

Green Building Practices, Occupant Health and Ergonomics

Presented by:

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Speaker Overview

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Agenda

- Green Building
- Occupant Concerns
- Role for Ergonomics
- Integration of Ergonomics
- Overview of LEED Certification
- Pilot Credit 44 - Revised

Green Building

- Recognition that individuals tend to spend more than 90 percent of their time indoors. (Hancock, 2002)
- Where we live and work is clearly linked to our overall health. (Srinivasan, O'Fallon, & Deary, 2003)



Green Building - Drivers

- ▶ Protection of the environment
- ▶ Reduce overall energy costs
- ▶ Reduce water consumption
- ▶ Create a positive tenant experience – improved occupant performance

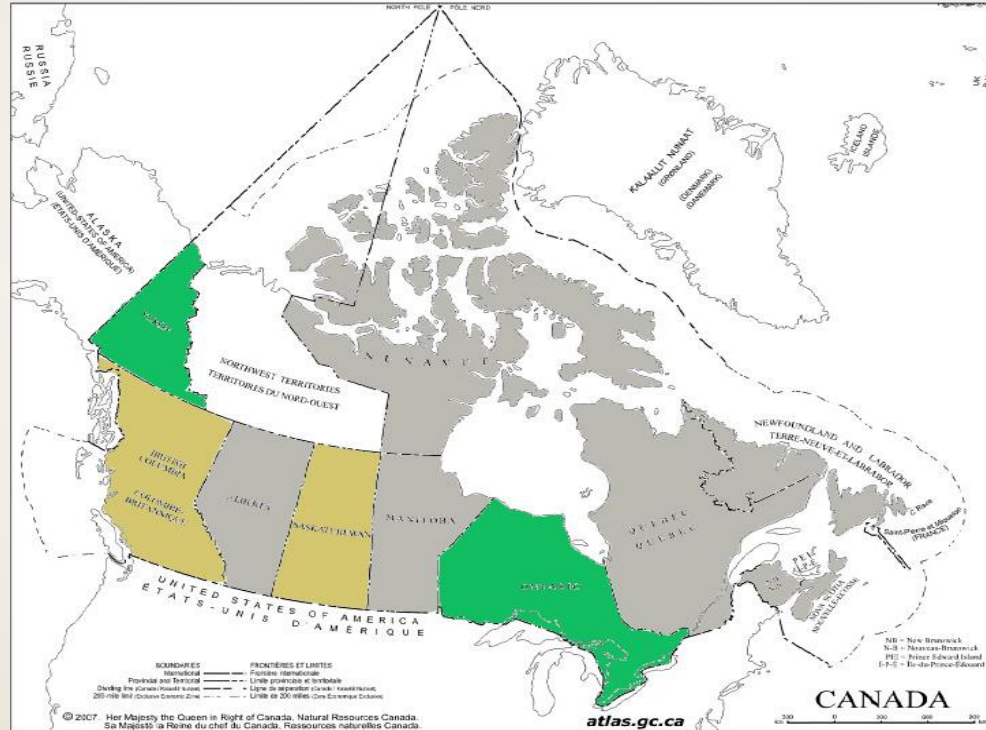


Green Building Certifications

UK and Europe	Americas	Rest of World
BREEAM	LEED (US and Canada)	Green Star (Australia)
The Green Guide to Specification	US DOE Design Guide (US)	BEAM (Hong Kong)
Office Scorer	WBDG (U.S.)	LEED (China and India)
Sustainability Checklists	HOK Sustainable Design Guide (US)	Greenmark (Singapore)
Environmental Impact Assessment	BREEAM (Canada)	GBTool (South Africa)
Strategic Environmental Assessment	Green Globes (U.S. & Canada)	
	BOMA BEST	

Adapted from: Reed, R., Bilos, A. Wilkinson, S. & Schulte, K., 2009, page 3.

