



**YUDELSON
ASSOCIATES**



Mining Gold From the Green Building Revolution

Jerry Yudelton

Yudelton Associates

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Take-Aways



Green building is important for controlling CO₂ production



Green design/development is here to stay

- **Growth for new buildings still +67% rate in 2009**
- **1300 new LEED projects a month**

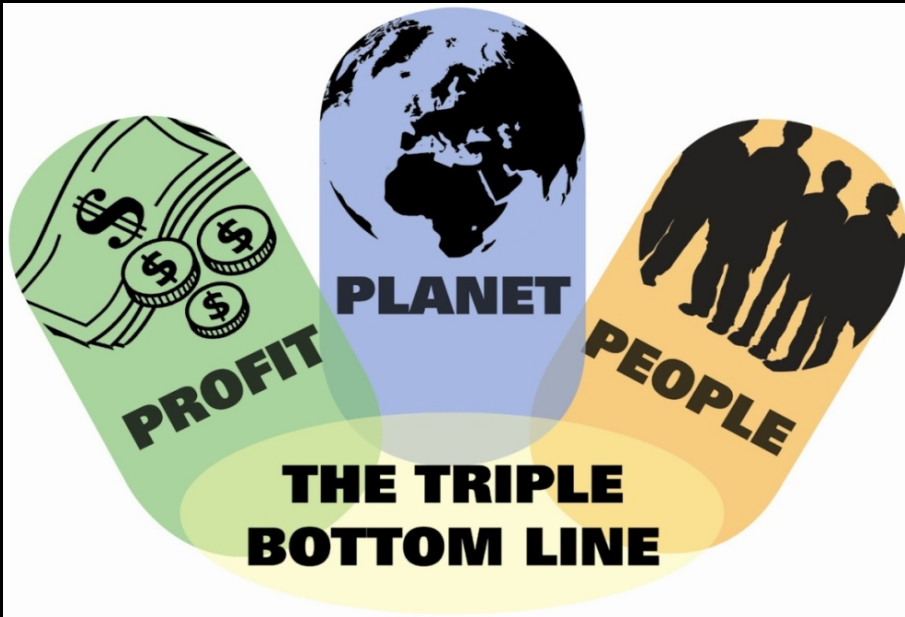


Benefits are significant for all building types



Cost premium is 2% or less

Triple Bottom Line



Profit

- Financial return
- Marketing & PR
- Higher Productivity

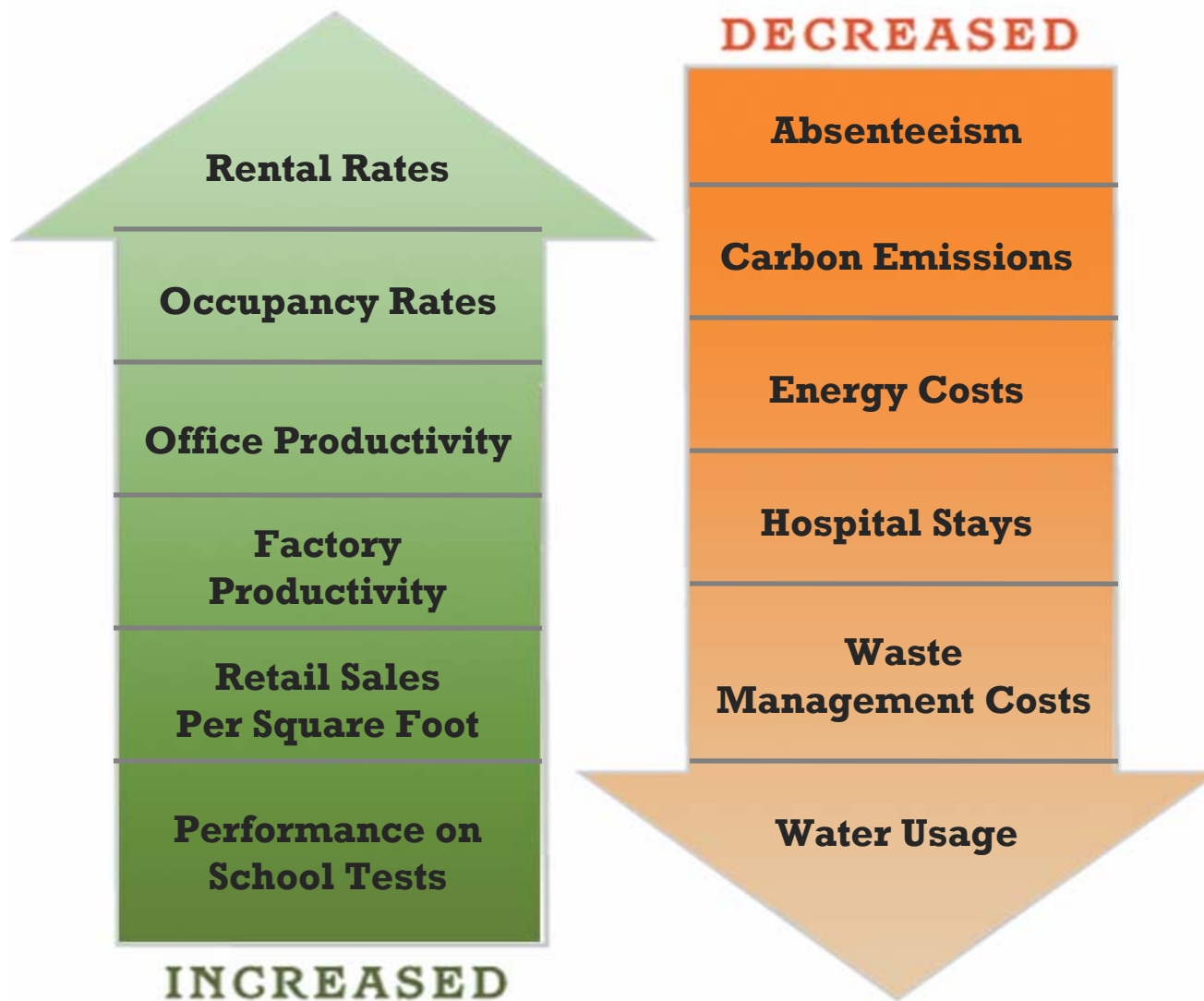
