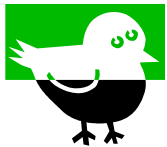


# Tapping the Power of Facility Information The Future of Building Management Visibility



Terry Hoffmann  
(Follow me on Twitter @MetasysMan)  
Dave Mosby



# Our Journey Today



- The BAS Promise
- Where are we now?
- Where do we need to go?
- Keys to making it happen
- Focus on Visibility
- Integration to the Enterprise
- Dashboards
- Real world examples
- Summary



# What is the Automation Promise



- Buildings that are:
  - Comfortable
  - Safe
    - Occupants
    - Assets
  - Efficient (Productive)
    - Energy
    - Equipment
    - Enterprise
  - Sustainable

# Building Management

## Where do we stand ?



- For the most part our building control systems are standalone and not integrated
- Our systems are under-instrumented
- Our control systems are over-distributed
- We are wasteful (\$14 billion powering and cooling data centers in N.A. and only 30% of the energy ever touches a computer)
- We do not follow the process:  
Plan, instrument, measure, manage, improve  
You can't manage what you don't measure

# THE most cost effective solution ...

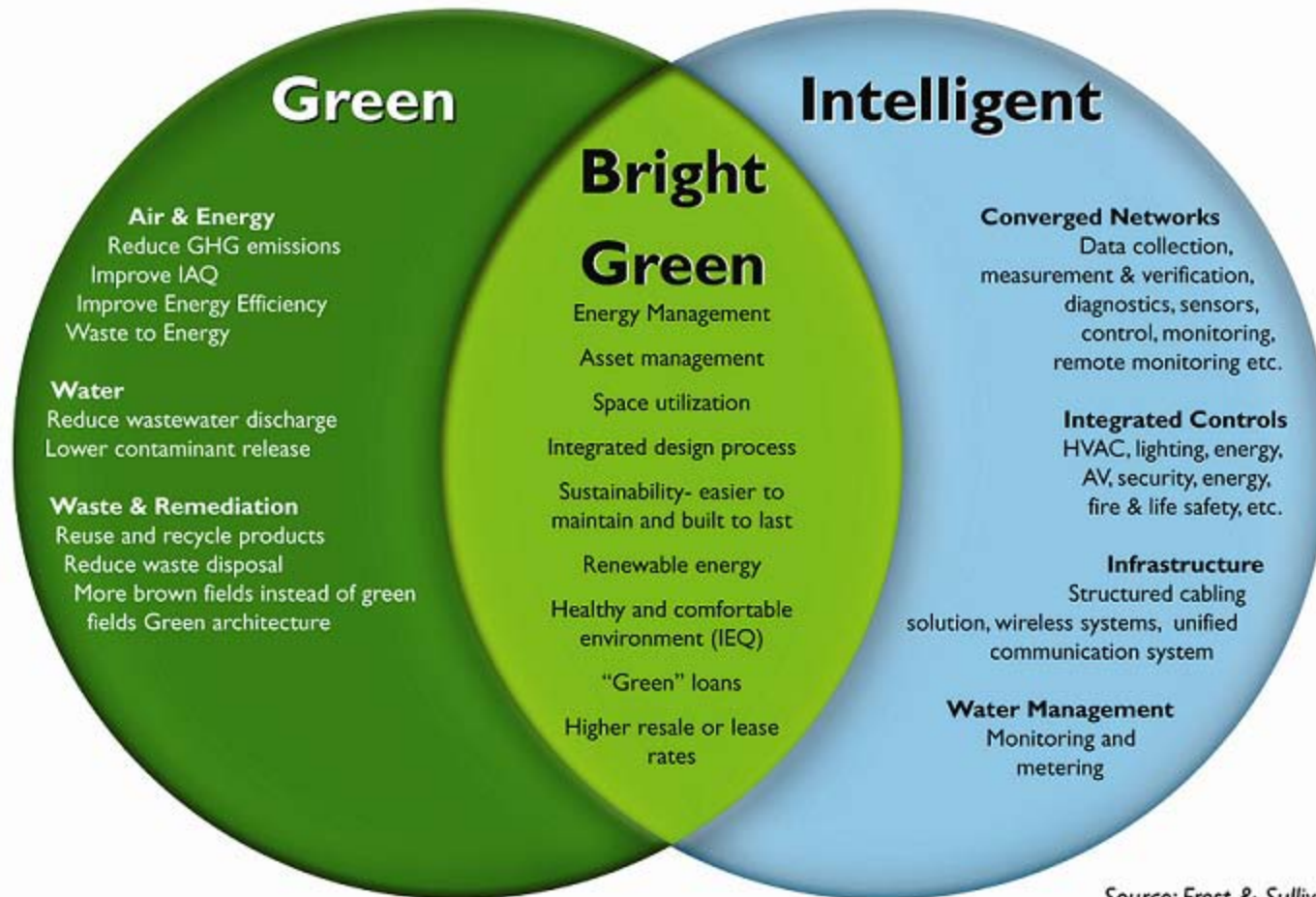


- **Resource efficient buildings that:**
  - Reduce energy use
  - Reduce use of Water and creation of Wastewater
  - Reduce CO<sub>2</sub> production
  - Increase use of renewable energy
  - Reduce consumption of other natural resources
  - Reduce generation of pollution
  - Create healthy environments and occupants

***a.k.a. = A Healthy, Technology Driven,  
High Performance Green Building***



# Convergence of Intelligent and Green Buildings



Source: Frost & Sullivan

# Technology applied to deliver.....



- Compatibility
- Mobility
- Connectivity
- Scalability
- Security
- Interoperability
- Efficiency
- Longevity
- Flexibility
- Reliability

# Technology



# Key Concepts – Applied Technology Building Management



## 1 VISIBILITY

Enhanced User Experience



## 3 FLEXIBILITY

Hardware & Software Platforms



## 5 SECURITY

Security & Fire Safety



## 2

## EFFICIENCY

Energy & Plant Applications



## 4

## CONNECTIVITY

Including Enhanced Wireless Capabilities



## 6

## SUSTAINABILITY

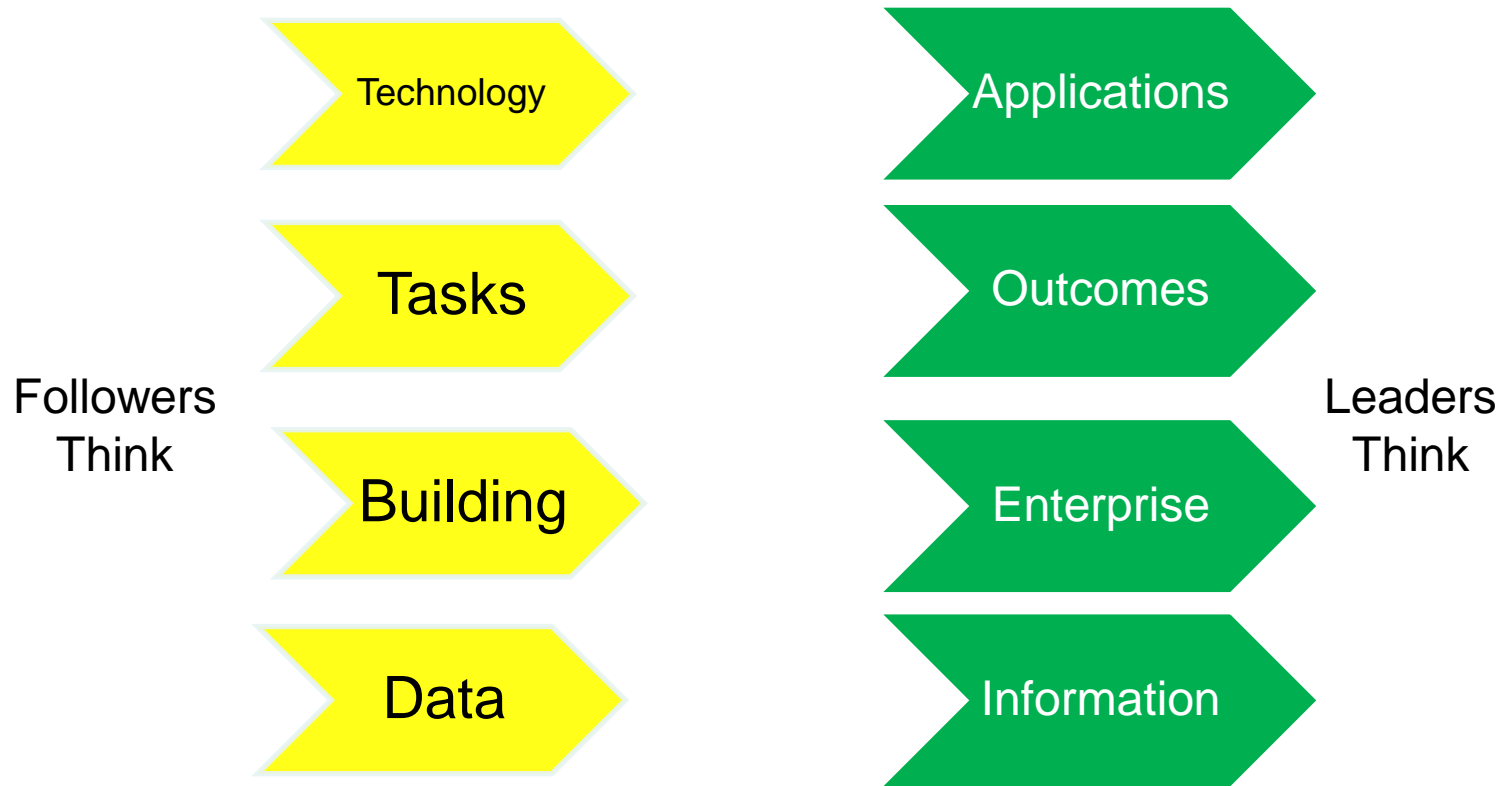
Programs





# Where We are Headed

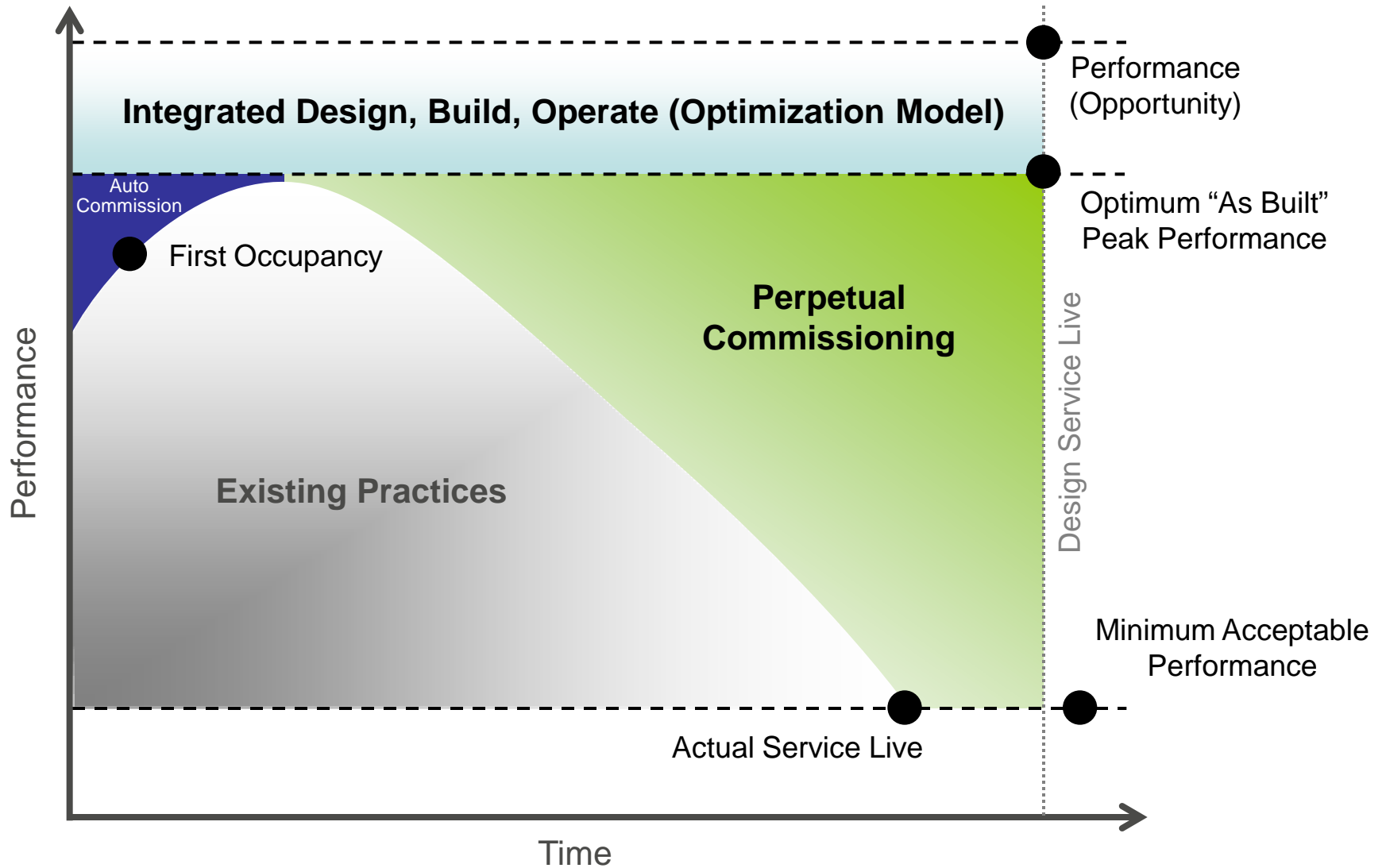
## Thinking with the End in Mind – Left to Right Transformation



The Difference

Automation ----- Optimization

# The Enterprise Real Lifecycle Cost Model



But you can't manage what you can't see



Data transformed = Information

Information needs to be:

Tailored

Focused

Actionable

**Visibility**

**is the key**

Because even the best  
Information is useless if it's  
invisible



# Information Visibility Elements



- Device Level Interfaces
- Tailored Summaries
- Advanced Reporting
- Graphical displays
- Mashups
- Dashboards
- Mobile Access

The collage illustrates various information visibility elements:

- Mobile Access:** A hand holding a smartphone displaying a mobile app interface with a 'Standard Summary' for AHU-1, showing status (Online) and temperature (72.2 deg F).
- Advanced Reporting:** A printed report titled 'Metasys Site Name Energy Overview Report' by Johnson Controls. It includes sections for General (Report Generated by, Report Generation Date/Time, Energy Unit/Type, Category, Reporting Period, Time Zone, Functional Area, Location, Notes), Weather Data (Current Year vs. Previous Year for Outdoor Air Temp Avg, High & Low, Enthalpy Avg, High & Low, Humidity Avg, Heating Degree Days, Cooling Degree Days), Sample Data (2009 Energy Count, % Lammable, Missing Samples), and Energy Consumption By Type (a 3D pie chart showing 55% Electrical, 25% Gas, 8% Steam, 8% Oil, 2% Fuel Oil, 2% Natural Gas).
- Device Level Interfaces:** Two physical Johnson Controls thermostat devices. One is a 'FEC 1621 UNIVERSAL BINARY' thermostat with a color display showing 'Main Menu', 'Override', 'Display Information', and 'Controller Information'. The other is a 'RoomTemp' thermostat showing '68.0 °F'.

