Introduction to LEED for the Accredited Professional

February 25, 2010

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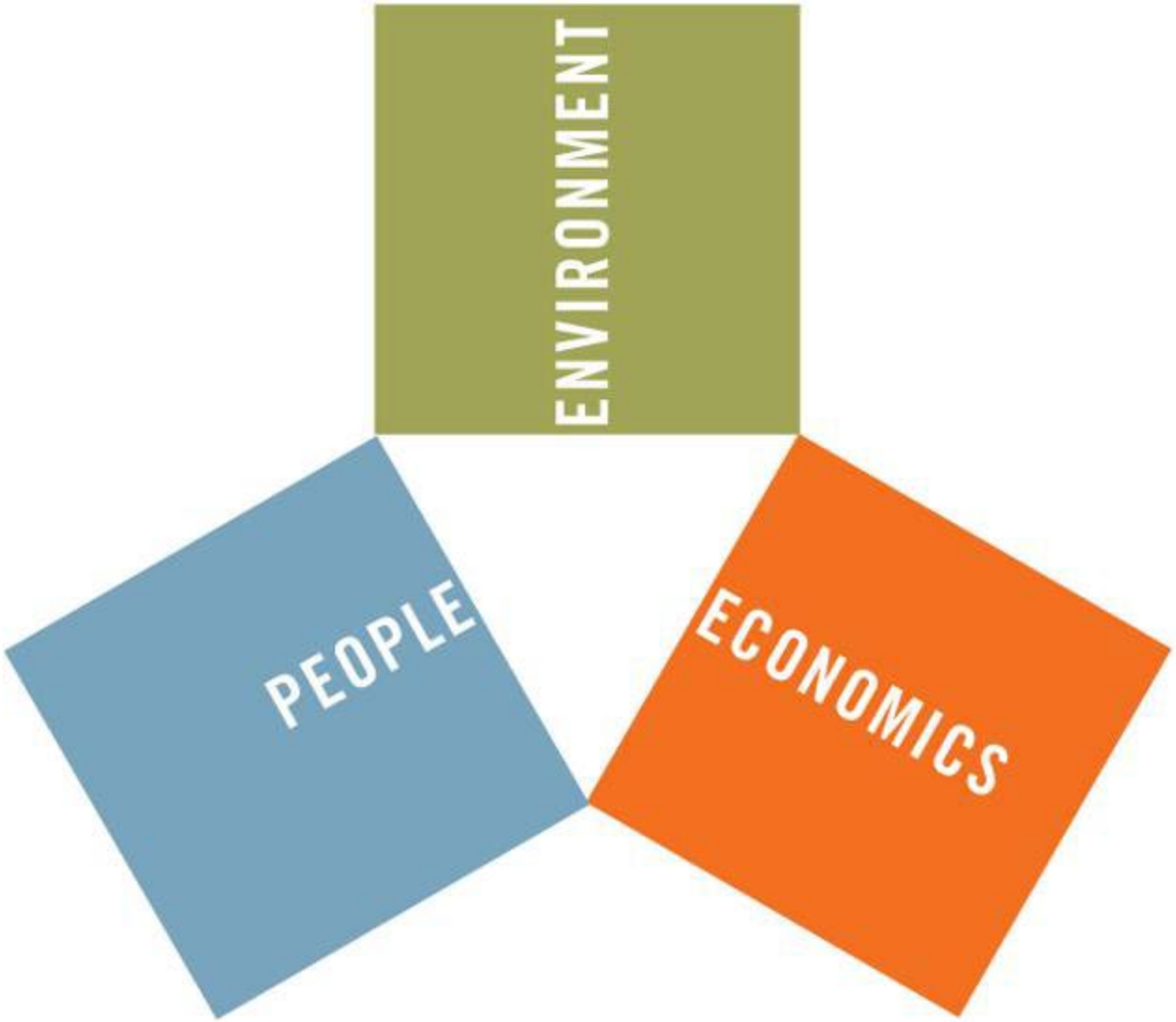
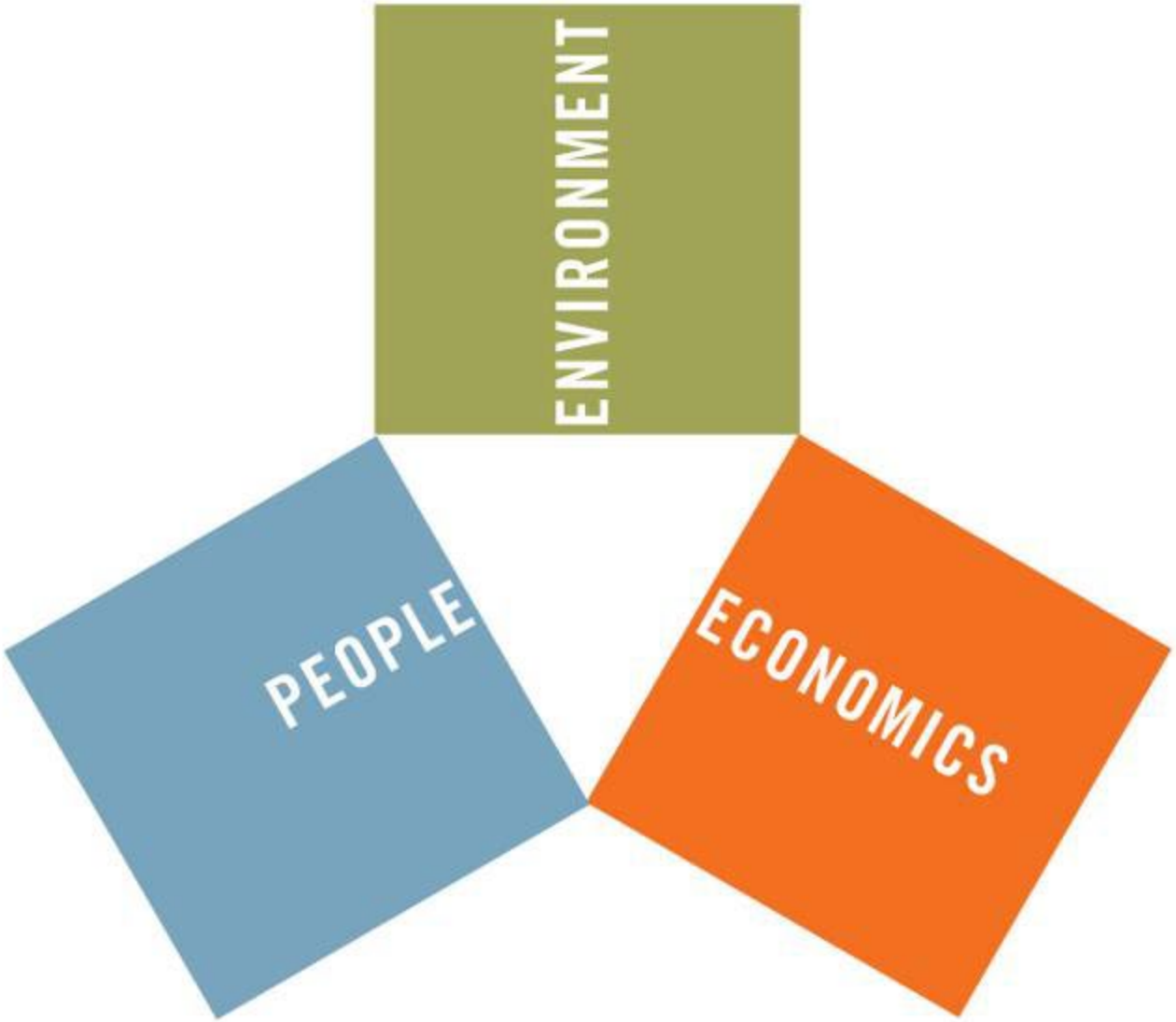
Overview of USGBC, LEED Rating Systems, and Green Buildings

The Triple Bottom Line.



The Triple Bottom Line.

Reduced Environmental Impact.
Peak Efficiency.
Improved Capitalization Rates.
Increased Marketability.
Higher Lease Rates.
Improved Productivity.
Reduced Absenteeism.
Build Green. Everyone Profits.

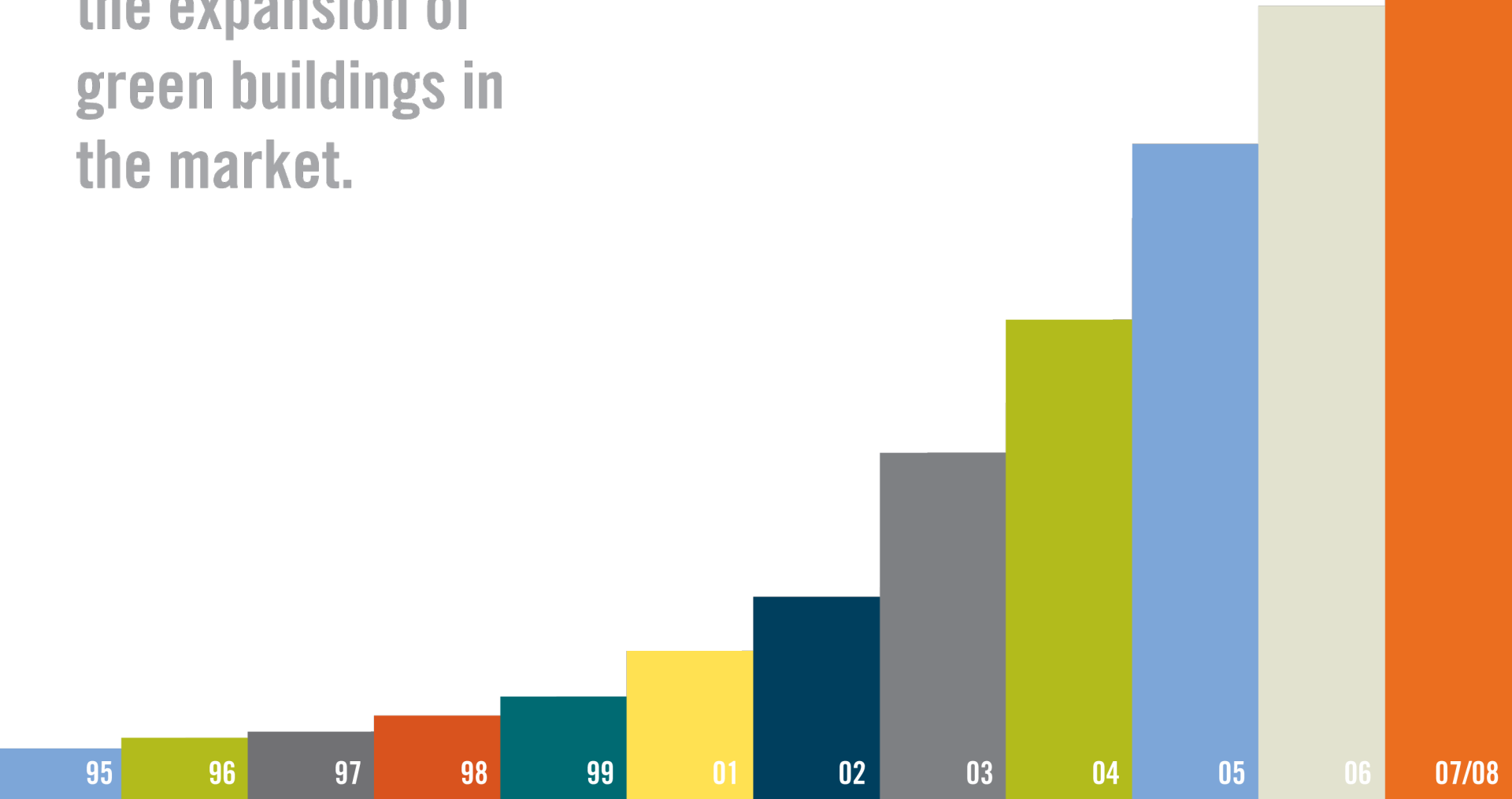


What is green building?

Design and construction practices that meet specified standards, resolving much of the negative impact of buildings on their occupants and on the environment.

