Retrofitting Existing Buildings for Demand Response & Energy Efficiency

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CYPRESS ENVIROSYSTEMS™

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V7.0

Who is Cypress Envirosystems?

Heritage

- Subsidiary of Cypress Semiconductor (NASDAQ: CY)
  - Quality-driven processes
  - Deep technology experience: Cypress wireless devices are in 100 million devices all around us
- Sister company of SunPower

Cutting Edge Silicon Valley Technology

Leadership

- CEO: Harry Sim, ex-Honeywell executive (15yrs.)
- Executive staff: Over 100 years of facilities and energy experience

Applied to Legacy Facilities

Mission

- Modernize existing facilities
- Develop technologies that cost 60-80% less than existing solutions
- Enable retrofits that install in minutes, avoid disruption, require little or no retraining
- Target payback of less than 18 months

Cypress Envirosystems: Problems We Solve…

Pneumatic Thermostats

Dial Gauges

Need to save energy & improve uptime, but hindered by outdated facility?

Steam Traps

Standalone Transducers, LED/LCD Displays

-80C Freezers

Legacy Fluorescent Lighting

Manual Instrumentation, Not Programmable, No Diagnostics…
Equals: Wasted Energy, Higher Downtime, More Labor Required

What is our Solution?

WIRELESS PNEUMATIC THERMOSTAT

"Go from Pneumatic to DDC in minutes"

WIRELESS GAUGE READER

"Remotely Read Gauges in minutes"

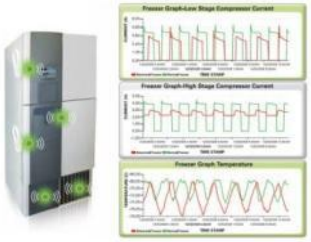
WIRELESS STEAM TRAP MONITOR

"Avoid Expensive Steam Leaks"

BLUE BOX HUB/RECEIVER

WIRELESS TRANSDUCER READER

"Remotely Read Transducers – No Wires"



WIRELESS FREEZER MONITOR

"Predicts and Avoids Costly Freezer Failure"

WIRELESS LIGHT CONTROLLER

"Reduce Electricity Use"

Non-invasive, easy retrofit, energy and labor savings, payback under one year

Focus on Areas of Largest Energy Use and Waste

Industrial Plants

- Steam, Thermal – 40%
  (solution: WSTM)
- Compressed Air – 25%
  (solution: WGR, WTR)
- Rotating Equipment, pumps, HVAC – remainder
  (solution: WGR, WTR, WFM, WBM)

Commercial Buildings

- HVAC – 40%
  (solution: WPT)
- Lighting – 20%
  (solution: Adura ALPS partnership)
- Plug loads, data centers – remainder
  (solution: WTR, WBM)

Source: US Energy Information Administration, 2007

Regulation Drivers: California Example

- **Default Critical Peak Pricing**
  - Starting May 1st, 2010, virtually all commercial office building customers will move to a default electricity pricing rate called Critical Peak Pricing
    www.pge.com/mybusiness/energysavingsrebates/demandresponse/cpp/
  - This rate structure provides for discounted rates when no CPP events are called. However, on CPP event days, higher "critical peak" energy charges will be assessed for usage between noon and 6pm.
  - Customers are notified by PG&E by 3pm the day prior to the critical event.
  - Customers with Auto-Demand Response enabled buildings (e.g. communicating thermostats, lighting etc.) can automatically reduce usage using these high rate periods to avoid high charges.
- **Assembly Bill 1103 – Building Energy Efficiency Disclosure**
  - Starting January 1, 2010, all commercial building lease transactions must disclose the energy efficiency history and Energy Star rating of the facility. More efficient buildings will be able to attract premium tenants, and potentially command a rental premium.

Source: California Public Utilities Commission Decision, July 31st, 2008 (see page 21 and Attachment B)
http://docs.cpuc.ca.gov/word_pdf/FINAL_DECISION/85984.pdf

Peak Load 50% over Base Load – Mostly Commercial Buildings. Peak Load Costs $100-150/kW To Keep on Standby.

Retrofit of Pneumatic HVAC Controls

70% of Commercial Buildings Still Pneumatic

- **Waste energy, more maintenance, unhappy tenants…**
  - No Night Setback, No Zone Control, No Optimal Start/Stop, No Occupancy Override, No Demand Response…
- **High Cost to Retrofit**
  - Market rate of $2,000 - $3,000 per zone for traditional DDC retrofit
- **Disruptive to Tenants**
  - Open Walls, Ceiling, Exposure to Asbestos

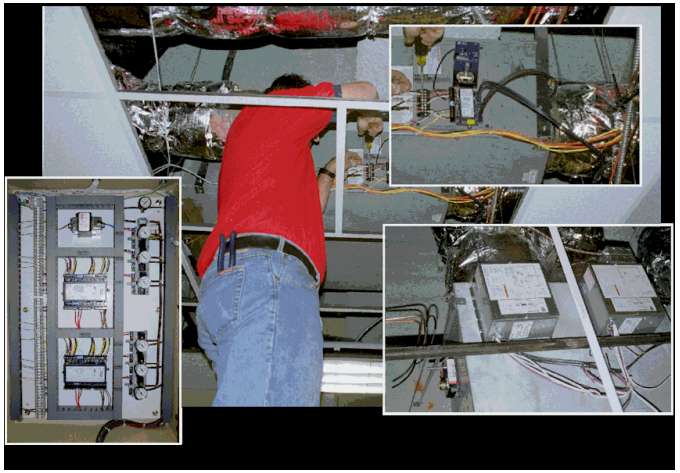
Typical Legacy Pneumatic Thermostats

Retrofitting Existing Buildings is a PAIN IN THE NECK!!

The WPT enables zone control without disrupting occupants

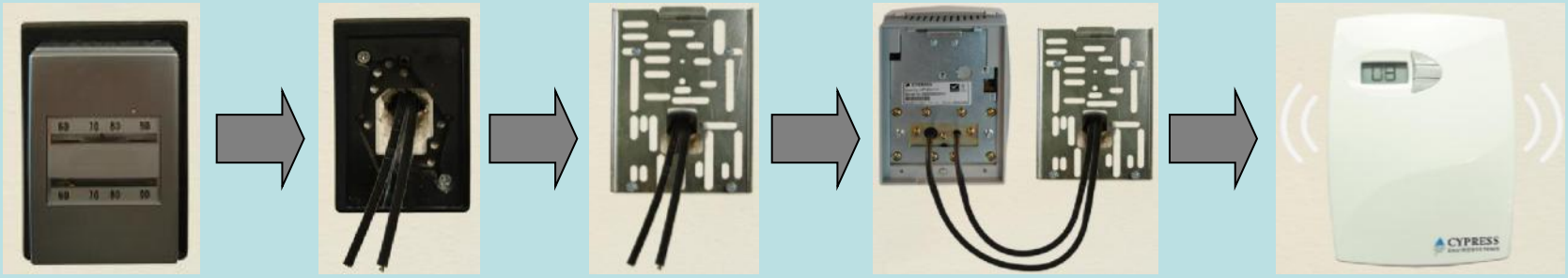
- Opening walls and running wire drive up traditional DDC retrofit costs
- Occupants do not want to be disrupted by projects
- The WPT provides benefits of DDC zone control
  - ✓ 20-minute retrofit
  - ✓ 80% lower cost
  - ✓ Minimal disruption

Traditional DDC Retrofit is Invasive

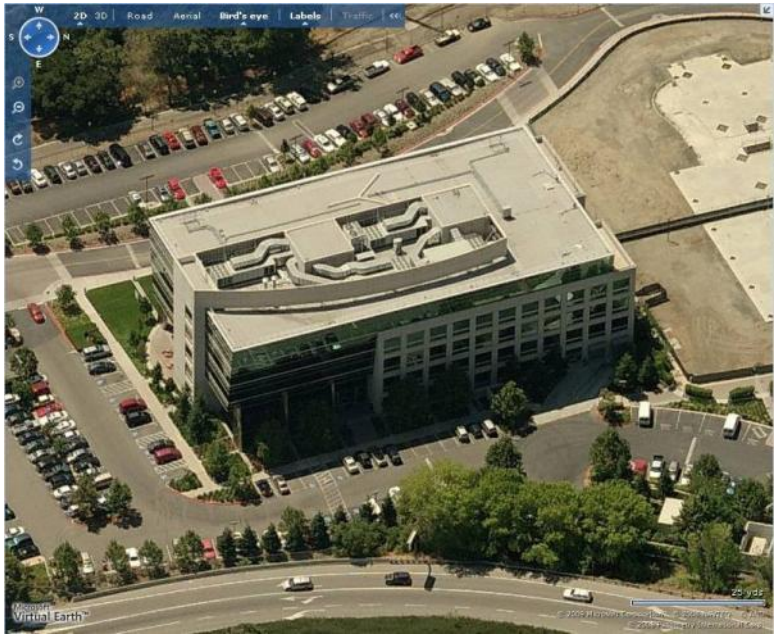


WPT Provides DDC Zone Control without Disruption

Step 1	Step 2	Step 3	Step 4	Step 5
Identify pneumatic thermostat type	Remove thermostat and backplate	Install WPT backplate to wall	Attach pneumatic pipes to WPT	Hang on wall and integrate with BAS

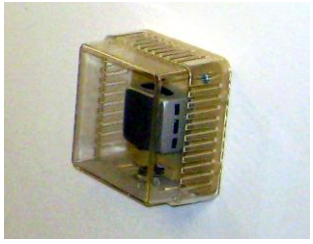


Enabling Smart Grid – Auto Demand Response



- County of Santa Clara, Social Services Administration
- 2 Buildings, each 5 story, built 2000
- Total 300,000 sq-ft
- 350 Pneumatic Thermostats, non-communicating
- Estimated Demand Response load shed: 200kW
- Would like to participate in PG&E Auto-DR program, but challenging with pneumatic thermostats

15 Minute Replacement of Thermostat



80% Lower Cost, 5% of the Time vs. Conventional DDC

Santa Clara County Government Project

	Cypress Envirosystems Wireless Pneumatic Thermostats Retrofit	Conventional Direct Digital Control Retrofit
Installed Price	350 x $500 = $175,000	350 x $2,500 = $875,000
Time Required	8 days	6 months
Disruption to Operations	Minimal	Significant
Potential Exposure to Toxic Substances in Walls	None	Unknown
Paid for by PG&E Auto DR Incentive	100% covered	31% covered

"Installation took only eight days and was one of the easiest, fast and most cost effective energy efficiency improvements we have ever made in our buildings"
- Jeff Draper, Manager of Building Operations

Quantified Savings for Santa Clara County

300,000 sq-ft facility, $175,000 cost to retrofit (before utility incentives)

- **Energy Savings:** $42,000 per year
  - 350,000 kWh per year base load reduction, at $0.12 per kWh
  - Derived from enforcing Temperature Setpoint Policy and Retrocommissioning

- **Demand Response Savings:** $7,500 per year
  - 10,700 kWh curtailed at peak rates $0.70 per kWh
  - Based on 12 events per year, 4 hours each, 0.6kW shed per thermostat

- **Maintenance Cost Savings:** $156,000 per year
  - Continuous commissioning data helped prioritize maintenance and reduced troubleshooting time

