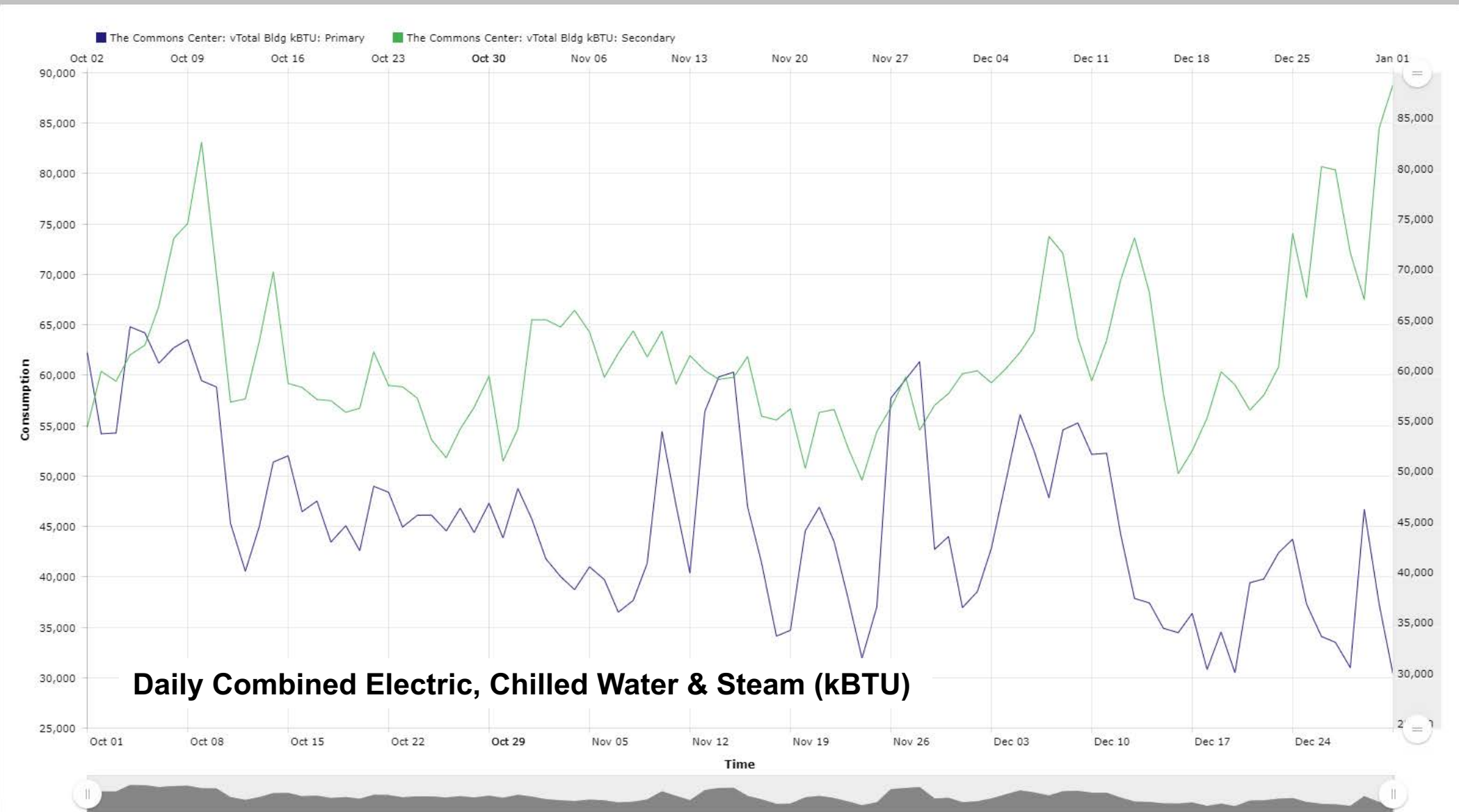


Vanderbilt: Peabody Commons

Consumption Chart

Units: kilobtu Timeframe: 10/1/18 - 12/31/18 Secondary Timeframe: 10/2/17

Unit Unit/ft²



Time	Secondary Time	The Commons
10/1/18 12:00...	10/2/17 12:00...	62,243
10/2/18 12:00...	10/3/17 12:00...	54,192
10/3/18 12:00...	10/4/17 12:00...	54,269
10/4/18 12:00...	10/5/17 12:00...	64,800
10/5/18 12:00...	10/6/17 12:00...	64,199
10/6/18 12:00...	10/7/17 12:00...	61,190
10/7/18 12:00...	10/8/17 12:00...	62,722
10/8/18 12:00...	10/9/17 12:00...	63,530
10/9/18 12:00...	10/10/17 12:00...	59,454
10/10/18 12:00...	10/11/17 12:00...	58,837
10/11/18 12:00...	10/12/17 12:00...	45,312

