

Top 10 Energy Efficiency Opportunities

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Federal Utility Partnership Working Group

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Siva Sethuraman
Customer Energy Solutions
PG&E

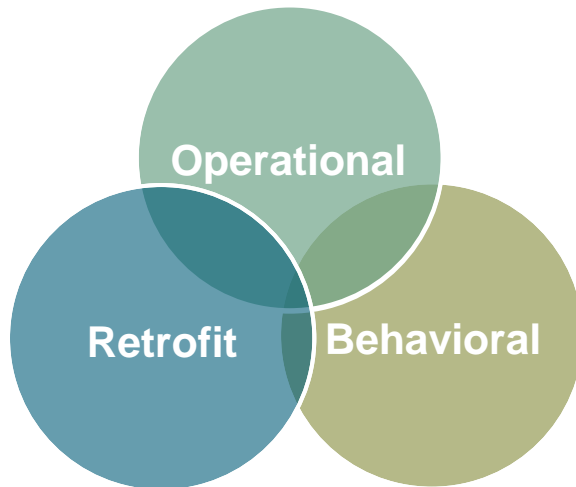




Whole Building²

A comprehensive, performance-based approach to achieving 15+% energy savings in existing commercial buildings - quantification of energy use baselines and estimate savings at the whole building level leveraging the power of interval meter data.

Types of Energy Savings



- Simplified, integrated offering
- Bigger incentives tied to performance
- Flexibility to pursue a range of measures overtime
- Transparent and credible bill savings

Baseline Analytics, Examples





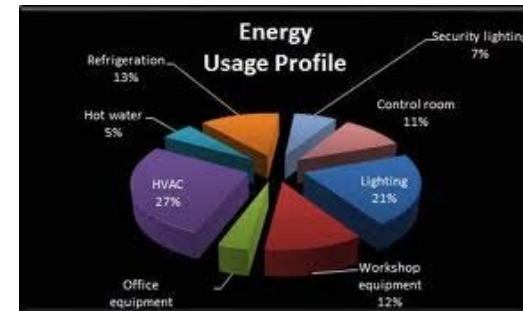
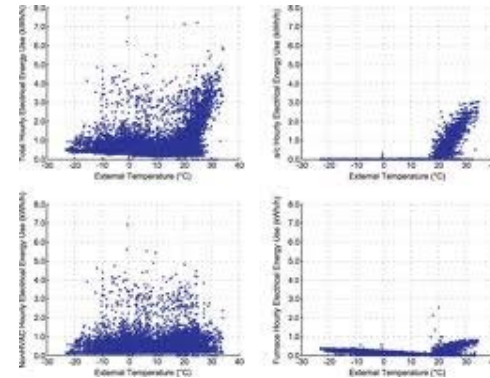
Small Commercial EMS³

- Energy management system (EMS) products that offer integrated controls capabilities across multiple building systems (HVAC, Lighting, etc.) and are specially designed for small, existing commercial buildings.
- Targeting a deemed rebate.

Technology Examples



Analytics enabled RCx



- Software analytic tools can disaggregate whole building smart meter interval data into discrete end-uses like lighting, HVAC, hot water and plug loads
- This in addition to analysis of weather normalized load data allows for remote identification of operational energy efficiency opportunities

Analytics enabled RCx – scalable and cost effective for small, medium facilities

- **Significant Therms savings and Improved Reliability**
 - Payback is in the 6-12 months time frame. Savings can be 100~10,000 Therms
 - Avoided shutdowns – Priceless.

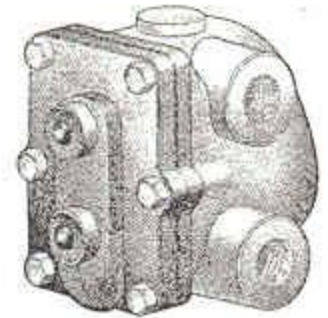
- **Low Customer Implementation Cost:** 400\$ for hardware & labor is 1-4 hours/trap

- **Customer Diversity (Large Commercial, Industrial & SMB)**
 - Refineries, Chemical Facilities
 - Manufacturing
 - Food Processing
 - Ag (e.g: Greenhouses)
 - Healthcare
 - Biotech, High Tech
 - Universities & more
 - Commercial

- **Have a structured audit process to identify failures; Use audit info to prioritize replacements**
- **Include Steam Leaks as part of your Audit (leaks**



