SUSTAINABILITY TRACK
Session 3

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GSA

Phoenix, AZ
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Air Force Facility Approach to ASHRAE 90.1

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AFCESA/CENF
Aug 08

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Overview

- The Laws and Rules
- Strategic Vision
- Objectives
- Policy/Technical Guidance
- Project Example
- Summary

EPACT 2005

- `(3)(A) Not later than 1 year after the date of enactment of this paragraph, the Secretary shall establish, by rule, revised Federal building energy efficiency performance standards that require that--
- (i) if life-cycle cost-effective for new Federal buildings-
- (I) the buildings be designed to achieve energy consumption levels that are at least 30 percent below the levels established in the version of the ASHRAE Standard or the International Energy Conservation Code, as appropriate, that is in effect as of the date of enactment of this paragraph…

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DOE New Rule

From the new 10 CFR 433, 434,435, dated 17 Dec 2007

- (c) If a 30 percent reduction is not lifecycle cost-effective, the design of the proposed building shall be modified so as to achieve an energy consumption level at or better than the maximum level of energy efficiency that is lifecycle cost-effective, ……..

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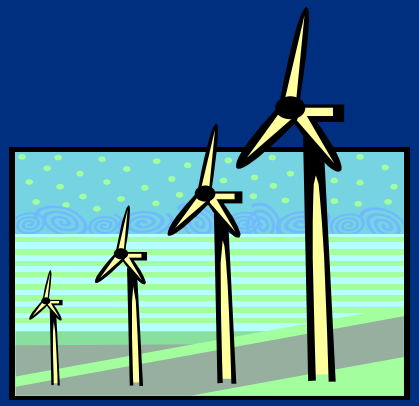
Energy Programs

Improve Infrastructure

Sustainable Design

Manage Costs

Renewable Energy



Energy Awareness

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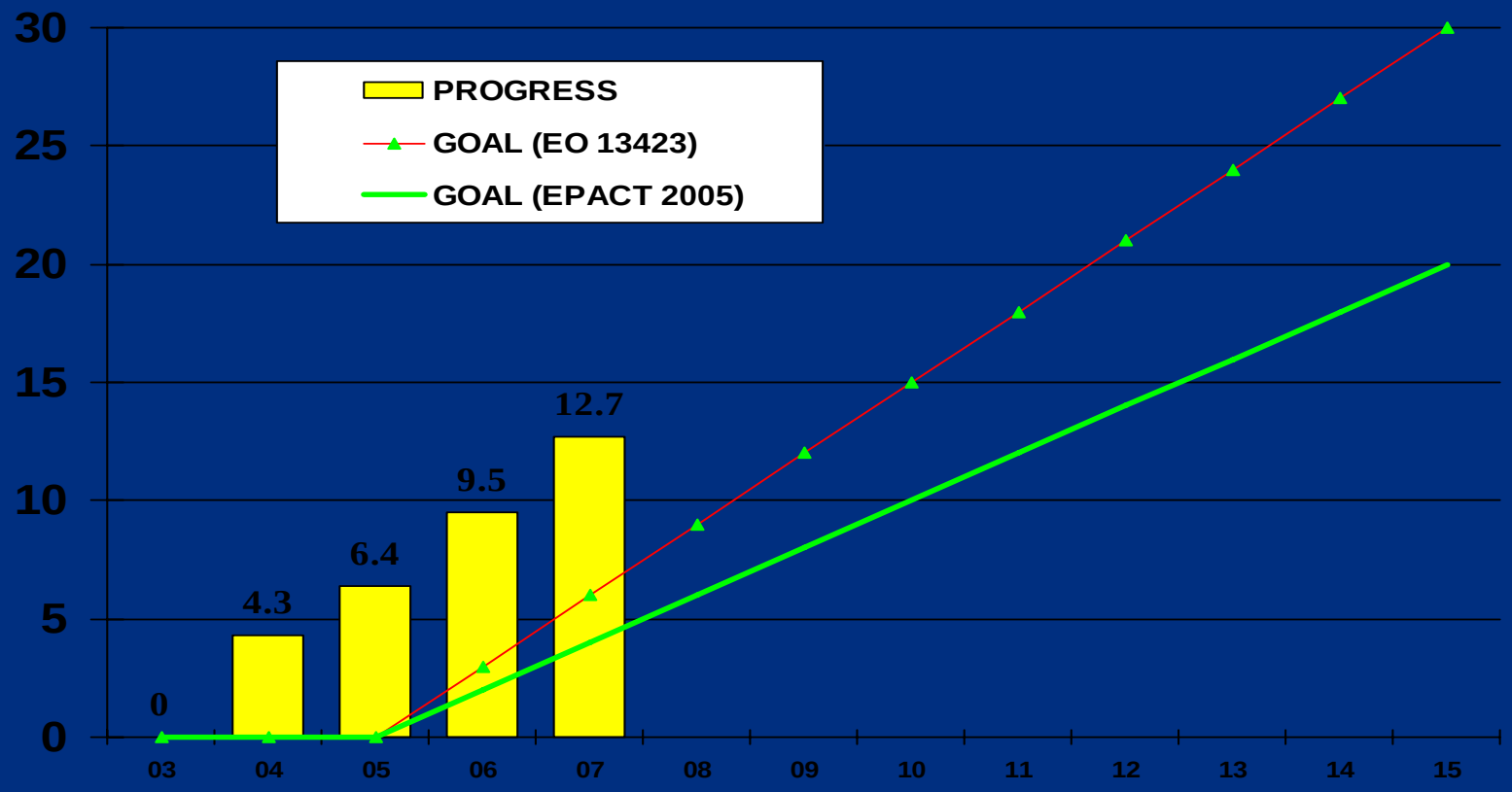
Conservation Results