STATISTICS

Primary

100.00%

BREAKDOWN

Secondary

100.00%

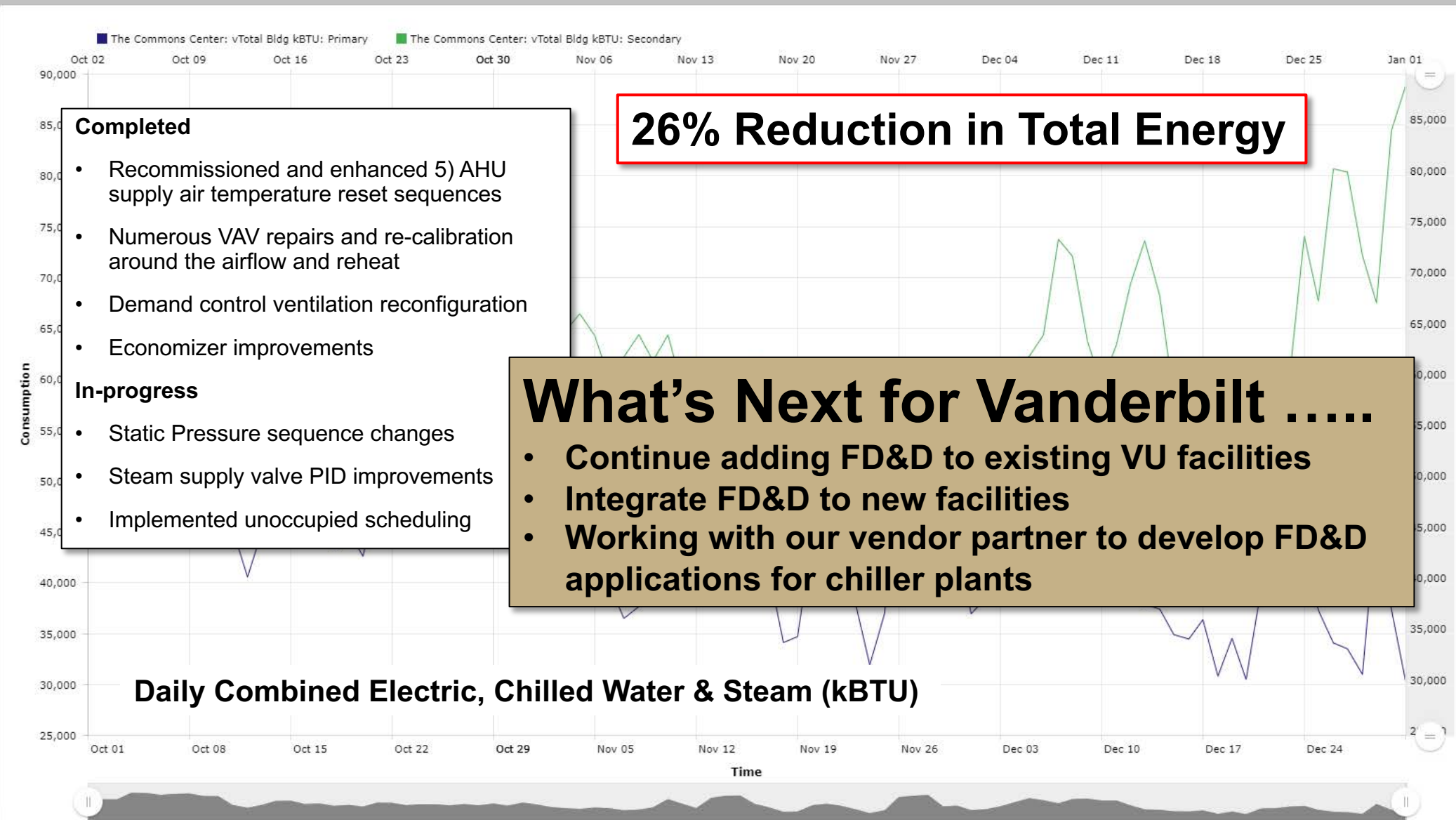


Vanderbilt: Peabody Commons

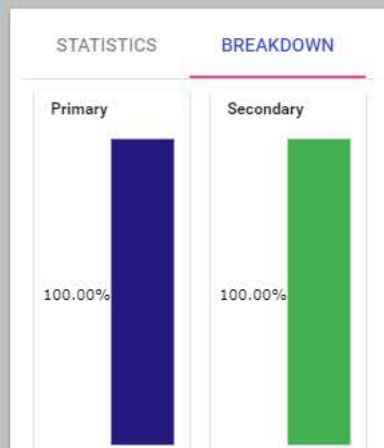
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Unit Unit/ft²