# Device Level Interfaces



- Configurable
- Usable
- Secure
- Intuitive
- Efficient





# Tailored Summaries



Metasys

Item Edit View Action Insert Tools Query Help Terry Logout Exit

Corporate Center - VAVs

Tailored Summary Summary

Available Tailored Summaries

- Monitoring - Corp Center VAVs
- Configuration - Corp Center VAV Flow
- Configuration - N2 Controllers

Key Data

Item	Value
5757_1-1	Online
5757_1-1.DA-T	60 deg F
5757_1-1.SF-S	On
5757_1-1.MA-T	55 deg F

Controller	Description	Zone Temp	Setpoint	Discharge Temp	Htg Output	Flow	Flow Setpoint
VAV-1-01	Multipurpose 106N	71 deg F	72 deg F	62 deg F	0 %	1,544 cfm	1,520 cfm
VAV-1-02	NE Conference 109	72 deg F	72 deg F	87 deg F	0 %	467 cfm	470 cfm
VAV-1-10	Multipurpose 106S	73 deg F	73 deg F	62 deg F	0 %	329 cfm	320 cfm
VAV-1-11	Women 107	68 deg F	68 deg F	60 deg F	0 %	183 cfm	179 cfm
VAV-1-12	Men's Vest 105A	72 deg F	72 deg F	61 deg F	0 %	90 cfm	90 cfm
VAV-1-13	AV Closet 104	73 deg F	72 deg F	---	---	18 cfm	28 cfm
VAV-1-14	5757,VAV-1-14	71 deg F	70 deg F	---	---	119 cfm	131 cfm
VAV-1-3	Conference 111	65 deg F	64 deg F	61 deg F	0 %	796 cfm	840 cfm
VAV-1-4	Pantry 114	72 deg F	72 deg F	68 deg F	23 %	781 cfm	790 cfm
VAV-1-5	Interview Rm 113	68 deg F	68 deg F	62 deg F	0 %	255 cfm	255 cfm
VAV-1-6	Interview Rm 118	73 deg F	72 deg F	62 deg F	0 %	347 cfm	360 cfm
VAV-1-7	Waiting 122	73 deg F	73 deg F	61 deg F	0 %	1,339 cfm	1,244 cfm
VAV-1-8	Lobby 101	73 deg F	73 deg F	62 deg F	0 %	927 cfm	885 cfm
VAV-1-9	Corridor / Stor 112W/102	71 deg F	72 deg F	62 deg F	0 %	318 cfm	315 cfm
VAV-2-1	Corr 218	72 deg F	72 deg F	63 deg F	0 %	138 cfm	135 cfm
VAV-22	Stand Alone Radiation	73.5 deg F	65 deg F	---	---	---	---
VAV-2-10	Office 223	72 deg F	72 deg F	64 deg F	---	302 cfm	300 cfm
VAV-2-11	Office 224	71 deg F	71 deg F	??? 269 deg F	0 %	443 cfm	436 cfm

Total Row Count: 38

Server: 5/6/2010 02:16 PM CDT

# Advanced Reporting



## My Site

### Last Month's Energy Usage



#### General

Report Generated By: Ed, Energy Manager  
 Report Generation Date/Time: Thursday, December 03, 2009 11:50 AM  
 Time Zone: Central Standard Time  
 Report Path: Standard Reports\Energy Essentials Reports\Big Picture Energy\  
 Energy Types: Electricity, LP Gas, Natural Gas, Steam, Water Dist.  
 Categories: Building Energy Use, Other, Outdoor Energy Use, Process Energy Use  
 Subcategories: Domestic Hot Water, Lighting, Multiple, Other, Plug Loads, Snow Melt  
 Duration: 11/1/2009 12:00:00 AM - 11/30/2009 12:59:59 PM  
 Functional Area (no units): N/A  
 Locations: College of Engineering, Jefferson Dorm, Toner Hall  
 Items: Electricity, Natural Gas, Steam, Water Dist., LP Gas  
 By Billing Period: Not Included

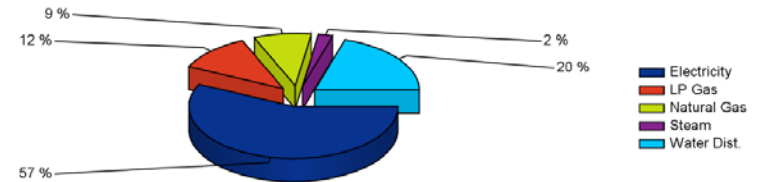
#### Weather Data

	Current Period	Previous Year
Outdoor Air Temp Avg (deg F):	70.13	70.31
Outdoor Air Temp High   Low (deg F):	79.99   60.00	89.96   50.02
Outdoor Air Enthalpy Avg (Btu/lb dry air):	39.91	41.26
Outdoor Air Enthalpy High   Low (Btu/lb dry air):	69.98   2.94	70.00   5.64
Outdoor Air Humidity Avg (%RH):	57.42	65.26
Outdoor Air Humidity High   Low (%RH):	59.34   52.77	98.00   45.47
Heating Degree Days (75.00deg F):	150	151
Cooling Degree Days (55.00deg F):	450	450

#### Sample Data Quality

Total Sample Count:	61,068	63,908
% Unreliable:	4.65	0.00
Missing Samples:	2,840	0

## Overview



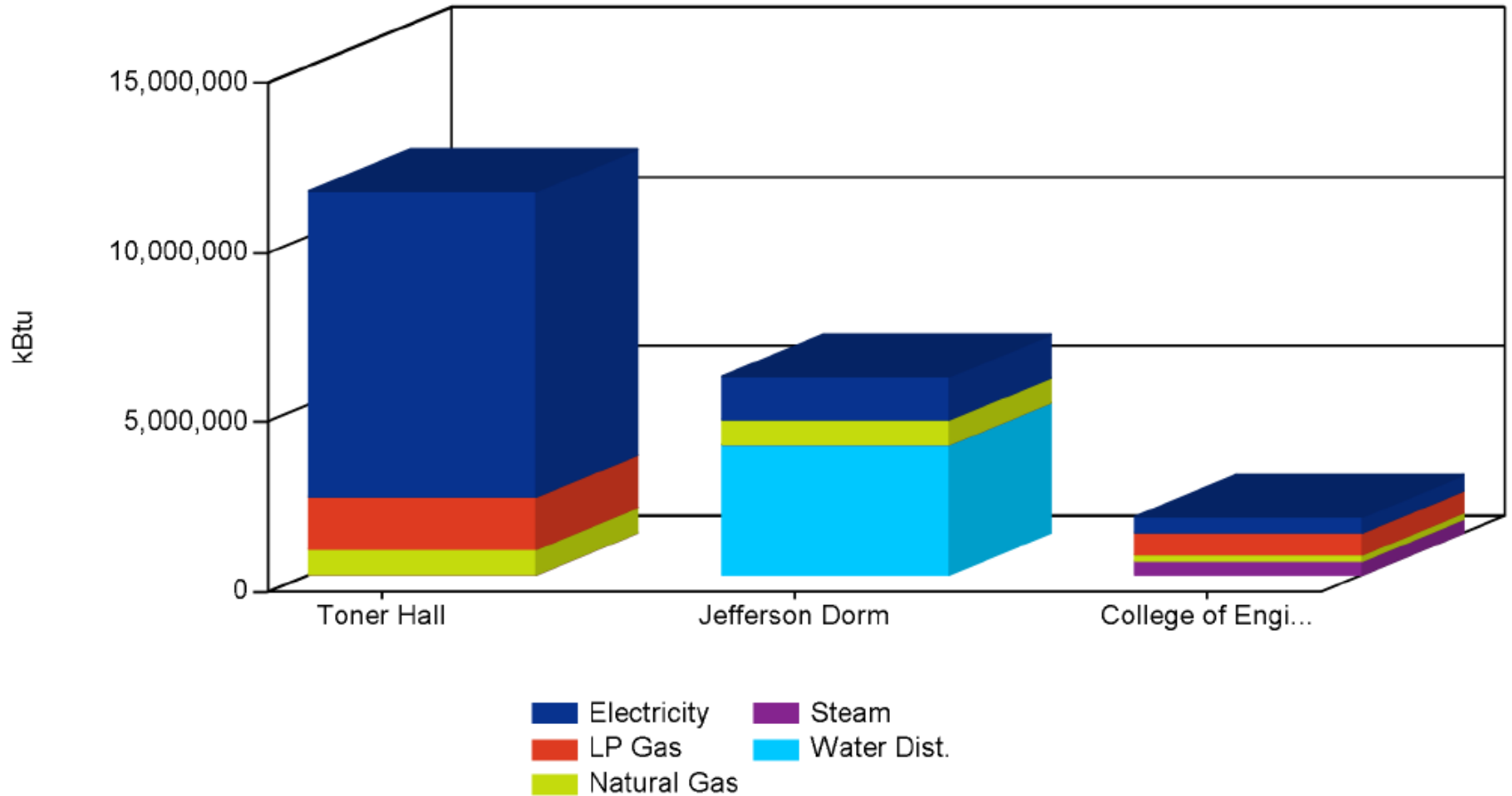
## Energy Usage

Category	Subcategory	Energy Type								Source Energy (kBtu)
		Electric (kWh)	Nat. Gas (thrm)	Steam (lbm)	Oil	Water Dist. (MBtu)	LP Gas (Gal)	Coal	Water Cons.	
<b>Total Building Energy Use</b>		<b>188,958</b>	<b>15,954</b>			<b>2,846</b>				<b>7,665,397.06</b>
Building Energy Use	Domestic Hot Water		15,954			2,846				5,511,924.41
	Lighting	106,450								1,213,167.62
	Multiple	10,486								119,507.27
	Plug Loads	72,022								820,797.76
<b>Total Outdoor Energy Use</b>		<b>754,527</b>								<b>8,599,006.91</b>
Outdoor Energy Use	Lighting	754,527								8,599,006.91
<b>Total Process Energy Use</b>				<b>267,303</b>			<b>24,142</b>			<b>2,612,888.15</b>
Process Energy Use	Multiple			267,303						418,208.71
	Snow Melt						24,142			2,194,679.44
<b>Net Facility Energy Use</b>		<b>943,485</b>	<b>15,954</b>	<b>267,303</b>		<b>2,846</b>	<b>24,142</b>			<b>18,877,292.12</b>
<b>Source Energy Equivalent (kBtu)</b>		<b>10,752,479.56</b>	<b>1,670,383.16</b>	<b>418,208.71</b>		<b>3,841,541.25</b>	<b>2,194,679.44</b>			<b>18,877,292.12</b>

