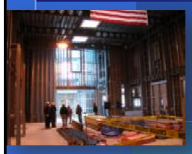
LEED
New Construction



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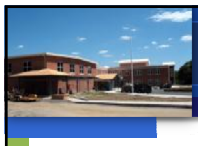

Learning Objectives

- Participants completing this seminar will be able to…
  - Understand the CT Regulations with regard to LEED
  - Define “green.”
  - Understand what LEED/USGBC mean.
  - Learn how to become a LEED Accredited Professional.
  - Explain the criteria of a LEED NC certified project.
  - Understand the LEED Online and submittal process.
  - Illustrate the role of the Building Official with respect to LEED.

Public Act 07-242

- Sec. 10. Section 16a-38k of the general statutes is repealed and the following is substituted in lieu thereof (*Effective January 1, 2008*)
  - State Facility [Effective Jan 1st 2007]
    - New Construction - Total Cost 5M or more w/ State funding 2M or more
    - Renovation - Total Cost 2M or more w/ State funding 2M or more
  - Any New Construction [Effective Jan 1st 2009]
    - New Construction - Total Cost 5M or more w/ State funding 2M or more
  - School Renovation [Effective Jan 1st 2009]
    - Renovation - Total Cost 2M or more w/ State funding 2M or more
  - Exception
    - Costs of compliance outweigh benefits as determined by OPM

Public Act 07-242

- Sec. 10. Section 16a-38k of the general statutes is repealed and the following is substituted in lieu thereof (*Effective January 1, 2008*):
  - Meet or Exceed LEED Silver
    - Energy efficiency must exceed 2004 (ASHRAE) Standard 90.1 by no less than twenty per cent,
  - OR Meet or Exceed two-globe rating in the Green Globes USA design program

What is LEED?

CES

What is LEED?

- "USGBC" stands for – United States Green Building Council
- Its Role:
  - Development,
  - Implementation and
  - Validation of the LEED building standard.
- USGBC is a non-profit consensus organization

U.S. GREEN BUILDING COUNCIL LEED USGBC

What is LEED?

OUR MISSION

To transform the way buildings and communities are designed, built and operated, enabling an environmentally and socially responsible, healthy and prosperous environment that improves the quality of life.

© U.S. Green Building Council, 2008

What is LEED?

USGBC membership growth reflects the expansion of green buildings in the market.

*As of July 2008

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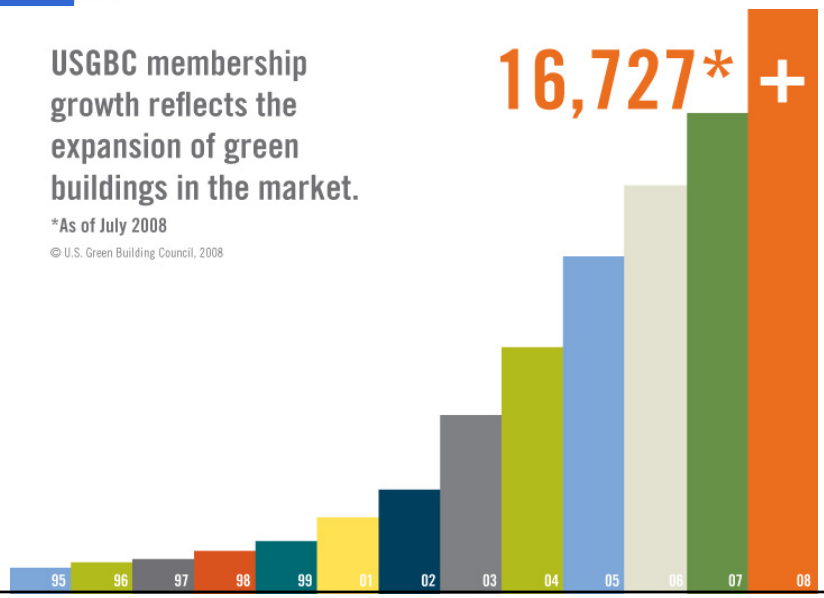


What is LEED?

- What is LEED?
  - "LEED" stands for Leadership in Energy and Environmental Design
- LEED – A Working Definition
  - Whole-building approach that encourages and guides a design team to optimize environmental and economic concepts under a standard framework for comparison

What is LEED?

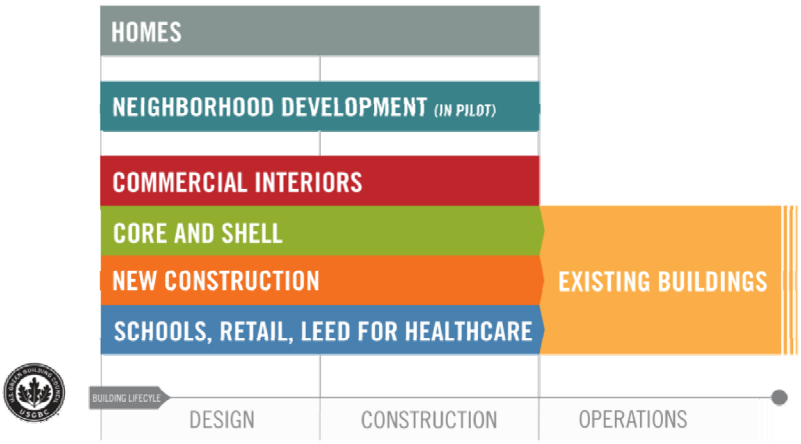
- The Different versions LEED
  - LEED-NC for new construction projects (the most commonly applied-for LEED certification)
  - LEED-EB for existing buildings seeking LEED certification
  - LEED-CI for commercial interior fit-outs by tenants
  - LEED-CS for core-and-shell projects (total building minus tenant fit-outs)

What is LEED?

- The Different versions LEED
  - LEED-H for Homes
  - LEED-ND for neighborhood development
    (drafting stage - to go into pilot late 2006, early 2007)
  - LEED – Schools
  - Others are in the works for retail, health care (Pilot Program)

What is LEED?