FY07 PROGRESS = 12.7%

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Strategic Vision

2015
GOALS
Reduce Cost by 20% by 2020
Reduce Energy Intensity by 3% Per Annum
Reduce Water Use by 2% Per Annum
Increase Renewables at Annual Targets (3%, 5%, 7.5%, 25%)
Reduce Ground Fuel Use by 2% Per Annum
Increase Alternative Fuel Use by 10% Per Annum

Governance

Improve Current Infrastructure
- Envelope
- HVAC / controls
- Plumbing
- Water Systems
- Central Plants
- Interior Lighting
- Distribution
- RWP
- Right size fleet
- Low speed vehicles

Improve Future Infrastructure
- Plan / Program
- Develop better designs
- Implement better designs
- Commission
- Increase use of alternative-fuel, hybrid tech vehicles

Expand Renewables
- Develop
  - Solar
  - Wind
  - Geothermal
  - Biomass
- Purchase Renewable Energy Credits
- Explore hydrogen tech

Manage Costs
- Plan
- Negotiate/ Litigate
- Educate
- Operate & Maintain

Plan Program Budget	Decision Mgt	Awareness
■ 5 Yr Project Plan ■ Effective Resourcing ■ Balanced Investment	■ Effective Data ■ Performance Measurement	■ Strategic Comm ■ Awards/Incentives ■ Education and Trng

Asset Management

Optimize assets > > > performance, risk and cost >>> enterprise-wide

Culture Change

See the waste > > > Acknowledge the waste > > > Eliminate the waste

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Objectives

- Pillar II: Improve Future Infrastructure
- Objective 2.1: Eliminate roadblocks in the planning/programming/design/construction/ commissioning processes that inhibit delivery of high-performance and sustainable buildings.
  - AFSO21 Value Stream Mapping (VSM) on project delivery process
  - Customer Concept Document (CCD)

Objectives

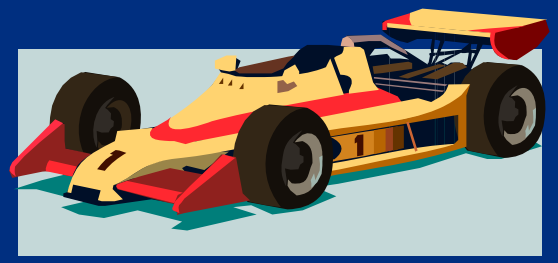
- Pillar II: Improve Future Infrastructure
- Objective 2.2: Develop a program to provide sustainable facilities, which exceed industry energy intensity and water conservation standards.
  - Facility Energy Intensity Targets
  - Establish MILCON Energy Intensity Policy
  - MILCON Facility Sustainability Audits

