

- ★ **Vanderbilt University located 1 mile from downtown Nashville, TN. Founded with a \$1,000,000 gift from Commodore Cornelius Vanderbilt in 1873**
- ★ **Vanderbilt is a private research university and medical center with just over 12,000 under graduate and graduate students, a faculty and staff of 24,176. Vanderbilt is the second largest private employer in the state of Tennessee.**
- ★ **We serve 14.5 M SQFT in 153 buildings Vanderbilt Medical Center & Campus, with some combination of central plant utilities including electricity, steam, and chilled water.**
- ★ **7M SQFT Vanderbilt Campus**



# VANDERBILT UNIVERSITY





# Vanderbilt Utilities: Facilities Network

**AUTOMATEDLOGIC**  
United Technologies

Building  
Automation  
Systems



Smart Buildings  
Smart Campus  
Smart Cities



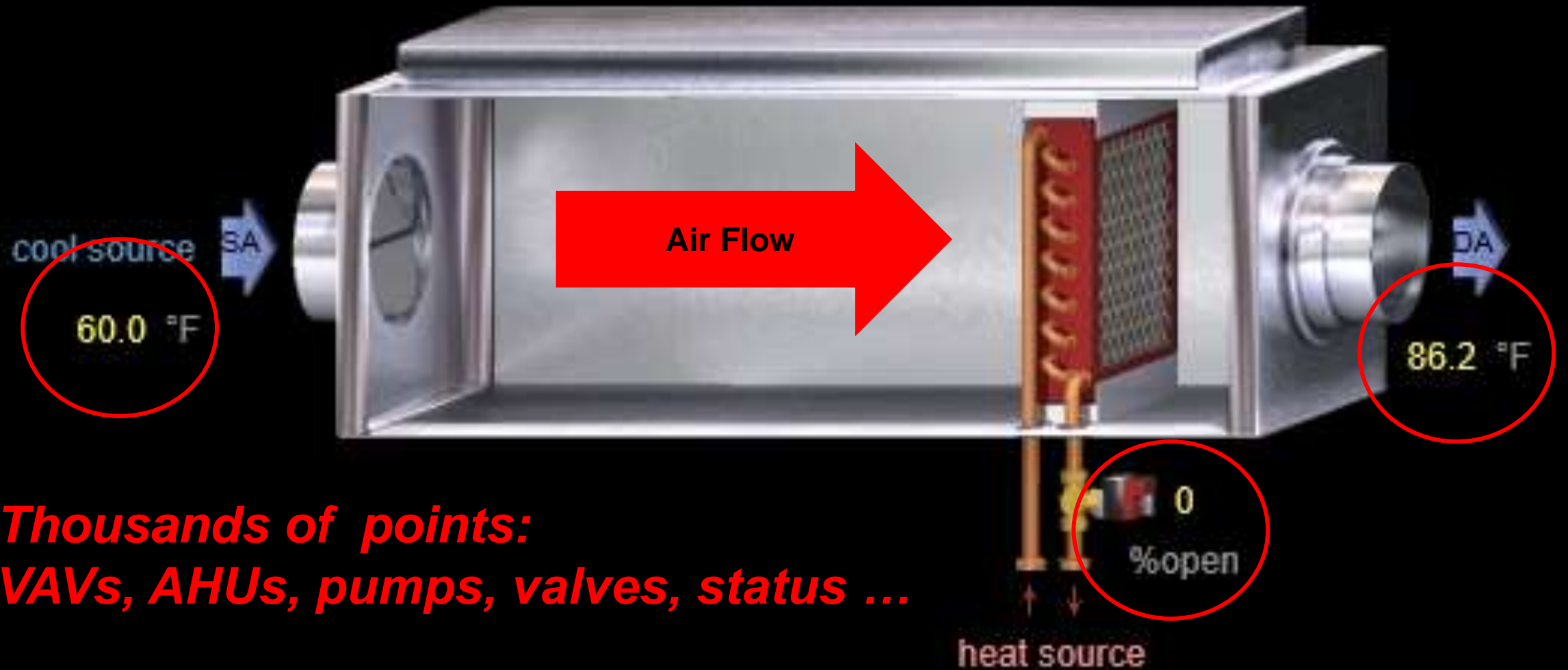
Data Warehouse,  
FD&D Platform



Power Plant Operating System

airflow 1023 cfm  
setpoint 1000 cfm  
damper 35 %open

# VAV Box



***Thousands of points:  
VAVs, AHUs, pumps, valves, status ...***





## Vanderbilt Utilities: Data Warehouse & FD&D Platform

### Challenges:

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

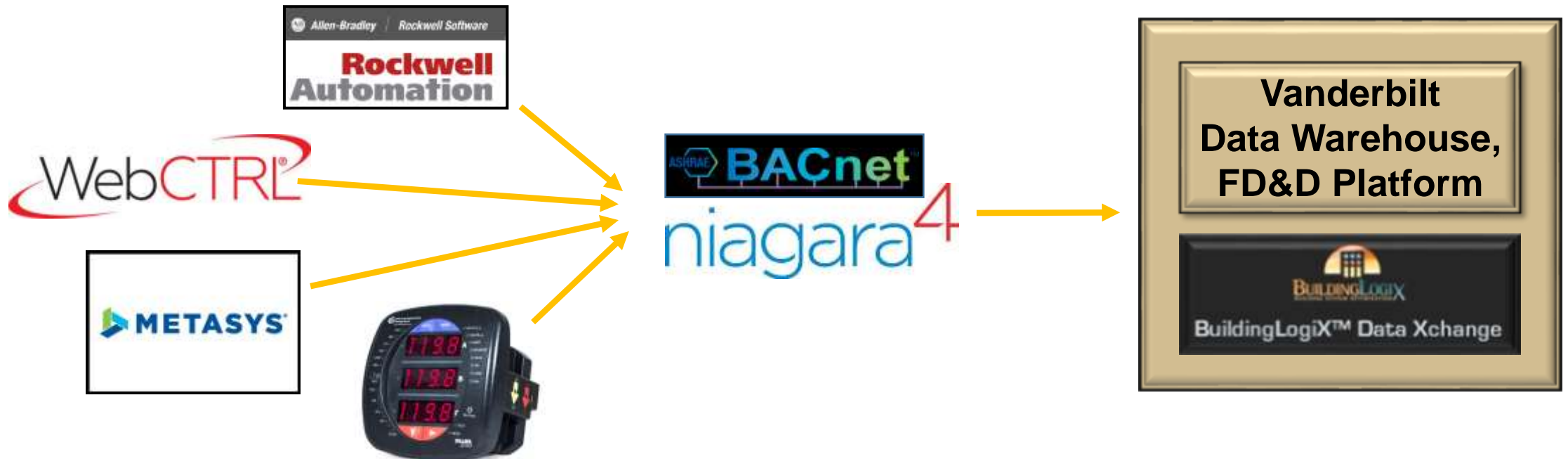
### Objectives with FD&D:

- 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 Utilities: FD&D Implementation