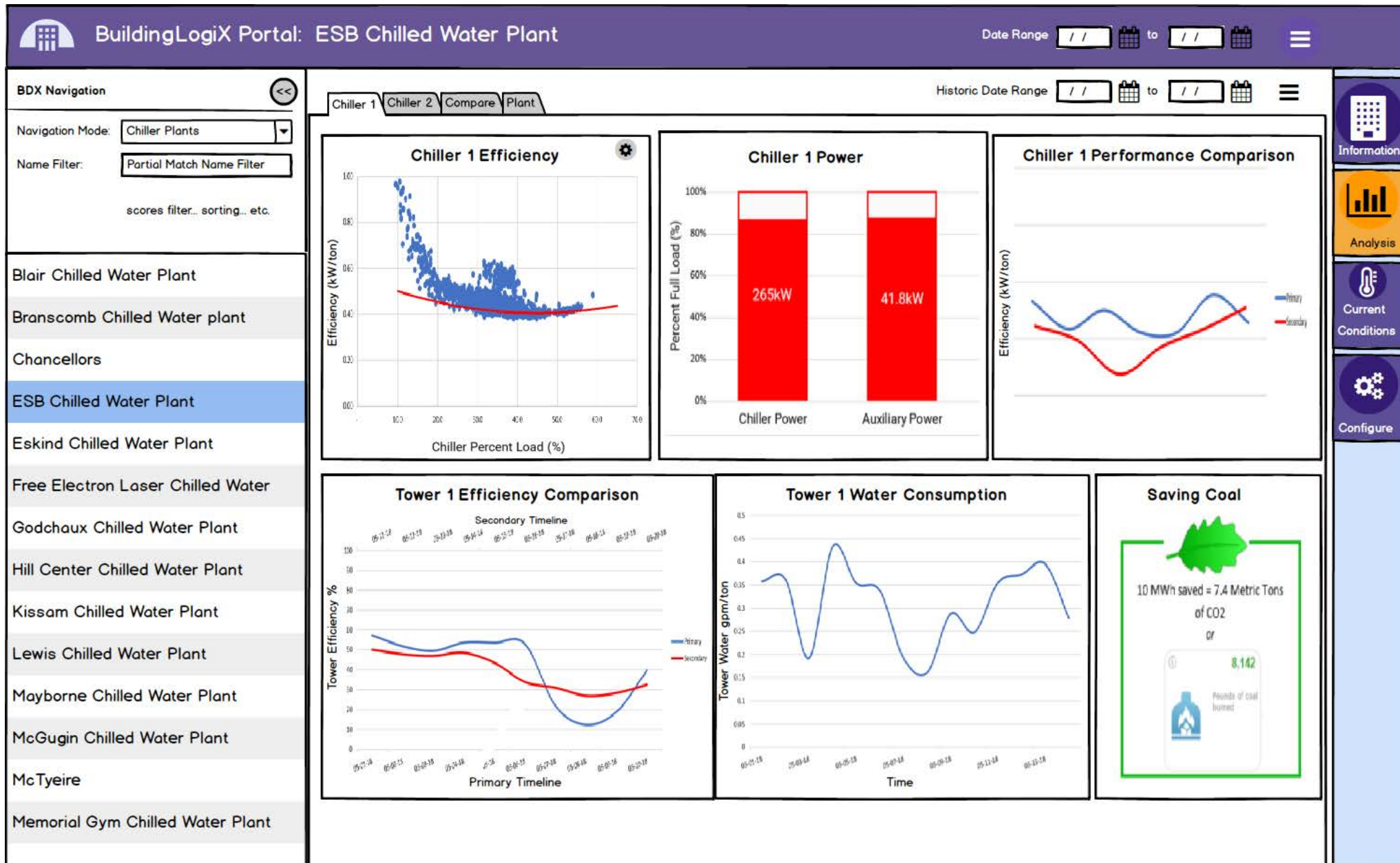


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Vanderbilt FD&D : Plant Watch, Chiller Plant Efficiency



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 is 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

New Installation – Universal Health Services (represented by Grumman/Butkus Associates)

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)

