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DOE/FEMP Technology Deployment in Energy Savings Performance Contracts

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Agenda

- DOE/FEMP Technology Deployment in ESPCs Working Group
- Examples of Successful Deployment of Technologies in Federal ESPC projects
- Interagency Technology Deployment Working Group

Technology Deployment



Focus is on:

New and underutilized technologies applicable to existing buildings, developed beyond bench-test status, commercially available through a private-sector partner, or already in the commercial market but with minimal market penetration in the federal building sector.

Technology Deployment In Energy Savings Performance Contracts Working Group

- Authorized at the Federal ESPC steering committee meeting in November 2010
- Objectives include:
 - Increase the utilization of FEMP Designated Product Specifications (top 25% in efficiency) for selected technologies in ESPC
 - Accelerate deployment of new technologies through ESPC with particular emphasis on use of the FEMP Technology Deployment Matrix
- Expected results include:
 - best-practice guidance papers that address techniques of enhancing technology deployment in ESPCs, and case studies of successful deployment examples

Technology Deployment in ESPCs Working Group - Initiatives

- Periodic “technology” conference calls to increase awareness and educate agency technical POCs, ESCOs, Core team, FFS and PFs on the latest and best available technologies for ECMs
- Support for appropriate opportunities to incorporate demonstrations of EERE technologies in ESPCs
- Risk sharing through the R,R&P matrix and M&V
- Use of the Technology Deployment in ESPC WG as a user community to identify parameters/characteristics in technology testing that would accelerate market acceptance in ESPCs
- Other means as jointly identified by the Working Group

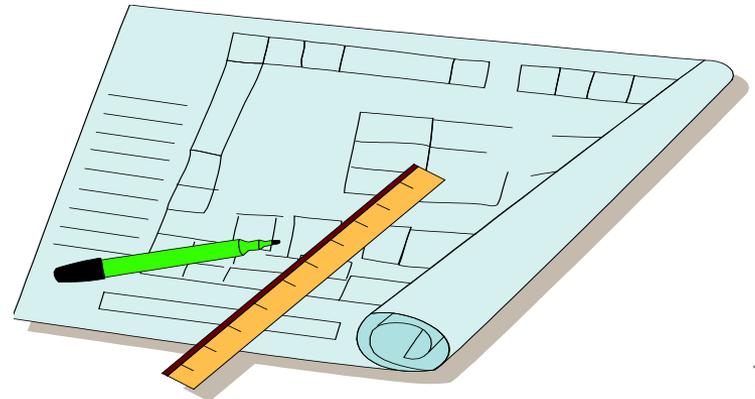
Technology Deployment in ESPC WG - Activities

- Four working group meeting/conference calls held to date
- Typically 20-25 Participants from ESCOs, Agencies, DOE and Nat'l Labs
- Agendas have included: FEMP Designated Products, Technology Deployment Matrix, Aerosol Duct Sealing, and Spectrally Enhanced Lighting (SEL)
- Next monthly working group call scheduled for August 18, 2011
- Beginning case study development
- Still open to new participants



FEMP Designated and Energy Star Products

- Increase the utilization of FEMP Designated Product Specifications (top 25% in efficiency) for selected technologies in ESPCs
- Incorporated into the DOE ESPC IDIQ contract via a recent contract modification
- FAR 52.223-15
- http://www1.eere.energy.gov/femp/technologies/procuring_eeproducts.html



Technology Deployment Matrix

- Excel multi-tabbed workbook tool to assist agencies and ESCOs identify newer and underused energy saving technologies to help meet energy reduction goals.
- Identifies 50 top ranked underused technologies for Federal ESPC/UESC projects.
- Ranked to maximize energy savings impact.
- Provides easy access to information, resources, case studies, assessments, websites, tools and points of contact to help evaluate applicability in energy improvement projects
- Saves research time and provides better direction in making Energy Conservation Measure (ECM) decisions.

Technology Deployment Matrix

- The new version is posted on the FEMP website:

http://www1.eere.energy.gov/femp/technologies/newtechnologies_matrix.html

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A B C D E F G H I

1 **FEMP Technology Deployment Matrix 2010**

2

3 **Workbook**

4 **Introduction**

5 The intent of this Technology Deployment Matrix is to identify and rank new and underused technologies which hold the most promise to impact the federal market in order to prioritize resources in the next several years. Therefore these technologies have been selected on the basis that they can be deployable immediately and have high potential to be incorporated into agency energy-use reduction programs. Technologies were selected through a comprehensive survey of emerging technology evaluation and deployment programs by federal agencies, state energy programs, and public utilities.