LEED addresses the complete lifecycle of buildings:



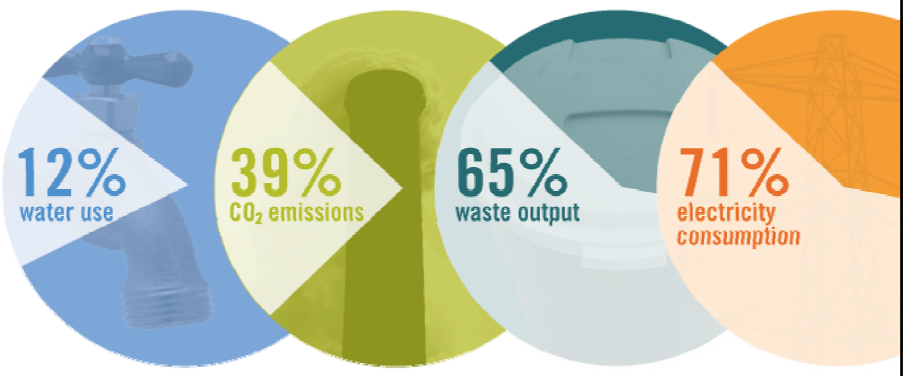
What is LEED?

What is LEED?

- Why was LEED created ?
  - Define “green building” by providing a standard of measurement
  - Promote integrated, whole-building design practices
  - Raise awareness of Environment impact, world impact, health, operating cost impact
  - Raise consumer awareness of green building benefits
  - Recognize environmental leadership in the building industry and stimulate green competition

What is LEED?

U.S. Building Impacts:



What is LEED?

WORLDWIDE, BUILDINGS ACCOUNT FOR...

17% fresh water withdrawals

25% wood harvest

33% CO_2 emissions

40% material and energy use
45% in china

Benefits of LEED

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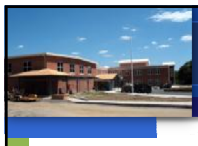
Benefits of LEED



- Benefits of LEED
  - Enhance occupant health and comfort

Benefits of LEED

- Benefits of LEED
  - Improve occupant performance

Benefits of LEED

- Benefits of LEED
  - Decrease employee absenteeism and turnover

Benefits of LEED

- Benefits of LEED
  - Contribute to growing knowledge base

Benefits of LEED

- Benefits of LEED
  - Receive PR exposure through the USGBC Website, case studies, media announcements and a LEED certification plaque to mount on the building

Becoming a LEED™ AP

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Becoming a LEED™ AP

- What is a LEED Accredited Professional?
  - Anyone interested in LEED process;
    - Design or Administrative.
  - No Degree or Professional Certificate Required.
  - Must pass a comprehensive exam.
    - To test understanding of green building practices and principles, and familiarity with LEED requirements, resources, and processes
  - Required for LEED Project Certification.

Becoming a LEED™ AP

- Information regarding the program is available on the USGBC website at www.usgbc.org.
- Educational and training resources for green technologies can be obtained through the USGBC.
- Study Groups assist with Learning LEED.

Becoming a LEED™ AP

- Benefits of LEED Professional Accreditation
  - Individual Benefits
    - Receive a LEED Accredited Professional Certificate, a marketable credential to an employer, prospective employer, or client
    - Provides an avenue for continued professional development
  - Employer Benefits
    - Eligibility for projects requiring a LEED Accredited Professional
    - Enhances credibility to clients and in the green building market place in general

What is LEED?

The LEED Design/Construction Process

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LEED Process

- LEED NC Design/Construction Process Cont…
  - Assemble Team
  - Organize a LEED Design Charette
  - Determine which rating system applies?
  - Register Project Online
  - Conduct Integrated LEED Construction/Design Process
  - Proceed with standard project phasing (SD/DD/CD/CA)
  - Submit verification of LEED points throughout design/construction process.

The LEED Process

- LEED NC Design/Construction Process Cont…
  - LEED Certified 26 – 32 points
  - Silver Level 33 – 38 points
  - Gold Level 39 – 51 points
  - Platinum Level 52+points (69 possible)

The LEED Process

- LEED NC Design/Construction Process Cont…
  - Registration Costs
    - $450 – USGBC Members
    - $600 – USGBC Non-Members
  - Certification Costs
    http://www.usgbc.org/DisplayPage.aspx?CMSPageID=1497
    - Varies depending on LEED project type (NC, CI…etc)
    - Project Size
      - < 50,000 sq. ft
      - 50, 000 – 500, 000 sq. ft
      - >500, 000 sq, ft

The LEED Process

- LEED NC Design/Construction Process Cont…
  - Other Project Certification Costs?
    - Appeals - $/$
    - Design Review - $/$
    - Construction Review - $/$
    - Combined Design and Construction Review - $/$
    - * Rebate for Platinum Certification (No specific $ listed)

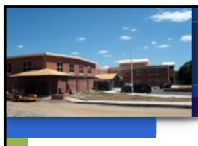
The LEED Process

- LEED NC Design/Construction Process Cont…
  - "Lead" Time for USGBC Review
    - Design Review
    - Construction Review
    - Combined Design and Construction Review
  - Final Verification submission for Certification
  - Receive Plaque

The LEED Rating System

LEED Rating System

- Sections of the rating system:
  - Sustainable Sites
  - Water Efficiency
  - Energy and Atmosphere
  - Materials and Resources
  - Indoor Environment Quality
  - Innovation in Design



LEED Rating System

- Sustainable Sites:
  - Intent: Design selection that limits, eliminates, or restores a buildings impact to local ecosystem.
  - Prerequisites: Construction Activity and Pollution Prevention
    - Reduce pollution from construction activity by controlling soil erosion, into waterway, increasing sedimentation in waterways , and reduce airborne duct control .
    - Requirement: Create Erosion Sediment Control Program based on 2003 EPA Construction General Permit or local requirements whichever is more stringent.