... a phased approach

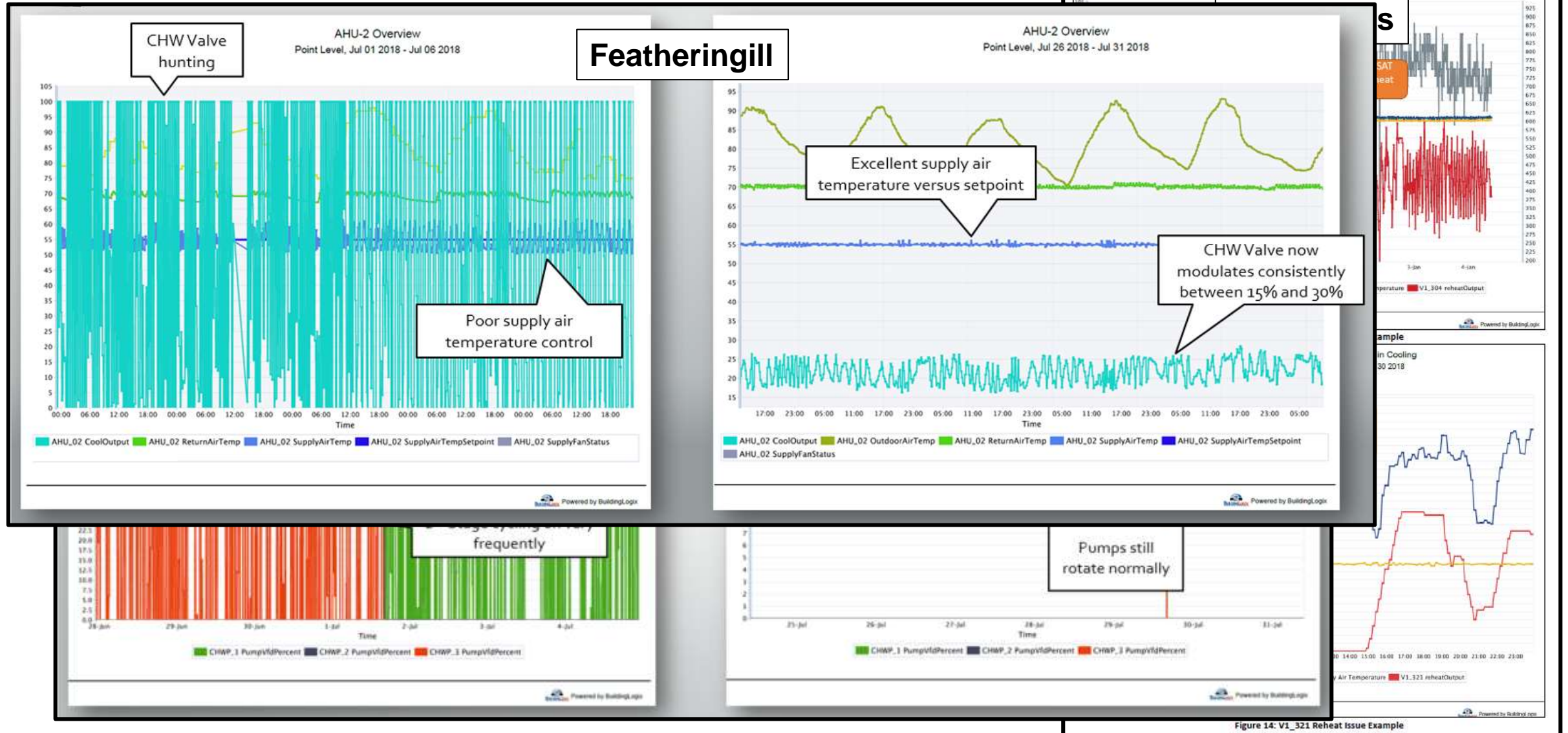








Figure 14: V1\_321 Reheat Issue Example







# Vanderbilt FD&D : Peabody Commons

**BuildingLogiX Building Portal: The Commons Center**

Date Range:  1/2/2019 to  2/1/2019   

**Buildings** 


Sort by:


Building Name 


Filter by:


Building Name


Building Category


[All] 


Scores: 


  
Sigma Nu


  
St Agustines Chapel


  
Stallworth Child Care

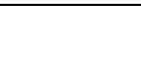
  
Stambaugh House

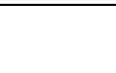
  
Stevenson Science Cen...

  
Student Life

  
Student Recreation Cen... 8.6

  
Sutherland House

  
Tarpley Building

  
The Commons Center 7.7

**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**  
Leaflet | © OpenStreetMap contributors  
Building Info  
Scores  
Energy  
Current Conditions  
Configure



Scorecard View

BDX Report Selector

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](#)

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

BuildingLogiX™ Reports

Applications ▾ BDX ▾

Commons VAV Scorecard

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

Report Results (129 of 129)

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.	5.5	9.8	0.0	8.0
VAV_01_07	7.7	6.0	N.E.	0.1	0.0	9.5	9.5
VAV_02_08	7.8	6.0	N.E.	0.0	0.0	10.0	10.0
VAV_01_13	0.0	4.9	0.0	N.E.	8.0	9.9	9.0
VAV_01_15	0.1	7.5	N.E.	N.E.	0.0	9.9	9.9
VAV_05_31	0.4	0.0	0.0	10.0	10.0	0.0	9.7
VAV_03_06	0.4	0.0	8.7	9.2	1.6	9.9	9.9
VAV_07_17	0.4	7.4	8.2	7.1	9.2	10.0	6.5
VAV_03_03	0.5	7.9	1.9	10.0	2.0	9.9	9.9
VAV_03_05	0.6	6.7	5.8	9.4	0.3	9.9	9.9
VAV_07_37	0.7	7.0	5.5	6.7	5.1	10.0	10.0
VAV_01_04	0.7	8.0	8.0	10.0	3.7	9.9	9.9
VAV_01_20	0.7	5.5	0.0	7.7	9.0	9.9	9.9
VAV_03_04	0.7	6.1	8.2	0.2	0.2	9.9	9.9
VAV_05_10	0.8	6.0	0.1	N.E.	10.0	10.0	9.0
VAV_02_02	0.8	6.6	0.0	10.0	6.9	10.0	10.0
VAV_02_11	0.8	5.5	7.4	5.5	9.5	10.0	9.7
VAV_04_09	0.8	5.6	0.1	5.4	10.0	9.7	9.0
VAV_01_14	0.8	6.4	8.6	6.3	7.0	9.9	9.9
VAV_02_04	0.8	6.9	9.8	1.6	0.5	10.0	10.0
VAV_04_06	0.8	5.7	10.0	0.2	10.0	9.7	9.0
VAV_01_06	0.8	6.0	0.0	N.E.	8.9	9.9	9.9
VAV_04_02	0.9	6.3	0.0	10.0	10.0	9.5	9.7
VAV_04_07	0.9	6.3	0.0	N.E.	9.9	9.5	9.7
VAV_04_11	0.9	6.3	0.0	N.E.	10.0	9.7	9.7
VAV_01_18	0.9	7.8	9.0	N.E.	0.6	9.9	0.7
VAV_05_24	9.0	6.8	6.7	8.8	9.5	10.0	9.2

VAV Scorecard

1 week 2 weeks 30 Days 60 Days 90 Days 6 Mo 12 Mo YTD

(1 of 2)