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

13,615+



U.S. BUILDINGS IMPACTS ON RESOURCES

39% of total energy consumption

71% of electricity consumption

39% CO_2 emissions

30% of raw materials use

30% of waste output

12% of potable water consumption

THE NEXT GENERATION'S PERSPECTIVE WILL INCREASE GREEN BUILDING

89% choose brands aligned with social cause

74% listen to brands aligned with social cause

69% shop for brands aligned with social cause

66% recommend brands aligned with social cause

PERCEIVED ADVANTAGES OF BUILDING GREEN

8-9% decrease in operating costs

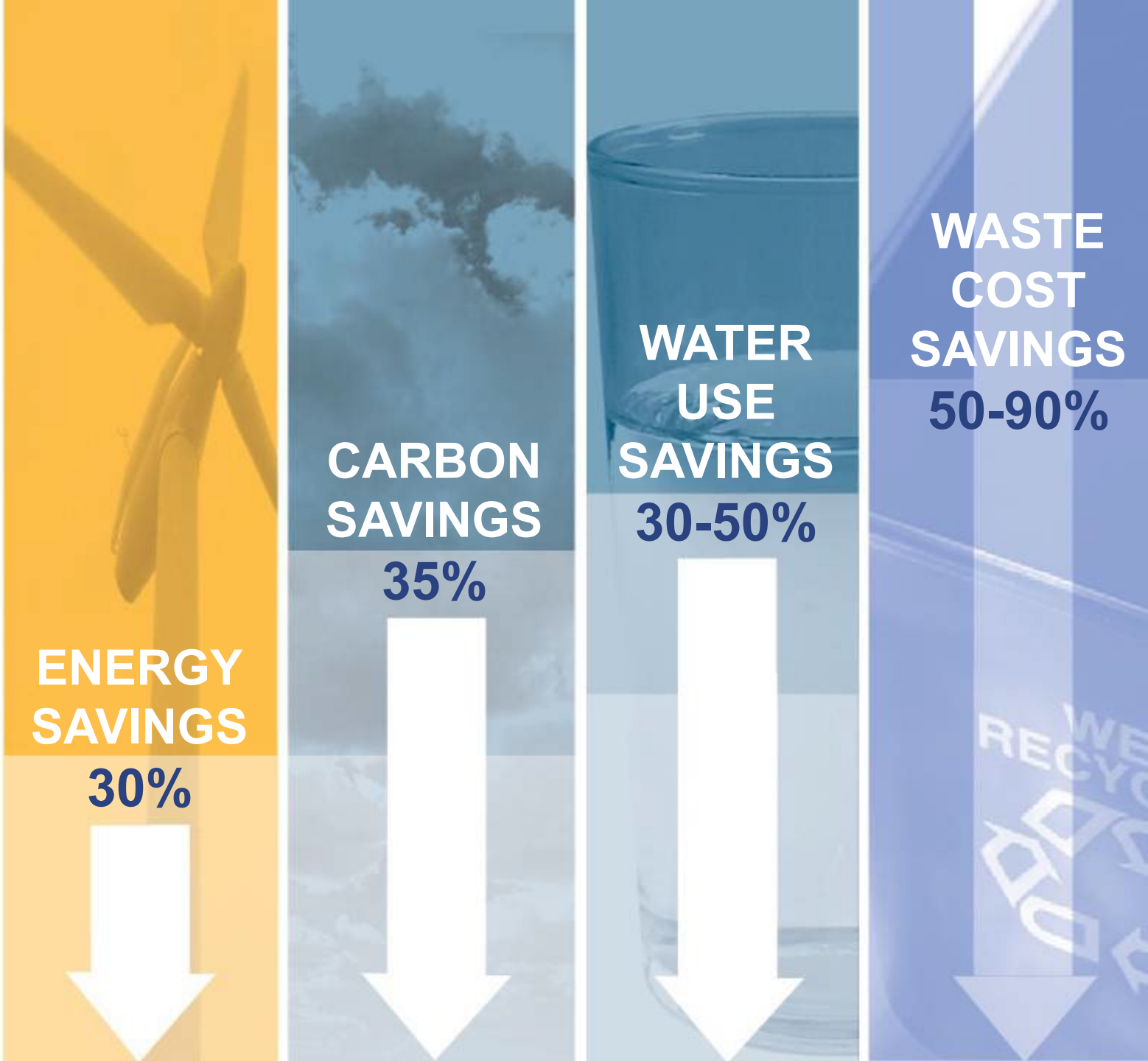
7.5% increase in building values

6.6% improvement in ROI

3.5% increase in occupancy

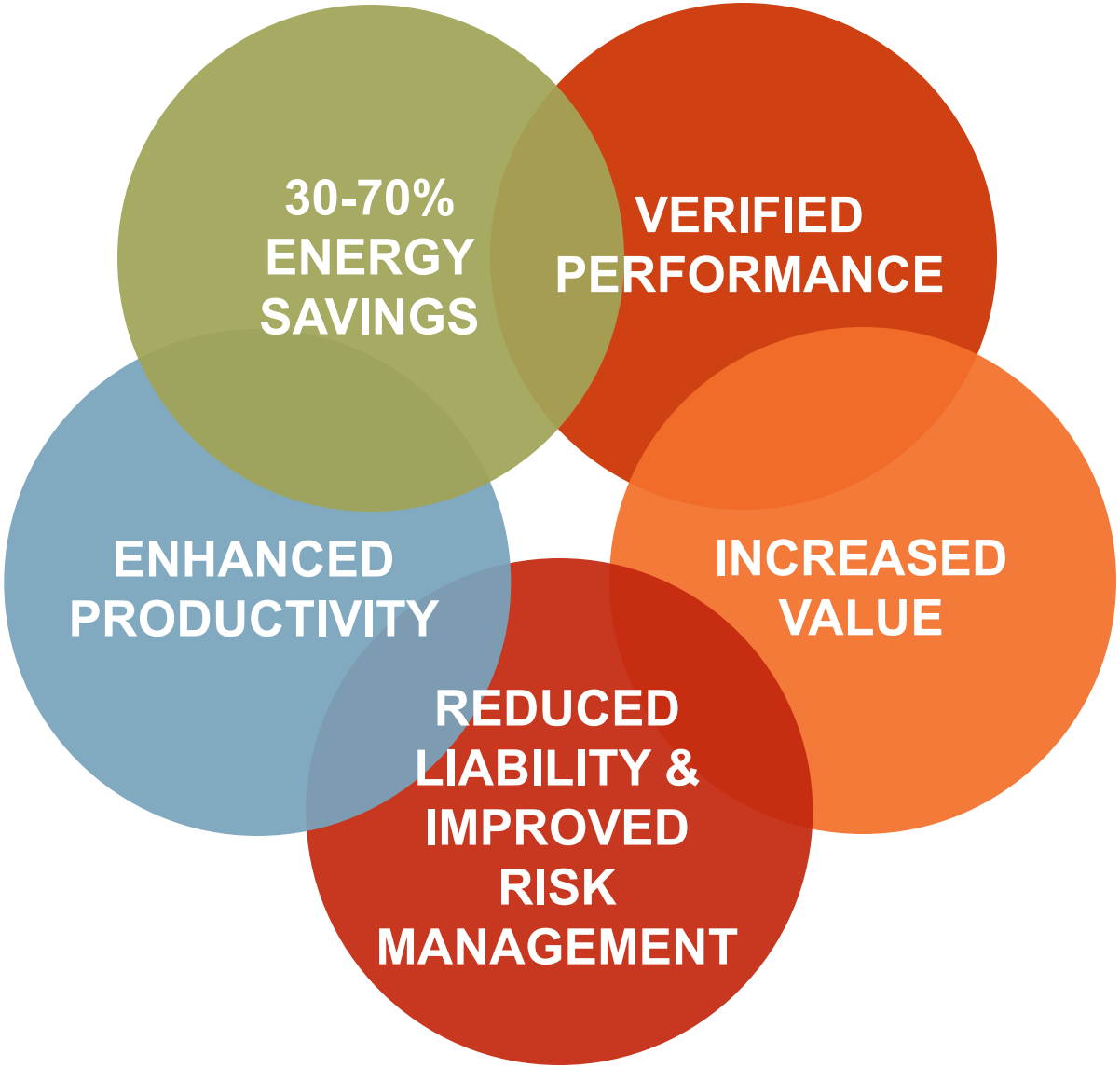
3% rent increase

Average Savings of Green Buildings

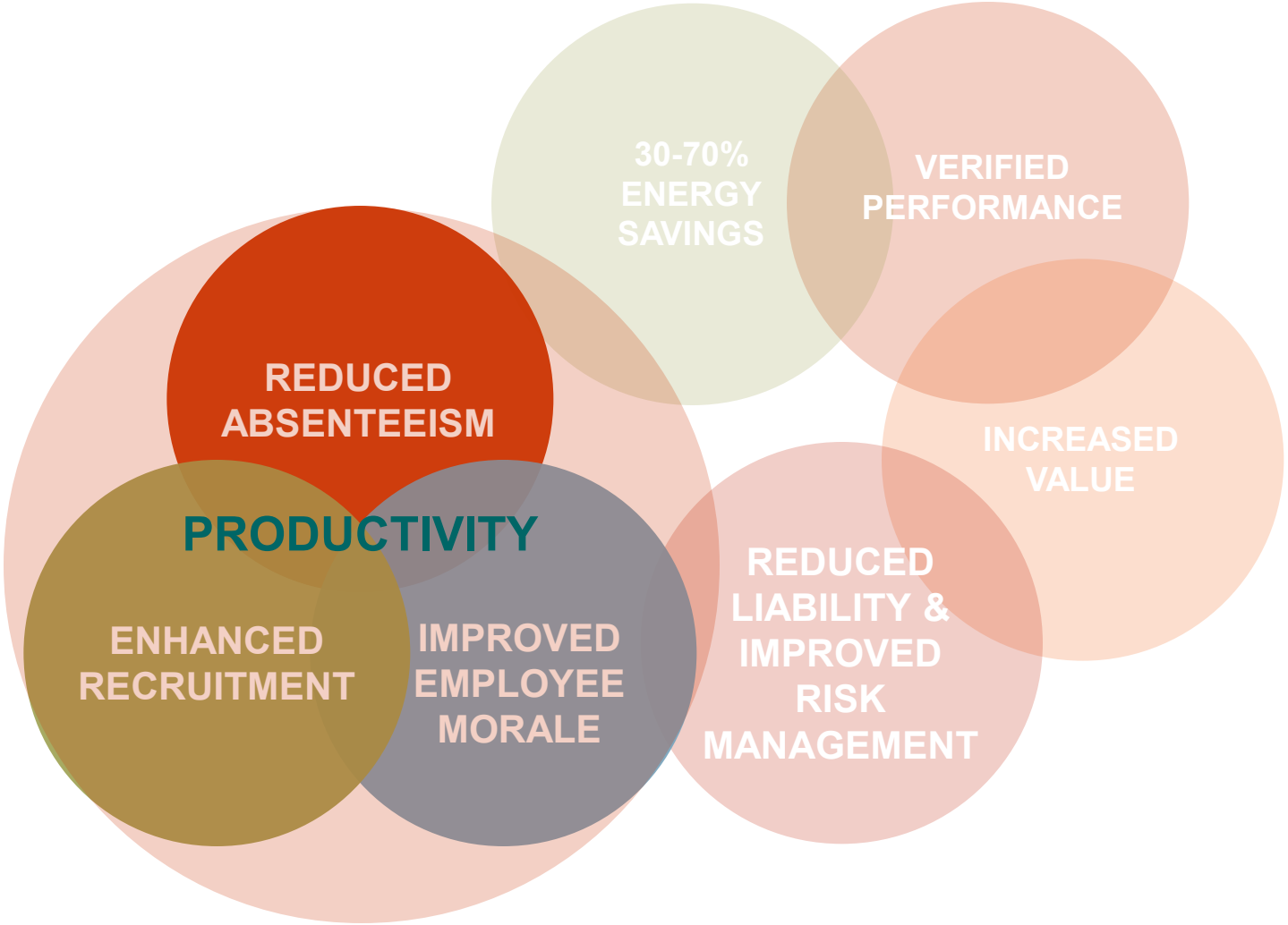


Source:
Capital E

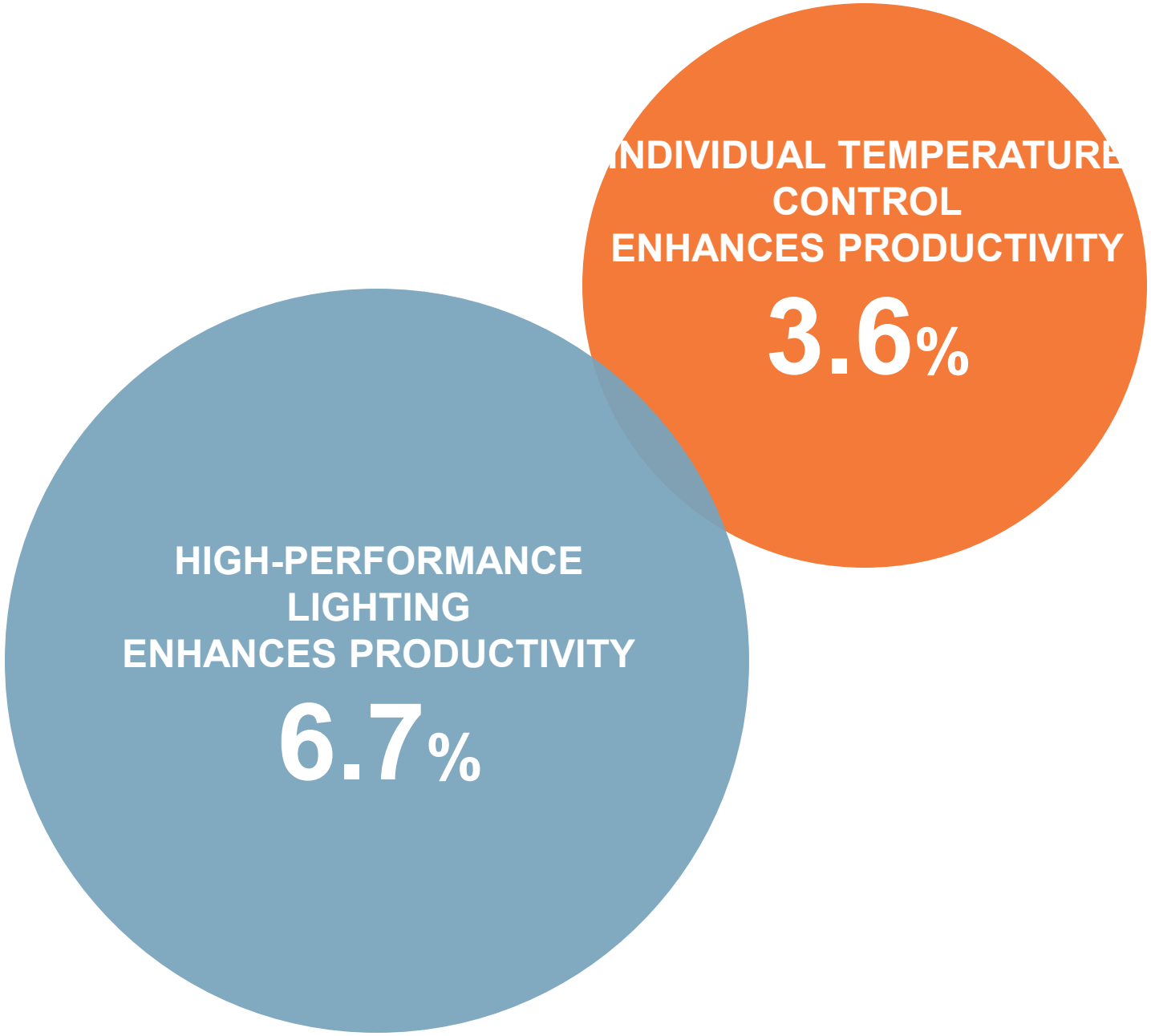
Improved Bottom Line.