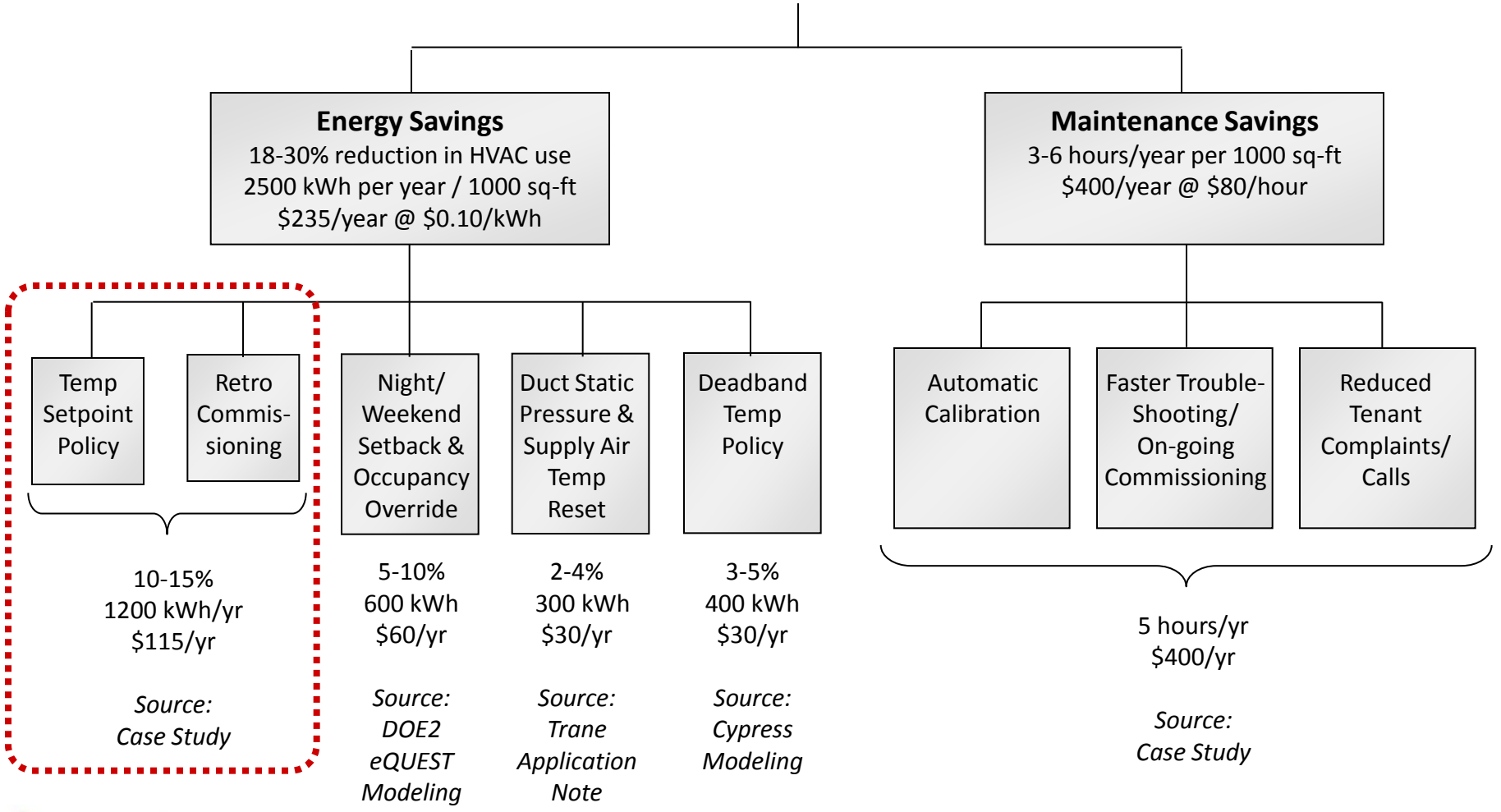
- **Payback Period:** 16 months *BEFORE* UTILITY INCENTIVES
  - Some savings kick in partially in first year, fully in subsequent years.

Wireless Pneumatic Thermostat Savings

Estimated Savings Potential

$635/year (per 1000 sq-ft)
Upfront Retrofit Cost: $600 (per 1000 sq-ft)
Payback Period: 11 months

Note: All calculations based on 300,000 sq-ft retrofit project, $0.10 per kWh electricity rate, and $80 per hour maintenance labor rate.



Temp Setpoint Policy / Retrocommissioning Savings

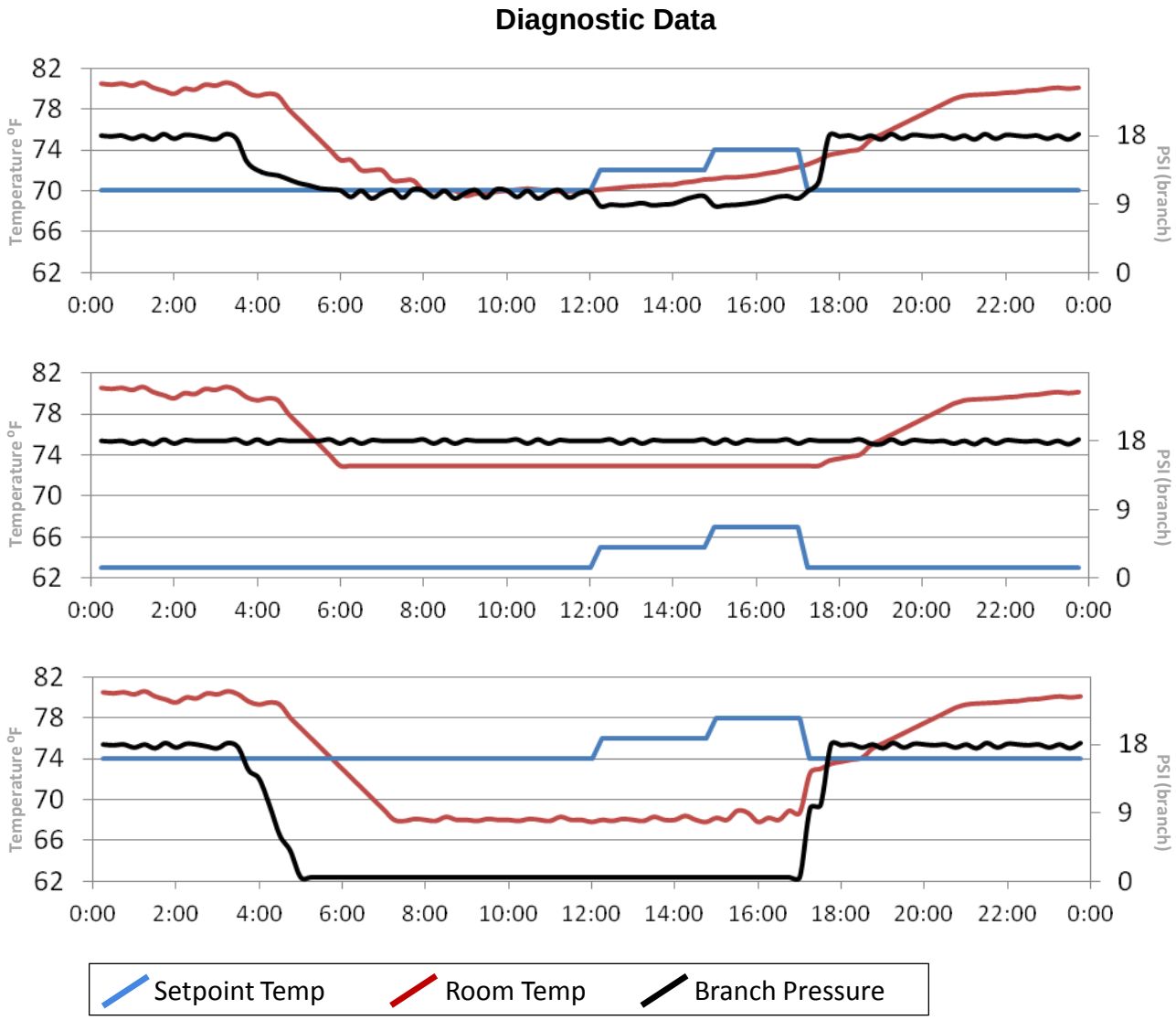
Enforcing Temperature Setpoint Policy

- Conventional Pneumatic Thermostats drift out of calibration, and are often set on max or min by occupants.
- Result: zones often over-cool or over-heat, and even fight among each other, wasting energy.
- WPT Solution: Enforce thermostat setpoint remotely. Monitor constantly and set alarms if over/below limits.

Retrocommissioning

- Conventional Pneumatic Thermostats, do not provide any data for diagnostics
- Result: malfunctioning zones are not detected or corrected, wasting energy.
- WPT Solution: Monitoring data enable discrepancies to be quickly identified. Take Low-cost or no-cost retrocommissioning steps to correct.

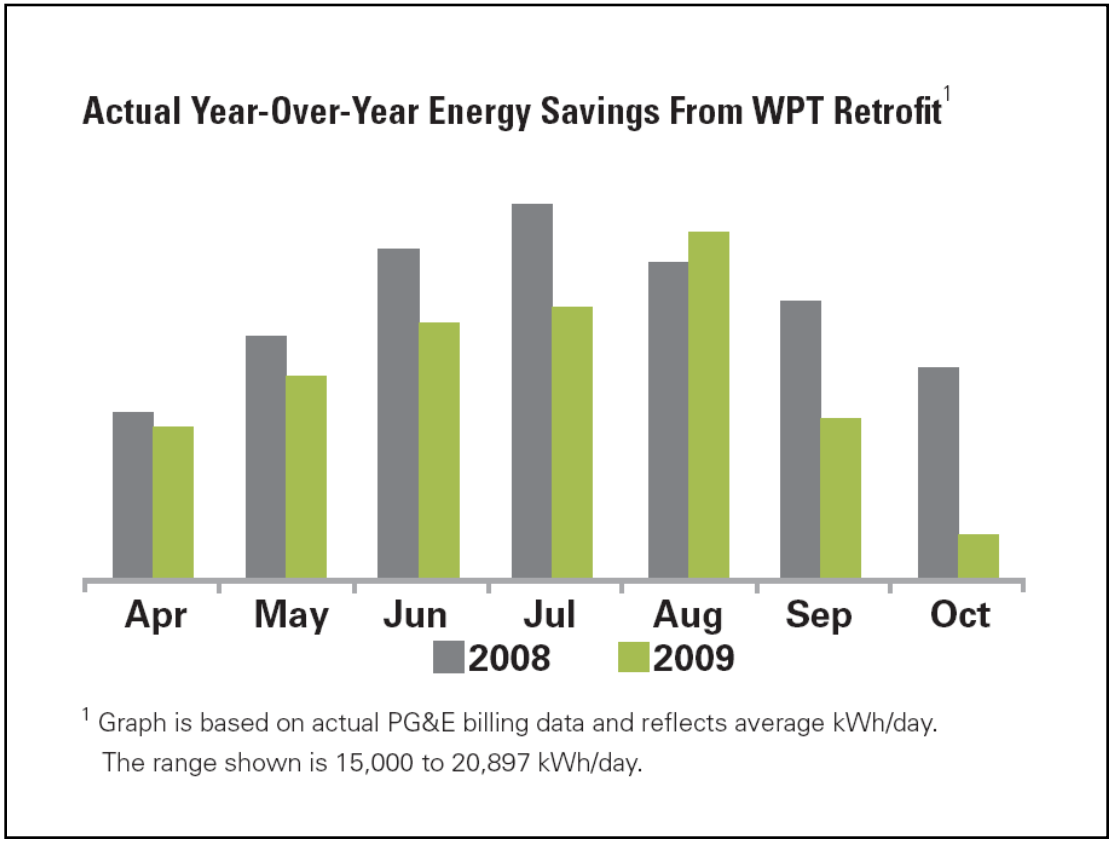
The WPT's Diagnostic Data Enable Retro and Ongoing Commissioning to Improve Maintenance Costs and Save Energy



Alarm	Possible Faults
	• None
	• Faulty Reset Velocity Controller • Stuck damper • Broken spring • Undersized cooling capacity design
	• Faulty Reset Velocity Controller • Electric reheat and AC on • VAV Box Fault • Adjacent Zone Overcooling

Actual Case Study Results: 15% Savings

- Santa Clara County Government Buildings – 300,000 sq-ft retrofit completed in March 2009.
- Actual Post-retrofit energy use compared with same period in prior year, adjusted for deg-days.
- Reduction in HVAC energy use of 15% due to temperature setpoint policy and retrocommissioning.



