



Energy Management Future Imperative for Sustainable Development

Energy 2003

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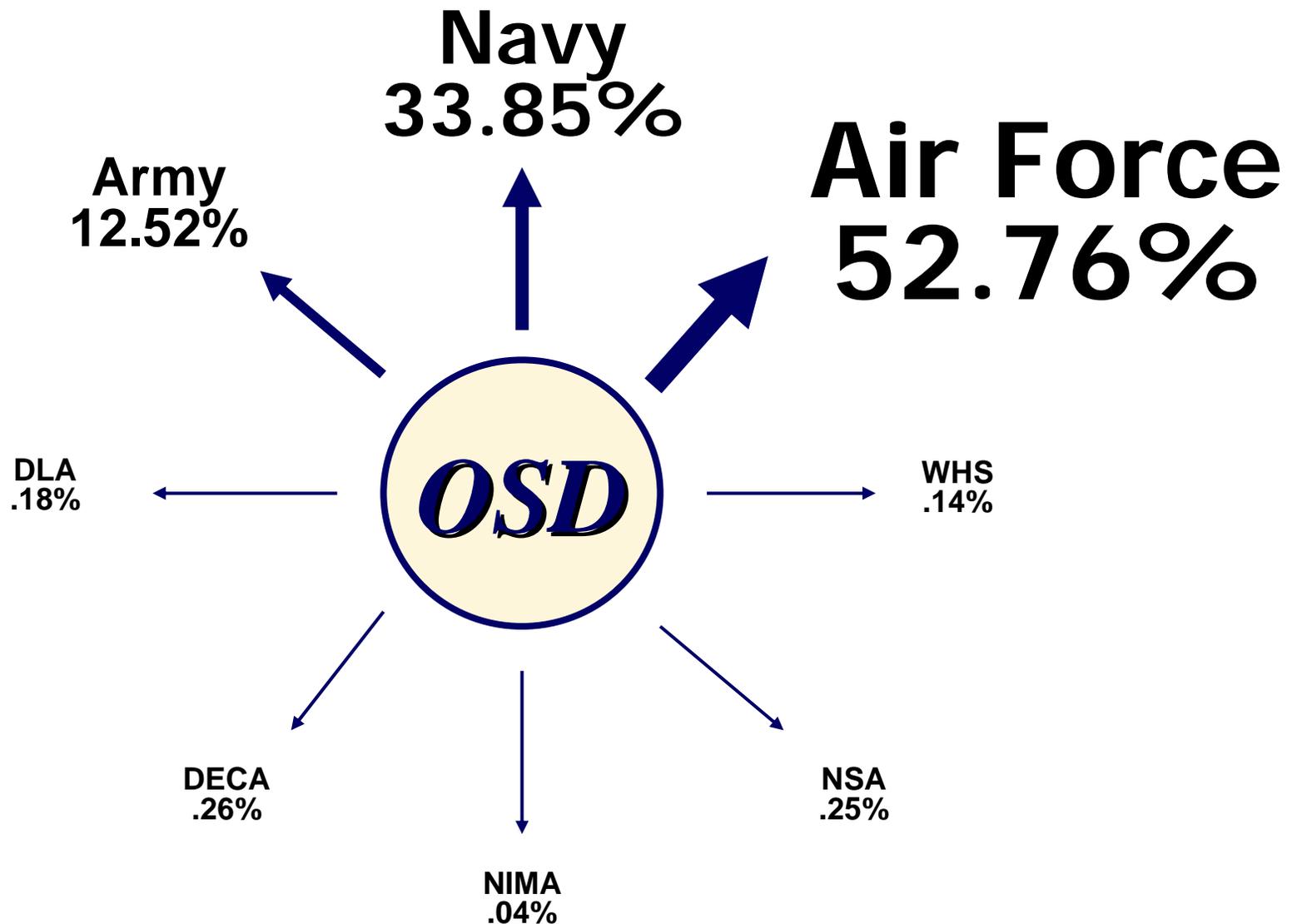
Perspectives

DoD Infrastructure

- ◆ **Value** **\$600 B**
- ◆ **Buildings and structures** **621,850**
- ◆ **Square Miles** **46,425**

