Energy Technology Assistance Program

Technology Seminar – June 23, 2011

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Reduce energy use. Save money. Create jobs.

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Presentation Overview

- ETAP program
  - Overview of focus technologies
  - Services
  - How to participate
- ETAP technologies: savings – benefits – rebates
  - Bi-level lighting for parking lots and garages
  - Wireless lighting controls
  - Wireless HVAC controls

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ETAP Administration

- Energy Technology Assistance Program (ETAP) is funded by ARRA via the California Energy Commission State Energy Program
- ETAP is an Energy Upgrade California initiative
- Energy Solutions administers the program
- Program runs through March 2012
- More information at: http://energy-solution.com/ETAP

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ETAP Focus Technologies

- Bi-level lighting fixtures for parking lots and garages
- Wireless lighting controls
- Wireless HVAC controls

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Focus Technology Benefits

- Cost-effective energy savings
- Short payback periods
- Installation that requires minimal disruption to occupants & avoids costly asbestos abatement
- Highly customizable
- Works with variety of building automation systems (BAS)

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ETAP Services to Speed Adoption

- Free technical assistance
  - Project scoping
  - Audits
  - Technical and economic feasibility analysis
- Identification of additional financial resources
- Implementation assistance
- Rebates

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How to Participate

- Cities, counties, special districts, community colleges, and universities throughout CA are eligible for technical assistance and rebates
- Contractors can submit bids to install ETAP projects
- Manufacturers with qualifying products may benefit from ETAP rebates
- Public building owners can implement ETAP retrofits, taking advantage of utility rebates

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ETAP Participants

Cities
Berkeley
Concord
Covina
Davis
Fairfield
Hayward
Irvine
Livermore
Long Beach
Oakland
Palo Alto
Pleasanton
Richmond
Sacramento
Salinas
San Bernardino
San Francisco
Santa Cruz
Santa Monica
Santa Rosa
Visalia
Walnut Creek

Counties
Alameda
Contra Costa
Marin
Orange
Placer
Sacramento
San Mateo
Santa Clara
Solano
Sonoma

Public Agencies
AC Transit
BART
Port of Oakland
SMUD

Public Institutions
CalPoly Pomona
CSU Fullerton
CSU Long Beach
Delta College
Hartnell College
UC Berkeley
UC San Diego
UC San Francisco
UC Santa Barbara
UC Santa Cruz
Cabrillo Community College

TRACK OUR PROGRESS

Number of agencies enrolled:	47
ETAP rebate dollars reserved:	$716,969.64
ETAP rebate dollars remaining:	$1,850,146
Total energy cost savings:	$444,900
Energy savings in projects with reserved rebates:	4,309,812 kWh

ENERGY SAVINGS IDENTIFIED:
1,071 kW | 18,234,049 kWh | 194,176 Therms

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Bi-level Lighting for Parking Lots and Garages

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Parking Garage and Lot Lighting
Savings Opportunity

Inefficient Existing Fixtures

- HID
- Older multi-lamp fluorescent

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Parking Garage and Lot Lighting

Savings Opportunity

More light is delivered than is needed

- In unoccupied areas
- When daylight is sufficient

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ETAP-supported Bi-level Lighting

Bi-level or dimming fixtures with integrated occupancy sensors

- Garages
- Lots
- Stairwells
- Pathways

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Bi-level Lighting

Energy Savings

- Source change from an inefficient fixture
- Reduced light levels when not needed
- **Energy Cost Savings: 25% - 70%**

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Bi-level Lighting

Other Benefits

- Improved Light Quality

- Improved personal safety
- Extended lamp life lowers maintenance costs

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Bi-level Lighting

Maintenance and Operation Considerations

- Increased equipment life
- With wireless controls
  - -identification of equipment failures
  - -remote programming
- DOE estimate on lamp or ballast replacement
  - -$225 per parking lot fixture
  - -$75 per parking garage fixture

Bi-level Lighting

ETAP Rebates

- ETAP Rebates
  - Bi-level LED - **$200/fixture**
  - Bi-level T8/T5/Induction - **$100/fixture**
  - Bi-level Lamp & ballast retrofit (garage only) - **$40/fixture**

Bi-level Lighting
Utility Rebates

- LED - **$0.05/kWh** and **$100/peak kW** reduction
- T8/T5* - **$25/fixture**, or **$0.05/kWh** and **$100/peak kW** reduction
- Lamp & ballast retrofit / Induction - **$0.05/kWh** and **$100/peak kW** reduction

* PG&E's rebates are shown but other utilities throughout the state offer similar rebates.

