

Retrofitting Existing Facilities for Energy Efficiency, Uptime, and Productivity

www.CypressEnviroSystems.com

The Opportunity for Facilities



Cutting Edge
Silicon Valley
Technology



*Typical Existing Facility in
Silicon Valley*

How can we bring the Cutting Edge to the Legacy Facility?

Cypress Envirosystems: Problems We Solve...



*Pneumatic
Thermostats*



Dial Gauges



Steam Traps

Need to save energy & improve uptime, but hindered by outdated facility?



Gas Cylinders



-80C Freezers



*Legacy Fluorescent
Lighting*



*Uninterruptible
Power Supplies*

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

Non-Invasive Retrofit Solutions



WIRELESS PNEUMATIC THERMOSTAT
"Go from Pneumatic to DDC in minutes"



WIRELESS GAUGE READER
"Remotely Read Gauges in minutes"



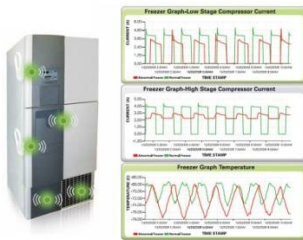
WIRELESS STEAM TRAP MONITOR
"Avoid Expensive Steam Leaks"



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"



WIRELESS BATTERY MONITOR
"Automates UPS Health Check"

Non-invasive, easy retrofit, energy and labor savings, payback in 18 months

US Commercial & Industrial Energy Usage

Industrial Plants

- Steam, Thermal – 40%
- Compressed Air – 25%
- Rotating Equipment, pumps, HVAC - remainder

Commercial Buildings

- HVAC – 40%
- Lighting – 20%
- Plug loads, data centers - remainder

Source: US Energy Information Administration, 2007

Reduce Energy Waste: Steam Trap Leaks

Challenge:

- Steam Traps have high failure rates – 15% per year
- Manual Audits are labor intensive and infrequent
- Malfunctioning Steam Traps leak expensive steam



Even Small Steam Trap Can Waste \$10,000 per Year if Not Detected

Wireless Steam Trap Monitor (WSTM)

CYPRESS ENVIROSYSTEMS WIRELESS STEAM TRAP MONITOR



- Wireless steam trap monitor detects faults and alarms on error, avoiding expensive leak loss
- Non-invasive installation: no breaking seals, wireless, integrates with existing automation
- Battery life of 3+ years at typical sample rates
- IP65/NEMA 4 rated for outdoor use
- One year payback on investment