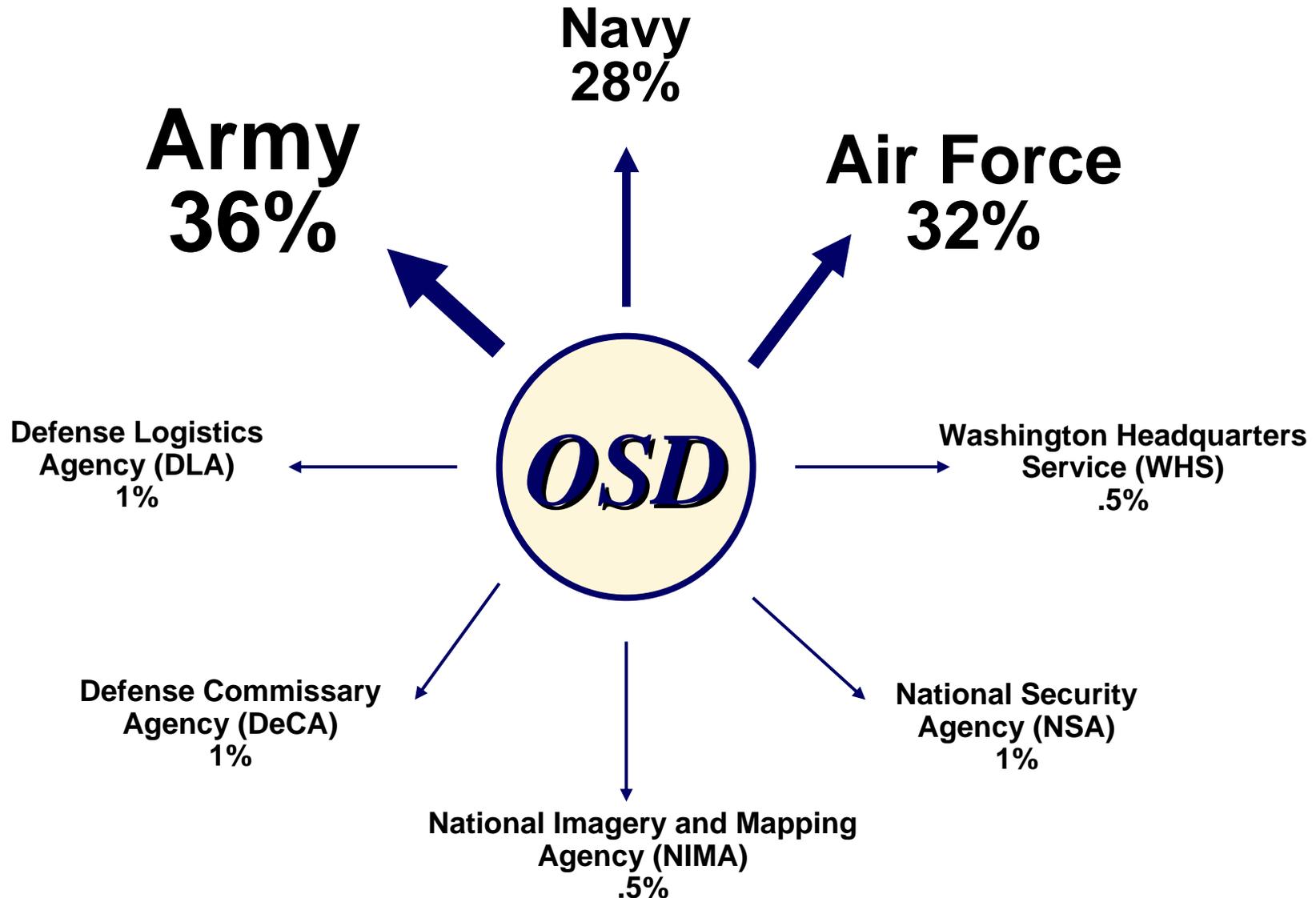


Military Services and Defense Agencies (Total)





Military Services and Defense Agencies (Buildings)





