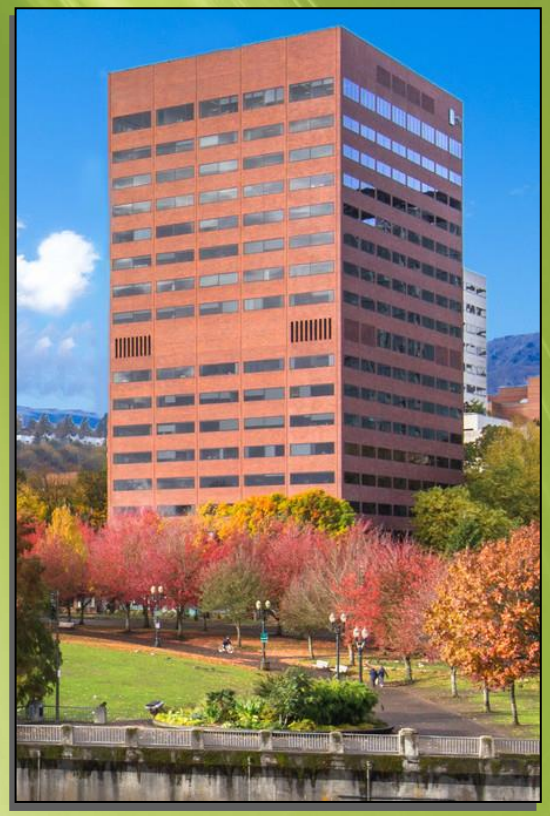
Cypress Envirosystems

Bank Plaza WPT Project

Sample Cost and Payback

Version 1



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Summary

- Based on building HVAC system information provided by management, Cypress Envirosystems estimated existing energy and operational costs, and projected savings due to Wireless Pneumatic Thermostat Retrofit, and ROI payback period.

- We used a model which compares actual savings from prior WPT projects to estimate the savings at Bank Plaza. The following energy savings strategies were considered: Setpoint enforcement, after hours setbacks/occupancy override, supply air temperature reset, duct static pressure reset, ongoing commissioning MBCx, auto-calibration.

- Assume WPT retrofit for 368 thermostats (covering 295,000 sq-ft).

- Estimated savings – Energy Efficiency
  - 25% aggregate reduction in energy cost
  - $0.36 savings per sq-ft/year, or $105,787 savings per year

- Estimated cost for project implementation is $1.04 per sq-ft, or total of $307,320. Estimated Project payback period is 2.5 years without any utility rebate.

Building Overview

Building Description

Location:	Anytown, USA
Usage:	20 story office building
Total area:	295,000 sq-ft
Project area:	295,000 sq-ft
Thermostats:	368
Terminal Units:	VAV with hot water reheat
	(Perimeter Units, about 200 qty)
	VAV Cooling Only
	(interior Units, about 200 qty)
Central Plant:	Electric chiller, with AHU's
	Variable pitch vanes on fans
	Occupancy 7am to 6pm weekdays
	Weekends often see 12 hours of off hours work
BAS:	Siemens Apogee with BACnet/IP interface

Estimated HVAC Portion of Energy Consumption

Average cost per kWh*:	$0.12
Annual electricity usage (kWh)	5,843,652
Annual electricity cost ($)	$701,238
Est. % consumed by HVAC	50%
Est. Annual HVAC electricity usage (kWh)**	2,921,826
Est. Annual HVAC electricity bill:	$350,619
Est. HVAC annual electical use per sq-ft (kWh)	9.90
Est. HVAC annual electrical cost per sq-ft	$1.19
Average Gas cost per therm	$0.79
Annual Gas Usage (therms)	102,010
Annual Gas bill ($)	$80,588
Est. % consumed by HVAC	90%
Est. HVAC annual Gas Usage (therms)	91,809
Est. HVAC annual Gas Billl:	$72,529
Est. HVAC annual gas therms/sqft per year	0.35
Est. HVAC annual gas cost per sq-ft	$0.25

