Department of State
Overseas Buildings Operations (OBO)

Achieving High Performance, Sustainable Buildings
- IFMA & FFC of the NRC

Achieving Sustainability Compliance

1. **Federal Mandates**
2. **Getting to Green**
   a. Goals
   b. New Construction
   c. Existing Buildings
3. **Eco-Diplomacy**

Donna McIntire, [illegible]ED
Sustainability Program Manager

Sept. 11, 2008

Buildings
Impact on Environment

Buildings Use:

- **Electricity - 70%** of U.S consumption
- **Energy - 39%** of U.S. primary energy use
- **Green House Gases - 39%** of Carbon Dioxide (CO_2)
- **Materials - 40%** of raw materials globally, or 3 billion tons/yr
- **Waste – 30%** waste output **-** 136 million tons of construction and demolition
- **Water - 12.2%** of all potable water, or 15 trillion gallons/yr

Federal Buildings
Impact on Environment

The federal government owns approximately **445,000** buildings with total floor space over **3 B** gsf, in addition to leasing **57,000** buildings comprising **374 M** gsf of floor space. These federal buildings account for **37%** of the government's total energy use.

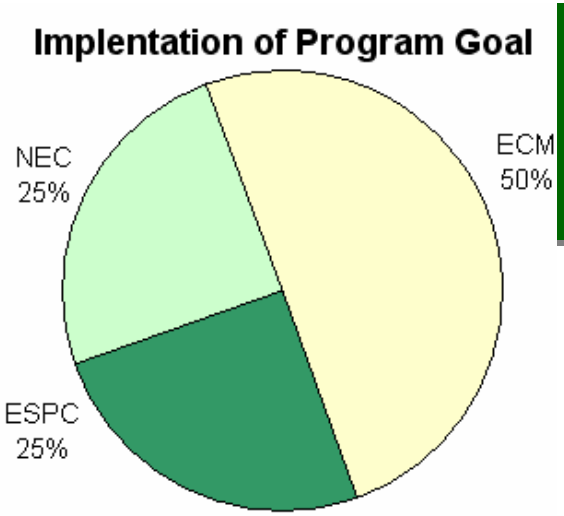
Federal Mandates:

- **EPAct 2005, Section 103 - building metering**
- **EPAct 2005, Section 203 - 7.5% renewable by 2013**
- **EO 13423 - New & Renovation comply w/ MOU**
- **EO 13423 - 15% incorporate MOU by 2015**
- **EO 13423 - 16% water use reduction by 2015**
- **EO 13423 & EISAct 2007 - 30% energy use reduction in existing facilities by 2015**
- **EISAct 2007 - 55% energy use reduction in new construction by 2010 & 100% by 2030**
- **EISAct 2007 - Manage stormwater to pre-developed conditions**

Energy Independence and Security Act:

***signed by* President Bush *on* Dec. 19, 2007:**

- **Strengthens national security, by lessening our dependence on foreign oil**
- **Reduces global warming**
- **Lowers energy costs for consumers**
- **Creates hundreds of thousands of new jobs and strengthens our economy**



Getting to Green - Goals
Project Implementation

Goals:

- ✓ **15% of facilities meet MOU Guiding Principles**
- ✓ **3rd Party Building Certification**

Project Implementation **Total Projects** 257

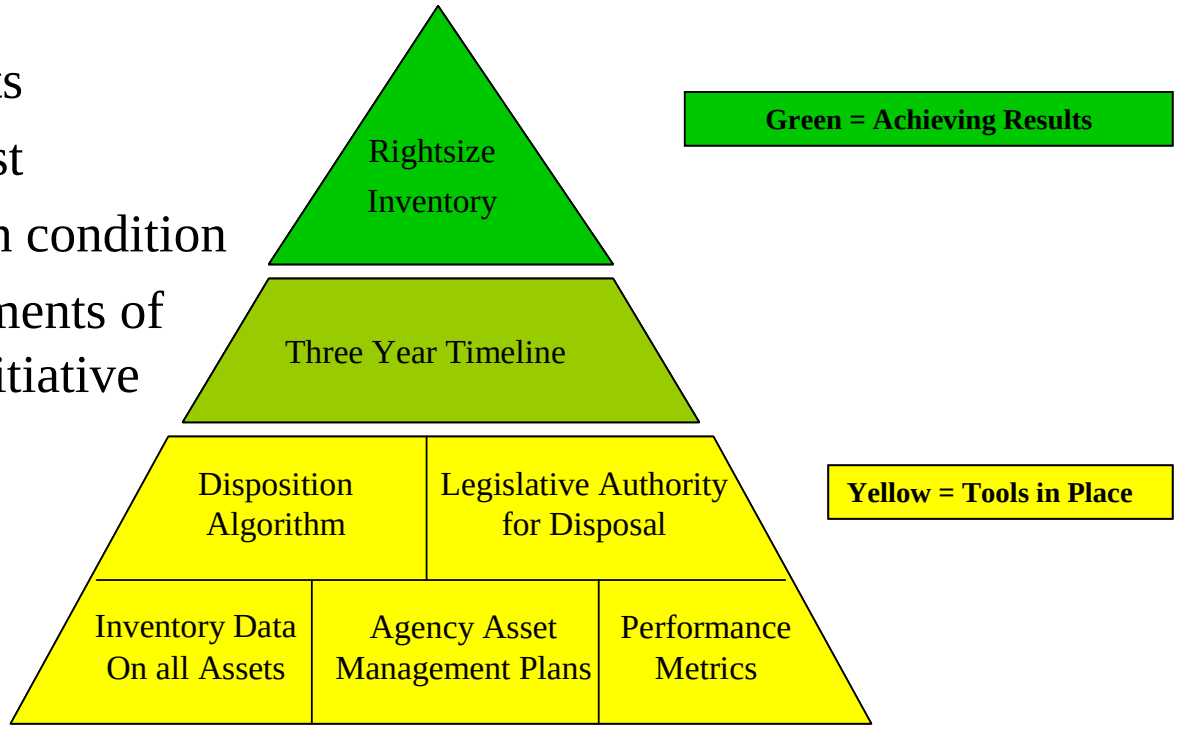
NEC (25%)	FY08	FY09	FY10	FY11	FY12	FY13	FY14	FY15
Target	10	10	8	7	7	7	7	7
Complete		20	28	35	42	49	56	**63**
						% of Program Goal - OBO Capital Funding Projects		**25%**

Total to replace	**180**
Completed to date	**-56**
Under Construction	**-34**
Total left to replace	**90**

Getting to Green - Goals
President's Management Agenda (PMA)

4 key areas of achievement:

1. Eliminating surplus assets
2. Operating at the right cost
3. Ensuring critical assets in condition
4. Complying with requirements of Federal Real Property Initiative



Inventory data and performance measures are tracked through OBO's Real Property Inventory database and then reported to the Federal Real Property Profile (FRPP), maintained by GSA

Getting to Green - Goals
PMA - Federal Real Property Profile (FRPP)

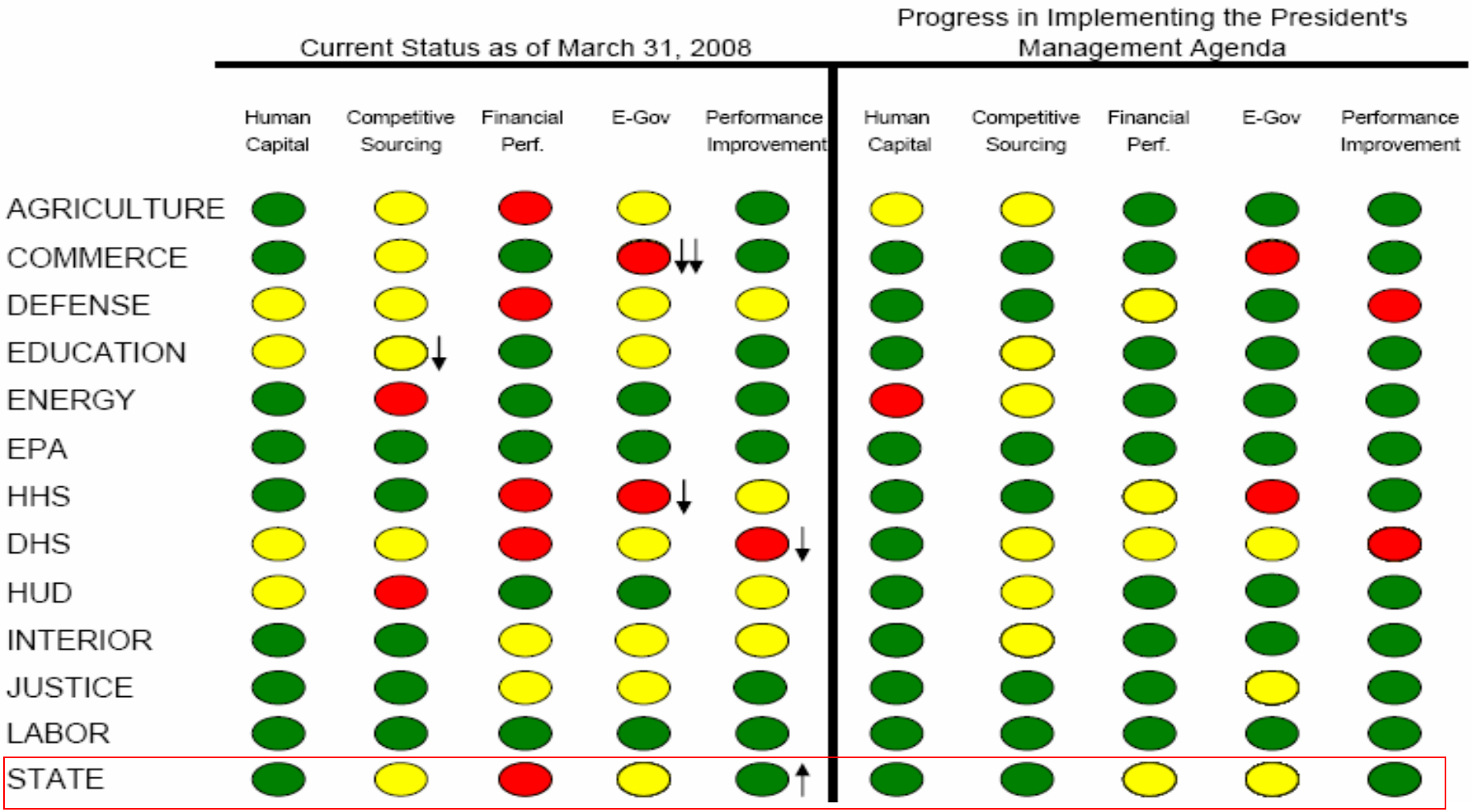
	Data Element		Data Element		Data Element
1	Real Property Type	9	Utilization	17	State
2	Real Property Use	10	Value	18	Country
3	Legal Interest	11	Condition Index:	19	County
4	Status	12	Mission Dependency	20	Congressional District
5	Historical Status	13	Annual Operating Costs	21	Zip Code
6	Reporting Organization	14	Main Location	22	Installation/Sub-Installation ID
7	Using Organization	15	Real Property Unique ID	23	Restrictions
8	Size	16	City	24	Disposition
25	**Meets Sustainability Goals of the Executive Order**				

