Deploying Emerging Technologies in U. S. Federal Buildings through ESPC

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The Department of Energy's Federal Energy Management Program's (FEMP) mission is to facilitate the Federal Government's implementation of sound, cost-effective energy management and investment practices to enhance the nation's energy security and environmental stewardship.

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:

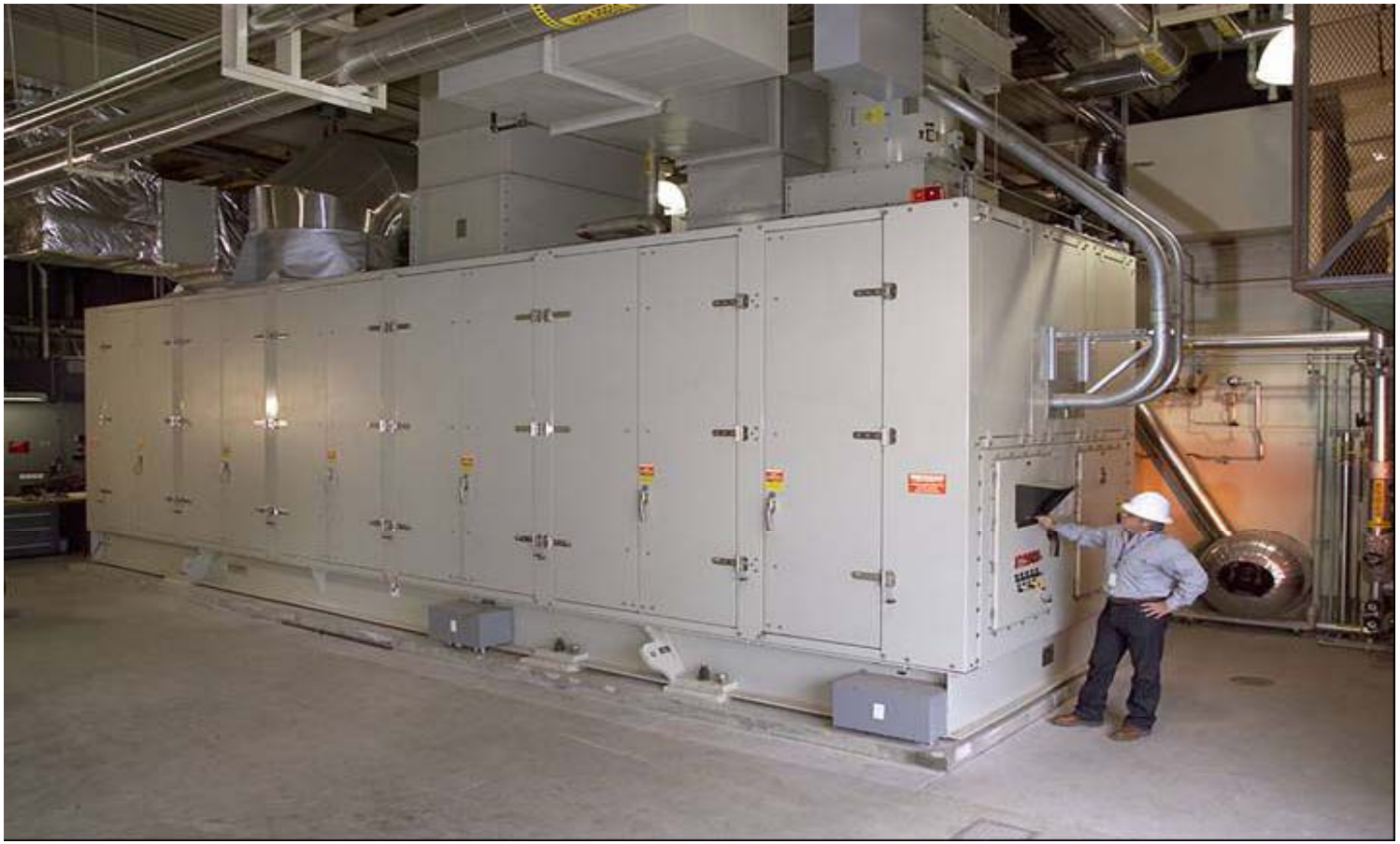
New and emerging technologies will be defined as applicable to existing buildings, developed beyond bench-test status, ready for beta-testing at a minimum, commercially available through a private-sector partner, or already in the commercial market but with minimal market penetration in the federal building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

