



## DAY 366 FOR AN OWNER...

Optimizing my “energy efficient” building

- Have a good pair of glasses
- Understanding key indicators
- Have a qualified team
- Measure your progress

# The Glasses



- 2009 - Invested in portfolio wide building automation
  - IT infrastructure
  - Allowed for simultaneous monitoring of entire Richmond portfolio
- 2010 – Created a continuous commissioning agreement
  - Focused on building optimization vs. typical maintenance
  - Develop energy conservation measure projects
- 2011- Monitor energy consumption
  - Started building a network of energy meters
  - Invested in software
  - Measured our progress
- 2012 – Intelligent services
  - Leveraged existing BAS infrastructure to find optimization issues
  - **Find problems before our tenants complain!**



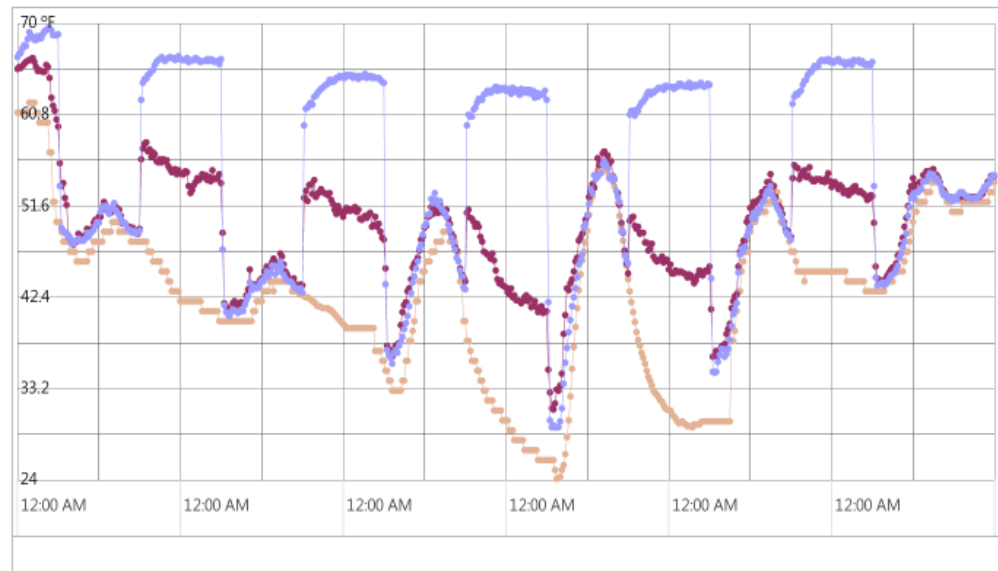
# Understanding Key Indicators



- Outside Air Sensor Calibration
- OA Humidity Sensor Calibration
- Economization Performance
- Static Pressure Setpoint vs. Actual Static Pressure
- Variable Air System (VAS) Performance

Arboretum 1  
9100 Arboretum Pkwy, Richmond, VA, 23236

Outdoor Air Temp Sensor Comparison  
11-Dec-2012 - 16-Dec-2012



Left Y-Axis (Degrees)

- OA Temp (Reference value)
- RTU-1 (Northside)
- RTU-2 (Southside)

# Raising the bar for the team



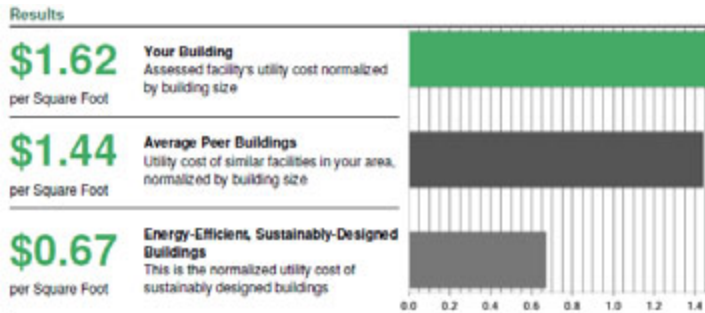
- Incentive contest
  - Yearly bonus for “most improved” building engineer.
- Training
  - Vendor neutral building automation troubleshooting
  - “Systems” understanding, i.e. how does a faulty VAV flow sensor affect the RTU supply fan?
- What we learned:
  - People, not unlike companies, like money
  - Identified individual employee strengths and encouraged development.

