Commissioning (Cx) in the Federal Sector

Timothy D. Unruh, PhD, PE, CEM, LEED AP
Program Manager
DOE FEMP

Federal Energy Management Program
Learning Objectives

1. Participants will be able to identify commissioning mandates for federal buildings and understand their emphasis.
2. Participants will be able to summarize characteristics of the federal building inventory.
3. Participants will be able to identify current actions in federal building commissioning.
Outline and Introduction

- FEMP Overview
- Federal Commissioning Mandates
- Federal Building Characteristics
- Commissioning Guidance
- Current Actions
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.
FEMP Overview

- Project Funding
- Technical Support
- Reporting and Tracking/Communication
Project Funding:

- FEMP supports federal agencies through the entire project development process, offering assistance identifying, obtaining, and implementing project funding mechanisms.
- Project funding tools include Energy Savings Performance Contracts (ESPCs), Utility Energy Services Contracts (UESCs), Power Purchasing Agreements (PPAs), and various Federal and State Energy Incentives Programs.
FEMP Overview

- Technical Support
  - FEMP provides technical support services across the Federal Government enabling agencies to meet their energy efficiency & renewable energy goals.
  - FEMP services include the following topics:
    - Mobility
    - Sustainable design
    - Water conservation
    - Greenhouse gas management
    - Labs and data centers design
    - Operations & Maintenance best practices
    - Metering
    - Renewables
FEMP Overview

- Reporting and Tracking/Communications
  - Works to improve the quality of DOE & inter-agency planning, reporting & communication processes
  - Delivers assistance through
    - Interagency coordination
    - Assistance with annual reporting requirements
    - Development of guidance documents
    - Training workshops and related events
Where is the Federal Government on its energy goals?
• **Reduce Energy Intensity**
  
  – **Goal:** reduce energy intensity (Btu/square foot) by 15% in FY 2010 compared to FY 2003; 30% reduction required in FY 2015.
  
  – **Status:** 15.0% reduction (only 10.7% without additional credits)
FEMP Overview

• Use Renewable *Electric* Energy
  
  – **Goal**: use renewable electric energy equivalent to at least 5% of total electricity use; at least half of which must come from sources developed after January 1, 1999. Must be at least 7.5% in FY 2013 and thereafter.
  
  – **Status**: 5.2% overall
• **Reduce Greenhouse Gas Emissions**

  – **Goal:** reduce government-wide GHG emissions by 28% for Scope 1&2 emissions and 13% for Scope 3 emissions by 2020 (from 2008 levels)

  – **Status:** Pending
Federal Commissioning Mandates

The Energy Independence and Security Act (EISA) 2007

- Facility energy managers are responsible for completing comprehensive energy and water evaluations of 25% of covered facilities each year...and following up on implemented measures, including fully commissioning equipment, putting O&M plans in place, and measuring and verifying energy and water savings

Guiding Principals for Federal Leadership in High Performance and Sustainable Buildings Memorandum of Understanding

- Employ total building commissioning practices tailored to the size and complexity of the building and its system components
- Designate a commissioning authority
- Commissioning requirements in construction documents, including a commissioning plan
Federal Commissioning Mandates

**Executive Order 13423**
- Federal agencies are to ensure new construction and major renovations comply with the Guiding Principles for Federal Leadership in High Performance and Sustainable Buildings (Guiding Principles)

**Executive Order 13514**
- Federal agencies shall increase energy efficiency ....ensuring that all new construction, major renovation, or repair and alteration of Federal buildings complies with the Guiding Principles for Federal Leadership in High Performance and Sustainable Buildings (Guiding Principles)
Federal Commissioning Mandates

Guiding Principles for Sustainable New Construction and Major Renovations

• Employ Integrated Design Principles
  – Integrated Design
  – Commissioning
• Optimize Energy Performance
  – Energy Efficiency
  – On-Site Renewable Energy
  – Measurement and Verification
  – Benchmarking
• Protect and Conserve Water
  – Indoor Water
  – Outdoor Water
  – Process Water
  – Water-Efficient Products
• Enhance Indoor Environmental Quality
  – Ventilation and Thermal Comfort
  – Moisture Control
  – Daylighting
  – Low-Emitting Materials
  – Protect Indoor Air Quality during Construction
  – Environmental Tobacco Smoke Control
• Reduce Environmental Impact of Materials
  – Recycled Content
  – Biobased Content
  – Environmentally Preferable Products
  – Waste and Materials Management
  – Ozone Depleting Compounds
Federal Commissioning Mandates

BASIC STEPS FOR EISA PROJECT MANAGEMENT AND PERFORMANCE MONITORING

Identify Covered Facilities
Assign Energy Managers

Project Management Framework (4-Year Cycle)

Continuous Improvement

• Step 4
  Follow-up M&V

• Step 3
  Solicit, Award and Implement Projects

• Step 2
  Prioritize ECMS and Bundle info Projects

• Step 1
  Evaluations (audit and commissioning assessments)

Performance Monitoring & Diagnosis Framework (Annual Cycle)

Facility-Level Footprint Benchmarking
Install Meters
Monitor Meter Data for Diagnosis
Benchmark Building Performance
Disclose Results and Share
What do the mandates stress if you provide commissioning or evaluation services to a Federal agency?
Federal Commissioning Mandates

• **Baseline and benchmark**
  – How much is used
  – Understand how it is used (use/unit)
Federal Commissioning Mandates