Objectives

- Pillar II: Improve Future Infrastructure
- Objective 2.3: Develop measurement capabilities to track execution and performance of facilities constructed through the MILCON program.
  - MILCON Energy Consumption Verification
  - Energy/LEED Tracking
  - SR&M Project Priority and Tracking

Sustainable solution

- A two prong approach to meet on-going changes in ASHRAE 90.1 and meet sustainable mandates:
  - Use of LEED's as our primary metric for the planning/design/construction of new facilities
  - Use technology specific projects to reduce the energy consumption
- The Drivers:
  - Policy
  - Technical Guidance (includes training)



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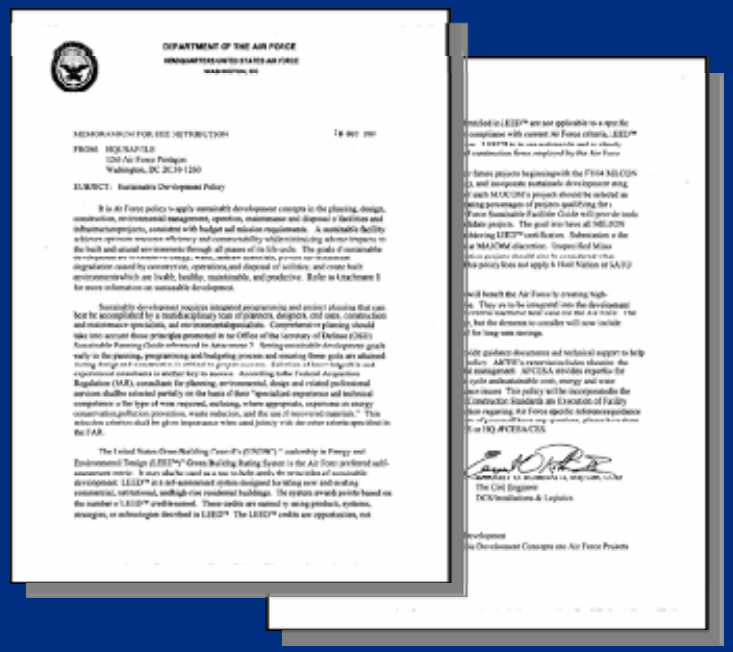
Policy/Technical Guidance

- AF Civil Engineering Policy Memo – 19 Dec 01

  - LEED** is the AF preferred self-assessment metric
  - Goal: All MILCON projects in the FY09 program capable of achieving LEED certification (26-32 points)
  - Application for actual LEED certification is at MAJCOM discretion


DEPARTMENT OF THE AIR FORCE

MEMORANDUM FOR SEE DISTRIBUTION

FROM: HQ USAF/CE
1260 Air Force Pentagon
Washington, DC 20330-1260

SUBJECT: Sustainable Development Policy

It is Air Force policy to apply sustainable development concepts to the planning, design, construction, environmental management, operation, maintenance and disposal of facilities and infrastructure projects, consistent with budget and mission requirements. A sustainable facility achieves optimum resource efficiency and constructability while minimizing adverse impacts to the built and natural environments through all phases of its life cycle. The goals of sustainable development are to conserve energy, water, natural resources, protect our treasured degradation caused by construction, operations, and disposal of facilities, and create built environments which are healthy, healthy, maintainable, and productive. Refer to Enclosure 1 for more information on sustainable development.

