



Developing a Business Case for Sustainable Federal Facilities

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Outline

- **Background:** Rationale and audiences for the 'business case' for sustainable federal facilities
- **Conceptual framework:** "Sustainable" facilities – three key aspects
- **Approach:** Understanding the tangible and less tangible costs and benefits of sustainable facilities
- **Preliminary results:** Examples, gaps, and next steps



Executive order requires sustainable design

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Executive Order 13123

Efficient Energy Management

Whole Building Design Guide: the Order required DoD, GSA (with DOE and EPA) to develop sustainable design principles, which were organized into the following categories:

- Site
- Energy
- Materials
- Water
- Indoor Environmental Quality (IEQ)
- Operations and Maintenance

Executive order requires lifecycle costing

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Executive Order 13123

Efficient Energy Management

Life-cycle costing: the Order requires agencies to use life-cycle cost analysis in making decisions about investments in construction, products, services, etc.

Federal Energy Management Goals

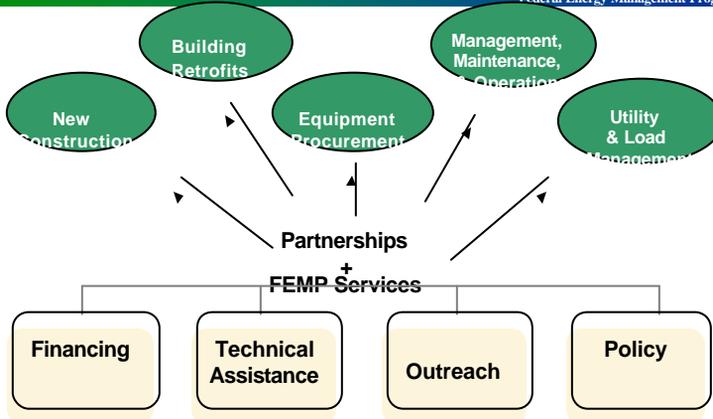
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- **Reduce energy consumption**
 - Facility energy per square foot to be reduced by 30 percent in 2005 and 35 percent in 2010 relative to 1985
 - Industrial/laboratory energy to be reduced by 20 percent in 2005 and 25 percent in 2010 relative to 1990
- **Expand use of renewable energy**
 - 2.5% of Federal facility electricity consumption by 2005
 - 2,000 solar energy systems by 2000; 20,000 by 2010
- **Implement best management practices for water conservation in 80% of Federal facilities by 2010**
- **Reduce greenhouse gas emissions 30 percent by 2010 (from 1990)**

Targeting Key Opportunities



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Rationale for articulating a “business case” for sustainable facilities

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- The Federal agencies are pursuing sustainable design/construction goals, in compliance with the Executive Orders
- But higher first costs remain difficult to justify, especially in a government setting
- Need more proof that “green” is better – compelling economic data; fact-based and balanced information



Audiences for the ‘business case’

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- Designers within federal government and private A&E firms
- Middle managers involved in facility decisions
- Budget formulators in Federal Agencies
- High-level government policy makers
- The private sector

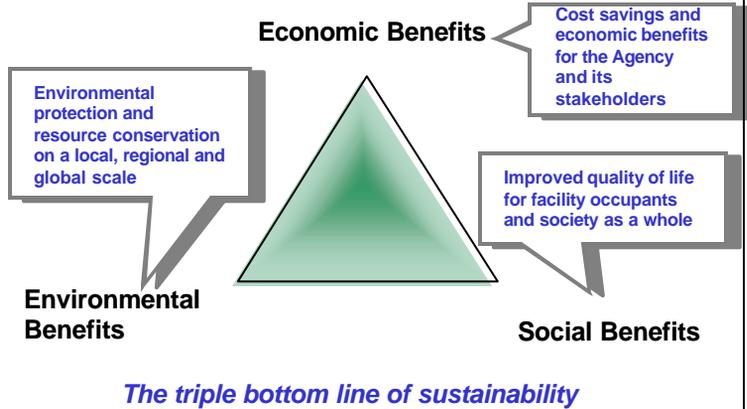
In a recent survey, USGBC members rated developing the ‘business case’ for sustainable design a high priority.