LEED Rating System

Yes	?	No	Project Totals (Pre-Certification Estimates)	69 Points
			Certified: 26-32 points **Silver**: 33-38 points **Gold**: 39-51 points **Platinum**: 52-69 points	

Yes	?	No	Sustainable Sites	14 Points
Yes			Prereq 1 **Construction Activity Pollution Prevention**	Required
			Credit 1 **Site Selection**	1
			Credit 2 **Development Density & Community Connectivity**	1
			Credit 3 **Brownfield Redevelopment**	1
			Credit 4.1 **Alternative Transportation**, Public Transportation	1
			Credit 4.2 **Alternative Transportation**, Bicycle Storage & Changing Rooms	1
			Credit 4.3 **Alternative Transportation**, Low-Emitting & Fuel Efficient Vehicles	1
			Credit 4.4 **Alternative Transportation**, Parking Capacity	1
			Credit 5.1 **Site Development**, Protect or Restore Habitat	1
			Credit 5.2 **Site Development**, Maximize Open Space	1
			Credit 6.1 **Stormwater Design**, Quantity Control	1
			Credit 6.2 **Stormwater Design**, Quality Control	1
			Credit 7.1 **Heat Island Effect**, Non-Roof	1
			Credit 7.2 **Heat Island Effect**, Roof	1
			Credit 8 **Light Pollution Reduction**	1

Slide 55 – Water Efficiency

LEED Rating System

- Sustainable Sites
  - Credit 1: Site Selection:
    - Intent: Rehabilitate existing damaged sites to reduce development on undeveloped land.
    - Requirement
      - Do not build buildings, roadways, hardscapes on specific land including Prime Farmland, land within 100 year flood, land where endangered species exist, undeveloped land within 50 feet of a body of water, existing public parkland.

LEED Rating System

- Sustainable Sites
  - Credit 2: Development Density & Community
    - Intent: Build where existing infrastructure exists to limit additional infrastructure to support new building.
    - Requirement:
      - Option 1: Limit building square footage per acre. (60,000 square feet per acre).
      - Option 2: Build on an existing development AND within ½ mile of existing neighborhood AND within ½ mile of basic services (Banks, Fire Station, Convenience Store, etc…)

LEED Rating System

- Sustainable Sites
  - Credit 3: Brownfield Redevelopment
    - Intent: Rehabilitate damaged site, reduce development on undeveloped land.
    - Requirement
      - Clean up and build on a site identified as “contaminated” or a “Brownfield”

LEED Rating System

- Sustainable Sites
  - Credit 4.1: Alternative Transportation – Public Transportation Access
    - Intent: Reduce pollution and land development impact from automobile use
    - Requirement
      - Build within ½ mile of major railway or subway.

LEED Rating System

- Sustainable Sites
  - Credit 4.2: Alternative Transportation – Bicycle Storage and Changing Rooms
    - Intent: Reduce pollution and land development impact from automobile use
    - Requirement:
      - Provide bicycle storage for 5% of all building users AND showers/changing room for .5% of Full Time Employees within 200 yards of the building.
      - OR
      - Provide bicycle storage for 15% of all building occupants.

LEED Rating System

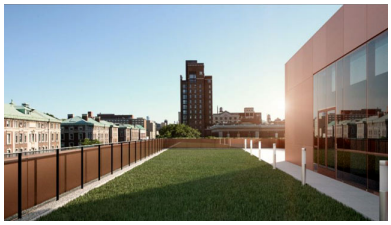
- Sustainable Sites
  - Credit 4.3: Alternative Transportation – Low Emission and Fuel Efficient Vehicles
    - Intent: Reduce pollution and land development impact from automobile use
    - Requirement:
      - Opt. 1 Provide fuel efficient vehicles* for 3% of Full Time Employees and preferred parking.
      - Opt. 2 Provide preferred parking for fuel efficient vehicles* for 5% of Full Time Employees.
      - Opt 3. Provide alternative fuel station for 3% total parking capacity.
      - *Zero emission (ZEV) or score minimum of 40 by ACEEE American Council Energy Efficient Economy.

LEED Rating System

- Sustainable Sites
  - Credit 4.4: Alternative Transportation – Parking Capacity
    - Intent: Reduce pollution and land development impact from automobile use
    - Requirement:
      - Opt. 1 Non-Residential Size parking not to exceed local zoning AND preferred parking for 5% of total parking capacity for carpools.
      - Opt. 2 Non-Residential Provide preferred parking for 5% of total parking capacity for carpools.
      - Opt. 3 Residential: Provide parking not to exceed local zoning AND infrastructure to promote shared vehicle such as drop offs and carpools.
      - Opt. 4 Provide no new Parking

LEED Rating System

- Sustainable Sites
  - Credit 5.1: Site Development– Protect or Restore Habitat
    - Intent: Conserve existing natural areas and restore damaged areas.
    - Requirement:
      - On Greenfield sire limit site disturbances including hardscapes to prescribed distances from building, sidewalk, hardscapes, driveways,.
      - On previously developed sites; restore a minimum of 50% of the site area with native or adapted vegetation.
        - Roof vegetation may apply.



LEED Rating System

- Sustainable Sites
  - Credit 5.2: Site Development– Maximize Open Space
    - Intent: Conserve existing natural areas and restore damaged areas.
    - Requirement:
      - Opt. 1 Reduce development footprint by 25% of zoning open space requirements.
      - Opt. 2 If no zoning, provide open space area adjacent to building equal to building footprint.
      - Opt. 3 If zoning but not including open space requirement , provide open space area adjacent to building equal to 20% of building footprint.

LEED Rating System

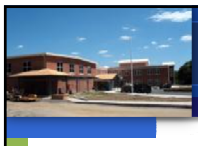
- Sustainable Sites
  - Credit 6.1: Storm Water Design – Quantity Control
    - Intent: Limit disruption to local water by reducing impervious surfaces, increase site infiltration and stormwater runoff
    - Requirement:
      - Opt. 1 Existing Imperviousness less than 50%. Implement stormwater plan to limit stormwater run off to meet pre-development run off peak discharge rates based on 24 hour storm
      - Opt. 2 Provide stormwater management plan to protect steams from excessive erosion.
      - Opt. 3 Existing Imperviousness greater than 50%. Reduce stormmwater run off by 25% of predevelopment run off peak discharge rates based on 24 hour storm.

LEED Rating System

- Sustainable Sites
  - Credit 6.2: Storm Water Design – Quality Control
    - Intent: Limit disruption to local water by reducing impervious surfaces, increase site infiltration and stormwater runoff
    - Requirement:
      - Implement stormwater management plan that reduces impervious surfaces, captures an treats 90% of average annual rainfall using acceptable building practices (BMPs).