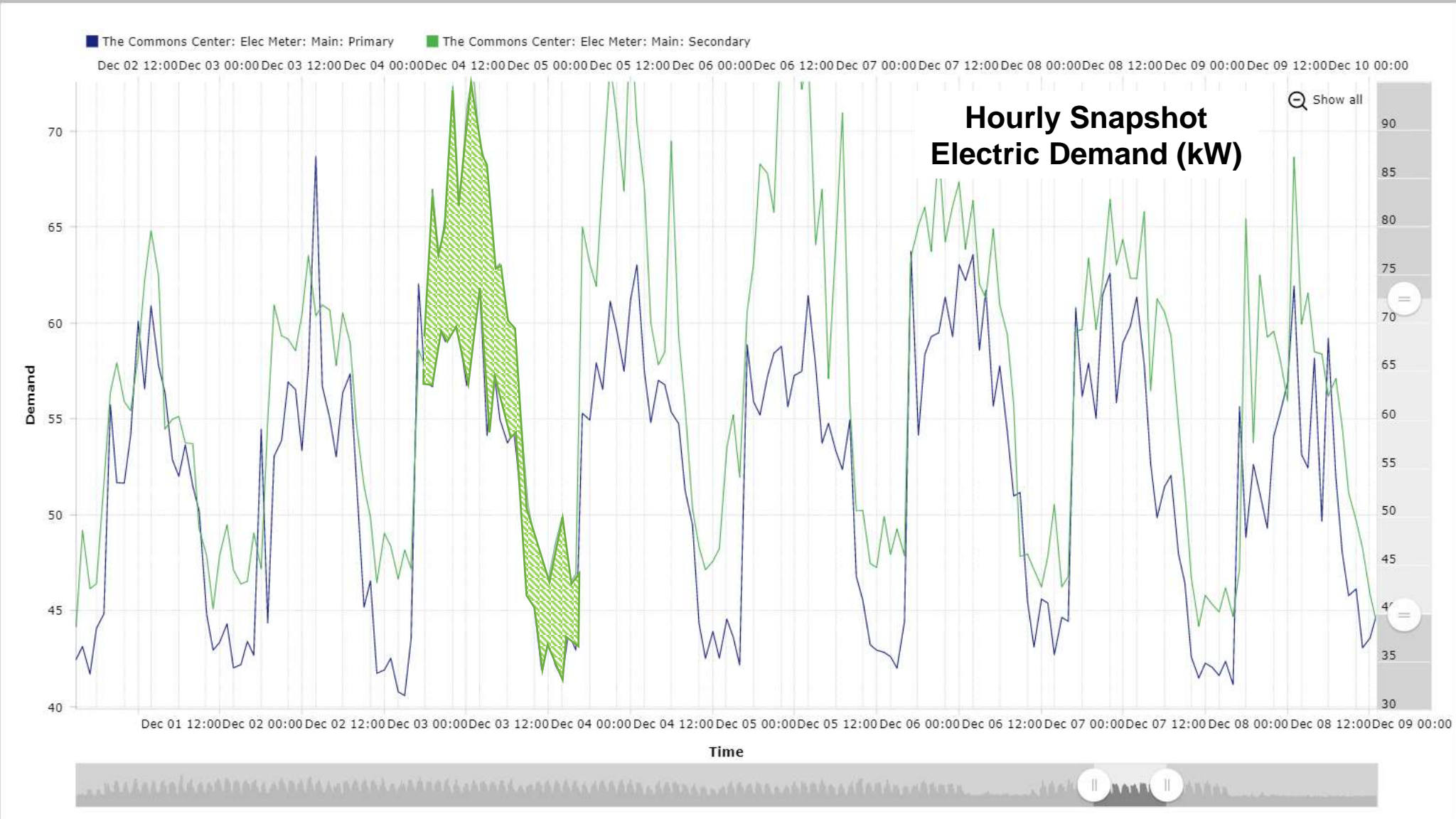


# Vanderbilt: Peabody Commons

← Demand Chart

Units: kW    Timeframe: 8/12/18 - 12/31/18    Secondary Timeframe: 8/13/17

Unit ☐ Unit/ft<sup>2</sup>



Time	Secondary Time	The Commons
8/12/18 12:00...	8/13/17 12:00...	40.50
8/12/18 1:00 ...	8/13/17 1:00 ...	40.02
8/12/18 2:00 ...	8/13/17 2:00 ...	39.52
8/12/18 3:00 ...	8/13/17 3:00 ...	40.47
8/12/18 4:00 ...	8/13/17 4:00 ...	39.76
8/12/18 5:00 ...	8/13/17 5:00 ...	40.06
8/12/18 6:00 ...	8/13/17 6:00 ...	41.11
8/12/18 7:00 ...		39.10