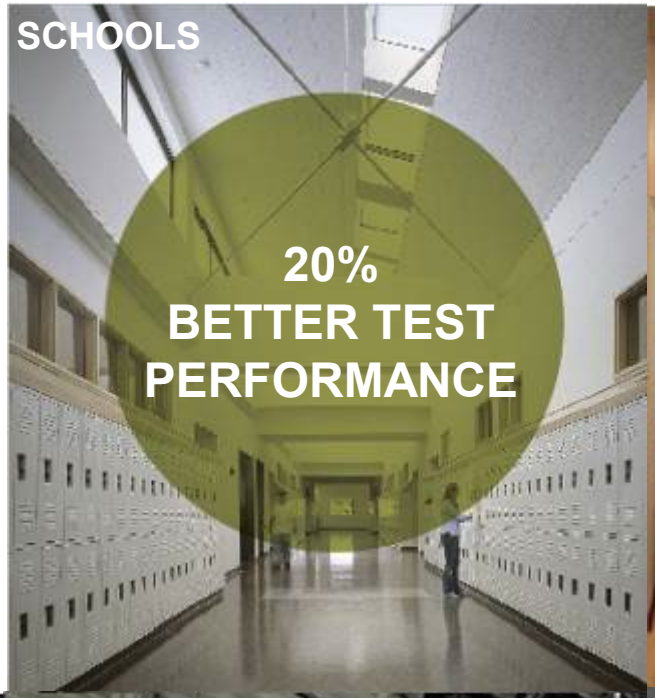
Improved Bottom Line.

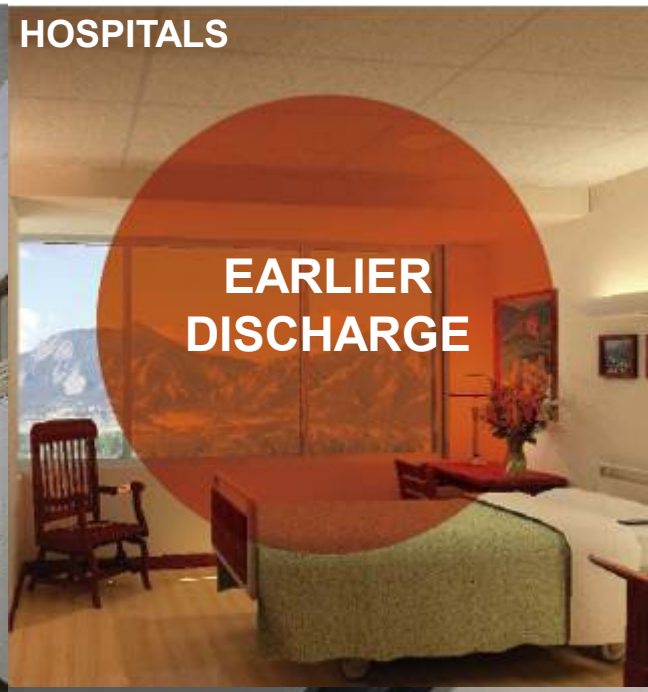


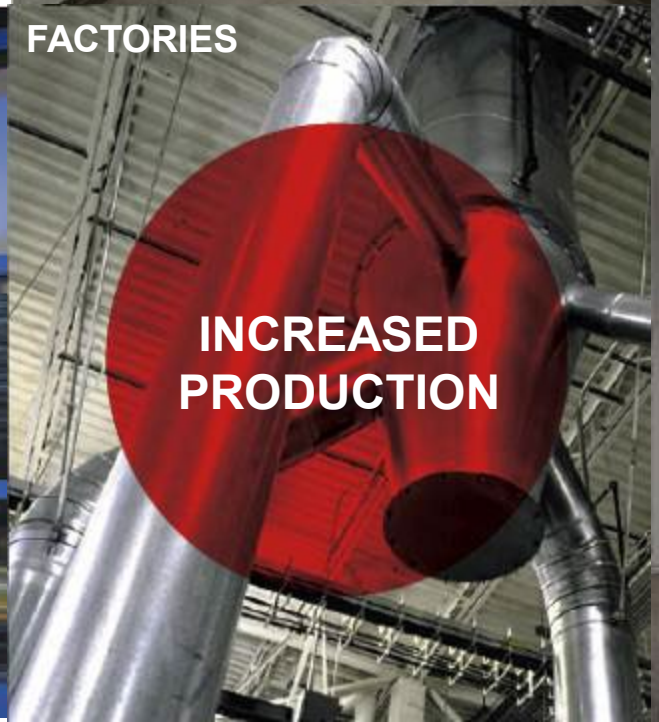
Average Productivity Gains



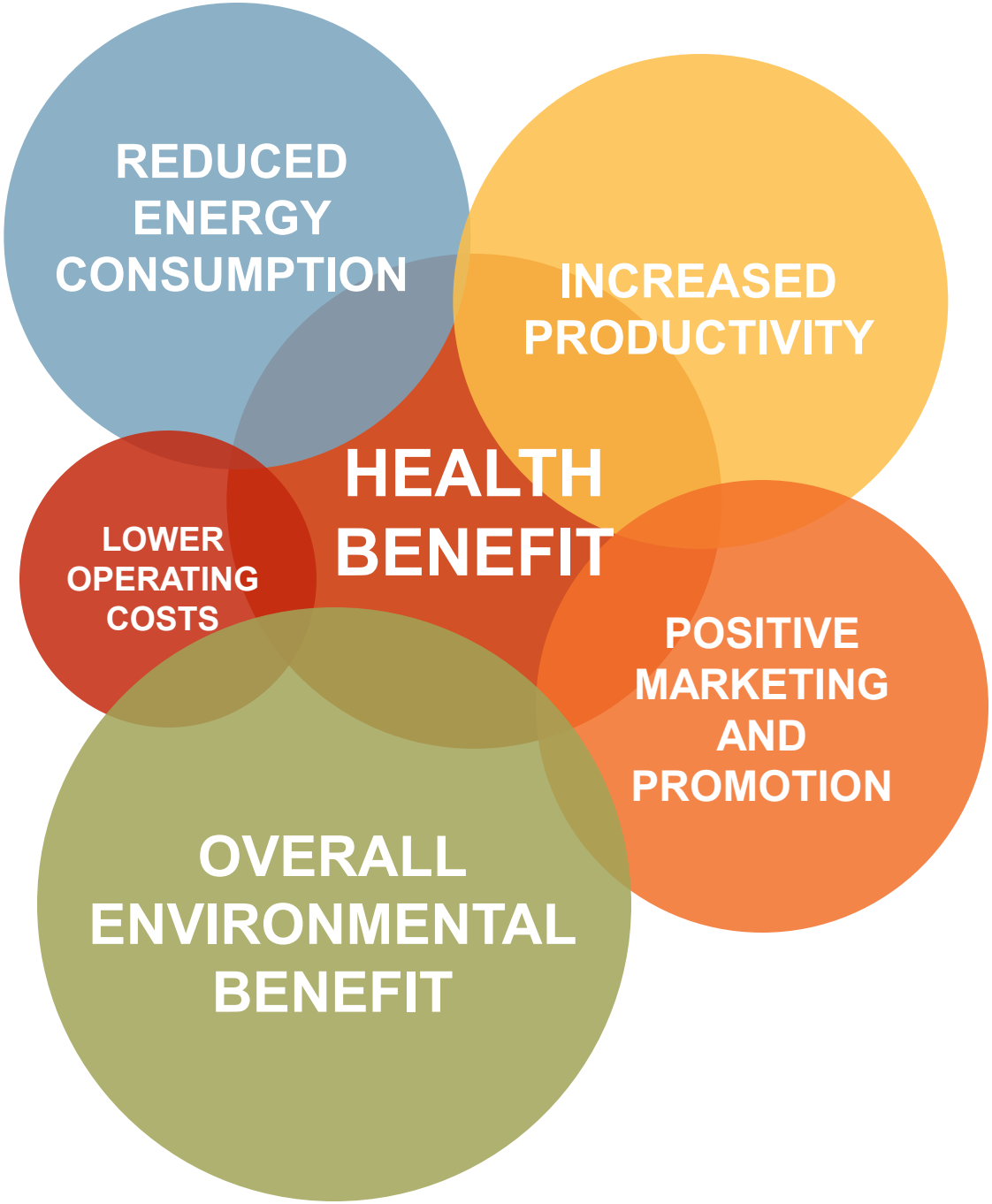
Increased Productivity.







Occupants and tenants perceive value of working in a green building to be:



What is the LEED System?

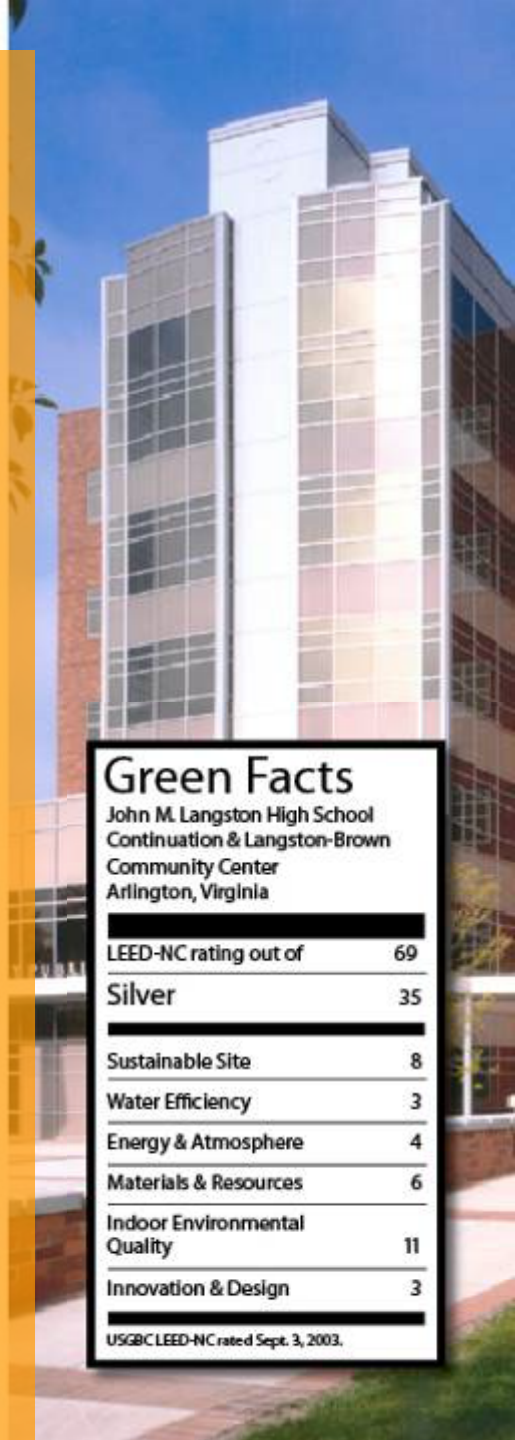
LEADERSHIP in ENERGY and ENVIRONMENTAL DESIGN

A leading-edge system for certifying DESIGN, CONSTRUCTION, & OPERATIONS of the greenest buildings in the world

Scores are tallied for different aspects of efficiency and design in appropriate categories.

For instance, LEED assesses in detail:

1. Sustainable Sites
2. Water Efficiency
3. Energy & Atmosphere
4. Materials & Resources
5. Indoor Environmental Quality
6. Innovation & Design Process



