

*simple, smart, sustaining solutions...*



## Understanding Operations & Maintenance for Buildings LEED for Commercial Interiors



Green Building Services, Inc.  
[www.greenbuildingservices.com](http://www.greenbuildingservices.com)

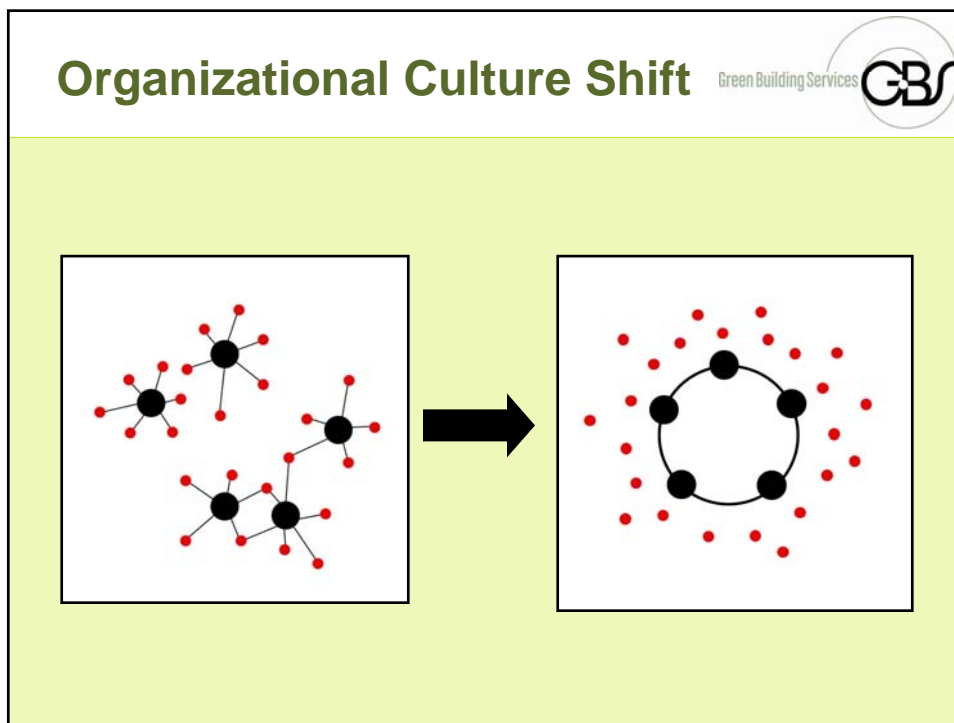
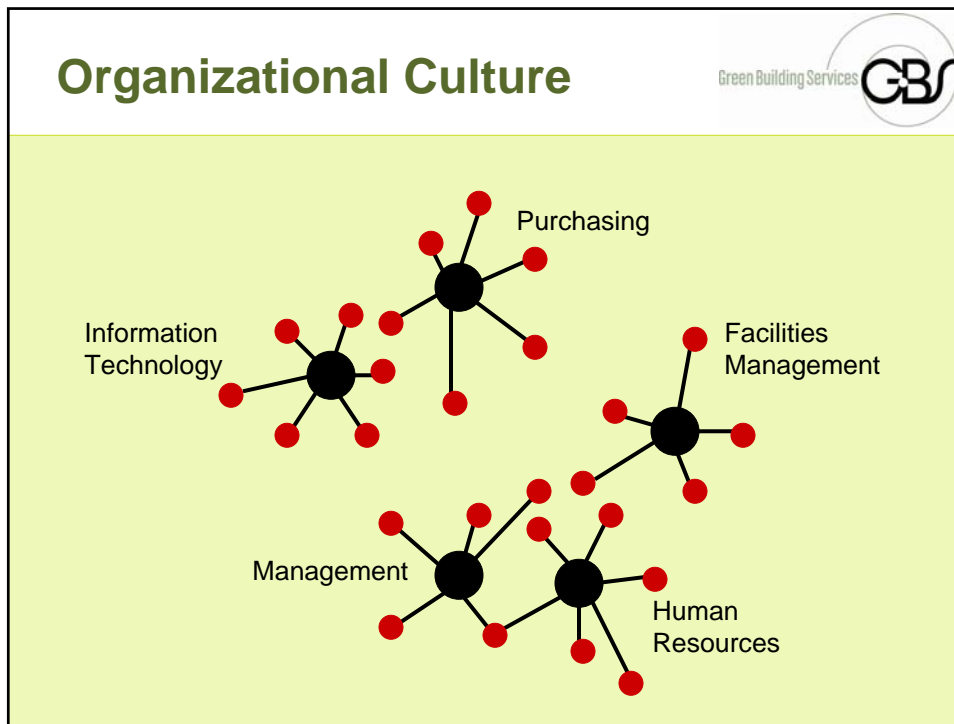
## LEED-EB for Existing Buildings

