

Headquarters U.S. Air Force

Integrity - Service - Excellence

Sustainability and Green Remediation The Air Force Civil Engineering Perspective

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Deputy Director
AFCEE**

**Year of the Air Force
Family**



15 June 2010

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- **Implementing Current Directives**
 - **New Facilities**
 - **Existing Facilities**
- **Holistic Approach**
 - **Sustainable Communities**
- **Green & Sustainable Cleanup**
- **Success Stories**
- **Opportunities**

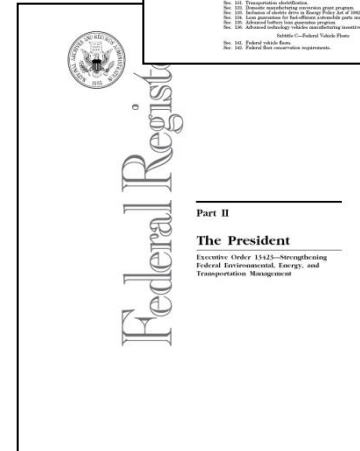
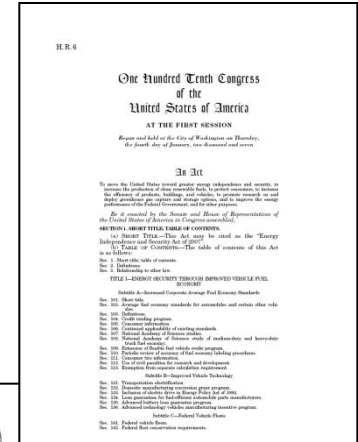


... necessary components for success!



Current Directives

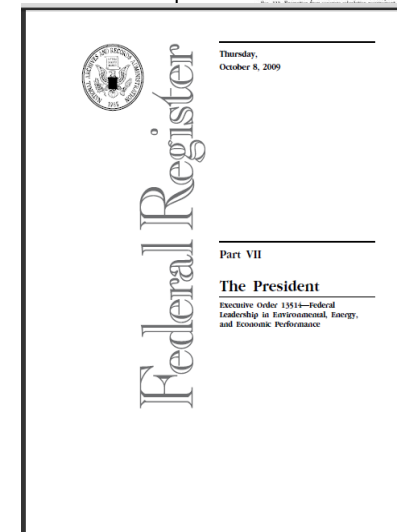
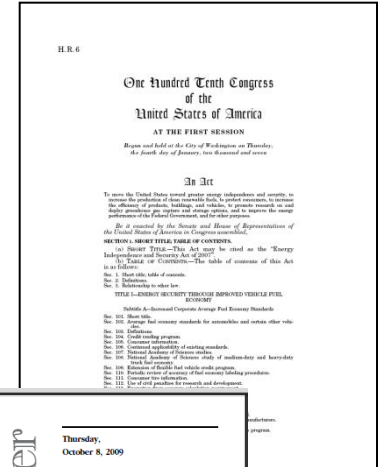
- **Energy Policy Act of 2005 (EPAct05) – Aug 05**
 - New facilities, 30% more efficient than ASHRAE 90.1
 - Installation of advanced meters
- **Executive Order (EO) 13423 – Jan 07**
 - Reduce Energy Consumption 30% by 2015
 - Reduce Water use 16% by 2015
 - All new construction must incorporate High Performance and Sustainable Buildings (HPSB) Guiding Principles (per Fed MOU – Jan 06)
 - 15% of existing buildings must be HPSB by 2015





Current Directives, Cont'd

- **Energy Independence and Security Act of 2007 (EISA07) – Dec 07**
 - New buildings reduce fossil fuel generated energy 55% by 2010 to 100% by 2030
 - 30% hot water supplied by solar water heaters
 - Restore predevelopment hydrology
- **EO 13514, Leadership in Environmental, Energy, and Economic Performance expands requirements of EO 13423 – Oct 09**
 - GHG reporting requirements for scope 1, 2, & 3
 - Each agency shall develop, implement, and annually update an integrated Strategic Sustainability Performance Plan



Multiple requirements require multiple surveys, fragmented compliance paths & potential duplication of effort