Currently 24 data elements in FRPP. One new element to be added per **EO 13423**.

FRPP will track success in meeting the 15% goal by 2015 through these elements.

Getting to Green - Goals
PMA - Federal Real Property Initiative

Executive Branch Management Scorecard



Getting to Green - Goals
PMA - 26th Element

OMB's Environmental, Energy, and Transportation Scorecards

Based on: EO 13423

ENVIRONMENTAL STEWARDSHIP SCORECARD
Department of Energy

	CURRENT STATUS (As of January 1, 2008)[1]		PROGRESS		COMMENTS
ENVIRONMENTAL STEWARDSHIP **Senior Official:** Alexander (Andy) A. Karsner, Assistant Secretary for Energy Efficiency and Renewable Energy **Lead EOP Analysts:** Cyndi Vallina and Dana Arnold	Yellow	• EMS report card : __X_ ≥75% green & ≤5% red on facility metrics (G) __ <15% red on facility metrics (Y) • Green purchasing: _X_ Agency has affirmative procurement program (APP) for all green products and services, demonstrates & monitors compliance, develops corrective actions if applicable, and conducts training (G) __ Agency has APP and representative acquisitions for all covered areas (Y) • Sustainable design/green bldgs[2]: __ Implements Guiding Principles and on track to meet the 15% goal by 2015 (G) _X_ Implements Guiding Principles on all new building projects & leased space (Y) • Electronic stewardship (ES): _X_ Acquires ≥ 95% EPEAT-registered electronics; enables Energy Star features; extends life & uses sound disposition practices (G) __ Has ES plan & on track to implement goal by 2010 (Y) • Compliance Management Plan: _X_ Implemented operational recommendations (G) __Developed implementation plans and strategies (Y)	Green	Actions taken since July 1, 2007: • Revised DOE Order 450.1 to establish EMS as the EO implementation framework. • Provided training and tech. assistance to sites on implementing green requirements. • Submitted SBIP & on track with CY07 milestones. • Implemented CY07 actions due in ES plan and reported on progress. • DOE Acquisition Guide, Chapter 23 was updated on sustainable acquisition, including EPEAT, WaterSense, Plug-In Hybrid Vehicles, and Sust. Buildings. Planned actions for next six months: • Issue revised DOE Order 450.1A. • Complete site-specific EMS data and submit final report to EPA and OFEE. • Conduct EMS Training in June. • Continue to support and expand EMSAN to assist DOE sites on EO implementation. • Continue to provide training and technical assistance to DOE sites on implementing the EO in EMSs. • Continue outreach and education program on green purchasing. • Complete proposed SBIP milestones & submit baseline data on sustainable inventory to OMB by 6/30/08. • Implement actions due by 6/30/08 in final ES plan and report on progress.	• DOE remains Yellow on Status because it has not yet achieved the green standards for success on sustainable buildings. • DOE remains Green on Progress because it completed all planned actions for the last 6 months. • Approximately one-third of DOE's contracting activities conducted procurement self-assessments, which included green purchasing. • DOE has a comprehensive reporting system that allows tracking of implementation of all E.O. 13423 life-cycle goals for electronics stewardship. • DOE won the Federal Electronics Reuse and Recycling Campaign (ERRC) Agency Award for the second year in a row (2006-2007), recycling more than 625,000 pounds of end of life electronics.

15%

[1] Status will be updated annually to reflect performance data collected at the end of each fiscal year. Progress will be assessed twice annually (Jan/July).
[2] Each agency is required to ask GSA to institute sustainable design in contracts and leases on its behalf.

January 2008

Getting to Green - Goals
PMA Federal Real Property Initiative

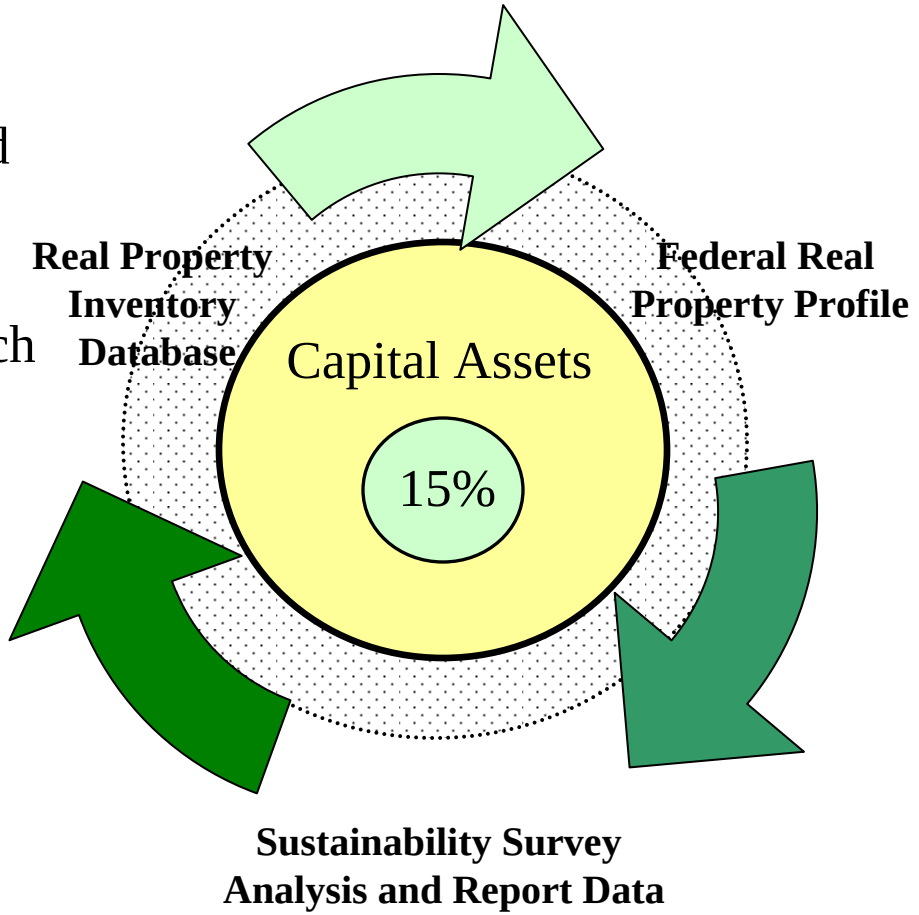
Reporting on PMA Data Element #26

Step 1: Define "world" of assets that meet the Capital Asset (CA) threshold
different for each Agency

Step 2: Collect sustainability data for each CA by Property ID for deposit into Real Property Inventory Database

Step 3: Report % of CA that meet EO 13423 Sustainability data

"***GREEN***" is 15% by 2015



Getting to Green – New Construction
LEED Certification

LEED is a 3rd party certification program:

- The US Green Building Council (USGBC) was founded in **1993**
- **78** chapters and affiliates across the U.S.
- **16,727** member companies and organizations
- USGBC membership represents over **3.9 B** gsf of building space

- **1,212** LEED New Construction - Certified Projects
- **8,088** LEED New Construction - Registered Projects
- **57,417** LEED Accredited Professionals