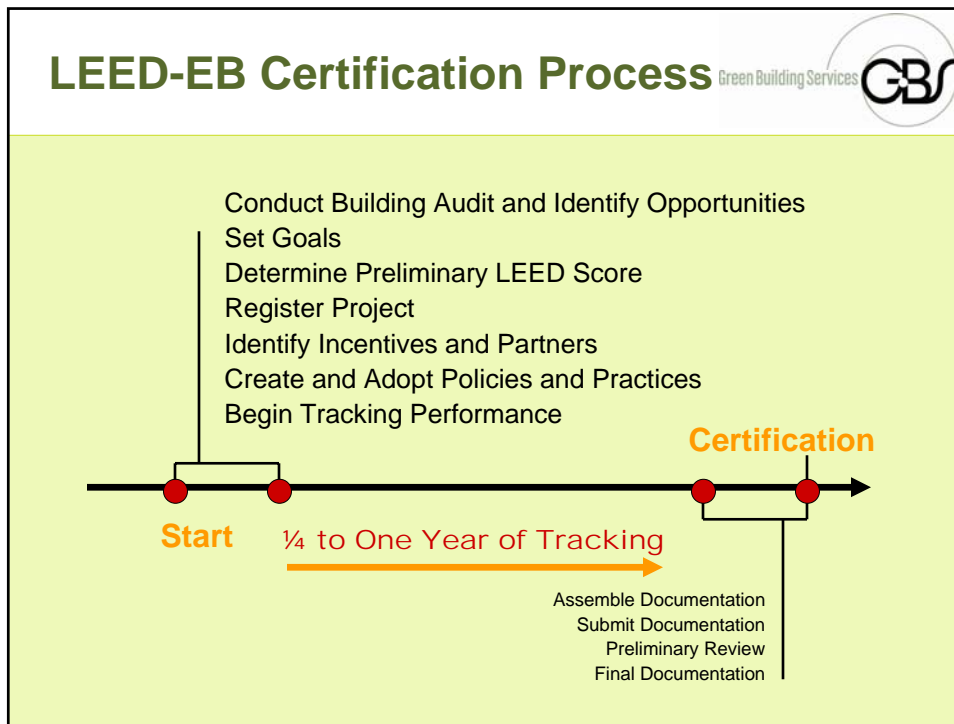


Oregon Convention Center,  
Portland OR

For building owners and service providers that address building operation and on-going upgrades and performance improvements.

*LEED is a Registered Trademark of the US Green Building Council*





### LEED-EB Point Breakdown

Green Building Services **GBS**

	Points
Sustainable Sites	14
Water Efficiency	5
Energy and Atmosphere	23
Material and Resources	16
Indoor Environmental Quality	22
Innovation in Design	5
<b>Total</b>	<b>85</b>

Certification Levels	
<b>Certified</b>	<b>32-39 points</b>
<b>Silver</b>	<b>40-47</b>
<b>Gold</b>	<b>48-63</b>
<b>Platinum</b>	<b>64-85</b>

## The LEED-EB Process



1. Conduct comprehensive building sustainability audit
2. Assess opportunities and set goals
3. Implement policies and practices
4. Develop quarterly reporting begin documentation
5. Submission and certification

## Comprehensive Building Sustainability Audit



### What is the difference?

- Determining factors that effect **Economic**, **Social**, and **Environmental** considerations.