Planet

- Less carbon, waste and energy and water use

People

- Job satisfaction
- Healthy work environment

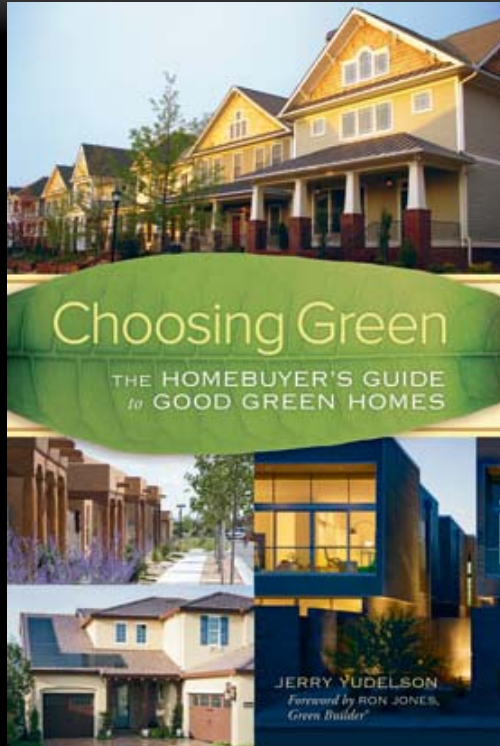
Range of Proven Benefits



Green Building Important for Carbon Reduction



Life-Cycle Positive Solution



Choosing Green
Choosing Green

🌿 Buildings are the **only** Life Cycle Cost-positive solution

🌿 **25%** of total carbon solution can come from buildings, including homes, stores, offices, hotels, institutional buildings and other structures

Importance of Building Green

🌱 In the year 2035, 75% of the built environment will be either new or renovated, vs. 2005.