DOD Statistics

Consumption \$ 6.8 B

	<u>BTU % USED</u>
◆ Vehicles/Ships	70%
◆ Buildings	25%
◆ Industrial	4%



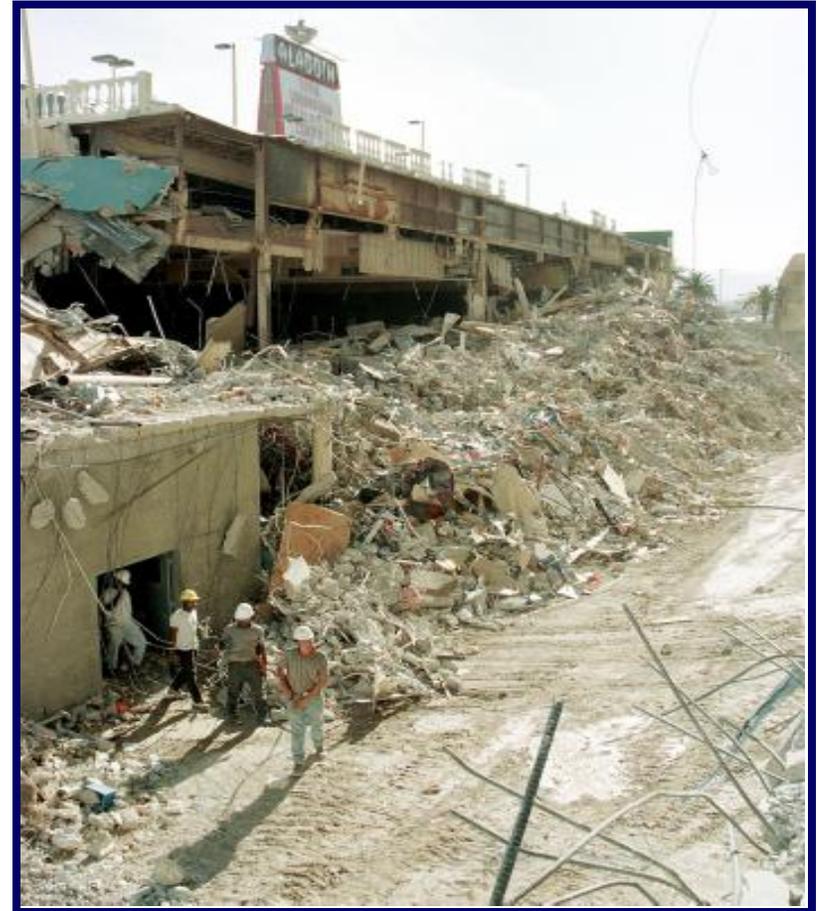
30-40% of Energy Use and Atmospheric Emissions





35-40% of the Municipal Solid Waste Stream

- ◆ **150 million tons of construction and demolition waste**
- ◆ **220 million tons for all other municipal solid waste**





25-30% of Materials and Wood Use





Sustainable Design – The Beginning

1970s

- * **First major legislation to address Federal energy management**
- * **Reduction goals put in place**

1980s

- * **Congressional support intensifies**
- * **Regulations allowed alternative funding (i.e. shared energy savings contracts)**
- * **Implemented incentives for energy reduction**
- * **Reduction goals intensify**
- * **Environmental regulations imposed on Federal buildings**

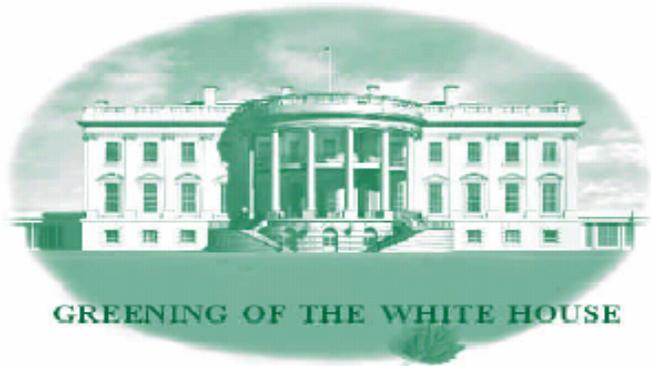
1990s

- * **Performance goals for Federal buildings**
- * **Extended reduction goals**
- * **Sustainable design begins**
- * **Pollution prevention becomes major issue**



