

# LEED Implementation Scope and Cost



Conventional Facilities Advisory Committee  
Ove Dyling  
Assistant Director for Design Conventional Facilities  
September 25, 2007

# Sustainable Design

---

- On September 20, 2007 BNL received DOE clarification of LEED Certification for Light Source type facilities
- Strategies:  
Line item Construction Projects (including major renovations) with cost that exceed \$5 million will incorporate the “Guiding Principles” for high performance and sustainable buildings to the maximum extent possible.
- Action Steps:
  - Exemptions:  
Projects that build new special purpose facilities (such as light sources; nanocenters; particle accelerators; nuclear facilities; etc.) will be reviewed on a case by case basis for impact of applying the “Guiding Principles” to their efficacy and cost-effectiveness

# What it takes to reach GOLD level

---

- Certification level is virtually no cost, silver moderate, Gold is substantial – approximate cost trade-off for each point:
- Heat Island Effect, Non-roof:
  - Tree shading, open grid paving, or light colored paving
  - Cost impact to landscaping and paving costs \$300 -\$500
- Light Pollution Reduction:
  - Cut-off fixtures – minimal cost included
- Innovative Wastewater Technologies:
  - Collect rain water from LOB to use for sewage conveyance
    - Cost: \$282,000 (alternate can be waterless urinals)
  - Collect rainwater from Ring Building to use as 20% make-up water to cooling tower
    - Cost: \$375,000

# What it takes to reach GOLD level cont.

---

- Water Use Reduction 30% Reduction:
  - Collecting rainwater (credit 3.2)
    - Cost \$400-700k
- Optimize Energy Performance:
  - Clearstory windows – Ring Exterior
    - Cost: \$277,000
  - High Performance Glazing - included
  - Day lighting Controls in LOB Offices - included
  - Improving Building Envelope - included
  - Air-side Economizer
    - Cost: \$123,000

# What it takes to reach GOLD level cont.

---

- Indoor Chemical & Pollutant Source Control:
  - MERV 13 Filtration for return and outside air
    - Cost: minimal (negative pressure for room with chemicals)
- Controllability of Systems, Lighting:
  - 90% of occupancy can control the lighting level.
    - Cost: minimal
- Thermal Comfort, Design:
  - Thermal comfort of air temperature, radiant temperature, air speed and humidity within allowable range of ASHRAE 55.
    - Cost: \$100,000
- Thermal Comfort, Verification:
  - Survey building occupancy within 6 months to 18 months
    - Cost: minimal

# What it takes to reach GOLD level cont.

---

- Innovation in Design: Rainwater for Cooling Tower Make-up:
  - Same as Innovative Wastewater Technologies.
- Enhanced Commissioning:
  - Cost: \$1 to \$2 per square feet.
- Enhanced Refrigerant Management:
  - Due to increasing availability little cost impact.
- Measurement & Verification:
  - In the cost range of \$2 to \$4 per square feet. Write and implement can range from \$50,000 to \$200,000
- Construction Waste Management:
  - Contractor needs to be experienced in LEED projects.
    - Cost: minimal

# What it takes to reach GOLD level cont.

---

- Regional Materials and Recycled Content:
  - Materials must be available locally.
  - Contractor needs to be experienced in LEED projects.
- Daylighting:
  - Clearstory windows in LOB and Ring Building
    - Cost: \$277,000 - \$348,000
- Process Chilled Water Heat Recovery;
  - Supports the Executive Order
  - Possible innovation credit
    - Cost: \$420,000
- Summary of Cost to reach GOLD level:
  - \$1,454,000 - \$1,800,000

# Strategy for NSLS II

---

- Incorporate no cost and minimal cost items in base scope package
  - Will be sufficient to achieve certification
  - May enable silver rating (as experienced with CFN)
- Identify alternates in bid package for additional cost items that do not complicate design/bid process
  - Prioritize and Implement if favorable bid results
- Do not implement items that pose operational risks to accelerator reliability/operation