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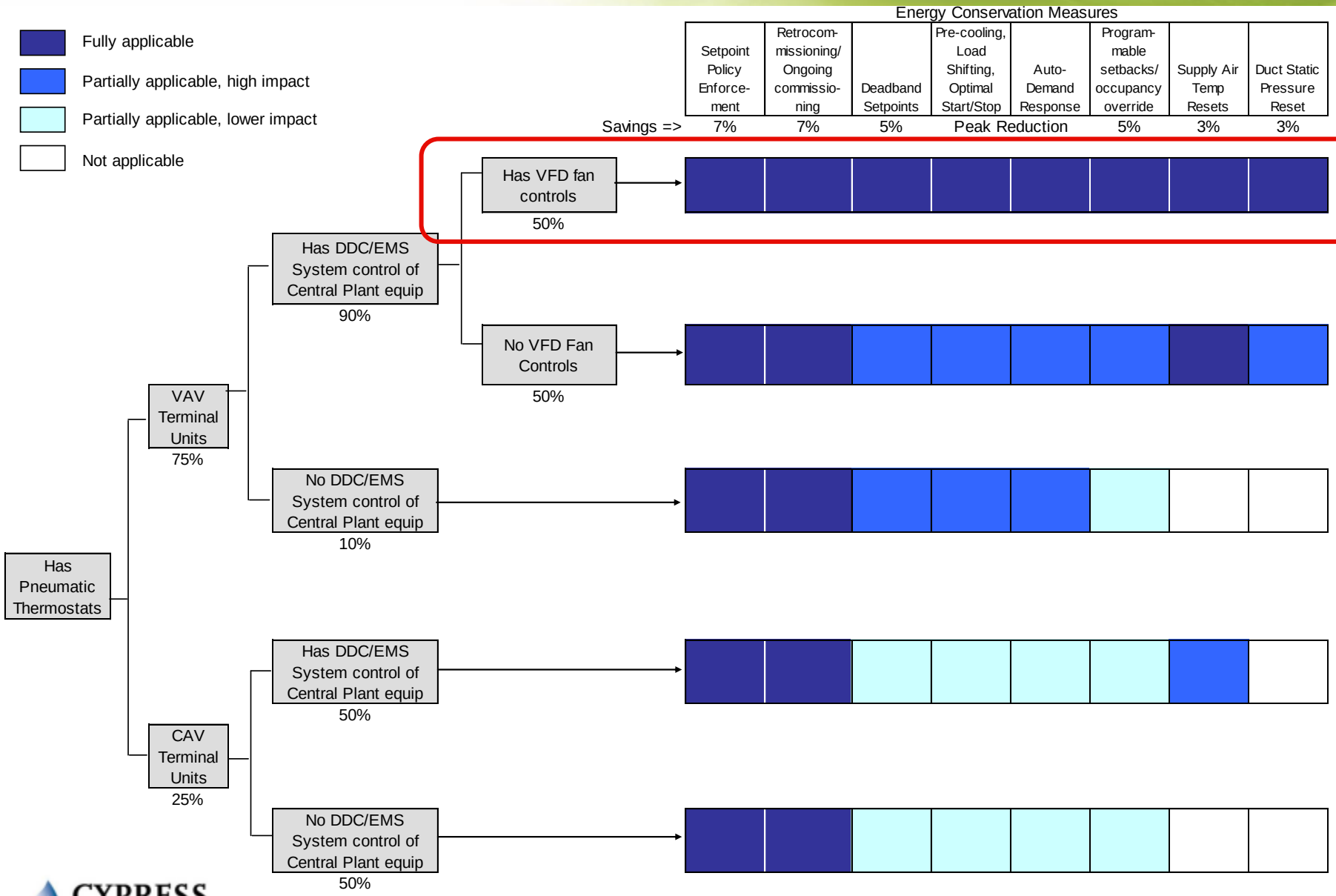
Potential Energy Savings Control Strategies