Sustainable Sites

Construction Activity Pollution Prevention

Site Selection

Development Density & Community Connection

Brownfield Redevelopment

Alternative Transportation

Site Development

Stormwater Design

Heat Island Effect

Light Pollution Reduction

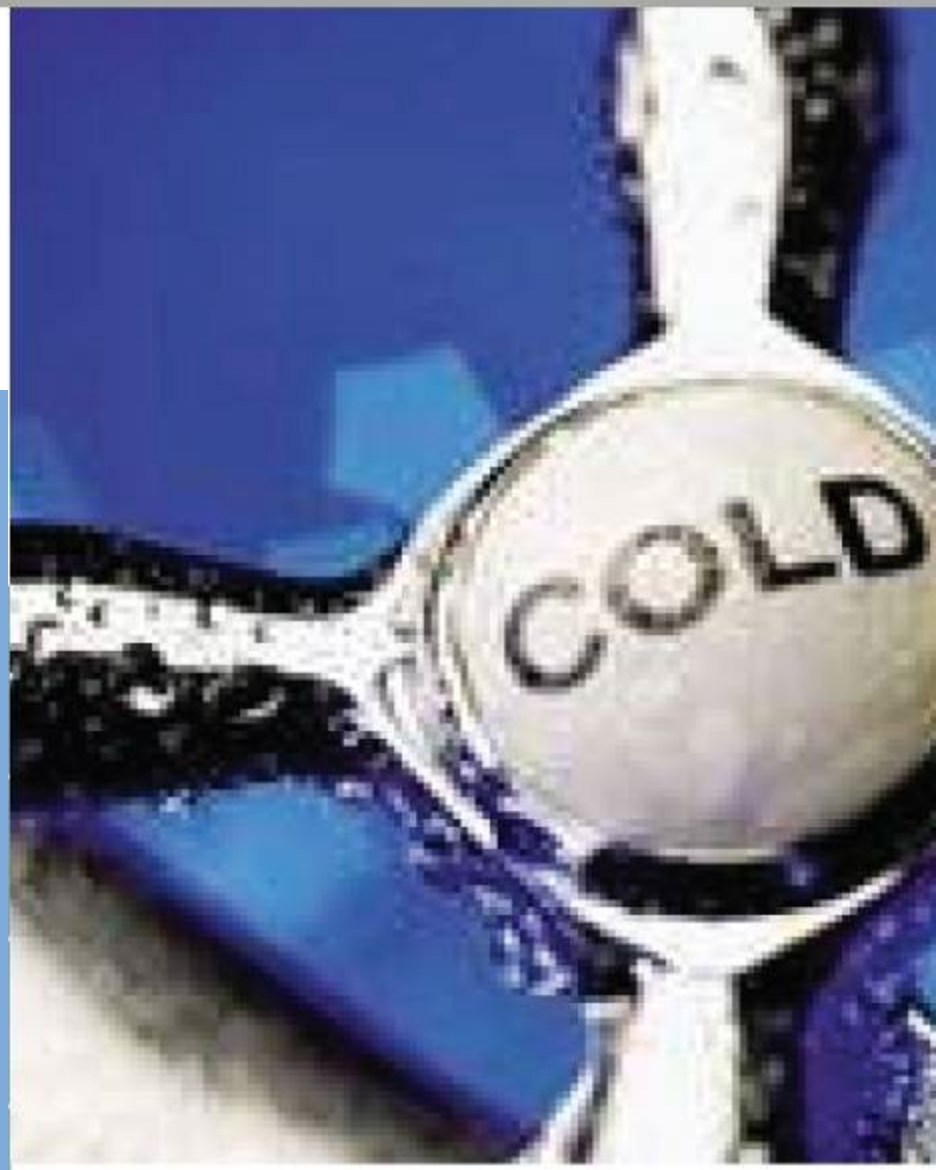
Sustainable Sites

Efficient Water Use

Water Efficient Landscaping

Innovative Wastewater Technologies

Water Use Reduction

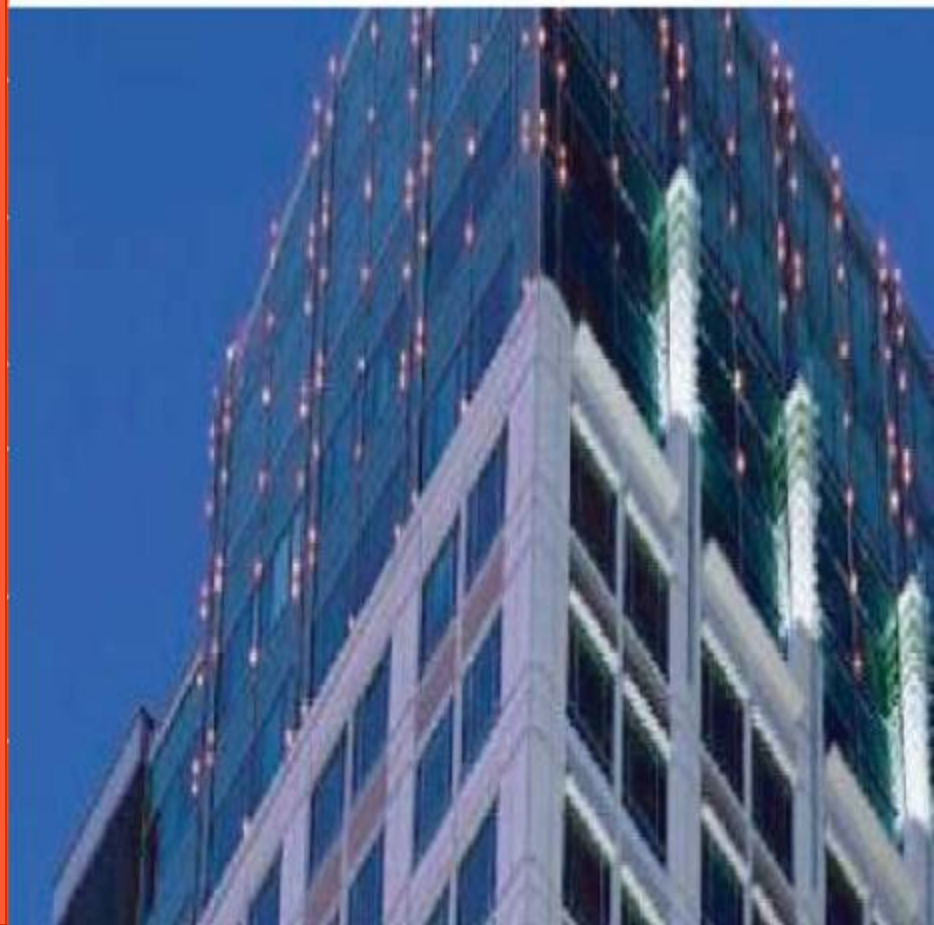


Sustainable Sites

Efficient Water Use

Energy & Atmosphere

- Fundamental Commissioning
- Minimum Energy Performance
- Fundamental Refrigerant Management
- Optimize Energy Performance
- On-Site Renewable Energy
- Enhanced Commissioning
- Enhanced Refrigerant Management
- Measurement & Verification
- Green Power



Sustainable Sites

Efficient Water Use

Energy & Atmosphere

Materials & Resources

Storage & Collection of Recyclables

Building Reuse

Construction Waste Management

Materials Reuse

Recycled Content

Regional Materials

Rapidly Renewable Materials

Certified Wood

Sustainable Sites

Efficient Water Use

Energy & Atmosphere

Materials & Resources

Indoor Environmental Quality

- Minimum IAQ Performance
- Environmental Tobacco Smoke
- Outdoor Air Delivery Monitoring
- Increased Ventilation
- Construction IAQ Management Plan
- Low-Emitting Materials
- Indoor Chemical & Pollutant Control
- Controllability of Systems
- Thermal Comfort
- Daylight & Views

Sustainable Sites

Efficient Water Use

Energy & Atmosphere

Materials & Resources

Indoor Environmental Quality

Innovation

LEED AP
Innovation in Design
Regional Credits

Levels of LEED Ratings

Points required

Platinum
80+

Gold
60-79

Silver
50-59

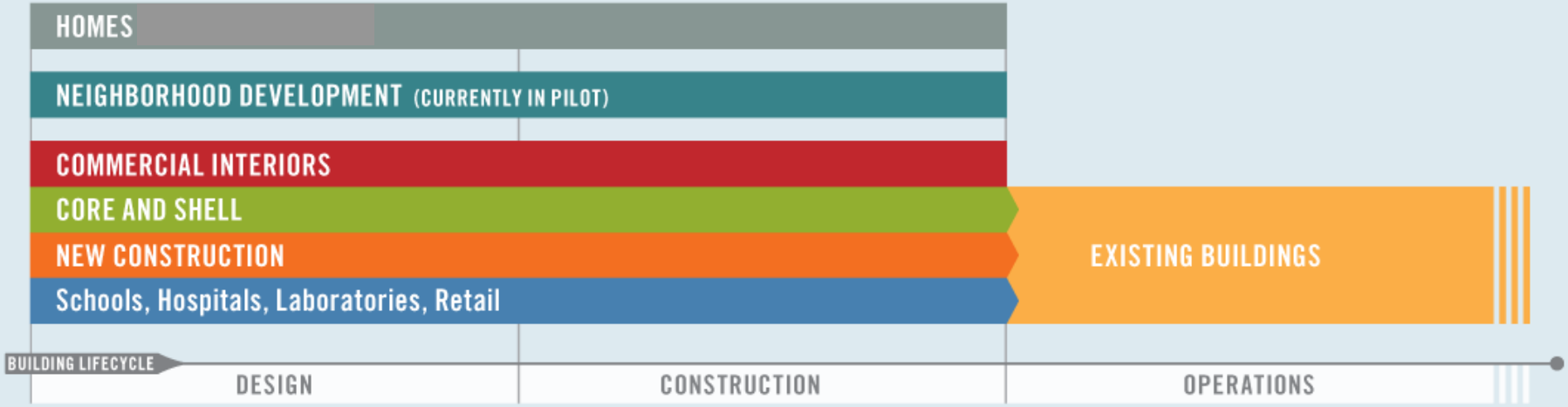
Certified
40-49

Green Buildings worldwide are certified with a voluntary, consensus-based rating system. USGBC has four levels of LEED.

Categories of LEED Ratings

LEED addresses the complete lifecycle of commercial buildings.

Programs are in pilot for Homes and Neighborhoods.



Increase in LEED Projects in three years.

2002:
More than 80 million square feet.

2003:
More than 141 million square feet.

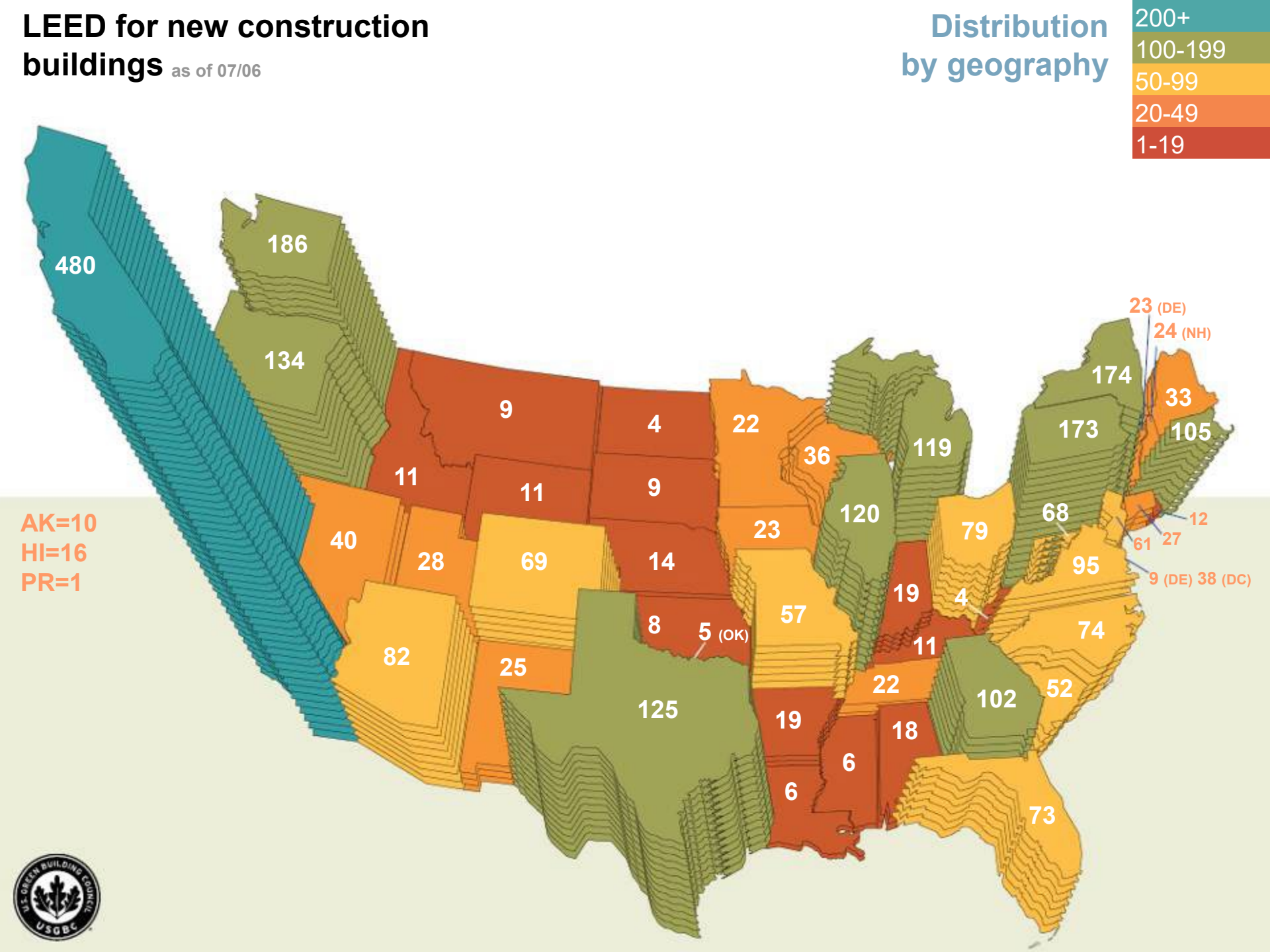
2004:
More than 180 million square feet.

2005:
500 million square feet.

