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

federal energy management program

Energy Management in the Federal Sector

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IAC Student Meeting

Presentation Outline

- Background
  - Education/Work
- Federal Energy Management Program (FEMP)
  - Mission/Goals
  - Services
- Career Opportunities

Background

- Education
  - Degree
  - Internships
- Work
  - Architect of the Capitol

FEMP Mission—Lead by Example

FEMP strives to enhance energy security, environmental stewardship and cost reduction within the Federal Government by:

- advancing energy efficiency and water conservation;
- promoting the use of renewable energy, sustainable building design, and distributed energy resources; and
- improving utility management decisions at Federal facilities

E.O. 13123: Federal Energy Management Goals

- Reduce energy consumption
  - Facility energy per square foot to be reduced by 30 percent in 2005 and 35 percent in 2010 relative to 1985
  - Industrial/laboratory energy to be reduced by 20 percent in 2005 and 25 percent in 2010 relative to 1990
- Expand use of renewable energy
  - 2.5% of Federal facility electricity consumption by 2005
- Reduce greenhouse gas emissions 30 percent by 2010 compared to 1990

New Goals under EPACT 2005

Energy Efficiency

Reduce energy intensity per square foot (in all Federal buildings) by 2% annually from 2006 through 2015 compared to a FY 2003 baseline.

Renewable Electricity Consumption

Goal	Fiscal Year
Not less than 3%	2007-2009
Not less than 5%	2010-2012
Not less than 7.5%	FY 2013 and thereafter