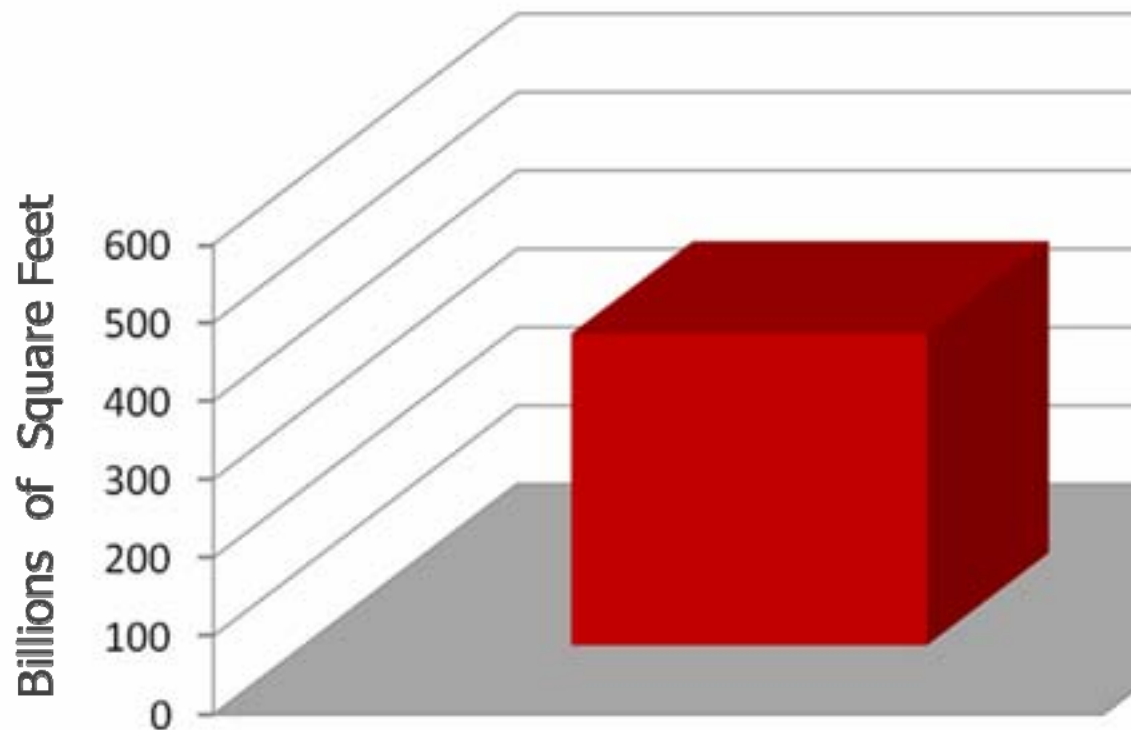
🌱 We can transform our energy consumption and CO₂ production by constructing and renovating all buildings to green standards.



McDonalds Corp. HQ
LEED-EB GOLD

Our Opportunity to Build Green

Current US building stock is approx. 300 billion sf.



Over the next 30 years:

- 52 billion sf will be demolished
- 150 billion sf will be remodeled
- 150 billion sf will be new construction

Starting 2005, by the year 2035, three-quarters of building stock will be new or renovated

LEED Growth Accelerates!

- 🌿 2005 to 2006: +50% cumulative growth in new LEED registered projects
- 🌿 2006 to 2007: +75%
- 🌿 2007 to 2008: +80%
- 🌿 2009: +85%