Getting to Green – New Construction
Crosswalk of EO 13423 w/ LEED-NC

1		13	**Sustainable Sites**	Possible Points	14
Y			Prereq 1	Construction Activity Pollution Prevention	
		1	Credit 1	Site Selection	1
		1	Credit 2	Developmental Density & Community Connectivity	1
		1	Credit 3	Brownfield Redevelopment	1
		1	Credit 4.1	Alternative Transportation: Public Transportation Access	1
		1	Credit 4.2	Alternative Transportation: Bicycle Storage & Changing Rooms	1
		1	Credit 4.3	Alternative Transportation: Low Emitting & Fuel Efficient Vehicles	1
		1	Credit 4.4	Alternative Transportation: Parking Capacity	1
		1	Credit 5.1	Site Development: Protect or Restore Habitat	1
		1	Credit 5.2	Site Development: Maximize Open Space	1
1			Credit 6.1	Stormwater Design: Quantity Control	1
		1	Credit 6.2	Stormwater Design: Quality Control	1
		1	Credit 7.1	Heat Island Effect: Non-Roof	1
		1	Credit 7.2	Heat Island Effect: Roof	1
		1	Credit 8	Light Pollution Reduction	1

3		2	**Water Efficiency**	Possible Points	5
1			Credit 1.1	Water Efficient Landscaping: Reduce by 50%	1
		1	Credit 1.2	Water Efficient Landscaping: No Potable Water Use or No Irrigation	1
		1	Credit 2	Innovative Wastewater Technologies	1
2			Credit 3	Water Use Reduction: 20-30% Reduction	2

8		9	**Energy & Atmosphere**	Possible Points	17
Y			Prereq 1	Fundamental Commissioning of the Building Energy Systems	
Y			Prereq 2	Minimum Energy Performance - CFR434/ASHRAE 90.1-1999	
Y			Prereq 3	Fundamental Refrigerant Management	
6		4	Credit 1	Optimize Energy Performance: 20-60% New / 10-50% Existing	10
		3	Credit 2	On-Site Renewable Energy: 5-20%	3
		1	Credit 3	Enhanced Commissioning	1
1			Credit 4	Enhanced Refrigerant Management	1
1			Credit 5	Measurement & Verification	1
		1	Credit 6	Green Power	1

4		9	**Materials & Resources**	Possible Points	13
Y			Prereq 1	Storage & Collection of Recyclables	
		1	Credit 1.1	Building Reuse: Maintain 75% of Existing Walls, Floors, & Roof	1
		1	Credit 1.2	Building Reuse: Maintain 95% of Existing Walls, Floors, & Roof	1
		1	Credit 1.3	Building Reuse: Maintain 50% Shell & 50% Interior Non-Structural Element	1
1			Credit 2.1	Construction Waste Management: Divert 50% From Disposal	1
		1	Credit 2.2	Construction Waste Management: Divert 75% From Disposal	1
		2	Credit 3	Materials Reuse: 5-10%	2
1			Credit 4.1	Recycled Content: 10% (post-consumer + 1/2 pre-consumer)	1
		1	Credit 4.2	Recycled Content: 20% (post-consumer + 1/2 pre-consumer)	1
		1	Credit 5.1	Regional Materials: 10% Extracted, Processed, & Manufactured Regionally	1
		1	Credit 5.2	Regional Materials: 20% Extracted, Processed, & Manufactured Regionally	1
1			Credit 6	Rapidly Renewable Materials	1
1			Credit 7	Certified Wood	1

9		6	**Indoor Environmental Quality**	Possible Points	15
Y			Prereq 1	Minimum IAQ Performance	
Y			Prereq 2	Environmental Tobacco Smoke (ETS) Control	
1			Credit 1	Outdoor Air Delivery Monitoring	1
		1	Credit 2	Increased Ventilation	1
1			Credit 3.1	Construction IAQ Management Plan: During Construction	1
1			Credit 3.2	Construction IAQ Management Plan: Before Occupancy	1
1			Credit 4.1	Low-Emitting Materials: Adhesives & Sealants	1
1			Credit 4.2	Low-Emitting Materials: Paints & Coatings	1
1			Credit 4.3	Low-Emitting Materials: Carpet Systems	1
1			Credit 4.4	Low-Emitting Materials: Composite Wood & Agrifiber Products	1
		1	Credit 5	Indoor Chemical & Pollutant Source Control	1
		1	Credit 6.1	Controllability of Systems: Lighting	1
		1	Credit 6.2	Controllability of Systems: Thermal Comfort	1
1			Credit 7.1	Thermal Comfort: Design	1
		1	Credit 7.2	Thermal Comfort: Verification	1
1			Credit 8.1	Daylight & Views: Daylight 75% of Spaces	1
		1	Credit 8.2	Daylight & Views: Views for 90% of Spaces	1

1		4	**Innovation & Design Process**	Possible Points	5
		1	Credit 1.1	Innovation in Design: Green Housekeeping or Bldg. as Educat Tool	1
		1	Credit 1.2	Innovation in Design: Acoustics	1
		1	Credit 1.3	Innovation in Design: Enhanced IAQ	1
		1	Credit 1.4	Innovation in Design: Enhanced Life Safety	1
1			Credit 2	LEED™ Accredited Professional	1

26		43	**Total Project Score**	Total Points	69

Getting to Green – New Construction
DOS FY08 Projects LEED Certified

				Sustainable Sites	Possible Points 14	
Y				Prereq 1	Construction Activity Pollution Prevention	
		1		Credit 1	Site Selection	1
			1	Credit 2	Development Density & Community Connectivity	1
			1	Credit 3	Brownfield Redevelopment	1
		1		Credit 4.1	Alternative Transportation: Public Transportation Access	1
1				Credit 4.2	Alternative Transportation: Bicycle Storage & Changing Rooms	1
			1	Credit 4.3	Alternative Transportation: Low Emitting & Fuel Efficient Vehicles	1
1				Credit 4.4	Alternative Transportation: Parking Capacity	1
			1	Credit 5.1	Site Development: Protect or Restore Habitat	1
1				Credit 5.2	Site Development: Maximize Open Space	1
	1			Credit 6.1	Stormwater Design: Quantity Control	1
		1		Credit 6.2	Stormwater Design: Quality Control	1
1				Credit 7.1	Heat Island Effect: Non-Roof	1
1				Credit 7.2	Heat Island Effect: Roof	1
1				Credit 8	Light Pollution Reduction	1

				Water Efficiency	Possible Points 4	
1				Credit 1.1	Water Efficient Landscaping: Reduce by 50%	1
		1		Credit 1.2	Water Efficient Landscaping: No Potable Water Use or No Irrigation	1
		1		Credit 2	Innovative Wastewater Technologies	1
1				Credit 3.1	Water Use Reduction: 20% Reduction	1
1				Credit 3.2	Water Use Reduction: 30% Reduction	1

				Energy & Atmosphere	Possible Points 17	
Y				Prereq 1	Fundamental Commissioning of the Building Energy Systems	
Y				Prereq 2	Minimum Energy Performance - CFR434/ASHRAE 90.1-1999	
Y				Prereq 3	Fundamental Refrigerant Management	
2				Credit 1.1	Optimize Energy Performance: 20% New / 10% Existing	2
		2		Credit 1.2	Optimize Energy Performance: 30% New / 20% Existing	2
		2		Credit 1.3	Optimize Energy Performance: 40% New / 30% Existing	2
			2	Credit 1.4	Optimize Energy Performance: 50% New / 40% Existing	2
			2	Credit 1.5	Optimize Energy Performance: 60% New / 50% Existing	2
		1		Credit 2.1	On-Site Renewable Energy: 5%	1
			1	Credit 2.2	On-Site Renewable Energy: 10%	1
			1	Credit 2.3	On-Site Renewable Energy: 20%	1
1				Credit 3	Enhanced Commissioning	1
1				Credit 4	Enhanced Refrigerant Management	1
	1			Credit 5	Measurement & Verification	1
			1	Credit 6	Green Power	1

				Materials & Resources	Possible Points 13	
Y				Prereq 1	Storage & Collection of Recyclables	
			1	Credit 1.1	Building Reuse: Maintain 75% of Existing Walls, Floors, & Roof	1
			1	Credit 1.2	Building Reuse: Maintain 95% of Existing Walls, Floors, & Roof	1
			1	Credit 1.3	Building Reuse: Maintain 50% Shell & 50% Interior Non-Structural Element	1
1				Credit 2.1	Construction Waste Management: Divert 50% From Disposal	1
		1		Credit 2.2	Construction Waste Management: Divert 75% From Disposal	1
			1	Credit 3.1	Materials Reuse: 5%	1
			1	Credit 3.2	Materials Reuse: 10%	1
1				Credit 4.1	Recycled Content: 10% (post-consumer + 1/2 pre-consumer)	1
		1		Credit 4.2	Recycled Content: 20% (post-consumer + 1/2 pre-consumer)	1
1				Credit 5.1	Regional Materials: 10% Extracted, Processed, & Manufactured Regionally	1
		1		Credit 5.2	Regional Materials: 20% Extracted, Processed, & Manufactured Regionally	1
		1		Credit 6	Rapidly Renewable Materials	1
		1		Credit 7	Certified Wood	1