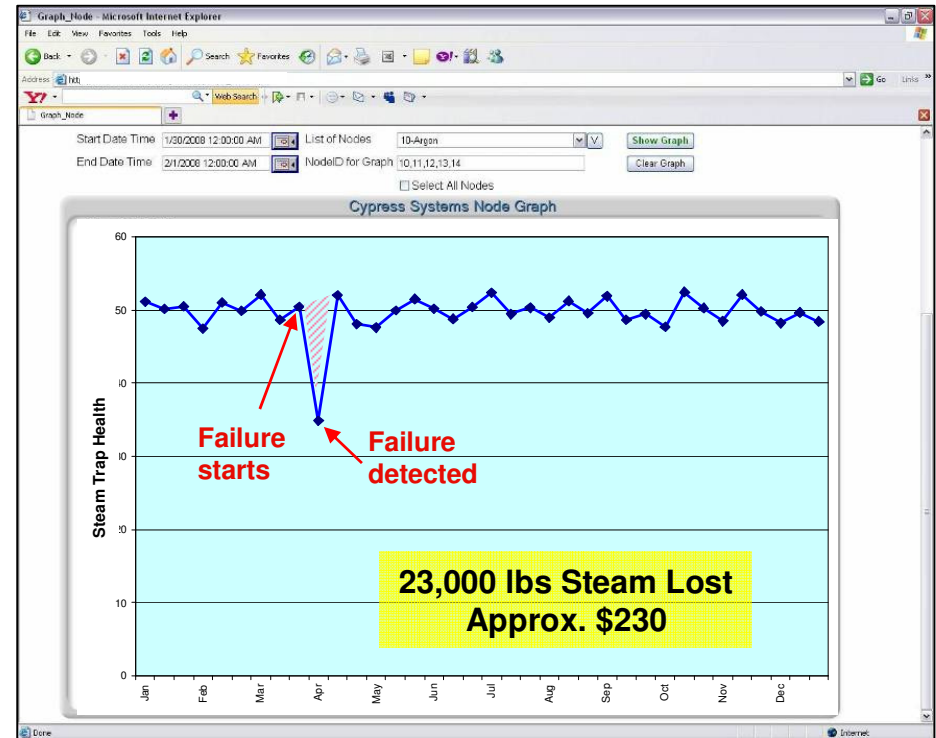
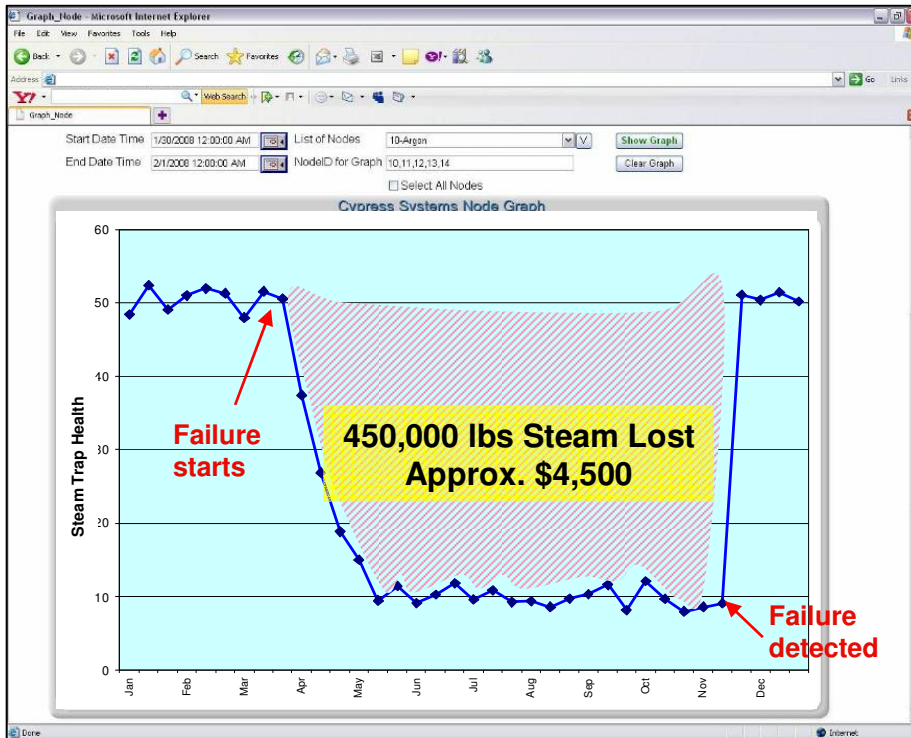
Save Energy and Time Locating Faulty Steam Traps

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

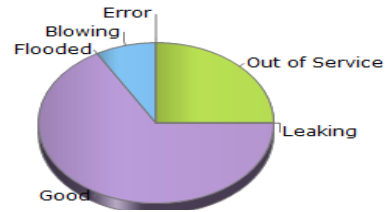
Overview

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

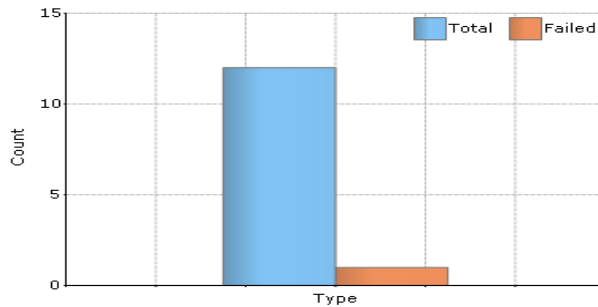
Steam loss (lbs/hr)	35.70
Dollar loss (\$/yr)	4,691.38