DoD Took Lead in Sustainable Development

DOE/EE-0000



**Six
Year
Report**

November 1999

**Energy Efficient/Environmentally Sensitive
DoD Showcase Facility:
The Pentagon, A National Historic Landmark**



October 31 – November 2, 1994



Naval Facilities Engineering Command Sustainable Development Pilot Projects

PROJECT				Change in Est. Construct. Cost	Est. Annual Savings *	Pay Back
FY-96	P-002T	\$19.9 mil	Renovate Quadrangle Buildings Washington Navy Yard, DC	+ \$95,000	\$130,000	Less than 1 year
FY-96	P-247	\$ 4.1 mil	Physical Fitness center MCB Camp Pendleton, CA	- \$180,000	\$6,300	Immediate Savings
FY-96	HC/R-3-94	\$14.8 mil	Whole House Renovations (450 units) NAVSTA Mayport, FL	+1000/unit	\$250/unit	Less than 5 years
FY-96A	P-758	\$ 7.8 mil	BEQ/Mess Hall NSGA Sugar Grove, WV	- \$100,000	\$1,600	Immediate Savings
FY-94A	P-488	\$ 9.0 mil	BEQ NCBC, Port Hueneme, CA	- \$142,000	\$1,600	Immediate Savings
FY-97	H-321	\$34.6 mil	276 Housing Units NAS Lemoore, CA	No cost Increase	\$44,000	Immediate Savings
FY-96A	H-374	\$ 6.2 mil	23 Housing Units/Multi-Purpose Facility NSGA Sugar Grove, WV	Project withdrawn		
FY-97	P-626 P-641 P-646	\$60.1 mil	BEQ, NTC Great Lakes, IL	- \$600,000	\$110,000	Immediate Savings

18 Sep 1998

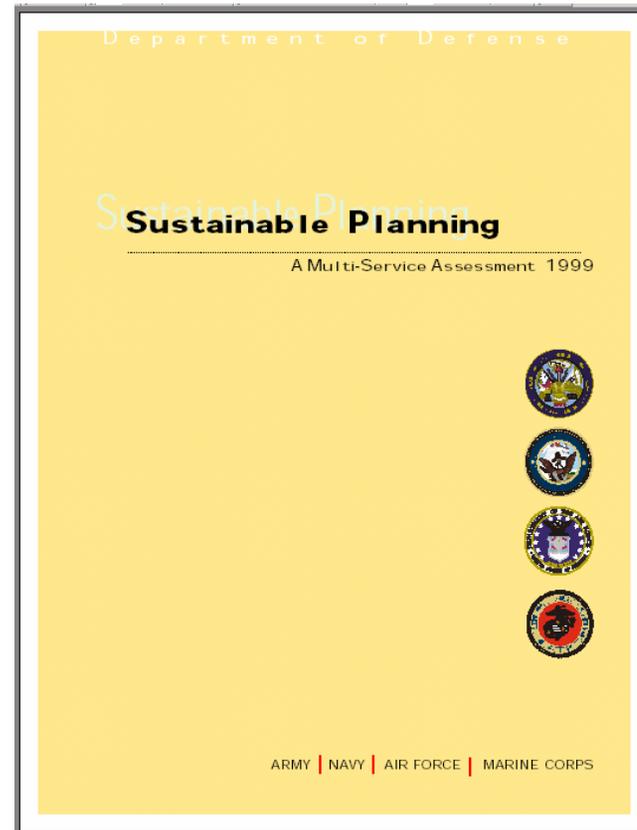
* Energy savings only. Maintenance, repair, and other savings not included.



Guidance

SUSTAINABLE PLANNING: A Multi-Service Assessment 1999

Department of Defense





New Age of Energy Security

A Time for Transformation

Conclusions

- ◆ DoD - long step recognizing importance of U&E
- ◆ Crucial backbone
- ◆ Proactive
- ◆ Need your input / help / innovations
- ◆ To get to the next level with energy / energy security, we must do it together

Advantages

- ◆ Achieve through comprehensive energy strategy
 - Infrastructure modernization
 - Energy source flexibility
 - Energy waste reduction
- ◆ Proactive
 - Risks → Our management
 - Mission accomplishment

Challenges / Drawbacks

- ◆ New territory to explore
- ◆ More risky -- from inexperience
- ◆ Requires investment

Summary

- ◆ Energy Reliability = Energy Security
- ◆ Energy Reliability supports Readiness
- ◆ We need your partnership

Plan/Proposal

- ◆ Modernize the infrastructure
 - ◆ Invest in
 - Energy conservation
 - Energy efficiencies
 - Demand reductions
 - ◆ Exploit flexible energy sources
- Focus on leadership / execution / results

Introduction

- ◆ Statistics
 - DoD infrastructure
 - DoD commodity costs
 - DoD size
- ◆ VP's study/report
- ◆ WIIFT
 - No longer just throwing our weight around – now demonstrating
 - Leadership
 - Execution
 - Results

Problem

- ◆ Old school
 - Manage consumption
 - Manage goals
 - React to industry
- ◆ Stovepipe treatment

↓
BUT

- Will not lead us to the future
- Will not leave us much of a legacy to enjoy
 - Will fall behind in transformation

Facts at Hand

- ◆ CA energy crisis
- ◆ Poor state of infrastructure
- ◆ Critical infrastructure
- ◆ Poor information management
- ◆ Energy source dependence



Utilities and Energy Management

Vision

**100 %
reliability
of utility
services
to the
Warfighter**



Utilities and Energy Management

Grand Challenges

Modernize Infrastructure

Increase utility and energy conservation and demand reduction

Improve energy flexibility

Mission

Ensure that the DoD utility infrastructure is secure, safe, reliable and efficient, that energy and water commodities are procured effectively and efficiently, and that the components maximize energy and water conservation efforts.