Examples of ET in ESPCs

2006 case studies

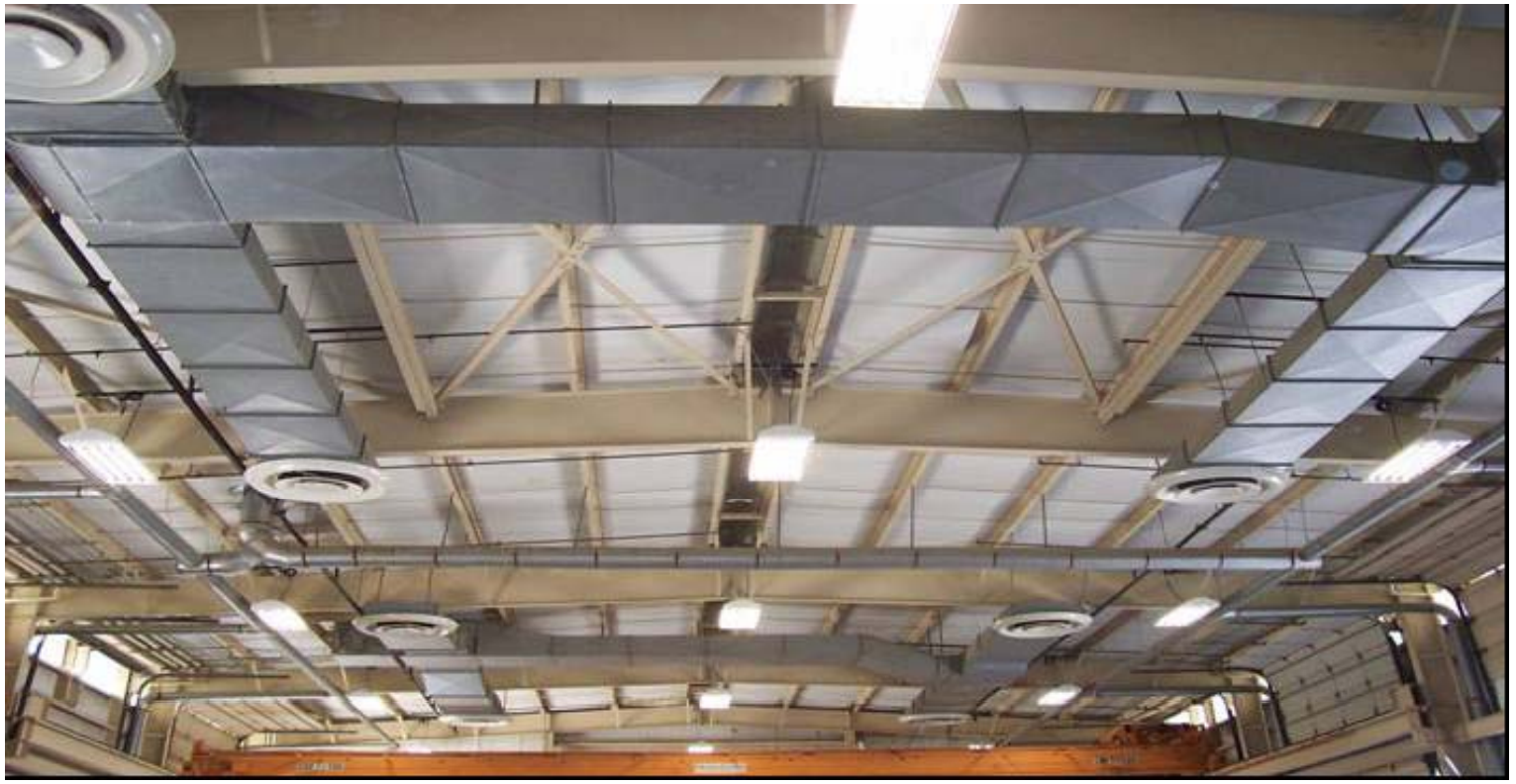
- **San Diego VA- Ultra Low NOx Turbine Cogen System**
- **Ft. Stewart- Super T-8 Lighting Technology**
- **Luke AFB- Integrated Cool/ PV Roofing System**
- **Ft. Irwin –HID to T-5 Hi- bay Lighting**
- **BOP Victorville- Wind Turbine and PV**
- **NAS Oceana- Waste water reuse/energy recovery**
- **EPA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