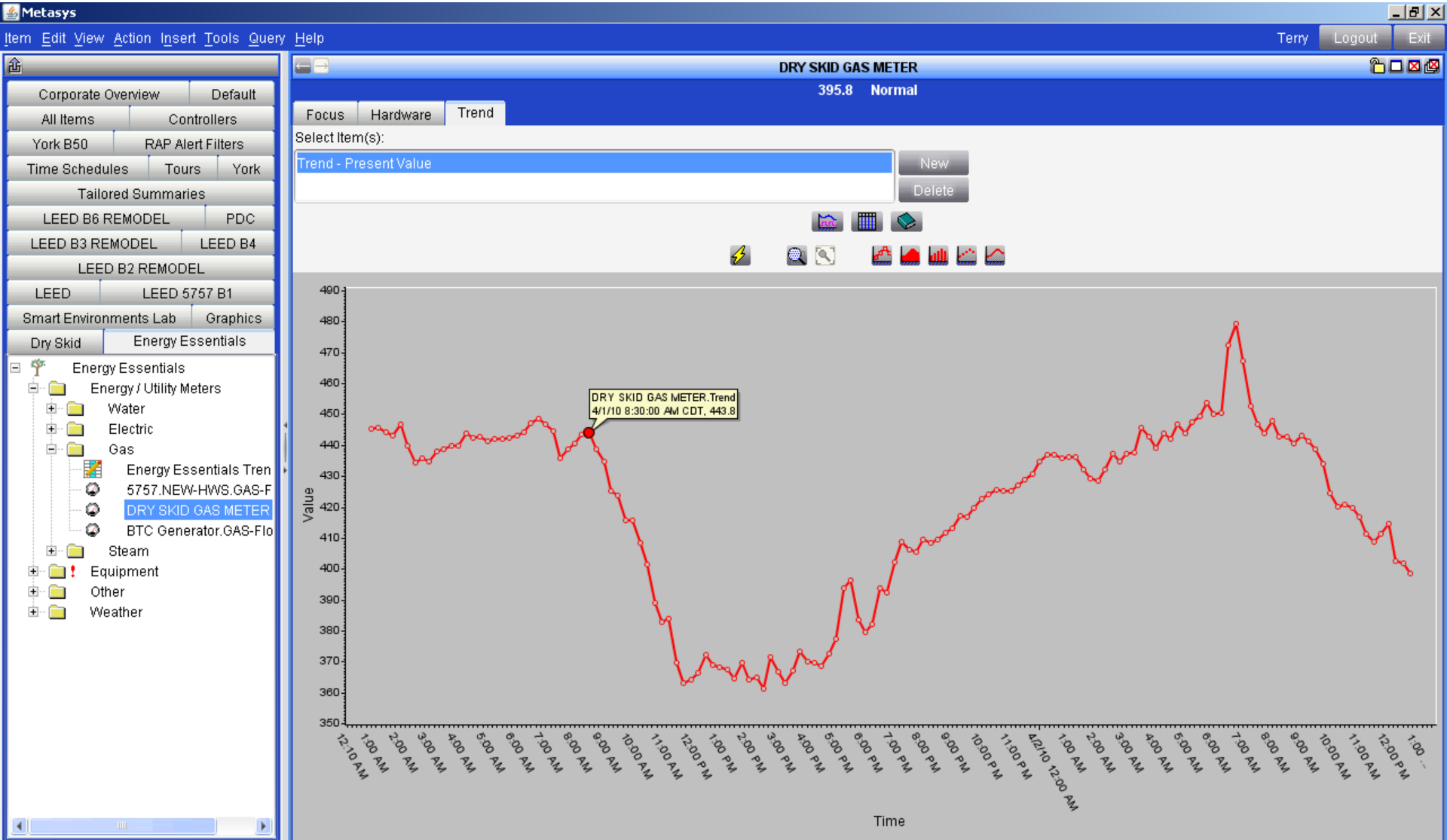
# Advanced Reporting



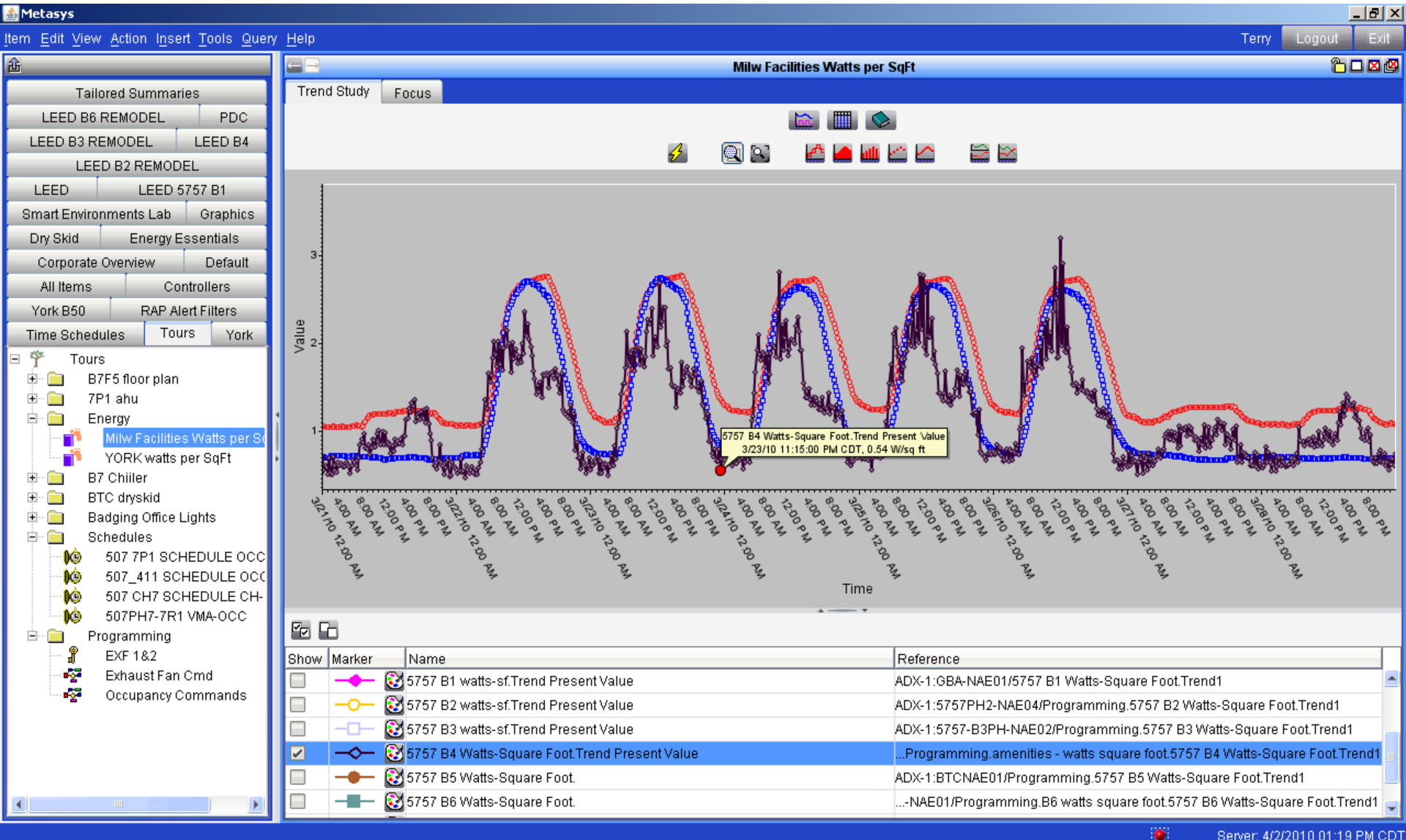
## Usage by Location with Energy Type



# Graphical Displays



# Graphical Displays/KPIs



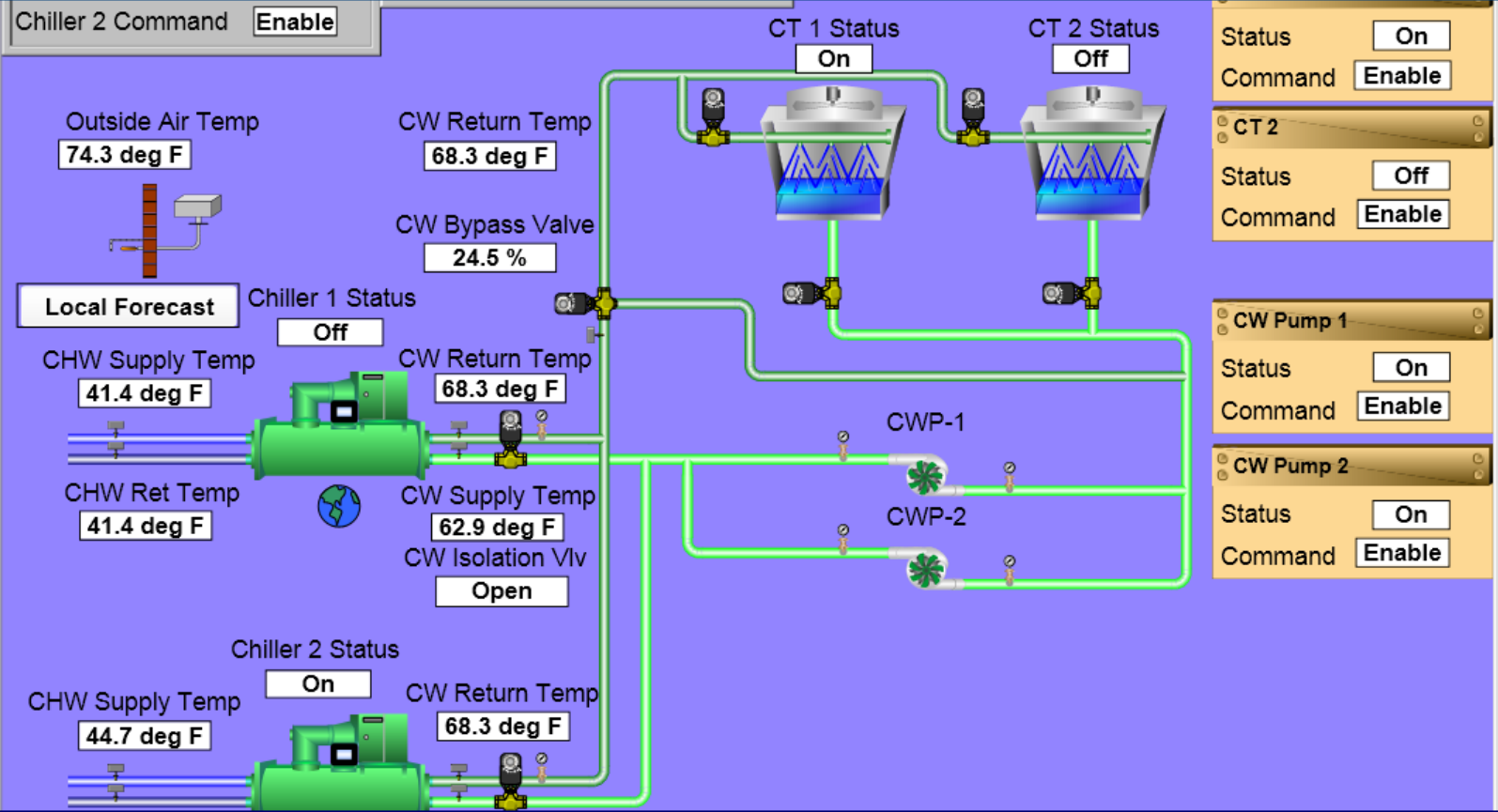


# Graphical Displays/Mashups



metasyssysagent

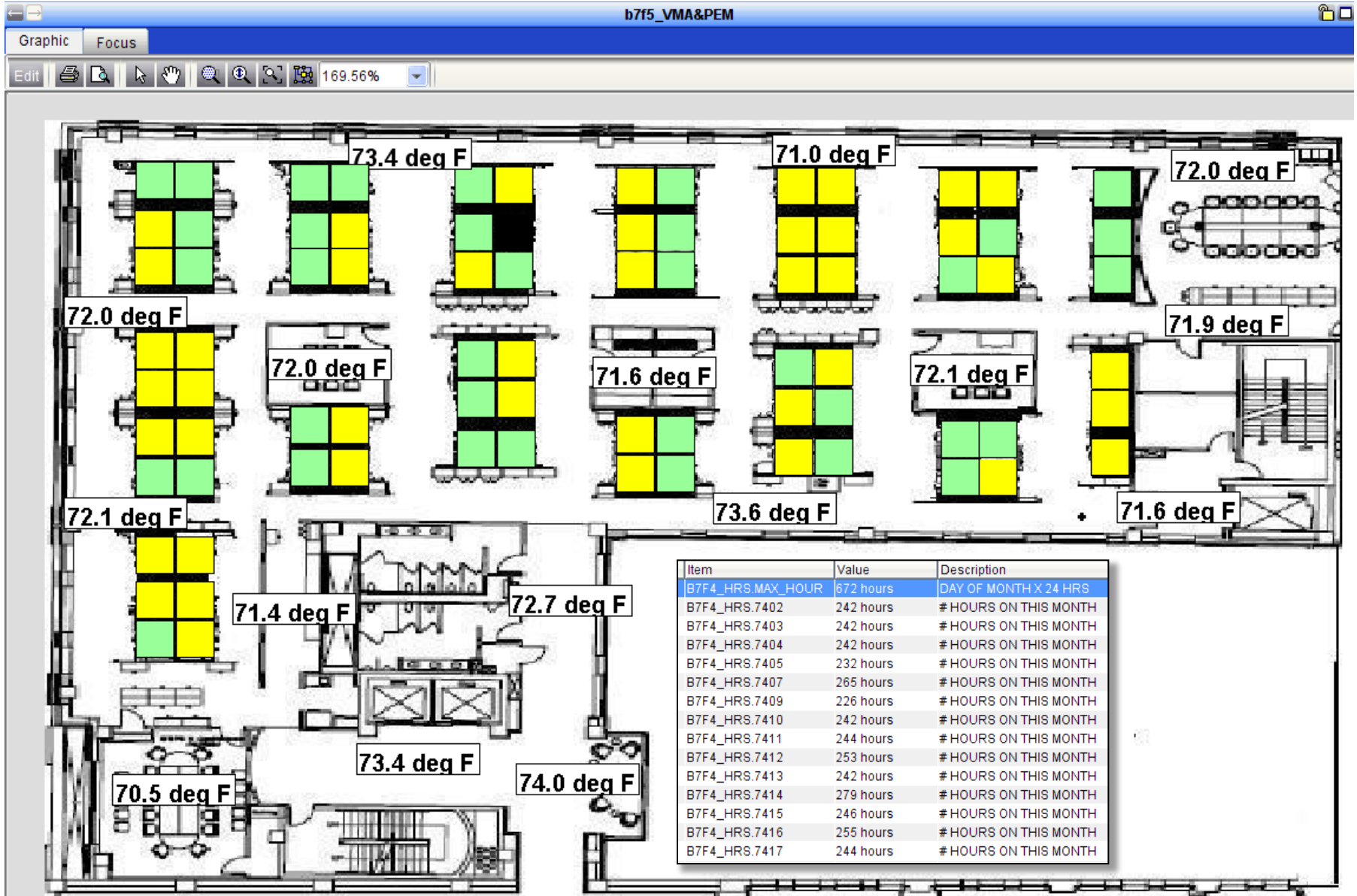
Graphic: CHWSYS



Copyright © Johnson Controls, Inc. 2007-2009

System Information

# Graphical Displays/Mashups



# Graphical Displays/Mashups/KPIs



Item	Value	Description
B7F4_HRS.MAX_HOUR	672 hours	DAY OF MONTH X 24 HRS
B7F4_HRS.7402	242 hours	# HOURS ON THIS MONTH
B7F4_HRS.7403	242 hours	# HOURS ON THIS MONTH
B7F4_HRS.7404	242 hours	# HOURS ON THIS MONTH
B7F4_HRS.7405	232 hours	# HOURS ON THIS MONTH
B7F4_HRS.7407	265 hours	# HOURS ON THIS MONTH
B7F4_HRS.7409	226 hours	# HOURS ON THIS MONTH
B7F4_HRS.7410	242 hours	# HOURS ON THIS MONTH
B7F4_HRS.7411	244 hours	# HOURS ON THIS MONTH
B7F4_HRS.7412	253 hours	# HOURS ON THIS MONTH
B7F4_HRS.7413	242 hours	# HOURS ON THIS MONTH
B7F4_HRS.7414	279 hours	# HOURS ON THIS MONTH
B7F4_HRS.7415	246 hours	# HOURS ON THIS MONTH
B7F4_HRS.7416	255 hours	# HOURS ON THIS MONTH
B7F4_HRS.7417	244 hours	# HOURS ON THIS MONTH