Vision

100 % reliability of utility services to the Warfighter

DoD ENERGY POLICY

Initiatives

Actions	Strategies	Goals	Grand Challenges	Mission	Vision
<ul style="list-style-type: none"> Issue guidance Demonstrate benefit of program High %age of privatization Technology (better data) Right people involved 	<ul style="list-style-type: none"> Align Services with working group/guidance Ensure proficiency in carrying out program Execute program efficiently and effectively 	<p>Successfully Complete utility privatization by 2005</p>	<p>Modernize Infrastructure</p>	<p>Ensure that the DoD utility infrastructure is secure, safe, reliable and efficient, that energy and Water commodities are procured effectively and efficiently, and that the components maximize energy and water conservation efforts.</p>	<p>100 % reliability of utility services to the Warfighter</p>
<p>Implement appropriate Distributive Energy Resources</p>	<p>Implement conservation measures and reduce cost</p>	<p>Bring all systems to C2 level</p>	<p>Increase utility and energy conservation and demand reduction</p>		
<p>Embrace Sustainable Design</p> <ul style="list-style-type: none"> LCC Analysis W B Design Guide 	<p>Achieve / increase energy awareness</p>	<p>Sound Stewardship In management of systems</p>	<p>Improve energy flexibility</p>		
<p>Enhance recognition</p> <ul style="list-style-type: none"> Showcase facilities Awards Training 		<p>Expand use of renewable energy</p>	<p>Reduce energy consumption</p>		
<p>Establish metering policy</p> <ul style="list-style-type: none"> Benchmarking Accuracy in accounting/billing Energy Star Buildings 	<p>Reduce greenhouse gases</p>				
<p>Promote renewable energy</p> <ul style="list-style-type: none"> Purchases Self-generated 	<p>Ensure DoD standards Focus on going from utility privatization to utility management</p>		<p>Expand use of renewable energy</p>		
<p>Pursue energy funding</p> <ul style="list-style-type: none"> Congressional appropriations Private sector investments 	<p>Improve Energy</p> <ul style="list-style-type: none"> Efficiency Development Investment 				
<p>Increase efficiency products use</p> <ul style="list-style-type: none"> Energy Star Alternative fuels 					



Sustainable Development

- ◆ **Energy consumption and atmospheric emissions**
- ◆ **Environmentally preferable products**
- ◆ **Life-cycle cost analysis**
- ◆ **Indoor air quality**



Sustainable Design Costs Reasonable

- ◆ **No additional first-cost**
- ◆ **Advanced energy efficiency for minimum investment**
- ◆ **Reduced site preparation & landscaping**
- ◆ **Lower construction waste costs**
- ◆ **Better design reduces change orders**



Benefits of Sustainable Design

Reduced Operating Costs

- ◆ **Lower Utility costs:
\$0.50-\$0.60 per square foot
vs. \$1.00-\$1.50**
- ◆ **Reduced maintenance costs**