LEED Rating System

- Sustainable Sites
  - Credit 7.1: Heat Island Effect– Non-Roof
    - Intent: Reduce Heat Island to minimize impact on microclimate and human/wildlife.
    - Requirement:
      - Opt 1. Provide following strategies on 50% of hardscapes.
        - Shade (within 5 years of occupancy)
        - Paving with surface of at least SRI 29
        - Open grid pavement
      - Opt. 2 Place 50% of parking spaces undercover, underdeck, under roof. Any roof must be least SRI 29.



LEED Rating System

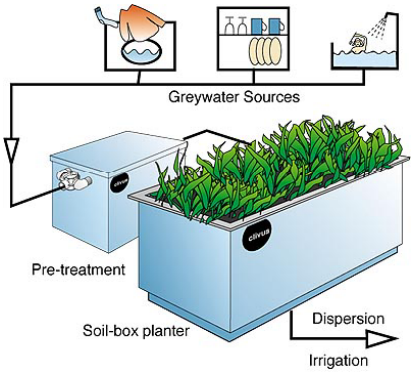
- Sustainable Sites
  - Credit 7.2: Heat Island Effect– Roof
    - Intent: Reduce Heat Island to minimize impact on microclimate and human/wildlife.
    - Requirement:
      - Opt 1. Provide roof material of specified SRI (Solar Reflectance index) for minimum of 75% of roof.
      - Opt 2. Install vegetated roof for minimum 50% of roof area.
      - Opt. 3 Install combination of High Albedo and vegetated roof for specified SRI..

LEED Rating System

- Sustainable Sites
  - Credit 8: Light Pollution
    - Intent: Minimize light trespass from building and site, reduce sky-glow and glare, reduce impact on nocturnal environments.
    - Requirement:
      - Opt 1. Maximum light candela must not exit windows.
      - Opt 2. All non-emergency lights must turn off automatically during non-working hours.
      - Exterior Lighting
      - Only lighting for safety and comfort per ASHRAE/IESNA 90.1_2004. 80% of power density of exterior areas, 50% for building facades and landscape features.

LEED Rating System

- Water Efficiency
  - Intent: Design selection that limits or eliminates buildings impact to local water usage for both potable, greywater or irrigation usage.
  - Prerequisites – None



LEED Rating System

Yes	?	No	Water Efficiency		5 Points
			Credit 1.1	**Water Efficient Landscaping**, Reduce by 50%	1
			Credit 1.2	**Water Efficient Landscaping**, No Potable Use or No Irrigation	1
			Credit 2	**Innovative Wastewater Technologies**	1
			Credit 3.1	**Water Use Reduction**, 20% Reduction	1
			Credit 3.2	**Water Use Reduction**, 30% Reduction	1

Slide 61 – Energy & Atmosphere

LEED Rating System

- Water Efficiency
  - Credit 1.1; Water Efficient Landscaping reduction 50%
    - Intent – Limit the use of potable water or other natural surface/subsurface water resource for landscape irrigation.
    - Requirement
      - Reduce quantity of mid-summer water usage below baseline case.

LEED Rating System

- Water Efficiency
  - Credit 1.2 – No Potable Use for Irrigation
    - Intent – Eliminate the use of potable water or other natural surface/subsurface water resource for landscape irrigation.
    - Requirement
      - Reduce quantity of mid-summer water usage below baseline case.

LEED Rating System

- Water Efficiency
  - Credit 2.0 – Innovative Wastewater Technologies
    - Intent – Reduce generation of wastewater and potable water demand.
    - Requirements
      - Opt. 1 Reduce potable water use for building sewage by 50% using water conserving fixtures or non-potable graywater.
      - Opt. 2 Treat 50% of wastewater on-site to tertiary standards; must be used infiltrated or used on site.

LEED Rating System

- Water Efficiency
  - Credit 3.1 – 20% Reduction
  - Credit 3.2 – 30% Reduction
    - Intent – Maximize water efficiency with building.
    - Requirements
      - Exceed Energy Policy Act of 1992 by 20% for water usage, not including irrigation.
      - Based on estimated water usage.
      - Only applies to water closets, urinals, lavatories, faucets, showers and kitchen sinks.

LEED Rating System

- Energy and Atmosphere
  - Intent
    - Reduce environmental impact of building systems including maximizing energy efficiency, minimizing greenhouse gas emissions and ozone depletion while promoting renewable energy sources.
  - Prerequisites
    - Fundamental Commissioning of systems - Verification of installation, calibration, and performance according to requirements, basis of design and construction documents.
    - Minimum Energy Performance – Comply with ASHRAE 90.1 for minimum performance levels of HVAC/Lighting Systems.
    - Fundamental Refrigerant Management – Use no CFCs in HVAC equipment.

LEED Rating System

Yes	?	No		Energy & Atmosphere	17 Points
Yes			Prereq 1	**Fundamental Commissioning of the Building Energy Systems**	Required
Yes			Prereq 1	**Minimum Energy Performance**	Required
Yes			Prereq 1	**Fundamental Refrigerant Management**	Required

***Note for EAc1:** All LEED for New Construction projects registered after June 26, 2007 are required to achieve at least two (2) points.

			Credit 1	**Optimize Energy Performance**	1 to 10
			Credit 1.1	10.5% New Buildings / 3.5% Existing Building Renovations	1
			Credit 1.2	14% New Buildings / 7% Existing Building Renovations	2
			Credit 1.3	17.5% New Buildings / 10.5% Existing Building Renovations	3
			Credit 1.4	21% New Buildings / 14% Existing Building Renovations	4
			Credit 1.5	24.5% New Buildings / 17.5% Existing Building Renovations	5
			Credit 1.6	28% New Buildings / 21% Existing Building Renovations	6
			Credit 1.7	31.5% New Buildings / 24.5% Existing Building Renovations	7
			Credit 1.8	35% New Buildings / 28% Existing Building Renovations	8
			Credit 1.9	38.5% New Buildings / 31.5% Existing Building Renovations	9
			Credit 1.10	42% New Buildings / 35% Existing Building Renovations	10
			Credit 2	**On-Site Renewable Energy**	1 to 3
			Credit 2.1	2.5% Renewable Energy	1
			Credit 2.2	7.5% Renewable Energy	2
			Credit 2.3	12.5% Renewable Energy	3
			Credit 3	**Enhanced Commissioning**	1
			Credit 4	**Enhanced Refrigerant Management**	1
			Credit 5	**Measurement & Verification**	1
			Credit 6	**Green Power**	1

Slide 67 – Materials & Resources

LEED Rating System

- Energy and Atmosphere
  - Credit 1: Optimize Energy Performance
    - Intent – drive the Envelope/HVAC/Lighting systems designers to use all available technologies to minimize the energy required to fully operate the building.
    - Requirement
      - Develop a building energy model to quantitatively demonstrate the energy savings associated with optimization measures.

