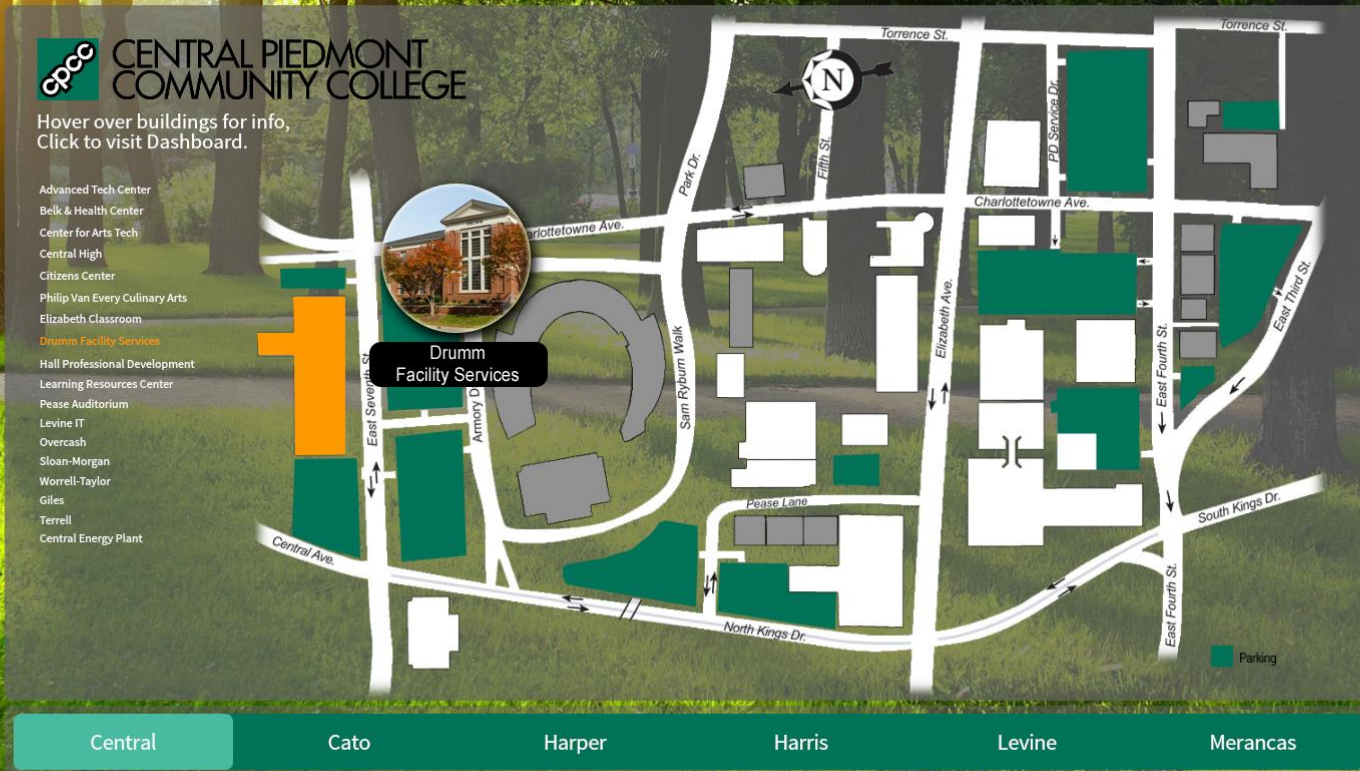


# Designing a Campus Utility Measurement System



# Campus Sustainability

**NOT**

Easy  
Cheap  
Fast

Reach **Sustainability** Targets

Reduce **CapEx**



# Designing a Campus Utility Measurement System

1 - What's there

2 - What's needed

3 - How data is collected

4 - Where does the data go

5 - What you do with the info



**No One Size Fits All**

**Your Operational Goals**

**Your Sustainability Goals**

*Example*

Ohio University  
Kennnesaw State