Bank of America
 **Tower**

New York City
LEED: Platinum
\$1 billion



Green Building Statistics

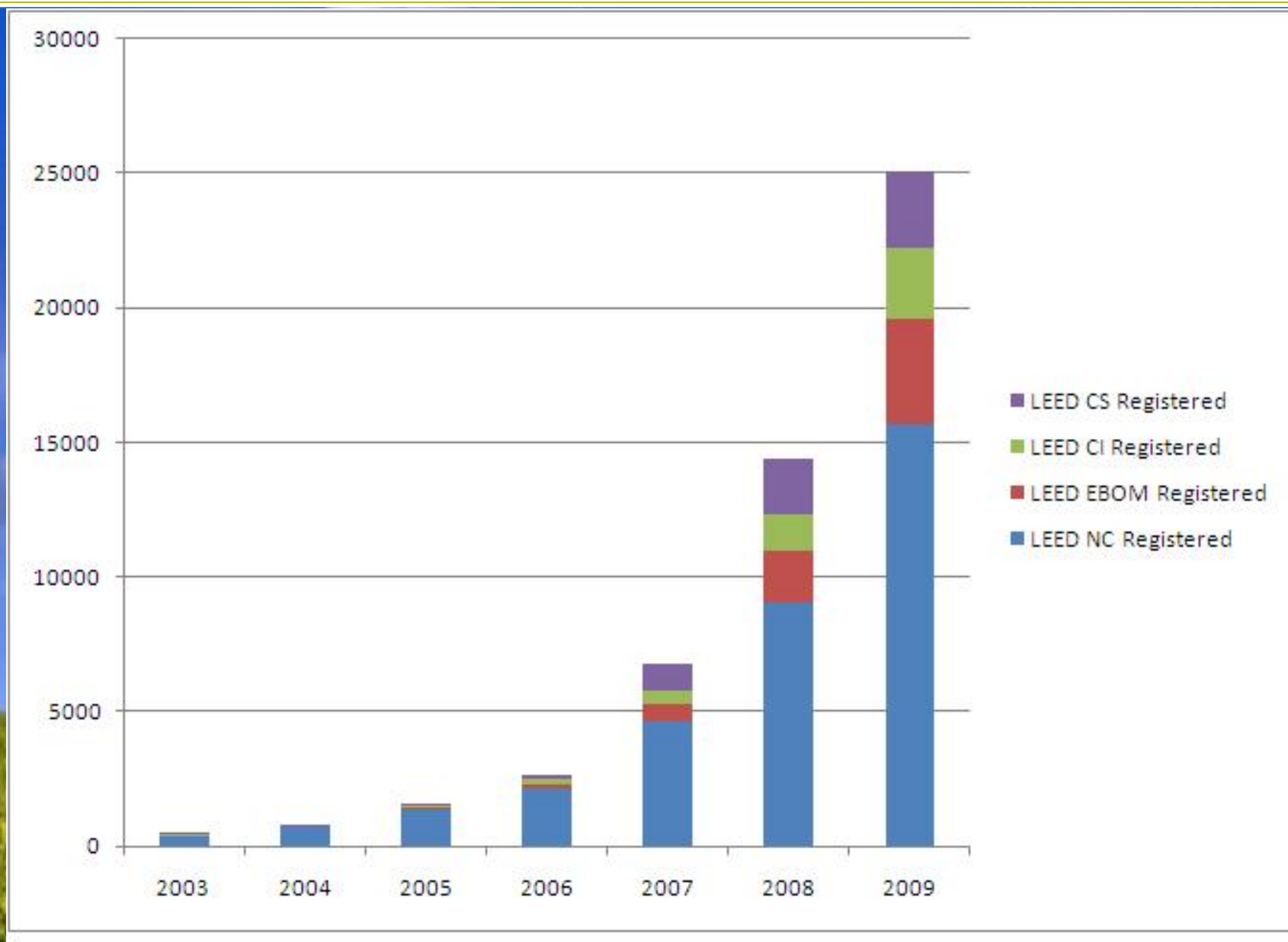


- ❖ USGBC: 20,000+ corporate members
- ❖ 25,000 LEED registered projects (Jan. 2010)
- ❖ 4,000 LEED certified projects (Jan. 2010)
- ❖ 140,000+ LEED Accredited Professionals