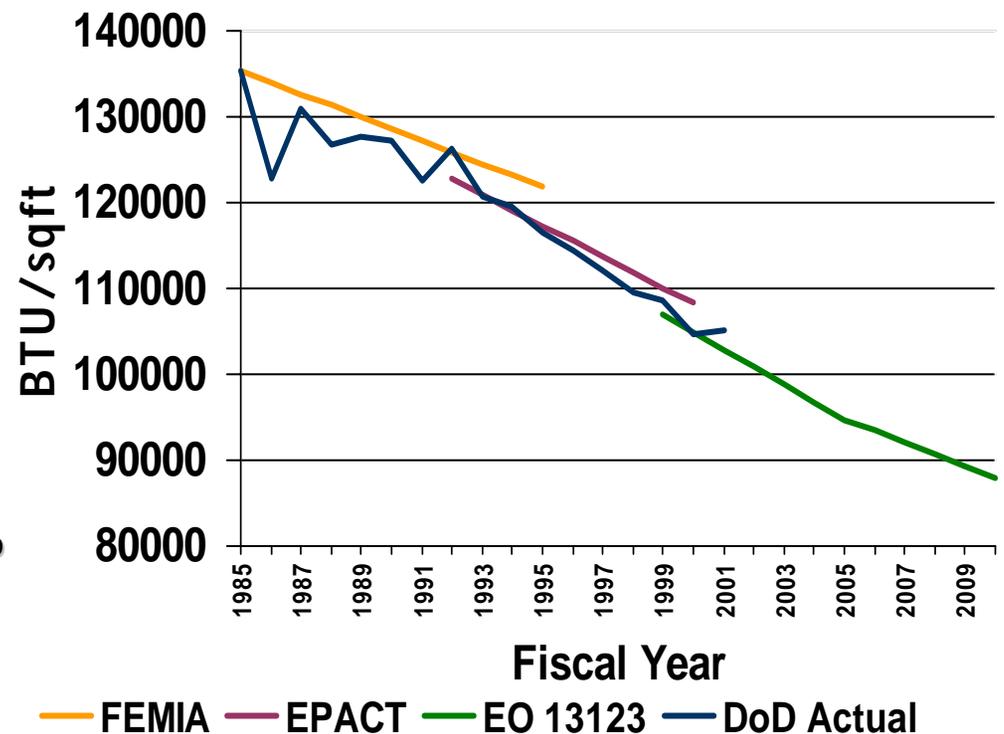


Energy Performance

DoD Reduction goals

- ◆ Building energy use per GSF down 35% from 1985 to 2010
- ◆ Industrial energy use per GSF down 25% from 1990 to 2010
- ◆ Cut greenhouse gas emissions by 30% from 1990 to 2010
- ◆ By FY01 DoD has reduced Building energy use by 23% since 1985
- ◆ By FY01 DoD has reduced Industrial energy use by 20% since 1990

Standard Facility Reduction Goals vs Actual Usage





OSD Statistics



By FY02 DoD had reduced building energy use by 25%, since 1985

Consumption \$ 6.8 B

	<u>BTU % USED</u>
Vehicles/Ships	70%
Buildings	25%
Industrial	4%

Goals

- Building energy per GSF
 - ↓ 30% by 2005; 35% by 2010
- Industrial / lab energy
 - ↓ 20% by 2005; 25% by 2010

DoD Performance

- 25.4%
- 24.5%



Performance Awards

- Presidential DoD received 3 of 5 awards
- FEMP Awards DoD received 29 of 54 awards (Army 13; DON 12; AF 4)



Traditional Design

Typical planning and design process relies on the expertise of specialists who work somewhat isolated to focus on the program needs during the development of a building design.

- ◆ **Linear process from architect to engineering consultants.**
- ◆ **Periodic design meetings to coordinate efforts.**



Whole Building Design

A successful "Whole Buildings" design is a solution that is greater than the sum of its parts. The fundamental challenge of 'whole buildings' design is to understand that all building systems are interdependent.

- ◆ **Looks at how materials, systems and products of a building connect and overlap.**
- ◆ **Looks at how the building and its systems can be integrated with supporting systems on its site and in its community.**



Whole Building Design

- ◆ **The fundamental challenge of 'whole buildings' design is to understand that all building systems are interdependent.**
- ◆ **Through a systematic analysis of these interdependencies, a much more efficient and cost-effective building can be produced.**



Whole Building Design Guide

WBDG

<http://www.wbdg.org>

Your Complete
Internet Resource to
Building-Related
Design Guidance,
Criteria, and
Technology

The screenshot shows the homepage of the Whole Building Design Guide (WBDG) website. The browser address bar displays <http://www.wbdg.org/>. The page features a navigation menu on the left with categories: News, Events & Training; Design Guidance; Project Management; and Mandates / References. Below this is a section for 'Browse the libraries of' with logos for CONSTRUCTION CRITERIA ASE and IHS. The main content area has a header 'Welcome to the Whole Building Design Guide' and a sub-header 'A Building Professional's Gateway to Up-to-Date Information on Integrated, 'Whole Building' Design Techniques and Technologies'. A 'WBDG Focus On' section highlights 'SECURITY' with a brief description and a list of design objectives: Provide Security for Building Occupants and Assets; Balancing Security/Safety & Sustainability Objectives; Glazing Hazard Mitigation; Security and Safety in Laboratories; and Threat/Vulnerability Assessments & Risk Analysis. A 'The "Whole Building" Design Approach' section explains the goal of creating a successful high-performance building. The right sidebar lists 'Participating Agencies' with logos for the Department of Defense, National Institute of Building Sciences, GSA, NASA, and others. The footer includes contact information for the National Institute of Building Sciences (NIBS) and a disclaimer.