New Facilities Air Force Sustainable Policy

ATTACHMENT 1
LEEDTM NC, v2.2 Project Checklist

LEED NC v2.2 Sustainable Sites	14 Possible Points
SS Credit 1: Construction Activity Pollution Prevention	Required
SS Credit 2: Site Selection	1
SS Credit 3: Development Density & Community Connectivity	1
SS Credit 4: Alternative Transportation: Public Transportation Access	1
SS Credit 4.2: Alternative Transportation: Bicycle Storage & Changing Room	1
SS Credit 4.4: Alternative Transportation: Low Emitting & Fuel Efficient	1
SS Credit 4.6: Alternative Transportation: Parking Capacity	1
SS Credit 5: Stormwater Management: Protection of Existing Features	1
SS Credit 6: Stormwater Management: Maximum Open Space	1
SS Credit 7: Stormwater Management: Quantity Control	1
SS Credit 8: Stormwater Management: Quality Control	1
SS Credit 9: Heat Island Effect: Non-Roof	1
SS Credit 10: Heat Island Effect: Roof	1
SS Credit 11: Light Pollution Reduction	1
Water Efficiency	5 Possible Points
WE Credit 1.1: Water Efficient Landscaping: Reduce by 50%	1
WE Credit 1.2: Water Efficient Landscaping: No Potable Water Use	1
WE Credit 2: Innovative Wateruse Technologies	1
WE Credit 3.1: Water Use Reduction: 20% Reduction	1
WE Credit 3.2: Water Use Reduction: 30% Reduction	1
Energy & Atmosphere	17 Possible Points
EA Credit 1: Fundamental Commissioning of the Building Energy Systems	Required
EA Credit 2: Minimum Energy Performance	Required
EA Credit 3: Fundamental Refrigerant Management	Required
EA Credit 4: Optimize Energy Performance	1-3
EA Credit 5: On-Site Renewable Energy	1-3
EA Credit 6: Enhanced Commissioning	1
EA Credit 7: Enhanced Refrigerant Management	1
EA Credit 8: Measurement & Verification	1
EA Credit 9: Green Power	1
Materials & Resources	13 Possible Points
MR Prerequisite: Storage & Collection of Recyclables	Required
MR Credit 1.1: Building Materials: 75% of Existing Walls, Floor, Roof	1
MR Credit 1.2: Building Materials: 75% of Existing Walls, Floor, Roof	1
MR Credit 2.1: Building Materials: 75% of Interior Non-Structural Elements	1
MR Credit 2.2: Construction Waste Management: Divert 75% from Landfill	1
MR Credit 3.1: Materials: Recycle 5%	1
MR Credit 3.2: Materials: Recycle 10%	1
MR Credit 4.1: Recycle Content: 10% (post-consumer + 1% pre-consumer)	1
MR Credit 4.2: Recycle Content: 20% (post-consumer + 1% pre-consumer)	1
MR Credit 5.1: Regional Materials: 10% Extracted, Processed & Manufactured Regionally	1
MR Credit 5.2: Regional Materials: 20% Extracted, Processed & Manufactured Regionally	1
MR Credit 6: Recycled-Content Materials	1

Old 19-41 points Platinum 12-49 points

- Current policy issued July 07
- Key requirements
 - All MILCON vertical facilities shall be *capable of achieving LEED "Silver"*
 - Incorporates EPAct05 and EO 13423 requirements
 - FY09: 5% of total MILCON LEED certified
 - FY10/after: 10% LEED certified
- Policy currently in re-write



Existing Facilities

HPSB Pilot Study

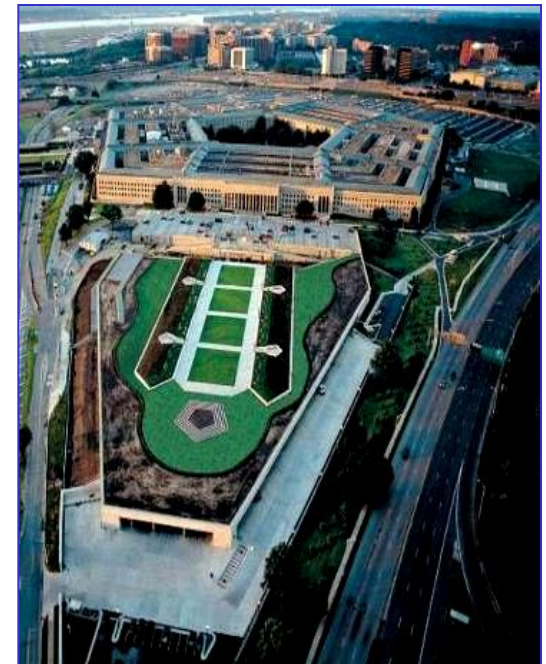
- **15% of existing building inventory must be HPSB by 2015**
- **AF MILCON produces approximately 50-70 new facilities per year**
 - **Will not reach 2015 goal with new construction alone!**
- **AFCEE conducted initial test for HPSB surveys**
 - **5 AF installations: 30 buildings surveyed**
 - **Each building has ~ 40 aspects**
 - **Over 75% of HPSB aspects are installation-wide aspects**
 - **Average score: 70%**
 - **Requirements more difficult to achieve are:**

