



LEED Credits & Evaporative Cooling

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Environmental Impacts of Buildings*

- ◆ 39% of total energy use
- ◆ 70% of electricity consumption
- ◆ 30% of greenhouse gas emissions
- ◆ 40% of raw materials use
- ◆ 30% of waste output
- ◆ 12% of potable water consumption

*Statistics provided by USGBC's LEED for Product Manufacturers presentation, ©2005

What is the LEED System?

- ◆ LEED is created by the US Green Building Council (USGBC) as a voluntary consensus based national standard for developing high-performance, sustainable buildings and interiors.
- ◆ LEED = Leadership in Energy & Environmental Design

What is the LEED System?

- ◆ Credits are earned for satisfying criterion designed to address specific environmental impacts inherent in the design, construction and operations, and maintenance of buildings.



New Construction Certification Levels

◆ Certified	26-32 Points
◆ Silver	33-38 Points
◆ Gold	39-51 Points
◆ Platinum	52-69 Points



Existing Buildings Certification Levels

◆ Certified	32-39 Points
◆ Silver	40-47 Points
◆ Gold	48-63 Points
◆ Platinum	64-85 Points



LEED Credit Categories

- ◆ Sustainable Sites
- ◆ **Water Efficiency**
- ◆ **Energy & Atmosphere**
- ◆ **Materials & Resources**
- ◆ Indoor Environmental Quality
- ◆ **Innovation & Design Process**

Misconceptions

- ◆ Per USGBC Reference Manual 2.2, MR 3-5 LEED Credits do **not** apply to HVAC equipment
- ◆ Mechanical, electrical & plumbing components along with appliances and equipment are excluded from these credits due to their high \$ value compared to the amount of material, which would skew the calculations unfairly.

Misconceptions

◆ MR Credit 3 - Material Reuse

- Use salvaged, refurbished or reused materials such that the sum of these materials constitutes at least 5% or 10%, based on cost, of the total value of materials on the project.



Misconceptions

◆ MR Credit 4 - Recycled Content

- Use materials with recycled content such that the sum of post-consumer recycled content plus one-half of the pre-consumer content constitutes an additional 10% or 20% of the total value of the materials in the project.



Misconceptions

◆ MR Credit 5 – Regional Materials

- Use building materials or products that have been extracted, harvested or recovered as well as manufactured, within 500 miles of the project site.



Misconceptions

- ◆ WE Credits 1 through 3 - Water Use Reduction
 - None apply to cooling systems
 - Either apply to landscaping or reducing potable water usage



Misconceptions

- ◆ Products can NOT:
 - Be LEED certified
 - Be LEED approved
 - Be VOC Compliant



EA Credits 1 through 5 – Energy & Atmosphere

- ◆ Energy credits are based on total building energy consumption, not a single component
- ◆ Energy credits are attained via improvements over a base case
- ◆ The influence of multiple energy saving improvements is needed to gain credits
- ◆ Evaporative cooling is a significant influencer on energy consumption

EA Credits 1 through 5 – Energy & Atmosphere

- ◆ **Credit 1: Energy Optimization**
- ◆ Credit 2: On-Site Renewable Energy
- ◆ Credit 3: Enhanced Commissioning
- ◆ Credit 4: Enhanced Refrigerant Mgmt
- ◆ Credit 5: Measurement & Verification

EA Credits & Evaporative Cooling

- ◆ Evaporative water cooled vs. air cooled systems
 - More efficient than air cooled systems
 - Typically 40% or higher Coefficient of Performance (COP)
 - Lower condensing temperatures

EA Credits & Evaporative Cooling

- ◆ Optimizing chiller and cold water temperature
 - 2 vs. 3 GPM per ton
 - Cold water temperatures lower than 85°F
 - Design wet bulb temperatures less than 78°F
 - Annualized evaluation



EA Credits & Evaporative Cooling

- ◆ ASHRAE 90.1 (2004) is the minimum base case for the entire building, including:
 - CTI certified 38.2 GPM/HP for axial fan open cooling towers
 - CTI certified 20 GPM/HP for centrifugal fan open cooling towers



Additional Energy Savings

- ◆ Free Cooling

- ◆ Using Variable Frequency Drives

- Method of control

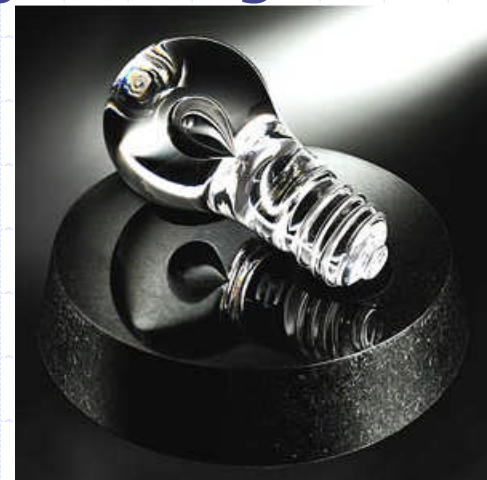
- Example: 10 cell cooling tower (100hp/cell)
1000 hp total at 50% heat load

- ◆ Operating with 5 cells on full speed = **500 hp**

- ◆ Controlling VFD's together (ramping all fans up and down together) = **125 hp** to meet the same duty.

Innovation & Design Process

- ◆ Provides design teams and projects the opportunity to be awarded points for exceptional performance above the requirements set by LEED
 - Installing a water conserving cooling tower



Discussion for Future Credits

◆ WE Credit 4.1 – Existing Buildings

- Manage water usage correctly
- Develop & implement a water management plan for the cooling tower
- Improve water efficiency by installing and/or maintaining a conductivity meter & automatic controls to adjust bleed rate and maintain proper concentration

Discussion for Future Credits

◆ WE Credit 4.2 – Existing Buildings

- Use make-up water that consists of 50% non-potable water
- Have a measured program in place that verifies make-up water quantities used from non-potable sources

◆ Acoustics





Questions?