LEED Rating System

- Energy and Atmosphere
  - Credit 2: On-Site Renewable Energy
    - Intent – promote the installation of renewable energy on-site to offset stress of energy use on electric grid and non-renewable sources such as coal-fired power and nuclear.
    - Requirement
      - Demonstrate the buildings total renewable energy supply as a percentage of the building annual energy cost.

LEED POINT SYSTEM CONTINUED

- Energy and Atmosphere
  - Credit 3: Enhanced Commissioning
    - Intent – Verify and Ensure that the entire building is designed, constructed and calibrated to operate as intended.
    - Requirements
      - Review of Design by Commissioning Authority
      - Review of the Construction Documents near completion of the construction document development phase.
      - Review of the contractor's submittals relative to the systems being commissioned.
      - Manual written that contains information required for re-commissioning building systems.
      - Contract in place to review building operation with O&M staff, including a plan for resolution of outstanding commissioning-related issues within one year after construction completion date.

LEED Rating System

- Energy and Atmosphere (cont.)
  - Credit 4: Enhanced Refrigerant Management
    - Intent – Reduce ozone depletion and support early compliance with the Montreal Protocol.
    - Requirement
      - Install base building level HVAC and refrigeration equipment and fire suppression systems that do not contain HCFC's or Halons.

LEED Rating System

- Energy and Atmosphere
  - Credit 5: Measurement and Verification
    - Intent – Provide for the ongoing accountability and optimization of building energy and water consumption performance over time.
    - Requirements
      - Metering for Lighting Systems and Controls, constant and variable motor loads; VFD operation; Chiller efficiency at variable loads (KW/ton); Cooling Load; Air and Water economizer and heat recovery cycles; Air distribution static pressures and ventilation air volumes; Boiler Efficiencies; Building Related process energy systems and equipment; Indoor water risers and outdoor irrigation systems.
      - Develop a measurement and verification plan that incorporates monitoring information

LEED Rating System

- Energy and Atmosphere
  - Credit 6: Green Power
    - Intent – Encourage the development and use of grid-source, renewable energy technologies on a net zero basis.
    - Requirements
      - Provide at least 35% of the building's electricity from renewable sources by engaging in at least a two-year renewable energy contract. Renewable sources are as defined by the Center for Resource Solutions (CRS). Green-e products certification requirements.

LEED Rating System

- Materials and Resources
  - Intent: Design selections to minimize
    - Raw material and Waste associated for creation for New Products.
    - Energy and transportation costs and consumption for New Products.
  - Prerequisite: Storage and collection of recyclables
    - Intent: Facilitate the reduction of waste generated by building occupants that is hauled to and disposed of in landfills.
    - Requirements: Provide an easily accessible area that serves the entire building and is dedicated to the collection and storage of non-hazardous materials for recycling paper, corrugated cardboard, glass plastics, and metals.

LEED Rating System

Yes	?	No	Materials & Resources		13 Points
Yes			Prereq 1	**Storage & Collection of Recyclables**	Required
			Credit 1.1	**Building Reuse,** Maintain 75% of Existing Walls, Floors & Roof	1
			Credit 1.2	**Building Reuse,** Maintain 95% of Existing Walls, Floors & Roof	1
			Credit 1.3	**Building Reuse,** Maintain 50% of Interior Non-Structural Elements	1
			Credit 2.1	**Construction Waste Management**, Divert 50% from Disposal	1
			Credit 2.2	**Construction Waste Management**, Divert 75% from Disposal	1
			Credit 3.1	**Materials Reuse**, 5%	1
			Credit 3.2	**Materials Reuse**, 10%	1
			Credit 4.1	**Recycled Content**, 10% (post-consumer + 1/2 pre-consumer)	1
			Credit 4.2	**Recycled Content**, 20% (post-consumer + 1/2 pre-consumer)	1
			Credit 5.1	**Regional Materials**, 10% Extracted, Processed & Manufactured	1
			Credit 5.2	**Regional Materials**, 20% Extracted, Processed & Manufactured	1
			Credit 6	**Rapidly Renewable Materials**	1
			Credit 7	**Certified Wood**	1

Slide 81 – Indoor Environment Quality

LEED Rating System

- Materials and Resources
  - Credit 1.1 – Building Reuse- Maintain 75% of Existing Walls, Floors, Roof.
    - Intent – Extend life of existing building resources to reduce impact of new buildings on manufacturing and transporting new materials.
    - Requirements
      - Maintain at least 75% of existing structural and envelope items based on surface area.
      - Hazardous materials excluded.
      - Windows, plumbing, HVAC may be upgraded.
      - Limits on additions

LEED Rating System

- Materials and Resources
  - Credit 1.2 – Building Reuse- Maintain 95% of Existing Walls, Floors, Roof
    - Intent – Extend life of existing building resources to reduce impact of new buildings on manufacturing and transporting new materials.
    - Requirements
      - Maintain at least 95% of existing structural and envelope items based on surface area.
      - Hazardous materials excluded.
      - Windows, plumbing, HVAC may be upgraded.
      - Limits on additions.

LEED Rating System

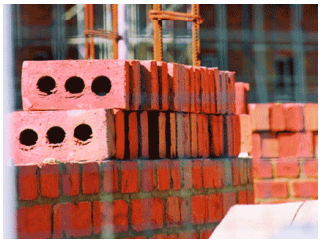
- Materials and Resources
  - Credit 1.3 – Building Reuse- Maintain 50% of Interior Non-Structural Elements
    - Intent – Extend life of existing building resources to reduce impact of new buildings on manufacturing and transporting new materials.
    - Requirements
      - Use existing interior non-structural elements (interior wall, floor, ceiling)in at least 50% by area of the completed building.
      - Limits on additions.