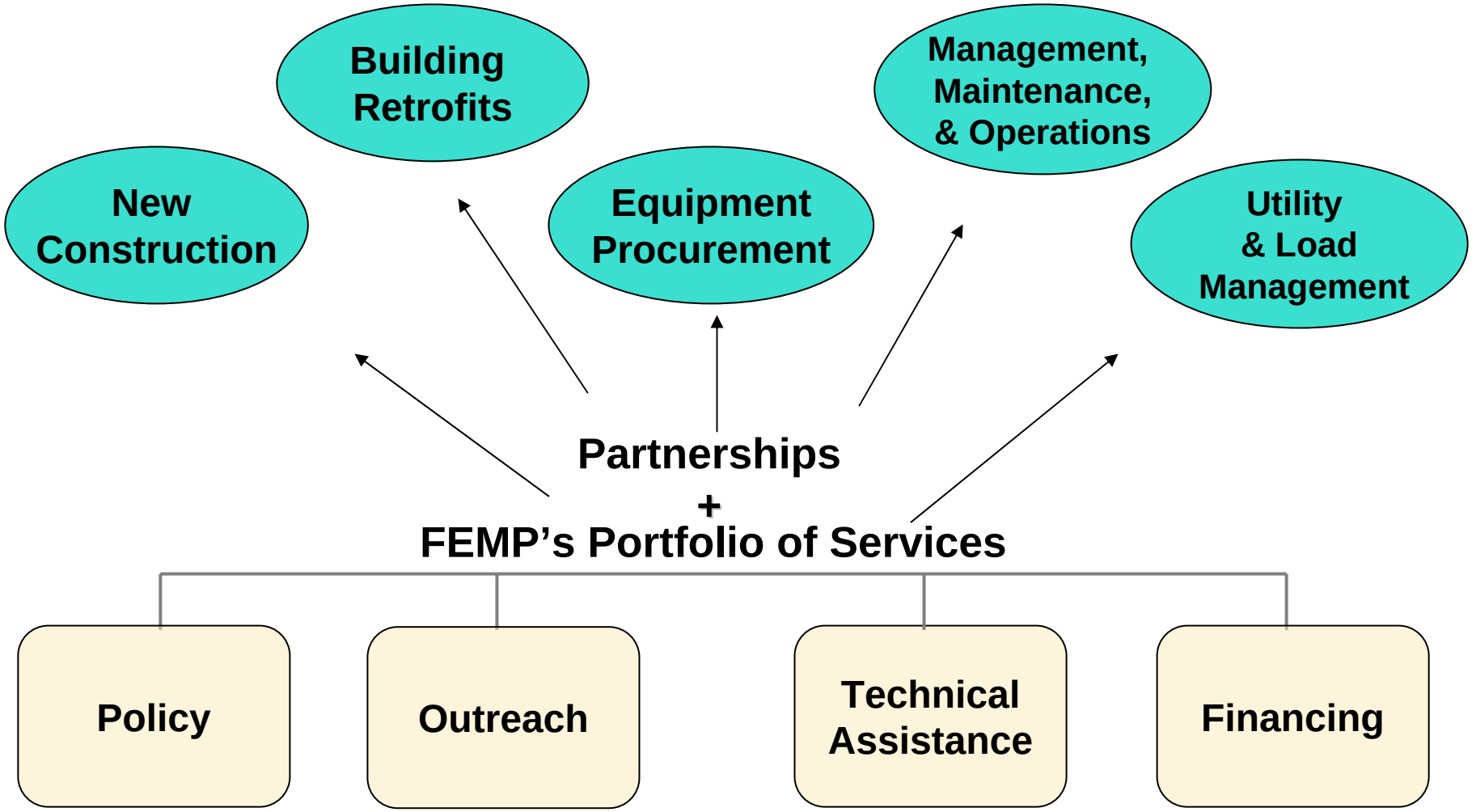
Putting FEMP into Context

- FEMP is one of 11 programs in DOE's Office of Energy Efficiency and Renewable Energy (EERE)
- FEMP one of the two that focuses on deployment; the other nine are primarily R&D

Why FEMP?

- The Federal Energy Universe
  - 500,000 facilities with a total area of over 3.0 billion sq. ft.
  - 1.7% of our nation's total energy use of approximately 98 quadrillion Btu
  - Annual energy bill $5.1 billion; 0.5% of total Government expenditures.
- The largest user of energy in the country >>> "Lead by example" cannot be optional, it has got to be mandatory
- Need for an entity to lead the "Lead by Example" effort.

Targeted Opportunities: Customer Needs



Major Activities

- Develop an understanding of R&D technologies
- Identification and analysis of technologies available for deployment.
- Testing and Validation
- Demonstration
- Design assistance
- Training
- Implementation tools
- Publications and outreach

Tech Transfer Initiative: Targeted Approach

- Highly energy efficient products for residential and commercial buildings
- Technologies with potential for large energy savings on a national scale (Lack of market penetration in the Federal sector)
- Products requiring late-stage (two years or less) development prior to commercialization; AND
- Products commercialized, yet not established in the market

Project Assistance Overview

- Promotes energy and water efficiency and renewable energy in federal facilities
- Provides cost-effective strategies for both new design and retrofit activities
- Project Assistance examples
  - Screening to identify and prioritize opportunities
  - Feasibility Studies, Life Cycle Cost Analysis
  - Procurement Specifications
  - Design Review
  - Evaluation of LEED and EnergyStar Ratings Assessments
  - Distributed Energy Resources (DER)

Case Study

New San Francisco Federal Building (GSA)

- Innovative design for mixed mode ventilation
- FEMP TA modeling with EnergyPlus saved $1.5M in construction costs with $9M in energy savings projected over 20 year period
- Lessons learned from FEMP TA to 20 GSA projects documented
- FEMP/TA by Lawrence Berkeley National Laboratory ($30k) & GSA added $25k

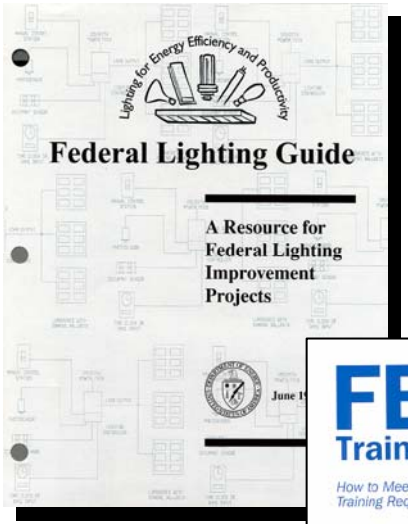
Case Study

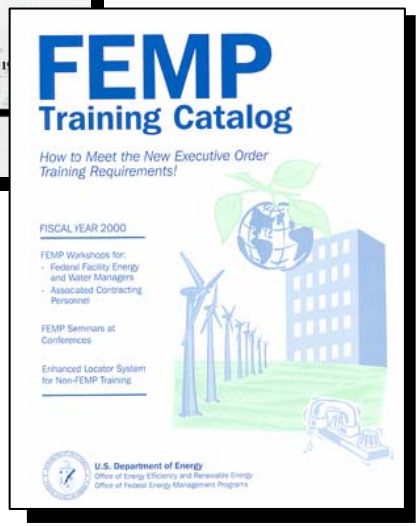
29 Palms Marine Corps Air Ground Combat Center

- 7.2-MW dual-fuel cogeneration
- Gas turbine
- Total cost $18 million
- Annual cost savings $5.8 million
- FEMP provided independent and unbiased review of design, and contributed to improving efficiency
- Partners
  - EERE DE/CHP Program
  - U.S. Naval Facilities Engineering Service Center (NFESC)
  - Johnson Controls Inc.
  - 29 Palms Marine Corps Air Ground Combat Center
  - Federal Energy Management Program
  - Renewables