Condition Summary



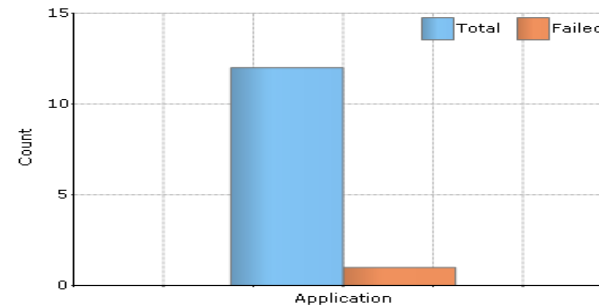
Condition	Count	% of Total
Good	8	66.67
Out of Service	3	25.00
Blowing	1	8.33
Error	0	0.00
Flooded	0	0.00
Leaking	0	0.00

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

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



Compressed Air – Design vs. Typical Case

Design Case

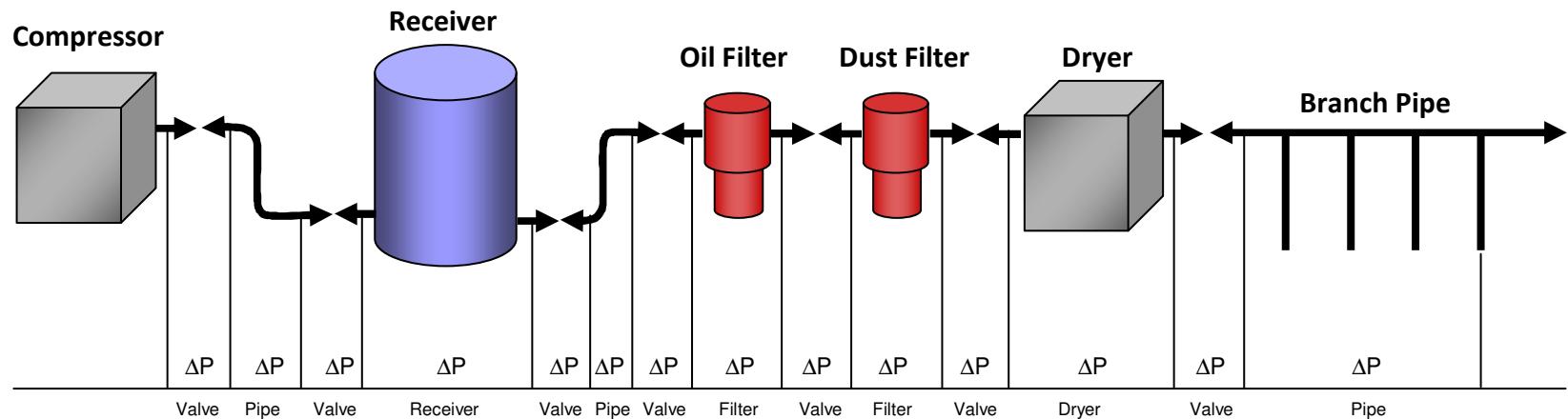
Compressor Working Pressure

105 psi

15 psi loss

End User Pressure

90 psi



Typical Case

Compressor Working Pressure

125 psi

Unknown Loss

End User Pressure

Must keep at least 90 psi

Clogged Filters, Leaks, Peak Usage

Typical Plant Operator Overpressures to Compensate for Potential Losses

Wireless Gauge Reader (WGR)



- Non-invasive, clamp-on to existing gauges in minutes
- Enables remote wireless monitoring of gauge
- No downtime
- No leak check
- No audit/requalification (e.g. FDA, OSHA)
- No running wires
- No drawings and approvals
- Minimal retraining of staff
- No new enterprise software
- Battery life of 3+ years at typical sample rates
- IP65/NEMA 4 rated for outdoor use
- Optional OPC or BACnet interface to existing building or plant automation system