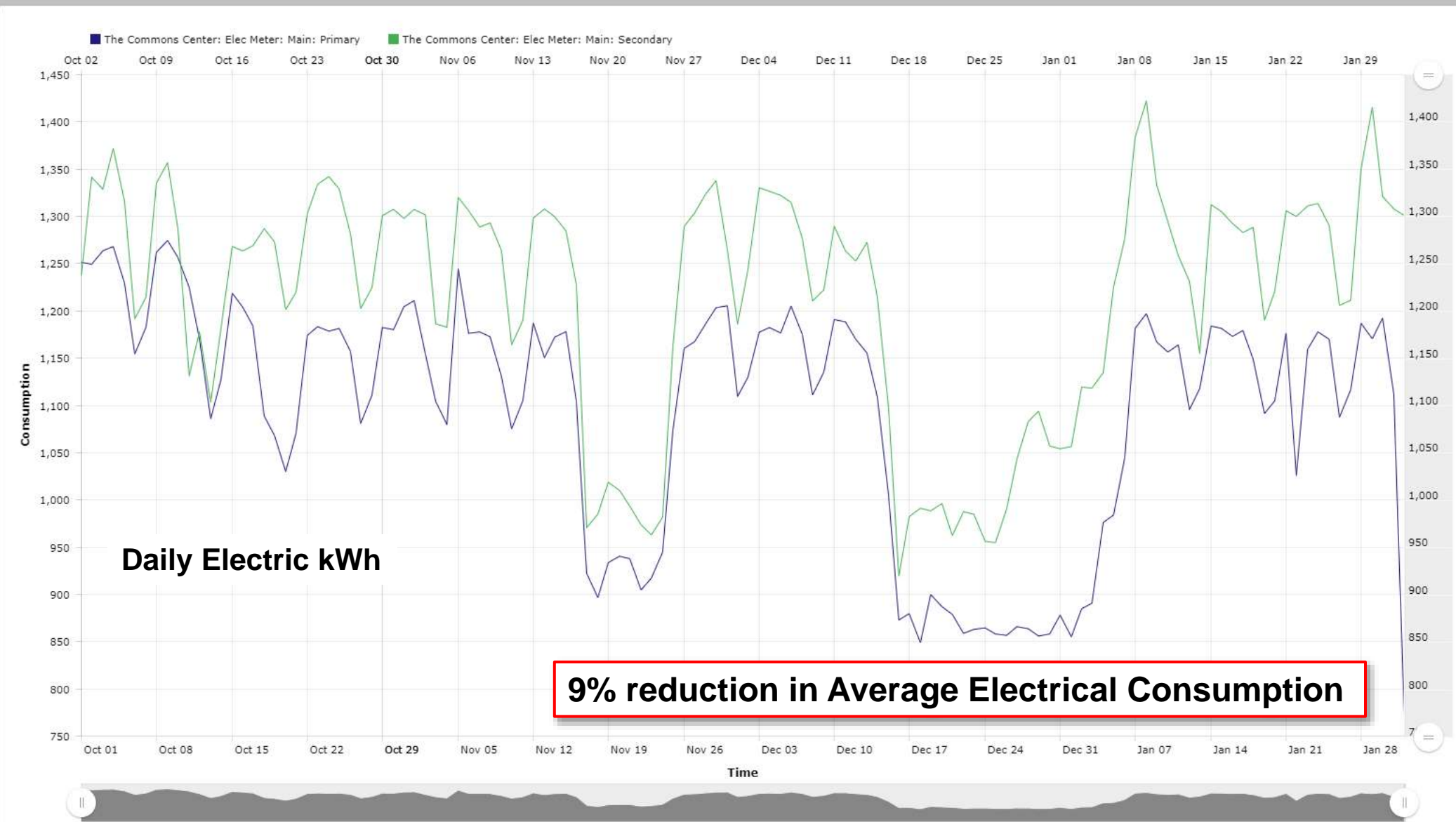




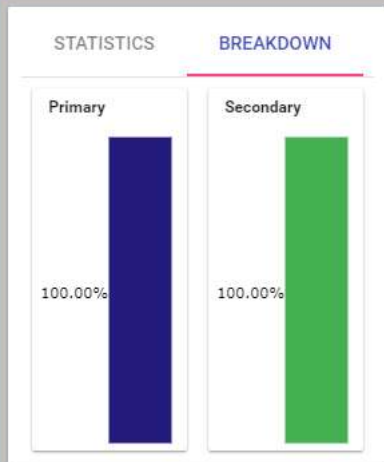
# Vanderbilt: Peabody Commons

Units: kilowatt hour    Timeframe: 10/1/18 - 2/1/19    Secondary Timeframe: 10/2/17

Unit ☐ Unit/ft<sup>2</sup>



Time	Secondary Time	The Commons
10/1/18 12:00...	10/2/17 12:00...	1,251
10/2/18 12:00...	10/3/17 12:00...	1,249
10/3/18 12:00...	10/4/17 12:00...	1,264
10/4/18 12:00...	10/5/17 12:00...	1,268
10/5/18 12:00...	10/6/17 12:00...	1,230
10/6/18 12:00...	10/7/17 12:00...	1,154
10/7/18 12:00...	10/8/17 12:00...	1,183
10/8/18 12:00...	10/9/17 12:00...	1,262
10/9/18 12:00...	10/10/17 12:00...	1,275
10/10/18 12:00...	10/11/17 12:00...	1,257
10/11/18 12:00...	10/12/17 12:00...	1,225