Canadian Jurisdictions (Province and Territories)





Occupant Concerns



- ▶ Evidence suggests that much attention has been given to the environmental impact of LEED buildings
- ▶ Limited attention has focused on the health impacts for occupants (Newham, 2010; Centre for Sustainable Building Research, 2008; Guerin, Young Kim, Brigham, Choi, & Scott, 2012)



Occupant Concerns



- ▶ Indoor environmental quality (IEQ) category:
 - ▶ Goal to create healthy, comfortable and productive environments for its occupants (Lee & Guerin, 2009)
 - ▶ Concerns exist that category is narrow and focuses on mechanical aspects (Lee & Guerin, 2009; Rodenburg, personal communications, 2010)



Occupant Concerns

- ▶ Post-occupancy results MIXED
(Lee & Guerin, 2009; Center for Neighborhood Technology, 2009; Birt & Newham, 2009)
- ▶ Occupants report concerns related to:
 - ▶ Lighting, Office layout, Temperature and Acoustics (Lee & Guerin, 2009; Birt & Newham, 2009; Paevere & Brown, 2008; Hwang & Kim, 2011, Hedge & Dorsey, 2013, Hedge, Miller, & Dorsey, 2014)

Occupant Concerns/Performance

- ▶ Lighting (Paevere & Brown, 2008)
 - ▶ Positioning of work surfaces in relation to windows
 - ▶ Too much or too little lighting
- ▶ Acoustics (Leaman et al., 2007)
 - ▶ Use of hard surface and low partitions
- ▶ Temperature (Lee & Guerin, 2009)
- ▶ Office Layout (Hedge, Miller, & Dorsey, 2014)
 - ▶ Designed for paperless office
 - ▶ Lack adjustability
 - ▶ Storage difficult to access



Case Study - Clinic

- Large medical clinic/center
- LEED – Silver
- Area of Concern
 - Reception area for day clinics
- 12 workstations



Case Study - Clinic

- Occupant Concerns
 - Lack of adjustability
 - Poor access to equipment & storage
 - Lack of working space
 - Direct glare
 - Poor visibility







Role for Ergonomics in Green Building

- ▶ Collaborate with architects/designers/end users to:
 - ▶ Develop ergonomics strategy
 - ▶ Big necessity for occupant needs
 - ▶ Designing the best we can for humans: work environment, workstation, IT equipment, accessories and materials



Integrating Ergonomics UC Berkeley

- ▶ Campus ergonomics program started in mid 1990's
 - ▶ Based on national standards for computer ergonomics
 - ▶ Strategy helped with basic assessments and training
 - ▶ Reactive and preventive (Grassroot efforts)

Integrating Ergonomics UC Berkeley

- ▶ Noticed challenges with designs
 - ▶ Limited adjustability for computer users
 - ▶ Long reaches at customer service counters
 - ▶ Lack of leg clearance at laboratory benches
 - ▶ High reaches to empty trash into tall dumpsters





Integrating Ergonomics UC Berkeley

- ▶ Strategies to influence change
 - ▶ Ergonomics task force with key campus partners
 - ▶ Construction & Design, EH&S, HR, Disability Management, Occupational Health, PT, Purchasing
 - ▶ Lunch and learns for project managers around design challenges and injury rates
 - ▶ System wide training: Ergonomic quality in facility design for architects, designers & ergonomists

Integrating Ergonomics UC Berkeley

- ▶ Make the case for ergonomics
 - ▶ Focus on mutual goals
 - ▶ Innovative design, client satisfaction,
 - ▶ Sustainable design & no remodels
- ▶ Construction design review
 - ▶ Get a seat at the table to review drawings
 - ▶ Develop guidelines to submit with comments



Integrating Ergonomics UC Berkeley



- ▶ UC system-wide design initiative for LEED certification (New Construction and Commercial Interiors)
 - ▶ Design to achieve LEED Gold (60-79 points) and required to achieve Silver (50-59) certification at a minimum

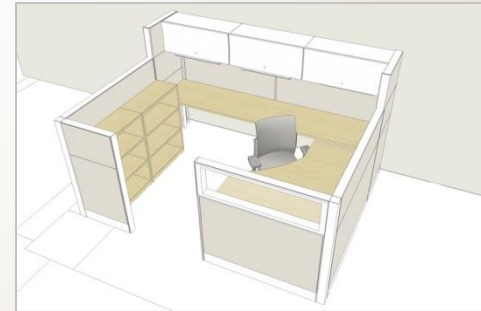


Integrating Ergonomics UC Berkeley

- ▶ Partnered with LEED Accredited Professional (AP) to design checklist showing how strategy meets LEED credit for ergonomics
 - ▶ Created a tangible link/reason to be at the table