Inverted Bucket Steam Traps

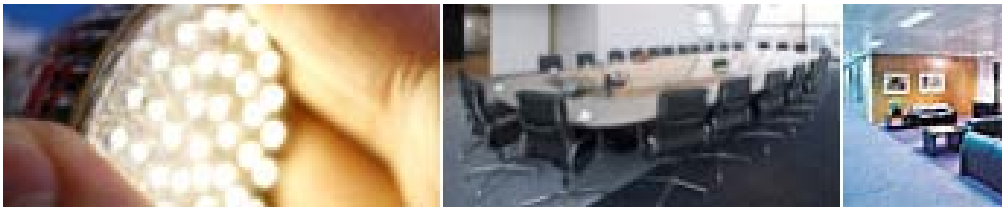


Float & Thermostatic Steam Traps



LED Ambient Lighting⁶

- **LED recessed fixtures and retrofit kits are the next generation of office lighting solutions.**
- **Lighting performance and energy efficiency have both improved dramatically**
- **Dimmable nature of LEDs will allow for full control capability.**
- **Solid state technology allows for longer product lifetimes, decreasing long-term maintenance costs.**





Advanced Lighting Controls

- **Combining basic lighting controls into a comprehensive solution**
- **Increased savings**
- **Improved controls for end users**
- **Increase overall productivity**

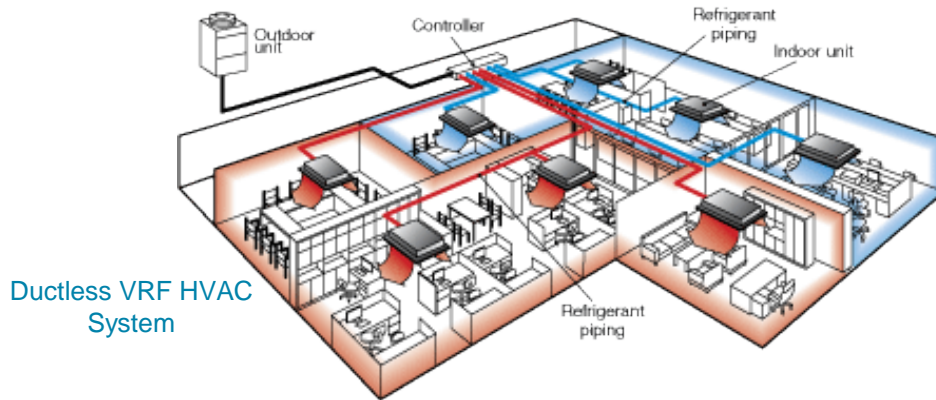


Controls along with LED maximizes LED energy performance



Why Ductless HVAC now?⁸

- **Well positioned for HVAC retrofits in SMB market.**
 - Motivated Manufacturers: Offer free contractor installation & maintenance training.
 - Excited Distributors: Distributors have seen a significant increase in interest.
- **Provides 30% energy efficiency over packaged AC. eSource and CEE support.**
- **Customer Payback: <3 years with distributors planning to discount new product.**
- **Proven Technology: Long and successful history in Asia and Europe.**



With incentives, distributors predict increased market acceptance with their promotions, discounts and design/bid assistance.