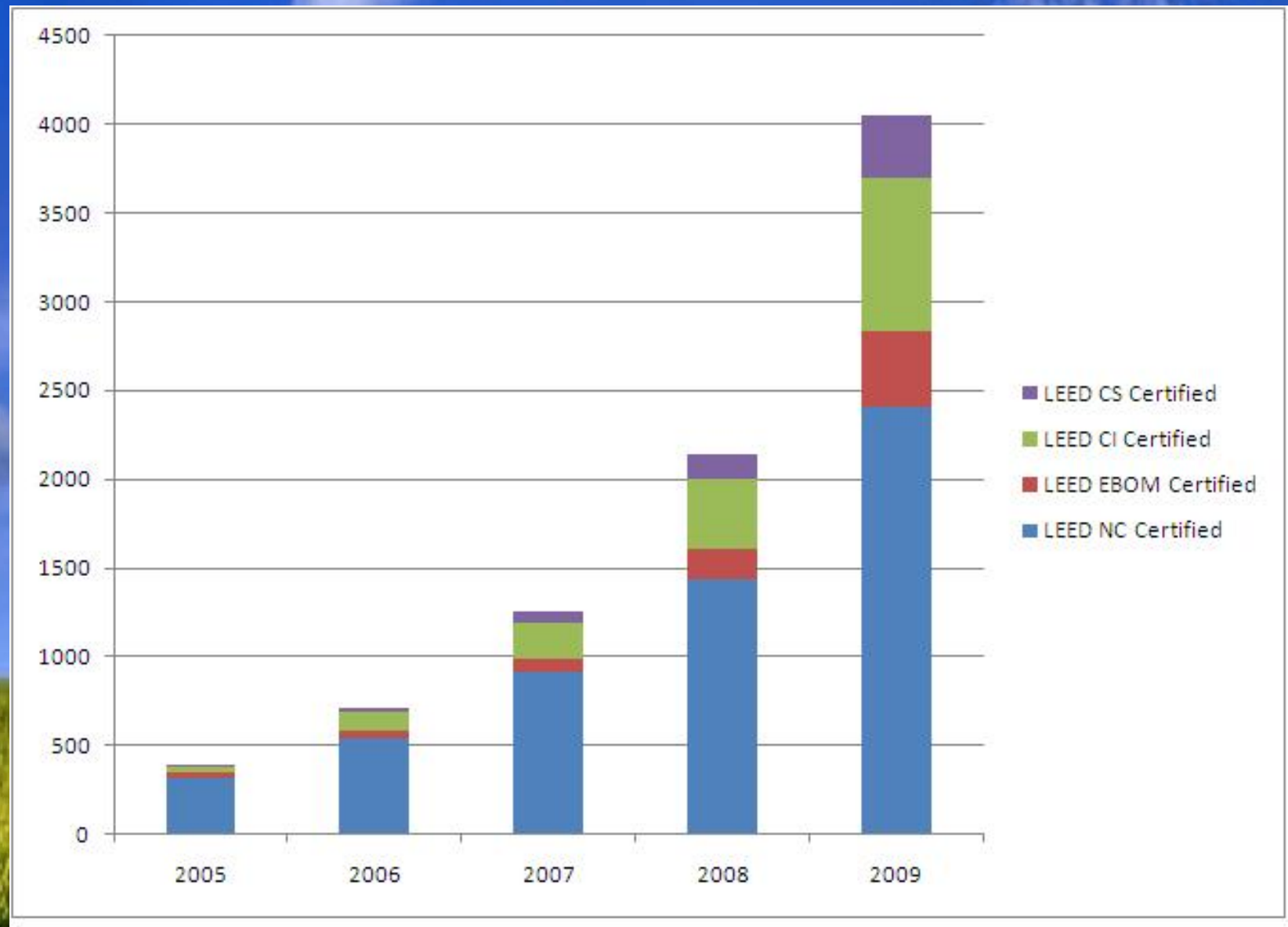
"In God We Trust; All Others Must Bring Data."