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Bi-level Lighting
Example Project Financials

Existing			Retrofit		Project Summary					
Location Type	Existing Fixture[1]	Existing kWh[2]	Fixture	Proposed kWh[3]	kWh Saving	Annual Energy Cost Savings[4]	Total ETAP Rebate	Utility Incentive	Net Project Cost	Payback[6] In Years
Parking Garage	150 Watt HPS	287,438	90 W LED, bi-level	120,724	166,714	$25,007	$35,000.00	$10,239	$93,011	3.54
Parking Garage	100 Watt HPS	211,554	New vapor tite w reflector, occ sensor and 2 F32T8s and a bi-level ballast	72,434	139,120	$20,868	$17,500	$8,544	$46,581	2.02
Parking Lot	400W Metal Halide	90,272	220 W LED	37,942	52,330	$7,850	$9,000	$2,617	$26,183	2.76
Parking Lot	250W HPS	58,145	150W Induction	27,766	30,378	$4,557	$4,500	$1,519	$19,406	3.27

Values listed above are provided as examples only and may not reflect your project's actual costs or savings.

Assumptions:
1 175 fixture quantity for garages, 45 fixture quantity for lots - 1 for 1 retrofits
2 Annual operating hours of 8,760 for garages, 4,380 for lots
3 Bi-level fixtures operate at 50% power, 25% of the time
4 $0.15/kWh energy rate
5 Standard utility rebate of $0.05/kWh, and $100/peak kW reduction
6 Includes estimated maintenance savings $25 per fixture for garages, $100 per fixture for lots

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Wireless Lighting Control for Parking Garages and Interior Spaces

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Interior Lighting
Savings Opportunity

More light is delivered than is needed

- In unoccupied areas
- In areas that require less light due to:
  - Sufficient daylight
  - Personal preferences

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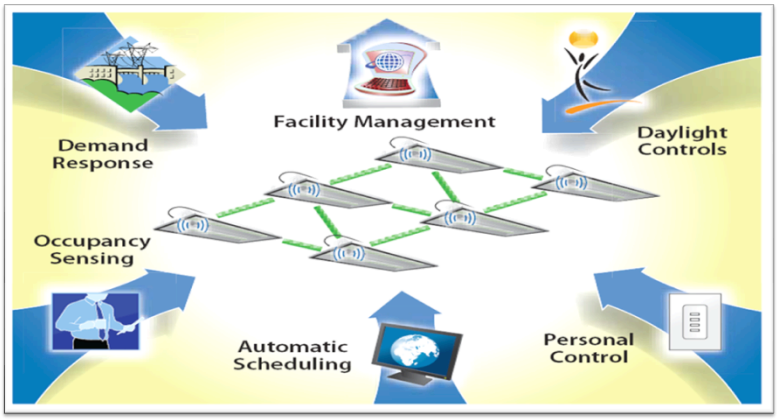
ETAP-supported Wireless Lighting Controls

Wireless Control Systems

- Parking garages and lots
- Interior space

Wireless Lighting Controls
Overview



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Wireless Lighting Controls

Energy Savings

Reduced light levels when not needed

- Occupancy sensing
- Automatic scheduling
- Daylight harvesting
- Personal control
- Energy Cost Savings: 10% - 50% (or higher)

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Wireless Lighting Controls

Other Benefits

- Improved personal safety
- Longer lamp life, lower maintenance costs
  - Lamps running fewer hours extends lamp life and lowers maintenance costs

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Wireless Lighting Controls
Financial Rebates

- ETAP Rebate
  - $0.18/kWh
- Utility Rebates
  - $0.05/kWh and $100/kW reduction

* PG&E's rebates are shown but other utilities throughout the state offer similar rebates.

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Wireless Lighting Controls
Example Project Financials

Building Size (sqft)	Annual Energy Cost Savings[1,2,3,4]	ETAP Incentive	Utility Incentive[5]	Net Project Cost	Payback In Years
25,000	$15,797	$18,956	$9,478	$62,663	4.0
50,000	$31,602	$37,923	$18,961	$105,087	3.3
150,000	$94,790	$113,748	$56,874	$276,113	2.9

Values listed above are provided as examples only and may not reflect your project's actual costs or savings.

Assumptions:

1 $0.15/kWh energy rate
2 Approximate breakdown of space = 50% open office and 50% private office
3 Power at controled points = 96W
4 Approximate blended savings from scheduling, daylight harvesting, presence detection and personal control = 50% for open office and 35% for private office space
5 Standard utility rebate of $0.09/kWh

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Wireless HVAC Controls

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Wireless HVAC Controls
Opportunity

Wireless Networking allows improved fan and equipment control without the difficulty of re-wiring

- Significant energy savings
- Improved performance data
- Improved zone-level control
- Cost-effective alternative to VAV, DDC
- Minimally invasive (e.g., asbestos)

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Wireless HVAC Controls

Discharge Air Regulation Technique

Vigilent's DART™ approximates Variable Air Volume (VAV) control in Constant Air Volume (CAV) systems through use of zone discharge temperature sensors, a wireless mesh network, and fan Variable Frequency Drives

~10% the cost of a traditional VAV retrofit and minimally intrusive

HVAC energy savings: 25%-55%

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Wireless HVAC Controls

DART Technology

- Fan speed control technology allows fans to deliver appropriate air flows to meet the zone air temperatures
  - Variable air flow is significantly more efficient at part load
- Significant savings
  - Cutting the air speed in half saves 81% of fan energy
  - Delivering less air requires less heating and cooling
- Typical DART™ projects will require installation of VFDs on Supply and Return Fans