LEED Rating System

- Materials and Resources
  - Credit 2.1 – Construction Waste Management – Divert 50% of Construction Material from Disposal.
    - Intent – Divert Construction and demolition debris from disposal in landfills.
    - Requirements
      - Recycle/Salvage at least 50% of non-hazardous demolition.
      - Strategy: Implement a plan excluding soil and land clearing debris excluded.
      - Recycle cardboard, metal, brick, concrete, carpet, gypsum, etc..

LEED Rating System

- Materials and Resources
  - Credit 2.2 – Construction Waste Management – Divert 75% of Construction Material from Disposal.
    - Intent – Divert Construction and demolition debris from disposal in landfills.
    - Requirements
      - Recycle/Salvage at least 75% of non-hazardous demolition.
      - Strategy: Implement a plan excluding soil and land clearing debris excluded.
      - Recycle cardboard, metal, brick, concrete, carpet, gypsum, etc..



LEED Rating System

- Materials and Resources
  - Credit 3.1 – Material Reuse– Divert 5%
    - Intent – Reuse building materials to reduce demand of virgin products and create waste.
    - Requirements
      - Use salvage, refurbished, re-used permanent material for 5% of total project cost.
      - MEP, elevators excluded in costs.
      - Strategy: Flooring, beam, paneling, doors, furniture.

LEED Rating System

- Materials and Resources
  - Credit 3.2 – Material Reuse– Divert 10%
    - Intent – Reuse building materials to reduce demand of virgin products and create waste.
    - Requirements
      - Use salvage, refurbished, re-used permanent material for 10 % of total project cost.
      - MEP, elevators excluded in costs.
      - Strategy: Flooring, beam, paneling, doors, furniture.

LEED Rating System

- Materials and Resources
  - Credit 4.1 – Recycled Content – 20% (Post Consumer + ½ Pre-Consumer)
    - Intent – Increase use of building products incorporate recycled content materials to reduce use of virgin materials.
    - Requirements
      - Use materials with recycled content post consumer+ ½ pre-consumer is 20% of the total value of the project cost.
      - MEP, elevators excluded in costs.

LEED Rating System

- Materials and Resources
  - Credit 5.1 – Regional Materials – 10% Extracted, Processed & Manufactured Regionally
    - Intent – Increase use of local materials to reduce resources required transporting non-indigenous materials and products.
    - Requirements
      - Use material extracted, harvested or recovered, and manufactured within 500 miles of site at least 10% of total cost of materials within project.
      - MEP, elevators excluded in costs.

LEED Rating System

- Materials and Resources
  - Credit 5.2 – Regional Materials – 20% Extracted, Processed & Manufactured Regionally
    - Intent – Increase use of local materials to reduce resources required transporting non-indigenous materials and products.
    - Requirements
      - Use material extracted, harvested or recovered, and manufactured within 500 miles of site at least 20% of total cost of materials within project.
      - MEP, elevators excluded in costs.

LEED Rating System

- Materials and Resources
  - Credit 6.0 – Rapidly Renewable Materials
    - Intent – Use rapidly renewable materials to reduce depletion of finite raw materials.
    - Requirements
      - Use rapidly renewable materials and products (typically plants with 10 year or less harvest cycle) for 2.5% of total value of all material/products used in building.

LEED Rating System

- Materials and Resources
  - Credit 7.0 – Certified Wood
    - Intent – Encourage environmentally responsible forest management.
    - Requirements
      - Use minimum 50% of wood based materials/products certified in accordance with FSC (Forest Steward Council) principles and criteria for wood building components.

LEED Rating System

- Indoor Environment Quality
  - Prerequisites
    - Prerequisite 1—Minimum IAQ performance -Meet minimum requirements of voluntary standard ASHREA62-1999 (Ventilation for Acceptable Indoor Air Quality) and ASHRAE62-2001, Appendix H)
    - Prerequisite 2—Environmental Tobacco Smoke Control - Prohibit smoking in the building and in all areas surrounding building exits and opening windows OR provide smoking room with exhaust creating negative air inside (ASHRAE Standard 129-1997)

LEED Rating System

Yes	?	No		Indoor Environmental Quality	15 Points
Yes			Prereq 1	**Minimum IAQ Performance**	Required
Yes			Prereq 2	**Environmental Tobacco Smoke (ETS) Control**	Required
			Credit 1	**Outdoor Air Delivery Monitoring**	1
			Credit 2	**Increased Ventilation**	1
			Credit 3.1	**Construction IAQ Management Plan,** During Construction	1
			Credit 3.2	**Construction IAQ Management Plan**, Before Occupancy	1
			Credit 4.1	**Low-Emitting Materials**, Adhesives & Sealants	1
			Credit 4.2	**Low-Emitting Materials**, Paints & Coatings	1
			Credit 4.3	**Low-Emitting Materials**, Carpet Systems	1
			Credit 4.4	**Low-Emitting Materials**, Composite Wood & Agrifiber Products	1
			Credit 5	**Indoor Chemical & Pollutant Source Control**	1
			Credit 6.1	**Controllability of Systems**, Lighting	1
			Credit 6.2	**Controllability of Systems**, Thermal Comfort	1
			Credit 7.1	**Thermal Comfort,** Design	1
			Credit 7.2	**Thermal Comfort,** Verification	1
			Credit 8.1	**Daylight & Views,** Daylight 75% of Spaces	1
			Credit 8.2	**Daylight & Views,** Views for 90% of Spaces	1

Slide 99 – Innovation in Design

LEED Rating System

- Indoor Environment Quality
  - Prerequisites
    - Prerequisite 1—Minimum IAQ performance -Meet minimum requirements of voluntary standard ASHREA62-1999 (Ventilation for Acceptable Indoor Air Quality) and ASHRAE62-2001, Appendix H)
    - Prerequisite 2—Environmental Tobacco Smoke Control - Prohibit smoking in the building and in all areas surrounding building exits and opening windows OR provide smoking room with exhaust creating negative air inside (ASHRAE Standard 129-1997)

LEED Rating System

- Indoor Environment Quality
  - Credit 1: CO_2 Monitoring
    - Intent - Provide capacity for ventilation system monitoring to help sustain occupant comfort and well-being.
    - Requirements
      - For mechanically ventilated spaces, monitor CO_2 concentrations in all densely occupied areas (>/= 25 people/1000 SF) and measure OA flow to non-dense areas.
      - For naturally ventilated spaces, CO_2 monitoring is required in all spaces at 3 feet and 6 feet A.F.F.