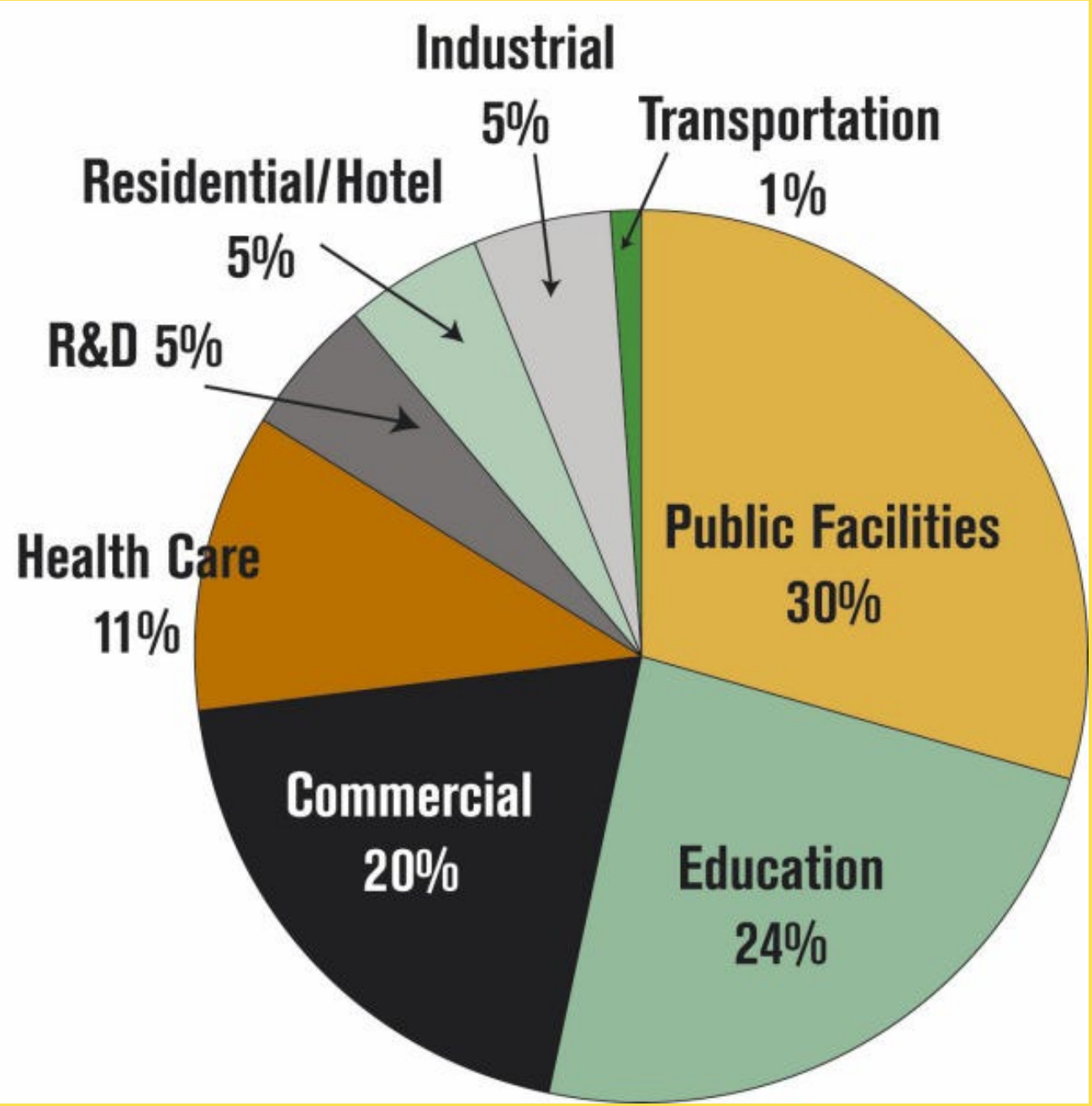
2006:
642 million square feet.

LEED for new construction buildings as of 07/06

Distribution by geography



Market Sectors



GBCI

GREEN BUILDING CERTIFICATION INSTITUTE

HEREBY CERTIFIES THAT

46,188

HAS ACHIEVED THE DESIGNATION OF

LEED® ACCREDITED PROFESSIONAL

BY DEMONSTRATING THE KNOWLEDGE OF GREEN BUILDING PRACTICE REQUIRED FOR SUCCESSFUL IMPLEMENTATION OF THE LEADERSHIP IN ENERGY AND ENVIRONMENTAL DESIGN (LEED®) GREEN BUILDING RATING SYSTEM™.

LEED AP™

Results of the California Study

33 Diverse Buildings

Built over the last **10** years

Cost construction premiums of **1.8%**

Results of the California Study

Results of the California Study:
Average Bottom Line Savings

The William and Flora Hewlett Foundation
Menlo Park CA
LEED Gold

Additional constructions costs for LEED-certified buildings

Average for offices and schools, based on 40 buildings

LEED On-line Resources

- LEED Green Building Rating Systems (free downloads).
- Reference Guides for the various rating systems (must buy).
- Submittal Templates.
- LEED AP Candidate Package.
- Slide Show Overview.
- Training Workshops schedules and locations.
- And much more . . .

LEED Resources

- Credit Interpretation Rulings
  - Continuously collected.
  - Must be member or have project to access.
  - Good source for innovation credits.
- Professional Accreditation
  - >43,000 so far
  - 2-hour exam by computer
  - Exam tests competency:
    - Knowledge of LEED Credit Intents & Requirements.
    - Coordinate Project and Team.
    - Implement LEED Process.
    - Perform Technical Analyses Required for LEED Credits.

Benefits of LEED Professional Accreditation

- Individual Benefits
  - Provides a marketable credential to an employer, prospective employer or client
  - Listing on GBCI website directory of LEED Accredited Professionals
  - LEED Accredited Professional certificate
  - Receive recognition for involvement in the LEED Certification process
- Employer Benefits
  - Eligible for projects on which owners are mandating the participation of a LEED AP
  - Strengthens qualifications when responding to RFPs requiring a LEED AP
  - Encourages the growth of knowledge and understanding of the LEED Certification process
- Industry Benefits
  - Encourages and promotes a higher understanding of LEED
  - Supports and facilitates transformation of the built environment

Becoming a LEED AP

References

- **LEED Reference Guide:**
  - www.usgbc.org/store > Publications
- **LEED Certification Process:**
  - www.usgbc.org/leed > Project Certification
- **Project Registration Form:**
  - www.usgbc.org/leed > Project Certification > Registration
- **LEED Credit Templates:**
  - www.usgbc.org/leed > LEED Resources > LEED Online Sample Credit Templates
- **LEED Online•**
  - www.usgbc.org/leed > Project Certification > LEED Online
- **Credit Interpretation Requests Process:**
  - www.usgbc.org/leed > LEED Reference Documents > CIR and Ruling Process Guidelines

Study Resources

- LEED Rating System and Errata (important to read):
  - http://www.usgbc.org/DisplayPage.aspx?CMSPageID=220
- LEED Reference Guide
  - More detailed discussion of credits
  - Strongly encouraged to pass the exam
  - Possible strategy: read through it and summarize each credit for yourself
  - Electronic version: K:\LEED\Rating Systems\LEED-NC v2.2 Reference Guide
  - Can be purchased online; cheaper for members
- Practice exams, flash cards, cheat sheets
  - K:\LEED\
  - http://www.cce.ufl.edu/LEED/index.asp
  - http://www.intheleed.com/

LEED at Illinois

- LEED Silver Certification Requirement
- All new construction or major renovations over $5 million
- Business Instructional Facility
  - LEED Platinum Certified
  - First and only Platinum building in the Big 10

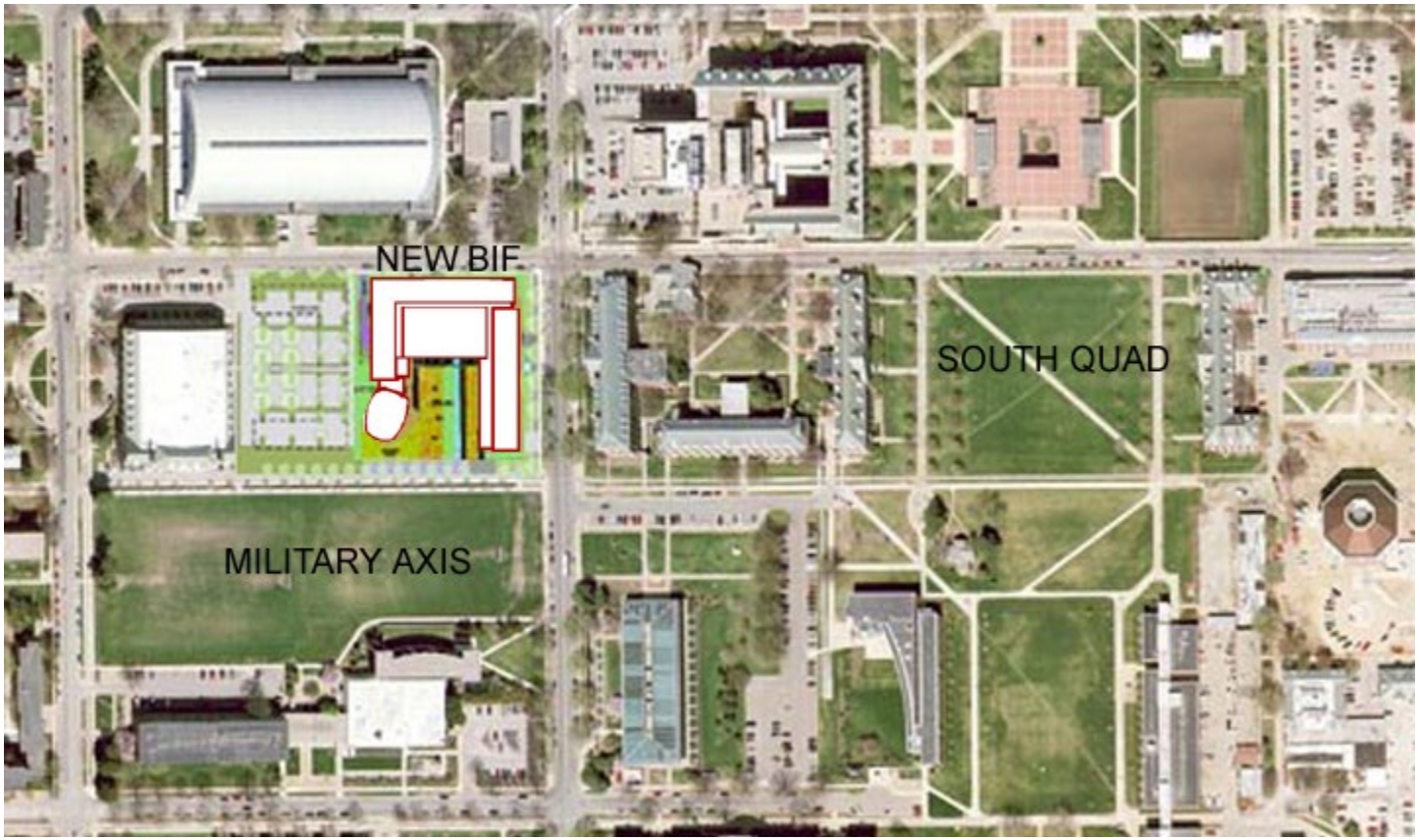
Other LEED Projects in Progress

- New ECE Building – Net Zero Goal
- Lincoln Hall Renovation
- Petascale Computing Facility
- Illinois Fire Services Institute
- Ikenberry Dining and Residence Halls
- Integrated Bioprocessing Research Laboratory
- New Natural History Building
- Newmark Student Center Addition
- Huff Hall North Addition

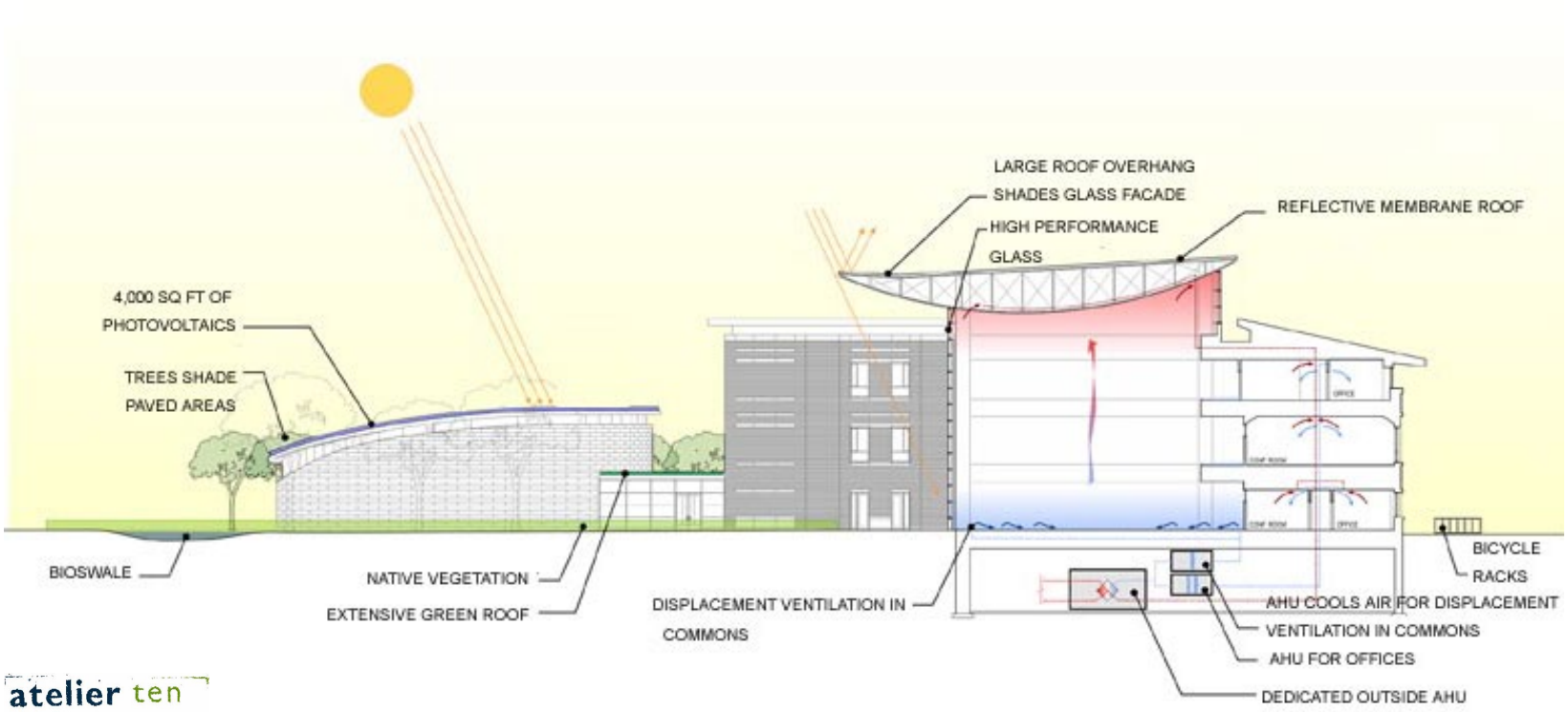
University of Illinois
Business Instructional Facility
LEED ® Platinum Design