Full case study available at: http://www.cypressenvirosystems.com/files/pdf/CountyofSantaClara_EnergySavings_Final.pdf

Documented 15% Reduction on HVAC Energy Use vs. Prior Year Due to Retrocommissioning and Temperature Setpoint Policy Enforcement

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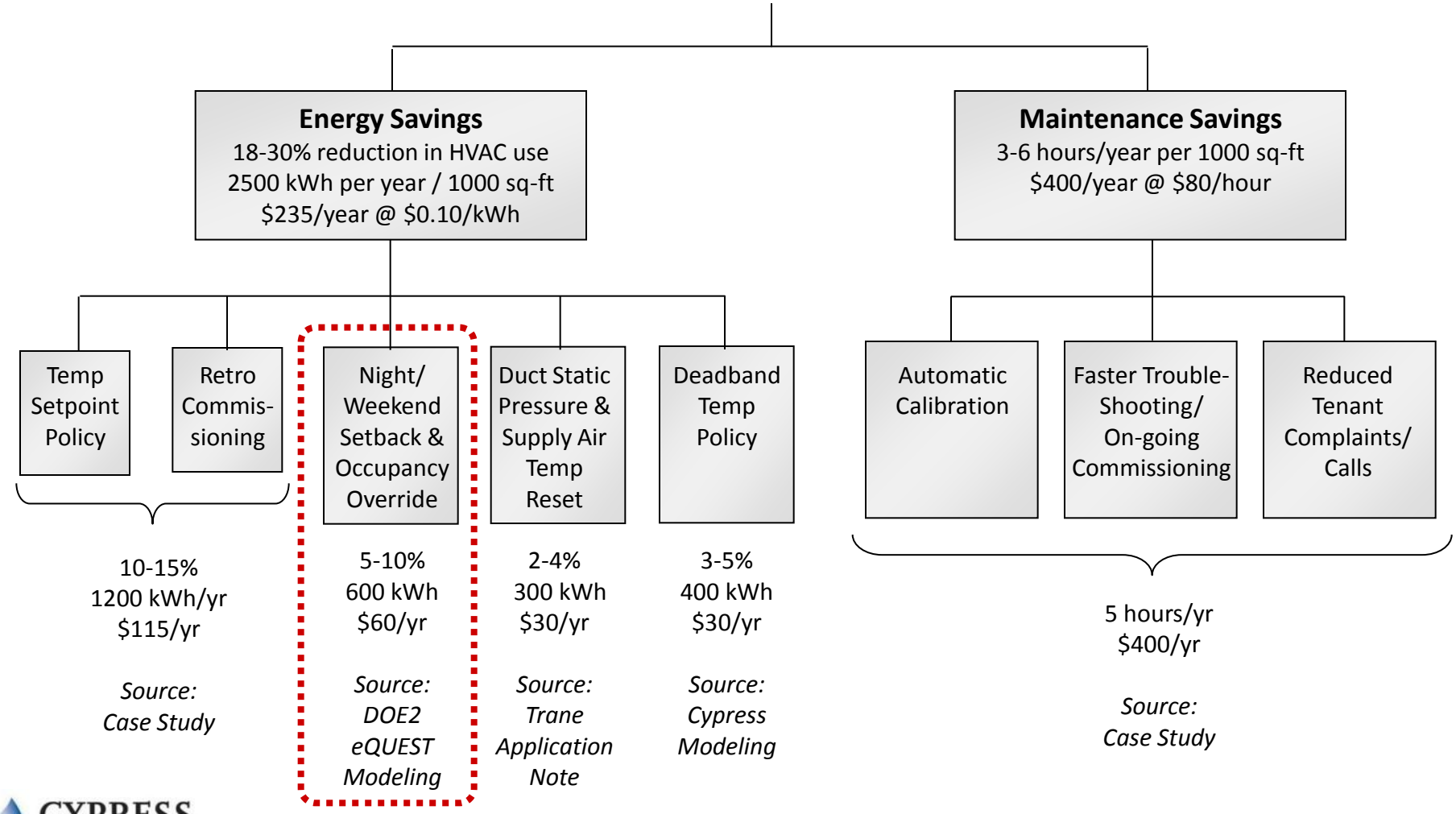


Temp Setpoint Policy / Retrocommissioning Savings

Weekend/Night Setback

- Many buildings have mixed use occupants with different use schedules e.g. 24x7 data centers, vs. 9-5 offices
- Pneumatic Thermostats do not allow programmable zone controls.
- Result: Zones are cooled or heated even when they are not occupied.
- WPT Solution: Temperature Setbacks can be programmed for different zones to reduce unnecessary energy use.

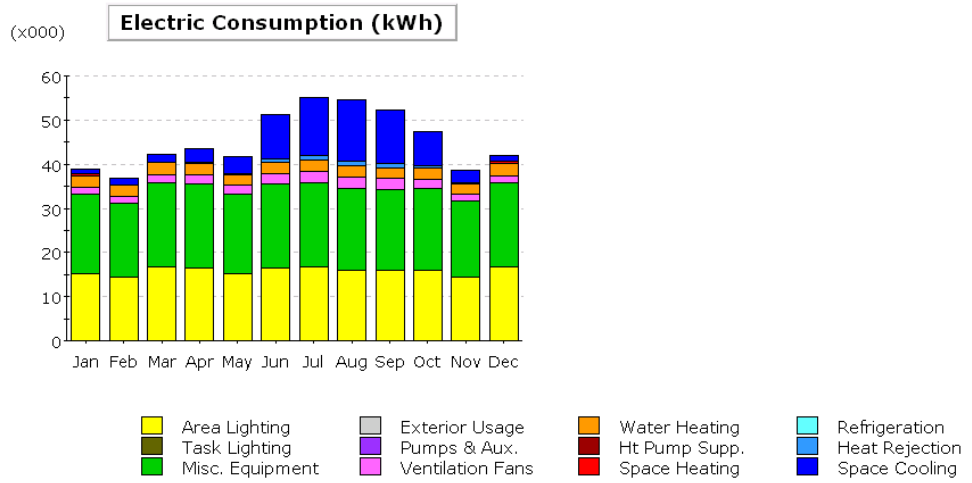
Occupancy Override

- Occupants may override programmed weekend or night setback if they are working late or on weekends.
- Front panel buttons on the WPT allow occupants to select override for temporary durations.
- Log of override zones are available to the building manager for optional billing allocation of costs.

Actual Case Study Results: 10% Savings

- Los Angeles Area Chamber of Commerce Building – 80,000 sq-ft retrofit completed in Sept 2009.
- Calculated energy savings for night/weekend setback using DOE2 eQUEST tool from US Dept. of Energy.
- Predicted reduction in HVAC energy use of 10%.

Project/Run: LA Chamber of Com - Baseline Design Run Date/Time: 05/13/09 @ 13:54



Electric Consumption (kWh x000)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Space Cool	0.85	1.55	1.78	2.98	3.87	10.08	13.27	14.05	12.24	7.87	3.00	1.14	72.67
Heat Reject.	0.03	0.07	0.08	0.16	0.21	0.68	1.00	1.07	0.92	0.55	0.15	0.04	4.96
Refrigeration	-	-	-	-	-	-	-	-	-	-	-	-	-
Space Heat	0.61	0.06	0.04	0.01	0.00	-	-	-	-	-	0.01	0.57	1.30
HP Supp.	-	-	-	-	-	-	-	-	-	-	-	-	-
Hot Water	2.51	2.40	2.77	2.75	2.46	2.61	2.56	2.42	2.41	2.45	2.28	2.68	30.31
Vent. Fans	1.49	1.53	1.83	1.99	1.88	2.39	2.58	2.60	2.46	2.10	1.54	1.65	24.06
Pumps & Aux.	0.04	0.04	0.05	0.05	0.04	0.05	0.05	0.04	0.04	0.04	0.04	0.05	0.52
Ext. Usage	-	-	-	-	-	-	-	-	-	-	-	-	-
Misc. Equip.	18.06	16.80	19.11	18.86	18.06	18.86	19.11	18.59	18.34	18.59	17.30	19.11	220.79
Task Lights	-	-	-	-	-	-	-	-	-	-	-	-	-
Area Lights	15.17	14.38	16.62	16.60	15.17	16.60	16.62	15.90	15.87	15.90	14.43	16.62	189.89
Total	38.76	36.83	42.28	43.40	41.71	51.28	55.18	54.68	52.29	47.50	38.74	41.85	544.49

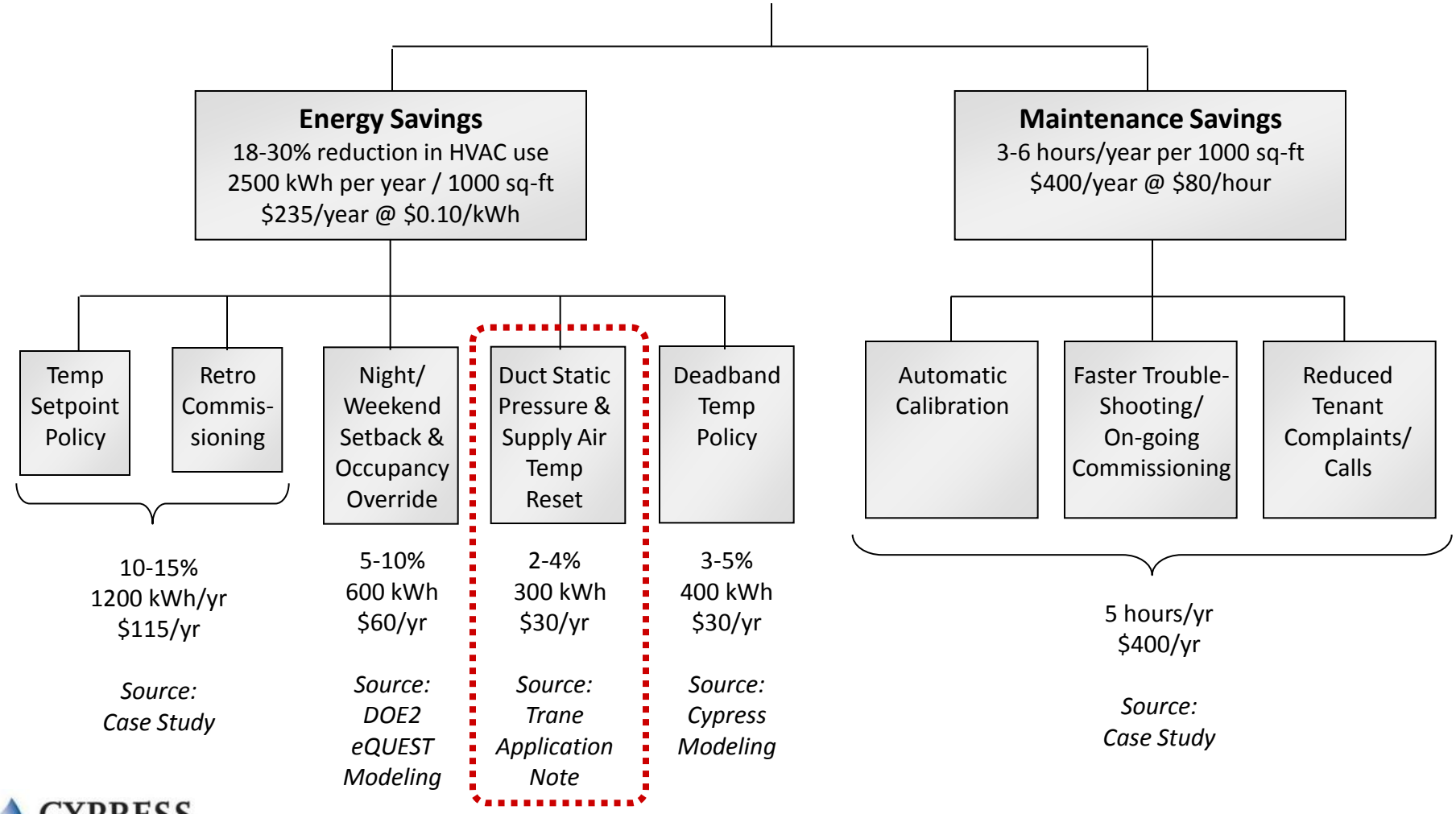
Calculated 10% Reduction on HVAC Energy Using eQUEST Modeling Software from the US Department of Energy

Wireless Pneumatic Thermostat Savings

Estimated Savings Potential

$635/year (per 1000 sq-ft)
Upfront Retrofit Cost: $600 (per 1000 sq-ft)
Payback Period: 11 months

Note: All calculations based on 300,000 sq-ft retrofit project, $0.10 per kWh electricity rate, and $80 per hour maintenance labor rate.



Duct Static Pressure Reset Savings

- **Reduce Ventilation Fan Speed / Duct Static Pressure when heating/cooling not required. Keep at minimum for Indoor Air Quality**
- **When heating/cooling required, increase fan speed for proper temperature control**
- **Save energy by reducing fan load when not needed.**
- **WPT Solution: Built-in branch pressure sensor directly indicates heating or cooling load, and enables existing Building Management Systems to control fan speed appropriately.**

Trane Models for DDC Systems Show 2-4% Energy Savings from Duct Static Pressure Reset. WPT Achieves Same Application with Pneumatic System.