Ready Introduction + Description Summary Overall Ranking Tech by Category General Info Resources Ranking Criteria

Info & Resources

Technology Deployment Matrix

FEMP - Technologies for Deployment - Top 20

Table 1

Rank	Technology	Category	Weighted Score
1	Spectrally Enhanced Lighting	Lighting	91
2	Low Ambient / Task Lighting	Lighting	88
3	Condensing Boilers	HVAC	86
4	Super T8 Lighting	Lighting	79
5	Commercial Ground-source Heat Pumps	HVAC	66
6	High R-Value Windows	Building Envelope	65
7	Duct Sealants	HVAC	63
8	LED / Solid State Lighting - Interior	Lighting	61
9	LED / Solid State Lighting - Exterior	Lighting	59
10	PC Power Management	Other	58
11	Condensing Water Heaters - gas	Water Heating	58
12	Water Cooled Oil Free Magnetic Bearing Compressor	HVAC	54
13	Integrated Daylighting Systems	Lighting	53
14	Cool Roofs	Building Envelope	53
15	Bi-level Garage / Parking Lot / Pedestrian Lighting	Lighting	53
16	Wrap Around Heat Pipes	HVAC	53
17	Window Films	Building Envelope	53
18	Commercial Energy Recovery Ventilation Systems (ERV)	HVAC	52
19	Air-side Economizers and Filters for Data Centers	HVAC	52
20	Induction Lighting	Lighting	51

From the
"Summary"
Tab

Technology Deployment Matrix

FEMP - Technologies for Deployment - General Information

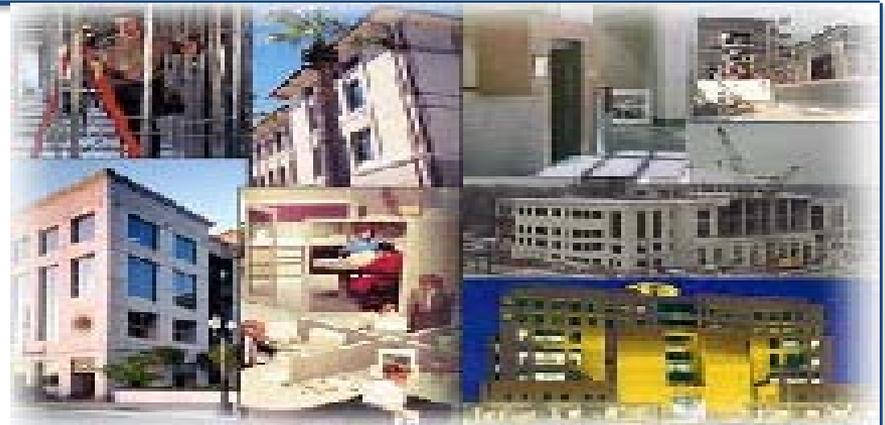
Rank	Technology	Application	Description	Key Factors to Consider	Points of Contact
Lighting					
1	Spectrally Enhanced Lighting	Almost any fluorescent lighting system in most building types and settings.	DOE research studies show that by simply shifting the color in fluorescent lamps from the warmer yellow to the cooler blue end of the color spectrum, people see things more clearly and spaces appear brighter. Therefore, by changing the color of light to be more like daylight, lighting levels can be reduced to save energy while still achieving the same visual acuity. Conventional practice utilizes lamps with correlated color temperature (CCT) of 3000K to 4100K and SEL uses lamps with a CCT of 5000K. In T8s with electronically ballasted fluorescent lighting systems, this translates to a 20 percent energy savings, and in T12s with magnetically ballasted systems, SEL can achieve a 50 percent savings.	SEL can be used as a based strategy in combination with other fluorescent lighting based measures such as Low Ambient / Task Lighting, delamping configurations and daylighting controls. To maximize occupant acceptance and comfort, SEL should be done so that color comparison with lower color temperature fluorescent lighting is minimized.	Konstantinos Papamichael, UC Davis & CLTC, 520-747-3834, kpapamichael@ucdavis.edu, Brian Liebel, The Lighting Partnership, (561) 202-1993, brian@thelightingpartnership.com Sam Berman, sam.berman@comcast.net; Eric Richman, PNNL, eric.richman@pnl.gov
2	Low Ambient / Task Lighting	Suitable for most office spaces, both cubicle and private office space environments, in most building categories	The low ambient / task strategy improves the visual environment by adding controllable task fixtures that provide light directly where its needed for a given task, while reducing the overhead (ambient) light level. Occupancy sensors can also be incorporated into the system		Konstantinos Papamichael, UC Davis & CLTC, 520-747-3834, kpapamichael@ucdavis.edu; Michael Myer, PNNL, michael.myer@pnl.gov
4	Super T8 Lighting	Almost any fluorescent lighting system in most building types and settings.	Super T8 lamps are 32W T8 lamps but with a barrier-coat design, high lumen maintenance (88-92 percent end-of-life lumens), long service life and high light output—3100+ initial lumens as opposed to 2850 for a standard T8. Combining Super T8 Lamps with low ballast factor ballasts (BF of ≤ 0.77) on a one-for-one replacement will save 15 to 20%.	Spectrally Enhanced Lighting should be considered as an alternative when considering Super T8s. Super T8 technology can be used as a based strategy in combination with other fluorescent lighting based measures such as Low Ambient / Task Lighting, delamping configurations and daylighting controls.	Michael Siminovitich, CLTC, 530-747-3835, mjsiminovitich@ucdavis.edu
8	LED / Solid State Lighting - Interior	Rapidly improving technology currently most applicable for downlights, tracklights, task lighting, accenting, high ceiling and high cost maintenance areas.	Interior LED retrofits are currently viable for downlights, tracklighting, sconces, and task lighting both line and low voltage. Replacements for incandescent A-Lamps have also been improving rapidly. Replacements for fluorescent tube lighting may be viable for high cost maintenance areas.	Evaluate samples of LED products in their intended fixtures and applications to gauge their "fit"—not only physically within the fixture, but in terms of lighting quality and aesthetic requirements. Evaluate test data and verify that product performance is based on standardized photometric testing (i.e., IES Method LM-79-08) and not LCD chip performance alone. Performance and life of LED replacement lamps is highly dependent on their design and thermal management, which includes the fixture in which they are installed. The product should be covered by a warranty or return policy in case the lamp does not perform as claimed. Examine ways to incorporate solid state lighting into lighting retrofit strategies such as Low Ambient / Task Lighting	Michael Siminovitich, CLTC, 530-747-3835, mjsiminovitich@ucdavis.edu; Ed Barbour, Navigant Consulting, 202-973-2470, edward.barbour@navigantconsulting.com; Linda Sandahl, PNNL, linda.sandahl@pnl.gov Jeff McCullough, PNNL, joff.mccullough@pnl.gov Eric Richman, PNNL, eric.richman@pnl.gov