Graphic: Corp



terry



# Enterprise Integration, Information Dashboards



## Enterprise Applications



## Data Normalization

EnNET Enterprise Integration Middleware

## Physical Convergence

Common IP Infrastructure

## Building Control Systems

Fire – HVAC – Security – Lighting – Metering – CCTV

Benefit/ Value  
**Reduced CAPEX  
and OPEX**

**Operation  
Maintenance  
Compliance  
Efficiency**

# Site Rankings

Cost and Usage Summary

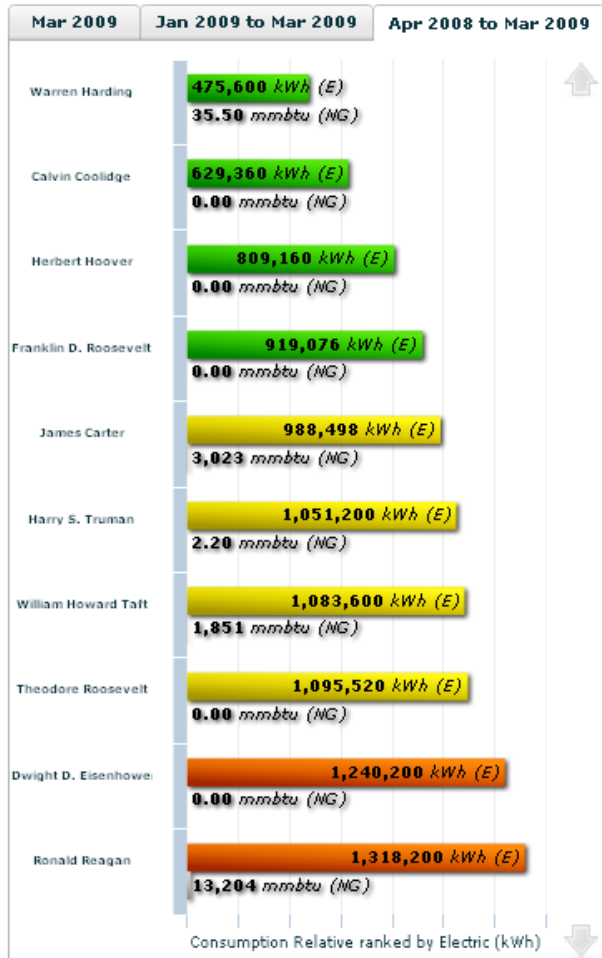
Cost and Usage Detail

BAS Events Summary

BAS Events Detail

Site Set: **1900s Presidents ( 17 Sites )** ▼

## Site Consumption



## Site Economic Impact



## Site Environmental Impact (Estimated)



Rank By: [Electric \(kWh\)](#) [Natural Gas \(mmbtu\)](#) | Normalization: [Relative \(No Normalization\)](#) [per sf](#) [per Person](#) [per Degree Day Heating](#) [per Degree Day Cooling](#)

Energy Analyzer

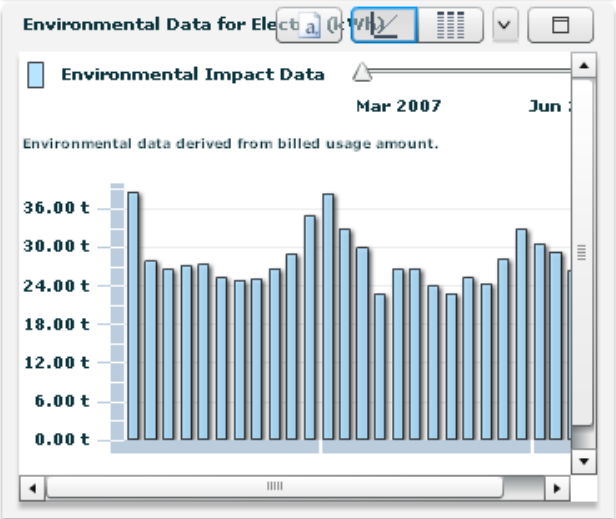
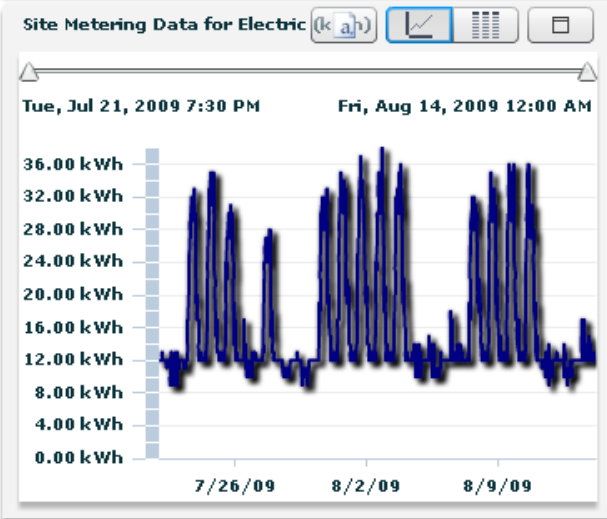
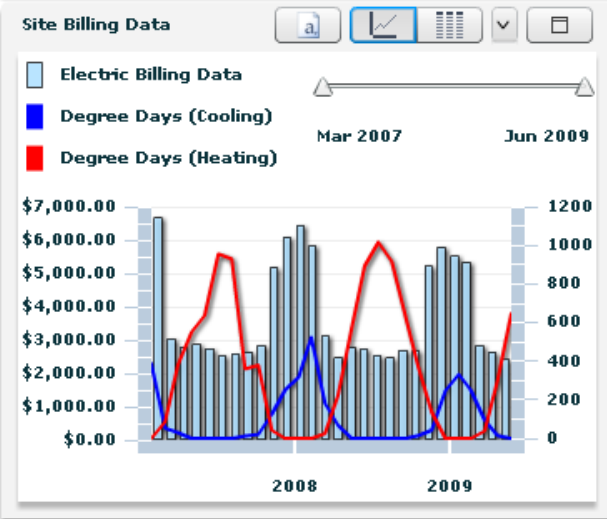
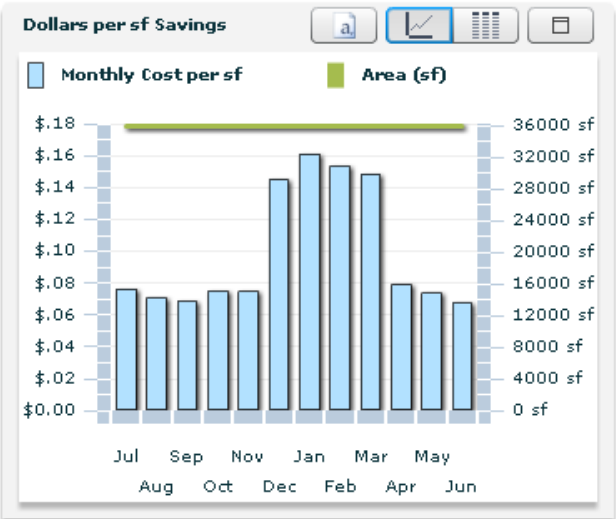
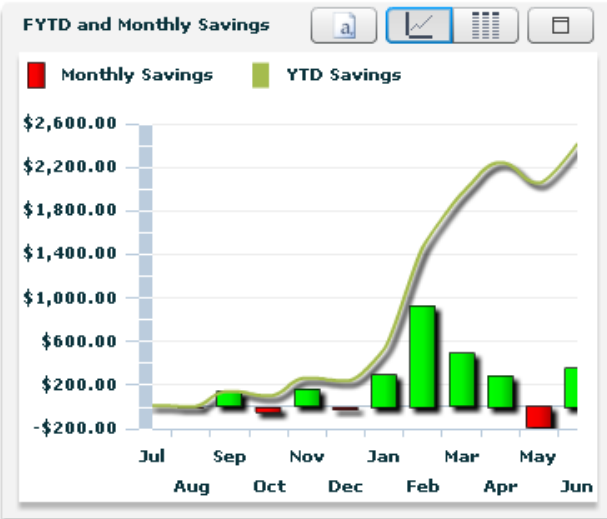
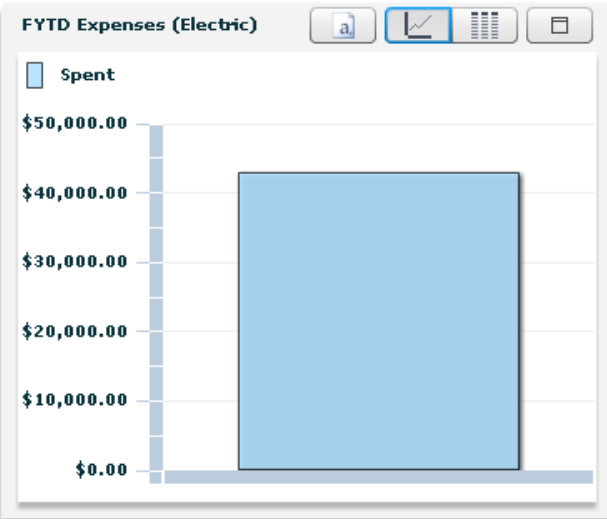
Time Series/Event Analysis

Help

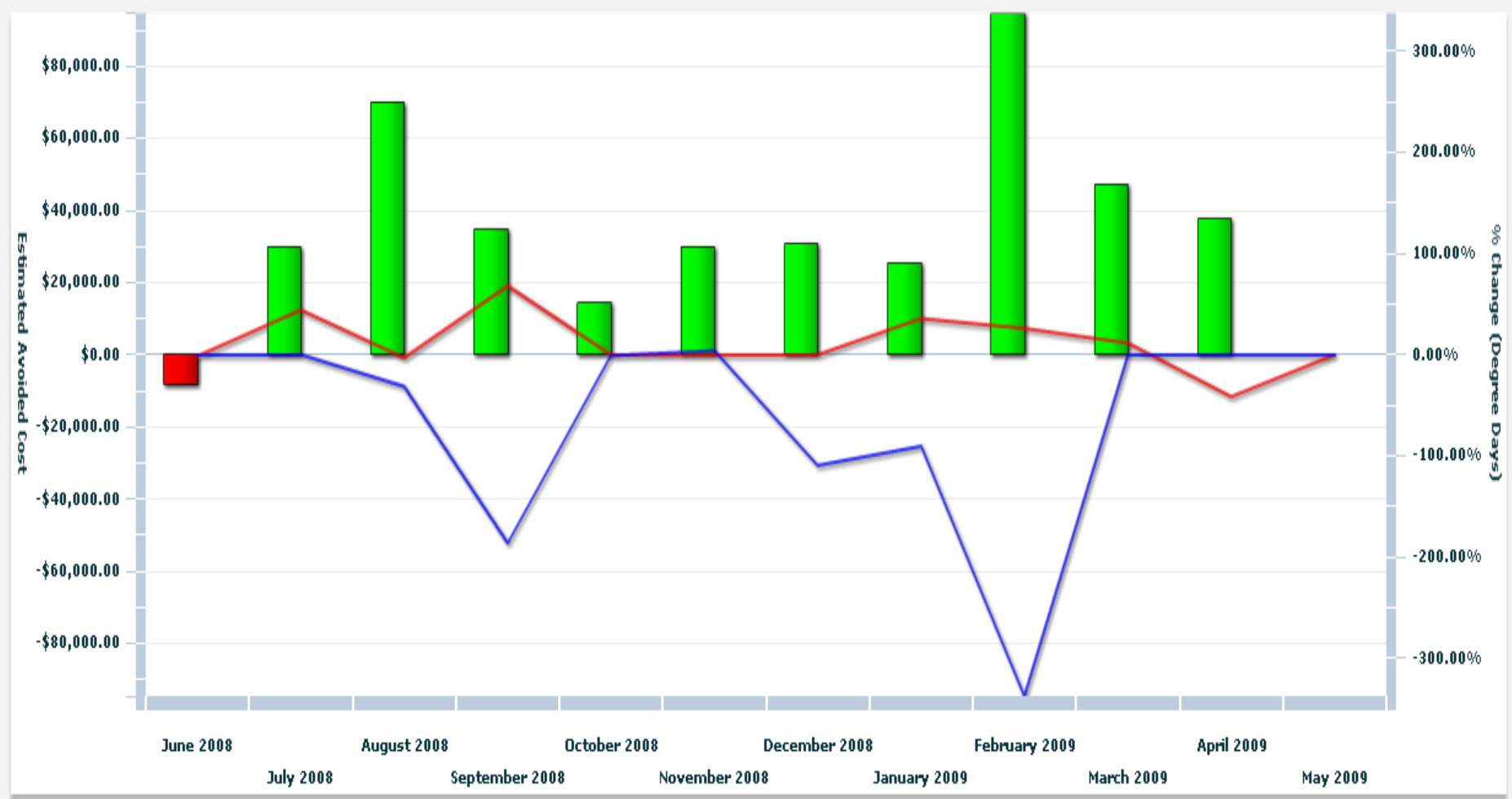
Administration



Site: Warren Harding



Enterprise Usage - All (44 Sites) Showing actual usage, calculated baseline



Baseline Chart |  Deviation Chart |  Cost Avoidance Chart |  Data Grid

Total cost avoided: \$406,673.31. Positive numbers represent an avoidance, negative numbers extra expense.