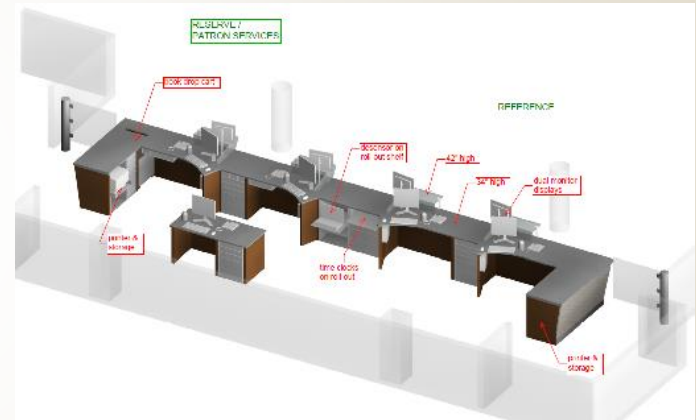
School of Law Addition

- Stumbled across first project
- Worked with client, architect and designer
 - Meetings to discuss occupant needs
 - Field trips with architect
 - look at innovative library counters
- Field trips to look at task stools
- Provided demos for staff to try out



School of Law Addition

- Reviewed drawings & provided guidelines
- Worked closely with designer
- Helped write narrative template with LEED AP
- Workstation evaluations and ergonomics survey
- Follow up



Library counter

Energy Biosciences Institute



- ▶ Opportunities to integrate ergonomics- design review committee
- ▶ EBI: Lab counters, loading dock and computer workstations
 - ▶ Provided guidelines, met with client, project mgr., architect and designer

Energy Biosciences Institute

- ▶ Mock ups and demos
- ▶ Ergonomics seen as costly
 - ▶ Capital budget does not take into consideration total cost of ownership or future expenditures
- ▶ No adjustability until they needed the LEED ergo credit
 - ▶ Then keyboard trays



ISEC/Jamestown Metal Products adjustable height mobile laboratory workstations



Lessons Learned

- ✓ Finding your way is not a linear process
- ✓ Learn the roles of the architect, project manager, LEED AP, interior designer etc.
- ✓ Become a part of the construction design review team
- ✓ Furniture is specified during the design development phase
- ✓ Get to the design table early and review all plans
- ✓ Meet with occupants to understand their needs

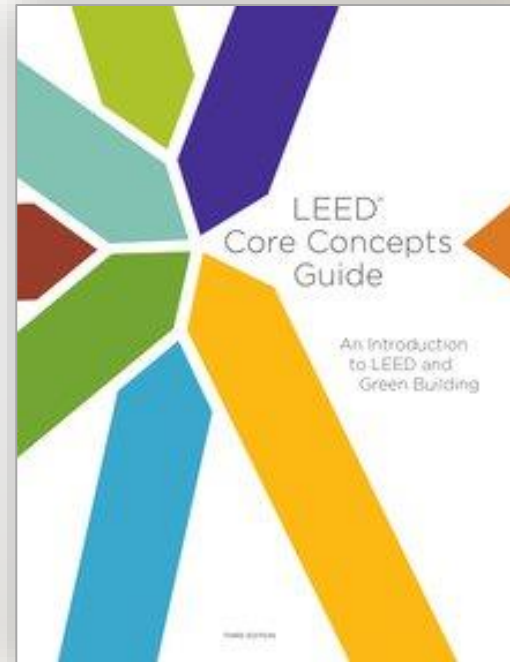


Lessons Learned

- ✓ Develop design guidelines for all aspects of the work environment, not just computer ergonomics
- ✓ Create a spreadsheet to follow up (30 days) on any concerns; don't make any assumptions
- ✓ Provide the road map for the ergonomics credit (computer workstation) and other work areas as you are able
- ✓ Keep your finger on the pulse gently