Social

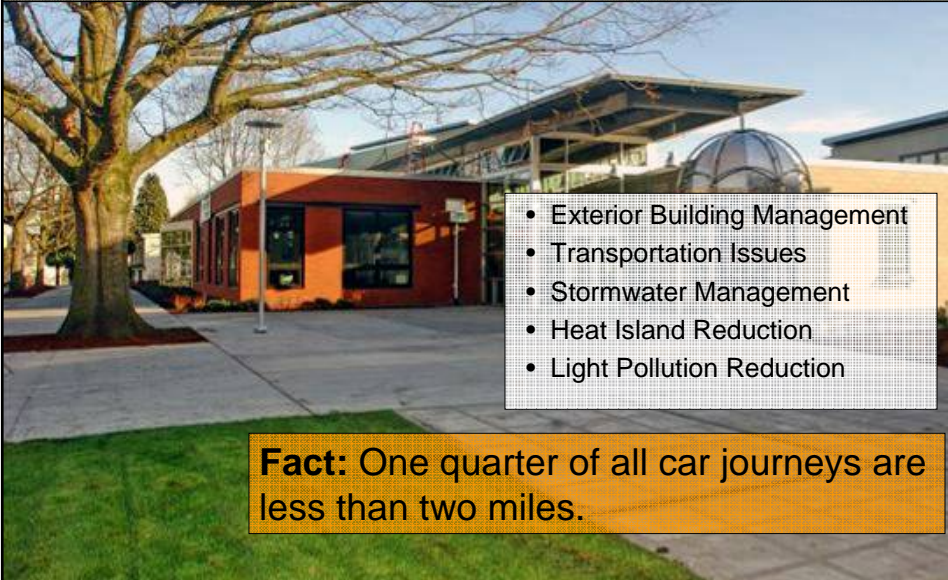


Economic



Environment

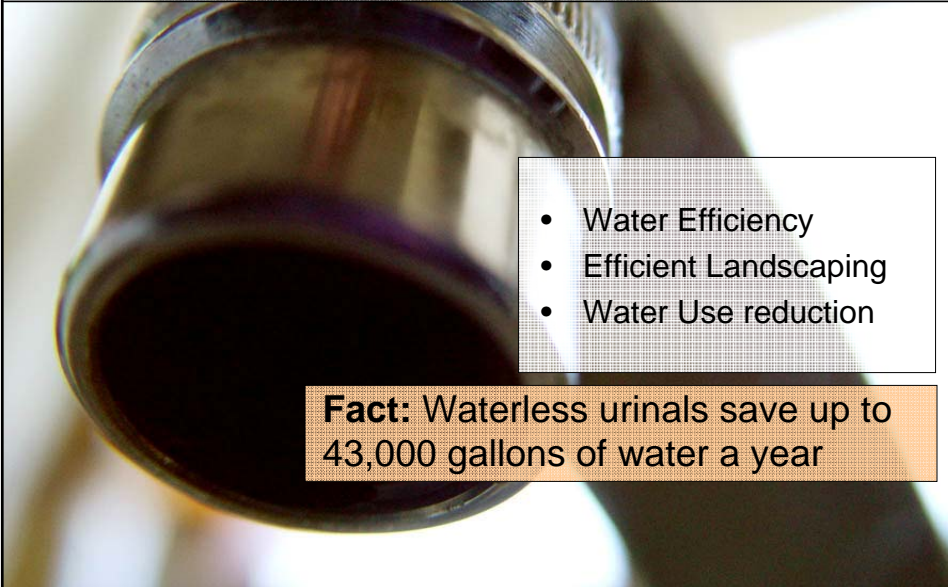
### Sustainable Sites



- Exterior Building Management
- Transportation Issues
- Stormwater Management
- Heat Island Reduction
- Light Pollution Reduction

**Fact:** One quarter of all car journeys are less than two miles.

### Water Efficiency



- Water Efficiency
- Efficient Landscaping
- Water Use reduction

**Fact:** Waterless urinals save up to 43,000 gallons of water a year

Assess Opportunities and Set Goals  
Water Efficiency



Minimum compliance 120% of Energy Policy Act of 1992.