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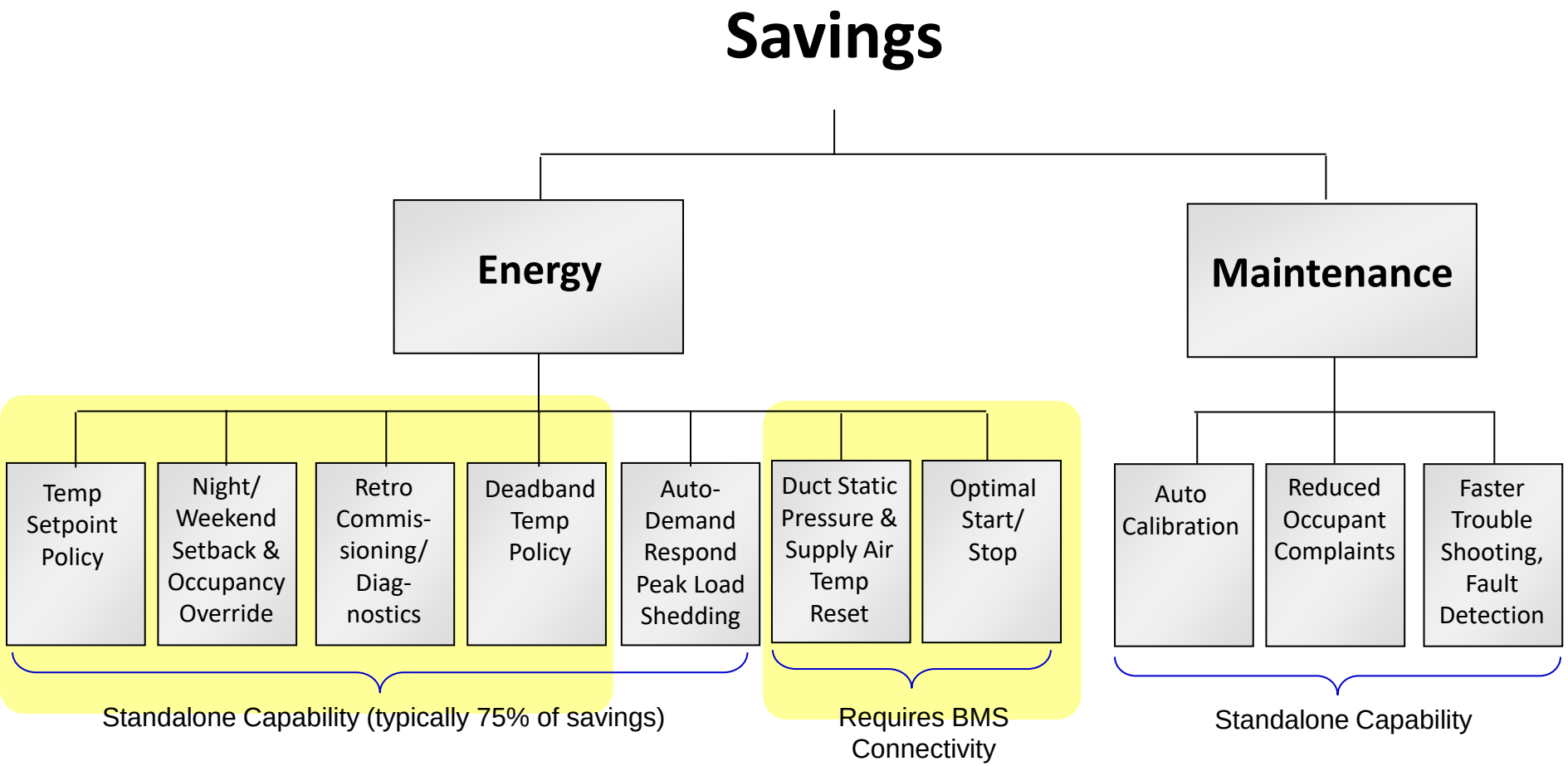
WPT Savings Strategies for Bank Plaza



Same Benefits as Direct Digital Control – but at a Fraction of the Price and Disruption

~25% Energy Savings Projected

	Applicability for Bank Plaza	Typical Savings based DDC and WPT experience	Est. Savings
Programmable Setbacks	Setback for weekends and nights - only condition zones where needed	5-10%	5%
Duct Static Pressure Reset*	Manage VFD static setpoint on Air Handlers	5-10%	5%
Supply Air Temp Reset*	Use WPT temperature sensors to optimize supply air temp at AHU's	2-4%	2%
Setpoint Enforcement, auto-calibration	Enforce setpoints to reasonable levels (i.e. no lower than 68 deg, no higher than 74 deg)	5-10%	5%
Deadband Setpoints	Implement 5 deg deadband	3-5%	3%
Optimal Start/Stop*	AHU's - can introduce zone based optimal start/stop	5-10%	5%
Potential Energy Savings via Applicable ECM's			**25%**

ECM Fully Applicable ECM Partially Applicable ECM Not Applicable

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Specific Considerations for Bank Plaza

- Financial tenants often work weekends – average 12 hours per week.