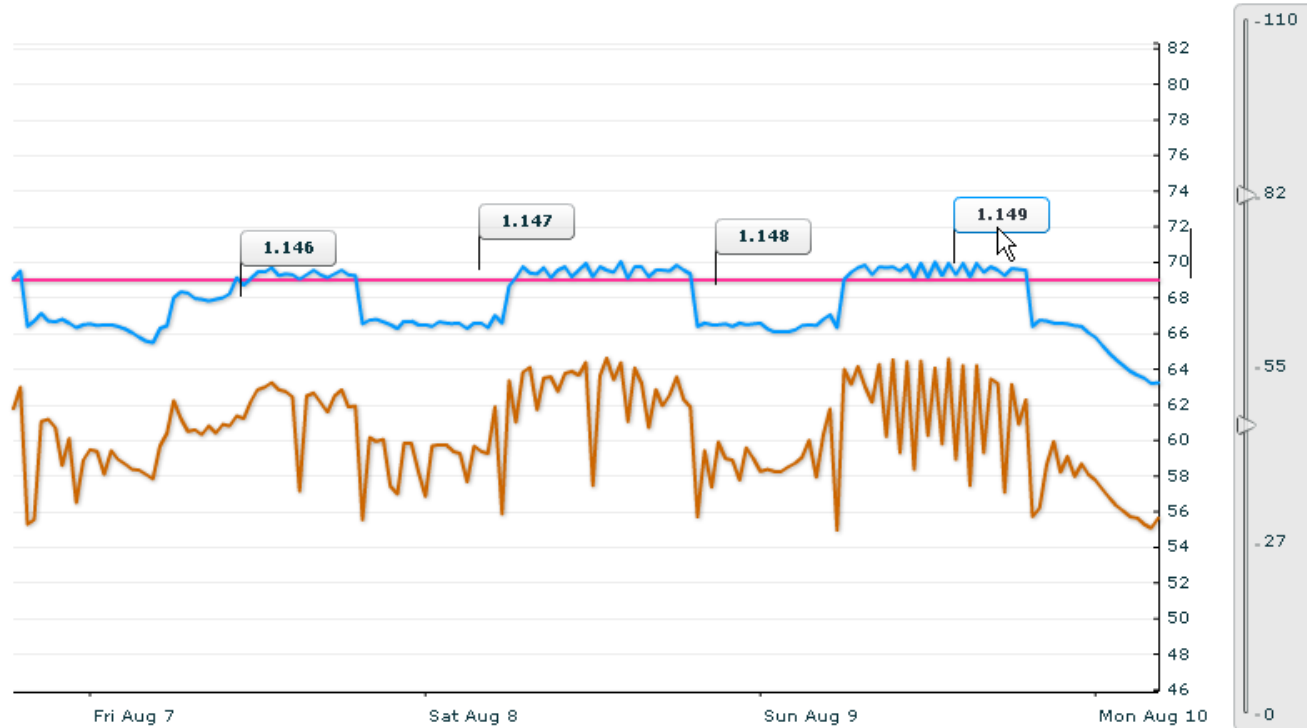
Details

Stats   
  Event Details   
  Event Detection   
  Date Range   
  Messages

Current Week   
  Current Month   
  Current 3 Months   
  Custom Range   
  Show Forecasted Data

Custom Range to Retrieve  
 From:    
 To:

Zoom [1d](#) [5d](#) [1m](#) [3m](#) Max ± : Data Axis Scaling [Restore Default](#) [Scale to Data](#)



Related Events

**HVAC\_Events**

**1.137: Sun Aug 2 2009 10:00:00 PM**  
 George Washington RTU-4  
 EnNET - Warning  
 The Space Temperature was below the Unoccupied Heating Setpoint plus the default allowed deviation. The default allowed

**1.145: Thu Aug 6 2009 10:30:00 AM**  
 George Washington RTU-4  
 EnNET - Warning  
 The Space Temperature was above the Unoccupied Cooling Setpoint plus the default allowed deviation. The default allowed

**1.146: Fri Aug 7 2009 06:00:00 AM**  
 George Washington RTU-4  
 EnNET - Warning  
 The Space Temperature was above the Unoccupied Cooling Setpoint plus the default allowed deviation. The default allowed

**1.147: Fri Aug 7 2009 06:00:00 PM**  
 George Washington RTU-4  
 EnNET - Warning  
 The Space Temperature was above the Unoccupied Cooling Setpoint plus the default allowed deviation. The default allowed

**1.148: Sat Aug 8 2009 06:00:00 AM**  
 George Washington RTU-4  
 EnNET - Warning  
 The Space Temperature was above the Unoccupied Cooling Setpoint plus the default allowed deviation. The default allowed

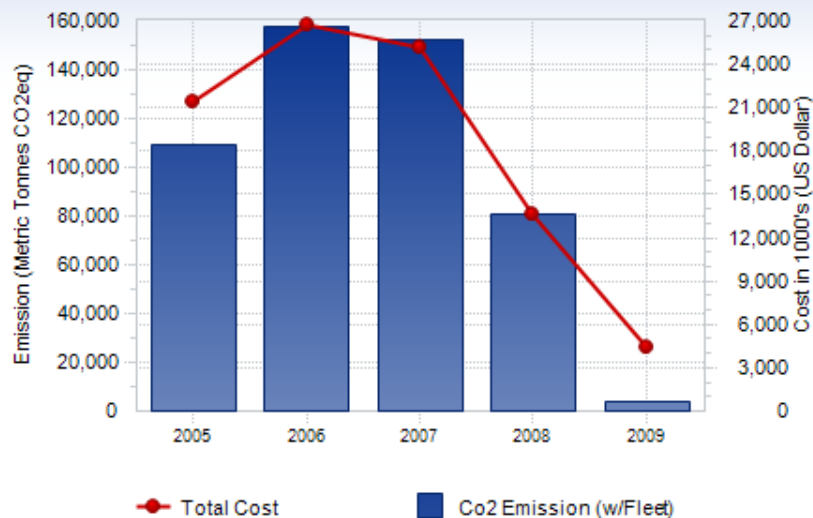
**1.149: Sat Aug 8 2009 06:00:00 PM**  
 George Washington RTU-4  
 EnNET - Warning  
 The Space Temperature was above the Unoccupied Cooling Setpoint plus the default allowed deviation. The default allowed

**1.150: Sun Aug 9 2009 06:00:00 AM**

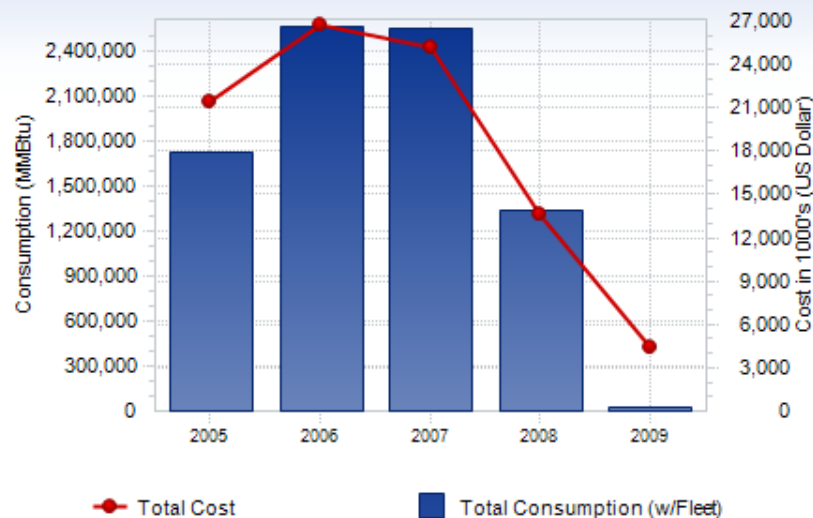
[Refresh Events](#)    [Load More Events](#)

Click the graph icon to see the graph, the table icon to see tabluar data, or the [a] button to export to CSV.

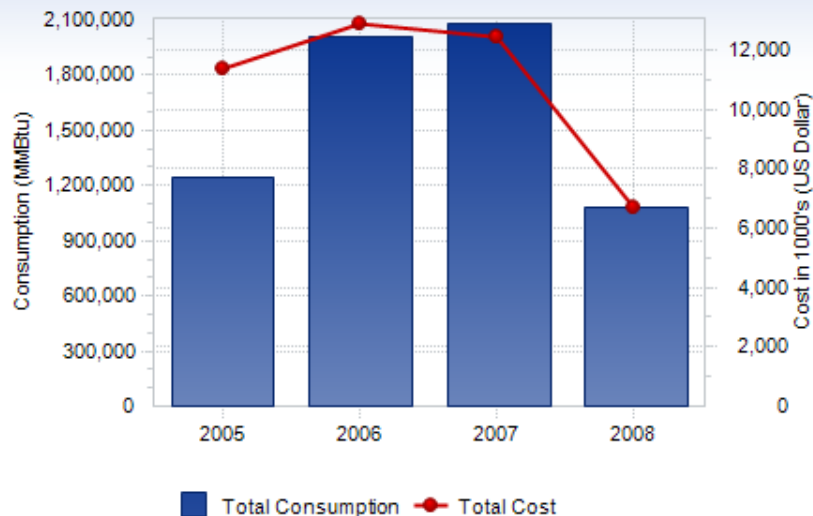
### Demonstration - Annual CO2 Emissions



### Demonstration - Annual Energy Cost and Consumption



### Facility 01 - Annual Energy Cost and Consumption



### Demonstration - Annual Water Cost and Consumption



**Reports**

- [Project Summary Report](#)
- [Quarterly Savings Report](#)
- [Change Report](#)

**Toolbox**

- [ROI Calculator](#)
- [Unit of Measure Converter](#)
- [Currency Converter](#)
- [CO<sub>2</sub> Calculator](#)

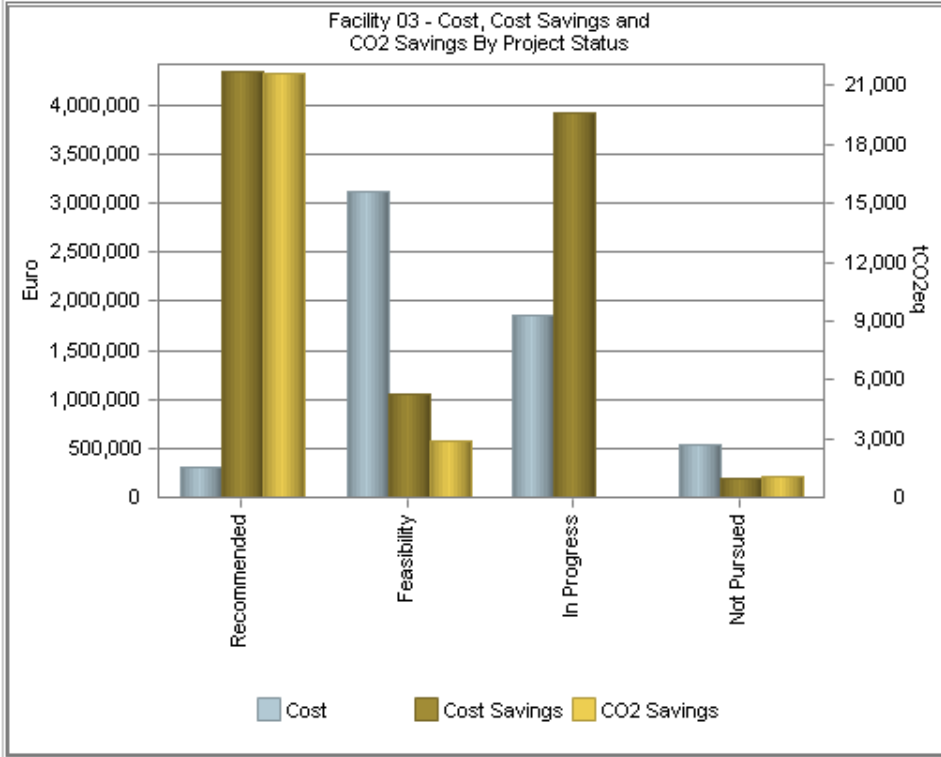
**Admin**

- [Project Categories](#)
- [User Preferences](#)
- [Category Grouping](#)

**My Reports**

Report Name	Run	Delete
1		

**Facility Project Summaries** Facility 03



- Completed Projects
- All Others

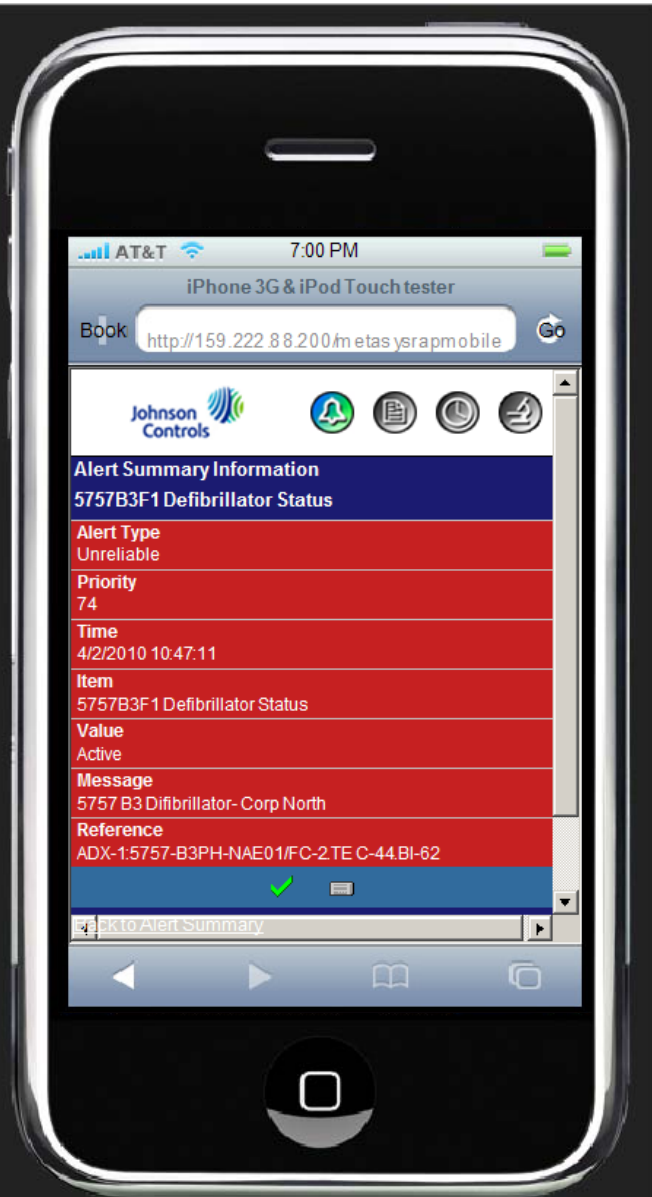
**Facility Project List**

[Add New Project](#) [Export to Excel](#)

Click on column headers to sort.