				Indoor Environmental Quality	Possible Points 15	
Y				Prereq 1	Minimum IAQ Performance	
Y				Prereq 2	Environmental Tobacco Smoke (ETS) Control	
1				Credit 1	Outdoor Air Delivery Monitoring	1
1				Credit 2	Increased Ventilation	1
	1			Credit 3.1	Construction IAQ Management Plan: During Construction	1
		1		Credit 3.2	Construction IAQ Management Plan: Before Occupancy	1
		1		Credit 4.1	Low-Emitting Materials: Adhesives & Sealants	1
1				Credit 4.2	Low-Emitting Materials: Paints & Coatings	1
1				Credit 4.3	Low-Emitting Materials: Carpet Systems	1
		1		Credit 4.4	Low-Emitting Materials: Composite Wood & Agrifiber Products	1
	1			Credit 5	Indoor Chemical & Pollutant Source Control	1
			1	Credit 6.1	Controllability of Systems: Lighting	1
		1		Credit 6.2	Controllability of Systems: Thermal Comfort	1
1				Credit 7.1	Thermal Comfort: Design	1
1				Credit 7.2	Thermal Comfort: Verification	1
		1		Credit 8.1	Daylight & Views: Daylight 75% of Spaces	1
		1		Credit 8.2	Daylight & Views: Views for 90% of Spaces	1

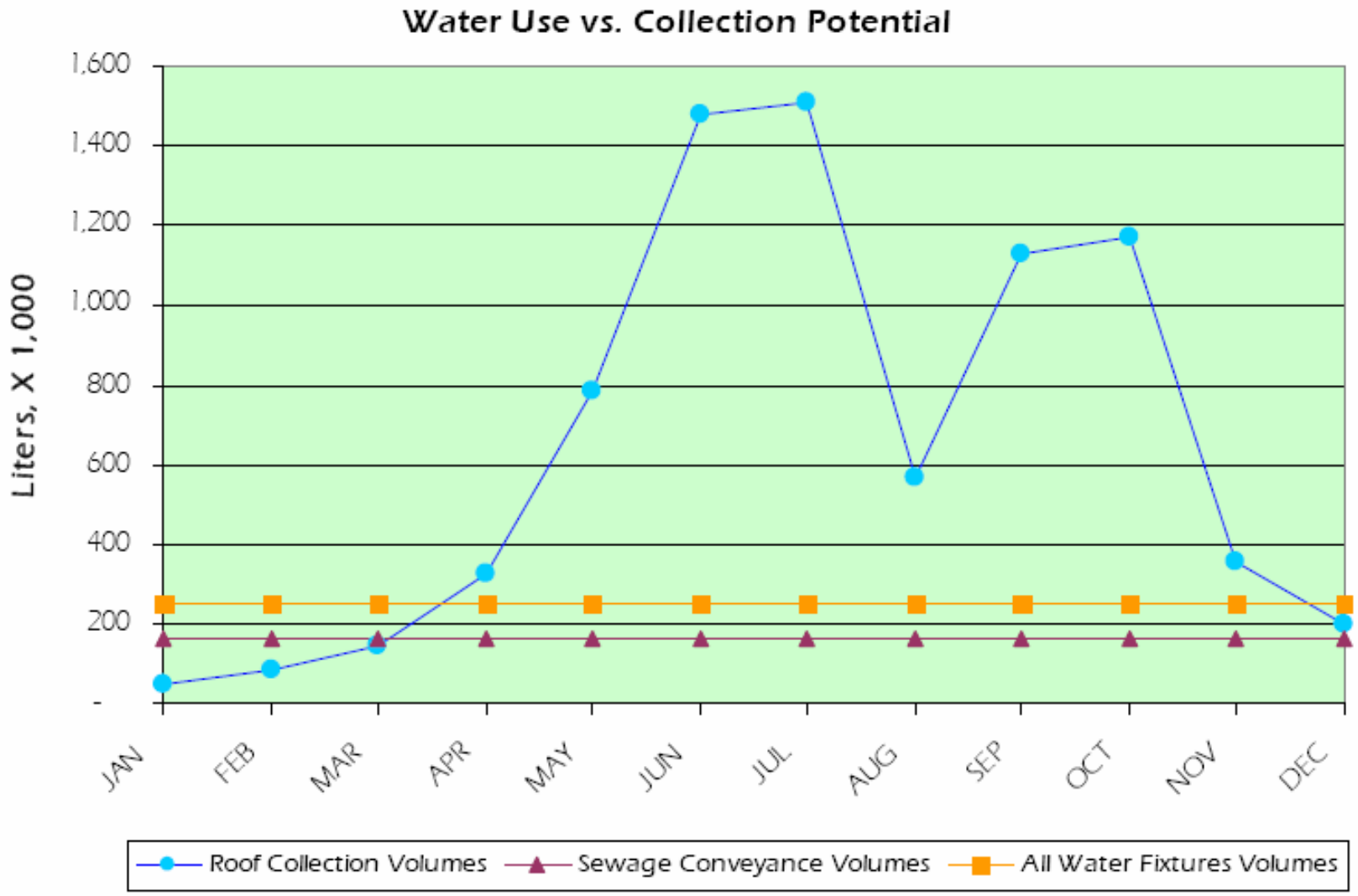
				Innovation & Design Process	Possible Points 5	
1				Credit 1.1	Innovation in Design: Increased Life Safety – Security	1
1				Credit 1.2	Innovation in Design: Acoustics	1
1				Credit 1.3	Innovation in Design: Enhanced IAQ	1
	1			Credit 1.4	Innovation in Design: Project Specific	1
1				Credit 2	LEED™ Accredited Professional	1

26	5	21	17	Total Project Score	Total Points 69

Getting to Green – New Construction
Budget Recommendations

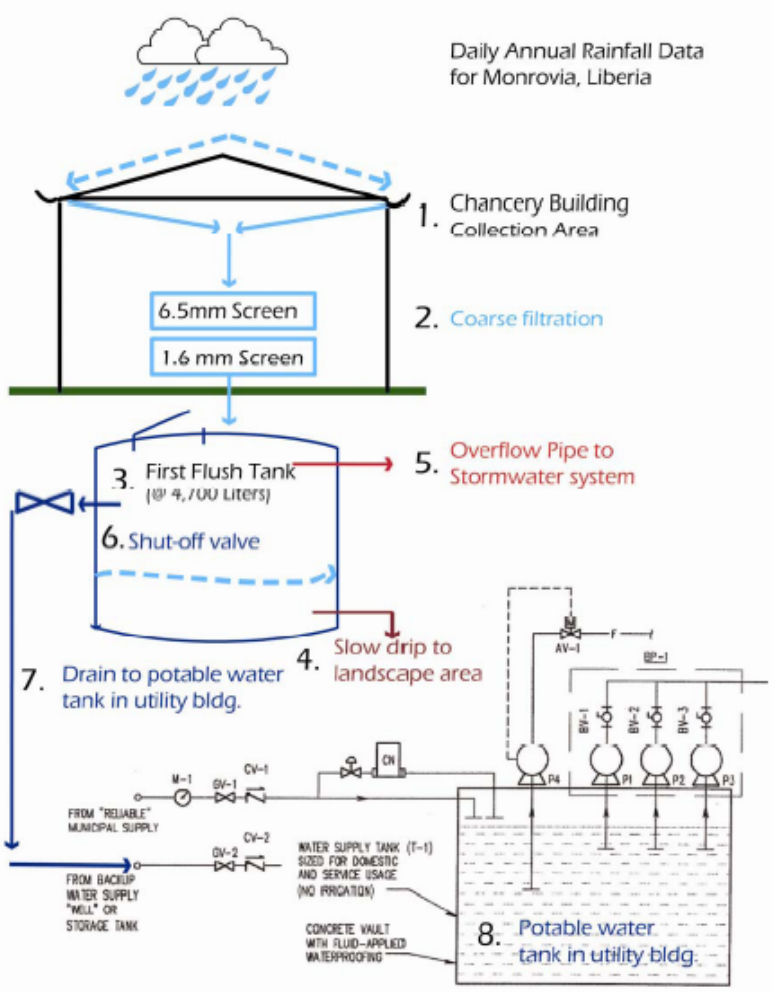
Energy & Sustainable Design Program (ESDP)				Primary recommendations for project cost			
		Item A	Item B	Item C	Item D	Item E	
Project	Budget	LEED Certification	Photovoltaics	Wind Power	LED Site Lighting	Sustain. Lighting	
FY10 TOTAL 1st Cost	$14,423,626	$27,134	$5,770,000	$0	$1,240,000	$4,411,291	
FY10 TOTAL Savings	$65,657,037	$52,990	$11,377,078	$0	$27,586,180	$14,703,844	
Asuncion	$1,677,284	$3,484			$210,000	$590,300	
Paraguay	$0						
50-Year Savings	$4,759,914	$13,210			$1,322,961	$1,967,604	
NEC LRBP Budget	$132,100,000	9,248gsm or 99,5456gsf = ($2,489 + $995)	128 - year payback		12.67 - year payback		
Bujumbura	$2,558,506	$2,526	$1,685,000		$210,000	$427,980	
Burundi	$0						
50-Year Savings	$7,466,430	$10,510	$2,351,000		$1,322,961	$1,426,556	
NEC LRBP Budget	$105,100,000	6,705gsm or 72,172gsf = ($1,804 + $722)	12 - year payback		12.67 - year payback		
The Hague	$894,668	$2,645			$210,000	$448,023	
Netherlands	$0						
50-Year Savings	$4,017,882	$13,640			$1,322,961	$1,493,362	
NEC LRBP Budget	$136,400,000	7,019gsm or 75,552gsf = ($1,889 + $756)	53 - year payback		12.67 - year payback		
Jakarta	$2,190,443	$8,396			$170,000	$1,436,047	
Indonesia	$500,000						