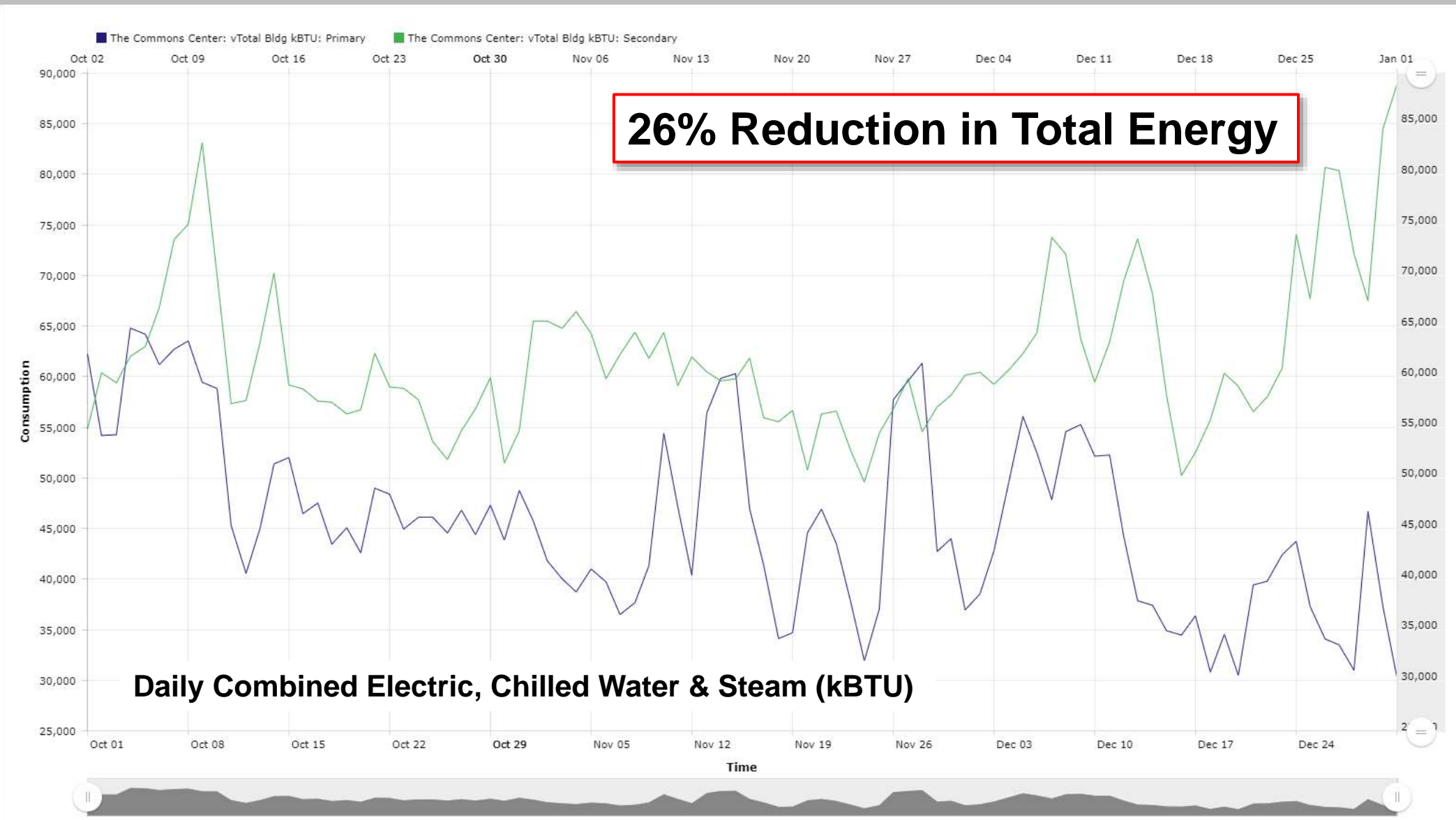


# Vanderbilt: Peabody Commons

Consumption Chart

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

Unit ☐ Unit/ft<sup>2</sup>



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%



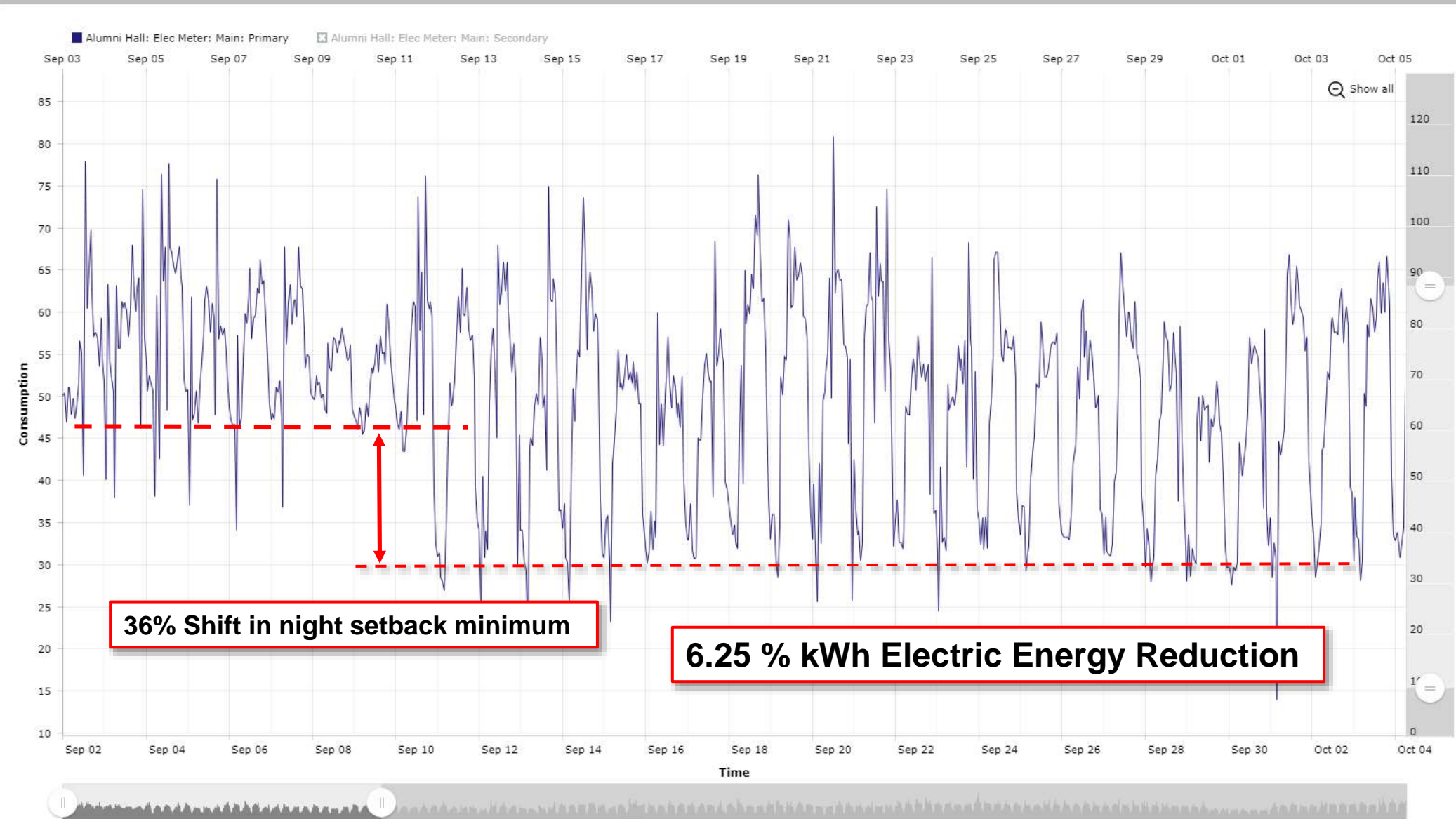


# Alumni Hall Electric Energy

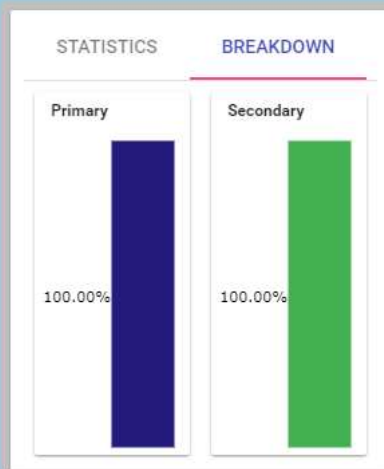
← Consumption Chart

Units: kilowatt hour    Timeframe: 9/2/18 - 1/15/19    Secondary Timeframe: 9/3/17

Unit ☐ Unit/ft²



Time	Secondary Time	Alumni Hall Elec Meter
9/2/18 12:00 ...	9/3/17 12:00 ...	50.07
9/2/18 1:00 AM	9/3/17 1:00 AM	50.40
9/2/18 2:00 AM	9/3/17 2:00 AM	46.93
9/2/18 3:00 AM	9/3/17 3:00 AM	51.09
9/2/18 4:00 AM	9/3/17 4:00 AM	51.04
9/2/18 5:00 AM	9/3/17 5:00 AM	47.84
9/2/18 6:00 AM	9/3/17 6:00 AM	49.80
9/2/18 7:00 AM	9/3/17 7:00 AM	47.36
9/2/18 8:00 AM	9/3/17 8:00 AM	49.10
9/2/18 9:00 AM	9/3/17 9:00 AM	51.51
9/2/18 10:00 ...	9/3/17 10:00 ...	56.57
9/2/18 11:00 ...	9/3/17 11:00 ...	55.26
9/2/18 12:00 ...	9/3/17 12:00 ...	40.61
9/2/18 1:00 PM	9/3/17 1:00 PM	77.89