Energy Efficiency	Water Conservation
Metering	Commissioning
Daylighting	Thermal Comfort
Ventilation	



Crossroads

- Multiple federal *sustainability* requirements
- All establish multiple goals for energy reduction, water reduction, storm water management, use of renewable energy, etc.
- Requirements frequently overlap/conflict
- Synergies between HPSB and existing audits and programs
- **Opportunity to identify a compliance strategy holistically**



Align compliance paths to minimize reporting burden



A Holistic Approach

HPSB Efficiencies

Building-by-building approach

- Each building has ~40 HPSB aspects
- Many aspects are the same for every building on the installation
- Must perform energy & water calculations/ modeling on every applicable building

Requires ~ 840,000 data points

Installation approach

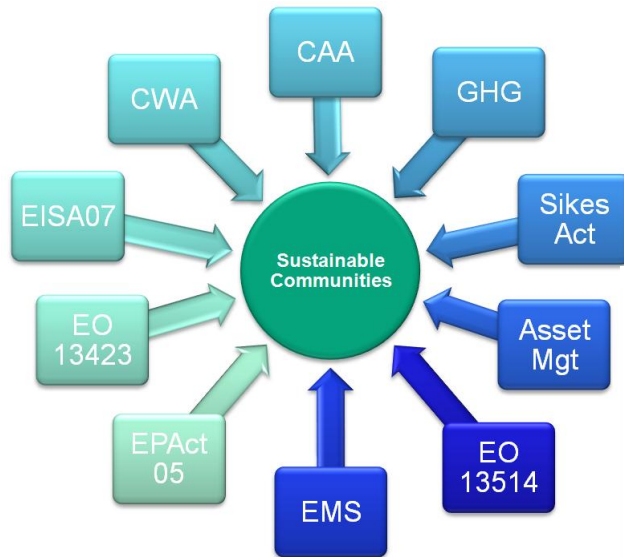
- **Each installation has ~30 HPSB aspects**
- Transfer requirements for energy & water reductions to the installation
- Augment successful Energy Audit program to address energy & water performance at the building level

Reduces burden to ~70, 000 data points

Approaching requirement by SF vs. number of buildings, the 15% HPSB goal for AF could be met by as few as 184 facilities



Sustainable Communities Consolidating Across Programs



Ideal world – work all requirements under one umbrella



Sustainable Communities

Categories & Scorecard Snapshot

COMMUNITY
DESIGN &
DEVELOPMENT

MISSION
READINESS

ENERGY &
GREENHOUSE GAS
EMISSIONS

MATERIALS &
WASTE
MANAGEMENT

WATER EFFICIENCY

TRANSPORTATION

NATURAL
INFRASTRUCTURE

COMMUNITY
ENGAGEMENT

BUILT
INFRASTRUCTURE

INNOVATION &
REGIONAL

Sustainable Communities Scorecard

Installation Name:

Location:

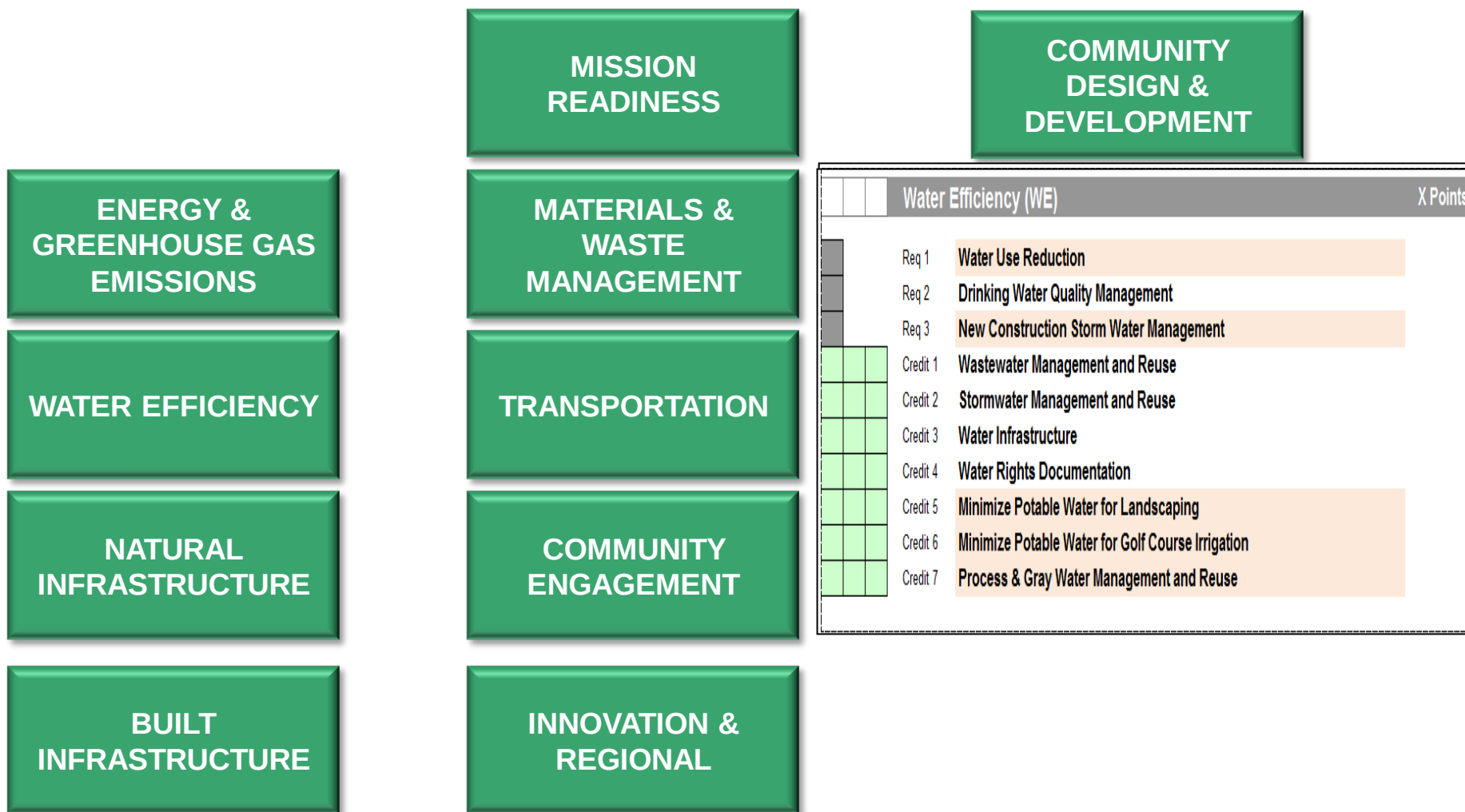
Yes ? No

Community Design & Development (CDD)		X Points
Req 1	EMS Conformance	
Req 2	Asset Master Plan	
Req 3	Installation Planning Profile	
Credit 1	Sustainable Design Standards	
Credit 2	Effective Land Use	
Credit 3	Development Near Existing Infrastructure	
Credit 4	Choices for Getting Around	
Credit 5	Shared Use Pathway Network	
Credit 6	Brownfield Redevelopment	
Credit 7	Demolition	
Credit 8	Heat Island Effect: Installation	
Credit 9	Light Pollution: Installation	



Sustainable Communities

Categories & Scorecard Snapshot



Categories defined by *Requirements* and *Credits*



Scorecard & Credit Template

[illegible]

Points



Green & Sustainable Remediation (GSR)

- **Cleanup from past AF communities must be done in a Green and Sustainable manner**
 - AF Environmental Remediation Program (ERP) Office of the Secretary of Defense (OSD) Policy on GSR 2009
 - AF ERP- Optimization (ERP-O) process 2009
- **Overarching goal – is still to protect human health and the environment**
- **Objective – Incorporate GSR *technologies* as part of holistic approach to *optimize* cleanup**
 - *Technology-driven (green)*
 - *Process-centric (sustainment)*



Green and Sustainable Remediation (GSR)

