

SUSTAINABILITY TRACK

Session 3



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Army Approach to ASHRAE 90.1

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Overview



- Requirements
- Strategy
- Policy/Technical Guidance
- Implementation
- What is Coming

Requirements



- EPACT 05
- “Guiding Principals” MOU
- DOE Rule
- Executive Order 13423
- DepSecDef Memo

EPACT 2005



- “...The Secretary shall establish, by rule, revised Federal building energy efficiency performance standards that require that - if life-cycle cost-effective for new Federal buildings - 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”



“Guiding Principals” MOU

- Signed by 19 Federal Agencies
- Requires
 - Collaborative, integrated design process
 - Whole Building Commissioning
 - Comply with EPEAT 05 goal of energy consumption 30% better than ASHRAE 90.1
 - Measurement & Verification



DOE New Rule

- All new facilities 30% better energy consumption than ASHRAE 90.1-2004 facility
- Requires LCC analysis to show 30% or better savings is cost-effective
- Does not prohibit nor require greater than 30% savings even if achievable and life cycle cost-effective
- If a 30 % reduction not achievable, must try for less energy savings in LCC effective manner but must continue to comply with applicable standard



EO 13423

- It is the policy of the United States that Federal agencies conduct their environmental, transportation, and energy-related activities under the law in support of their respective missions in an environmentally, economically and fiscally sound, integrated continuously improving, efficient, and sustainable manner.
- Ensure that new Federal Construction complies with the “Guiding Principals...” MOU



Deputy Secretary of Memo of 16 Feb 2007

- “...the Department... should continue to set an example by aggressively implementing the guidance outlined in the EO” (referring to 13423)



Army Energy Strategy

The Army Energy Strategy for Installations is based on five major initiatives supported by specific actions:

- Eliminate energy waste in existing facilities
- Increase energy efficiency in renovation and new construction
- Reduce dependence on fossil fuels
- Conserve water resources
- Improve energy security



Policy/Technical Guidance

- Sustainable Design and Development Policy Update – Life-Cycle Costs, DASA (I&H) memo of 27 Apr 07
 - The SDD policy letter specifically calls out EAct 2005 as a requirement for the MILCON program.
 - Highlighted LEED EA Credit 1 Optimize Energy Performance IAW EAct 2005, the Federal MOU, and by extension EO 13423
 - Allows 2% additional 1391 “SDD & EAct05” line-item cost to achieve LEED Silver, EAct05 and EO13423 if actual costs are undetermined at time of programming
 - If determined through LCC analysis that 30% reduction is not cost-effective, successive LCC analysis will be completed at 5% successively lower energy consumption levels to determine the appropriate energy consumption reduction



Policy/Technical Guidance

- Engineering and Construction Bulletin (ECB) 2008-1: Sustainable Design and Development (SDD), 28 Jan 2008
 - Announces publication of the detailed Army Implementation Guide for SDD Policy
 - Notifies that all Army employees are members of USGBC and may take advantage of membership
 - Gives POCs at USACE



Policy/Technical Guidance

- USACE Army LEED Implementation Guide, 15 Jan 2008
 - includes the basic Army Policy for implementing SDD on all Army projects
 - revises requirements for renovation and repair
 - revises definition of exempt facilities and climate controlled facilities
 - conveys Center of Standardization Multiple Contractor project requirements
 - clarifies reporting requirements, including formal endorsements at Prescribed Reporting Points



Training

- USACE EPACT 2005 Energy Workshop
 - EPACT 2005
 - ASHRAE 90.1-2004
 - Army Path to Meet EPACT 2005 for New Construction



Army EPACT05 Study

- Funded by OACSIM
- Performed by partnership of HQ USACE, Corps District COSs, ERDC/CERL, NREL, and ASHRAE
- Goals:
 - To develop specific Army RFP guidance on compliance with EPACT05 for Tier 1 Army facilities
 - To ensure effective and easy compliance with EPACT05 in all Army MILCON projects