Project Number	Project Name	Status	Project Manager	Budgeted Year	Building	Documentation			
7716	902 Filter System Modifications	Recommended	S.Mitchell	N/A	Building A	View	<a href="#">View</a>	<a href="#">Edit</a>	<a href="#">Delete</a>
7715	500 LTHW FCU and RHB pumps seasonal shutdown	Feasibility	Steve Mitchell	N/A	Building A	View	<a href="#">View</a>	<a href="#">Edit</a>	<a href="#">Delete</a>
7714	Science Building Vac Pump Turn Off	Recommended	Steve Mitchell	N/A		View	<a href="#">View</a>	<a href="#">Edit</a>	<a href="#">Delete</a>

# Mobile Access/UI convergence



# Mobility





# Visibility: Summary & Direction



- “We are headed, inexorably, toward an image based culture dominated by the visual language...”

Futurists, 1970

- We will not type, but rather touch, pinch, swoosh, tilt, shake and caress.

(Wired Magazine 05/2010)



# Vision

A more comfortable, safe and sustainable world.





## Case Study: State of Missouri Enterprise Solution



**Dave Mosby, National Solutions Business Development Director**

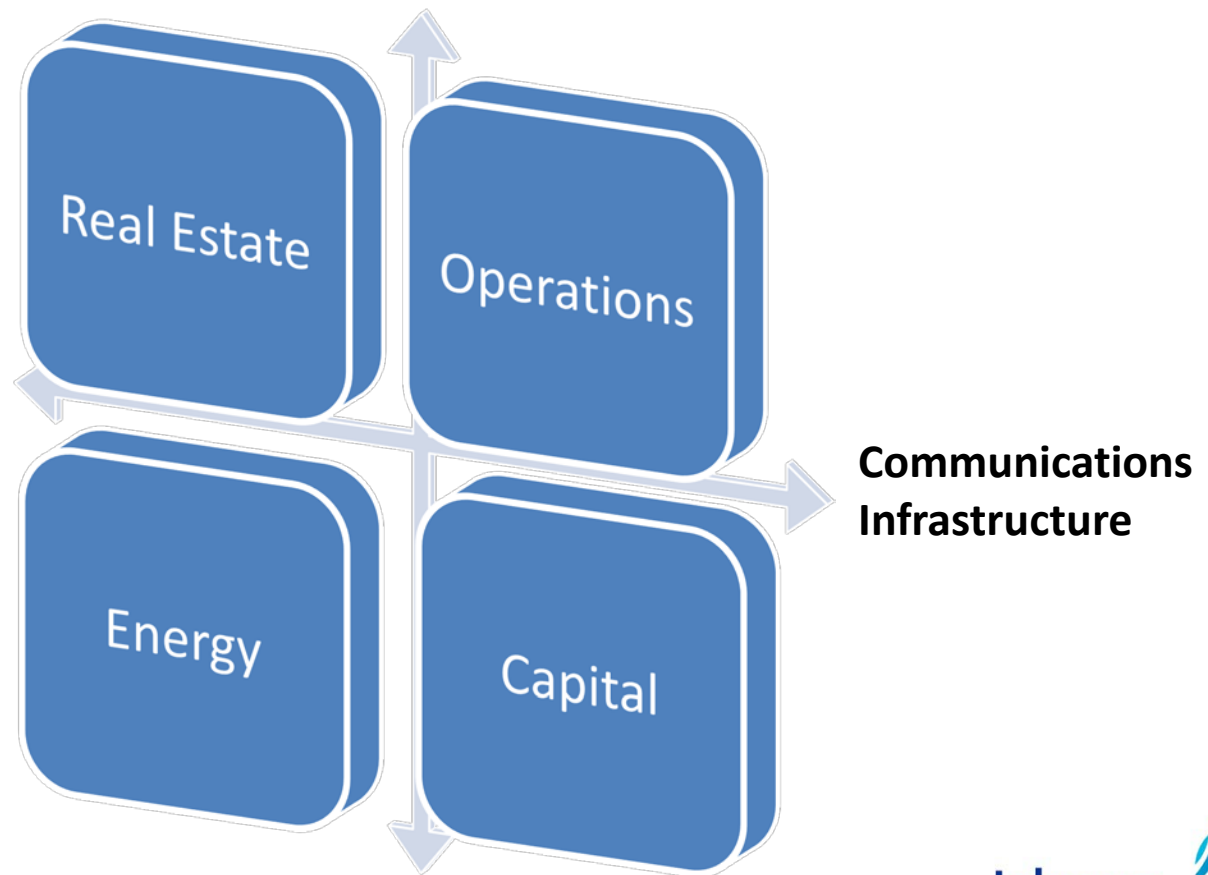


# OVERVIEW

- Vision
- Solution
- Results
- Lessons Learned
- Questions



# Budget Boxes







RADIO CALL

BATTERY POWER

BATTERY POWER NORMAL

EMERGENCY CABIN RELEASE

END TAXI ALERT

TAXI WARNING

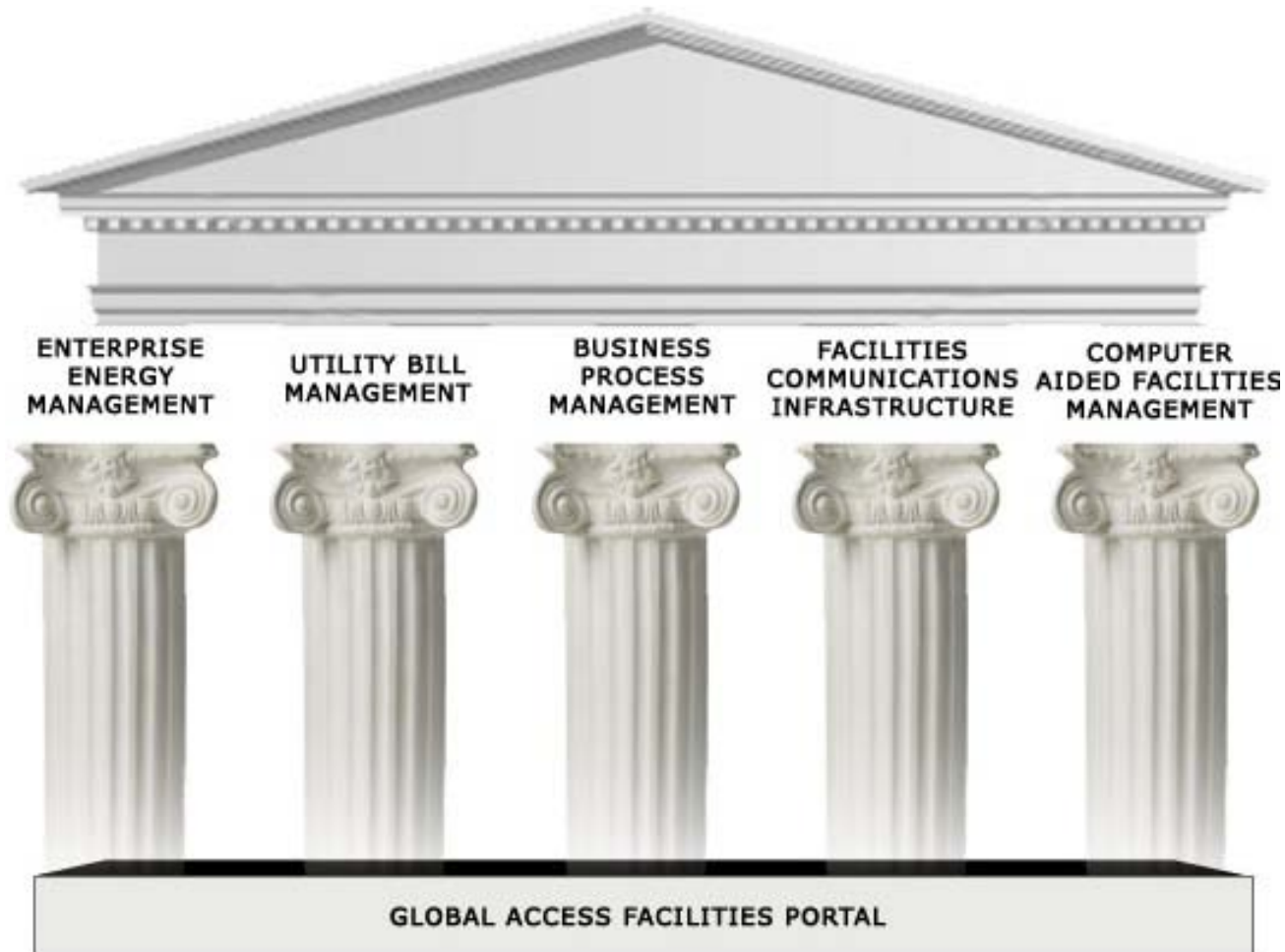
APU 1 START  
APU 2 START

FUEL





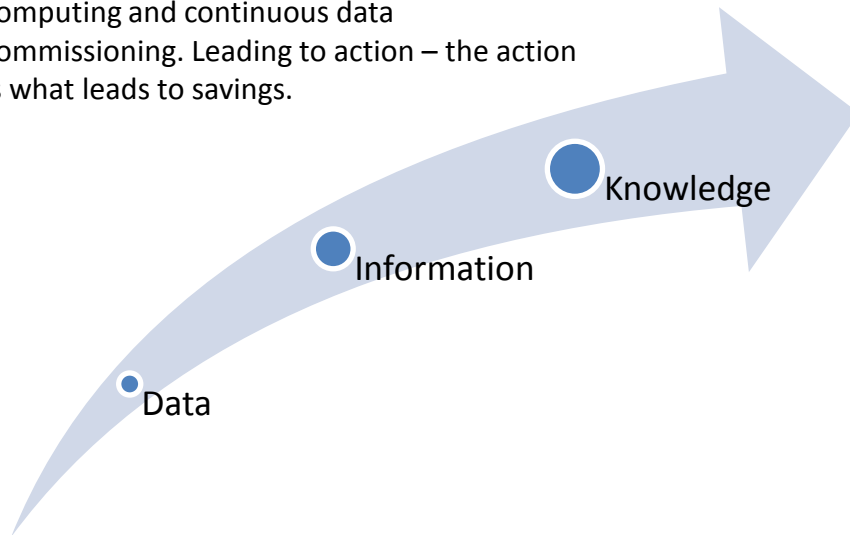
# Enterprise Solution



**Building Blocks of the Enterprise Solution**

# Enterprise Solution – Driving Value

Multiple Data sources are leveraged in a distributed data environment – This is the fuel to drive the data through into cloud computing and continuous data commissioning. Leading to action – the action is what leads to savings.





# At an Executive Level an Enterprise Solution provides:



**Visibility** – a window into real estate, energy, operating, capital programs

**Transparency** – data availability to all with the click of a mouse

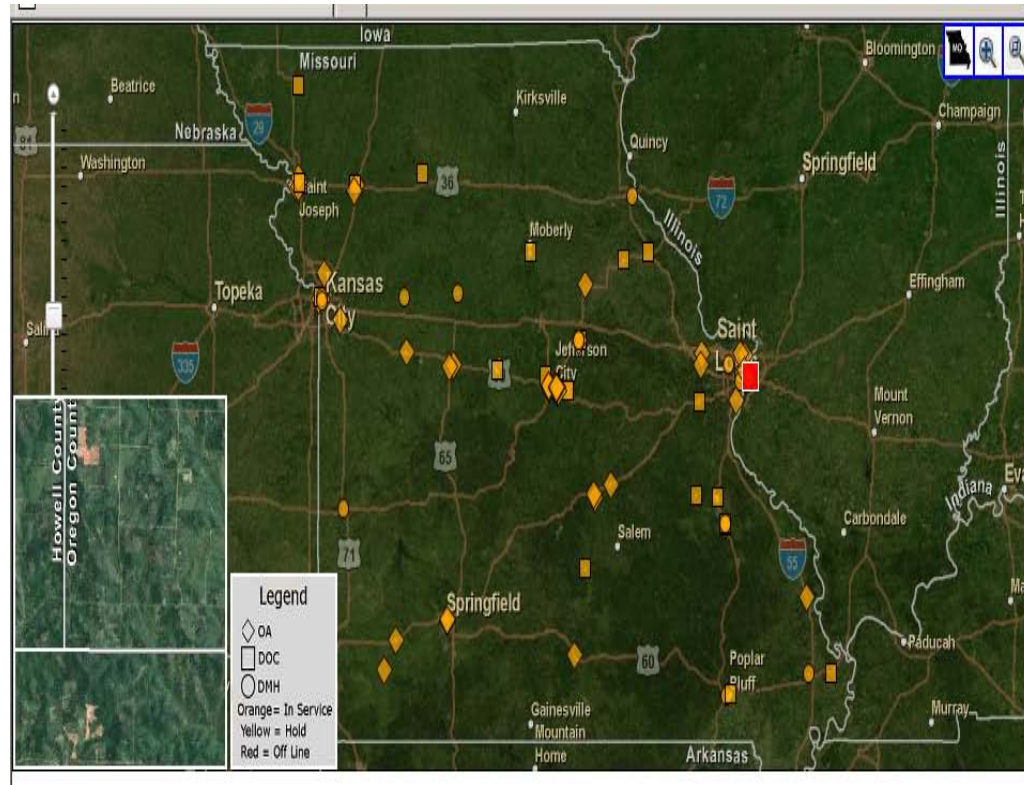
**Accountability** – independent measurement & verification 'managed' by internal staff



# Enterprise System Monitoring

The State Network is monitored from Network 24 hours a day / 7 days a week with full visibility of platform status and any issues state-wide.