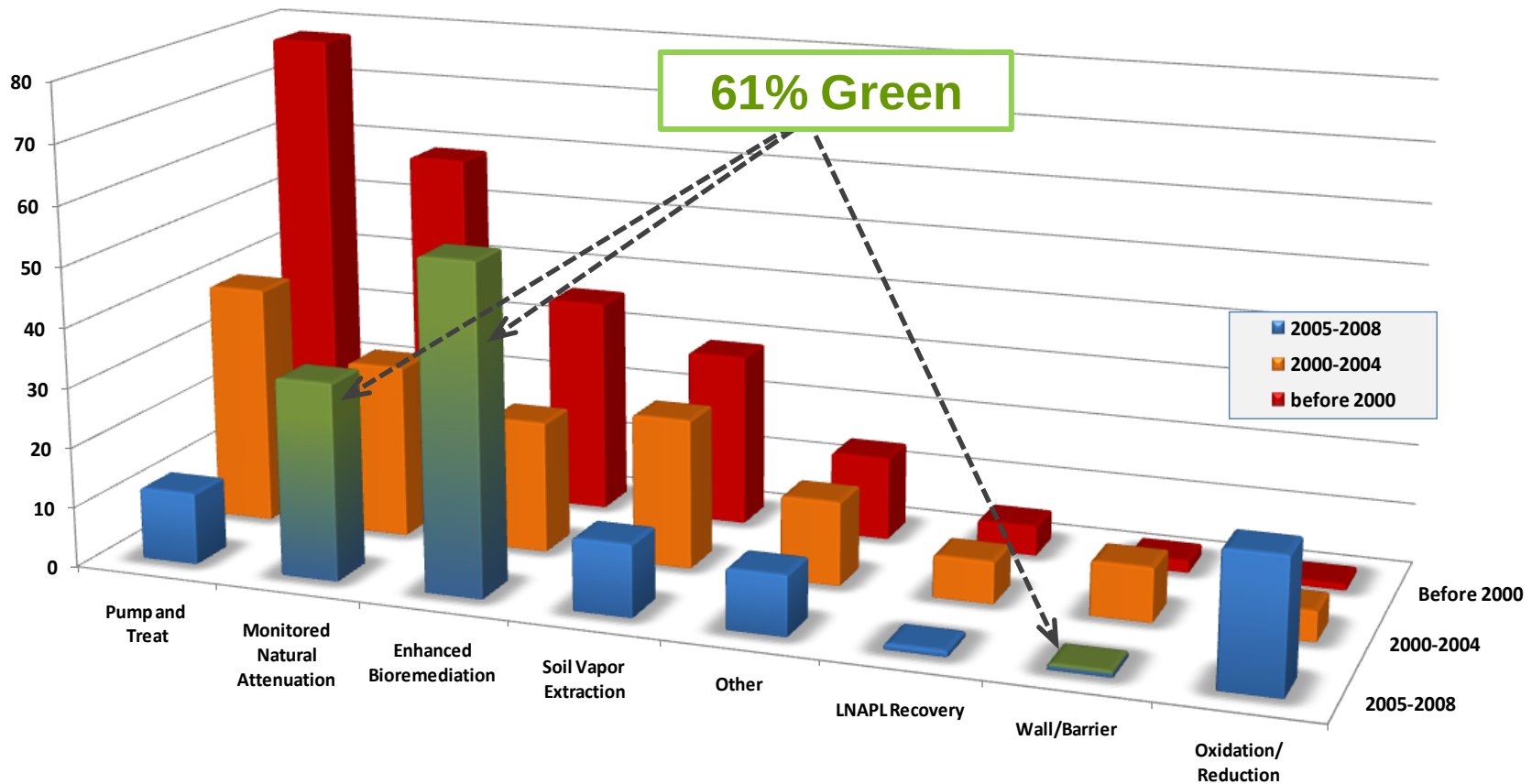
- **Key elements of the GSR initiative to minimize:**
 - Energy use for treatment systems
 - Water use/impacts on water resources
 - Material consumption/waste generation
 - Impacts on land and ecosystem
 - Air emissions
- **GSR Strategy is Technology Focused - Use low energy intensive, green remediation technologies to:**
 - Protect human and environment
 - Reduce environmental footprint
 - Improve performance
 - Serve as environmental stewards for future generations