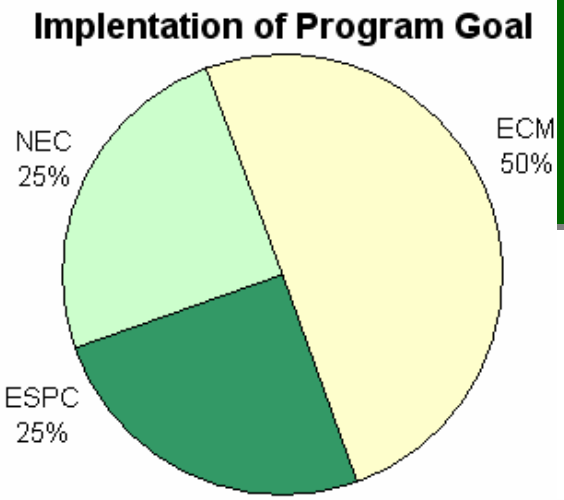
Getting to Green – New Construction
Initial Planning Survey (IPS)



Getting to Green – New Construction
Initial Planning Survey (IPS)

Monrovia, Liberia NEC	First Cost	Payback	NPV	Include?
1. Rainwater Collection				
Sewage Conveyance Only	$ (438,000)	4.42	$ 1,547,735	
100% Potable Water	$ (40,000)	-0.75	$ 3,385,479	Y
2. Potable Water Options				
Option 1	$ (6,979)	-0.77	$ 879,217	
Option 2	$ (19,219)	-0.73	$ 1,950,614	
Option 3	$ (19,669)	-0.75	$ 2,370,549	
Option 4	$ (19,984)			Y
3. Envelope				
Window Shading	$ (223,244)	11.89	$ 212,930	Y
Eliminate Wall Insulation	$ 17,646	-1.94	$ 480,535	Y
Window Film	$ (19,460)	15.23	$ 11,084	Y
Temperature Set Points	$ -	-0.98	$ 1,250,329	Y
Demand Control Ventilation	$ (20,000)	-0.63	$ 1,441,483	Y
4. PV Energy				
Scenario A: Site Arrays	$ (3,000,000)	13.72	$ 2,138,603	
Scenario B: Point-Of-Use Arrays	$ (1,350,000)	12.80	$ 1,116,529	
5. Wind Energy Options				
Scenario A: 30 kW	$ (120,040)	15.44	$ 39,572	
Scenario B: 45 kW	$ (296,300)	15.22	$ 102,778	
Secenario C: 330 kW	$ (734,000)	12.13	$ 479,971	
6. Waste Heat				
Adsorption Chiller	$ (120,250)	1.02	$ 1,253,243	Y
Enthalpy Wheel	$ (36,184)	0.18	$ 791,503	Y
7. Lighting				
New Luminaires	$ (14,615)	-0.82	$ 2,282,533	Y
Occupancy Sensors	$ (31,707)	0.81	$ 370,934	Y
Daylight Sensors	$ (72,724)	1.19	$ 607,910	Y
TOTAL ALL YES MEASURES	$ (580,522)	2.10	$ 12,087,963	





Getting to Green - Goals
Project Implementation

Goals:

- ✓ **15% of facilities meet MOU Guiding Principles**
- ✓ **3rd Party Building Certification**

Project Implementation **Total Projects** 257

ECM (50%)	FY08	FY09	FY10	FY11	FY12	FY13	FY14	FY15
Target	2	7	20	20	20	20	20	20
Complete		9	29	49	69	89	109	**129**
							% of Program Goal - Energy Conservation Measures	**50%**

ESPC (25%)	FY08	FY09	FY10	FY11	FY12	FY13	FY14	FY15
Target	2	3	10	10	10	10	10	10
Complete		5	15	25	35	45	55	**65**
							% of Program Goal - Private Sector Projects	**25%**

Getting to Green - Goals
Facility Audits & Tracking

Goals: ✓ **Audit 75% of facilities = ~193 Posts for water and energy consumption;**

4-year Audit Cycle for 193 Posts

Post Audits	FY08	FY09	FY10	FY11	FY12	FY13	FY14	FY15
Target	48	48	48	49	48	48	48	49
Complete	Cycle I	96	144	**193**	Cycle II	96	144	**193**

Total Posts =	**257**
Posts to audit in 4 year cycles (75% of 257) =	**193**
Posts to audit every year (1/4 of 193) =	**48**
Private Sector Activity	**100%**

✓ **Web-based Tracking;**

Web-Based Tracking of Utilities and Guiding Principals

Post Reporting	FY08	FY09	FY10	FY11	FY12	FY13	FY14	FY15
Complete	90	167	257	257	257	257	257	257