LEED Rating System

- Indoor Environment Quality
  - Credit 2: Increased Ventilation
    - Intent - Provide additional outdoor air ventilation to improve indoor air quality for improved occupant comfort, well-being and productivity.
    - Requirements
      - For mechanically ventilated spaces, increase breathing zone outdoor air ventilation rates to all occupied spaces by at least 30% above minimum rates required by ASHRAE 62.1.
      - For naturally ventilated spaces, design systems for occupied spaces to meet the recommendations set forth in the Carbon Trust Good Practice Guide 237 using the flow diagram process shown in Figure 1.18 of the Chartered Institution of Building Service Engineers (CIBSE) Applications Manual 10: 2005, Natural Ventilation in non-domestic buildings.

LEED Rating System

- Indoor Environment Quality
  - Credit 3.1: Construction IAQ Management Plan During Construction
    - Intent – Reduce indoor air quality problems due to construction / renovation process.
    - Requirement - Develop and implement Indoor Air Quality (IAQ) Management Plan for
    - Option 1 – FLUSH OUT
      - After construction, prior occupancy, flush out 14,000 cubic foot of outdoor air / 1 SF floor area, while temp at 60 degree F, and 60% relative humidity. OR
      - If occupancy prior to completion of flush out, can occupy space with delivery of 3,500 cu ft. air / 1SF floor area. Once occupied, ventilate at minimum rate of 0.30 cfm/SF. Or the design minimum outside air rate per **EQ Prerequisite 1**, whichever greater. Ventilation to start 3 hours prior to occupancy. Maintain until 14,000 cu.ft./ 1SF delivered. OR
    - Option 2 – AIR QUALITY TESTING
      - Conduct baseline IAQ testing, protocols set with USEPA Compendium of Methods for the Determination of Air Pollutants in Indoor Air
        - Demonstrate maximum concentrations of following not exceeded
        - Formaldehyde
        - Particulates (PM10)
        - Total VOC
        - 4-*Phynylcyclohexene
        - Carbon Monoxide (CO)

LEED Rating System

- Indoor Environment Quality
  - Credit 3.2: Construction IAQ Management Plan Before Occupancy
    - Intent – Reduce indoor air quality problems due to construction / renovation process.
    - Requirement - Develop and implement Indoor Air Quality (IAQ) Management Plan for construction and pre-occupancy phase.
      - Meet of exceed Control Measures of the Sheet Metal and Air Conditioning Contractors National Association (SMACNA) IAQ Guidelines for Occupied Buildings under Construction, 1995, Chapter 3.
      - Protect stored on-site or installed absorptive material from moisture / damage
      - If permanent air handlers, used during construction, filtration media with Minimum Efficiency Reporting Value (MERV) of 8 to be used at each return air grille (ASHRAE 52.2-1999). Replace filters prior occupancy.

LEED Rating System

- Indoor Environment Quality
  - Credit 4.1: Low Emitting Materials, Adhesives and Sealants
    - Intent – To reduce quantity of indoor air contaminants that are odorous, irritating and / or harmful.
    - Requirements - all adhesives and sealants used in the interior of the building shall comply with following referenced standards:
      - Adhesives, Sealants and Sealant Primers: South Coast Air Quality Management District (SCAQMD) Rule #1168. Effective date July 1, 2005, amended date January 7, 2005.
      - Aerosol Adhesives: Green Seal Standard for Commercial Adhesives GS-36 requirements in effect October 19, 2000.

LEED Rating System

- Indoor Environment Quality
  - Credit 4.2: Low Emitting Materials, Paints and Coatings
    - Intent – To reduce quantity of indoor air contaminants that are odorous, irritating and / or harmful.
    - Requirements
      - Architectural paints, coatings and primers , not to exceed the VOC content limits of **Green Seal Standards GS-11**, **Paints**, first edition, May 20m 1999.
        - Flats: 50 g/L
        - Non-flats:150 g/L
      - Anti-corrosive and antirust paints: not to exceed VOC content limit of 250g/L, per **Green Seal Standard GC-03**, (metals) Anti-Corrosive Paints, 2nd edition, January 7, 1997.
      - Clear wood finishes, floor coatings, stains, sealers, shellacs to interior elements. Not to exceed VOC content limits established in **South Coast Air Quality Management District (SCAQMD) Rule 1113, architectural coatings**, rules effective January 1, 2004
        - Clear wood finish: varnish 350 g/L; lacquer 550 g/L
        - Floor coatings: 100 g/L
        - Sealers: waterproofers 250 g/L; sanding sealer: 275 g/L; all other sealer 200 g/L
        - Shellac: clear 730 g/L. pigmented 550 g/L
        - Stains: 250 g/L

LEED Rating System

- Indoor Environment Quality
  - Credit 4.3: Low Emitting Materials, Carpet Systems
    - Intent – To reduce quantity of indoor air contaminants that are odorous, irritating and / or harmful.
    - Requirements
      - All carpet installed in the building interior shall meet the testing and product requirements of the Carpet and Rug Institute's Green Label Plus program.
      - All carpet installed in the building interior shall meet the requirements of the Carpet and Rug Institute Green Label Program
      - All carpet adhesive shall meet the requirements of EQ Credit 4.1: VOC limit of 50 g/L.

LEED Rating System

- Indoor Environment Quality
  - Credit 4.4: Low Emitting Materials, Wood and Agri-fiber Products
  - Intent – To reduce quantity of indoor air contaminants that are odorous, irritating and / or harmful.
    - Requirements
      - Composite wood and agri-fiber products used on the interior of the building (defined as inside of the weatherproofing system) shall contain no added urea-formaldehyde resins. Laminating adhesives used to fabricate on-site and shop-applied composite wood and agri-fiber assemblies shall contain no added urea-formaldehyde resins.
      - Composite wood and agri-fiber products are defined as: particleboard, medium density fiberboard (MDF), plywood, wheatboard, strawboard, panel substrates and door cores. Furniture and equipment are not considered base-building elements and are not included.