162 Sites, 1000 + buildings







The Global Access Portal gives **controlled access and security** to a full system of applications for the total management of the State's portfolio of facilities.

**Single Sign-On** limits the confusion of multiple passwords.

- Utility Bill Management
- Enterprise Energy Management
- Computer Aided Facilities Management
- Business Process Management
- Energy WIKI
- Vendor Portal
- Steam Star
- VFA



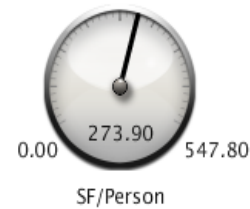
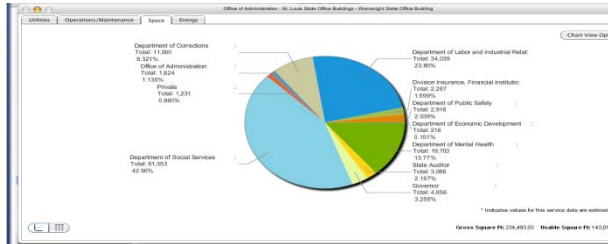
For assistance please call the Portal Help Desk: 1-877-411-2236

You may also send an email to: [mosupport@talisentech.com](mailto:mosupport@talisentech.com)

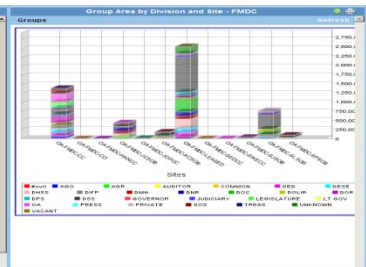


# Real Estate

Leasing Expenditures: FY06 \$55.3 M; FY09 \$41.7  
 \$20.9 Million Sold in Excess Real Estate



Divisions	Area	SALES	GA	FREDC	CC	GA	FREDC	CD	GA	FREDC	SIACCC	GA
AB Divisions	Area	5,562,833.70		1,407,412.13					5,131.65			5,345.07
ALJN	Area	6,146.08										
ALICE	Area	110,281.82		72,049.86								
AGB	Area	64,876.83										
ADDFEYN	Area	22,209.88		15,711.55								
ADWDRN	Area	394.35										
DEED	Area	282,643.70		84,324.28		4,889.90			4,754.75			
DESE	Area	247,877.86		86,609.89								
CONSGE	Area	485,442.82		22,975.76								
DEEP	Area	84,100.97		51,715.46								
DRSE	Area	182,809.18										
DRNE	Area	251,893.80		66,796.20								
DRSC	Area	436,408.15										
INDLIN	Area	239,923.99		74,819.23		241.75						
DRNE	Area	284,264.82		280,285.00								
DRNE	Area	141,283.87		80,928.00					143.99			
DRSE	Area	1,709,864.86		113,614.24								
GOVERNOR	Area	32,214.81		20,074.81								
LEGISLARY	Area	179,213.86		89,275.93								
LEGISLARY	Area	172,492.87		172,492.87								
N.Y. GOV	Area	3,230.88		3,230.88								





# Operations

The State of Missouri created a state of the art facilities management unit. With Blackberry interfaces, touch style kiosks, & 'one touch' supplier (Grainger) integration the maintenance staff and supervisors have the tools necessary to effectively manage:

- Purchase Orders
- Work Orders
- Preventative Maintenance
- Inventory (**\$500K reduction**)
- Resource Loads

**Approve and Issue Work Request: 2007002697**

Requested By: BOTO, DAVID  
 Work Request Status: Requested  
 Phone of Requestor: 1901  
 Date Work Requested: May 20, 2007  
 Work Location: 29551--  
 Time Work Requested: 12:27 pm  
 Equipment Codes:  
 Date Status Last Changed:  
 Time Status Last Changed:

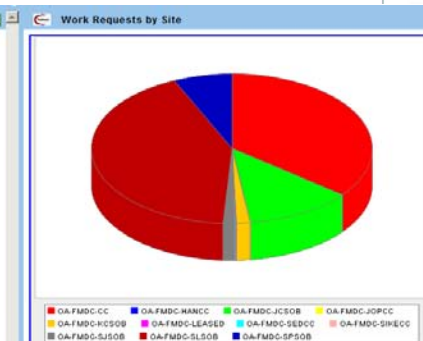
Problem Type: A.TEST  
 Primary Trade:  
 Date to Perform:  
 Time to Perform:  
 Work Priority:  
 Account Code:

**View - Edit Equipment Inventory**

Sites	Refresh	Equipment (Edit)	Refresh																								
<table border="1"> <thead> <tr> <th>Site Code</th> <th>Site Name</th> </tr> </thead> <tbody> <tr><td><input type="checkbox"/></td><td>DPS-HP-GHQ GENERAL H</td></tr> <tr><td><input type="checkbox"/></td><td>DPS-HP-PAI PATROL AI</td></tr> <tr><td><input type="checkbox"/></td><td>DPS-HP-PDF PURSUIT D</td></tr> <tr><td><input type="checkbox"/></td><td>DPS-HP-SHA STRAFFORD</td></tr> <tr><td><input type="checkbox"/></td><td>DPS-HP-TAHQ TROOP &amp; T</td></tr> <tr><td><input type="checkbox"/></td><td>MOBILE YARD TRUCK &amp; C</td></tr> </tbody> </table>	Site Code	Site Name	<input type="checkbox"/>	DPS-HP-GHQ GENERAL H	<input type="checkbox"/>	DPS-HP-PAI PATROL AI	<input type="checkbox"/>	DPS-HP-PDF PURSUIT D	<input type="checkbox"/>	DPS-HP-SHA STRAFFORD	<input type="checkbox"/>	DPS-HP-TAHQ TROOP & T	<input type="checkbox"/>	MOBILE YARD TRUCK & C		<table border="1"> <tbody> <tr> <td>Equipment Code*: HPGHQ-Q-EPAN135</td> <td>Equipment Manufacturer: Square D</td> </tr> <tr> <td>Site Code*: DPS-HP-GHQ</td> <td>Model Number: M9406-S1 (ML)</td> </tr> <tr> <td>Building Code*: 55101</td> <td>In-Service Date:</td> </tr> <tr> <td>Equipment Standard*: EPAN</td> <td>Warranty Code:</td> </tr> <tr> <td colspan="2">Equipment Description: Electric Panel 1-</td> </tr> </tbody> </table>	Equipment Code*: HPGHQ-Q-EPAN135	Equipment Manufacturer: Square D	Site Code*: DPS-HP-GHQ	Model Number: M9406-S1 (ML)	Building Code*: 55101	In-Service Date:	Equipment Standard*: EPAN	Warranty Code:	Equipment Description: Electric Panel 1-		
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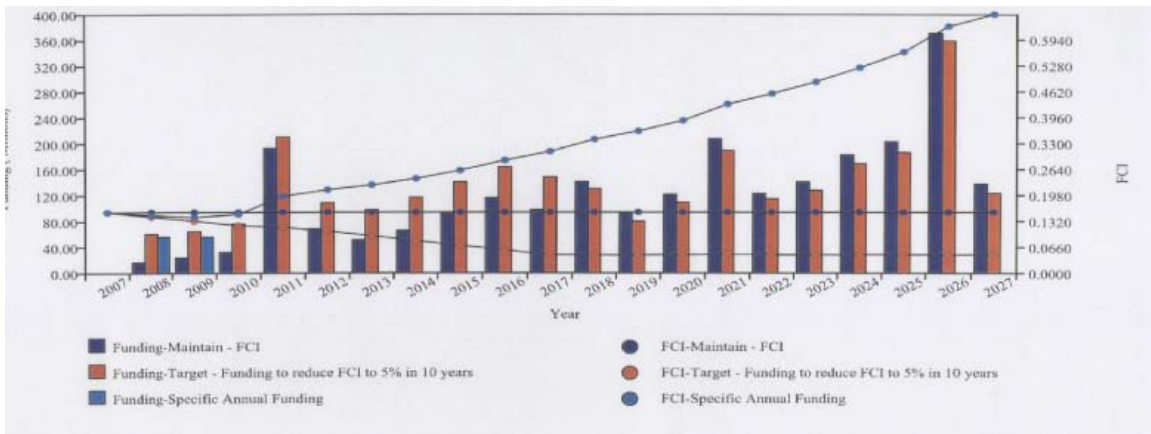
Save Add New Delete Cancel

Integration of Supply Vendors



# Capital

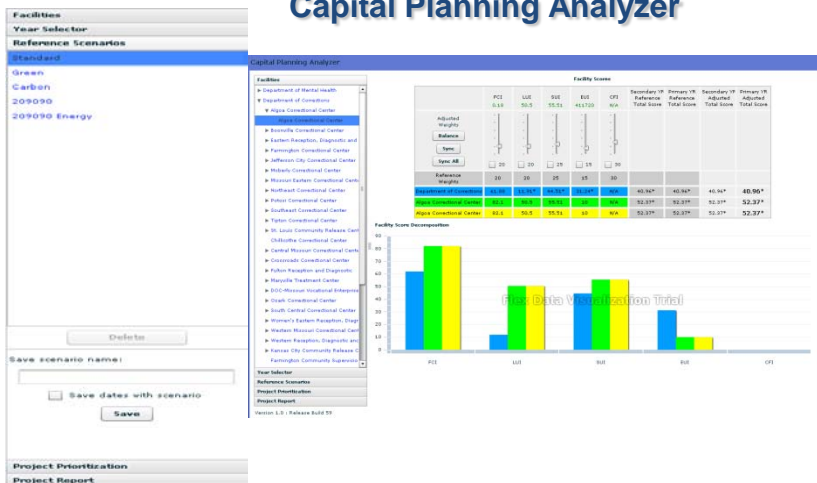
## Funding/FCI Report



## Project Prioritization

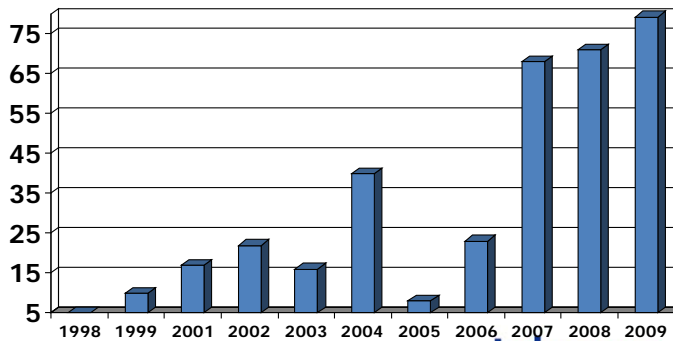
The screenshot shows two tables from the Capital Planning Analyzer software. The top table lists projects with columns for Project Name, Priority, and Facility Name. The bottom table provides a detailed view of project prioritization, including columns for Project Name, Priority, and Facility Name.

## Capital Planning Analyzer

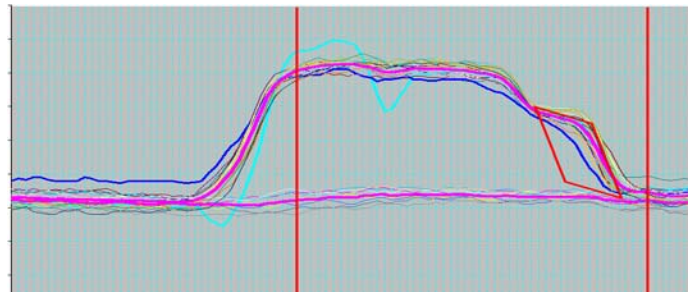
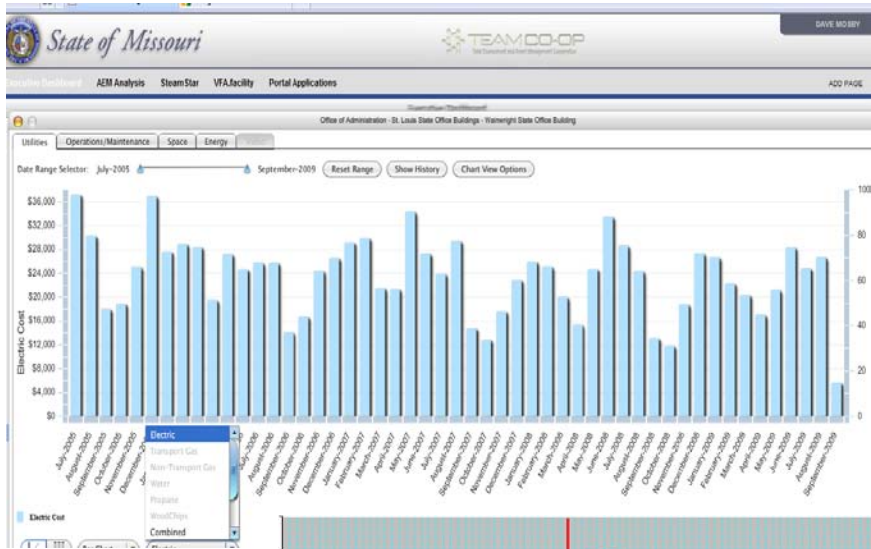


## Facilities Maintenance & Repair Fund

Millions



# Energy Management – Accounting & Analysis



The energy management solution gives executives and building managers access to the necessary data, **at all levels of detail**, to properly manage and maintain their buildings in the most energy efficient manner possible.