Total Posts =	**257**
OBO Program Activity	**100%**

Getting to Green – Existing Buildings Sustainability Database

Sensitive But Unclassified

Sustainability Data

Collection, Storage, & Reporting

FINAL SUMMARY REPORT

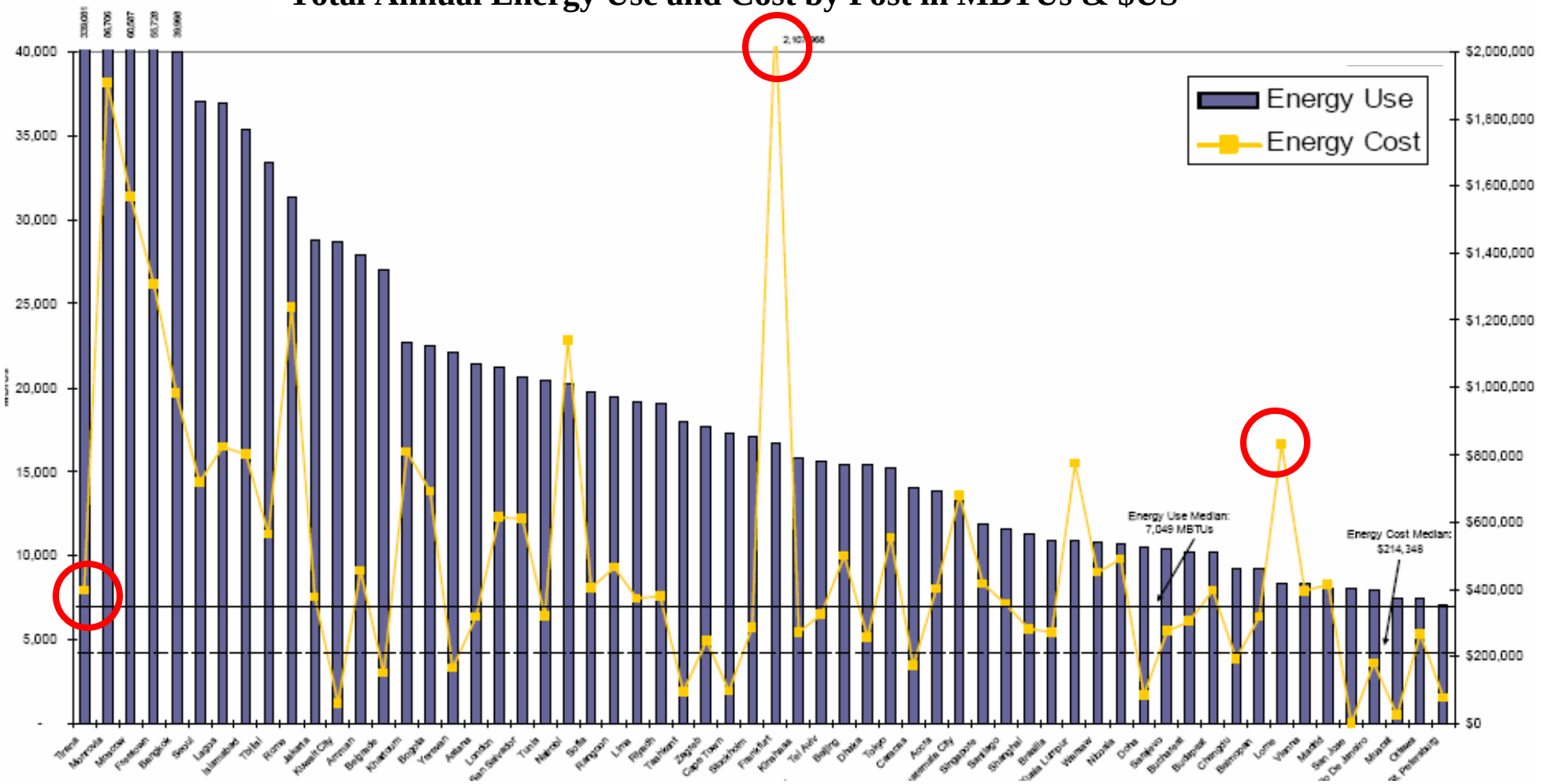
JANUARY 10, 2008

JACOBS

U.S. DEPARTMENT OF STATE
Bureau of Overseas Buildings Operations

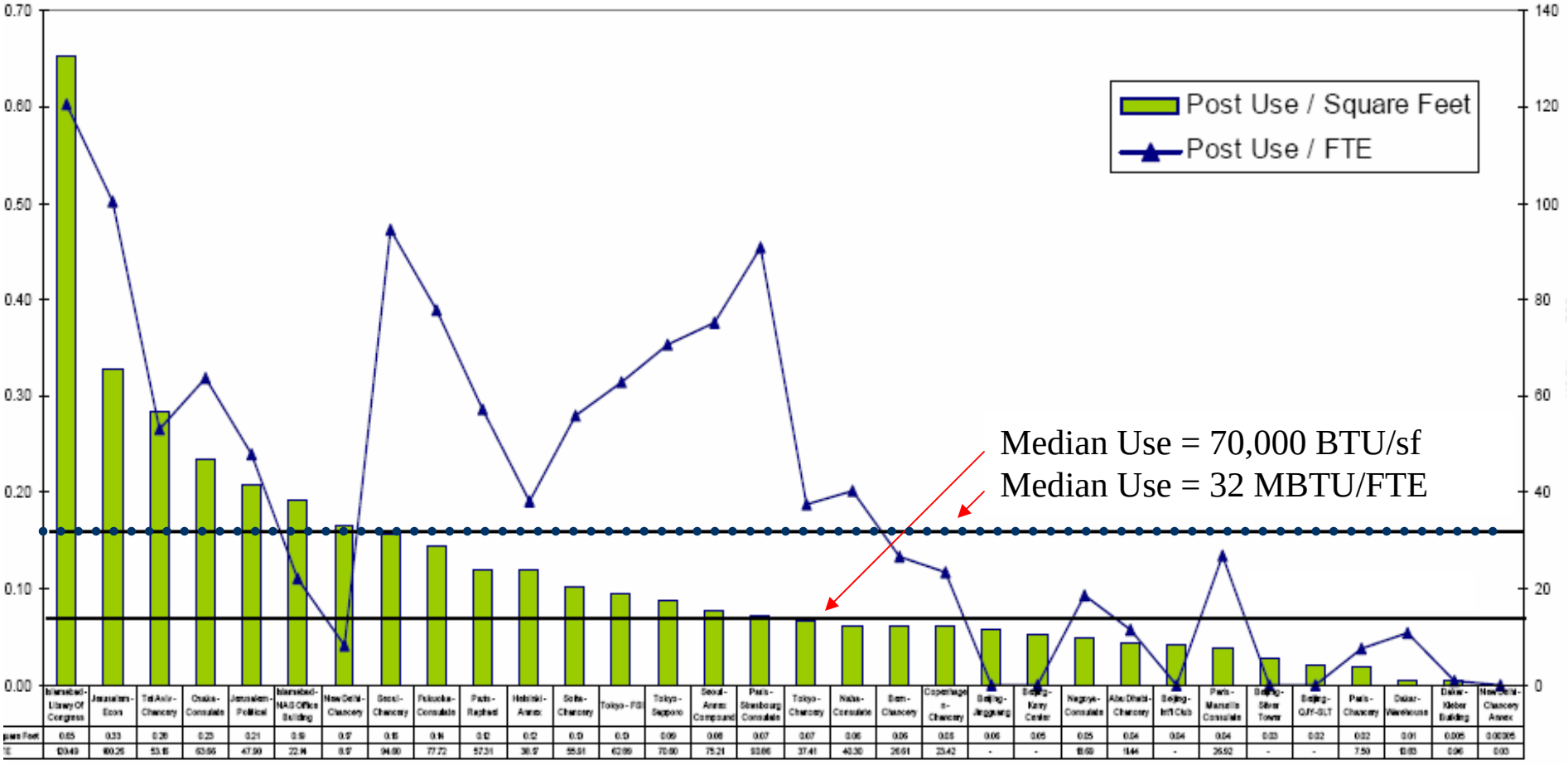
Getting to Green – Existing Buildings
Energy Use & Cost by Post for 2007

Total Annual Energy Use and Cost by Post in MBTUs & $US



Getting to Green – Existing Buildings
Energy Use by sf & FTE

Annual Energy Use MBTU/sf and /FTE by <u>Building</u>



Executive Order 13423: Strengthening Federal Environmental, Energy, and Transportation Management

Energy Baseline 2007

(a) improve energy efficiency and reduce greenhouse gas emissions of the agency, through reduction of energy intensity by (i) 3 percent annually through the end of fiscal year 2015, or (ii) 30 percent by the end of fiscal year 2015, relative to the baseline of the agency's energy use in fiscal year 2003;

	Usage			Cost			Target 08
	MBTU	MBTU / m2	MBTU / FTE	$	$ / m2	$ / FTE	3% Decrease
Electricity:	219,740	0.87	34.74	9,454,744	37.49	1,494.58	213,148
Diesel:	54,306	0.22	8.58	1,067,949	4.23	168.82	52,677
Natural Gas:	18,199	0.07	2.88	311,652	1.24	49.27	17,653
Propane:	254	0.001	0.04	3,310	0.01	0.52	246
District Heating:	43	0.0002	0.01	15,226	0.06	2.41	42
District Cooling:	0	0	0	0	0	0	0

Total Energy Consumed (MBTU):	**292,542**	**# Yes**	**% Yes**	**Target 08**
Buildings with HVAC System Maintenance Programs:		134	59%	Prog. in Place

Getting to Green – Existing Buildings
Crosswalk of EO 13423 w/ LEED-EB

Crosswalk

http://www1

			EQc1.3	IAQ Best Management Practices: Increased Ventilation	1
			EQc1.4	IAQ Best Management Practices: Reduce Particulates-Air Distr	1
1			EQc1.5	IAQ Best Management Practices for Facility Alterations&Additions	1
			EQc2.1	Occupant Comfort: Occupant Survey	1
1			EQc2.2	Occupant Comfort: Occupant Controlled Lighting	1
1			EQc2.3	Occupant Comfort: Thermal Comfort Monitoring	1
1			EQc2.4-5	Daylight and Views 50,% Daylight / 45% Views	1
1			EQc2.4-5	Daylight and Views, 75% Daylight/ 90% Views	1
			EQc3.1	Green Cleaning: High Performance Cleaning Program	1
			EQc3.2-3	Green Cleaning: Custodial Effectiveness Assessment Score 3/2	2
			EQ c3.4	Green Cleaning: Sustainable Cleaning Products 30%	1
			EQ c3.5	Green Cleaning: Sustainable Cleaning Products 60%	1
			EQ c3.6	Green Cleaning: Sustainable Cleaning Products 90%	1
			EQc3.7	Green Cleaning: Sustainable Cleaning Equipment	1
			EQc3.8	Green Cleaning: Entryway Systems	1
			EQc3.9	Green Cleaning: Indoor Integrated Pest Management	1
5	**0**	**0**	**Subtotal**		
LEED			**Innovation**		**7 Points**
YES	Maybe	No			
			IOc1.1-4	Innovation:	4
1			IOc2	LEED Accredited Professional	1
			IOc3	Documenting Sustainable Building Cost Impacts	2
1	**0**	**0**	**Subtotal**		
26	**0**	**0**	**Total YES/Maybe/No**		

* Guiding Principle acheived at ES rating of 75, OR refer to Energy Efficiency tab for more compliance options

** Guiding Principle requirement, no LEED Credit associated

*** Guiding Principles requires 50% recycled or salvaged construction waste

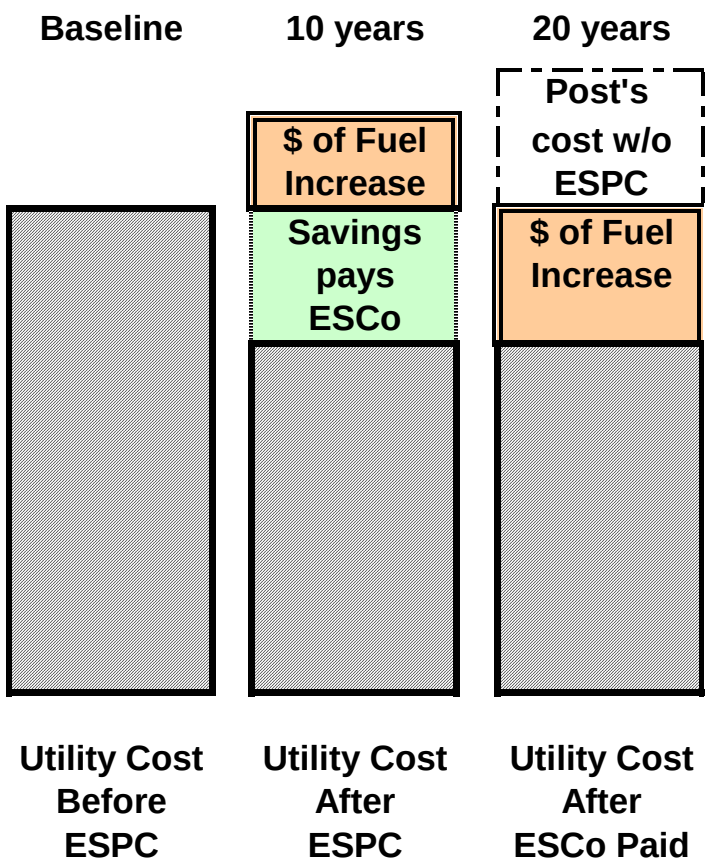
Fulfillment of Guiding Principles for HPSB completes 24 LEED EB credits and 4 prerequisites.