LEED Green Building Certification System

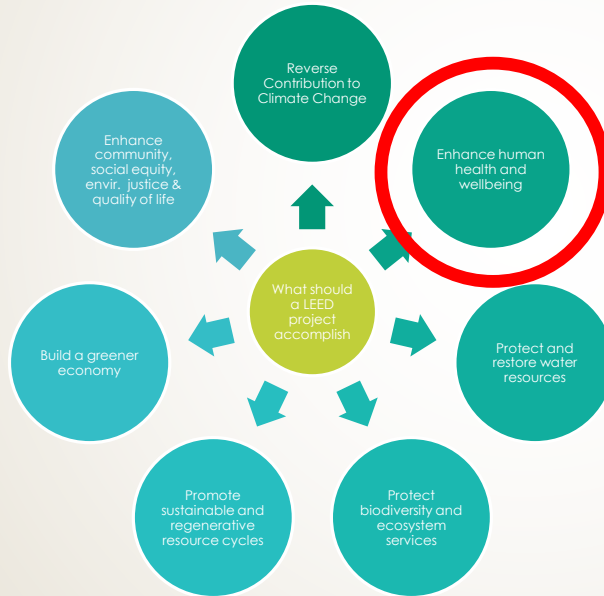
- ▶ Leadership in Energy and Environmental Design
- ▶ Started in 1998
- ▶ Voluntary, consensus driven & internationally recognized
- ▶ Primary goal:
 - ▶ promote building practices that are environmentally responsible, profitable, & healthy for its building occupant



www.usgbc.org/leed



LEED v4 System Goals



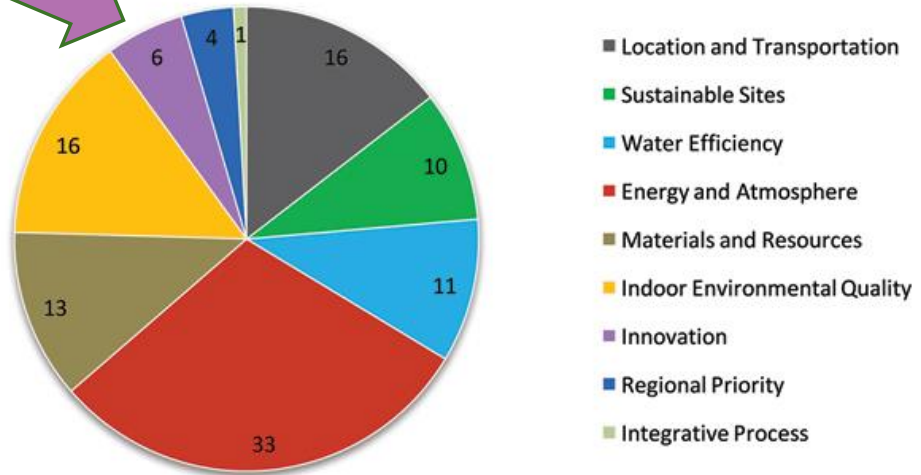
Human Health & Wellbeing

- Protect and improve individual human health through changes in how we design, construct and operate within the built environment
 - Support occupant comfort and wellbeing
 - Protect human health from direct exposure to negative health effects
 - Protect human health globally and across the entire built environment life cycle