# Designing a Campus Utility Measurement System

1 - What's there

2 - What's needed

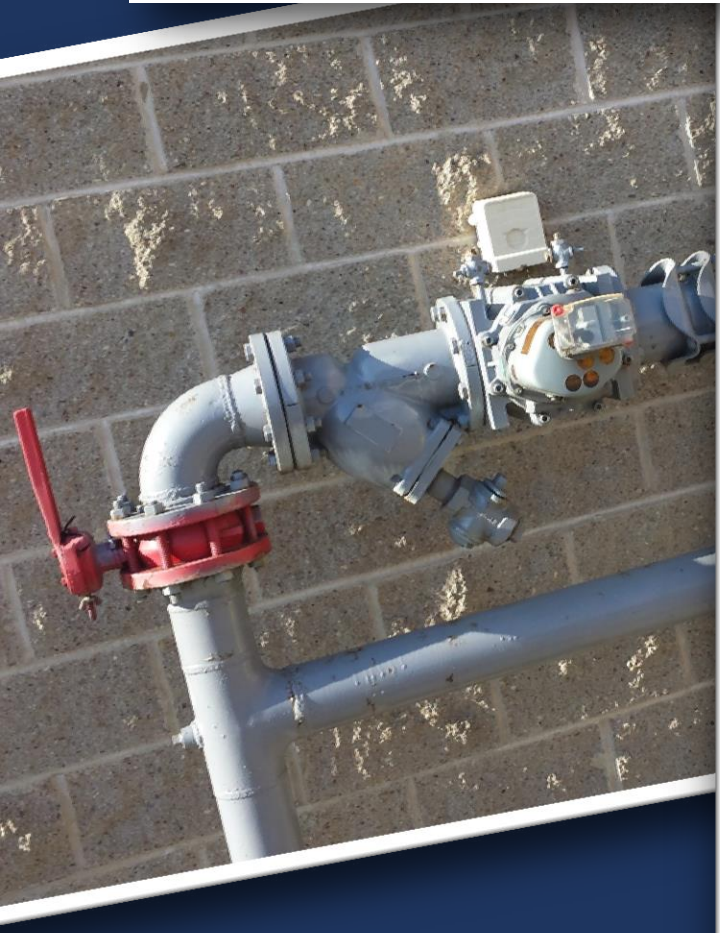
3 - How data is collected

4 - Where does the data go

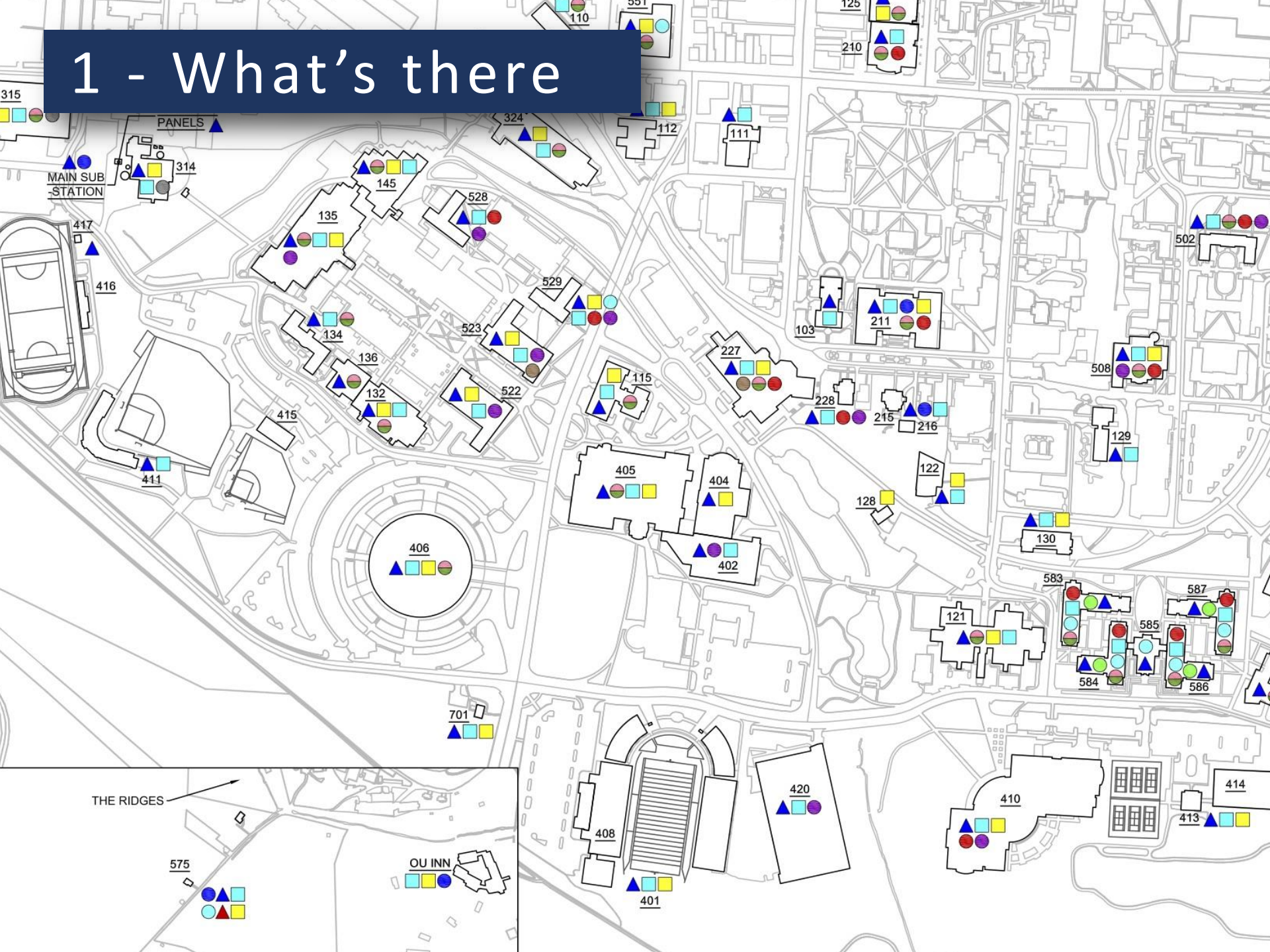
5 - What you do with the info

# 1 - What's there

## What utilities do you have?



# 1 - What's there



Meter Inventory?

“*It's a Nightmare*”

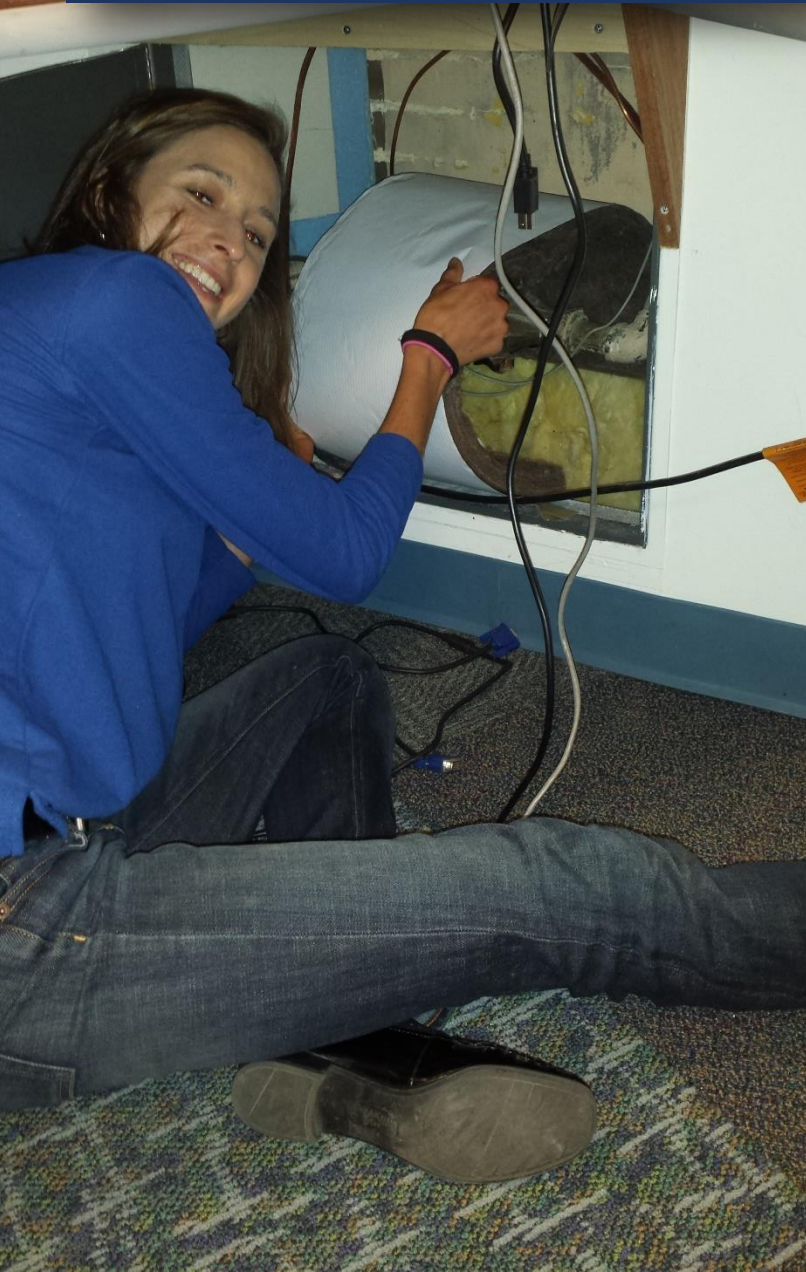
Eric Valentine  
Energy Manager, Rice University

# 1 - What's there



## The Harry Potter Door

## 1 - What's there



# Hidden Meters

1 - What's there

**Team Work!**



# 1 - What's there





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The background of the slide is a detailed map, likely of a city or industrial area. It features numerous small, colored markers (triangles, squares, circles) in blue, green, yellow, and red, scattered across the map. Some markers are accompanied by numbers, such as 110, 125, 210, 315, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500. The map also shows street names and building outlines.