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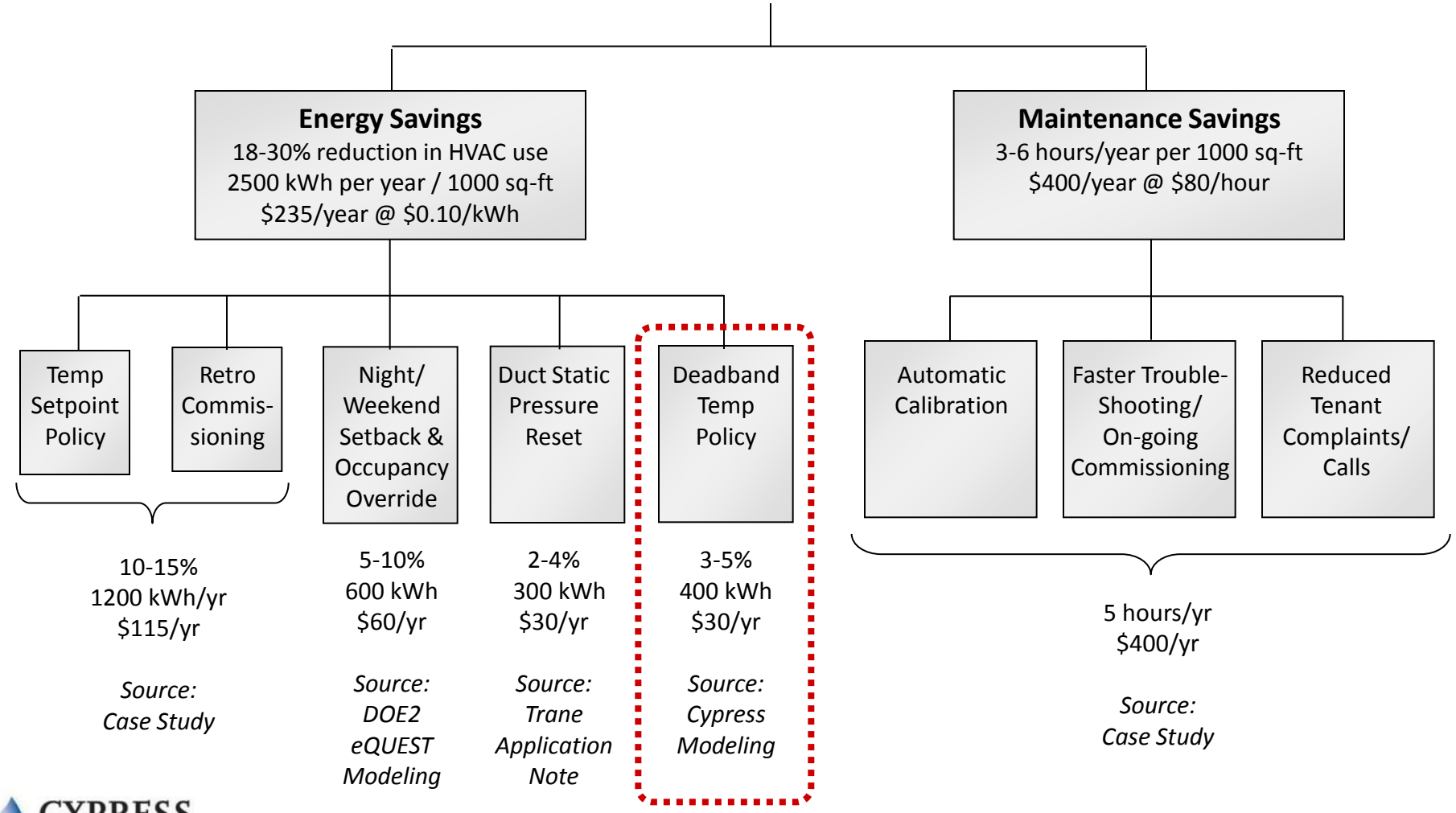


Deadband Temperature Setpoint Policy

What is it?

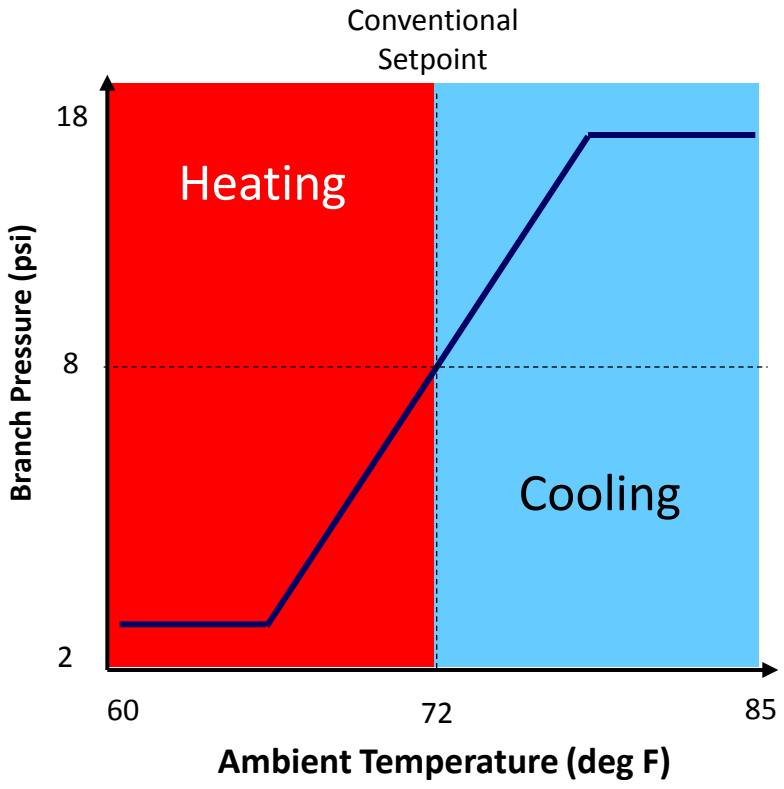
- When zone temperature is within certain limits e.g. between 68F and 78F, *ALL HEATING AND COOLING IS DISABLED* for that zone.
- When ambient temperature is outside these limits, heating and cooling is *ENABLED* to maintain basic comfort.

Why?

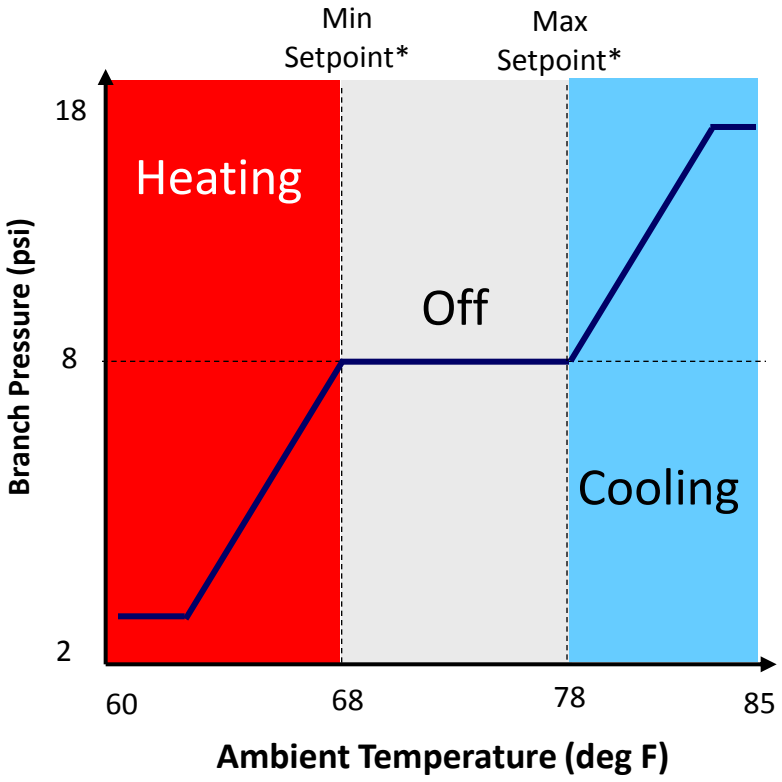
- Up to 60% energy savings potential, for occupants who can tolerate some range of temperature swing.
- Many universities and public institutions have mandated this type of temperature setpoint policy…the Deadband WPT enables and automatically enforces the policy.
- Benefits are INCREMENTAL to Night Setback, Occupancy Override, Demand Response and other energy management strategies available with the standard WPT (and also available on deadband WPT).

Comparison: Standard Pneumatic vs. Deadband Function

Standard Pneumatic Thermostat Behavior (Typical, Direct Acting)



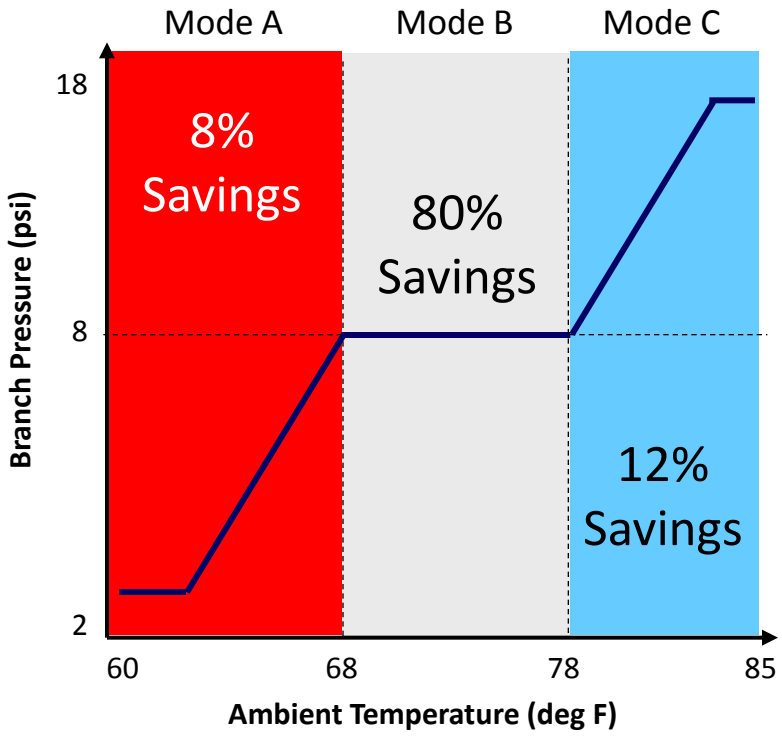
Deadband Pneumatic Thermostat Behavior (Typical, Direct Acting)



*Minimum and Maximum Setpoints are selectable by user or building manager

Energy Savings Enabled by Deadband

Significant Savings!



	% of time operating in:			Est. Energy Savings
	Mode A	Mode B	Mode C	
Location 1 (e.g. San Diego, CA)	20%	70%	10%	59%
Location 2 (e.g. Fargo, ND)	75%	20%	5%	23%
Location 3 (e.g. Miami, FL)	20%	50%	30%	45%

Deadband Savings By Mode vs. Standard Stat

- Mode A – Min Setpoint 4F below conventional Setpoint => 8% energy savings.*
- Mode B – Only ventilation fans running, no heat or cool => 80% energy savings.**
- Mode C – Max Setpoint 6F above conventional Setpoint => 12% energy savings.*

* Every degree of setback equals 2% energy savings. Source: ACEEE.
** Ventilation uses about 20% of the energy in HVAC even when cooling or heating is not active.
Souce: US Energy Information Administration.

Wireless Pneumatic Thermostat Savings

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Energy Savings
18-30% reduction in HVAC use
2500 kWh per year / 1000 sq-ft
$235/year @ $0.10/kWh

Maintenance Savings
3-6 hours/year per 1000 sq-ft
$400/year @ $80/hour

Temp Setpoint Policy	Retro Commis-sioning	Night/ Weekend Setback & Occupancy Override	Duct Static Pressure Reset	Deadband Temp Policy
10-15% 1200 kWh/yr $115/yr		5-10% 600 kWh $60/yr	2-4% 300 kWh $30/yr	3-5% 400 kWh $30/yr
Source: Case Study		*Source: DOE2 eQUEST Modeling*	*Source: Trane Application Note*	*Source: Cypress Modeling*

Automatic Calibration	Faster Trouble-Shooting/ On-going Commissioning	Reduced Tenant Complaints/ Calls
5 hours/yr $400/yr		
Source: Case Study		

Savings from Reduced Maintenance

- **Auto-Calibration**

- **Reduced Tenant Hot/Cold Calls:**
  Built-in BACnet and email alarm notification - before tenants complain.

- **Faster Troubleshooting/On-going Commissioning:**
  Built-in branch pressure, zone temperature, and setpoint temperature sensors with trending, history, and alarming. Service strategy converted from Scheduled Maintenance to Condition Based Maintenance, and enable Ongoing Commissioning.