LEED Rating System

- Indoor Environment Quality
  - Credit 5: Indoor Chemical and Pollutant Source Control
  - Intent – Minimize exposure of building occupants potentially hazardous particulates and chemical pollutants.
    - Requirements
      - Employ permanent entryway systems at least six feet long in the primary direction of travel to capture dirt and particulates.
      - Exhaust spaces where hazardous gases could be present such as garages, housekeeping, laundry, copying and printing rooms.
      - Filter regularly occupied areas with minimum MERV 13 filtration prior to occupancy.

LEED Rating System

- Indoor Environment Quality
  - Credit 6.1: Controllability of Systems: Lighting
    - Intent - Provide a high level of lighting system control by individual occupants or by specific groups in multi-occupant spaces.
    - Requirements
      - Provide individual control for 90% of building occupants to enable adjustments to suit individual task needs and preferences AND
      - Provide lighting system controllability for all shared multi-occupant spaces to enable lighting adjustment that meets group needs and preferences.

LEED Rating System

- Indoor Environment Quality
  - Credit 6.2: Controllability of Systems: Thermal Comfort
    - Intent - Provide a high level of thermal comfort system control by individual occupants or by specific groups in multi-occupant spaces.
    - Requirements
      - Provide individual comfort controls for 50% of building occupants (operable windows are acceptable if occupants are 20 feet inside and less than 10 feet to either side of the window AND
      - Provide comfort system controls for all shared multi-occupant spaces to enable adjustment to suit group needs and preferences

LEED Rating System

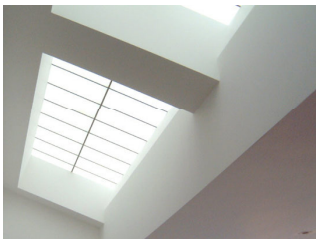
- Indoor Environment Quality
  - Credit 7.1: Thermal Comfort: Design
    - Intent - Provide comfortable thermal environment that supports the productivity and well-being of building occupants.
    - Requirements
      - Design HVAC systems and the building envelope to meet the requirements of ASHRAE Standard 55-2004, Thermal Comfort Conditions for Human Occupancy.

LEED Rating System

- Indoor Environment Quality
  - Credit 7.2: Thermal Comfort: Verification
    - Intent - Provide for the assessment of building thermal comfort over time.
    - Requirements
      - Agree to implement a thermal comfort survey of building occupants within a period of six to 18 months after occupancy.

LEED Rating System

- Indoor Environment Quality
  - Credit 8.1: Daylight and Views: Daylight 75% of Spaces
    - Intent - Provide for the building occupants a connection between indoor spaces and the outdoors through the introduction of daylight and views into regularly occupied areas of the building.
    - Requirements
      - OPTION 1: Glazing
      - OPTION 2: Daylight Simulation Model
      - OPTION 3: Daylight Measurement



LEED Rating System

- Indoor Environment Quality
  - Credit 8.2: Daylight and Views: Views 90% of Spaces
    - Intent - Provide for the building occupants a connection between indoor spaces and the outdoors through the introduction of daylight and views into regularly occupied areas of the building.
    - Requirements
      - Achieve direct line of site to the outdoor environment via vision glazing between 2'6" and 7'6" A.F.F. for building occupants in 90% of all regularly occupied areas.

LEED Rating System

- Innovation and Design
  - No Prerequisite
  - Credits
    - Innovation in Design
    - Exemplary Performance Credits
    - LEED AP Associated with Project

LEED Rating System

Yes	?	No			
			Innovation & Design Process		**5 Points**
			Credit 1.1	**Innovation in Design:** Provide Specific Title	1
			Credit 1.2	**Innovation in Design:** Provide Specific Title	1
			Credit 1.3	**Innovation in Design:** Provide Specific Title	1
			Credit 1.4	**Innovation in Design:** Provide Specific Title	1
			Credit 2	**LEED® Accredited Professional**	1

LEED Submittal Process

CES

LEED Submittal Process

- First, you need to register the project
- Needed information includes
  - Project Type
  - General Project Information
  - Primary Contact Info
  - Project Owner Info
  - Project Details
  - Cost
    - Non-USGBC Member: $600
    - USGBC Member: $450

LEED Submittal Process

- Submittal process is handled online
- Online Submittals
  - Online submittal forms are available to the project administrator and the responsible party within the design team (i.e. CES for EA Credit #1: Optimize Energy Performance).
  - The submittals are available as “template” PDF files which are electronically submitted.
  - The files can be printed out or downloaded as electronic files for review.

LEED Submittal Process

- Submittal/ Certification Timeline
  - Preliminary Review
    - Project Team submits all attempted credits and prerequisites. USGBC returns them to the project team as “earned”, “clarify” or “denied.”
    - Duration: 25 business days or expedited 12 business days.
  - Preliminary Review Response
    - Project Team responds to any credits or prerequisites marked as “clarify” and resubmits to USGBC.
    - Duration: Up to 25 business days or expedited 10 business days.

LEED Submittal Process

- Submittal/ Certification Timeline
  - Final Review
    - USGBC reviews the resubmitted credits and returns a final review of all credits and prerequisites, which will either be marked “earned” or “denied.”
    - Duration: 15 business days or expedited 7 business days.
  - Accept or Appeal
    - Project team has 25 business days to choose to accept or appeal the results of the final review.
    - Duration – up to 25 business days.
  - Appeal
    - Denied credits or prerequisites may be resubmitted to USGBC for appeal. USGBC will return the appealed prerequisite(s) or credit(s) to the project team as “earned” or “denied.”
    - Duration: 25 business days or expedited 12 business days.

LEED Submittals Summary.xlsx

LEED for Building Officials

CES

LEED for Building Officials

- Sec. 10. Section 16a-38k of the general statutes is repealed and the following is substituted in lieu thereof (*Effective January 1, 2008*):
  - Meet or Exceed LEED Silver
- Project may not seek certification
  - What information does the building official need to verify that it meets the LEED rating system?

LEED for Building Officials

- What does the Building Official need to Review?
  - Project Type/LEED Rating System Chosen
  - Initial Project Checklist Summary
    - Request a summary of “applicable credits” when the permit documents are submitted (end of CD phase)
  - Submittal Information
    - Request Submittal information for “applicable credits” and certification that a “responsible party” has adhered to the requirements of the LEED Rating System
  - Final Project Checklist Summary
    - Request a summary of “earned credits” before the CO is issued for the project (end of CA phase)

CES

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