LEED Rating System Categories

Pilot Credit Library

LEED v4 Points by Category

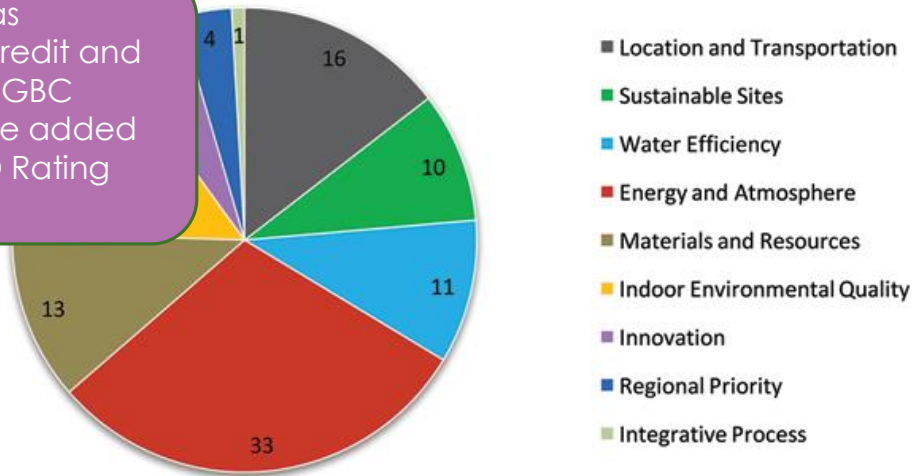


LEED Rating System Categories

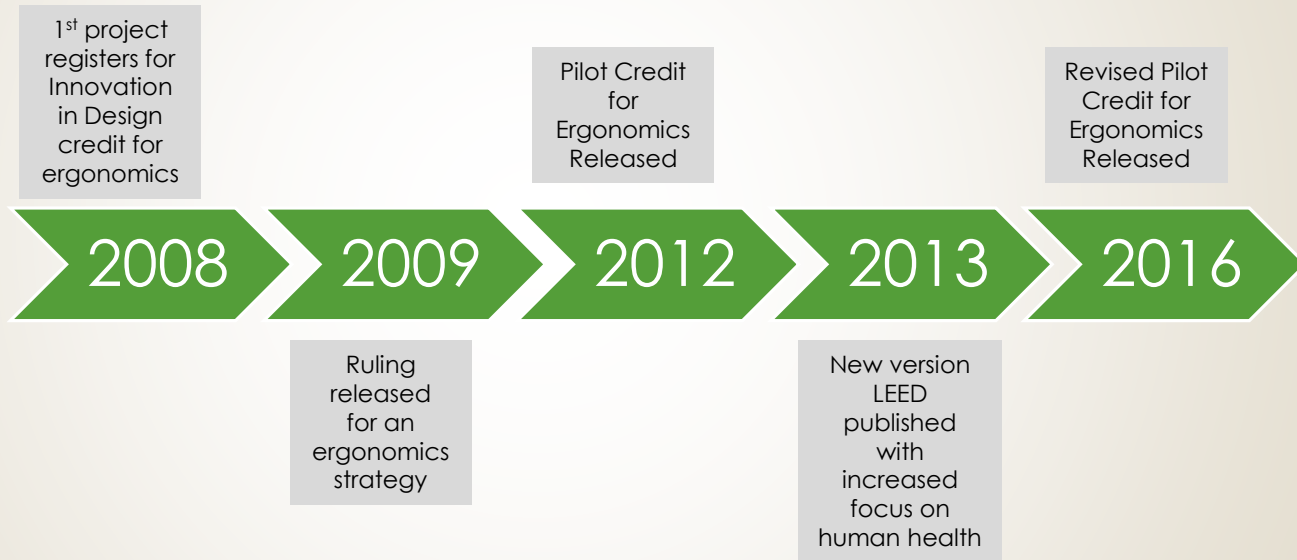
Pilot Credit Library

Test kitchen for new ideas
Project teams pilot the credit and
provide comments to USGBC
Successful credits may be added
to future versions of LEED Rating
System

LEED v4 Points by Category



LEED & Ergonomics Timeline





USGBC - Submission Concerns

- ▶ Minimal detail on ergonomics principles and design
- ▶ Lack of project description
- ▶ Wide range of submissions
- ▶ Limited information for ongoing monitoring & validation of program
- ▶ No clarity about role of ergonomist/health and safety

Revised PC 44 (2016)

- Title
 - Ergonomics Approach for Computer Users
- Intent
 - Occupant well-being (human health, sustainability, performance)
- Focus
 - Physical work environment, specifically computer workstation
- Engagement of an Ergonomist or Health & Safety Specialist





Revised PC 44 (2016)

- ▶ Ergonomics requirements aligned with design/build cycle
 - ▶ New Construction: prior to building occupancy
 - ▶ Existing Building: 1 year post occupancy



New Construction

➤ Steps

- Engagement of an expert
- Commitment to ergonomics strategy
- Description of ergonomics strategy