GSR Technology Trends

Remediation Systems by Year

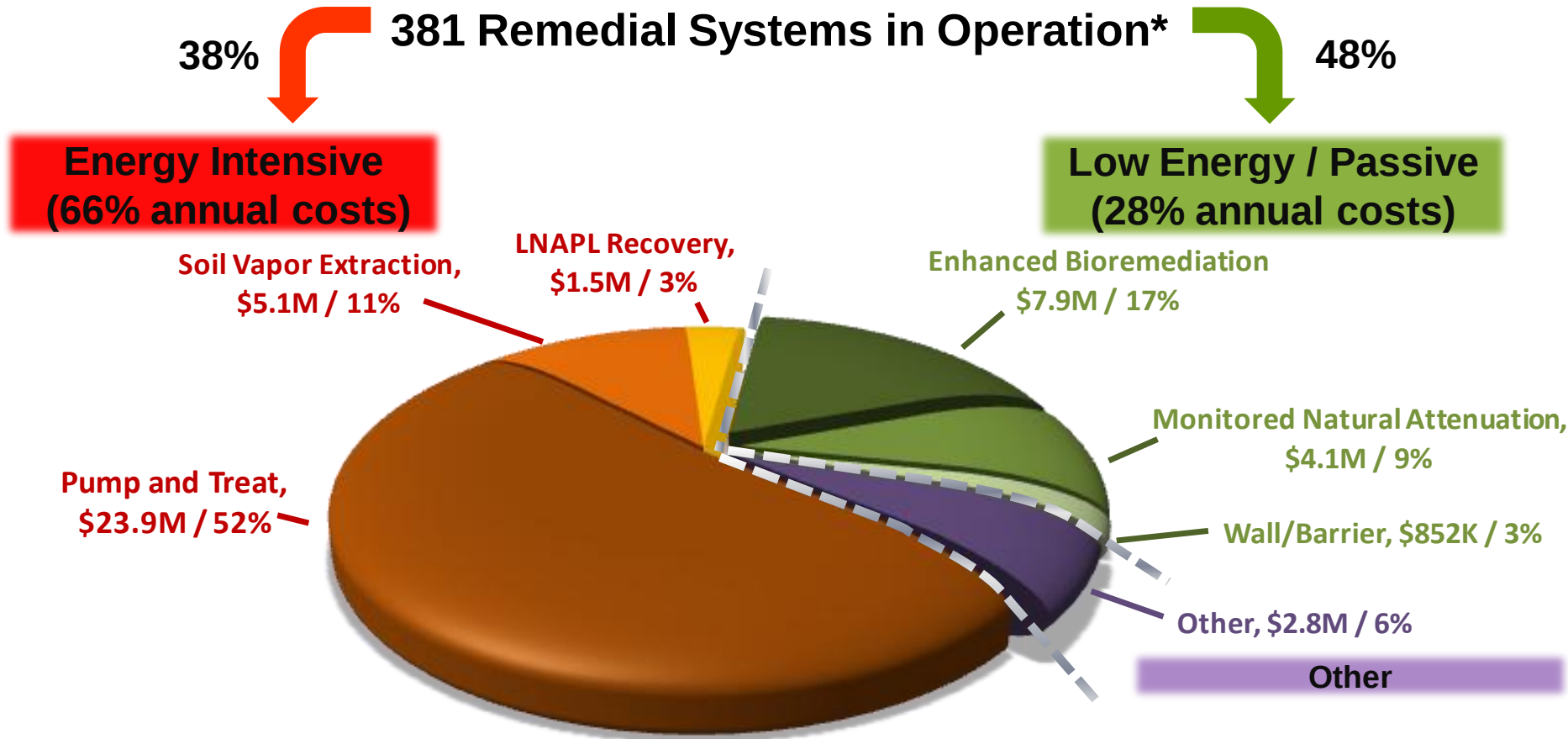
Executive Order (EO) 13423 – 2007
AF Sustainable Remediation Initiative - 2007





AF Remediation System

Annual Costs by Technology



*Based on FY08 EDITT System
Inventory as of 15 March 2010



AF GSR Strategy

Technology Focus

■ **Formulate The Need (Air Force needs)**

- Annual process, engaging AFCEE, Air Staff, MAJCOMs, installations

■ **Demonstrate The Potential (promising opportunities)**

- Connect needs to solutions
- Includes COTS, technology transfer, new solutions

■ **Validate The Technology (early resources)**

- Cost & Performance data, engineering/design/application guides, professional reviews
- Joint AFCEE and user to dem/val with eye to implementability

■ **Educate The Enterprise – (environmental professionals)**

- Technology transfer throughout
- Tools: publications, presentations, technical consultation, guides and manuals, training events, strategic partnerships