- **Actual Case Study Results, Santa Clara County Government– 300,000 sq-ft retrofit**
  - 60% reduction in maintenance service – from $25k/month to $10k/month
  - Key learnings: predictively detect faults, dispatch service personnel only to zones with identified faults, and monitor to confirm fault is fixed post service call.

Full case study available at: http://www.cypressenvirosystems.com/files/pdf/CountyofSantaClara_EnergySavings_Final.pdf

60% Reduction in Maintenance Service Hours by Dispatching Service Work Only to Detected Problem Areas, and Faster Troubleshooting

LEED Credits

LEED for Existing Buildings: Operations & Maintenance
Registered Project Checklist

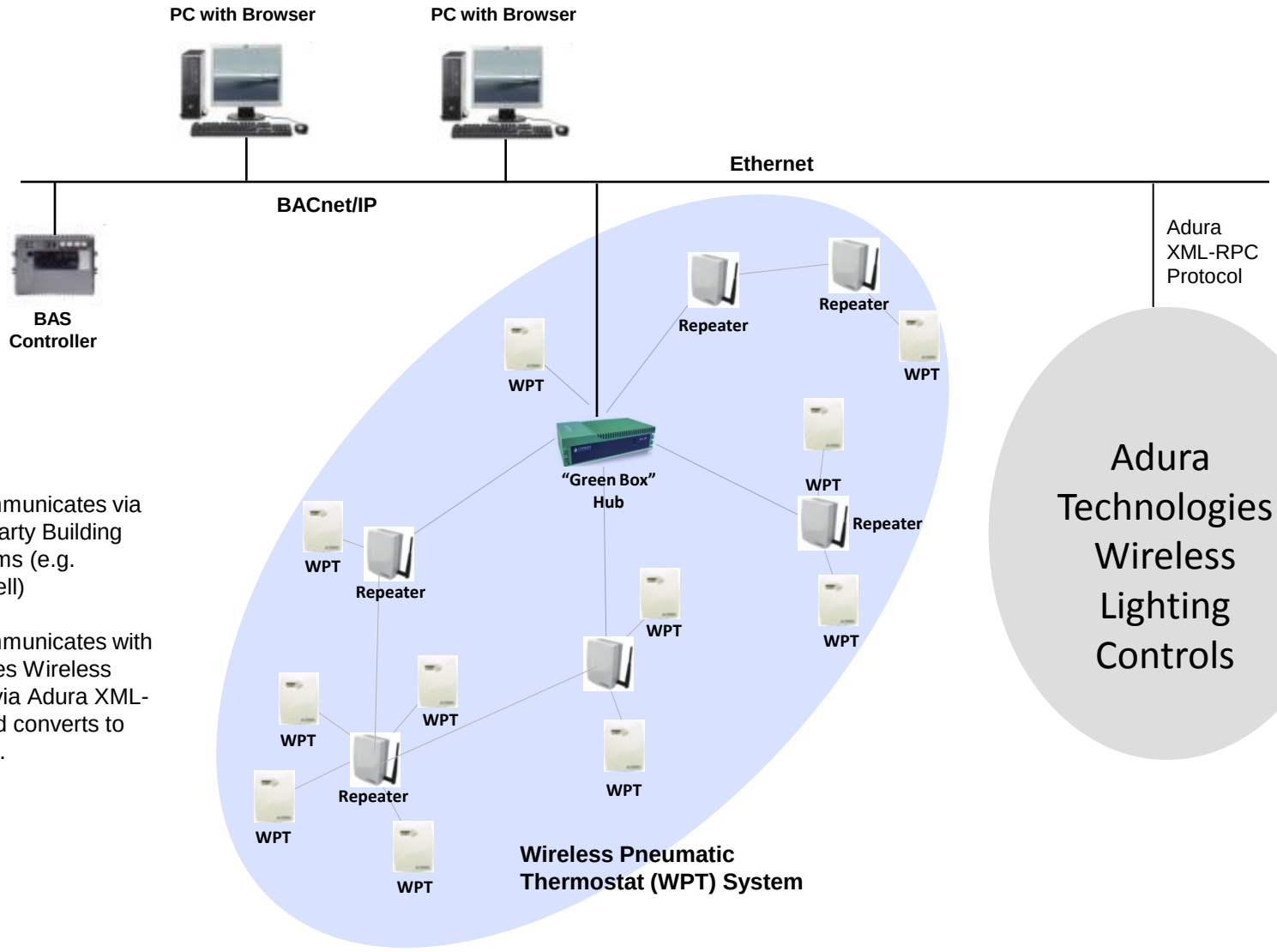
			Energy & Atmosphere, continued			
			Existing Building Commissioning			
			Credit 2.1	**Investigation and Analysis**	✓	2
			Credit 2.2	**Implementation**	✓	2
			Credit 2.3	**Ongoing Commissioning**	✓	2
			Performance Measurement			
			Credit 3.1	**Building Automation System**	✓	1
			Credit 3.2-3.3	**System Level Metering**		1 to 2
				Credit 3.2 40% Metered		1
				Credit 3.3 80% Metered		2

Tenant Comfort and Satisfaction, Ability to Attract Top Tier Tenants, and Lower Lease Churn Rates Are Incremental to Energy Savings Benefits

Compatible with Existing Systems

VENDOR	BAS	TEST PARTNER	LOCATION
ALERTON	BACtalk	Syserco	Fremont, CA
AUTOMATEDLOGIC CORPORATION	ALC	ACCO Engineered Systems	San Leandro, CA
Honeywell	Excel, Tridium	Honeywell Corp.	Golden Valley, MN Wixom, MI
Johnson Controls	Metasys	RSD-Total Control JCI Sensor Products	San Jose, CA Milwaukee, WI
SIEMENS	Apogee	Siemens Building Technologies	Hayward, CA
Schneider Electric	Andover Continuum **StruxureWare**	EMCOR Integrated Solutions	Pleasanton, CA
TRANE	Trane Tracer Summit BCU	Trane	Calgary, Alberta - Canada
Delta CONTROLS	ORCA	Cypress Semiconductor	San Jose, CA

Current Wireless Pneumatic Thermostat (WPT) Architecture



Notes:

WPT System Communicates via BACnet/IP to 3rd party Building Automation Systems (e.g. Johnson, Honeywell)

WPT System Communicates with Adura Technologies Wireless Lighting Controls via Adura XML-RPC interface, and converts to BACnet/IP objects.

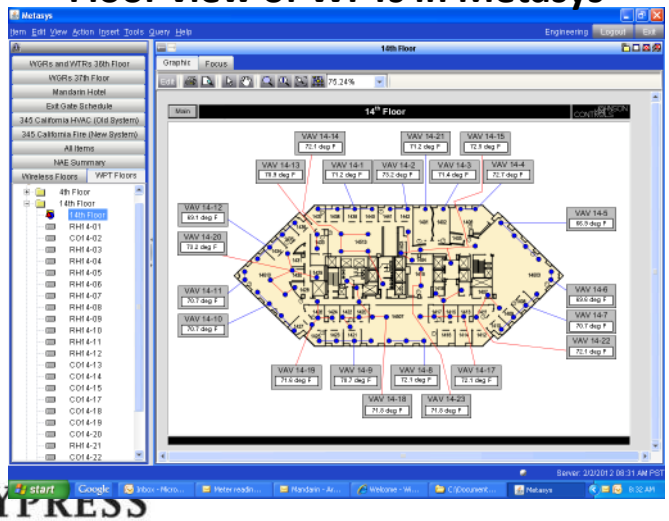
Adura Technologies Wireless Lighting Controls

Examples of how the WPT Provides Zone Visibility and Control through the GBC and other Building Automations Systems

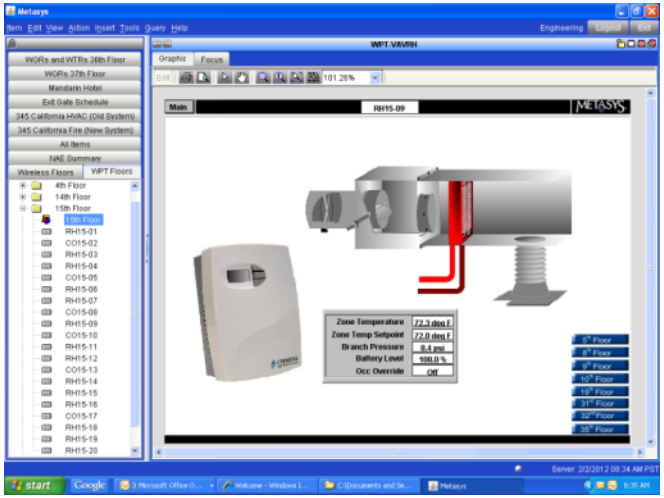
Cypress Envirosystems GBC Interface

Floor view of WPTs in StruxureWare

Floor view of WPTs in Metasys



Detailed zone view of WPTs in Metasys



Corporate Customers

Education Customers

K-12 School Districts

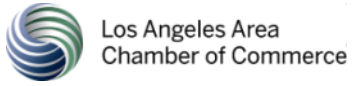
- New York City, NY
- Limestone school district, IL
- East Hartford, CT
- Monroe, NY
- White Plains, NY
- Chisholm SD, MN
- De Smet Jesuit, MO
- Midland, TX
- West Bloomfield, MI
- Ottawa, Canada
- Loudoun, VA
- North Smithfield, RI

Government & Health Care

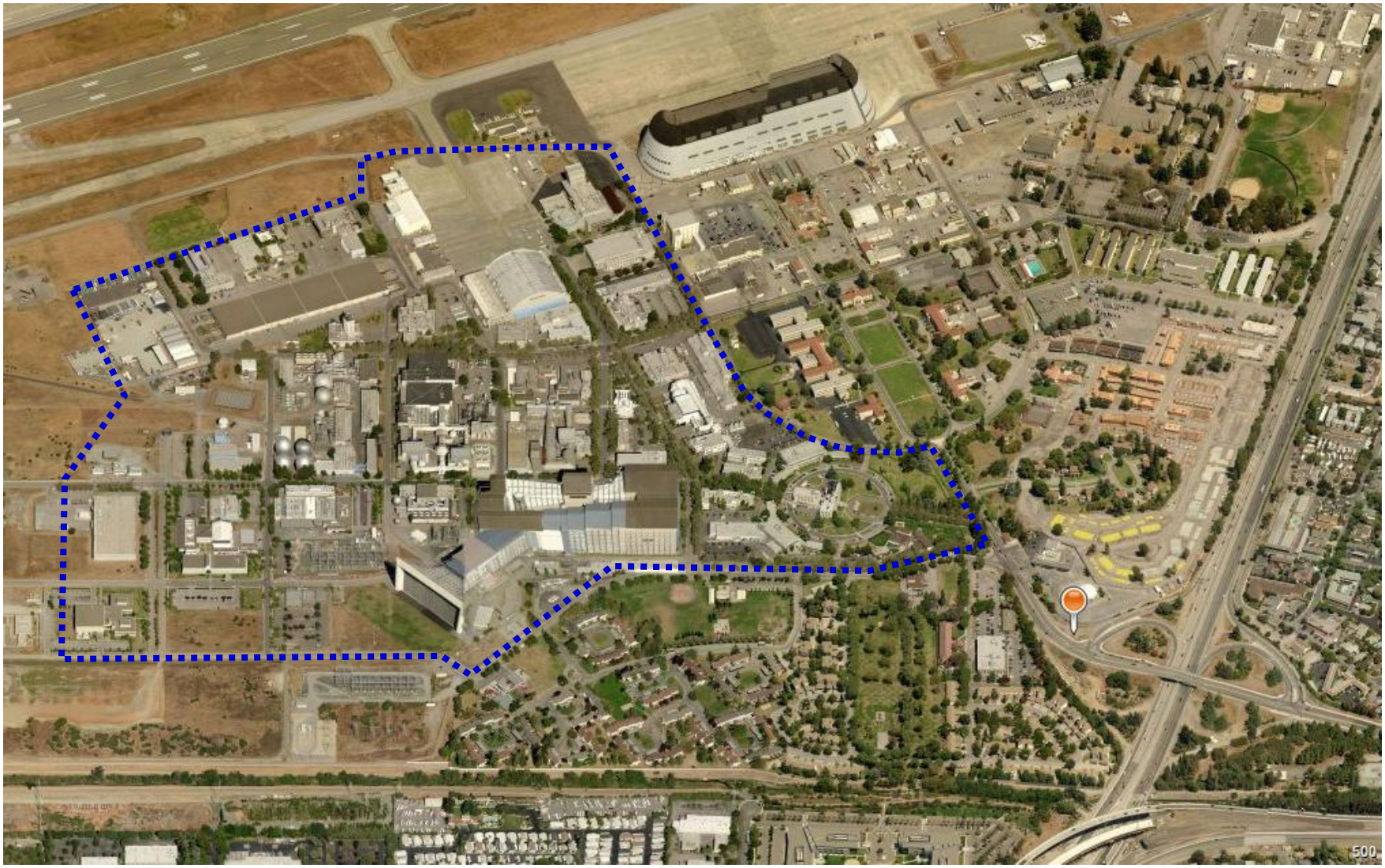
Government

Health Care

Commercial Real Estate Customers



NASA Ames Research Center



14 Buildings, 1,400 WPT's in 1.5 million square feet

Authorized Channel Partners

GOLD CHANNEL PARTNERS

Honeywell Process Solutions

Honeywell Building Solutions

Invensys Wonderware

acco engineered systems

EMCOR

SUNBELT CONTROLS

Johnson Controls

SILVER CHANNEL PARTNERS

TRANE

azbil

Temperature Control Systems

G&O Thermal Supply Company

NAGASE

RSD Refrigeration Supplies Distributor

Industrial Controls

Yorkland Controls Environmental Solutions

Survey Questions

Cypress Envirosystems Quarterly Customer Survey (Q3 2010)

Questions for Channel Partners

Question 1: How satisfied are you with the product quality?