Construction Progress Oct ‘07

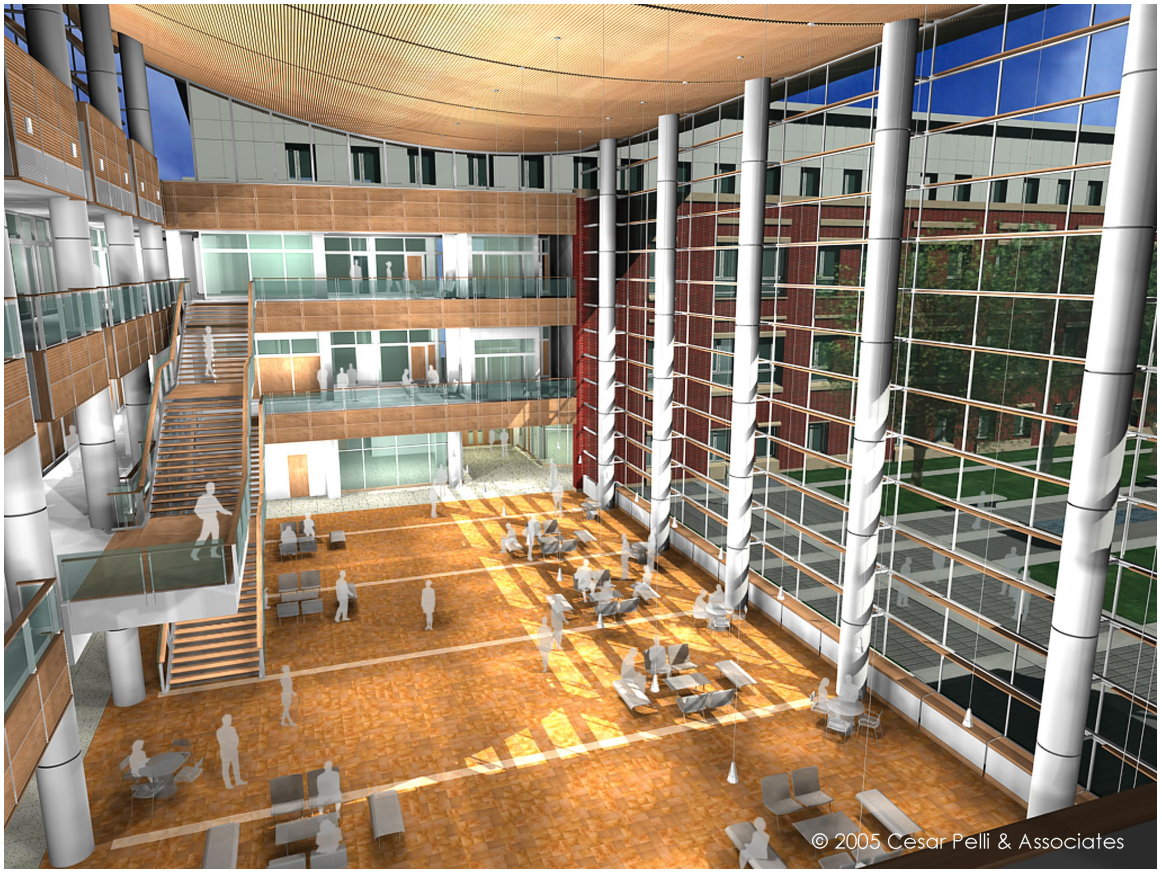
Building Location Plan



Section – North Wing



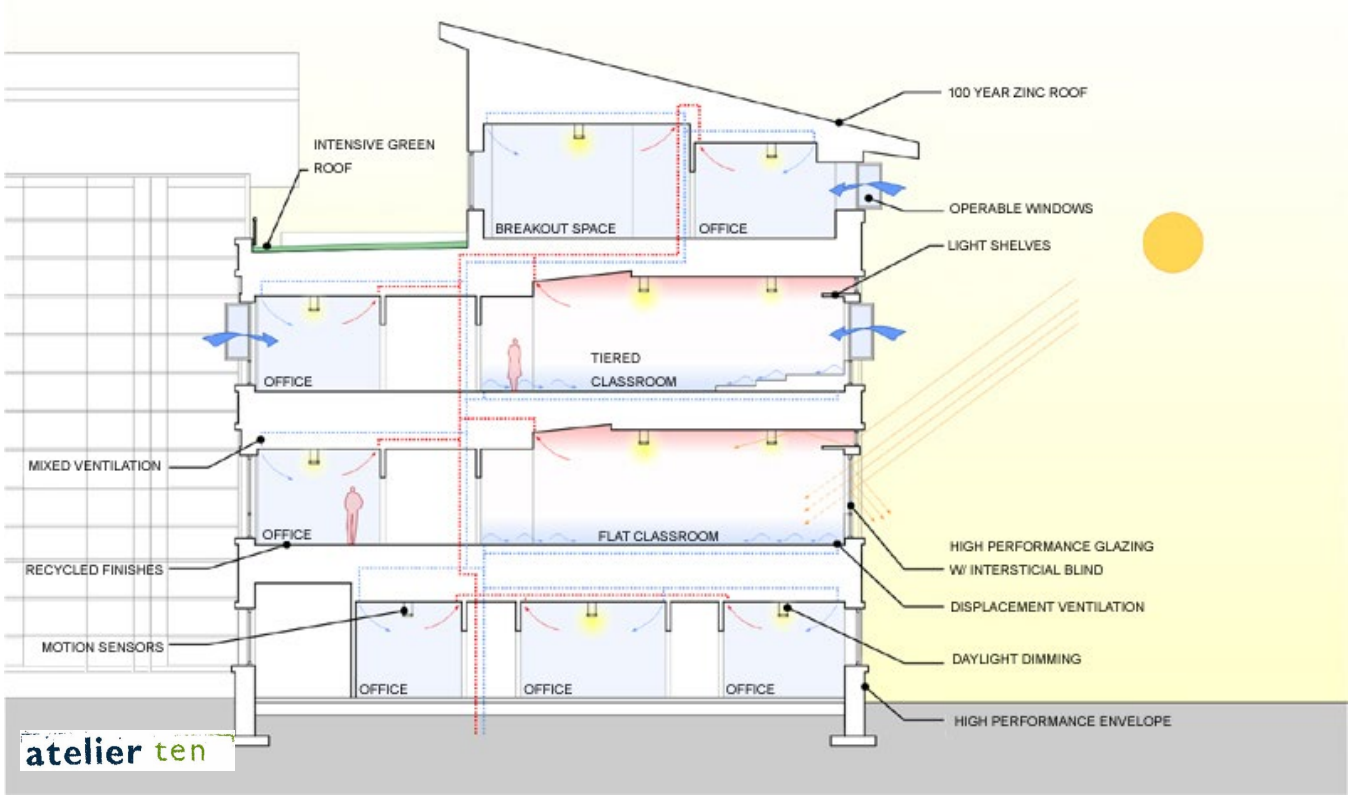
Commons



View from
3rd Floor
West Side

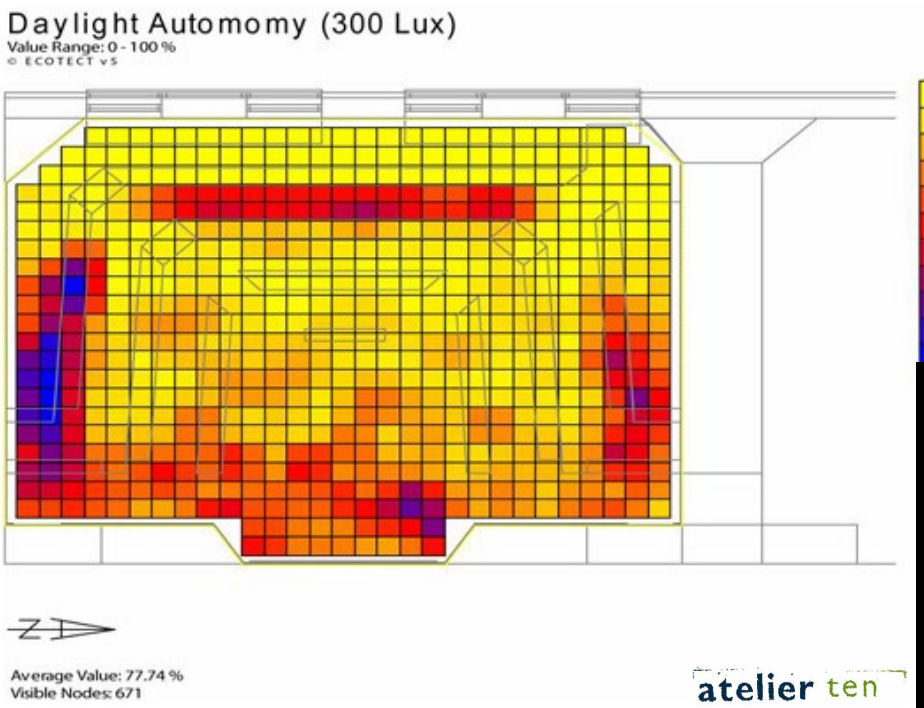
Cor
Pr
C

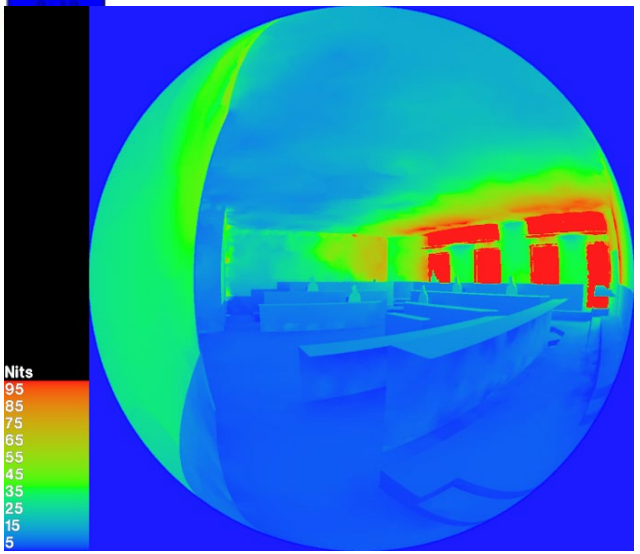
Section - Typical Wing



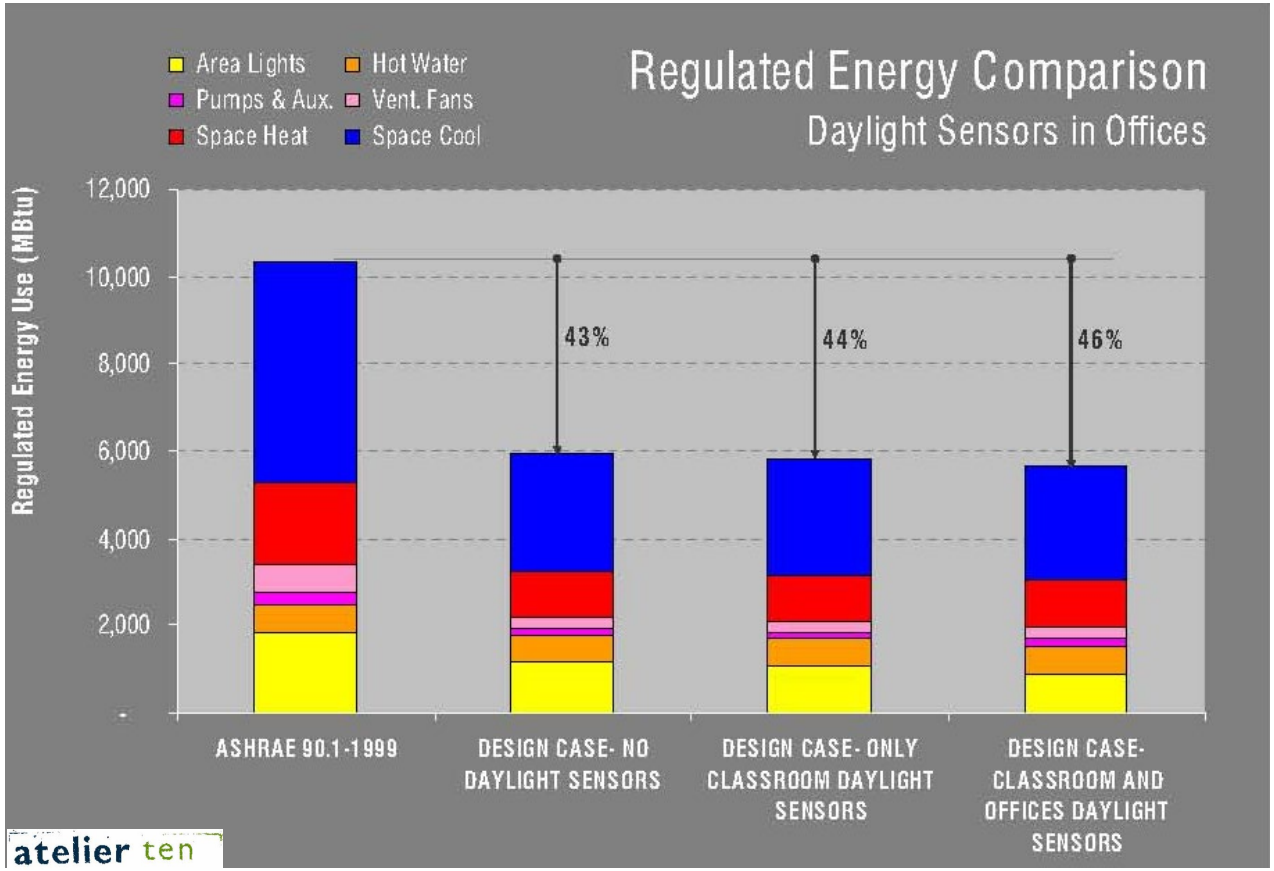
- Integrated Design
  - High Performance Envelope
  - Efficient Daylighting
  - Artificial Light Auto Dimming
  - Shading and Orientation
  - DOA with Heat Recovery
  - Displacement Ventilation or VAV
  - Campus Wide Centra Utilities