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

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.**

Quick, Non-Invasive Energy Audits

- Most Energy Flows are NOT electrical
- Air, Chilled Water, Steam, Compressed Air etc.
- Need to measure flow, temperature, pressure to get baseline and consumption



70% of Commercial Buildings Still Pneumatic

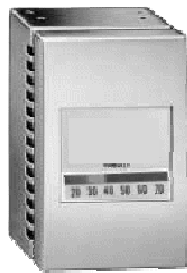
- **Waste energy, more maintenance, unhappy tenants...**
 - No Night Setback, No Zone Control, No Optimal Start/Stop, No Occupancy Override, No Demand Response...
- **High Cost to Retrofit**
 - Market rate of \$2500 - \$3000 per zone for traditional DDC retrofit
- **Disruptive to Tenants**
 - Open Walls, Ceiling, Exposure to Asbestos



Retrofitting Existing Buildings is a PAIN IN THE NECK!!

Wireless Pneumatic Thermostat (WPT)

EXISTING LEGACY STAT



- Manual Setpoint Control
- No Remote Readings
- No Diagnostics
- Manual Calibration Required
- Cannot support Demand Response strategies

DDC in 20 Minutes!

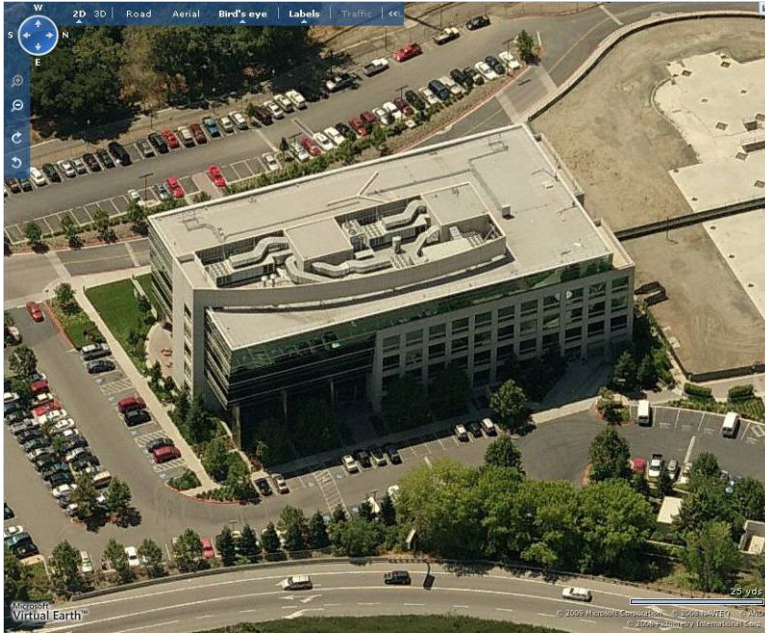
CYPRESS ENVIROSYSTEMS WIRELESS PNEUMATIC THERMOSTAT



- Remote Wireless Setpoint Control
- Remote Monitoring of Temperature & Pressure
- Pager/Cell Notification of Excursions
- Automatic Self-calibration
- Programmable Temperature Setbacks
- Occupancy Override
- Enables Demand Response strategies
- BACnet Interface to BMS
- Compatible With Existing Johnson, Honeywell, Siemens, Robertshaw
- Minimum 2yr battery life

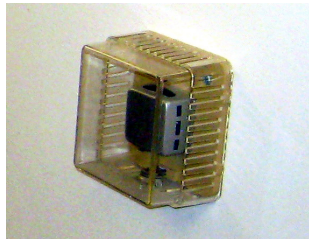
Get the benefits of Direct Digital Control (DDC) in less than 20 minutes, 80% Lower Cost