## 2 - What's needed

# Coordinated & Integrated

Meters

Submeters

Meter Map

Control/EMS/BAS

Servers

Control Hierarchy & Integration

Dashboard?

## 2 - What's needed

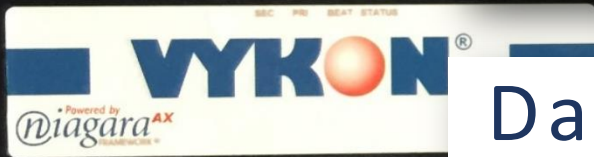
Meters vs Submeter

Calibration & Repair

Commissioning

Data Acquisition Devices

STOJ01



CAMPUS DHCP

UNIVERSAL INPUTS 1-8  
U1 0V U2 0V U3 0V U4 0V U5 0V U6 0V U7 0V U8 0V  
UNIVERSAL INPUTS 9-16  
U9 0V U10 0V U11 0V U12 0V U13 0V U14 0V U15 0V U16 0V  
INPUT PWR 24VAC/DC



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1 - What's there

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### 3 - How data is collected

# Utility Meters

No Data

Manual Spreadsheet Data

Electronic

Interval

### 3 - How data is collected

# Data Integrity

## **Metering Standards**

Communications Protocols

Units of Measure

Naming Conventions

Communications Issues

# 3 - How data is collected

LEGEND				
	Appears to be good		Misc issues - units might be off, data looks wrong	
	Bad/missing data, zero values, stopped collecting		Accumulating trend is rolling over to zero	
	No data - no point or trend in database at all		Data is zero for periods of time	
Meter Info	Histories at Server			
BUILDING NAME	kW Trend	kWh Trend	CHW BTU Trend	CHW BTU/hr Trend
Building #1	REAL_POWER_DEMAND	REAL_POWER_USAGE_DELTA Rollover	CHWEnergyMeterBTU Total_1Min Missing Data	CHWEnergyRateBTUperH
Building #2	REAL_POWER_KW	THREE_PHASE_REAL_ENERGY Rollover	On the loop but no data	No energy rate history
Building #3	EC_1_POWER_METER ENERGY_DEMAND Data to zero sometimes	ENERGY_USAGE_DELTA Rollover and to zero	On the loop but no data	No energy rate history
Building #4	CEP_ENERGY_DEMAND Data to zero sometimes	CEP_ENERGY_USAGE_DELTA	Plant_CHW_Meter_NetTotalizer	No energy rate history
Building #5	ElecMeter 1 WattsTotal3Phase ElecMeter 2 WattsTotal3Phase	No consumption history	No consumption history	Several different energy rates, which one is accurate?
Building #6	No demand history	No consumption history	No consumption history	No energy rate history
Building #7	No demand history	REAL_POWER_USAGE_DELTA	CHWEnergyMeterBTU Total_1Min 1 min interval missing data	CHWEnergyRateBTUperH
Building #8	EC_1_POWER_METER ENERGY_DEMAND Data to zero sometimes	ENERGY_USAGE_DELTA	CHW_EnergyMeter_PositiveTotalizer Possible facet/unit issue - are in MBTU, not BTU need to verify facet/unit in AX	CHW_EnergyRateBTUperH
Building #9	REAL_POWER_DEMAND	REAL_POWER_USAGE_DELTA Rollover	CHWEnergyMeterBTU Total_1Min 1 min history - should be 15 min Missing data and not accumulating (stale)	CHWEnergyRateBTUperH Data is not changing
Building #10	Points POWER_METER_INPUT_KW	POWER_BILLING_PERIOD_DELTA	CHW Energy Meter_NetTotalizer Possible facet/unit issue - are in MBTU, not BTU need to verify facet/unit in AX	Bldg_HW_EnergyRateBTUperH
Building #11	EC_1_POWER_METER ENERGY_DEMAND Data to zero sometimes	ENERGY_USAGE_DELTA	Overcash_CHW_EnergyMeter_NetTotalizer Data has stopped collecting	CHW_EnergyRateBTUperH Data has stopped collecting
Building #12	POWER_METER_ENERGY_DEMAND	ENERGY_USAGE_DELTA	CHW_EnergyMeter_NetTotalizer Possible facet/unit issue - are in MBTU, not BTU need to verify facet/unit in AX	CHW_EnergyRateBTUperH