Technology Deployment Matrix

FEMP - Technologies for Deployment - Resources

Rank	Technology	Manufacturers	Tech Brief	Publications: Case Studies, Assessments, Websites					Tools / Calculators / Design Resources	
Lighting										
1	Spectrally Enhanced Lighting	GE Lighting, Philips, Sylvania, others	DOE 2010 - Spectrally Enhanced Lighting: Port Hueneme Case Study	NAVFAC 2009 - TechVal slides - general technologies	DOE/EERE 2010 - Spectrally Enhanced Lighting: Business Office Case Study	DOE/EERE 2010 - Spectrally Enhanced Lighting: Sonoma State University Case Study	DOE/EERE 2010 - Spectrally Enhanced Lighting: Washington Navy Yard Case Study			
2	Low Ambient / Task Lighting	Numerous depending on fixtures used for task lighting.	Integrated Office Lighting System - CLTC	Integrated Office Lighting System - CLTC	PG&E/HMG 2009 - High Efficiency Office: Low Ambient/ Task Lighting Pilot Project - Small Office	NAVFAC 2009 - Navy Techval Program, FUPWG 2009	High Efficiency Office: Low Ambient/ Task Lighting - Large Office	Bi Level Switching in Offices Spaces 2010	Bi-level Switching in Office Spaces - CLTC	
4	Super T8 Lighting	GE Lighting, Philips, Sylvania		FEMMP 2010 - TechVal slides - general technologies	facilitiesnet.com 2004 - Lamps in a New Light					
8	LED / Solid State Lighting - Exterior	Luminaires-roadway & parking: SPILINGInc, VizorLED, Finelite Inc., GE Lighting Solutions		SMUD - Canopy Lighting	DOE 2010 - Solid State Lighting Gateway Demonstrations	FEMP/TechVal 2010 - LED Parking Lot Lighting			DOE/FEMP 2010 - Exterior Lighting Guide	DOE/EERE 2010 - Caliper - fact sheet