Air Force Success Stories

- **Nellis AFB PV System**
 - 6th largest PV array in North America
- **EPA Green Power Partnership**
 - Top federal agency for renewable energy (4% of total electricity, Apr 10)
- **AF MILCON Program**
 - AF Weather Agency – 1st LEED Gold in the AF
 - Keesler Housing – 736 LEED Silver homes
- **Natural Resources**
 - Solid Waste Diversion (2007), 62%
 - HAZWASTE disposal reduction (1996-present), 33%
 - Toxic Release Inventory reduction (2001-2006), 34%
 - Ozone Depleting Substance elimination (1990-present), 96%
 - Water Reduction (FY01-FY07), 32%



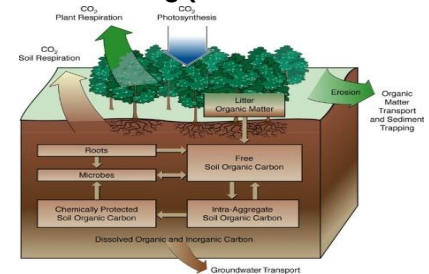
70,000 panels



AF Weather Agency – 1st LEED Gold



Keesler Housing (736 LEED Silver Homes)





Air Force Success Stories (GSR)

- Beginning to purposefully analyze sustainability as part of selection criteria for new remediation systems and optimization
- MMR, MA - Wind turbine to power groundwater cleanup
- Altus AFB, OK - Solar-powered in situ bioreactor; biowall replaces pump-and-treat
- Kennedy Space Center, FL – Solar-powered recirculation system
- Travis AFB, CA - Solar-powered pumps for pump-and-treat system; in situ bioreactor
- Hickam AB, HI - Solar-powered in situ reactor
- Patrick AFB, FL - Solar-powered aerator





Upcoming Opportunities Construction

- **Approx 300 AF projects LEED registered, seeking certification**
- **Execution of Energy and HPSB audits / data collection**
- **Future Energy and HPSB projects resulting from audits**
- **Broad Agency Announcements (BAA)**

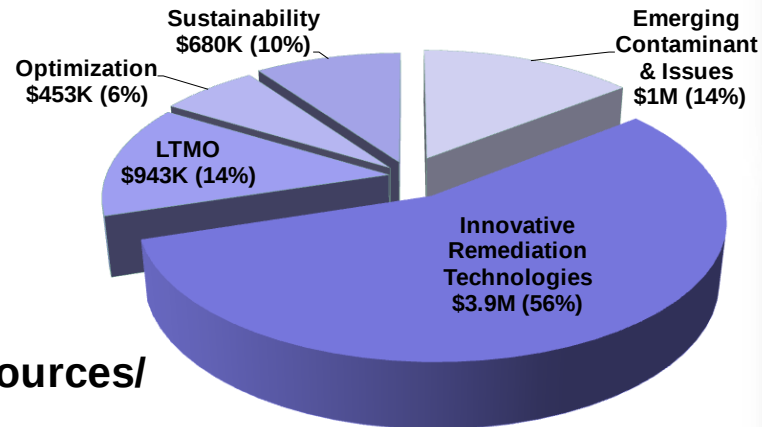




Upcoming Opportunities Environmental Restoration

Broad Agency Announcement (BAA) for USAF Environmental Restoration Program Innovation

- Contract mechanism for demonstrate/validate of innovative technologies
 - Identify BETTER, FASTER, CHEAPER, & GREENER solutions
 - Appears in FedBizOps: needs, dates, and details
 - Awards based on: technical merits and broad spread application
 - \$3M-\$4M/yr AFCEE -- leveraged -- \$36M (total) SERDP/ESTCP
 - Bases integrated into process: needs, evaluation, site selection
 - Access at www.afcee.af.mil/resources/technologytransfer/baa





Upcoming Opportunities Environmental Compliance

Program	FY11 Program Amount (\$M)
Air Quality	\$ 31.2
Cultural Resources	\$ 11.6
Environmental Quality Program Support	\$ 65.8
Hazmat/Hazwaste/Toxics	\$ 94.5
Natural Resources	\$ 4.6 K
NEPA	\$ 16.6
Ranges	\$ 0.5
Water Quality	\$ 26.9

**Mostly Executed At Installation Levels...Communicate!!!
So We Don't Lose Out On These Opportunities!**



Just a thought . . .

“Nothing is as powerful as an idea whose time has come.”

Victor Hugo