- Occupied space during weekends is relatively small portion of the building – estimated 15%, but heat and A/C is provided for entire building due to layout of AHU's.

- Installation of WPT's can set unoccupied zones to unoccupied setpoint temperatures to save energy.

- Savings Estimate:
  - 60 hours run-time M-F, 12 hours run-time on weekends.
  - On weekends, we can save 80% of energy if we reset unoccupied zones
  - Savings = [12 / (60 + 12)] * 80% = 13.3%
  - We conservatively estimate 5% savings in our model

Energy Savings Estimates:
$0.36 per sq-ft per yr, $105,787 per yr total

Energy Consumption for HVAC	Current	Projected WPT Savings		Projected Consumption
Est. HVAC annual electricity usage (kWh)	2,921,826	25%	730,457	2,191,370
Est. HVAC annual electricity bill:	$350,619		$87,655	$262,964
Est. HVAC annual electical use per sq-ft (kWh)	1.19		0.30	0.89
Est. HVAC annual electrical cost per sq-ft	$1.19		$0.30	$0.89
Est. HVAC annual gas usage (therms)	91,809	25%	22,952	68,857
Est. HVAC annual gas bill:	$72,529		$18,132	$54,397
Est. HVAC annual gas use per sq-ft (therms)	0.31		0.08	0.23
Est. HVAC annual gas cost per sq-ft	$0.25		$0.06	$0.18
Est. HVAC TOTAL annual energy bill	**$423,148**	**25%**	**$105,787**	**$317,361**
Est. HVAC TOTAL annual energy cost/sq-ft	**$1.43**		**$0.36**	**$1.08**

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Estimated Maintenance Savings – $19,320 per year

Number of Thermostats	**368 units**
Typical labor hours expended per thermostat per year (existing)	**2.5 hours**
Reduction in labor hours due to WPT Retrofit	**35%**
Total Labor Hour Savings by implementing WPT Retrofit	**322 hours**
Cost per labor man-hour fully loaded	**$60 per man-hour**
Total Labor Cost Savings	**$19,320**

Project Financials

Estimated Annual Savings

	per sq-ft		for entire building	
Energy	0.3 kWh 0.08 therms	$0.36	730,457 kWh 22,952 therms	$105,787
Labor		$0.07		$19,320
Total		$0.42		$125,107

Estimated Upfront Project Cost

Cost per thermostat - Parts	$580
Cost per thermostat - Labor	$160
Number of thermostats	368
Sub-total thermostat retrofit	$272,320
Est. cost for Siemens BACnet integration and programming	$35,000
Project Cost	$307,320
Cost per sq-ft	$1.04

Est. Payback Period (without utility rebates)

Simple Payback	2.5 years
Payback if only counting energy savings benefits	2.9 years

Est. Payback Period (with $100/stat utility rebate)

Simple Payback	2.2 years
Payback if only counting energy savings benefits	2.6 years

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Detailed Quote Breakdown

To: Justin Sheren
Bank Plaza

Quotation Number: 20190901BankPlaza
Date: 9/9/2019
Contact: Mike R
Email: mike@CypressEnvirosystems.com

Item	P/N	Description	Taxable?	Qty	Unit Price	Total
1	WPT-800-T2DP-DB	Wireless Pneumatic Thermostat, Two Pipe Direct Acting Deadband	N	368	$485.45	$178,645.71
2	WPT-800-HUSB	WPT Wireless Hub	N	7	$1,195.00	$8,365.00
3	GBC-800-001	Green Box Controller	N	7	$3,775.60	$26,429.19
4	BLD-Install	Wireless survey, wireless network setup, Green Box Controller setup, database setup and commissioning, BACnet interface setup, stat installation	N	368	$160.00	$58,880.00
					Sub-total	$272,319.90
					Sales Tax	$0.00
					Shipping, Handling	$650.00
					TOTAL	**$272,969.90**

- Terms of payment: 30 days net.
- Sales Tax not included. Responsibility of customer to pay applicable OR use tax.
- Does not include the following required from 3rd parties:
  - Integration of WPTs with Siemens Building Automation system, and associated programming
  - Provision of electrical power for Green Box and Hub - assume outlet available
  - Provision of IP network connection between Green Box and BAS

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