Classroom Daylighting

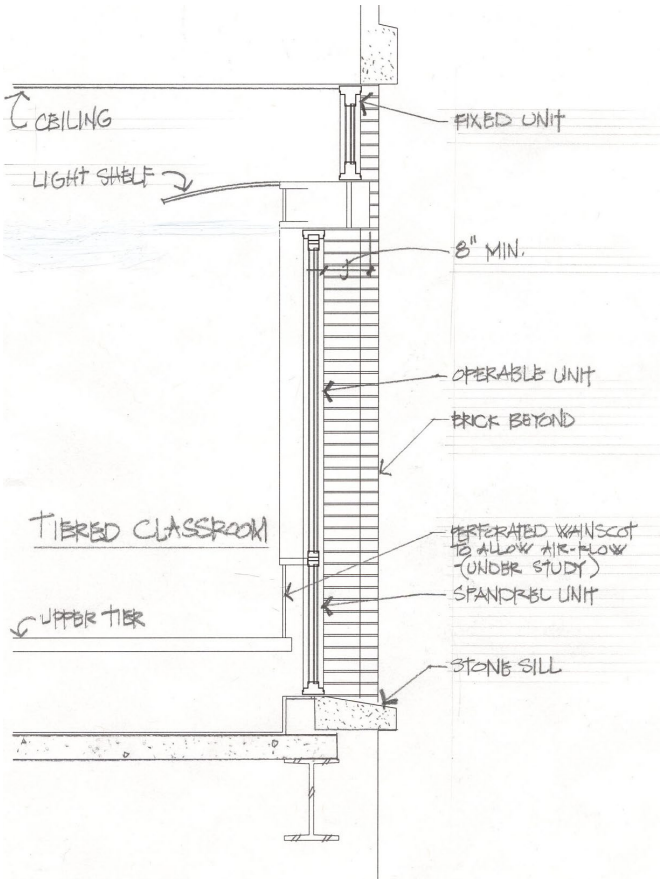




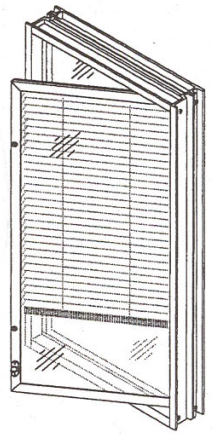
Daylight Sensor Study

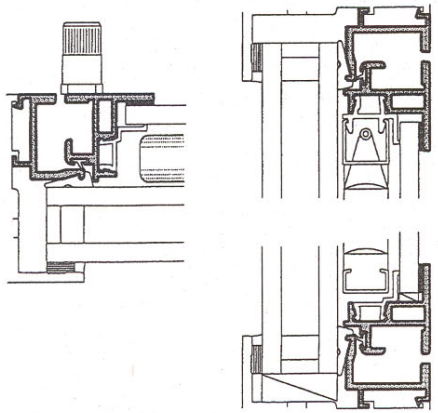


Wall / Window Section



Operable Casement Windows





5/8" Blind/Triple Glazed

Triple Glaze W/ Interstitial Blinds

Perimeter Heat

Eliminated at Casement Window Locations

Mean Radiant Temperature Model

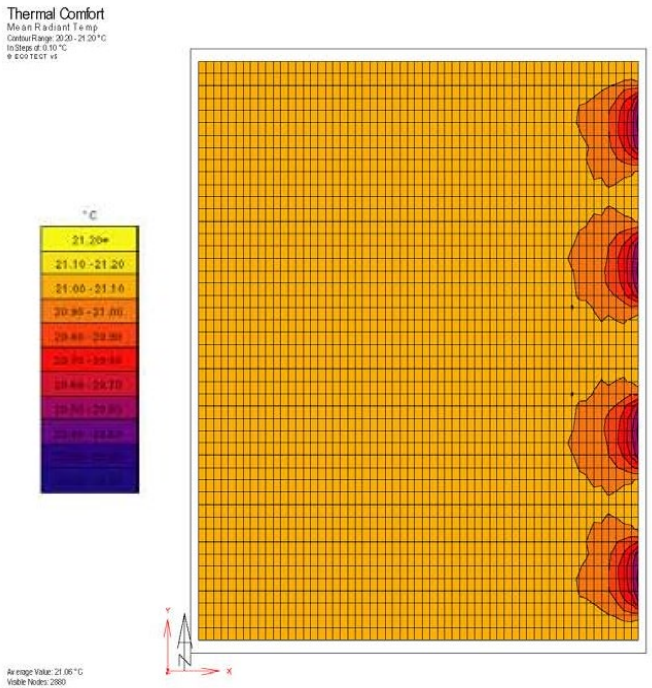
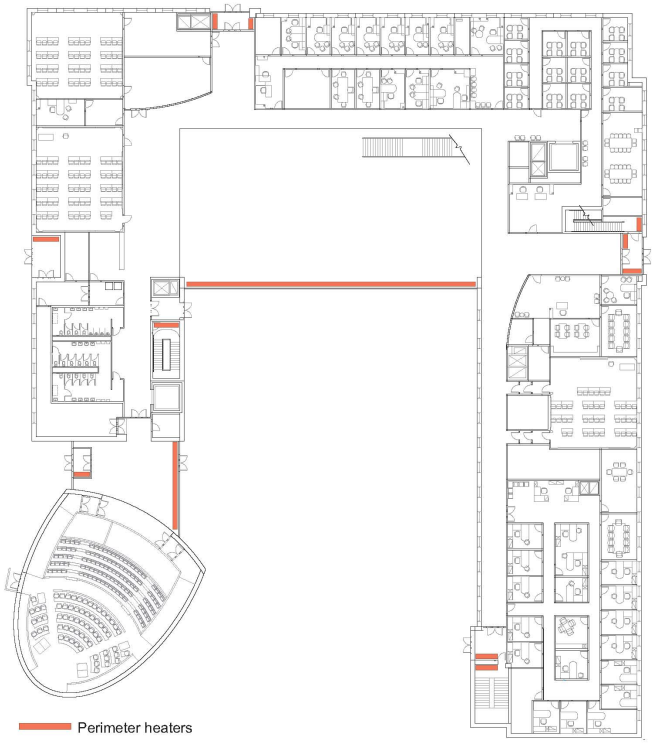


Figure 1: Mean Radiant Temperature Distribution in a typical classroom



Perimeter Heater Locations
First Floor

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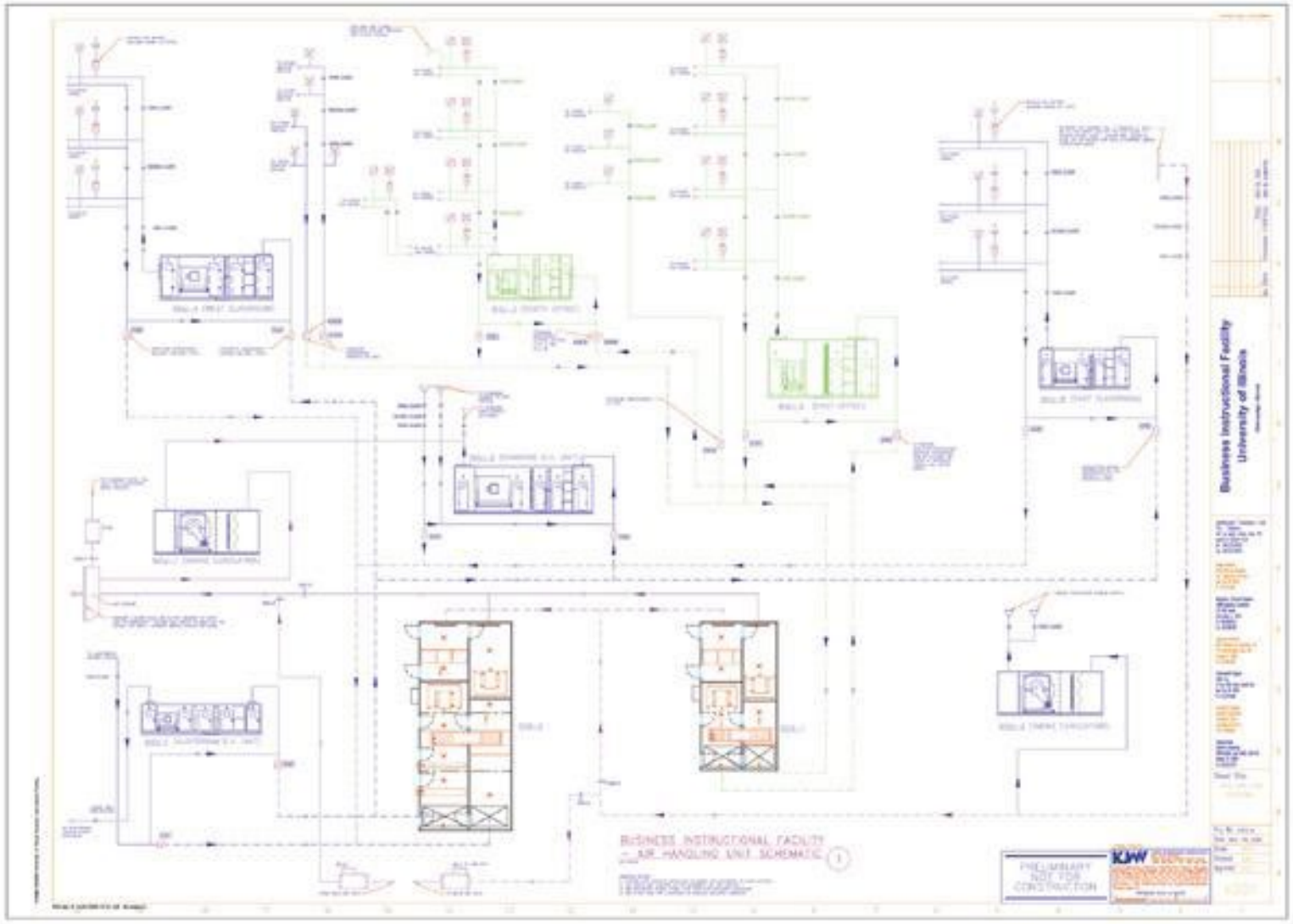
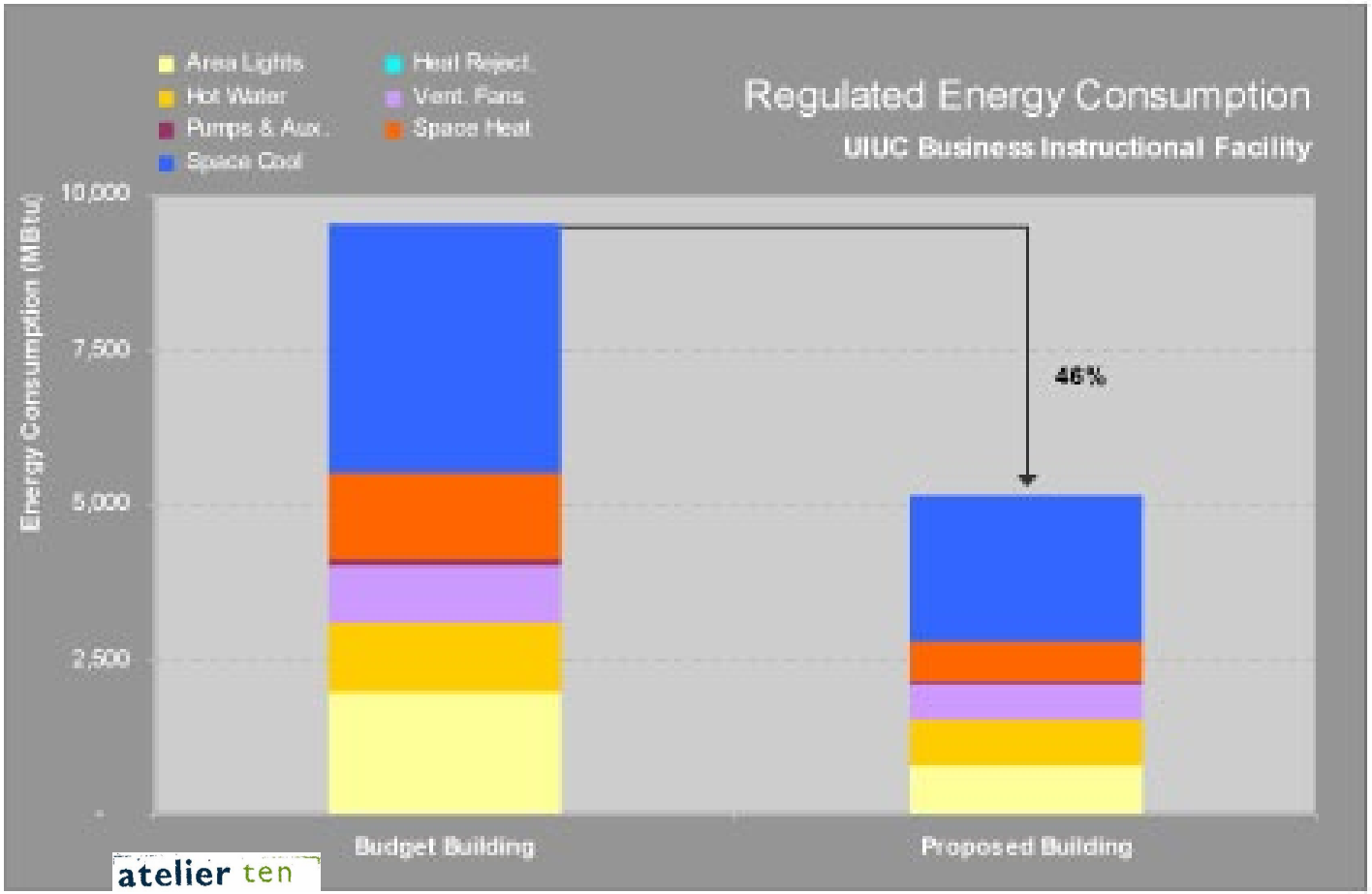
Air Flow Schematic



