Integrating & Maintaining Sustainable Buildings in the DoD

Col Bart Barnhart
ODUSD(I&E)
May 9, 2011
**Report Documentation Page**

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<thead>
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<th>1. REPORT DATE</th>
<th>2. REPORT TYPE</th>
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<th>12. DISTRIBUTION/AVAILABILITY STATEMENT</th>
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<th>13. SUPPLEMENTARY NOTES</th>
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<tr>
<td>Presented at the NDIA Environment, Energy Security &amp; Sustainability (E2S2) Symposium &amp; Exhibition held 9-12 May 2011 in New Orleans, LA.</td>
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Standard Form 298 (Rev. 8-98)  Prescribed by ANSI Std Z39-18
Integrating & Maintaining Sustainable Buildings in the DoD

- Driving Forces
- Green Building Requirements
- Challenges
Integrating & Maintaining Sustainable Buildings in the DoD

DoD’s building inventory is the key to Federal government sustainability

What does that mean, how can I make that statement ???

Let’s first take a look at how the Federal government sees sustainability
Driving Forces
Federal

- Executive Order 13514
  - President’s vision: ... create clean energy economy ... promote energy security ... safeguard environment ...
  - Centerpiece goal: Reduce GHG emissions (3 goals)
  - Other goals: High performance bldgs, water efficiency, energy efficiency, renewable energy, waste reduction, EMS, master planning, sustainable acquisition, electronics stewardship

- Energy Independence & Security Act (EISA) of 2007
  - §431 – Reduce energy use 30% by 2015 (2005 baseline)
  - §433 – Fossil fuel energy use eliminated by 2030

- Energy Policy Act (EPAct) of 2005
  - §109 – Bldg energy performance 30% better than ASHRAE
  - §203 – Renewable energy targets – 7.5% by FY2013

GHG emissions reduction and energy efficiency are focus areas
DoD’s FY 2010 OMB Scorecard

<table>
<thead>
<tr>
<th>Department of Defense</th>
<th>FY2010 OMB Scorecard on Sustainability/Energy</th>
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<tbody>
<tr>
<td><strong>Scope 1 &amp; 2 GHG Emission Reduction Target</strong></td>
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<tr>
<td>Submitted comprehensive inventory as 2008 baseline for Scope 1 &amp; 2 GHG Reduction Target of 34% by 2020.</td>
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<td>Score: GREEN</td>
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<tr>
<td><strong>Scope 3 GHG Emission Reduction Target</strong></td>
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<tr>
<td>Submitted comprehensive inventory as 2008 baseline for Scope 3 GHG Reduction Target of 13.5% by 2020.</td>
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<td>Score: GREEN</td>
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<tr>
<td><strong>Reduction in Energy Intensity</strong></td>
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<tr>
<td>Reduction in energy intensity in goal-subject facilities compared with 2003: 11.2% and not on track.</td>
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<td>Score: RED</td>
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<tr>
<td><strong>Use of Renewable Energy</strong></td>
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<td>Use of renewable energy as a percent of facility electricity use: 11.3% from any renewable source (including thermal)</td>
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<td>Score: YELLOW</td>
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<td><strong>Reduction in Potable Water Intensity</strong></td>
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<tr>
<td>Reduction in potable water intensity compared with 2007: 12.9% and on track for 20% in 2020.</td>
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<td>Score: GREEN</td>
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<td><strong>Reduction in Fleet Petroleum Use</strong></td>
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<td>Reduction in fleet petroleum use compared to 2005: 6.6% and not on track.</td>
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<td>Score: RED</td>
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<td><strong>Green Buildings</strong></td>
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<td>Sustainable green buildings: 0.00% of buildings sustainable. 0.40% GSF of inventory sustainable</td>
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1 Agency status on achieving GHG metrics in FY2010 will be assessed in July 2011.
Driving Forces

- **U.S. Energy Use – GHG Emissions Relationship**
  - Building Sector consumes 40% of all energy in the U.S.
  - Industrial Sector – 32%, Transportation Sector – 28%

- Building Sector energy use results in ~54% of U.S. GHG emissions

Driving Forces

2010 DoD Overall Energy Consumption

- **Operational**
  - $11.20B, 75%
  - 598 TBTU, 74%

- **Facilities**
  - $3.76B, 25%
  - 221 TBTU, 26%

This is ~80% of energy used by the Federal government, and ~1% of all energy consumed in the U.S.