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DART Applicable Buildings

- CAV air handling systems
- Capable of being retrofitted with VFDs, or already retrofitted with VFDs
- HVAC system components in operable condition
  - No "rogue zones"
- No baseboard heating or packaged units
- http://www.federspielcontrols.com/case_studies.php

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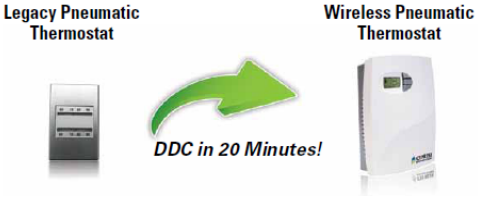
Wireless HVAC Controls

Wireless Pneumatic Thermostats (WPT)

Cypress Envirosystems WPTs replace existing pneumatic thermostats to provide wireless control with DDC functionality



Less than one quarter the cost of a traditional DDC zone retrofit

HVAC energy savings:

10% – 25%

"The Wireless Pneumatic Thermostat installation took only eight days and was one of the easiest, fastest and most cost-effective energy efficiency improvements we have ever made in our buildings."

Jeff Draper, Manager of Building Operations, County of Santa Clara

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Wireless HVAC Controls

WPT Technology

- Remote Setpoint Enforcement and Monitoring of Temperature & Pressure
  - Optional Deadband
- Programmable temperature setbacks
  - Occupancy override w/notification of excursions
- Reset Supply Air Temperature / Duct Static Pressure
- Auto-Demand Response

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Wireless HVAC Controls

WPT Applicable Buildings

- Pneumatic system should be in working order
  - Compatible with existing Johnson, Honeywell, Siemens, RobertShaw and TAC
- BACnet interface, compatible with or without existing Building Management Systems
- http://www.cypressenvirosystems.com/case-studies-2/commercial-buildings/wireless-pneumatic-thermostat/

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Wireless HVAC Controls

Maintenance and Operation Considerations

- Wireless HVAC devices are battery operated
- Systems monitors and reports battery power levels
- Depending on use, may require annual battery replacement
  - Some installations have shown strong battery performance for multiple years
  - WPTs: 2-4 years of battery life

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Wireless HVAC Controls

Maintenance and Operation Considerations

- Maintenance Savings: Additional diagnostic information from devices can help troubleshoot and predict complaints
  - What are actual set points for zones?
  - Are zones maintaining temperature?
  - How are neighboring zones performing?
- Eliminates need for periodic system wide retro-commissioning of thermostats

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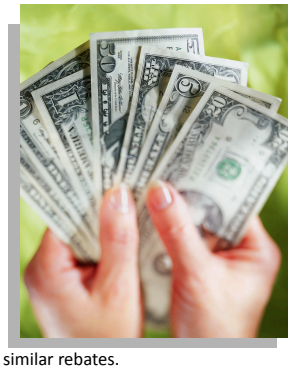
Wireless HVAC Controls
ETAP Rebates

- $0.18 / kWh annual savings
- Calculated based on estimated project savings

Wireless HVAC Controls
Utility Rebates

- Rebates for WPT or DART
  - $0.09/kWh
  - $100/peak kW
  - $1.00 / therm



* PG&E's rebates are shown but other utilities throughout the state offer similar rebates.

Wireless HVAC Controls
Example Project Financials

	Building Size (sqft)	Assumed # of Zones	Annual kWh Savings	Annual Therm Savings	Annual Energy Cost Savings[1]	ETAP Rebate	Utility Incentive[2]	Net Project Cost	Payback In Years
DART	200,000	230	520,000	70,000	$155,000	$93,600	$50,600	$108,800	0.7
	90,000	153	234,000	31,500	$69,750	$42,120	$35,190	$98,640	1.4
	25,000	63	65,000	8,750	$19,375	$11,700	$14,600	$48,700	2.5

	Building Size (sqft)	Assumed # of Thermostats	Annual kWh Savings	Annual Therm Savings	Annual Energy Cost Savings[1]	ETAP Rebate	Utility Incentive[3]	Net Project Cost	Payback In Years
WPTs	200,000	200	420,000	2,100	$65,310	$50,100	$69,900	–	IMMEDIATE
	90,000	153	189,000	945	$29,390	$34,020	$40,905	$32,175	1.1
	25,000	62.5	52,500	263	$8,164	$9,450	$14,363	$26,188	3.2

Values listed above are provided as examples only and may not reflect your project's actual costs or savings.

Assumptions:
1. $0.15/kWh and $1.10/therm energy rate
2. Includes standard utility rebate of $0.09/kWh and $1.00/therm
3. Includes standard utility rebate of $0.09/kWh, $1.00/therm, and $150/thermostat demand response incentive
4. ETAP rebate capped at 100% of project costs (after utility incentives)

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Follow Up Questions

ETAP Website
http://energy-solution.com/etap

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