Conceptual Framework

Sustainable Facilities: Three Key Aspects

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Approach

The Matrix of Benefits

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	Social	Environmental	Economic
Sustainable Siting			
Water Efficiency			
Materials & Resources			
Energy and Atmosphere			
IEQ			
O&M and Commissioning			

Triple Bottom Line Aspects of Sustainability

Sustainable Design Features/Strategies (grouped into LEED/WBDG categories)

Results

The Matrix of Benefits: Examples

	Social	Environmental	Economic
Sustainable Siting	Land preservation, improved aesthetics, less public disturbance	Lower resource use, protection of habitats, soil and water conservation	Reduced costs for site prep & clear-cutting, parking lots, storm drainage, landscape maintenance, mech. systems
Water Efficiency			
Materials & Resources			
Energy and Atmosphere			
IEQ			
Commissioning, O&M			

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IEQ			
Commissioning, O&M			

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IEQ	Reduced adverse health impacts; improved occupant productivity	Better air quality inside the facility, reduced VOC emissions	Organizational productivity, lower disability/health ins. costs; reduced threat of litigation
Commissioning, O&M			

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Commissioning, O&M	Occupant satisfaction, health/safety	Improved energy efficiency and air pollution emissions	Energy cost reduction, lower replacement costs, reduced cost of dealing with complaints

Tangible Economic Benefits: Quantitative Examples

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- **Reduced energy costs** **\$0.3-0.8/sf/yr**
- **O&M savings - water** **\$0.0025- 0.0050/sf/yr**
- **O&M savings - maintenance** **\$0.11-0.77/sf/yr**

Source: NYC High Performance Building Guidelines

<http://www.ci.nyc.ny.us/html/ddc/html/highperf.html>



Case Study: Wastewater treatment

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Sustainable Siting	<p>Headquarters Park Office Complex in Princeton, New Jersey (Four buildings; 366,500 square feet)</p> <ul style="list-style-type: none"> • Used wastewater recycling for treatment and recycling of both 'gray' and 'black' water, reduced flows to 1,600 gpd (original design was 27,000 gpd) • System cost \$250,000 less than the originally contemplated treatment system, lowered operating costs, and accrued \$15,000 per year in water bill savings
Water Efficiency	
Materials/Resources	
Energy Efficiency	
IEQ	
Commissioning and O&M	

Source: NYC High Performance Building Guidelines
<http://www.ci.nyc.ny.us/html/ddc/html/highperf.html>

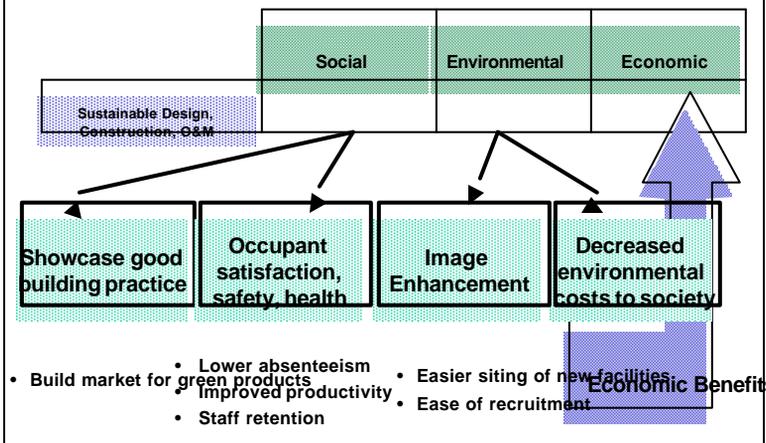
Case Study: Energy

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Washington Navy Yard Building 33	
Sustainable Siting	<ul style="list-style-type: none"> Very minimal first incremental first cost differential (features added in the last stage of design when budget was already fixed) Constrained due to historic nature of the building Added super windows, skylights, better lighting and lighting controls, high-efficiency HVAC motors; optimized chiller, piping, ductwork Obtained 15% electricity savings (\$58,000 per year) mostly due to mechanical system and downsized chiller
Water Efficiency	
Materials/Resources	
Energy Efficiency	
IEQ	
Commissioning and O&M	

The Matrix of Benefits: Less Tangible, Strategic Benefits

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The Matrix of Benefits – Data and Gaps

	Social	Environmental	Economic
Sustainable Siting	Yellow	Yellow	Yellow
Water Efficiency	Red	Green	Green
Materials & Resources	Yellow	Yellow	Yellow
Energy and Atmosphere	Yellow	Green	Green
IEQ	Green	Yellow	Yellow
Commissioning & O&M	Red	Green	Green



Quantitative data available



Anecdotal data



Data sparse or absent

Next Steps

- Complete data gathering and analysis
- Develop report on the “state of the art” – Sept '02
- Collaborate with others to develop protocols for measurement of key sustainable facility indicators – FY02-03