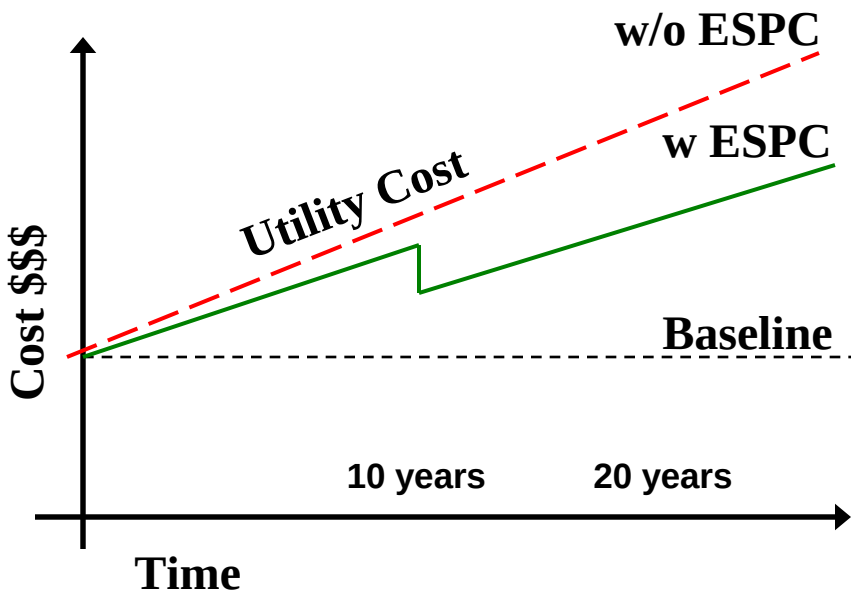
LEED Certification Rating System

Certified: 34-42 points, **Silver:** 43-50 points, **Gold:** 51-67 points, **Platinum:** 68-92 points

Getting to Green – Existing Buildings
Energy Savings Performance Contracting (ESPC)

ESPC - private funding paid by project energy savings over time.

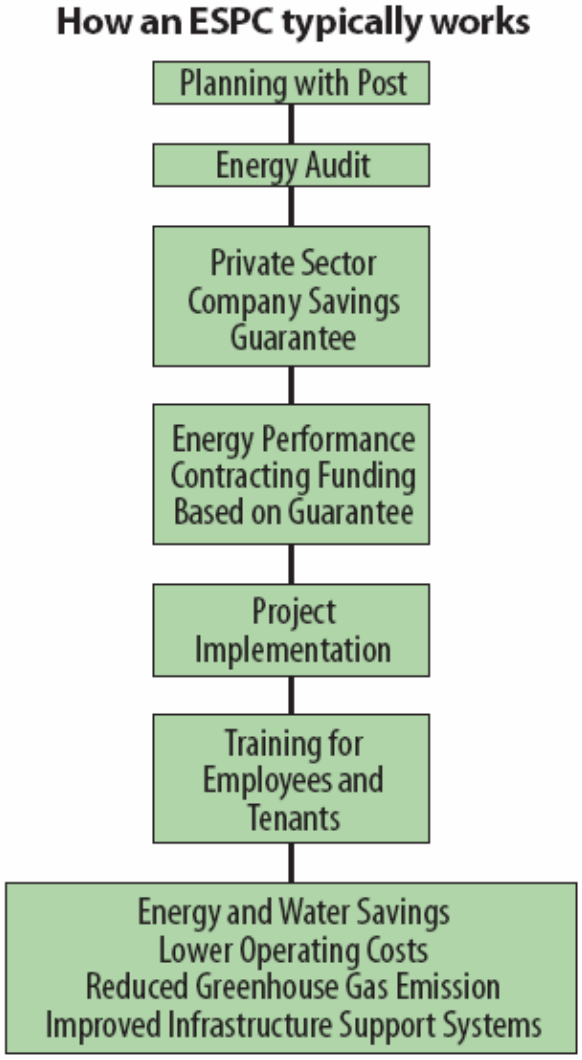




Getting to Green – Existing Facilities ESPC

ESPC - private funding paid by project energy savings over time.

- **Recommended** by *Energy Independence and Security Act*
- **Assistance** by DOE/FEMP pre-competed Energy Savings Contractors (ESCo)
- **Contract support** by OBO/OP/AM at 1% of project cost funded by project
- **Bundle** strategies to achieve reasonable payback period
- **Post Management of Contractor Payment -** lower O&M and utility costs pay the ESCo over time



DOS – DOE MOU:

DOS/OBO & DOE/FEMP signing Memorandum of Understanding to procure ESPCs for the Department

United States Department of State

JUL - 7 2008 *Washington, D.C. 20520*

ACTION MEMO FOR DIRECTOR, AD INTERIM SHINNICK

FROM: OBO/PE – Joseph Toussaint

SUBJECT: Memorandum of Understanding (MOU) with Department of Energy's Federal Energy Management Program (DOE/FEMP) to support Energy Savings Performance Contracting (ESPC)

Recommendation

That you approve the attached MOU to support work with DOE/FEMP to broadly implement ESPC projects for OBO facilities.

Approve _____ Disapprove _____

Background

The President's recent focus on energy- and water-related conservation compels the Department to comply with increasingly more stringent requirements in the operation and maintenance of its facilities. The Energy Independence and Security Act (EISA) signed by President Bush on December 19, 2007 recommended use of ESPCs to achieve the targets without the use of appropriated funds. OBO intends to ramp-up the use of ESPCs in an effort to meet the requirements of EISA, Executive Order 13423 - Strengthening Federal Environmental, Energy, and Transportation Management signed in January 2007, and other federal mandates. DOE/FEMP has developed a very useful program to assist agencies implement ESPCs. OBO has already used this alternative funding method on five projects.

Getting to Green – Existing Facilities ESPC

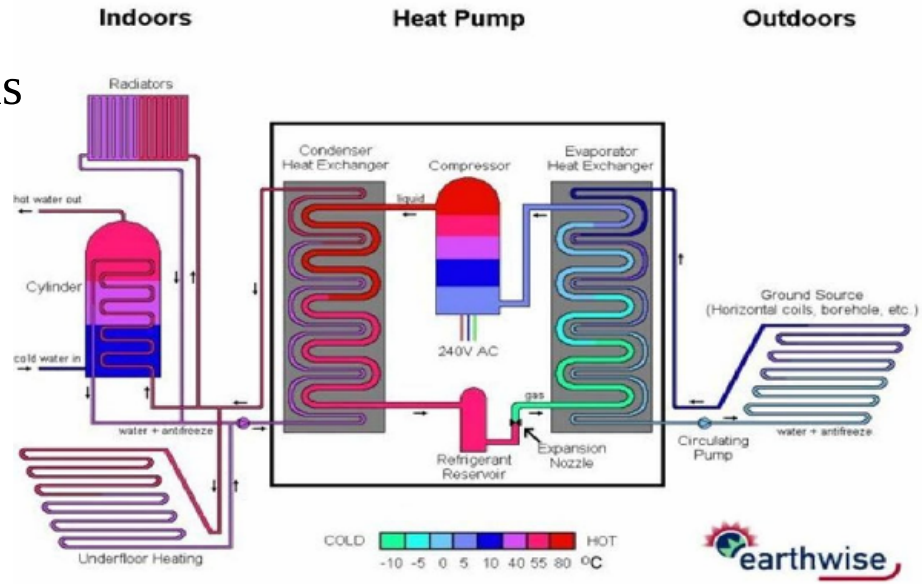
Examples of OBO ESPCs

- Mexico City: Lighting, motors, & controls
  1999- $0.58M 9-yr contract;

- Seoul: Geothermal heat pumps
  2001- $12.5M 19-yr contract;

- Santo Domingo: Lighting and controls
  2005- $0.72M 10-yr contract;

- Dhaka: Gas turbine generators
  2007- $0.72M 11-yr contract;