Total Energy vs. ASHRAE 90.1



Displacement Ventilation

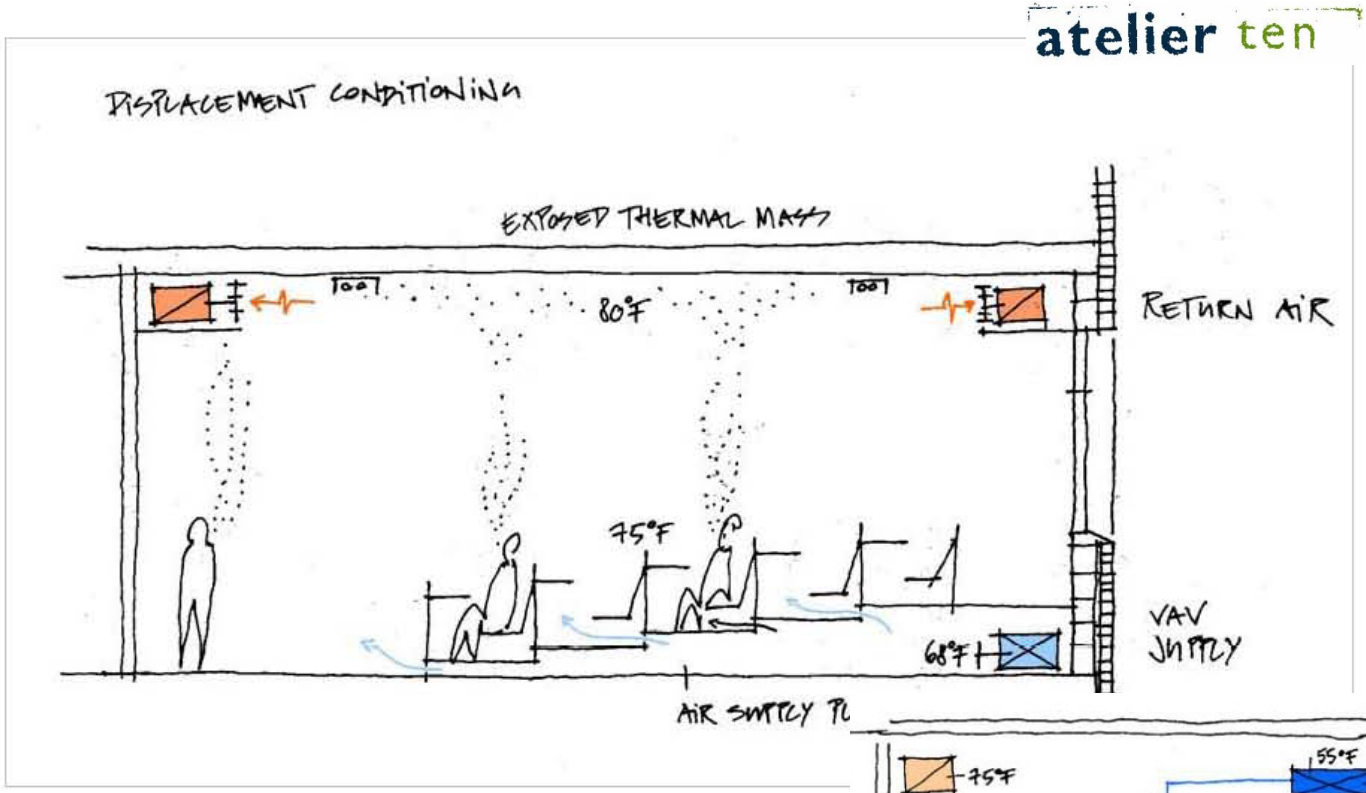
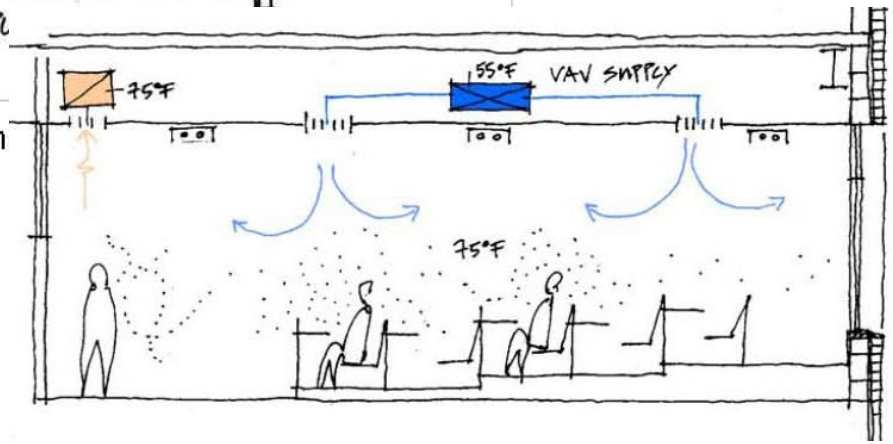


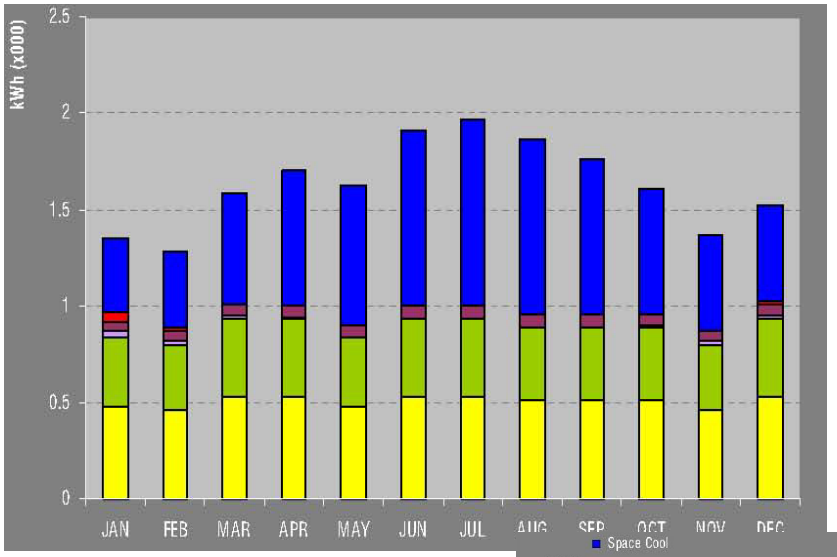
Fig.1: Classroom displacement ventilation



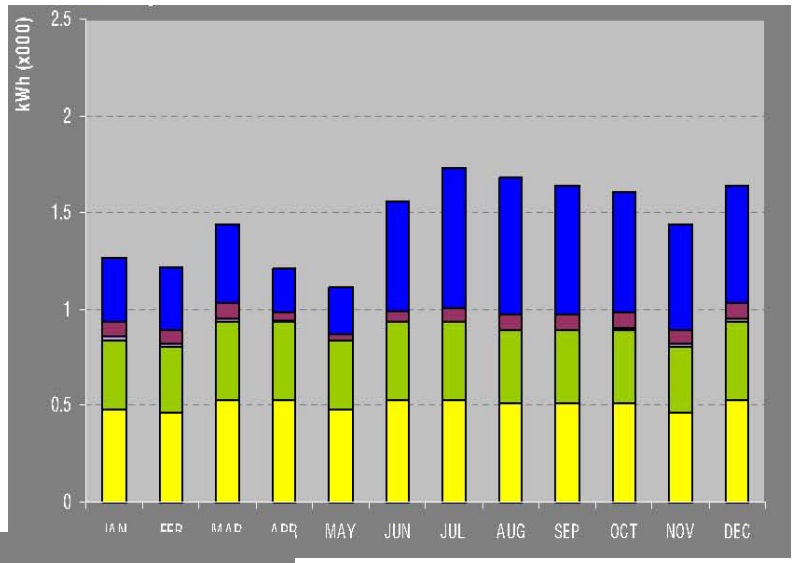
Displacement Ventilatio

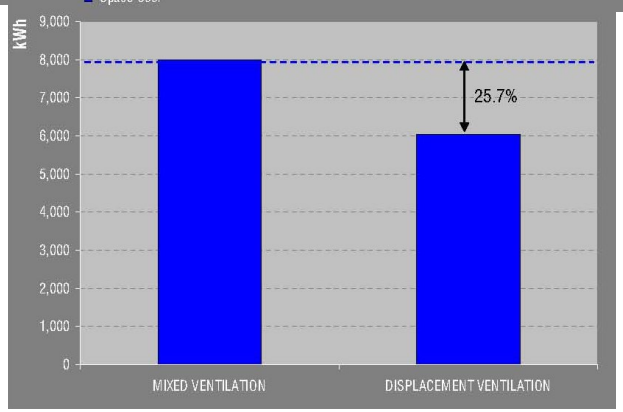
Monthly Energy Consumption

Mixed Ventilation Option



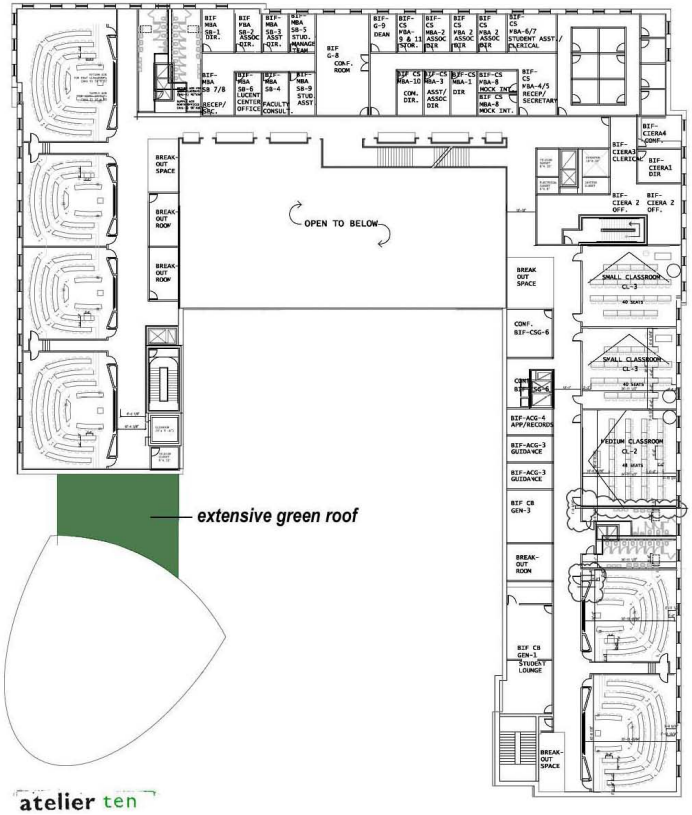
Displacement Ventilation Option

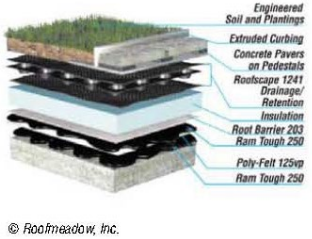




Site Plan

Green Roofs





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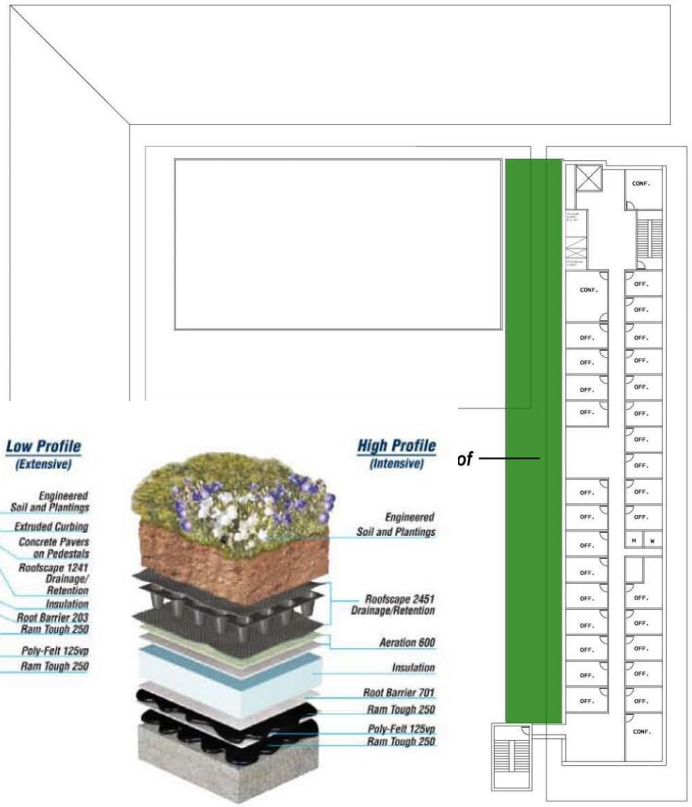

F&S Engineering

University of Illinois
Business Instructional Facility
LEED ® Gold Design

Construction Oct ‘07

Courtyard View