Question 2: How satisfied are you with the product training and support?

Question 3: Would you recommend Cypress Envirosystems to your customers?

Questions for End-Users

Question 1: How satisfied are you that the system works as expected?

Question 2: How satisfied were you with the planning and installation process?

Question 3: Would you recommend Cypress Envirosystems to colleagues in your industry?

Q3 Net Promoter Score – End Users

Survey ID	Customer Type	Company	Loca-tion	Name	Date	Ques-tion 1	Ques-tion 2	Ques-tion 3	Comments
621	End-User	Architect of the Capitol	DC	Ryan Ward	10/26	10	10	10	
614	End-User	Caterpillar	IL	Dave Van Natta	10/26	10	10	10	
605	End-User	CBS	NY	Tom Kane	10/26	10	10	10	Better then i expected.
622	End-User	CBS	NY	Rich Hunter	10/27				
609	End-User	City of Montreal	QC	Jacques Croteau	10/26	10	10	10	
615	End-User	Clemson University	SC	Tony Putnam	10/26	7	6	7	This may have been a slightly more complicated installation since it involved individual office on fan coil units in an older building
616	End-User	Clemson University	SC	Matt Holbrooks	10/26				
608	End-User	Central Michigan Univ	MI	Mike Walton	10/26				
601	End-User	Genentech	CA	Barkley Flynn	10/26				
620	End-User	Google	CA	Dan Cucoso	10/26				
623	End-User	Google	CA	Anthony Ravitz	10/14			10	We really like the WPT, but have money for DDC now. Sorry.
617	End-User	Kaiser Permanente	CA	Paul Becker	10/26	10	10	10	You guys are one of our best vendors. Love Chuck Muncy.
611	End-User	LEVACS (Eli Lilly)	IN	Mark Peterson	10/26	8	10	10	
610	End-User	Lilly Caribe	PR	Abel Gonzalez	10/26				
602	End-User	Linear Technology	CA	Rick Pasquini	10/26	10	10	10	This system has greatly reduced the amount of time and guess work in troubleshooting our HVAC issues
618	End-User	Santa Clara County	CA	Lin Ortega	10/26				
619	End-User	Santa Clara County	CA	Alan Fusco	10/26				
612	End-User	St. Joseph's Hospital	AZ	Walt Dubois	10/26				
613	End-User	St. Joseph's Hospital	AZ	Tom Cottage	10/26				
607	End-User	Stanford	CA	Tai Tran	10/26	10	10	10	
604	End-User	Sunpower - F2 Scrubber	PHIL	Peter R. Remo	10/26				
603	End-User	Sunpower - F2 WBM	PHIL	Michael Ecal	10/26				
606	End-User	SunPower - Fab2	PHIL	Dennies Andal	10/26				

Total responses	**9**	**9**	**10**	
Promoters	**7**	**8**	**9**	
Neutral	**2**	**0**	**1**	
Detractors	**0**	**1**	**0**	
End User Score	**78**	**78**	**90**	
Aggregate Score	**50**	**73**	**78**	*(Combined End-User and Channel Scores)*

Q3 Net Promoter Score – Channel Partners

Survey ID	Customer Type	Company	Loca-tion	Name	Date	Ques-tion 1	Ques-tion 2	Ques-tion 3	Comments
701	VAR	3V Chimica	Italy	Emiliano Vigna	10/26	6	7	7	
723	VAR	ACCO	CA	Mike Ridout	10/26	9	10	10	Our customer is very happy. Real pleasure to work with you. Class operation.
712	VAR	HBS - Monroe	NY	Bob Garvey	10/26				
707	VAR	HBS - WP	NY	Scott Anderson	10/26				
720	VAR	Johnson Controls Inc.	CT	Jack Runyan	10/26				
703	VAR	MEC - General	MI	Dan Bonfiglio	10/26				
704	VAR	Parker Design & Const	AZ	John Vigh	10/26	10	9	10	I am recommending Cypress everywhere!
724	Dist	RSD	CA	Dan Ginn	10/26	5	10	5	Need to fix BACnet issues and issue product bulletins
	Dist	RSD - Gardena	CA	Jose Bravo	10/28	10	10	10	Awesome working with you.
	Dist	RSD - Sacramento	CA	Tom Hardy	10/28	7	8	10	Version issues at Healthnet project.
716	Dist	SCI	QC	Pierre Longval	10/26	8	8	10	Official training for our staff is yet to come. Field support is terrific as fas as I'm concern. It really influenced the end user to take is
717	Dist	SCI	QC	Maurice D'Halewyn	10/26	9	8	10	The team effort to correct the problems described by my customers (city of MontrÃ©al) was impressive. No time was
718	Dist	SCI	QC	Serge Descary	10/26	5	10	8	EXCELENT SUPPORT FROM ROBERT BRILL AND ROBERT FALCONER
713	VAR	Silpac	CA	Mark Thornberry	10/26				
719	VAR	Southampton-Trane		Ghaudy Sanchez	10/26				
714	Dist	Wiles Legault	QC	Ron Gravelle	10/26	9	10	10	The delivery could be quicker. I have about 4 projects in the fire and hope they all go ahead. We also submitted a French version of
715	Dist	Wiles Legault	QC	Conrad Lemieux	10/26	9	9	10	when preparing a demo for clients we need to be able to edit the powerpoint presentation from your web site so we can customize
710	Dist	Yorkland - General	ON	Gerry Cellucci	10/26	8	9	10	
711	Dist	Yorkland - General	ON	Larry Gravelle	10/26	9	9	10	Web site should be easier to find how to install stats ect

Total responses	**13**	**13**	**13**
Promoters	**7**	**9**	**10**
Neutral	**3**	**4**	**2**
Detractors	**3**	**0**	**1**
"NPS" Score	**31**	**69**	**69**

CYPRESS ENVIROSYSTEMS

Selected WPT Customer Feedback

First and foremost, the work performed by the professional team at Cypress Envirosystems was seamless. The installation was very precise and strategic, the training both clear and complete, the knowledge and understanding of customer needs concise and competent . As a business partner Cypress Envirosystems is top notch and I will refer and recommend to all my company peers the same. Thanks again for a job well done and the support and training that was second to none. Thanks again for a great job.

Lawrence Riviera
Honeywell Building Solutions

It was an outstanding and record setting installation of the wireless pneumatic thermostats and they are all working great.
Everyone in the Dean's Office is very happy and impressed.
So far everything is great. Thanks for your efforts and please send my best regards to your colleagues.

Emir José Macari, Ph.D.
Dean of Engineering and Computer Science
California State University, Sacramento

In just five days, we went from zero control of our heating and air conditioning, to total control. It was amazing how easy it was to calibrate each WPT after installation. Now we control set points for all thermostats remotely and have programs in place to control them according to all sorts of variables. We now have a true wireless EMS system. We can go online and see every zone and control each one remotely. The WPT system also gives us very powerful diagnostic tools and troubleshooting tools.

Paul Becker, Facilities Manager
Kaiser Permanente

The whole project, including installation, cost about $175,000 for retrofitting 350 thermostats," says Ortega. "We made the deadline and received the PG&E incentive of $200,000. Talk about instant ROI. Plus, we figure that we are saving $42,000 per year on electric cost for just those two buildings. And then there's maintenance. We used to be out there all the time tinkering with the system. Now we monitor it online. We figure our maintenance expense has been cut in half from $25,000 monthly to $12,500.

Lin Ortega, Utilities Engineering Program Manager
Santa Clara County, California

We are excited about our new level of control on the 2 floors that were retrofitted!

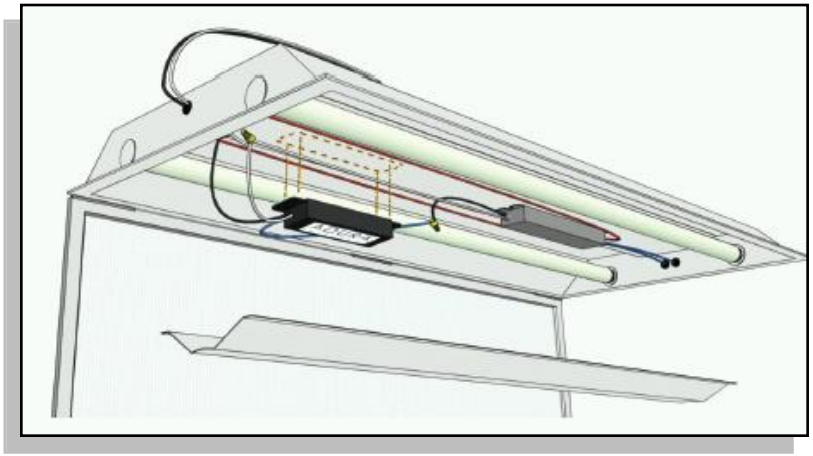
Timothy D. Danz
Chief Engineer, The California Center
Cushman & Wakefield
San Francisco CA 94104

The new WPTs are working great. We now remotely control setpoints, set alarms, run diagnostics, perform zone control, and occupancy override. Of course, some of the tenants complain that they have lost control of their thermostats, but I point out that the university has a setpoint policy of 70 degrees for heating and 74 degrees for cooling. At night we go to 60 and 85 degrees. Thanks to the new WPTs, this is the first time we've been able to implement the policy in that building."

Kirk Dillery, Energy Systems Specialist
Western Michigan University

Lighting Controls Retrofit

Easy Retrofit of Existing Fixtures



Strategy Employed	Savings Expected
Smart Scheduling	10-40%
Daylight Harvesting	5-15%
Task Tuning	5-20%
Presence Detection	25-50%
Personal Control	5-15%
Demand Management	5%
Total	50-75% (Blended)

Lighting Controller

Occupancy or Light Sensor Interface

Wall Control Interface

"Plus….sophisticated Enterprise Energy Management software designed to work with your lighting system to save energy"

Energy Auditing & Continuous Commissioning

Cypress Envirosystems: Problems We Solve…

Pneumatic Thermostats

Dial Gauges

Steam Traps

Need to save energy & improve uptime, but hindered by outdated facility?

Standalone Transducers, LED/LCD Displays

-80C Freezers

Legacy Fluorescent Lighting

Manual Instrumentation, Not Programmable, No Diagnostics…
Equals: Wasted Energy, Higher Downtime, More Labor Required

What is our Solution?