Flow Requirement	Energy Policy Act of 1992	Better than Code
Water Closets (GPF)	1.6	0.8 – 1.6
Urinals (GPF)	1.0	Waterless
Showerheads (GPM)	2.0	1.8
Faucets (GPM)	1.5	0.5
Replacement Aerators (GPM)	0.5	0.5
Metering Faucets (gal/CY)	0.025	0.025




Energy & Atmosphere

- Commissioning
- Minimum Energy Performance
- Building Operations and Maintenance
- Performance Measurement
- Documenting Sustainable Building Costs Impacts


**Fact:** Only 10% of the energy used by an incandescent light bulb provides light. The other 90% is released as heat, which uses 30% of the cooling energy.

## Assess Opportunities and Set Goals Energy Benchmarking



**Energy Star:**

- Percentile of total energy use
- Simple, need to know:
  - Square feet
  - Age
  - Use
  - Number of computers
  - Utility data
- Must be validated by an engineer
- Large database



## Assess Opportunities and Set Goals Energy Benchmarking





Downtown Office Bldg.


**STATEMENT OF ENERGY PERFORMANCE**  
1w1c  
Building ID: 1051343  
For 12-month Period Ending: December 31, 2004<sup>1</sup>

1w1c		Owner		
97201				
Gross Building Area: 256,873 sf <sup>2</sup>				
Year Built:				
Facility Space Use Summary				
Space Type	Area(ft <sup>2</sup> )	Occupants	Operating hours/week	Number of PCs
Office (General)	256,873	805	85	900
Site Energy Use Summary				
Electricity (kBtu)		15,247,914	Professional Verification Janice Peterson 16280 SW Upper Boones Ferry Portland OR 97204 503-603-1624	
Natural Gas (kBtu)		7,481,900	Licensed Number: 14908 State: OR	
<b>Total Energy (kBtu)</b>		<b>22,729,814</b>		
Results				
Energy Performance Rating <sup>3</sup> (1-100)		<b>57</b>	<div style="border: 2px solid red; border-radius: 50%; padding: 10px; display: inline-block;"> <b>Rating: 57</b> </div>	
Energy Intensity <sup>4</sup>				
Site (kBtu/ft <sup>2</sup> -yr)	88.6			
Source (kBtu/ft <sup>2</sup> -yr)	209.4			
Emissions				
CO <sub>2</sub> (1000 lbs/yr)		30,632		
SO <sub>2</sub> (1000 lbs/yr)		962		
NO <sub>x</sub> (1000 lbs/yr)		1,085		

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Assess Opportunities and Set Goals  
Existing Building Commissioning




“Verify that fundamental building systems and assemblies are performing as intended to meet current needs and sustainability requirements.”

Median cost \$0.27/SF  
15% energy savings  
0.7 year payback

Source: The Cost-Effectiveness of Commercial Buildings Commissioning, December 15, 2004, LBNL, 150 buildings, 15 states, 22.2 million SF

## Materials & Resources



- Solid Waste Audit
- Toxic Material Source Reduction
- Construction Demolition
- Building Materials flow
- Sustainable Cleaning Products
- Mercury Reduction

**Fact:** Making recycled paper instead of new paper uses 64% less energy and uses 58% less water.



## Access Opportunities and Set Goals Materials & Resources



### Solid Waste

- Conduct a waste stream audit
- Develop and implement a Waste Management Policy
- Educate staff about recycling
- Purchase items that can be recycled



## Assess Opportunities and Set Goals Purchasing



- Maintain a sustainable purchasing program:
  - Office paper
  - Office equipment
  - Furniture and furnishings
  - Building materials
- Optimize use of IAQ Compliant Products
  - Adhesives and sealants
  - Paints and coatings
  - Carpet and cushion-meet CRI Green Label Plus Carpet Testing Program
  - Composite panels and agrifiber products