Keep This Portion For Your Records

ACCOUNT NUMBER	60500-08010	BILL DATE	Oct 31, 2009
NAME	STATE OF MISSOURI	TOTAL AMOUNT DUE BY	Nov 13, 2009 \$45,463.66
SERVICE	401 W HIGH	AMOUNT PAYABLE AFTER DUE DATE	\$45,145.61
AT	JEFFERSON CITY, MO 65101		

Payment Received on Oct 29, 2009 \$47,476.12

TYPE OF SERVICE	METER NUMBER	START DATE	END DATE	REVISION	METER READING PRESENT	METER READING PREVIOUS	METER DIFFERENCE	METER MULTIPLIER	USAGE
Total kWh	0283183	09/30/08	09/30/08	29	0.0000	115132.0000	115132.0000	1.0000	115132.0000A
Peak kW	0283183	09/30/08	09/30/08	29	0.0000	1741.0000	1741.0000	1.0000	1741.0000A
Off Peak kW	0283183	09/30/08	09/30/08	29	0.0000	289.0000	289.0000	1.0000	289.0000A
Total EVAS	0283183	09/30/08	09/30/08	29	0.0000	36.0000	36.0000	1.0000	36.0000A
On Peak kW	0283183	09/30/08	09/30/08	29	0.0000	298.0000	298.0000	1.0000	298.0000A
Off Peak kW	0283183	09/30/08	09/30/08	29	0.0000	9338.0000	9338.0000	1.0000	9338.0000A
On Peak kW	0283183	09/30/08	09/30/08	29	0.0000	8338.0000	8338.0000	1.0000	8338.0000A
On Peak kW	0283183	09/30/08	09/30/08	29	0.0000	298.0000	298.0000	1.0000	298.0000A
On Peak kW	0283183	09/30/08	09/30/08	29	0.0000	21.2000	21.2000	1.0000	21.2000A

Service To

Total kWh	18/29/2008	118863.0000	Peak kW	18/29/2008	2916.0000
On Peak kW	18/29/2008	2932.0000	Off Peak kW	18/29/2008	2916.0000
Total EVAS	18/29/2008	60259.0000	Sec. Energy Block kW	18/29/2008	2932.0000
Reactive EVAS	18/29/2008	89.0000	Winter Billing Demand	18/29/2008	2932.0000
October Winter Base kW	18/29/2008	2138.0000	Winter Base Demand	18/29/2008	2138.0000
Base kWh Ratio	18/29/2008	0.9998	Base kWh (BUD)	18/29/2008	106679.0000
Revised kWh (BUD)	18/29/2008	123154.0000			

Service From: 09/30/2008 To: 10/29/2008

METERED ELECTRIC SERVICE BILLING

Annual Energy Charge	132,754.00 kWh @ 0.0270000	\$3,584.80
Demand Charge	1,420.20 kW @ 0.0080000	\$11,361.60
Base Energy Chg / Hour Demand	390,798.00 kWh @ 0.0487000	\$1,893,270.60
Base Energy Chg / Hour Demand	575,450.00 kWh @ 0.0100000	\$5,754,500.00
Base Energy Chg / Hour Demand	154,450.00 kWh @ 0.0100000	\$1,544,500.00
Reactive Charge	89.20 EVAS @ 0.0100000	\$892.00
Winter Base		\$227.15
Total Service Amount		\$45,179.48

MISCELLANEOUS CHARGES

Electric Special Facilities Charge	\$100	\$74.16
Electric Special Facilities Maintenance Charge		\$74.16
Current Amount Due		\$45,463.66
Prior Amount Due		\$9.50
Total Amount Due		\$45,463.66

Page 1 of 3



# Energy Management – Equipment Operations

Metasys remote

CHILLER Normal

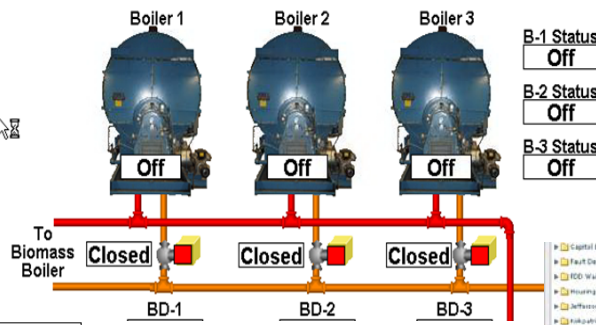
Logic Focus

113.99%

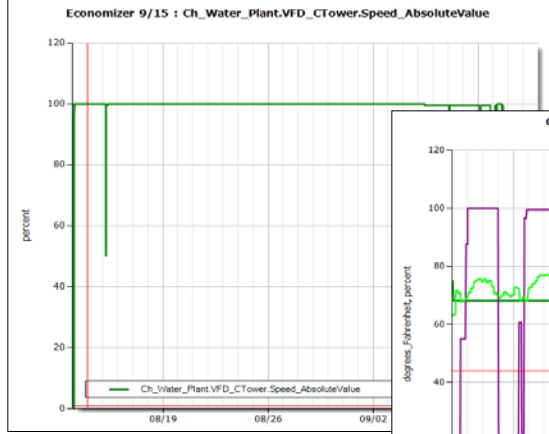
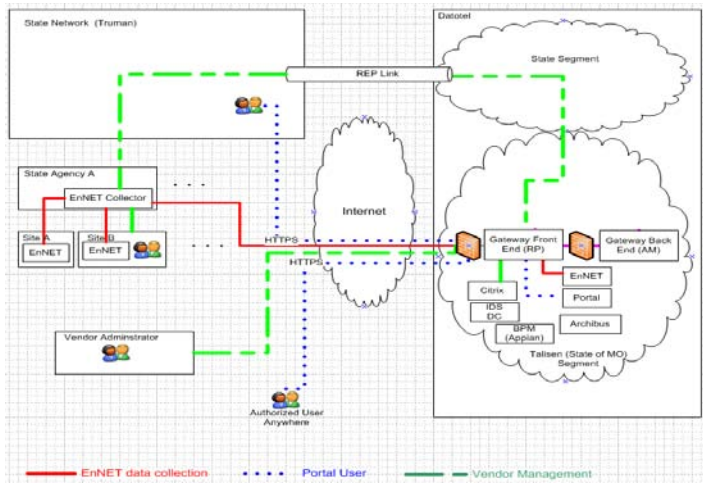
C&C Group

- SECC
  - Power Plant
  - CHW System
  - HW System
  - Biomass Boiler
  - Heat Exchangers
  - Generator Room
  - Plant Exhaust
  - Maint. Office FCU
  - Safety Office FCU
- Housing Units
- Administration
- Central Services
- Work Cadre

## Southeast Correctional Center Hot Water



- B-1 Status Off
- B-2 Status Off
- B-3 Status Off



Capital Building (Left On)

Fault Detection and Diagnosis (FDI)

ICD Winlight

Infrared unit 1

Infrared building (Left On)

Internal heats

Reliefs OC

Supreme Court

Human controller 075C3dc points

Human controller 075C8dc points

Human send heat and cool

New Group

Delete Group

Modify Group

Revoke Group

Filter Points By:

Legend

- Name: INI-076/N2-1-0760LL...
- Name: INI-076/N2-1-0760LL...
- Name: INI-076/N2-1-0760LL...
- Name: INI-076/N2-1-0760LL...

Remove

Remove All

Create User Site

Click the graph icon to see the graph, the table icon to see table data, or the [i] button to export to CSV.

Inventory of Utility Accounts Finds Savings

• **Boonville Correctional Center**

Single Six Inch Water Meter



A water account was found to be billing \$425 every month even though no water was being used for last 13 years!!

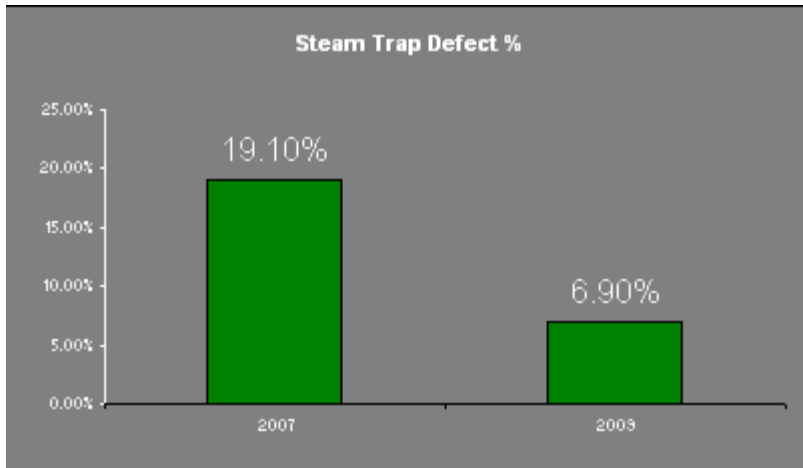
= \$425 \* 12 = \$5,100 in annual savings  
for this one account

= \$5,100 \* 13 = \$66,300 spent over 13 years

without this visibility

**Account # 18960100 was closed immediately!!**

# SteamStar Savings



“This was the most aggressive and productive trap testing project I have been involved in. The overall payback taking into account trap survey costs, replacement costs and energy losses (not including labor) was about a **26 day payback.**” -- Dir. Of Institutional Markets  
Armstrong National, Inc.

## 2007 Steam Trap Statistics

- 3,302 Installed Steam Traps Tested
- 2,981 Steam Traps In Service
- 568 Found Defective

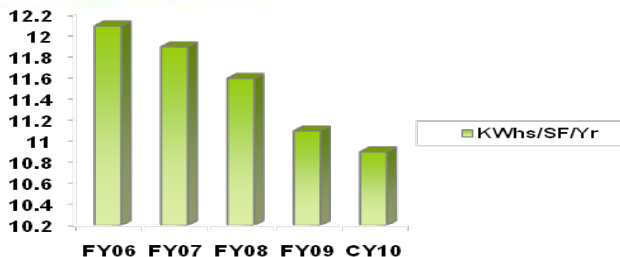
While the State of Missouri has saved ~ \$1M annually by replacing the defective traps, there is ~ \$800K left in potential annual savings in the remaining defective steam traps.



# Lewis and Clark



- Occupied in FY05, 122,000 sqft, 400 Employees, Cost \$17.5 M
- Green Design Elements – Daylighting, HE-HVAC, Recycling, Water Conservation, Native Materials
- Moving from Excellent to Outstanding Performance FY07 ESP Deployed

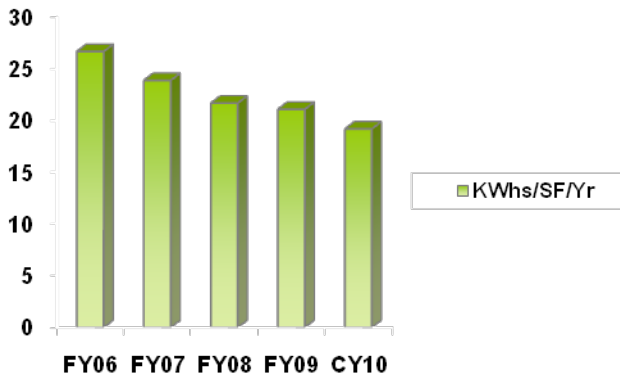


- FY06 12.1 KWhs/SF
- FY08 11.6 KWhs/SF
- CY10 10.9 KWhs/SF
- **9.0 % Reduction**

# Harry S. Truman



- Sq. Ft. – 753,138
- 2800 FTE
- Built in 1983
- PC 2005

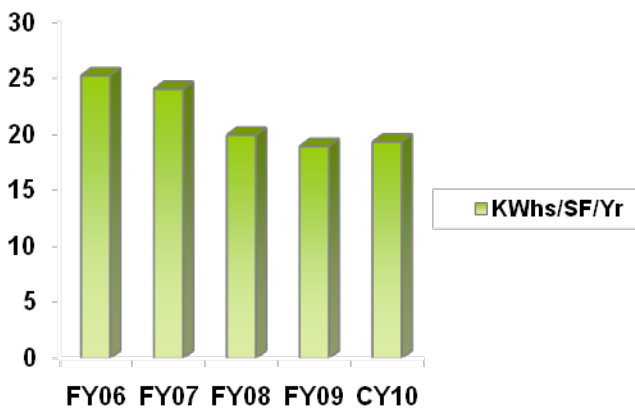


- FY06 26.7 KWhs/SF
- FY08 21.7 KWhs/SF
- CY10 19.2 KWhs/SF
- **28.0 % Reduction**

# Wainwright



- Size: 234,599 sq. ft.
- Building Population: 693
- Year Built: 1891
- Year Commissioned: 1981



- FY06 25.2 KWhs/SF
- FY08 24.0 KWhs/SF
- CY10 19.3 KWhs/SF
- **23.4 % Reduction**



**“Gov. Nixon announces 5.6 percent reduction in state energy bill over past year - saving taxpayers more than \$3 million.”**



“In the first year of implementation of EO 09-18, Gov. Nixon's administration achieved the following reductions:

**Electricity: Decrease of 25 million kWh (kilowatt-hours), or 5.5 percent.** That's enough to power more than 2,500 Missouri households for an entire year, and it corresponds to 16,250 tons of carbon dioxide not being emitted into the atmosphere.

**Gas (propane and natural gas): Decrease of 180,000 MMBtu (1 million Btu), or 9.1 percent.** That's enough to run more than 7,000 residential water heaters in Missouri for an entire year, and it corresponds to almost 11,000 tons of carbon dioxide not being emitted into the atmosphere.”

**Governors Office Press release, April 26, 2010.**



# Lesson Learned

- **Vision, Vision, Vision**
- **Politics, Power and People**
- **Leverage the law**
- **Make Money**
- **Public, Private Partnerships**



- Contact
  - Dave Mosby
  - [david.mosby@jci.com](mailto:david.mosby@jci.com)
  - 573-979-3052 (c)