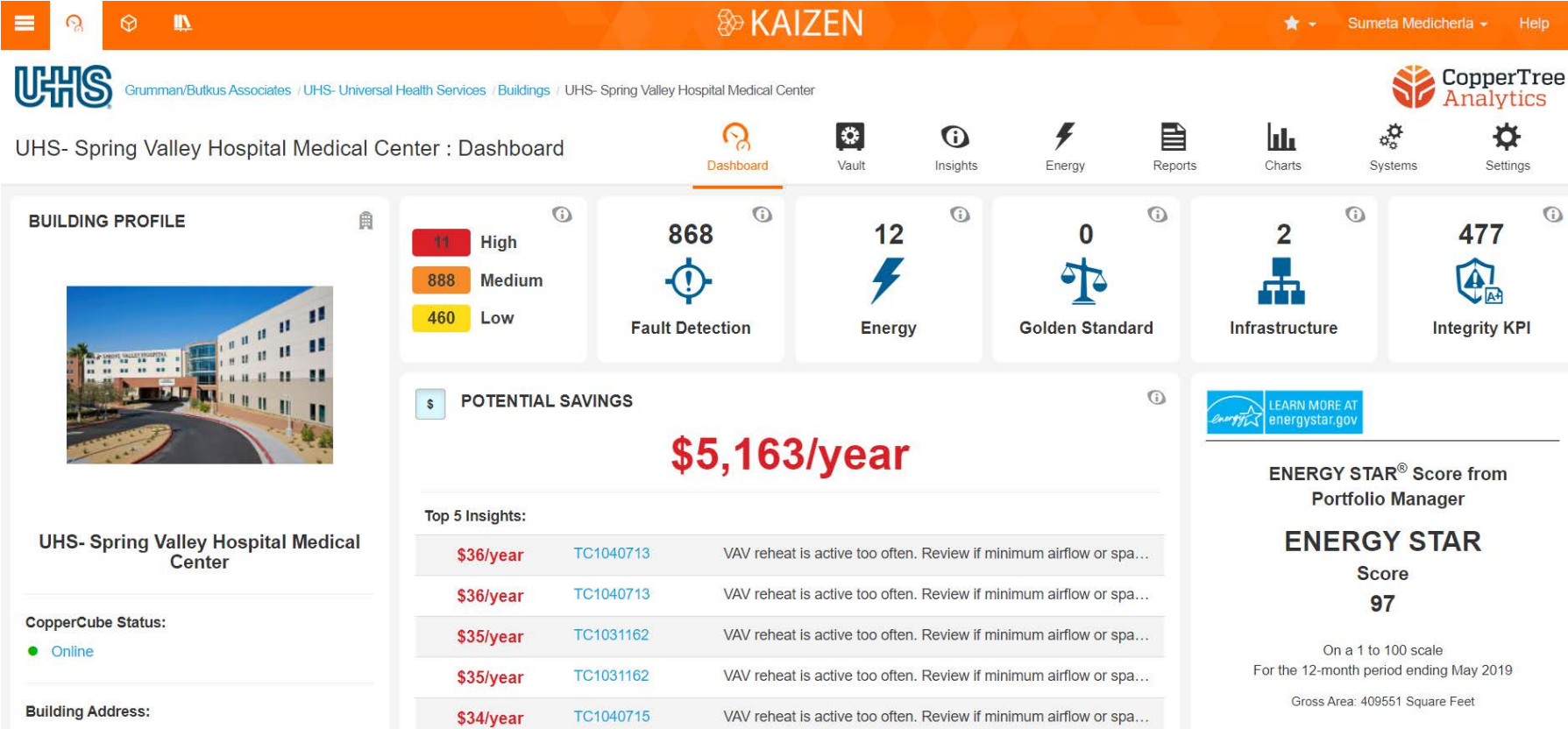
Ongoing Commissioning/MBCx Phase

- ✓ 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

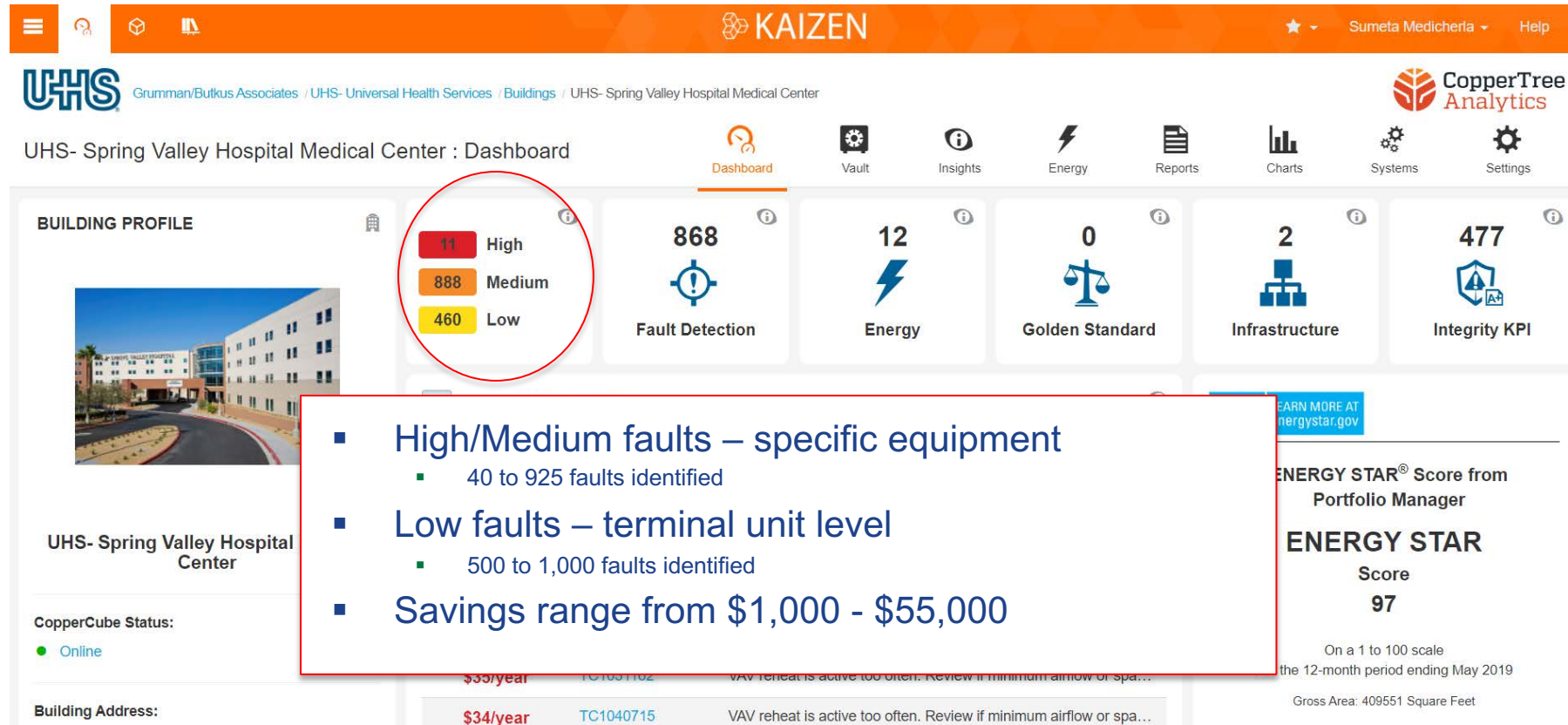
New Installation – Universal Health Services (represented by Grumman/Butkus Associates)

MBCx Platform – CopperTree Kaizen



New Installation – Universal Health Services (represented by Grumman/Butkus Associates)