-W. Edwards Deming

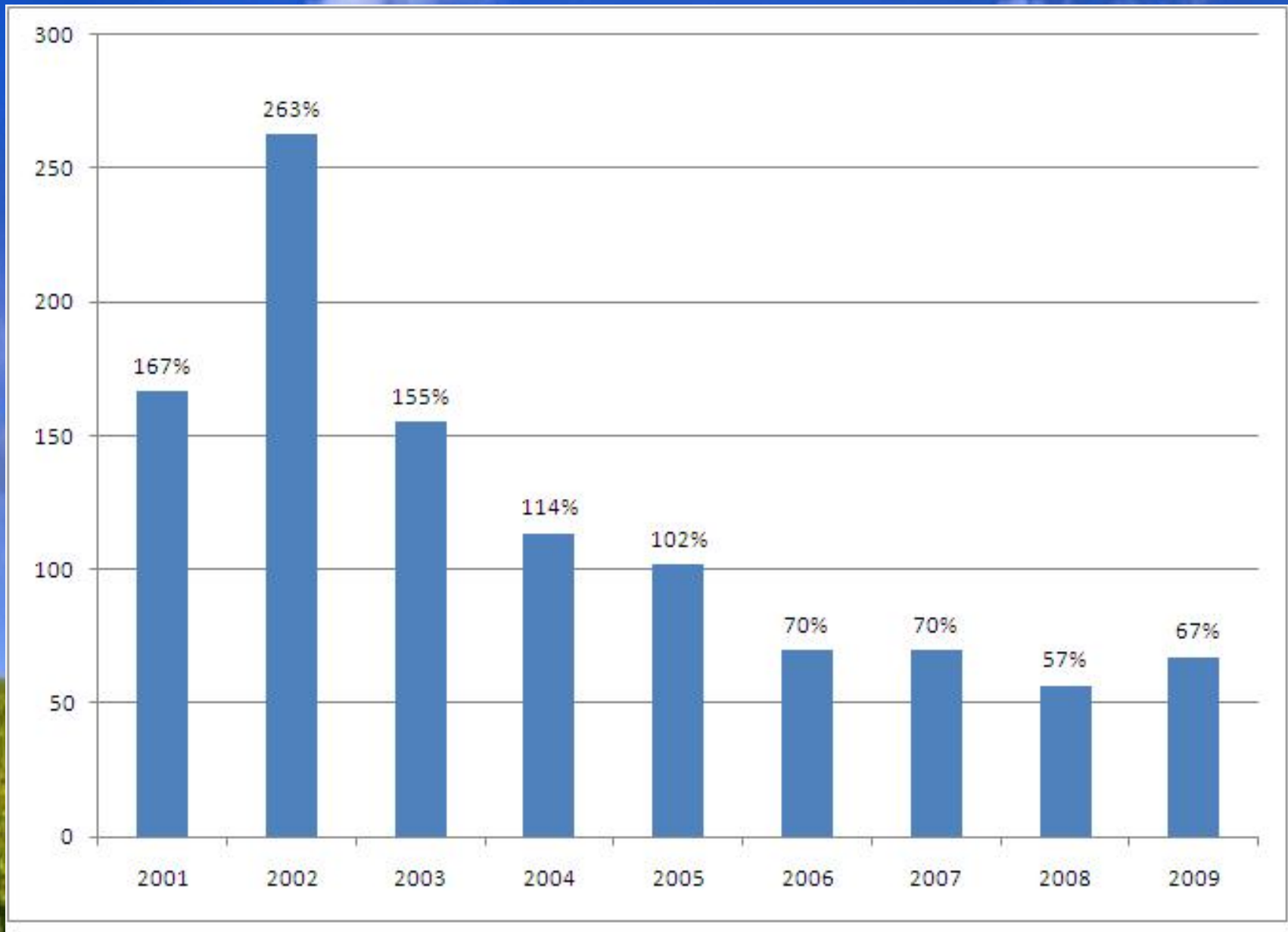
LEED Growth - Project Registrations