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

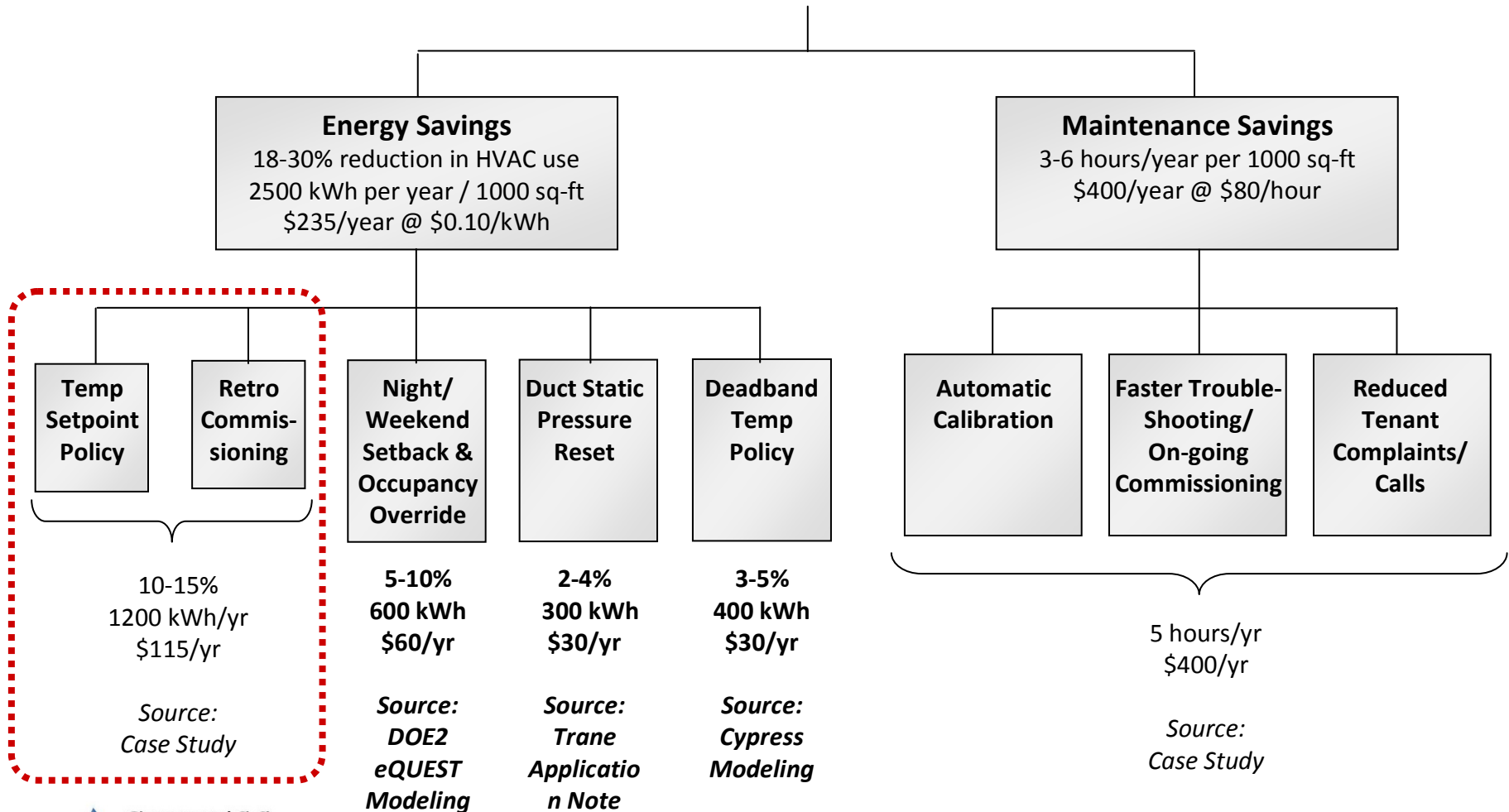
Quantified Savings for Santa Clara County

- 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
- Estimated Payback Period for Santa Clara County Project: 16 months *BEFORE* UTILITY INCENTIVES
 - Some savings kick in partially in first year, fully in subsequent years.