Army EPACT05 Study

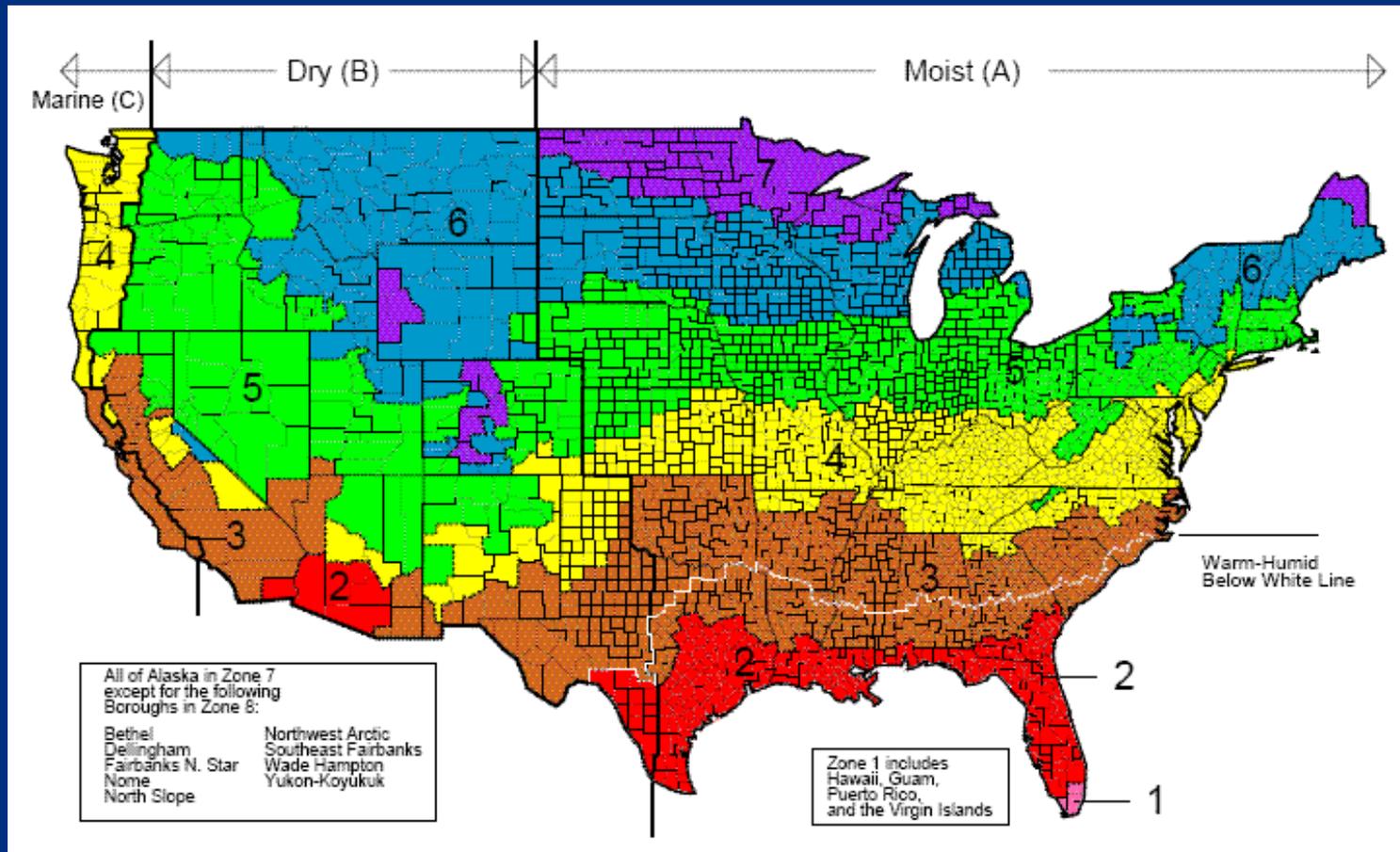
- Develop “Design Energy Targets” and “Prescriptive Design Guides” to achieve 30% savings compared to ASHRAE 90.1-2004 in fifteen climate zones for:
 - Tactical Equipment Maintenance Facility (TEMF)
 - Unaccompanied Enlisted Personnel Housing (UEPH) Barracks (1+1)
 - Training Barracks
 - Battalion Headquarters (BHQ)
 - Dining Facilities (DFAC)
 - Child Development Centers (CDC)
 - Company Operations Facilities (COF)
 - Reserve Centers



Army EPACT05 Study

- Based on site energy consumption NOT energy cost
- Companion first cost study being performed by HQ USACE and COSs

DOE U.S. Climate Zones





Locations Modeled

Climate Zone	City	HDD (Base 65°F)	CDD (base 50°F)
1A	Miami, FL	200	9474
2A	Houston, TX	1599	6876
2B	Phoenix, AZ	1350	8425
3A	Memphis, TN	3082	5467
3B	El Paso, TX	2708	5488
3C	San Francisco, CA	3016	2883
4A	Baltimore, MD	4707	3709
4B	Albuquerque, NM	4425	3908
4C	Seattle, WA	4908	1823
5A	Chicago, IL	6536	2941
5B	Colorado Springs, CO	6415	2312
6A	Burlington, VT	7771	2228
6B	Helena, MT	7699	1841
7A	Duluth, MN	9818	1536
8A	Fairbanks, AK	13940	1040