Access Opportunities and Set Goals  
Materials & Resources



**Janitorial**

Review existing Organizational Policy that addresses Sustainable Cleaning Products and Materials:

- Cleaning products to meet GS-37
- Janitorial paper products and trash bags that meet minimum req. of U.S. EPA's Comprehensive Procurement Guidelines
- Use concentrates that use dispensing equipment
- Janitorial paper, recycled content & chlorine free
- Equipment-vacuum cleaners & floor machines



**Indoor Environmental Quality**



- Outside Air Introduction and Exhaust Systems
- Systems Monitoring
- Increased Ventilation
- Construction IAQ Management
- Pollutant Source Controls
- Controllability of Systems
- Thermal Comfort
- Cleaning and Maintenance Practices
- Daylight and Views

**Fact:** \$29-168 billion are lost in productivity due to indoor environmental quality issues.

## Access Opportunities and Set Goals Indoor Environmental Quality



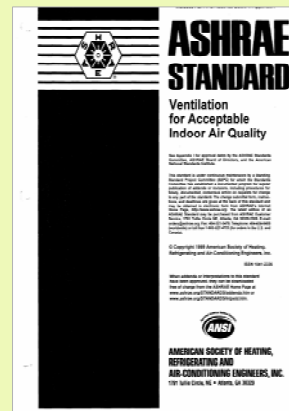
- Daylighting
- Views to outside
- Resourceful use of materials
- Non-toxic materials
- Improved air quality
- Aesthetically pleasing environment
- Flexible & creative space

## Assess Opportunities and Set Goals Indoor Environmental Quality



### Overview & Fundamentals:

- Indoor Air Quality
  - ASHRAE 62.1-2001/2004
  - LEED® Prerequisite (EQp1)
- Light
- Acoustics

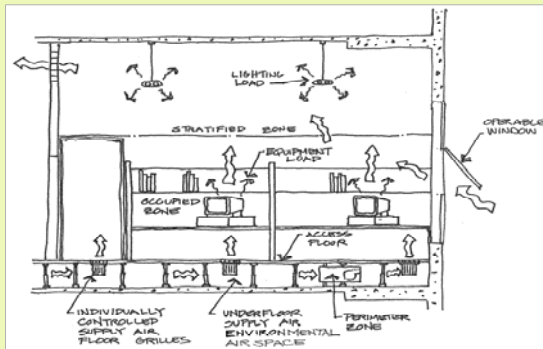


## Assess Opportunities and Set Goals Indoor Environmental Quality



How is Air Quality defined?

- Temperature
- Humidity
- Air Velocity
- Air Quality



## Assess Opportunities and Set Goals Indoor Environmental Quality

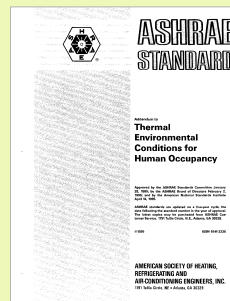


### Thermal Comfort:

- Comply with ASHRAE Standard 55-2004, Thermal Comfort Conditions for Human Occupancy.

Measurement Type	Winter	Summer
Dry Bulb at 30% RH	68.5°F - 76.0°F	74.0°F - 80.0°F
Dry Bulb at 50% RH	68.5°F - 74.5°F	73.0°F - 79.0°F
Wet bulb maximum	64°F	68°F
Relative humidity *	30% - 60%	30% - 60%

\* Upper bound of 50% RH will also control dust mites.



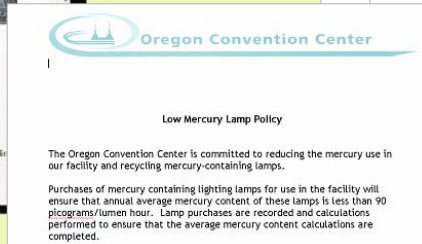
## Implement Policies and Practices



- Develop policies, guidelines and specifications



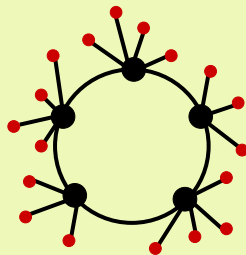
Multnomah County  
GREEN GUIDEBOOK  
FOR  
FACILITY MANAGERS