# Designing a Campus Utility Measurement System

1 - What's there

2 - What's needed

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# 4 - Where does the data go

Controller

Server

EMS/BAS

Dashboard

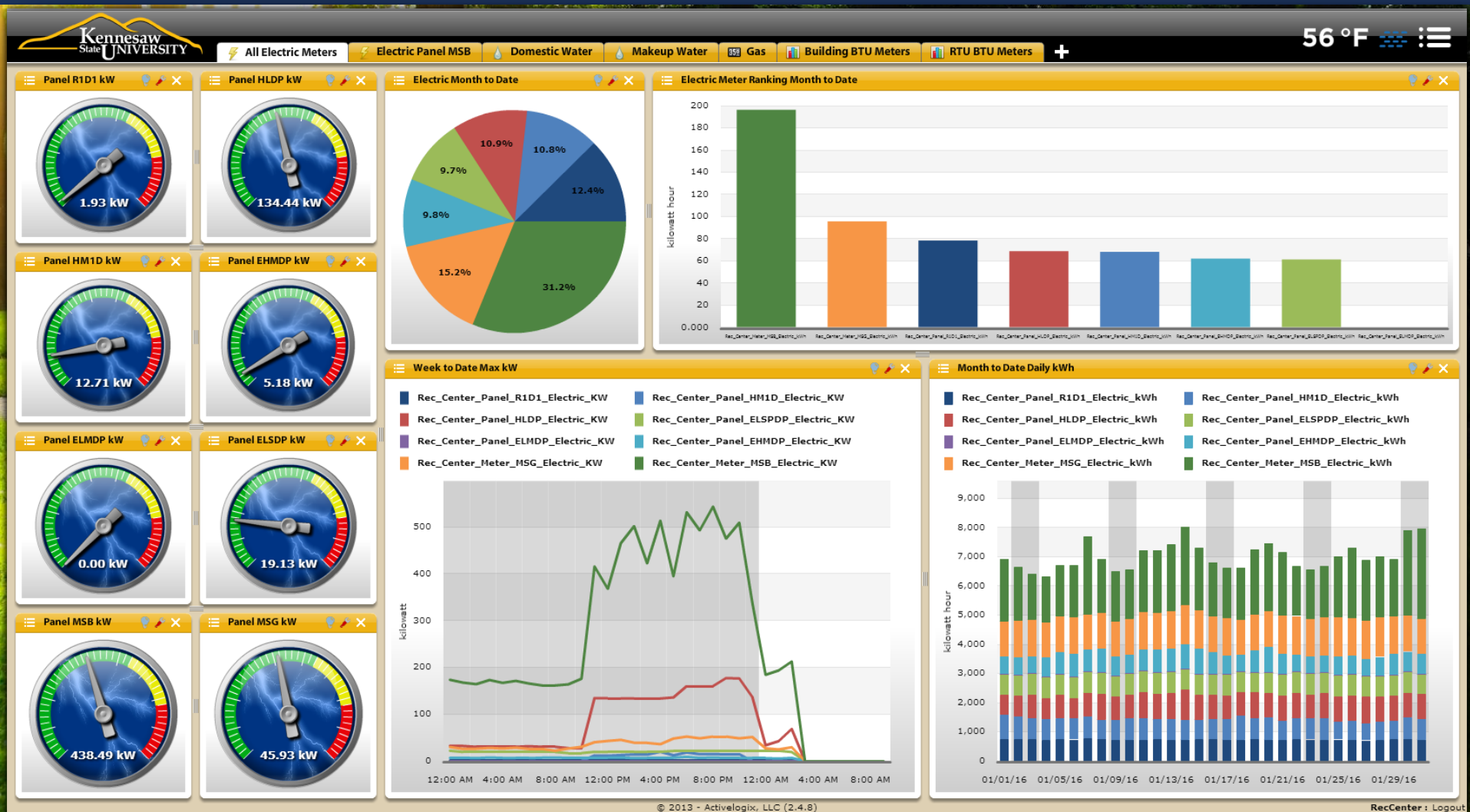
and...



4 - Where does the data go

**nowhere**

# 4 - Where does the data go





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2 - What's needed

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4 - Where does the data go

5 - What you do with the info

# What you do with the info

Kennesaw State  
Control Peak Demand  
8.294 → 8.0 MW

Control Twelve  
30-Minute Periods  
Save \$30,000+/Yr

What you do with the info

# Design Your Campus **Utility Measurement System**

Achieve **Sustainability Goals**  
via **Data Driven Solutions**

Reduce **CapEx**

**Stakeholder Buy-In**

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