Wireless Pneumatic Thermostat Savings

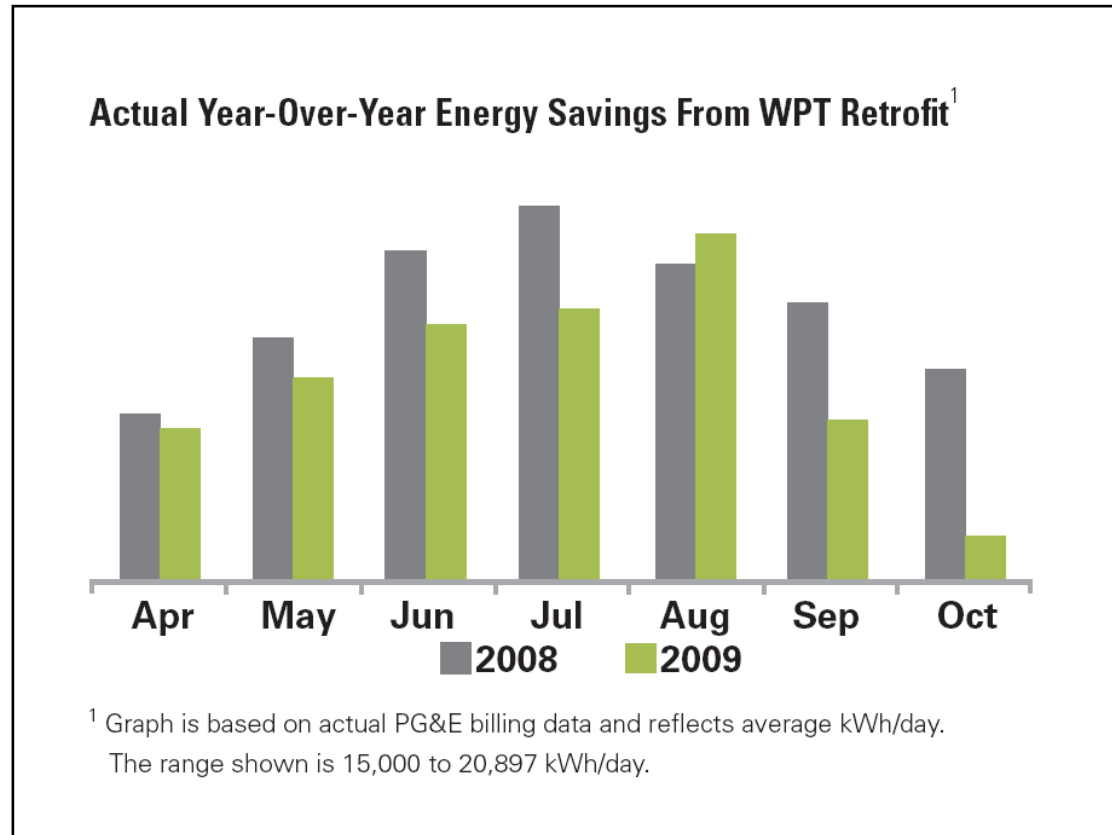
Estimated Savings Potential
 \$635/year (per 1000 sq-ft)
 Upfront Retrofit Cost: \$600 (per 1000 sq-ft)
 Payback Period: 11 months

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



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

LEED Credits










LEED for Existing Buildings: Operations & Maintenance Registered Project Checklist

			Energy & Atmosphere, continued			
			Existing Building Commissioning			
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 2.1	Investigation and Analysis	✓	2
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 2.2	Implementation	✓	2
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 2.3	Ongoing Commissioning	✓	2
			Performance Measurement			
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 3.1	Building Automation System	✓	1
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 3.2-3.3	System Level Metering		1 to 2
			Credit 3.2	40% Metered		1
			Credit 3.3	80% Metered		2

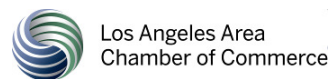
Tenant Comfort and Satisfaction, Ability to Attract Top Tier Tenants, and Lower Lease Churn Rates Are Incremental to Energy Savings Benefits

Compatible with Existing Systems

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

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Selected Cypress Envirosystems Customers



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