Sustainable development requires integrated programming and project planning that can best be accomplished by a multidisciplinary team of planners, designers, civil users, construction and maintenance specialists, and environmental engineers. Comprehensive planning should take into account these principles promoted in the Office of the Secretary of Defense (OSD) Sustainable Planning Guide referenced in Attachment 2. Setting sustainable development goals early in the planning, programming and budgeting process and ensuring these goals are attained during design and construction is critical to project success. Selection of knowledgeable and experienced consultants is another key to success. According to the Federal Acquisition Regulation (FAR), consultants for planning, environmental, design and related professional services should be selected partially on the basis of their "specialized experience and technical competence is the type of work required, including, where appropriate, experience on energy conservation, pollution prevention, waste reduction, and the use of recovered materials." This selection criteria should be given importance when used jointly with the other criteria specified in the FAR.

The United States Green Building Council's (USGBC) " Leadership in Energy and Environmental Design (LEED™)" Green Building Rating System is the Air Force preferred self-assessment metric. It may also be used as a tool to help assess the principles of sustainable development. LEED™ is a self-assessment system designed for rating new and existing commercial, institutional, and high-rise residential buildings. The system awards points based on the number of LEED™ credits earned. These credits are earned by using products, systems, strategies, or technologies described in LEED™. The LEED™ credits are opportunities, not

Attached to LEED™ are not applicable to a specific
compliance with current Air Force criteria. LEED™
A construction firms employed by the Air Force

Future projects beginning with the FY04 MILCON
and incorporate sustainable development using
each MAJCOM's projects should be selected as
using percentages of projects qualifying for
Force Sustainable Facilities Guide will provide tools
Future projects. The goal is to have all MILCON
achieving LEED™ certification. Submission is the
at MAJCOM discretion. Unspecified Minor
projects should also be considered when
policy does not apply to Host Nation or SAFE

will benefit the Air Force by creating high-
They are to be integrated into the development
central maintenance and care for the Air Force. The
but the domain to consider will now include
for long-term savings.

guidance documents and technical support to help
policy. AFCEE's environmental division shoulder the
management. AFCESA provides expertise for
cycle environmental costs, energy and water
issues. This policy will be incorporated in the
Construction Standards an Execution of Facility
Not requiring Air Force specific information/guidance
E or HQ AFCEE/CES.

The Civil Engineer
DCS/Installations & Logistics

Development
Development Concepts into Air Force Projects

**LEED = Leadership in Energy and Environmental Design

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Policy/Technical Guidance

- Air Force Sustainable Design and Development (SDD) Policy, 31 Jul 07
  - The SDD policy letter specifically calls out EPAct 2005 as a requirement for the MILCON program.
  - Highlighted LEED EA Credit 1 Optimize Energy Performance IAW EPAct 2005, the Federal MOU, and by extension EO 13423
  - Distinction between vertical, horizontal, utility and industrial projects

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Policy/Technical Guidance

- Requires documentation at key project milestones
- Allows 2% additional DD1391 line-item cost to achieve LEED Silver

- Training/emphasis on Sustainable programming and design
  - Over 430 trained using the AF Sustainable Design and Development Workshops
    - 8 completed with 6 more planned
  - Air Force Institute of Technology (AFIT)
    - Energy Managers course
    - Programmers course

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AF LEED projects

- Barksdale AFB, LA
  - Fitness Center, Bronze 2003
- Seymour Johnson AFB, NC
  - Crush Fire Satellite station, Certified 2007
- Edwards AFB, CA
  - Consolidated Support Faciltiy, Silver 2007
- Shaw AFB, SC
  - Library Facility, Silver 2008

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Policy/Technical Guidance

- Engineering Technical Letter (ETL) 08-13: Incorporating Sustainable Design and Development (SDD) and Facility Energy Attributes in the Air Force Construction Program
  - **Co-authored by AFCESA and AFCEE**
  - **Focuses on integrated approach at earliest point in project**
  - **Provides implementation guidance on definitions of project types, roles (including the LEED AP), documentation, reporting, and recommended methodologies and technologies**

Policy/Technical Guidance

- Other documents revised:
  - AFI 32-1023; *Design and Construction Standards and Execution of Facility Construction Projects* was revised to include the new design standards.
- Other documents being revised:
  - AFI 32-1021; *Planning and Programming Military Construction (MILCON) Projects*
  - AFI 32-1024; *Standard Facility Requirements*