# Measuring Progress

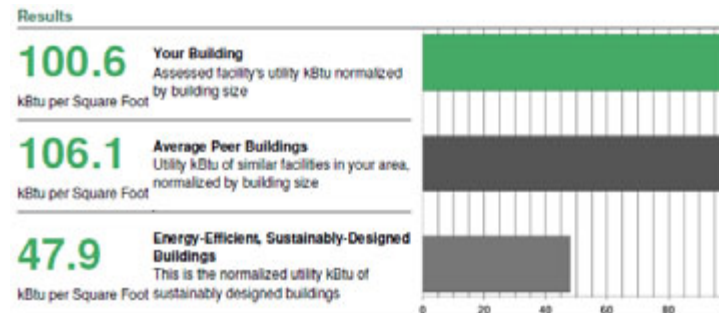


- Management/Reporting → Energy Star Ratings
- Proactive Energy Management
- Capital Project Justification

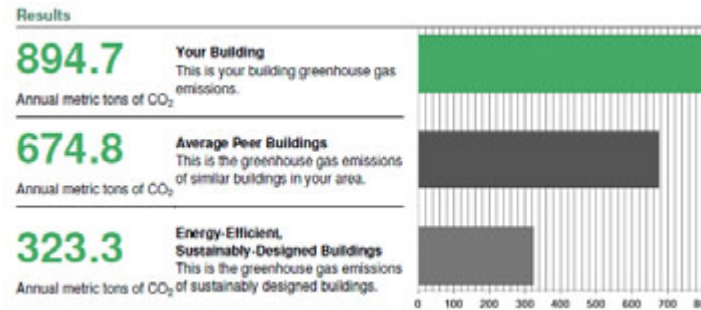
## Utility Cost per Square Foot



## Energy Use (kBtu) per Square Foot



## CO<sub>2</sub> Emission



# Where Do We Go From Here?



## Savings Summary

Selected ECMs	kWh	Therms	Annual Savings (\$)
Controls - Chiller / Tower Optimization	35,637	0	\$2,790
<b>Estimated Savings</b>	<b>35,637</b>	<b>0</b>	<b>\$2,790</b>

## Quick Results

Your Current Facility
This What-If Scenario
<b>Estimated Savings</b>

## Investment Summary

Capital Investment
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## Savings Summary

Selected ECMs	kWh	Therms	Annual Savings (\$)
Controls - Air-Side Economizer	276,177	0	\$21,625
<b>Estimated Savings</b>	<b>276,177</b>	<b>0</b>	<b>\$21,625</b>

## Quick Results

	Cost (\$/ft)
Your Current Facility	
This What-If Scenario	
<b>Estimated Savings</b>	

## Investment Summary

Capital Investment	\$60,000	Simple Payback	4.6 years
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## Savings Summary

Selected ECMs	kWh	Therms	Annual Savings (\$)
Controls - Demand Controlled Ventilation	69,190	0	\$5,418
<b>Estimated Savings</b>	<b>69,190</b>	<b>0</b>	<b>\$5,418</b>

## Quick Results

	Cost (\$/ft)	Energy Use (kBtu/ft)
Your Current Facility	\$1.79	77.9
This What-If Scenario	\$1.76	76.8
<b>Estimated Savings</b>	<b>1.4%</b>	<b>1.4%</b>

## Investment Summary

Capital Investment	\$25,000	Simple Payback	4.6 years
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