WIRELESS PNEUMATIC THERMOSTAT

"Go from Pneumatic to DDC in minutes"

WIRELESS GAUGE READER

"Remotely Read Gauges in minutes"

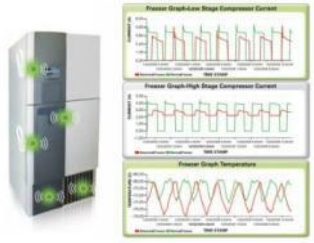
WIRELESS STEAM TRAP MONITOR

"Avoid Expensive Steam Leaks"

BLUE BOX HUB/RECEIVER

WIRELESS TRANSDUCER READER

"Remotely Read Transducers – No Wires"



WIRELESS FREEZER MONITOR

"Predicts and Avoids Costly Freezer Failure"

WIRELESS LIGHT CONTROLLER

"Reduce Electricity Use"

Non-invasive, easy retrofit, energy and labor savings, payback under one year

Energy Audits, Continuous Commissioning

Typical Air Handler Units

Wireless Magnehelic Reader
Monitors Filters and Airflow

- Chilled Water, Steam, Airflow are tough to measure in legacy buildings
- Most older Air Handler Units, Chillers, Boilers etc. are not monitored/automated
- Labor intensive to detect problems, check filters
- Manual gauges often the main means to check pressure, temperature, flow
- Solution: Wireless Gauge Reader clamps on in minutes and transmits reading wirelessly to BMS/BAS
- No downtime, no wiring, no leak checks
- Alarm notification and condition-based maintenance

Wireless Readers
Mounts Over Existing Gauges

Enables Monitoring of Legacy Air Handlers for 70% Less Than Traditional Transducers

Wireless Steam Trap Monitor (WSTM)

Leaking Traps Waste Energy

Typical Steam Trap

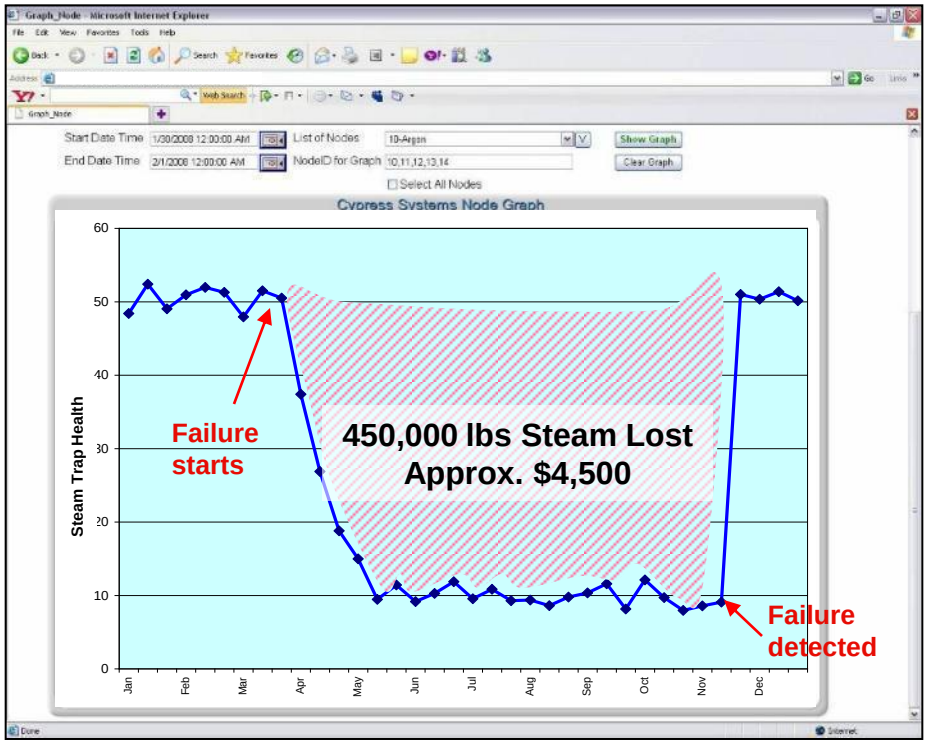
CYPRESS ENVIROSYSTEMS WIRELESS STEAM TRAP MONITOR

- Necessary part of the steam distribution system, usually hundreds of units per site
- 15-20% average failure rate; leaks steam
- Failed traps lose $5,000 per year (1/8” orifice)
- Manual inspection typically done annually – labor intensive, do not catch problems in timely manner
- Solution: Wireless steam trap monitor detects faults and alarms on error, avoiding expensive leak loss
- Non-invasive installation: no breaking seals, wireless, integrates with BMS
- Battery life of 3 years at typical sample rates
- IP65/NEMA 4 rated for outdoor use
- 18 months payback on investment

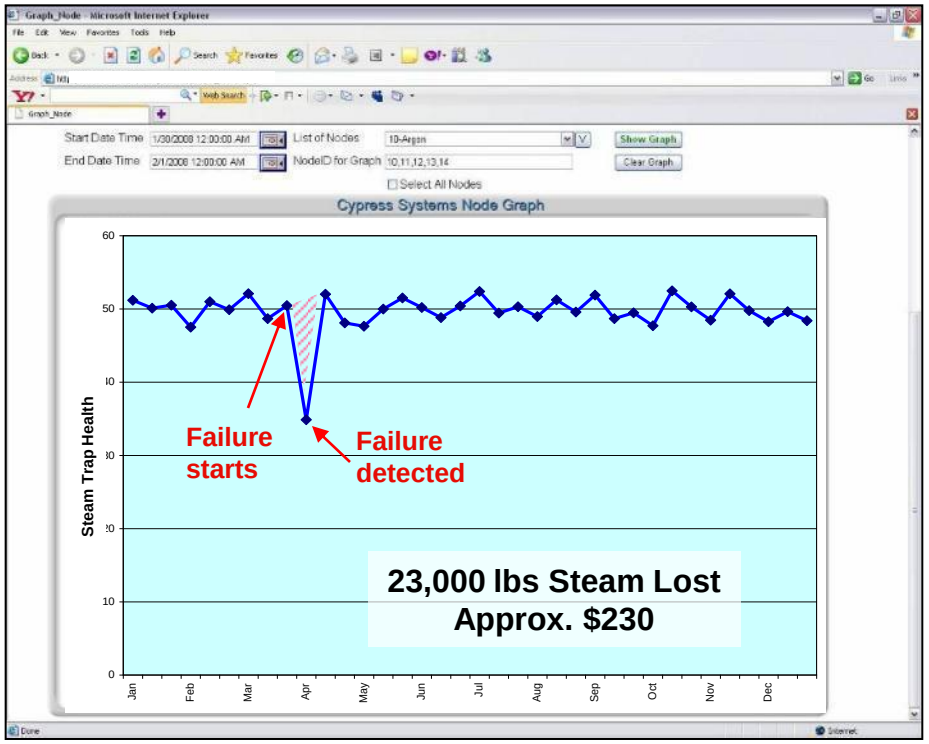
Save Energy and Time Locating Faulty Steam Traps

How Steam Trap Monitoring Saves Energy

Without Steam Trap Monitoring



With Steam Trap Monitoring



Typical savings for 1/8” orifice steam trap

Timely Detection and Correction of Trap Failures Avoids Prolonged Costly Steam Leaks

WSTM Screenshot

CYPRESS ENVIROSYSTEMS

Readings | Graph | Table | Reports | Alarm History | Status | Configuration | Site Settings | Help

WSTM Executive Summary Report

Overview

Total Number of Traps: 12		
Health Status	**Count**	**% of Total**
Nodes with low battery	0	0.00
Nodes with poor RF signal strength	0	0.00

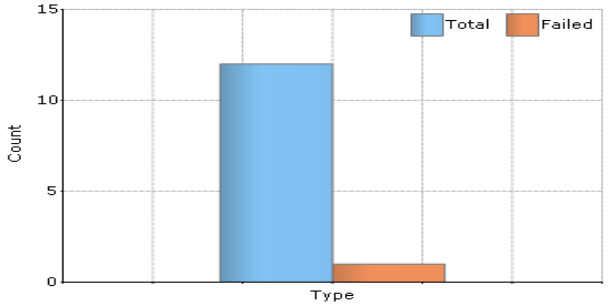
Energy Summary

Steam loss (lbs/hr)	35.70
Dollar loss ($/yr)	4,691.38

Condition Summary

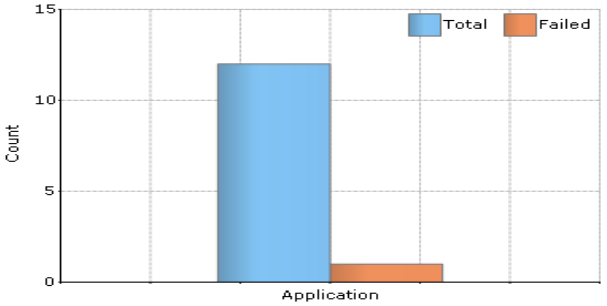
Condition	Count	% of Total
Good	8	66.67
Out of Service	3	25.00
Blowing	1	8.33
Error	0	0.00
Flooded	0	0.00
Leaking	0	0.00

Type Summary



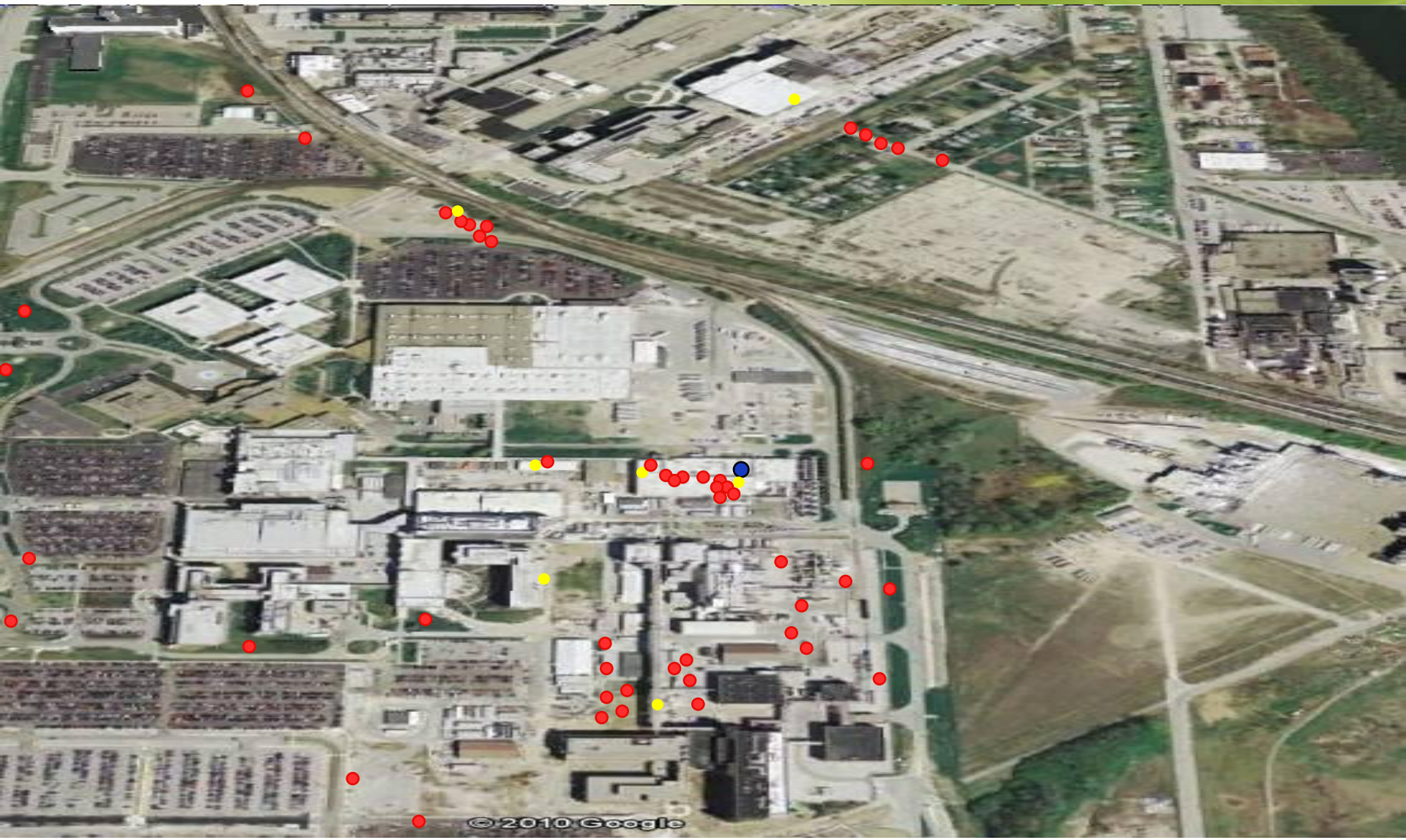
Type	Total Count	% of Total	Failure Count	Out of Service Count	% of In Service Failure
Bucket	12	100.00	1	3	11.11
Totals:	**12**	**100.00**	**1**	**3**	**11.11**

Application Summary



Application	Total Count	% of Total	Failure Count	Out of Service Count	% of In Service Failure
Drip	12	100.00	1	3	11.11
Totals:	**12**	**100.00**	**1**	**3**	**11.11**