EPACT05 Study Results

- Table of Design Energy Targets that specify the energy consumption (in BTU/sf-yr) to achieve 30% reduction compared to a 90.1-2004 design for each facility type and location
- A table (design guide) showing one prescriptive path for achieving at least 30% energy savings in a LCC effective manner for each facility type and location
- MT RFP language to implement prescriptive design



Two New Compliance Paths for a Specific MILCON Project

- Perform energy and LCC analysis for specific custom design and show that the specified design energy target is achieved in LCC effective manner

OR

- Follow prescriptive table for the building type and location and no further analyses required



TEMF Design Energy Targets

Climate Zone	City	With Plug Loads		Without Plug Loads	
		Baseline Energy Budget (kBtu/ft ²)	Target Energy Budget (kBtu/ft ²)	Baseline Energy Budget (kBtu/ft ²)	Target Energy Budget (kBtu/ft ²)
1A	Miami, FL	43	30	36	25
2A	Houston, TX	52	37	45	32
2B	Phoenix, AZ	49	34	42	29
3A	Memphis, TN	63	44	56	39
3B	El Paso, TX	54	38	47	33
3C	San Francisco, CA	50	35	43	30
4A	Baltimore, MD	82	57	75	52
4B	Albuquerque, NM	68	48	61	43
4C	Seattle, WA	71	50	64	45
5A	Chicago, IL	100	70	93	65
5B	Colorado Springs, CO	87	61	80	56
6A	Burlington, VT	115	80	108	75
6B	Helena, MT	106	74	99	69
7A	Duluth, MN	141	99	134	94
8A	Fairbanks, AK	214	150	207	145



TEMF Energy Conservation Measures



ECM	Description
Envelope	Wall and roof insulation for metal buildings and fenestration from the ASHRAE Small Office AEDG (ASHRAE 2004b); insulated overhead doors (R-4), high roof reflectivity for climate zones 1-5 (0.65)
Lower lighting power density (LPD) and daylighting	Lower LPD in office (0.9 W/ft^2) and consolidated bench (1.3 W/ft^2), daylighting in repair bays, office, and vehicle corridor
High efficiency HVAC equipment	increased efficiency of the baseline HVAC system to 3.52 COP, 0.9 E_t , and efficient fans (see Table Error! Bookmark not defined.)
Radiant floor heating	Radiant floor heating for the first floor. Requires R-10 (R-15 for climate zone 8) insulation under slab.
Transpired Solar Collector	Transpired solar collector on repair bays
Energy recovery	energy recovery on repair bay, vehicle corridor, and consolidated bench exhaust systems. Assumed on sensible heat recovery at 70% to 75% effectiveness.
Reduced exhaust in repair bays, vehicle corridor, and consolidated bench	Reduced exhaust requirements to 0.75 cfm/ft^2



Recommended Technologies

- HVAC Efficiency Improvements
- Prefabricated Vacuum Insulated Panels
- Cool Roof
- Improved Airtightness
- Insulation
- Windows
- Dedicated Outdoor Air Systems (DOAS)
- Radiant Heating/Cooling
- Grey Water Heat Recovery - showers
- Transpired Solar Wall
- Daylighting
- Solar Load Reduction
- Ground Source Heat Pumps





ASHRAE 90.1-2007

- Major changes include:
 - Demand controlled ventilation requirements
 - Boiler efficiency improvements
 - Increased fan power limitations
 - More stringent opaque elements
 - More stringent fenestration elements
- About 10% more stringent than 90.1-2004



ASHRAE 90.1-2010

- Goal of 30% more stringent than 90.1-2004
- Timeline:
 - out no later than December 2010
 - DOE determination no later than December 2011
 - EPACK05 deadline for State adoption no later than December 2013



EISA 07

- Reduction of fossil fuel-generated energy
 - 55% by 2010
 - 100% by 2030
- At least 30% of hot water demand in new construction and major renovations to be met using solar hot water heaters



Takeaway Messages

- ASHRAE 90.1 is a moving target
- Ever increasing stringency
- Train your practitioners
- Make it easier for contractors to hit targets



Would you like to know more about this session?

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Don't forget to fill out and drop off your session evaluations.