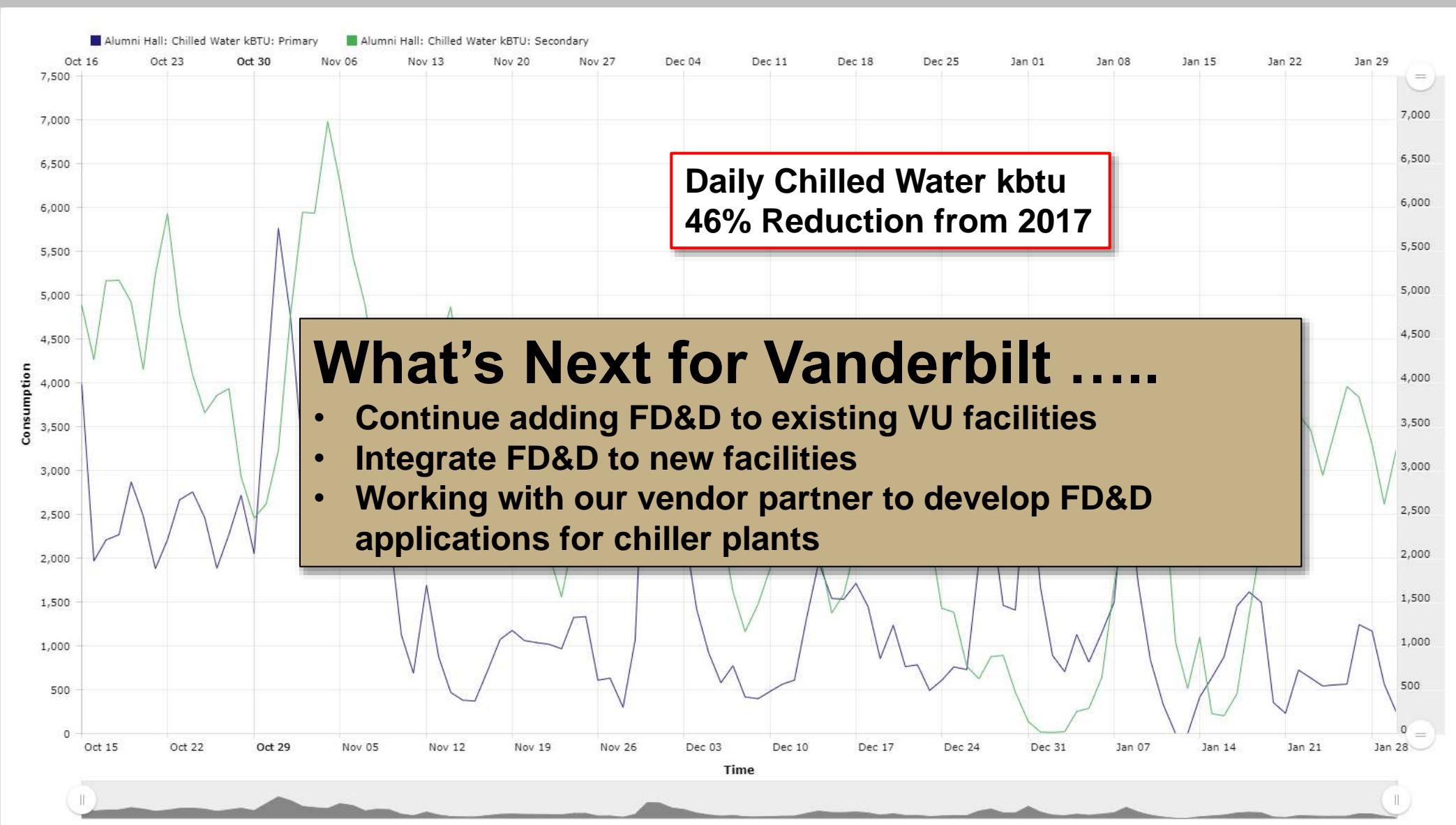


# Alumni Hall ChW Energy

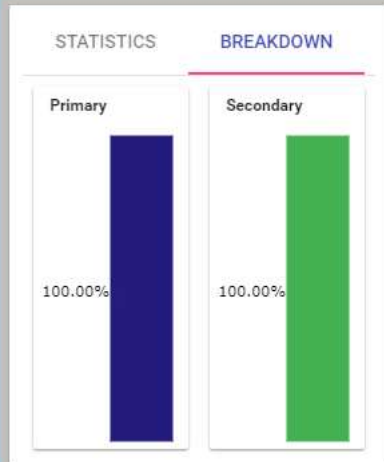
← Consumption Chart

Units: kilobtu    Timeframe: 10/15/18 - 1/30/19    Secondary Timeframe: 10/16/17

Unit ☐ Unit/ft<sup>2</sup>



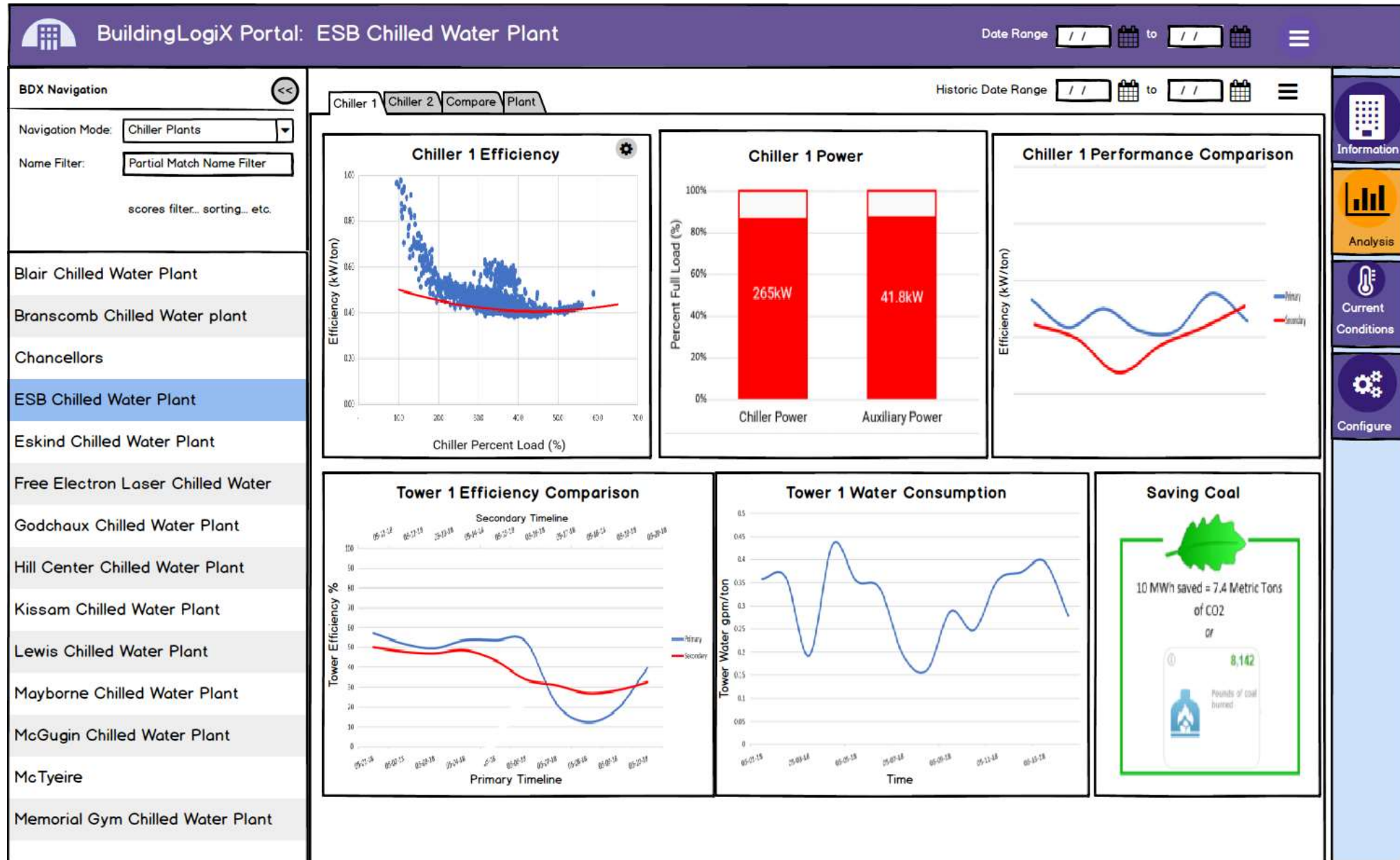
Time	Secondary Time	Alumni Hall Chilled Water
10/15/18 12:00...	10/16/17 12:00...	3,982
10/16/18 12:00...	10/17/17 12:00...	1,968
10/17/18 12:00...	10/18/17 12:00...	2,207
10/18/18 12:00...	10/19/17 12:00...	2,269
10/19/18 12:00...	10/20/17 12:00...	2,870
10/20/18 12:00...	10/21/17 12:00...	2,482
10/21/18 12:00...	10/22/17 12:00...	1,880
10/22/18 12:00...	10/23/17 12:00...	2,210
10/23/18 12:00...	10/24/17 12:00...	2,666





