



U.S. Department of Energy
Energy Efficiency and Renewable Energy

federal energy management program

Deploying Emerging Technologies in ESPC

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For More Information

- Would you like to know more about this presentation?
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Deploying Emerging Technologies

- Goals/Objective
- Define emerging technologies
- Examples of emerging technologies in ESPC projects - lessons learned
- Describe actions taken to incorporate ET in ESPCs
- Results to date
- Feedback, suggestions



Emerging Technologies in ESPCs

Goal/Objective:

- Tool to help reach Executive Order 13423, EPACT 2005 and EISA energy use reduction goals
- Means to acquire energy savings otherwise not attainable, and build larger ESPC/UESC projects & projects that would not be otherwise feasible



“Emerging Technologies”?

Definition:

New and emerging technologies will be defined as applicable to existing buildings, developed beyond bench-test status, ready for beta-testing at a minimum, commercially available through a private-sector partner, or already in the commercial market but with minimal market penetration in the federal building sector.



Examples of ET in ESPCs

2006 case studies

- **San Diego VA- Ultra Low NOx Turbine Cogen System**
- **Ft. Stewart- Super T-8 Lighting Technology**
- **Luke AFB- Integrated Cool/ PV Roofing System**
- **Ft. Irwin –HID to T-5 Hi- bay Lighting**
- **BOP Victorville- Wind Turbine and PV**
- **NAS Oceana- Waste water reuse/energy recovery**
- **EPA Ann Arbor- Fuel Cell**



San Diego VA- Ultra Low NOx Turbine Cogen System





Ft. Irwin –HID to T-5 Hi- bay Lighting: Pre-Retrofit





Ft. Irwin –HID to T-5 Hi- bay Lighting: Post-Retrofit





ET in ESPC- Lessons Learned

- **Projects require a mix of motivation and tolerance amongst project partners: partners are either motivated to incorporate the technology into the project or tolerant to have it as part of the project.**
- **Technologies can be the idea of the federal agency, ESCO and /or third party.**
- **Perceived risks need to identified managed and/ or mitigated**



ET in ESPC- Lessons Learned

- **Utilize technology experts from the National Labs and private sector to educate stakeholders, emphasizing value/benefits**
- **Positive relationships and trust among all parties is critical**
- **Need to be flexible and provide a customized approach to meet customer needs**
- **Applicable financial incentives can help offset first costs**



ET Deployment Action Plan to date

Steps/Tasks

- **Identified, cataloged, and prioritized technologies into FEMP Emerging Technology Matrix**
 - Alliance to Save Energy (ASE), FEMP, LBNL, other DOE Labs
 - Input from CA Emerging Technologies Council, Navy Techval program, others
- **Preliminary market assessment**
- **Developed/identified 1-2 page technology fact sheets**
- **Identified technology expert(s) and availability of technical assistance**



ET Deployment Action Plan

- **Disseminate new technology information to field (Educate PFs, Agencies, ESCOs)**
 - ESCO project development engineers critical
 - If application matches are found, coordinate technical assistance.
 - If necessary, small demo (if scalable) during the DES phase to confirm feasibility/acceptability
 - Implement technology on larger scale via ESPC
- **Identify any applicable financial incentives, prototypes, cost sharing opportunities, other funding sources.**



Emerging Technology (ET) Matrix

- The Emerging Technology (ET) Matrix is an Excel spreadsheet tool to assist agencies and ESCOs:
 - Identify emerging technologies for Federal ESPC/UESC projects.
 - Provide references for additional information, points of contact, and resources.
 - Save research time and provide better direction in making Energy Conservation Measure (ECM) decisions.
- ECM Categories
 - Building Envelope
 - HVAC
 - HighTech Buildings
 - Lighting
 - Power Generation
 - Water/Wastewater
 - Water Heating
 - Other



FEMP ET Matrix Websites

FEMP Emerging Technology Matrix

- http://www1.eere.energy.gov/femp/docs/emerging_tech_matrix.xls

Alliance to Save Energy Emerging Technology Report

- http://www1.eere.energy.gov/femp/pdfs/emerging_technologies_ase_report.pdf



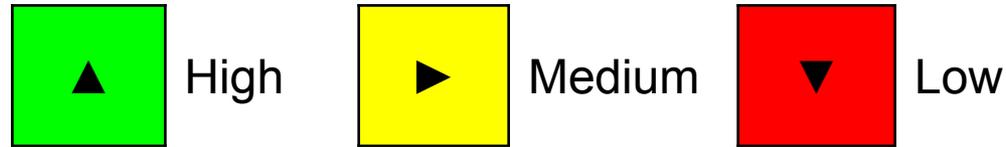
ESCO/Agency Review and Support

- **Prior to the Initial Proposal (IP) KickOff (KO) meeting agency customers will be provided an Emerging Technologies (ET) Matrix**
- **Agencies are requested to review the ET Matrix for potential saving opportunities**
- **At the IP KO meeting FFS/PF will provide an overview of the ET Matrix to the project team**
- **Prior to the IP development FFS/PF will schedule a meeting with the ESCO/Agency to go over the ET Matrix in more detail and identify potential ET ECMs**