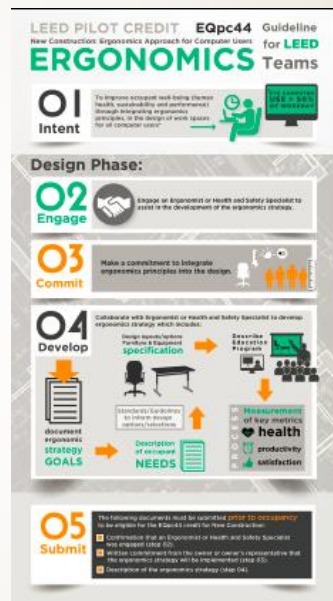
➤ Resources



- [Infographic](#)
- Description of ergonomist & health and safety specialist
- Current standards and guidelines
- Sample programs with strategies and goals
- Integrating ergonomics to reduce injuries
- Education/training
- Measurement/tracking

Revised PC 44 (2016)

➤ Infographic - NC



www.usgbc.org/resources/ergonomics-infographic-leedpc44-bdc

Existing Building

► Steps

- Engage an expert
- Create or apply ergonomics strategy
 - Goals
 - Principles
 - Occupant needs
 - Re-design/retrofit work stations
 - Education
 - Evaluation and maintenance

► Resources

- [Infographic](#)
- Same as for new construction



Revised PC 44 (2016)

► Infographic – EB



LEED PILOT CREDIT EQpc44 Guideline for LEED Teams
Existing Buildings: Ergonomics Approach for Computer Users

ERGONOMICS

01 Intent To improve occupant well-being (human health, sustainability and performance) through integrating ergonomics principles in the design of work spaces for all computer users.

02 Engage Engage an Ergonomist or Health and Safety Specialist.

Form ergonomics strategy:

03 Identify 1. What are the goals of the ergonomic strategy?
2. How will engagement of stakeholders be integrated into the overall design?
3. What are assigned needs, including occupant characteristics and/or demographics, tasks, and restrictions, equipment, work, work aids (WETA's) used to perform these tasks?

04 Redesign Redesign or confirm workstation layouts and furnishings to support occupant needs, and to be relevant standards and/or guidelines for process flow design.

Provide feedback, work feasible or proposed designs for user testing and feedback.

Select ergonomic results and furnishings based on occupant feedback & need.com

Review design options with occupants.

Workstation Redesign Review workstation design with occupants.

05 Develop Education program 2 or more educational opportunities

Process for tracking performance goals health, productivity, satisfaction

06 Implement Execute the ergonomics strategy.

07 Track Track the ergonomics strategy for a minimum of 3 one-year performance periods and report the results, noting that the goals have been met.

08 Submit This building must have been occupied and the ergonomics strategy in effect for a minimum 1-year period before submitting.

- Confirmation that Ergonomist or Health and Safety Specialist was engaged (MnE 02).
- Detailed description of the ergonomics strategy (MnE 03, 04, 05).
- Documentation showing performance/results of the ergonomics strategy (MnE 07).

www.usgbc.org/resources/ergonomics-infographic-leedpc44-om

Documentation for Projects

New Construction

- [2016: Revised language for Ergonomics Pilot Credit 44](#)

2016 Campus Ergonomics Strategy for New Construction (projects registered after 10/31/2016)

- [Narrative for LEED Credit \(2016\)](#)
- [Narrative for Written Commitment \(2016\)](#)

Campus Ergonomics Strategy for New Buildings: LEED Credit for Innovation in Design (1 Point)

- [Summary Checklist for Department Computer Workstation Evaluators](#)
- [Summary Checklist for Interior Designers](#)
- [Summary Checklist for IT](#)
- [User Ergonomics Survey](#)

Projects Receiving LEED Credit for Ergonomics

Berkeley Law School

- [LEED Submittal Template](#)
- [Narrative for LEED Credit](#)
- [Images of Furniture and Equipment](#)
- [Drawings of Reference and Checkout Library Counter](#)

Energy Biosciences Building

- [LEED Credit Interpretation Ruling on Ergonomics](#)
- [Narrative for LEED Credit](#)
- [Images of Furniture and Equipment and Other Supporting Documents](#)

Existing Buildings

- [2016: Revised language for Ergonomics Pilot Credit 44](#)
- [Narrative for LEED Credit \(2016\) \(projects registered after 10/31/2016\)](#)

<https://uhs.berkeley.edu/facstaff/ergonomics/design-guidelines>



Summary

- Role for ergonomics in green building
- Mutual goals with architects, designers & clients
- Look for opportunities – typically not a linear process
- PC 44 great way to leverage ergonomics



Thank you

Questions?