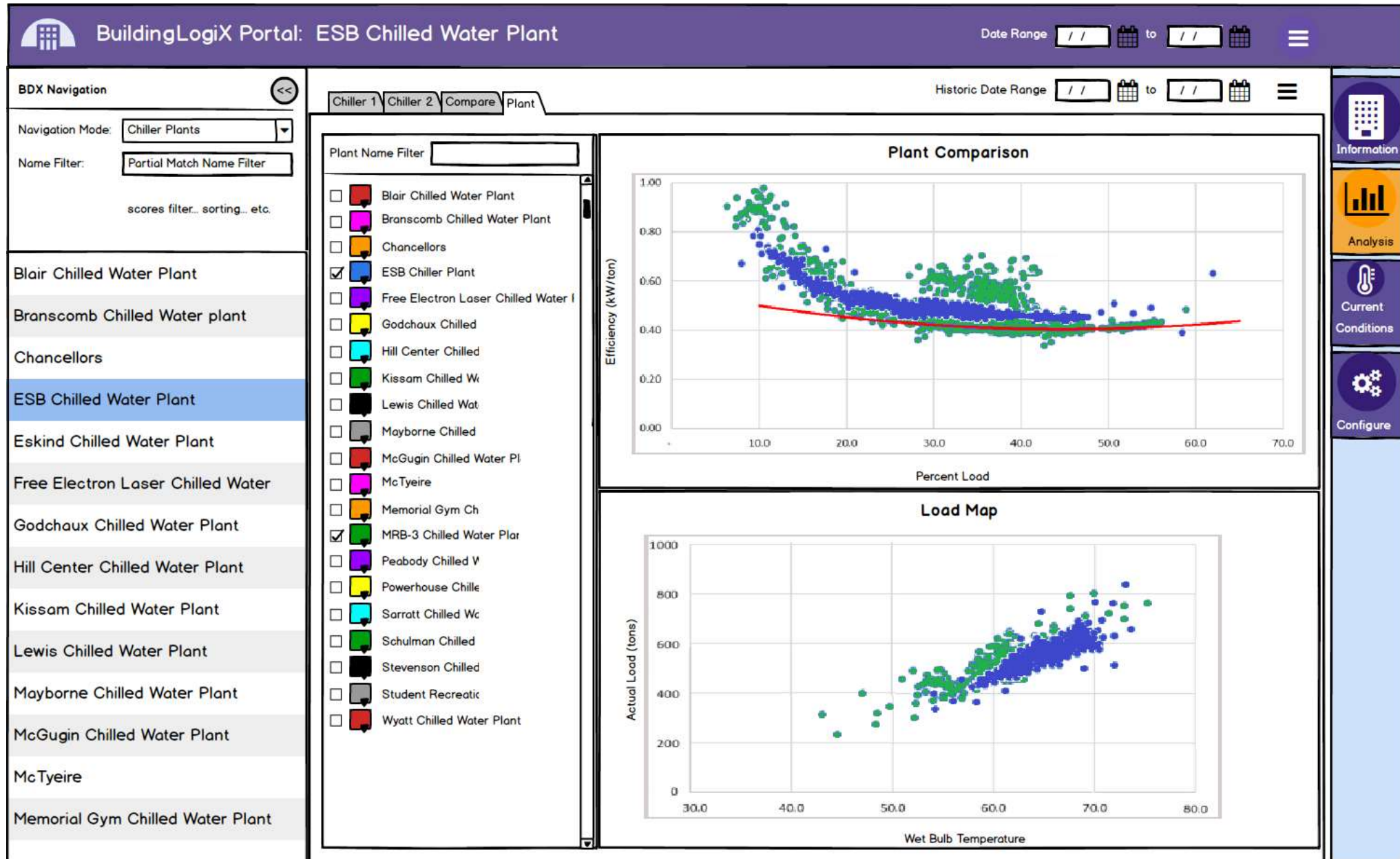


# Vanderbilt FD&D : Plant Watch, Chiller Plant Efficiency



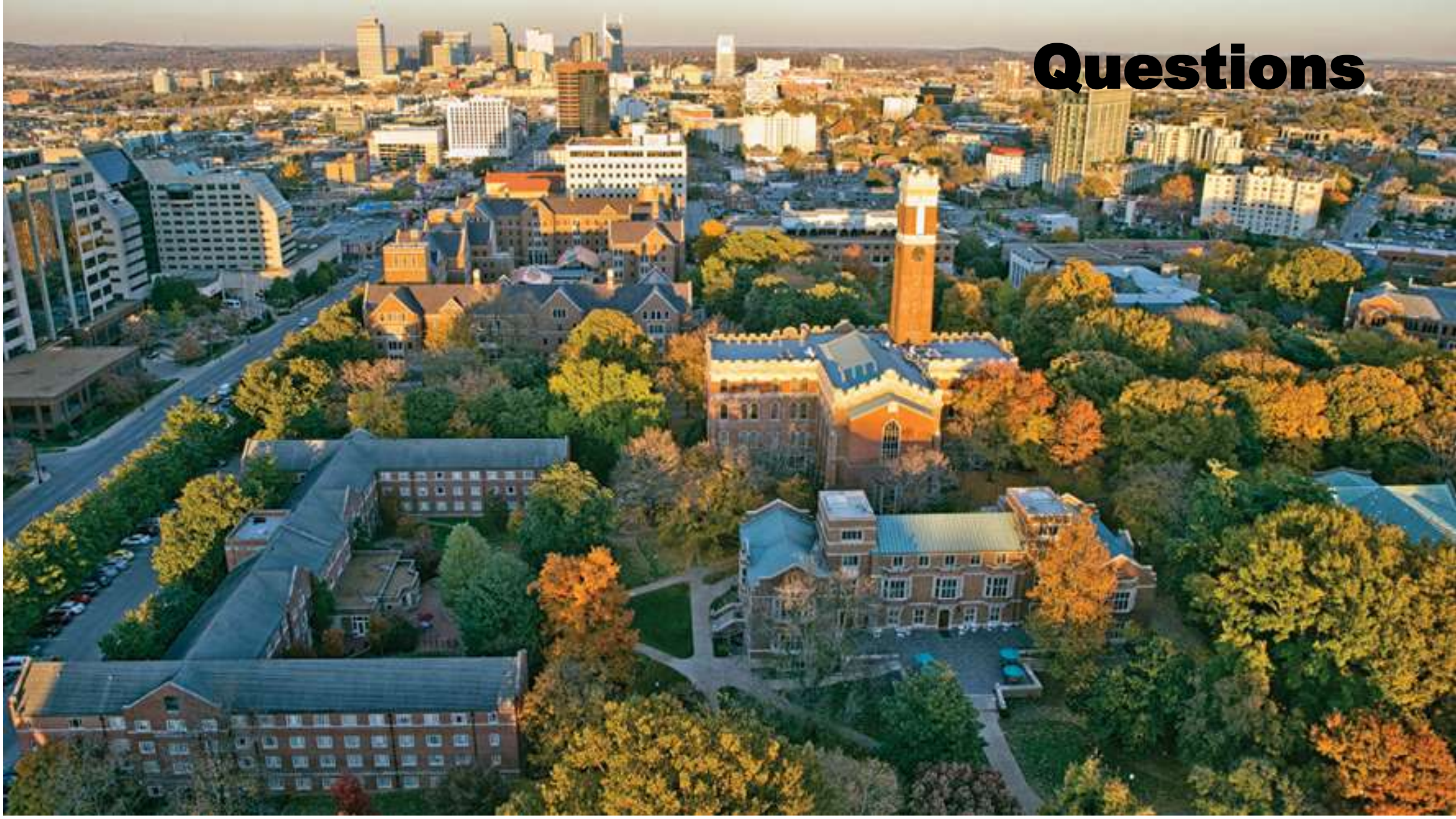


# Vanderbilt FD&D : Plant Watch, Chiller Plant Efficiency





# Questions





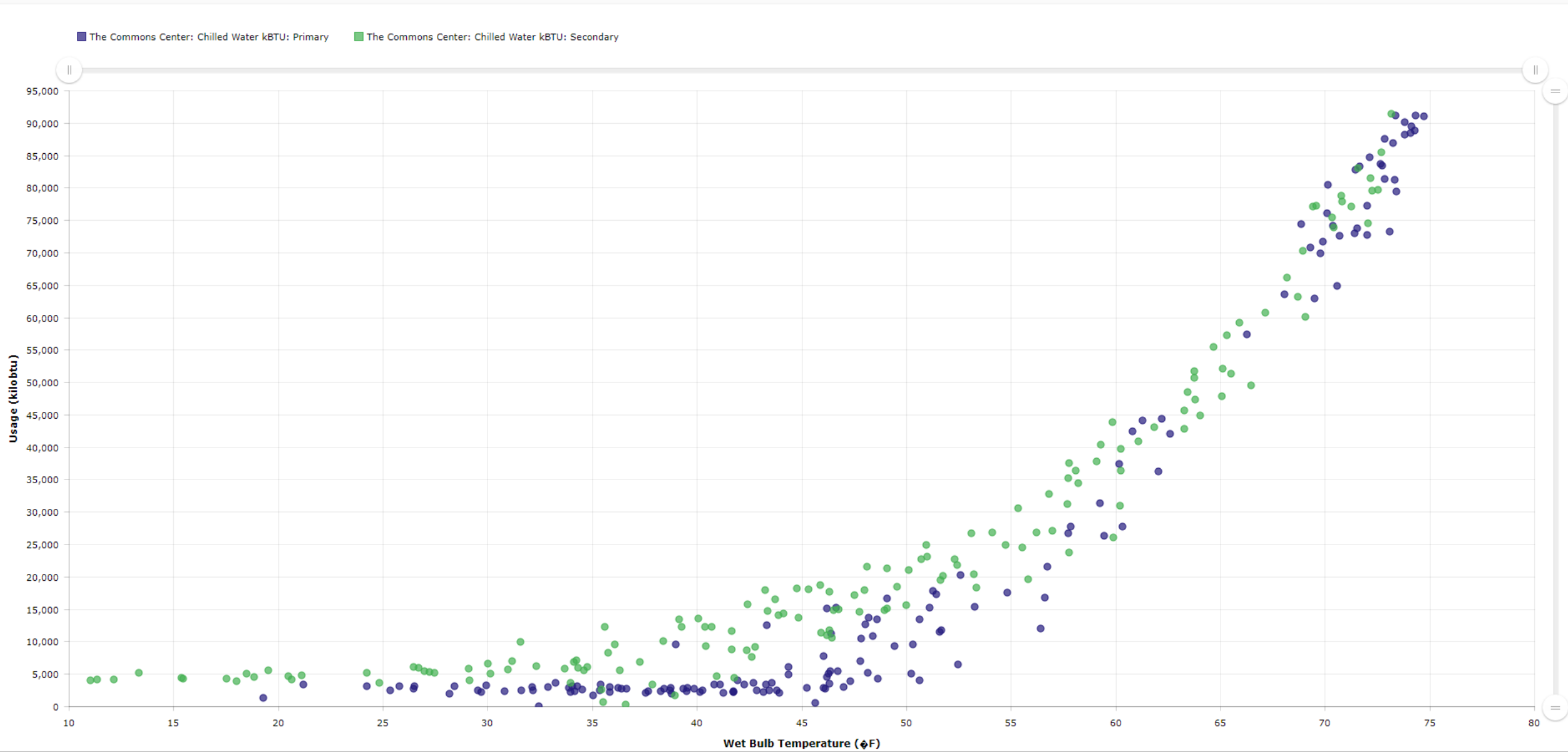
Extras





← Usage vs. Wet Bulb Temperature Chart

Timeframe: 9/1/18 - 1/31/19    Secondary Timeframe: 9/2/17





Buildings

Sort by:

Building Name

Filter by:

Building Name

Building Category

[All]

Scores: 0 to 10

Stevenson Science Cen...

Student Life

Student Recreation Cen...

Sutherland House

Tarpley Building

The Commons Center

Tolman Hall

Tunnel Access Building

University Club

VUH

VUH Parking

Vanderbilt Clinic

**Student Recreation Center**

2700 Childrens Way  
Nashville, TN 37212

132,471 square ft

**Utility Rates**

Electric: 0.08 (\$/kWh)  
Fuel: 5.60 (\$/MMBTU)

**Assigned Components**

AHU Internal Face Bypass	1
AHU Simple Cool Heat	3
AHU Stacked Return Economizer	6
AHU Two Deck Double Duct	3
Boiler	3
Cooling Tower	2
Cooling Tower Cell	2
Cooling Tower Fan	2
Damper	6
Electric Meter	3
Exhaust Fan	22
Fan Coil	4
Resource Meter	2
VAV	91
Water Pump	10
Water-Cooled Chiller	2
Weather	1

**Schedule**

Sunday	0:00 - 23:59
Monday	0:00 - 23:59
Tuesday	0:00 - 23:59
Wednesday	0:00 - 23:59
Thursday	0:00 - 23:59
Friday	0:00 - 23:59