MBCx Platform – CopperTree Kaizen



New Installation – Universal Health Services (represented by Grumman/Butkus Associates)



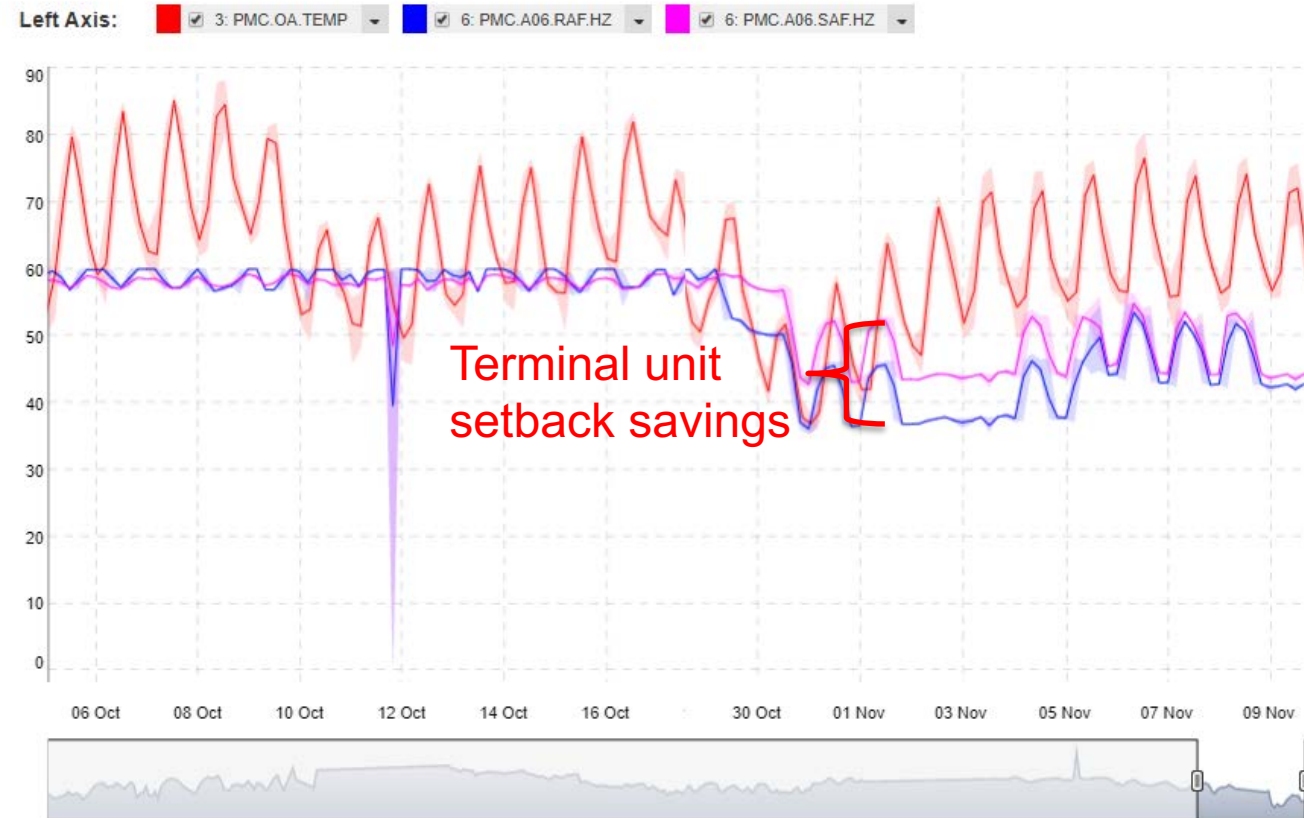
- Dining AHU – implemented AHU static pressure reset and terminal unit night setback
- Red line – OAT, Blue line – Return fan, Pink line – Supply fan
- Measure savings ~ \$22,000