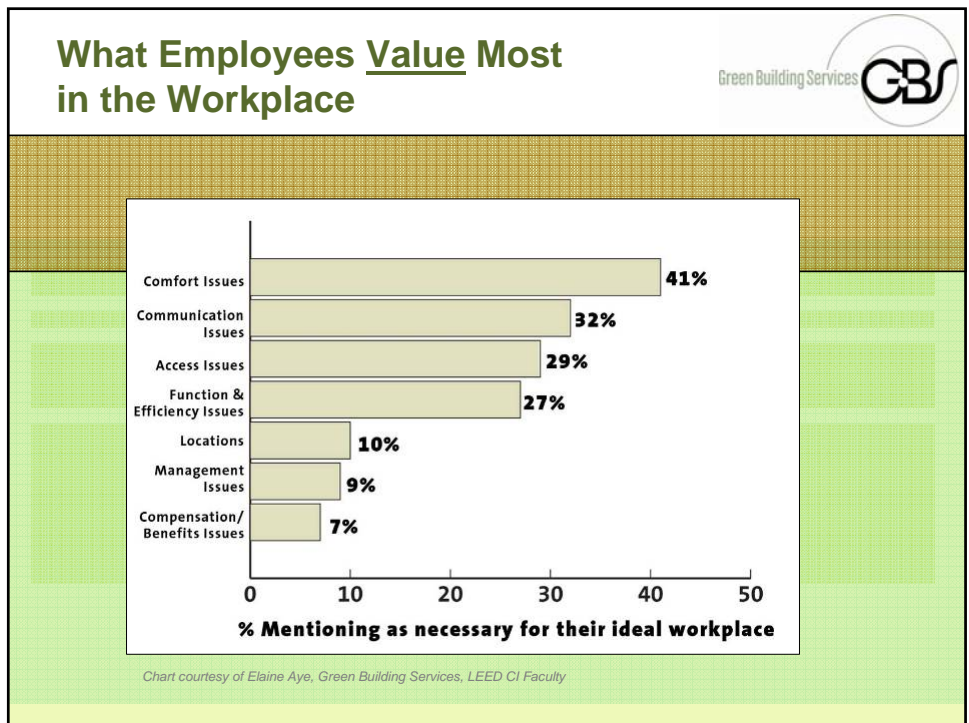
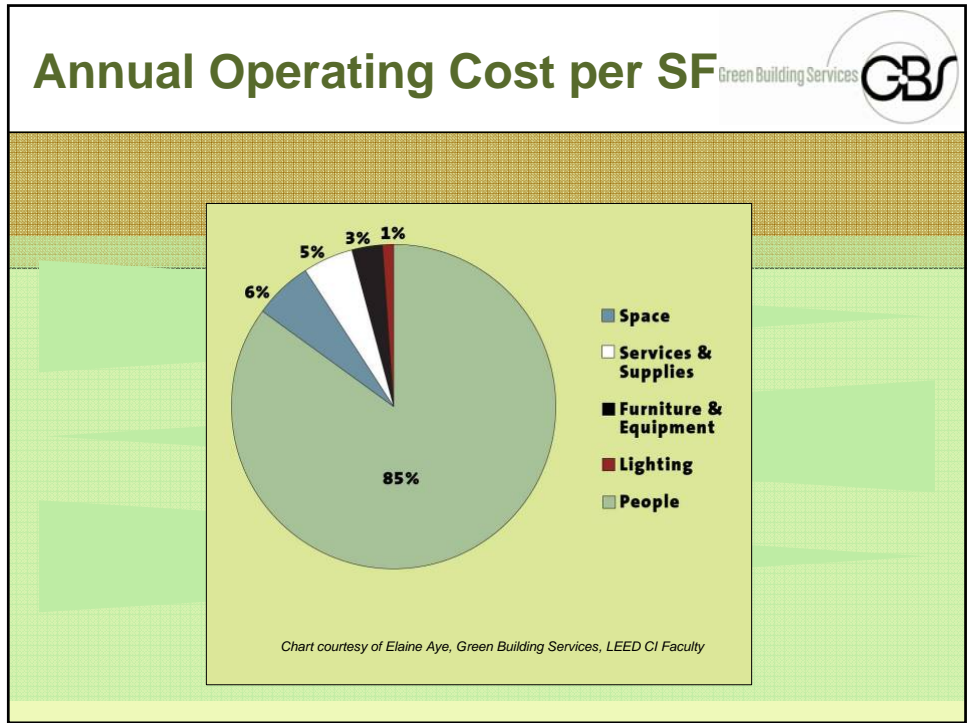
## Advancing Facilities Practices:

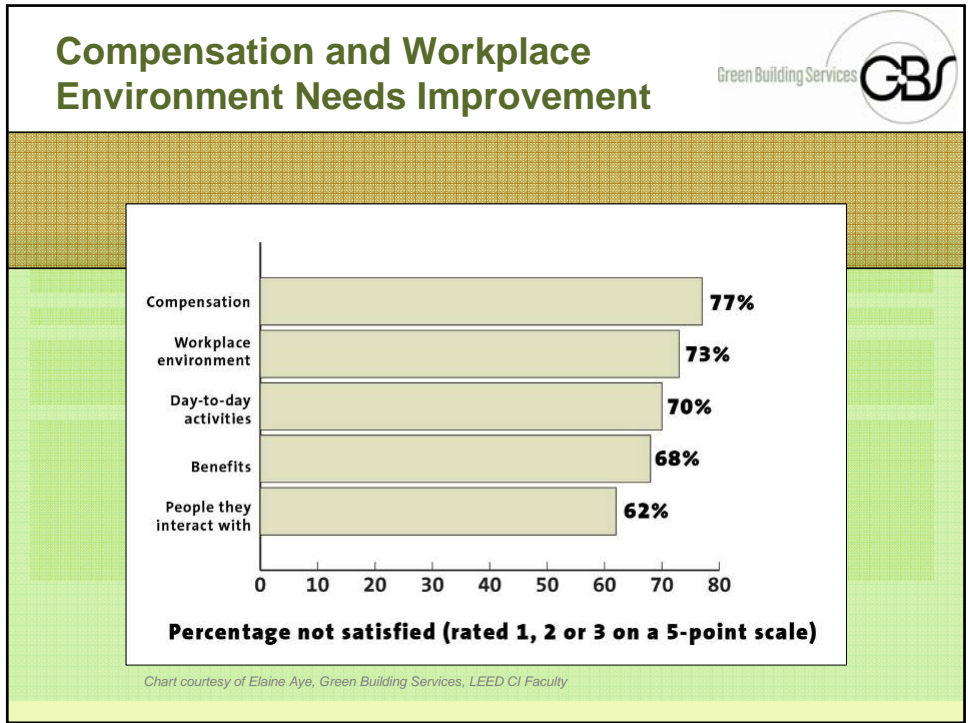


- Whole building sustainability analysis and reporting
- Measure and managing real-time on an ongoing basis
- Improve performance and add value
- Demonstrate market leadership