Saturday	0:00 - 23:59

**Location**



Building Info

Scores

Energy

Current Conditions

Configure





**Buildings**

Sort by:

Building Name

Filter by:

Building Name

Building Category

[All]

Scores: 0 to 10

Stevenson Science Cen...

Student Life

8.6 Student Recreation Cen...

Sutherland House

Tarpley Building

7.7 The Commons Center

Tolman Hall

Tunnel Access Building

University Club

VUH

VUH Parking

Vanderbilt Clinic

Off Schedule Runtime

1042.8

Hours

Potential cost savings:

\$2188.90

Runtime Cost

In Sched. \$6,724.73

Off Sched. \$2,188.90

Electric Consumption

34.23

MWh

Electric Cost:

\$2,738.24

Fuel Consumption

2,677.25

MMBTU

Fuel Cost:

\$15,656.43

Energy Savings by Resource

Chilled Water

Electric

Steam Condensate

Baseline

Actual Savings: 75%

Target Savings: 10%

Actual Savings: 84%

Target Savings: 5%

Actual Savings: 18%

Target Savings: 10%

The savings represents approximately \$17,830.77 in reduced energy costs.

Electric Demand

	Weekday	Weekend
Min	30.48 kW 1/17/19 2:55 AM	33.66 kW 1/6/19 12:25 AM
Max	75.42 kW 1/8/19 12:40 PM	66.54 kW 1/27/19 2:45 PM
Avg	47.28 kW	45.02 kW

Usage vs. Target Performance

31 out of 31 days

Longest winning streak: 31 days on 1/2/19

0 out of 31 days

Longest losing streak: 0 days

Building Info

Scores

Energy

Current Conditions

Configure