Information and Outreach

- Technical Assistance
  - SAVEnergy Audits
  - Design Assistance
  - DER/CHP
  - Renewable Energy /Green Power
  - Labs21
  - Industrial Facilities
  - Alert Audits
- Technical Information Training
  - Software Tools
  - Buying Energy Efficient Products
  - New Technology Demonstration Program
  - Federal Relighting Initiative





FEMP
FEDERAL ENERGY MANAGEMENT PROGRAM

Case Study

A series of case studies with 1 year of measured performance data

Federal Energy Management Program

Achieving Results with Renewable Energy in the Federal Government

Heating Water with Solar Energy Costs Less at the Phoenix Federal Correctional Institution

A large solar thermal system installed at the Phoenix Federal Correctional Institution (FCI) in 1998 heats water for the prisons and costs less than buying electricity to heat that water. This renewable energy system provides 70% of the facility's annual hot water needs. The Federal Bureau of Prisons did not incur the up-front cost of this system because it was financed through an Energy Savings Performance Contract (ESPC). The ESPC payments are 10% less than the energy savings so that the prison saves an average of $6,700 per year, providing an immediate payback. Boiler maintenance and hot water service call-outs for the facility have also been reduced.

The solar hot water system produces up to 50,000 gallons of hot water daily, enough to meet the needs of 3,250 inmates and staff who use the kitchen, shower, and laundry facilities. Because solar energy is cleaner than conventional electric power, the environmental benefits are real. Solar water-heating systems add no carbon dioxide or other emissions to the air around them. This renewable energy system offsets an average annual consumption of 1,600 megawatt-hours (MWh) of electricity and the release of nearly 600 tons of CO_2. For comparison, conventional electricity produced in Arizona emits 1,169 pounds of CO_2 per MWh.

The Federal Bureau of Prisons worked with the Department of Energy (DOE) Federal Energy Management Program (FEMP) and the ESPC contractor, Industrial Solar Technology Corporation (IST), to design and install the system. Under the terms of the 10-year ESPC contract, the prisons receive 10% of the total energy savings annually (an average of $6,700 per year), and the other 90% goes to amortize the first costs of the system. At the end of the 10-year period, the prison will take over ownership, operation, and maintenance of the solar system and benefit from 100% of the energy savings for the remaining 10 years of the expected service life.

Parabolic trough concentrator installed at the Phoenix Federal Correctional Institution provides up to 50,000 gallons of hot water daily—enough for more than 3,250 inmates, staff, laundry, and ventilation needs for 1,250 inmates and staff.

The solar system includes 17,040 ft² of parabolic trough concentrating collectors and a 20,000-gallon storage tank located adjacent to the collectors. Parabolic troughs, like other solar water-heating systems, are most cost effective for facilities with relatively constant hot water needs—places such as prisons, hospitals, and barracks. They heat water centrally using the sun's energy, so the facility can reduce the amount of energy purchased from the local utility for water heating.

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Megawatt-hours (MWh) are a measure of electricity, which is used to power homes, businesses, and industry.

Heating Water with Solar Energy Costs Less at the Phoenix Federal Correctional Institution"; the first in the "Achieving Results with Renewable Energy in the Federal Government" case study document series, was published in September 04.

Arraj Courthouse, Denver, CO
(Buildings-integrated Photovoltaics)

Naval Air Station, San Diego, CA
(750 kW PV –2005)

NREL Chemical Storage building, Golden, CO
(Transpired solar collectors -2005)

Social Security Administration
Philadelphia, PA
(Solar water heating –2006)

Career Opportunities

- FEMP Closely Coordinated with DOE Research Programs
  - DOE National Laboratories
- FEMP Procurement Recommendations
  - Rely on Credible Rating System Based on Significant DOE Research
- FEMP Benefits from Strong Technical Societies
  - Standards
  - Trained Architects, Engineers, ESCOs

Major Program Partners

- Federal Agencies
- DOE National Laboratories
- Associations
- Utilities
- Equipment Manufacturers
- Industry Partners/Energy Service Companies

How Does Partnering Work?

- Private partners play key roles: promote, market, sell, finance, implement
  - ESCOs and Utilities
  - CHP industry & associations (USCHPA, AGCC, IDEA, etc.)
- FEMP
  - provides assistance to identify and catalyze projects;
  - offers federal agencies unbiased technical assistance on equipment, design and financing to help agencies secure best-value projects

FEMP Contacts

- Website: http://www.eere.energy.gov/femp/

- FEMP Contact Information:
  (202) 586-5772