### Increased Productivity



**Factories**  
Increased production



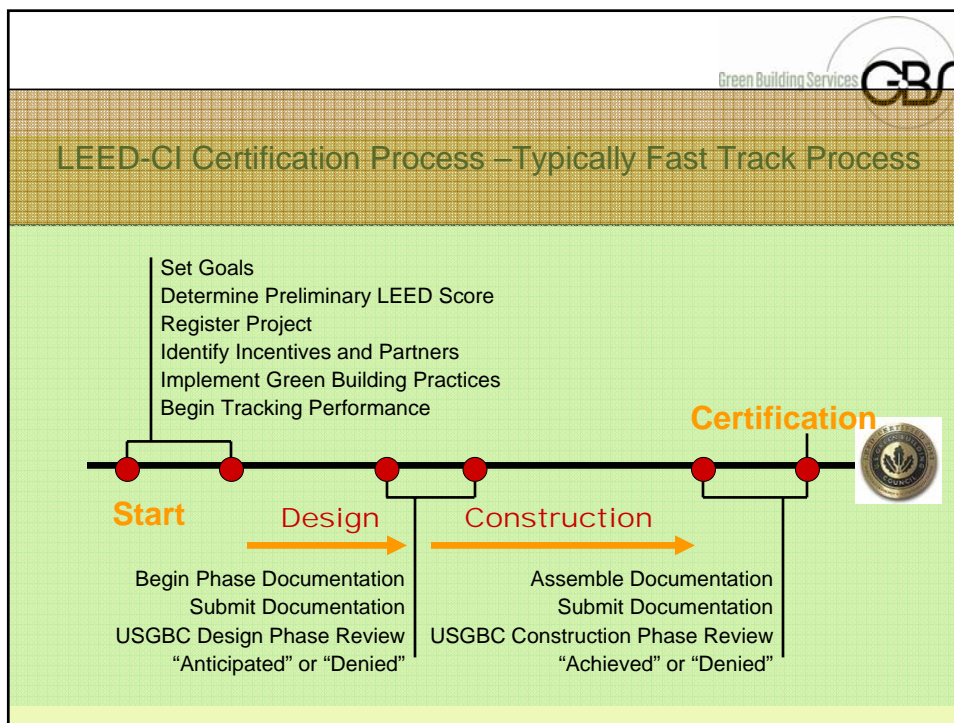
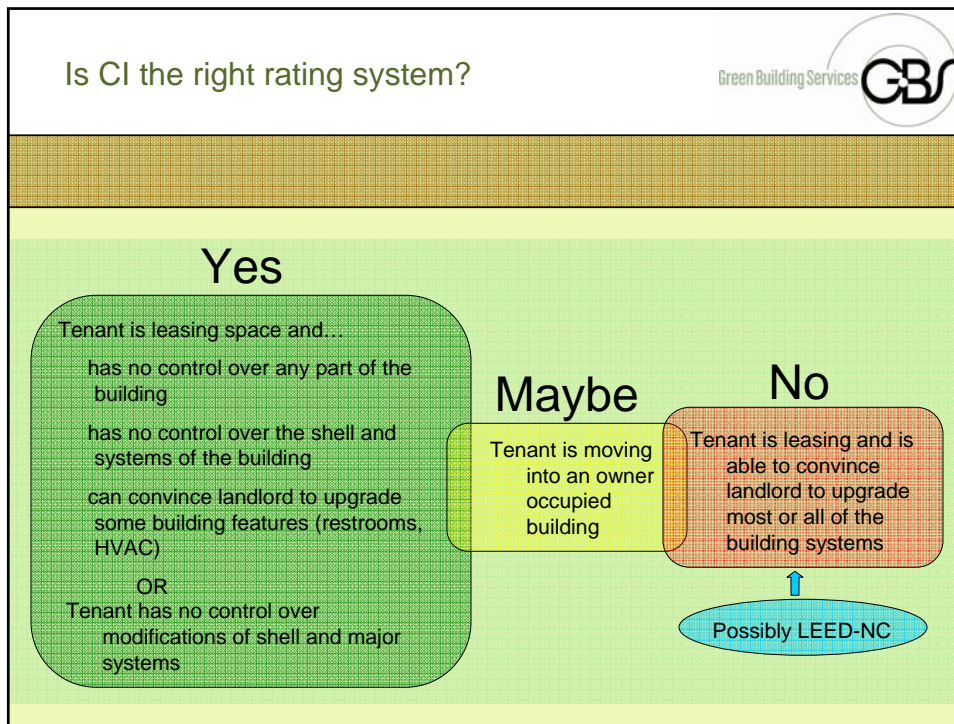
**Offices**  
2-18% productivity increase


**Retail**  
Increase in sales per square foot

**Schools**  
20% better test performance







**Hospitals**  
2 1/2 days earlier discharge





Green Building Services 

LEED Credit Categories

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

What Makes a Good Interior?



Creating indoor environments where people love to be.