New Installation – Universal Health Services (represented by Grumman/Butkus Associates)



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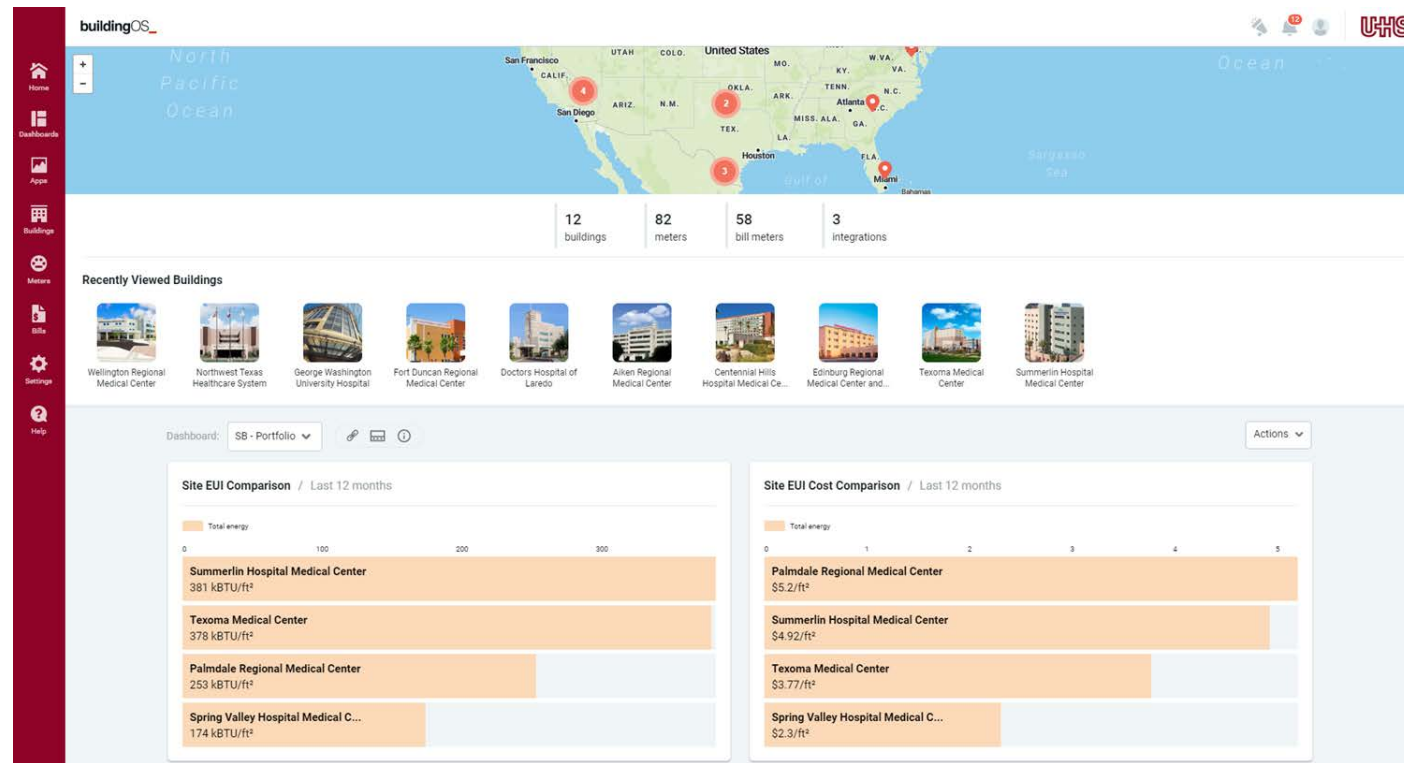
New Installation – Universal Health Services (represented by Grumman/Butkus Associates)