Geothermal Heat Pump System

Getting to Green – Existing Facilities
ESPC Photovoltaic Projects

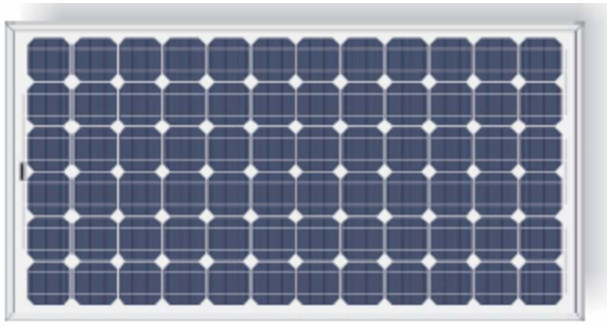
Photovoltaics: OBO Prioritization Listing **by Payback**:

Rank	FY NEC	Post	Country	kW PV	Project Cost (Total)	Annual Savings	Simple Payback (Years)	Utility Rate $/kWh
1	10	N'Djamena	Chad	300	$3,085,000	$1,955,088	2	$1.21
2		Abuja - NOX	Nigeria	125	$1,085,000	$671,104	2	-
3		Rangoon	Burma	250	$2,585,000	$671,882	4	-
4	09	Monrovia	Liberia	500	$4,085,000	$1,106,718	4	-
5	10	Santo Domingo	Dominican Rep	500	$4,085,000	$1,043,485	4	$0.40
6	05	Kigali	Rwanda	419	$4,275,000	$973,385	5	$0.45
7	05	Port-Au-Prince	Haiti	339	$4,390,000	$889,466	5	-
8	06	Harare	Zimbabwe	569	$4,637,000	$863,245	6	$0.15
8		Windhoek	Namibia	750	$6,085,000	$1,083,239	6	$0.40
9	06	Djibouti	Djibouti	569	$4,637,000	$821,817	6	$0.40
10	07	Ouagadougou	Burkina Faso	569	$4,637,000	$770,991	6	$0.40
11	07	Johannesburg	South Africa	569	$4,637,000	$767,662	6	$0.30
12		Kabul	Afghanastan	250	$2,085,000	$344,801	6	-
13		Athens	Greece	404	$2,711,000	$557,506	6	$0.12
14	09	Valletta	Malta	105	$925,000	$142,267	7	$0.30
15	06	Beirut	Lebanon	569	$4,637,000	$706,291	7	$0.30
16		Freetown	Siera Leon	500	$5,085,000	$747,574	7	-
17		Frankfurt	Germany	33	$299,500	$49,648	7	$0.14
18	06	Khartoum	Sudan	347	$2,861,000	$402,951	7	$0.40
19	08	Juba	Sudan	1000	$11,085,000	$1,569,768	7	-
20		Dushanbe	Tajikistan	300	$3,085,000	$402,110	8	$0.25
21	09	Malabo		200	$1,685,000	$220,673	8	-
22		Managua	Niceragua	569	$5,775,000	$705,489	8	$0.20
22	06	Brazzaville	Congo	569	$4,637,000	$549,338	9	$0.15
23		Phnom Penh	Cambodia	198	$2,065,000	$240,313	9	-
24		Conakry	Guinea	300	$2,485,000	$289,633	9	-

Getting to Green – Existing Facilities
ESPC Photovoltaic Projects

Photovoltaics: = ~$4.2M First Cost w/ $168M Savings

- **Economic benefits:** Passive power production with no fuel cost
  - 4–year payback for new construction depending on utility/fuel costs
  - Supplement prime power source – reducing generators in prime plant
  - Reduces electrical source use during peak load
  - LOW Maintenance – Passive system only requires periodic cleaning
  - Modular and able to be phased
- **System:** PV Panels, Inverters, & Mounting
  - Installation on large open roof areas
- **Other benefits:**
  - Increased security through independence/control of power source



Typical PV Panel

OBO's Photovoltaic Installation
Geneva, Switzerland

Getting to Green – Existing Facilities
ESPC - MagLev Chiller Projects

MagLev Chillers = $.5M First Cost w/ $19M Savings

- **Economic benefits**: Variable speed high efficiency modular cooling capacity with lower utility/fuel cost.
  - Reduces Power Usage – 1 k - 0.5 kW/ton of cooling
  - 6-7-yr payback – depending on utility/fuel costs
  - Lower Maintenance – oil free magnetic bearings reduce wear and maintenance
  - Modularity - additional capacity at minimum cost
  - No Cooling Tower – reduces water usage and minimizes chemical usage
- **System**: Compressors, condensers and controls
  - Low noise, frictionless bearings, variable frequency drive, permanent magnet rotors, compact.
  - Projects currently initiated Tokyo and Geneva
- **Savings**:
  - Reduction of generator size and fuel consumed in prime power plants.
  - Adjustable capacity Minimum production during low demand and subsequently low energy usage.
  - Modules can be added to match increasing loads.

High Efficiency Compressor

OBO's MagLev Chillers
Tokyo, Hong Kong

DESIGN & ENGINEERING

Home
About the Program
Green Team Initiatives
Green Building Certification
Energy & Sustainability Projects
Support

Utility Data Portal

Welcome

Since 1999, the Department of State's Bureau of Overseas Buildings Operations (OBO) has worked to significantly increase the performance of its more than 285 embassies and consulates around the world. Through new construction; major renovation, and systems upgrades, OBO has greatly improved conditions for our Americans overseas. OBO has already moved over 18,573 employees to 60 newly completed facilities, with an additional 30 new compounds under construction, and has substantially renovated over 200 since 2000.

Our diplomatic missions require safe, secure, functional, well-maintained, and sustainable platforms for operation. At a time of surging energy prices and increasingly limited access to freshwater resources, conservation is of paramount importance at our facilities. Through the past decade, issues of security have taken priority over energy and sustainability. Recent federal mandates have demonstrated the interconnection of these two concerns. The *Energy Policy Act* 2005, 2006 *Federal Leadership in High Performance and Sustainable Buildings Memorandum of Understanding (MOU)* 2007 *Executive Order 13423-- Strengthening Federal Environmental, Energy*; and *Transportation Management, and the Energy Independence and Security Act (EISA)* 2007 require aggressive targets for sustainability. EISA has reclassified energy and water as issues of national security. To address and meet the aggressive targets set by these Federal mandates, OBO formed a cross-cutting "Green Team" including participation by technical experts in the fields of real-estate, planning, architecture, civil engineering, electrical engineering, mechanical engineering, interiors, security, construction, and commissioning.

The Green Team has delivered several milestones to galvanize commitment, guide progress, and demonstrate results, including:

Eco - Diplomacy
OBO's 1st LEED Certification

NEC for Sofia, Bulgaria earned 7 Prerequisites and 26 Points:

- 37% Better than ASHRAE
- Brownfield Redevelopment
- Ozone Protection
- No Chemical Water Treatment
- Enhanced Indoor Air Quality
- Tree Preservation
- Building as Educational Tool

Eco - Diplomacy
OBO's 2nd LEED Certification

NEC for Panama City earned <u>7 Prerequisites & 26 Points</u>:

- 35% Better than ASHRAE
- Ozone Protection
- Water Efficient Landscaping
- Regional Materials
- Low Emitting Materials
- Enhanced Indoor Air Quality
- Building as Educational Tool

Eco – Diplomacy
Sustainability Studies & Reports

Studies and reports support both new and existing facilities:

- Wind
- Vegetative Roofs
- Sustainable Lighting
- Water Resources
- Photovoltaics
- ***Coming soon:***
    - Metering
    - LED

Eco - Diplomacy
OBO GreenGuide for Posts

GreenGuide for Embassy & Consulate Operations

First Edition

GreenGuide
for
Embassy & Consulate Operations

"I encourage our missions to use this timely and valuable guide to address energy and sustainability challenges at our facilities overseas, in response to federal mandates and in support of greater environmental stewardship. Regular adherence to the guidance provided here will allow Overseas Buildings Operations to participate in and forward the Department of State's platform of eco-diplomacy."

Patrick F Kennedy
Under Secretary of Management
Department of State

SITE

Natural wetland systems have often been described as the "earth's kidneys because they filter pollutants from water that flows through on its way to receiving lakes, streams and oceans. Because these systems can improve water quality, engineers and scientists construct systems that replicate the functions of natural wetlands.

WATER

The Saguaro is the ultimate water harvester-sucking up as much water as possible when it rains. The trunk and arms are pleated like an accordion and can expand or contract with the amount of water taken in. Saguaro roots extend to a diameter of 100 feet (for a 50-foot-high Saguaro) at a depth of only inches. Tiny hairs absorb even concentrated drizzle or mist.

ENERGY

The potential of solar power in the Southwest United States is comparable in scale to the hydropower resource of the Northwest. A desert area 10 miles by 15 miles could provide 20,000 megawatts of power, while the electricity needs of the entire United States could theoretically be met by a photovoltaic array within an area 100 miles on a side.

MATERIAL

The gecko can support his entire body with one toe. Biomimicry scientists are studying the microscopic hairs (setae) gecko's toes as a model for developing the first dry, self-cleaning adhesive

INDOOR ENVIRONMENT

Termites have designed their structure to perfectly balance the raging heat of the day and the bitter cold of the night naturally ventilating their environment to an even 78 *F.

TRANSPORTATION

Ruby-Throated Hummingbirds fly ~27 miles per hour on their 18.5 hour migration flight across the Gulf of Mexico without refueling.

That is fuel efficiency worth mimicking.