Overall DoD Energy Cost
- $11.20B Operational
- $3.76B Facilities
- $0.25B Fleet vehicles
- $15.21B TOTAL

Facilities Energy Consumption

- **Electricity** 46.5%
- **Natural Gas** 33.2%
- **Steam** 3.0%
- **Fuel Oil** 8.4%
- **LPG** 1.9%

Facilities Energy Cost

- **Electricity** 68.6%
- **Natural Gas** 15.3%
- **Steam** 3.5%
- **Fuel Oil** 9.2%
- **LPG** 1.3%

Source: 2010 DoD Annual Energy Management Report (not officially signed out as of this date)
Driving Forces

- So, DoD uses a lot of energy in its buildings, but how much in comparison with the rest of the Federal government???


**Nearly twice as much as the next 4 largest users combined**

So, DoD’s building inventory really **IS** (arguably) the key to Federal government sustainability
QDR and Defense Planning Guidance (DPG) define DoD future focus & funding priorities
- Increase energy security
- Increase facility energy efficiency
- Increase water use efficiency
- Reduce “fully burdened cost of fuel” (FBCF)
  - Key Performance Parameter for energy efficiency

The QDR sets key priorities for capability development & investment, and communicates SecDef’s intent for the next several years

The DPG is SecDef’s goals, priorities, and objectives, including fiscal constraints for development of budget requirements by the Military Departments & Defense Agencies
Driving Forces
DoD Mission Linkage

- Sustainable buildings increase energy security, enhance operational capability
  - Energy efficient installation + suitable renewable energy generation = less grid dependency = more energy security
    - Energy security assures warfighter reachback
  - Energy efficient installation + suitable renewable energy generation = reduced energy bill = more $ available for “tooth”
    - More $ available for “tooth” = enhanced operational capability

- Sustainable systems reduce DoD operational risk
  - Low fuel appetite = Fewer convoys; Fewer convoys = Less operational risk
  - Fully burdened cost of fuel (FBCF) affects funds available for operations
    - Cost to get fuel to fight; up to $400/gal
    - Iraq, May 08; 44 tankers, 220Kgal lost to insurgent attacks
  - Energy efficiency Key Performance Parameter will reduce FBCF over time
- EO 13514 required federal agencies to write a **Strategic Sustainability Performance Plan**
  - DoD’s SSPP publicly released August 26, 2010
  - Updated annually, next update due in June 2011
- SSPP consolidates EO, EISA, EPAct rqmts
  - SSPP features 21 performance-based sub-goals
  - Most goals were tracked pre-EO 13514

- DoD Sustainable Buildings Policy, Oct 2010
  - Build to LEED-Silver (or equivalent) **and** Guiding Principles
  - 40% of LEED points from energy/water
Green Building Requirements
EO 13514 – driven

- Reduce GHG emissions (34% by end of FY20)
  - Reduce facility energy consumption 37.5% by end of FY20 (2003 baseline)

- 15% of DoD bldgs (>5ksf) conform to Guiding Principles (GP’s) by FY15
  - 75k bldgs x 15% = 11.4k bldgs
  - Bldg must meet all five GP’s to conform
  - Pushes whole bldg renovations

- EO directs continual progress to GP conformance for 100% of DoD bldgs
  - 307k DoD bldgs – 75% of federal bldg inventory

- Beginning in 2020, all newly planned Federal bldgs designed for net-zero energy consumption

AF Weather Agency; Offutt AFB, NE
LEED Gold Certified

NAVFAC ESC; Port Hueneme, CA
LEED Silver Certified
Green Building Requirements
The GP’s and LEED

The 5 GP’s
• Employ Integrated Design Principles
• Optimize Energy Performance
• Protect and Conserve Water
• Enhance Indoor Environmental Quality
• Reduce Environmental Impact of Materials

LEED categories
• Sustainable Sites
• Energy and Atmosphere
• Water Efficiency
• Indoor Environmental Quality
• Materials and Resources

The GP’s and LEED … similar, only different
Meeting GP’s not enough to earn a LEED rating; earning a LEED rating does not make you GP compliant
DoD will do BOTH (GP’s & LEED) for new construction
• Caveat: DoD *does not* set a standard for % of LEED certified buildings

*There is no mention of LEED in Federal guidance!!*

GP’s – Guiding Principles; LEED – Leadership in Energy and Environmental Design
Additional cost to build green: Evidence from 146 green buildings

- Median in the data set: <2% added cost
- Public misperception: 17% added cost

*2007 opinion survey by World Business Council for Sustainable Development

Source: Greg Kats, Capital – E, May 2010
Challenges

- Spend a little more up front to save a lot more later
- Mil Depts funding sustainment at 80-90% level
  - Tough to operate buildings at designed performance parameters
- Training our “sustainability practitioners”
  - Keep building systems at peak performance, or life-cycle cost savings estimates do not happen
- Start making Net-Zero energy buildings a reality NOW !!!
Questions

Sustainability

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