Lilly Indianapolis, IN – Deploying 2,400 WSTM's

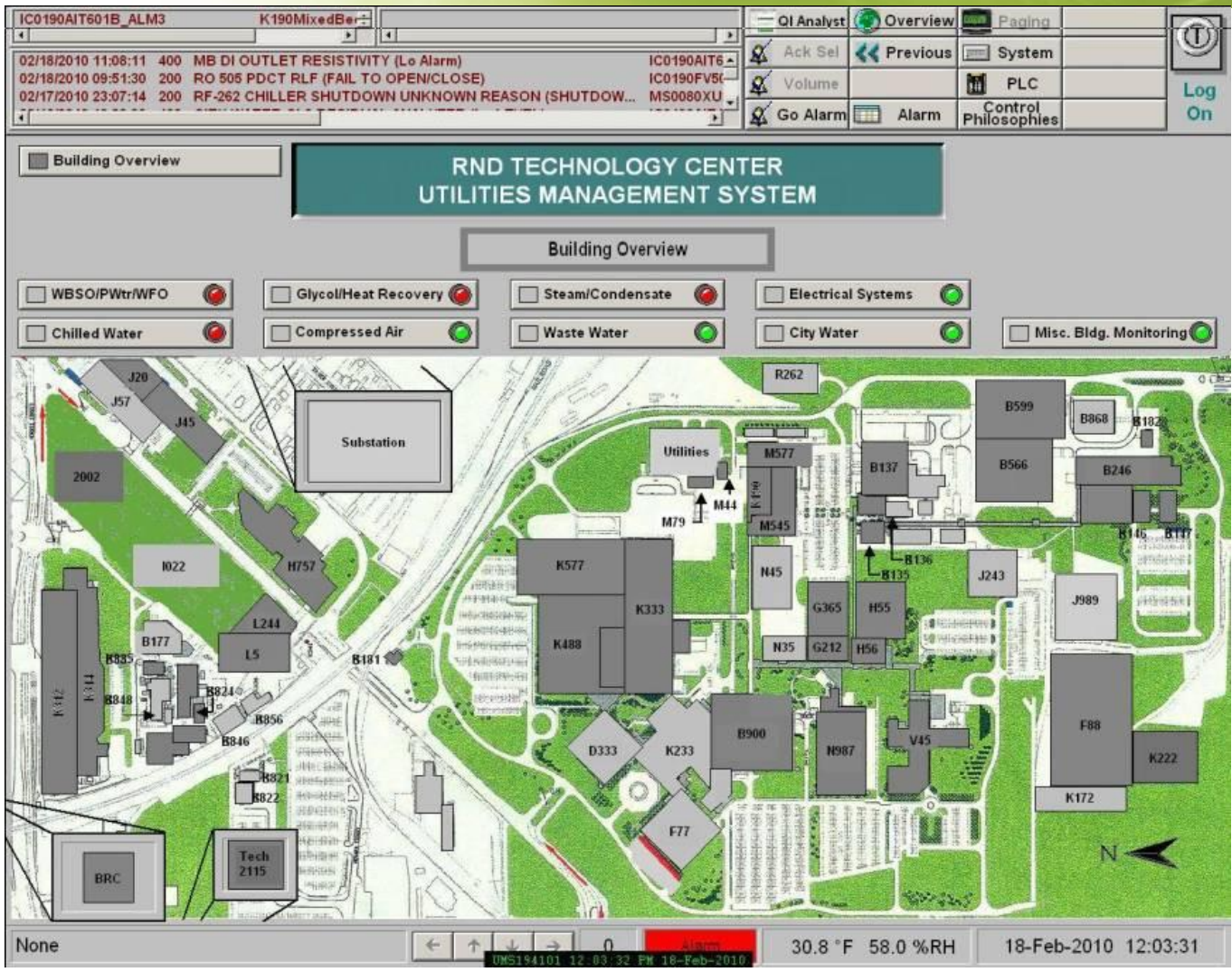


BBS WRE WSTM

CYPRESS ENVIROSYSTEMS™

Traversing Campus Wide Steam Distribution System

- Lilly Technology Center headquarters spans two city blocks
- Robust wireless network blankets large Tech Center complex to connect WSTM and other Cypress wireless devices



"Wireless is outstanding and will be a large competitive advantage to use the same platform for multiple applications" – Manager Steam Plant Operations

Extreme Environment

Cement bunker over 25 ft deep
Inaccessible “hot vault” traps at temperature up to 500 deg F
No hindrance in getting wireless signal back to the Blue Box and report condition data of the steam trap

Published Customer Articles and Case Studies

Control Magazine, Dec 2010

PRIMARY PROCESS MEASUREMENTS

Wireless Monitoring Delivers Fast Payback

Genentech checks steam traps and freezers to find energy savings and improve uptime.

by CHRIS STUBBS

Genentech's (www.gene.com) mission is to meet unmet medical needs, so one of the goals of our Corporate Facilities Services department is to operate its plant in South San Francisco as a world-class facility. The key focus area for achieving this goal is continuous improvement of facilities and maintenance systems to reduce operating costs. By driving down operating costs, more funds can be allocated to developing the product pipeline, and achieving the company's mission.

The guiding principles for identifying and executing continuous improvement projects include:

- Improving plant asset management by implementing a performance-based maintenance strategy. Genentech has a well-established, time-based asset maintenance program. Transitioning to a performance-based strategy will also allow Genentech to predict equipment failure and understand an asset's life cycle.
- Reducing energy costs. Identifying methods to improve the efficiency of energy consumption will reduce energy costs and improve the bottom line.
- Improving uptime. Research and operations expect the facility and equipment to be functional and reliable. Any downtime in the facility directly impacts the bottom line. Corporate Facilities Services focuses on improving uptime and equipment reliability to help achieve the mission.

Steam Traps and Freezers

Consequently, we identified several assets that could benefit from its performance-based maintenance strategy to reduce energy costs or improve uptime. The first was steam traps. Genentech has an annual steam-trap maintenance program. However, throughout the year, steam traps often fail. Steam loss from failed traps was estimated to cost the company hundreds of thousands of dollars annually. Steam-trap failures could be prevented or found as they occur using a steam-trap monitoring system, resulting in significant energy savings (Figure 1).

The second asset able to benefit from performance-based

Genentech, 2009

ARC Orlando Forum 2009, Field Device Strategies for Sustainability

Implementation Savings Calculation (slide 12)

Installed Units	Cost	Savings	Install Date	Savings Calculation
56 Steam Traps	$42,000	$42,525	09/2008	2 – 1/4" traps blown for 6 months at $15/1000 lbs = 210,000 lb/month x 6 months x 15/1000 x 2 traps = $37,800 2 – 1/8" traps 50% blown for 6 months at $15/1000 lbs = 52,500 lb/month x 50% x 6 months x 15/1000 x 2 traps = $4,725
20 Freezers	$20,000	$20,000	09/2008	$5000 per freezer x 4 failed freezers = $20,000
4 Air Handlers	$4,800	$13,400	04/2008	3 AHUS with 4 pre-filters each, changed 4x a year, reduced to 2x per year at $100 per filter = 4 x 2 x $100 x 3 = $2,400 1 AHU with 55 pre-filters, changed 4x a year, reduced to 2x per year at $100 per filter = 55 x 100 x 2 = $11,000
15 RO Monitoring Points	$18,000	TBD	04/2008	TBD: labor savings, troubleshooting, downtime savings **Note: savings hard to calculate due to regulatory impact of maintenance changes.
5 Other Misc. Points	$6,000	TBD	04/2008	TBD: labor savings, troubleshooting, downtime savings
Totals	**$90,800**	**$75,925**		**Payback of 14 months**

Genentech
IN BUSINESS FOR LIFE

More Case Studies with ROI on Website

Selected WSTM Users

- Genentech, Biotech – South San Francisco, CA
- Genentech, Biotech – Hillsborough, OR
- Eli Lilly, Pharmaceuticals – Indianapolis, IN
- Abbott, Pharmaceuticals – Campoverde, Italy
- Veneria Medical Center, Hospital – Milan, Italy
- VA Hospital, Hospital, Lebanon, PA
- UC Davis Medical Center, Hospital, Davis, CA
- Genel Makina, Boron Mine - Turkey
- InBev, Brewery – Wales, UK
- Cushman and Wakefield, Office building, San Francisco, CA

Upcoming VA Hospital Projects (VA Spec, already bid):

https://www.fbo.gov/index?s=opportunity&mode=form&id=2b0dc11b6ff9efd969cfbed6a487caa3&tab=core&_cview=1

https://www.fbo.gov/index?s=opportunity&mode=form&id=e958edc9a9b80a851ade16558bf9fdca&tab=core&_cview=1

Summary

- Retrofit for Commercial and Industrial Plants for Energy Efficiency and Auto-Demand Response
- Key Principles:
  - Non-Invasive, Clamp-on Devices Which Install in Minutes
  - Compatible with Existing Infrastructure
    - DDC Integration
    - No new training of staff
    - No new systems software
- Typical Payback of 18 Months or Less

Additional Backup Examples

Reduce Energy Consumption: Compressed Air

Customer Challenge:

Compressors, pumps and fans often run at settings beyond what is needed e.g. 125psi for Compressed Dry Air instead of 85psi, wasting >20% energy.

Operators lack monitoring so they don't reduce pressure – avoid risk of process upset.

Installing transducers is very time-consuming & disruptive for multiple air branches and can introduce leaks.

WGR Solution:

Typically manual gauges are already installed throughout CDA systems or coolant loop systems.

WGR's can monitor and alarm pressure/flow to ensure process integrity and reduce energy use.

App note available:
"Compressed Dry Air System Energy Savings"

Savings on 500hp Compressed Air System can be up to $100K per year, with a 8 month payback.

Improve Asset Health and Uptime

Customer Challenge:

Older equipment such as packaged heat exchangers, boilers, chillers, air dryers, hydraulic conveyors, water filters, HEPA filters, etc. often have little or no electronic monitoring outputs.

Adding new transducers require modifying the equipment package and may impact existing service/ warranty agreements.

WGR Solution:

Typically manual gauges are already installed on older packaged equipment.

The WGR can monitor, trend and alarm parameters for early fault detection and corrective action.

Case Studies Available:
"Facilities Monitoring"

"Tri-State Power Asset Health Monitoring"

"In the first two weeks of using the WGR, we were able to detect and develop corrective measures for a potentially costly issue that we never suspected" – Mike Long, Control System Supervisor, Tri-State Generation and Transmission

Reduce Consumables Usage

Customer Challenge:

Gas cylinders (e.g. cal gases), water filters, HEPA filters are often replaced at scheduled intervals rather than actual usage.

This results in more frequent changes than required, or results in downtime when not replaced in a timely manner.

Installing transducers may introduce leaks and require safety inspection.

WGR Solution:

Gas Cylinder regulators gauges, Magnehelic air flow gauges (for HEPA filters) are great examples of data which can be read and trended to optimize consumables use.

Reduces consumables cost, avoids downtime, and optimizes skilled labor.

Case Studies Available:
"Micrel Gas Management Savings"

We saved $215K per year on our 280 Gas Cylinders, a seven month payback.
– Ron Farry, Operations Manager, Micrel Inc.

Perform Faster Troubleshooting

Customer Challenge:

When excursions occur, technicians inspect many gauges and equipment in the hope of finding the source of the problem...but the relevant data was often not captured and is not available.

Often, data from different subsystems or equipment needs to be compared and time-indexed to identify the root cause.

WGR Solution:

The WGR may be permanently or temporarily installed to log data, and notify on excursions.

The time-indexed historical record helps reduce troubleshooting time and confidence.

Minimize Troubleshooting Labor and Downtime with Non-Invasive Data Logging of Historical Data

Enhance Safety, Reduce Incidents

Customer Challenge:

Many facilities perform manual rounds to inspect equipment and log gauge readings.

Some gauges are in awkward locations or may pose safety risks - high up on column, near heat sources, under floor etc.

Accurately reading gauges “face-on” (without parallax) are sometimes difficult or impossible.

WGR Solution:

Wherever there is a gauge in a hard-to-access location that needs to be read, the WGR is a fast and low cost candidate to do the job.

Reduce likelihood of safety incidents due to reading gauges in hard-to-access locations.

“I’m not getting more engineers, so I need to have them working smarter…using the WGR”
- Pat Ireland, Operations Manager, Novellus Inc.