# What it takes to reach GOLD level cont.

	Gold		Base		Cost	Comment
	Design	Design	Design	Design		
<b>Sustainable Sites</b>						
Prereq 1	Construction Activity	Y	Y			
Credit 1	Site Selection	Y	Y	No/Low Cost		
Credit 2	Development Density & Community Connectivity	N	N			
Credit 3	Brownfield Redevelopment	N	N			
Credit 4.1	Alternative Transportation, Public Transportation Access	Y	Y	No/Low Cost	In program	
Credit 4.2	Alternative Transportation, Bicycle Storage & Changing Rooms	Y	Y	No/Low Cost	In program	
Credit 4.3	Alternative Transportation, Low-Emitting and Fuel-Efficient Vehicles	Y	Y	No/Low Cost	Requires commitment by BNL to set aside parking for efficient vehicles	
Credit 4.4	Alternative Transportation, Parking Capacity	Y	Y	No/Low Cost	Requires commitment by BNL to not exceed local zoning requirement	
Credit 5.1	Site Development, Protect or Restore Habitat	?	?			
Credit 5.2	Site Development, Maximize Open Space	Y	Y	No/Low Cost	In program	
Credit 6.1	Stormwater Design, Quantity Control	Y	Y	No/Low Cost	Required by NY code	
Credit 6.2	Stormwater Design, Quality Control	?	?	No/Low Cost	Required by NY code	
Credit 7.1	Heat Island Effect, Non-Roof	Y	?	Cost	See Note 1	
Credit 7.2	Heat Island Effect, Roof	Y	Y	No/Low Cost		
Credit 8	Light Pollution Reduction	Y	?	Cost	See Note 2	
<b>Water Efficiency</b>						
		5	3			
Credit 1.1	Water Efficient Landscaping, Reduce by 50%	Y	Y	No/Low Cost	In program	
Credit 1.2	Water Efficient Landscaping, No Potable Use or No Irrigation	Y	Y	No/Low Cost	In program	
Credit 2	Innovative Wastewater Technologies	Y	?	Cost	Comprehensive Solution 1	
Credit 3.1	Water Use Reduction, 20% Reduction	Y	Y	No/Low Cost	Low flow fixtures	
Credit 3.2	Water Use Reduction, 30% Reduction	Y	?	Cost or Low Cost	Comprehensive Solution 1 or use of waterless urinals	
<b>Energy &amp; Atmosphere</b>						
		5	3			
Prereq 1	Fundamental Commissioning of the Building Energy Systems	Y	Y			
Prereq 2	Minimum Energy Performance	Y	Y			
Prereq 3	Fundamental Refrigerant Management	Y	Y			
Credit 1	Optimize Energy Performance	3	1	Cost	Comprehensive Solution 2	
Credit 2	On-Site Renewable Energy	?	?	High cost		
Credit 3	Enhanced Commissioning	Y	Y	Cost	See Note 11	
Credit 4	Enhanced Refrigerant Management	Y	Y	No/Low Cost	See Note 12	
Credit 5	Measurement & Verification	?	?	Cost	See Note 13	
Credit 6	Green Power	?	?	High cost		
<b>Materials &amp; Resources</b>						
		6	6			
Prereq 1	Storage & Collection of Recyclables	Y	Y			
Credit 1.1	Building Reuse, Maintain 75% of Existing Walls, Floors & Roof	Y	Y			
Credit 1.2	Building Reuse, Maintain 100% of Existing Walls, Floors & Roof	N	N			
Credit 1.3	Building Reuse, Maintain 50% of Interior Non-Structural Elements	N	N			
Credit 2.1	Construction Waste Management, Divert 50% from Disposal	Y	Y	No/Low Cost	See Note 14	
Credit 2.2	Construction Waste Management, Divert 75% from Disposal	Y	Y	No/Low Cost	See Note 14	
Credit 3.1	Materials Reuse, 5%	?	N			
Credit 3.2	Materials Reuse, 10%	N	N			
Credit 4.1	Recycled Content, 10% (post-consumer + ½ pre-consumer)	Y	Y	No/Low Cost	See Note 15	
Credit 4.2	Recycled Content, 20% (post-consumer + ½ pre-consumer)	Y	Y	No/Low Cost	See Note 15	
Credit 5.1	Regional Materials, 10% Extracted, Processed & Manufactured Regionally	Y	Y	No/Low Cost	See Note 15	
Credit 5.2	Regional Materials, 20% Extracted, Processed & Manufactured Regionally	Y	Y	No/Low Cost	See Note 15	
Credit 6	Rapidly Renewable Materials	N	N			
Credit 7	Certified Wood	?	?			
<b>Indoor Environmental Quality</b>						
		10	6			
Prereq 1	Minimum IAQ Performance	Y	Y			
Prereq 2	Environmental Tobacco Smoke (ETS) Control	Y	Y			
Credit 1	Outdoor Air Delivery Monitoring	Y	Y	No/Low Cost		
Credit 2	Increased Ventilation	?	N			
Credit 3.1	Construction IAQ Management Plan, During Construction	Y	Y	No/Low Cost		
Credit 3.2	Construction IAQ Management Plan, Before Occupancy	Y	Y	No/Low Cost		
Credit 4.1	Low-Emitting Materials, Adhesives & Sealants	Y	Y	No/Low Cost		
Credit 4.2	Low-Emitting Materials, Paints & Coatings	Y	Y	No/Low Cost		
Credit 4.3	Low-Emitting Materials, Carpet Systems	Y	Y	No/Low Cost		
Credit 4.4	Low-Emitting Materials, Composite Wood & Agrifiber Products	?	N		Low availability of materials	
Credit 5	Indoor Chemical & Pollutant Source Control	Y	?	Low Cost	See Note 6	
Credit 6.1	Controllability of Systems, Lighting	Y	?	Cost	See Note 7	
Credit 6.2	Controllability of Systems, Thermal Comfort	?	?		See Note 16	
Credit 7.1	Thermal Comfort, Design	Y	?	Low Cost	See Note 8	
Credit 7.2	Thermal Comfort, Verification	Y	?	Low Cost	See Note 9	
Credit 8.1	Daylight & Views, Daylight 75% of Spaces	?	?	Cost	See Note 17	
Credit 8.2	Daylight & Views, Views for 90% of Spaces	N	?			
<b>Innovation &amp; Design Process</b>						
		4	3			
Credit 1.1	Innovation in Design: Recycled Content 30%	Y	Y	No/Low Cost		
Credit 1.2	Innovation in Design: Green Cleaning	Y	Y	No/Low Cost		
Credit 1.3	Innovation in Design: Rainwater for Cooling Tower Make-up	Y	?	Cost	Comprehensive Solution 1	
Credit 1.4	Innovation in Design: Sustainable Site Maintenance	?	?			
Credit 2	LEED® Accredited Professional	Y	Y			
<b>Project Totals (pre-certification estimates)</b>						
		40	29			
Certified 26-32 points Silver 33-38 points Gold 39-51 points Platinum 52-69 points						