Funding Energy Initiatives

- Energy Conservation Investment Program
  - DoD Wide Program
  - Specific MILCON Funds
- Energy POM Funds
  - FY08 - $14.7M (reduced from $20.8M)
  - FY09 - $31.9M requested
- FYDP10-15
  - $250M wedge each FY
  - $423M requirements submitted for FY10

Energy Investment Opportunities

- HVAC Efficiency Improvements
- Decentralize Central Heat Plants
- Green Roof
- EMCS/Controls Improvements
- Electrical Efficiency Improvements
- Water Conservation
- Whole Building Energy Improvements
- Ground Source Heat Pumps
- Demolition/Consolidation
- Recommissioning
- Energy Audits
- Paint Hangar Recirculation
- Infrared Heating
- Renewable Energy

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Project Example

Robin's AFB, GA, Paint Hangar Exhaust Recirculation Air Project

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Project Example: Aircraft Paint Hanger

- Paint hanger exhaust recirculation:
  - Goal: to design and construct the first air recirculation system for paint and de-paint operations in the Air Force at Robins Air Force Base, Georgia.
  - This facility is capable of fully enclosing the largest US made aircraft, the C-5 Galaxy.
  - It provides state-of-the-art environmental control systems to create controlled temperature and humidity conditions needed for application of modern aircraft coatings

Project Example: Aircraft Paint Hanger (Con't)

- Current Situation:
  - Design for 100% makeup air for ventilation of aircraft coatings process
  - Conditioning 2.5 million cubic feet per minute of outside air to strict temperature and humidity limits
  - The energy intensity to operate this facility in a 100% make-up air configuration would be 2,160,000 Btu/SF.
  - environmental concerns; increased particulate emission from the facility because of 100% exhaust air to atmosphere.

Project Example: Aircraft Paint Hanger (Con't)

- Solution
  - this innovative design operates at a ventilation rate of 60 ft/min and allows for 80 percent of the conditioned air to be recirculated and reused.
  - This reduces peak electrical demand for cooling from more than 6.3 MW down to 1.9 MW
  - Reduces peak gas demand for heating and humidification from nearly 153,000 to less than 47,000 cubic feet per hour.

Project Example: Aircraft Paint Hanger (Con't)

- Solution (Con't)
  - The use of the air recirculation technology equates to a 76% energy reduction of 328,251,000,000 Btu's saved compared to conventional paint hanger usage and will save more than $2.6 million per year—equivalent to painting more than one C-5 aircraft for free.
- Other savings include:
  - Decreasing the required chiller and boiler capacities for the ER system lowered the construction cost by $10,000,000.

Project Example: Aircraft Paint Hanger (Con't)

- The new paint facility provides optimum conditions for application and curing of spray coatings;
  - reduces heat stress to workers during Georgia summers
  - complies with environmental and safety regulations; and decreases net particulate emission from the facility because exhaust air is filtered an average of five times before it is released.

Project Example: Aircraft Paint Hanger (Con't)

- Each of 16 fans (left) returns about 145,000–160,000 cfm to the front of the hangar bays, while each of four plenum areas (right) delivers between 360,000 and 400,000 cfm of conditioned air for reuse .

Project Example: Aircraft Paint Hanger (Con't)

- Under design or construction:
  - Initial transition to Elmendorf's 2005 C-17 paint hangar (MILCON);
  - F-22 CRF at Elmendorf AFB, AK;
  - ECIP project to retrofit a second C-5 paint hangar at Robins AFB, GA;
  - SR&M project to retrofit a paint hangar at Tyndall AFB, FL.
  - AF has over 50 existing paint hangers that will be phased in for this retrofit (FY10 thru FY15)
- Energy reduction using this technology is est to be 3-5% of the total AF energy reduction goal.

Summary

- Long Term Strategic vision
  - Sustainable- LEED
  - Tech specific
- Policy/technical guidance
- Training programs

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Would you like to know more about this session?

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