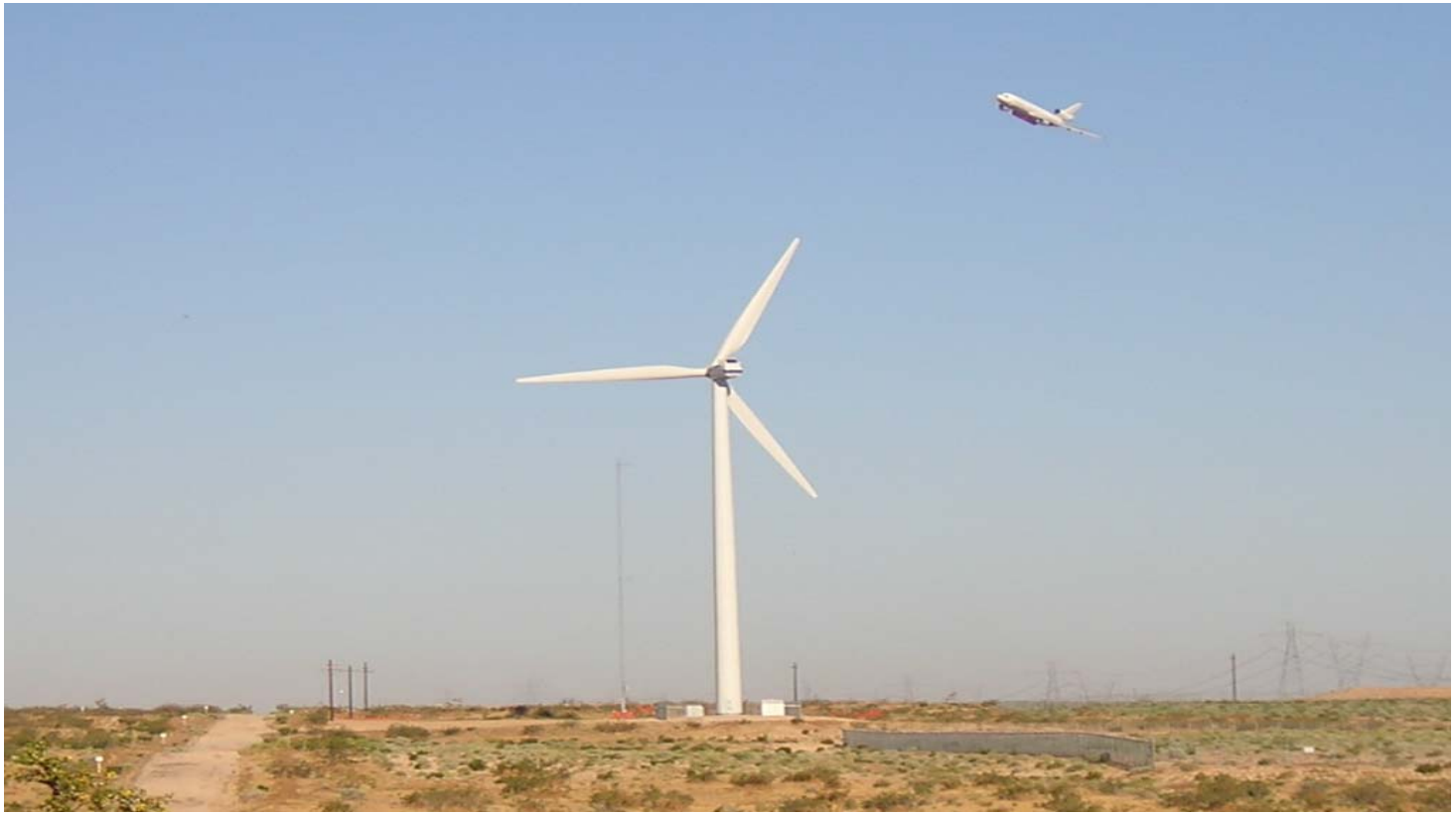
- **Technologies can be the idea of the federal agency, ESCO and /or third party.**