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New Installation – Universal Health Services (represented by Grumman/Butkus Associates)

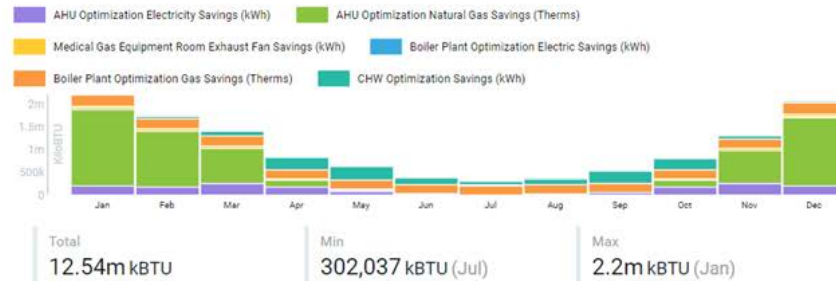
EIS Platform – Lucid BuildingOS



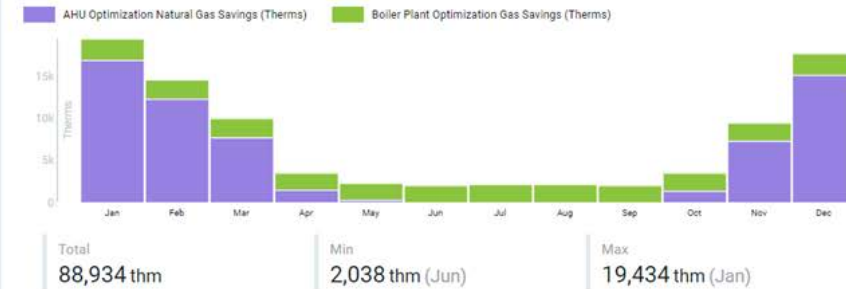
- Automated utility bill integration
- Compare 7 facilities for EUI and EUI cost.
- Additional metrics include electric, gas, water, and sewer per site and at the portfolio level.

New Installation – Universal Health Services (represented by Grumman/Butkus Associates)

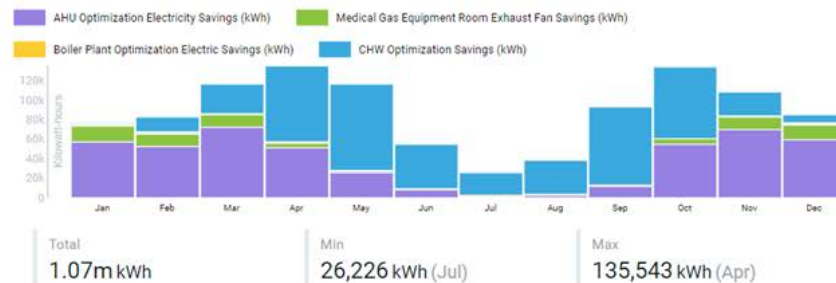
Project Verified Savings (Calculated) / Jan 1-Dec 31, 2017