HVAC QM Program

REFRIGERATION CONTROL PANEL TESTING AND CALIBRATION

COOLING COIL CLEANING

CONDENSER FAN/MOTOR CHECKED AND LUBRICATED

FRESH AIR, RETURN, AND EXHAUST AIR DAMPERS CHECKED FOR OBSTRUCTION AND LUBRICATION

CONDENSER COIL CLEANING

FILTER REPLACED WITH PROPER MEDIA

RETURN AIR FAN/MOTOR & SUPPLY FAN/MOTOR CHECKED AND LUBRICATED

ELECTRICAL CONNECTIONS CHECKED

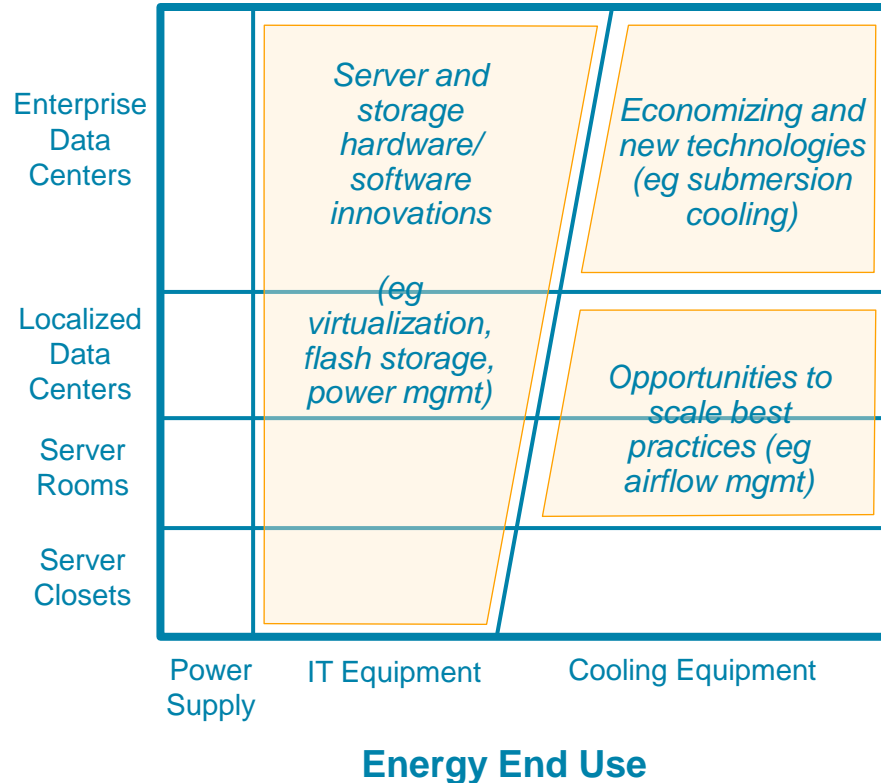
REFRIGERANT AND REFRIGERATION COMPRESSOR ADJUSTMENTS

BURNER SECTION COMBUSTION AND DRAFT TESTS



Data centers – including small server rooms in offices – are a significant and growing electricity end use. Optimized **IT equipment, cooling approaches, and controls systems** offer high potential to manage energy usage.

MAP OF DATA CENTER ENERGY



Airflow Management

- Isolation of supply and return air
- Management of CRAC controls



Emerging tech: Submersion Cooling

- Reduce cooling and server (fan) power
- High density



And No. 10 is.....¹¹



Appendix¹²



Top Ten Energy Conservation Solutions ¹³

	Description
Data Centers	A critical load growth area. Two areas of focus include (a) air flow modification to improve cooling performance (b) emerging technologies that look at switching from air cooled to liquid cooled datacenters
Whole Building	Capture the full spectrum of energy savings (retrofit, operational, behavioral) by utilizing metered data to estimate whole building savings
Small Commercial EMS	Energy Management Systems (EMS) products that offer integrated control capabilities across multiple building systems and are specially designed for small, existing commercial buildings
Software Enabled RCx	This program employs software analytics to de-segregate interval meter data into discrete end-uses like lighting, HVAC, ventilation etc. allowing for remote identification of operational energy efficiency opportunities. RCx programs can now be more scalable and cost-effective for medium and small facilities, a segment not supported by traditional RCx programs.
HVAC1	Commercial HVAC Quality Maintenance program provides rebates to facility owners and QM participating contractors to implement the ASHRAE national quality maintenance standard. Focused on packaged equipment the program does a full assessment of each system, recommends efficiency and maintenance measures, and provides rebates.
HVAC2	Variable Refrigerant Flow Ductless Heat Pumps provide zoned solutions for spaces in which ducted systems are impractical or suboptimal. Through an advanced control system a zone can be cooled while another is being heated.
LED Ambient Lighting	LED recessed fixtures and retrofit kits are the next generation of office lighting solutions. Lighting performance and energy efficiency have both improved dramatically, plus the dimmable nature of LEDs will allow for full control capability. Plus, solid state technology allows for longer product lifetimes, decreasing long-term maintenance costs.
Advanced Lighting Control Systems	By combining basic lighting controls into a comprehensive solution allows for increased levels of savings, as well as improved controls for end users, which can increase overall productivity.
Industrial	Tremendous natural gas savings opportunities exist in steam system performance improvements – steam traps, steam leaks – with payback in months.
	Similarly, considerable electric savings/DR opportunities exist in compressed air systems (VFDs, Storage, Leak mitigation) and in lab fume hoods.