GSA Region 7

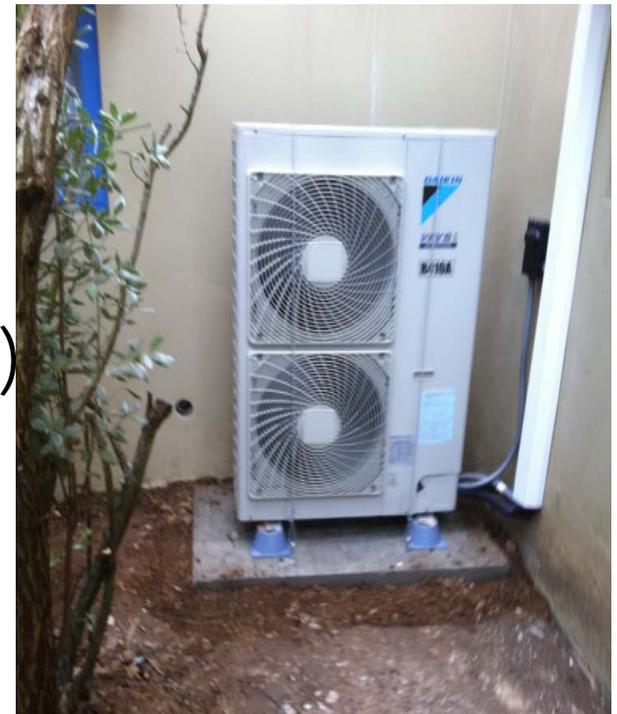


Three concurrent ESPC projects
with three separate ESCOs leveraged with ARRA \$

- LED Lighting
- Induction lighting
- Turbocor chillers
- Roof Integrated PV and cool roofs
- Wind
- Data center efficiency measures

Technology Demonstrations help mitigate potential risks

- During the IGA or Implementation phase
- Can be financed or funded directly
- Examples include:
 - Low flow water fixtures
 - Super T-8 lamps
 - Spectrally Enhanced Lighting (SEL)
 - Vent stack sealing
 - Cool roofs
 - VRV A/C systems



USCG Puerto Rico

Investment Grade Audit



scope included the demonstration of:

- cool roofs
- variable refrigerant volume (VRV) air-conditioning
- Baseline and post-retrofit conditions were measured before award (for each ECM)
- USCG is funded demonstrations directly
- Helps reduce price, installation and performance risk

Technologies Deployment in ESPC Projects

- **Outdoor LED Lighting:** US Army Korea, GSA 7, DOE Forrestal, USCG PYE
- **Induction Lighting:** Ft. Irwin, GSA Region 7, USCG Puerto Rico, USCG PYE
- **Super Boiler:** ORNL
- **Roof Integrated PV:** GSA 7
- **Lab/Air Flow/Fume Hoods:** DOE BNL, LANL, ORNL, NETL, USFS FPL
- **LED Runway Lights:** USCG PYE
- **Variable Refrigerant Volume (VRV) A/C:** USCG PR, Tinker AFB
- **Spectrally Enhanced Lighting (SEL):**
BOP, GSA, DOE, Army, USFS, USDA
- **Turbocor Chillers:** USDA Gainesville,
GSA Region 7, USCG PYE, NASA JPL



Technology Deployment in ESPCs projects

- **Duct Sealing:** Architect of the Capitol, House Office Building
- **Biomass Cogen/Boilers:** NETL, NREL, ORNL, Savannah River, Fairton FCI, Forest Service Regions 1, 2 & 4, BOP Pittsburg
- **Bay Source Heat Pumps:** FDA PR
- **Cool/Green Roof:** NETL, GSA PJKK Fed Bldg, USGS Gainesville, GSA Region 7
- **Wind power:** NETL, USFS Regions 2 & 4, GSA Region 7, Pantex, INL
- **Cool Roof, ESA for PV:** USCG PR



Interagency Technology Deployment Working Group

FEMP will use this group to-

- understand federal agencies technology deployment needs
- inform ESCOs, technology developers and vendors of potential market opportunities

Interagency Technology Deployment Working Group

With the help of the Interagency WG, FEMP will:

- Need to know the technologies the agencies are interested in and what policies are in place or need to be in place, which will help DOE understand the market.
- The purpose of the TD WG is to help FEMP understand agencies technology needs to inform the technology vendors and developers of potential market opportunities.
- Work together to develop policies, strategies, and tools to accelerate deployment.
- Focus on identifying technologies that meet requirements for broad Federal acquisition, including through UESC and ESPC vehicles.

Policies, strategies, and tools to accelerate emerging and underutilized technologies are currently underway

DOE/FEMP Technology Deployment Contacts

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