- Recommend metering
  - At building entrance
  - Sub-level metering
  - Type of metering
Federal Commissioning Mandates

• **Recommend no/low cost changes**
  – Building Controls
  – Data Centers
  – Plug Load
Federal Building Characteristics

- The Federal Government oversees approximately 3 billion square feet of federal building space spread over 15,000 sites and approximately 500,000 buildings
- There are 244 federal campuses over 3 million square feet with ~250,000 buildings and 1.7 Billion square feet

- This means:
  - Many buildings with one meter
  - Diverse operation hours and mission
  - High potential for maintenance issues
  - Challenging rules, requirements, and regulations
Federal Building Characteristics

• Federal construction spending is approximately $30 billion per year.
• Energy costs alone equal approximately $7 billion each year.

• This means:
  – Significant opportunities for commissioning
  – Significant opportunities for retro-commissioning
  – Savings potential
Life Cycle Cost vs. Simple Payback

• Life Cycle Cost
  – Life Cycle Cost presents the worth of all costs associated with a project. LCC provides an assessment of long-term cost effectiveness of a project
  – Guidance:  
    [www.femp.energy.gov/information/download_blcc.html](http://www.femp.energy.gov/information/download_blcc.html)

• Simple Payback
  – Simple Payback is the ratio of total installed cost to first-year savings. It focuses on how quickly the initial investment can be recovered and is not a measure of long-term performance or profitability.
Federal Building Characteristics

Building Energy Use by Agency: 388 Trillion Btu

DOD 57.2%
DOE 7.7%
VA 7.4%
USPS 6.7%
GSA 4.8%
Justice 3.4%
HHS 2.7%
NASA 2.4%
DHS 1.3%
Interior 1.3%
USDA 1.0%
DOT 0.9%
DOL 0.6%
DOC 0.7%
Treasury 0.5%
Other* 1.4%

*Other includes:
- EPA
- TVA
- SSA
- Archives
- State
- HUD
- NRC
- RRB
Commissioning Guidance

DOE – FEMP O&M Best Practices Guide (Chapter 7)

- Provides an introductory-level look at commissioning approaches with an O&M focus
- Presents guidance for commissioning best practices

- Used as a reference tool for facility managers and operators.
- Contains useful information about O&M Management, metering, technologies, energy and water efficiency, and cost reduction approaches.
Commissioning Guidance

DOE – Commissioning for Federal Facilities
• Provides a practical guide for commissioning at Federal facilities.
• Presents guidance for commissioning best practices
• Includes an interactive online training guide

• Reference document that should be used to gain a better understanding of commissioning, and to:
  ○ Help resolve operating problems
  ○ Improve comfort
  ○ Optimize energy use, and
  ○ Identify retrofits for commercial and institutional buildings and central plant facilities.
Commissioning Guidance

Highlights the benefits of metering
Describes methods and approaches for building-level, panel-level, and end-use metering.
Describes metering technologies, equipment and applications.
Provides case studies

• Provides the federal energy/facility manager and practitioner with:
  ○ Information to help understand metering
  ○ Actions to take to achieve the potential savings and benefits derived from the use of meters.
Commissioning Guidance

GSA - The Facilities Standards for the Public Buildings Service (P-100)

- Establishes mandatory design standards and criteria for new buildings, major and minor alterations
- Contains policy and technical criteria to be used in the programming, design, and documentation of GSA facilities

- Building Standard
- Applies to all new facilities or alterations of GSA owned, or lease construction with Government Option to Purchase buildings. It is recommended that the Facilities Standards apply to significant build-to-suit lease buildings.
- Contains policy and technical criteria to be used in the programming, design, and documentation of GSA buildings.
Commissioning Guidance

GSA Building Commissioning Guide

- Presents a step-by-step process for building commissioning from project planning through tenant occupancy
- Includes keys to success and best practices based upon industry guidance and GSA experience.

- Designed as a guide for building commissioning project planning.
- Primary audience: GSA’s Project Managers, construction management agents, and Commissioning Agents
Current Actions

• Guiding Principals for Federal Leadership in High Performance and Sustainable Buildings Memorandum of Understanding
  – Multi-agency commitment to optimizing energy performance, conserving water, improved indoor environmental quality, integrated design, and reduction of the impact of materials in federal facilities.

• FEMP Operations & Maintenance (O&M) Working Group
  – Inter-agency working group focused on educating Federal energy managers on O&M best practices and documenting the benefits of incorporating O&M in meeting Federal mandates

• ENABLE
  – New contracting concept under development by FEMP to aid agencies in meeting federal energy and water efficiency requirements in small facilities (under 200,000 square feet)
Current Actions

Government Building Energy Intensity
FY 2003 - FY 2010
(preliminary data)

2010 Progress without RE Purchase & Source Energy Savings Credits
113,168 Btu/GSF, 11.0% Reduction

EISA/E.O. 13423 Goal
15% Reduction in FY 2010

2010 Progress
107,813 Btu/GSF
15.0% Reduction

EISA/E.O. 13423 Goal
30% Reduction in 2015

- 18%
- 21%
- 24%
- 27%
- 30%
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Timothy D. Unruh, PhD, PE, CEM, LEED AP
Program Manager
Federal Energy Management Program
1000 Independence, SW
Washington, DC, 20585
(202) 586-5772