ET Matrix: Federal Sector Applicability

Example – Scotopic Lighting



Lighting					
Technology	Federal (Market) Leverage	Savings Potential		Cost Effectiveness	Retrofit Applicability
		Federal	US economy		
Scotopic Lighting	▲	▲	▶	▲	▲



ET Matrix: ESPC Applicability

Example – Scotopic Lighting

A

All or most federal facilities

M

Many federal facilities

S

Special conditions
(see measure description)

Technology	ESPC Applicability	Application	Description
Scotopic Lighting	A	Residential and Commercial	Optimized color temperature for improved visual effectiveness even at dimmed light output



ET Matrix: Information Sources

Report Type Source Date URL

	Report Type	Source	Date	URL
Scotopic Lighting	Website	DOE	2007	http://www1.eere.energy.gov/femp/new_technology/tech_demo_comp5.html
	2-pager	FEMP	2007	Download
	ACEEE Study (p. 134)	ACEEE	2004	http://www.aceee.org/pubs/a042full.pdf
	Field Evaluation	PNNL	2006	http://www.eere.energy.gov/buildings/info/documents/pdfs/selpies_field_eval_083006.pdf
	Economic Analysis	DOE	2006	http://www.eere.energy.gov/buildings/info/documents/pdfs/selpies_economics_validation_083006.pdf



ET Deployment Action Plan

- **Incorporate into ESPC training, kickoff meetings, Core Team technical assistance**
- **Promote and highlight quick/early success stories (TEAM initiative)**
- **Venues include: PF/ESCO, FUPWG, E200X, NAESCO, FEMP webpage, etc**
- **Conduct Evaluations/Assessments**
- **Develop case studies**
- **Gather additional success stories and disseminate information**



Results: ESPCs with Scotopic Lighting

- **BOP AZ- \$953,574 investment, \$184,870 annual savings. Awarded 03/08.**
- **DOE Ames Lab- \$ Investment \$306,802, annual savings \$38,127. Beginning DES phase.**
- **DOE ORNL- \$1,904,567 investment, \$164,912 savings. In DES development.**
- **DOE Y-12 - \$3,122,293 investment, \$318,058 savings. IP just received.**
- **GSA Long Beach, Awarded 07/07.**
- **Malmstrom AFB, \$ 550,096 investment, \$38,461 savings. IP review.**
- **DOE Hanford- \$906,495 investment \$34,009 savings. In DES development.**
- **US Army Korea- \$ 6,071,095 investment, \$528,455 annual savings. Beginning the DES phase.**
- **USDA Forest Products Lab, WI. \$98.180 investment, \$11,640 savings, IP completed.**



Results: Other ET Matrix Applications

- **Aerosol Duct Sealing – LBNL**
- **Lab Air Flow/Fume Hoods – DOE: LBNL, BNL, Ames**
- **Bay Source Heat Pump – FDA Puerto Rico**
- **Advanced Metering – DOE: ORNL, LLNL, PPPL, SLAC, NETL, LBNL**
- **Biomass Electric Generation or Boilers – Fort Stewart, ORNL, Savannah River, Forest Service Regions 2 & 4**
- **High Performance Windows – DOE Ames**
- **PV – DOE: NTS, PNNL, PPPL, HQ, INL, LANL, LLNL, NETL; US Army Korea, FDA Puerto Rico, AF: Aviano, Malmstrom & Lackland; Forest Service Region 2**
- **Wind power – NETL, USCG Puerto Rico, Forest Service Region 2 & 4**
- **T5 Lighting – Fermi Lab, ORNL, Ft. Stewart, US Army Korea**
- **Cool/Green Roof – NETL**



Results: ET Matrix Applications in UESCs

- **Combined Heat & Power – GSA, New York, ConEd; NIH, DC, Pepco; GSA, DC, Washington Gas**
- **High Efficiency Heat Pump – Little Rock AFB, Entergy; Corry Station USN, Pensacola, Gulf Power**
- **LED Lighting – GSA, New York, ConEd; Corry Station USN, Pensacola, Gulf Power**
- **Daylighting Controls - Corry Station USN, Pensacola, Gulf Power**
- **High Output T5s - Corry Station USN, Pensacola, Gulf Power**
- **Demand Control Ventilation - Corry Stn USN, Pensacola, Gulf Power**
- **Advanced Metering – Patrick AFB, FP&L; Robins AFB, GA Power; GSA, New York, ConEd; Corry Stn USN, Pensacola, Gulf Power**
- **Condensing Fuel-Fired Hydronic Boilers – Kennedy Space Center, FP&L**
- **PV – GSA, Chicago, ComEd; GSA, New York, ConEd**



ET Deployment Action Plan

- **Other Ideas**

- **Develop technology specific technical assistance tools based on user needs**
- **Demonstration project funding**
- **FEMP should form partnerships with industry**
- **Periodic Technology Updates/Training**



ET Deployment  Action Plan

Feedback/suggestions?

**Applicability to UESC and your
projects?**



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