- **Perceived risks need to identified managed and/ or mitigated**

ET in ESPC- Lessons Learned

- *Risk can be reduced by being properly shared among the parties , and by acquiring more detailed technical information*

Bureau of Prisons, Victorville CA



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 Preliminary Assessment (PA)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 PA KO meeting FFS/PF will provide an overview of the ET Matrix to the project team**
- **Prior to the PA 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

▲ High ► Medium ▼ Low

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
Scotopic Lighting	Website	DOE	2007	http://www1.eere.energy.gov/femp/new_technology/techdemo_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**
- **Venues include: PF/ESCO, FUPWG, E200X, NAESCO, FEMP webpage, etc**
- **Conduct Evaluations/Assessments**
- **Develop case studies**
- **Gather additional success stories and disseminate information**
- **Developing a multi-year program plan**

Results: ESPCs with Scotopic Lighting

- **BOP AZ- $953,574 investment, $184,870 annual savings. Awarded 03/08.**
- **DOE Ames Lab- $ Investment $267,585, annual savings $16,944. Award targeted 3/09.**
- **DOE ORNL- $1.8M investment, $160K savings. Awarded 07/08.**
- **DOE Y-12 - $3,122,293 investment, $318,058 savings. DES phase.**
- **Malmstrom AFB, $ 550,096 investment, $38,461 savings. IP review.**
- **US Army Korea- $ 6,071,095 investment, $528,455 annual savings. In DES phase.**
- **USDA Forest Products Lab, WI. $98.180 investment, $11,640 savings. DES phase.**
- **BOP-Lompac, Victorville #2**
- **GSA - PJKK Fed. Bldg., HI, Long Beach &Santa Ana, CA;**
- **DOE - Forrestal & Nevada Test Site**

Results: Other ET Matrix Applications

- **Aerosol Duct Sealing – Architect of the Capital**
- **Lab Air Flow/Fume Hoods – DOE: BNL, Ames, LANL**
- **Bay Source Heat Pump – FDA Puerto Rico**
- **Advanced Metering – DOE: ORNL, LLNL, PPPL, SLAC, NETL**
- **Biomass Electric Generation or Boilers – Fort Stewart, ORNL, Savannah River, Forest Service Regions 2 & 4, Fairton FCI**
- **High Performance Windows – DOE Ames**
- **PV – DOE: NTS, PNNL, PPPL, HQ, INL, LANL, LLNL, NETL; US Army Korea, USCG Puerto Rico, Malmstrom AFB; Forest Service Region 2**
- **Wind power – NETL, USCG Puerto Rico, Forest Service Region 2 & 4, Ft. Irwin**
- **Cool/Green Roof – NETL, GSA PJKK Fed Bldg**
- **Indoor/Outdoor LED fixtures – US Army Korea**
- **Induction Lighting – Ft. Irwin**

ET Deployment → Action Plan

- **Other Ideas**
  - **Assess Greenhouse gas abatement potential**
  - **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 your projects?

For more information on how to identify potential for renewables

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Would you like to know more about this presentation?

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