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



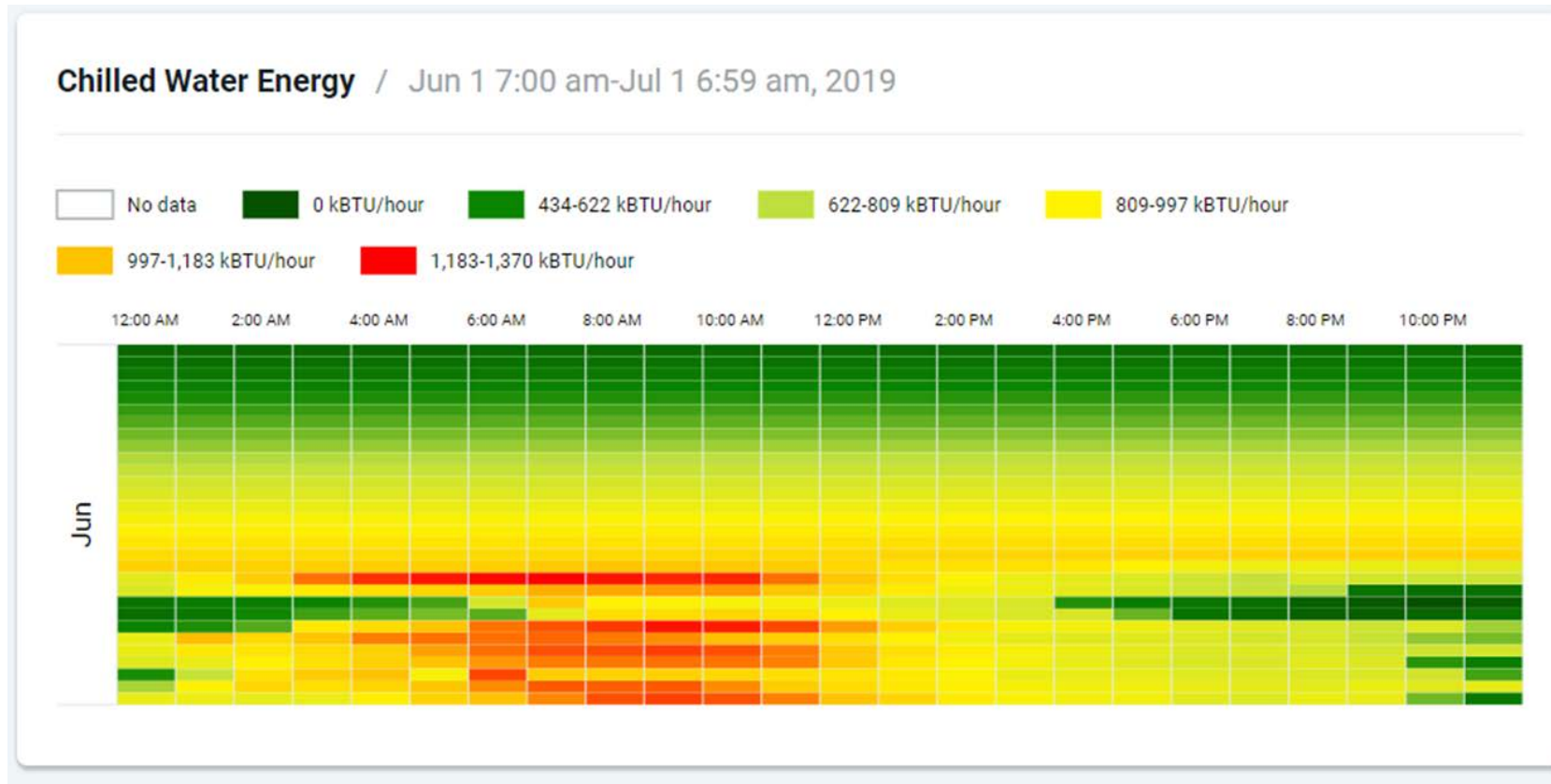
Project Verified Electric Savings / Jan 1-Dec 31, 2017



MBCx and EIS platforms integrated to track verified energy savings

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

MBCx Provider Recognition – Altura Associates

FDD implementer and MBCx Provider to four Campaign participants

- MGM Resorts International
- Los Alamos National Laboratory
- UC Irvine
- UC Santa Cruz



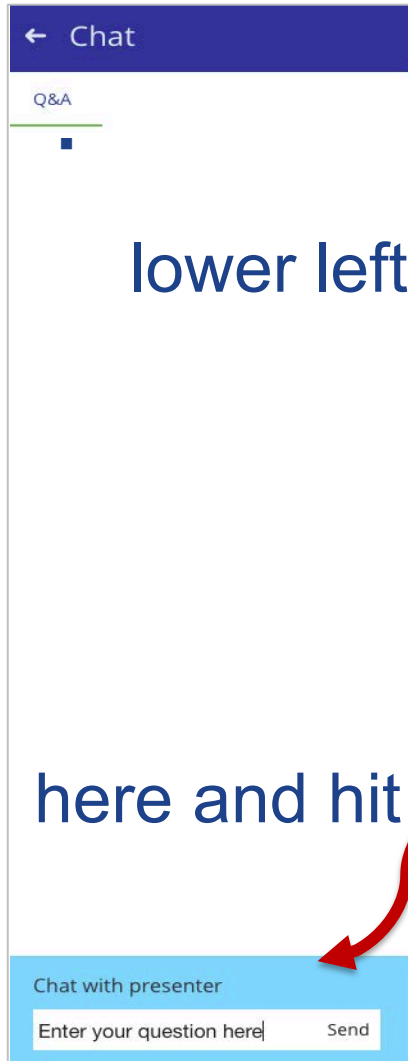
(L to R) Tom Poeling, BCxA, Tavis Werts, Altura, Liz Fischer, BCxA

“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



Q&A



lower left of screen

here and hit Send

Submit your questions through
chat icon on



Type your question

Better Buildings Summit



2020 SUMMIT

JUNE 8-10 | ARLINGTON, VA



@BetterBldgsDOE #BBSummit2020

U.S. DEPARTMENT OF
ENERGY

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](#), and select Energy Management and Information Systems checkbox

smart-energy-analytics.org

Questions, please contact:
Claire Curtin cmcurtin@lbl.gov
Hannah Kramer hkramer@lbl.gov