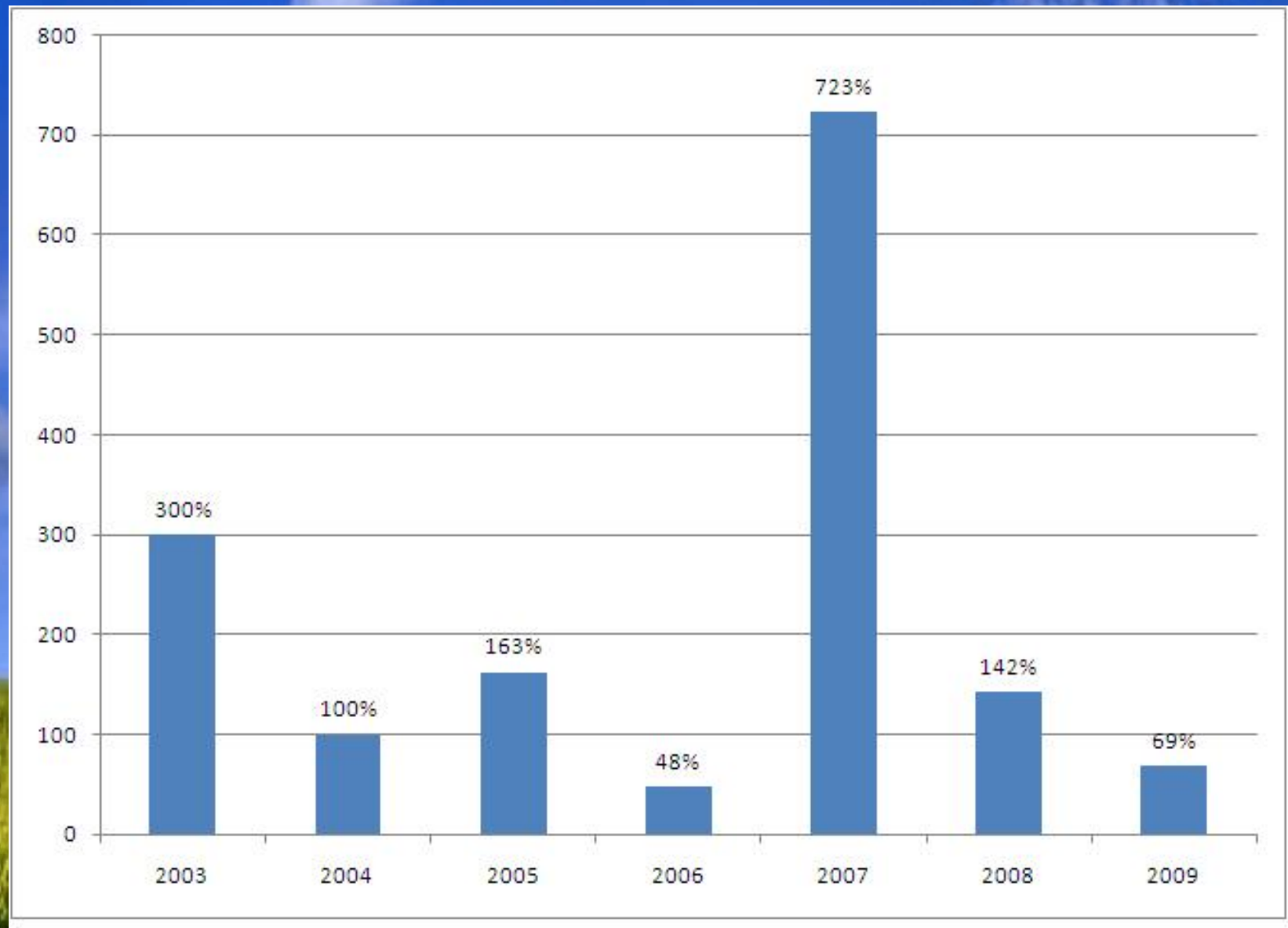
LEED Growth – Project Certifications



Cumulative LEED-NC Registrations

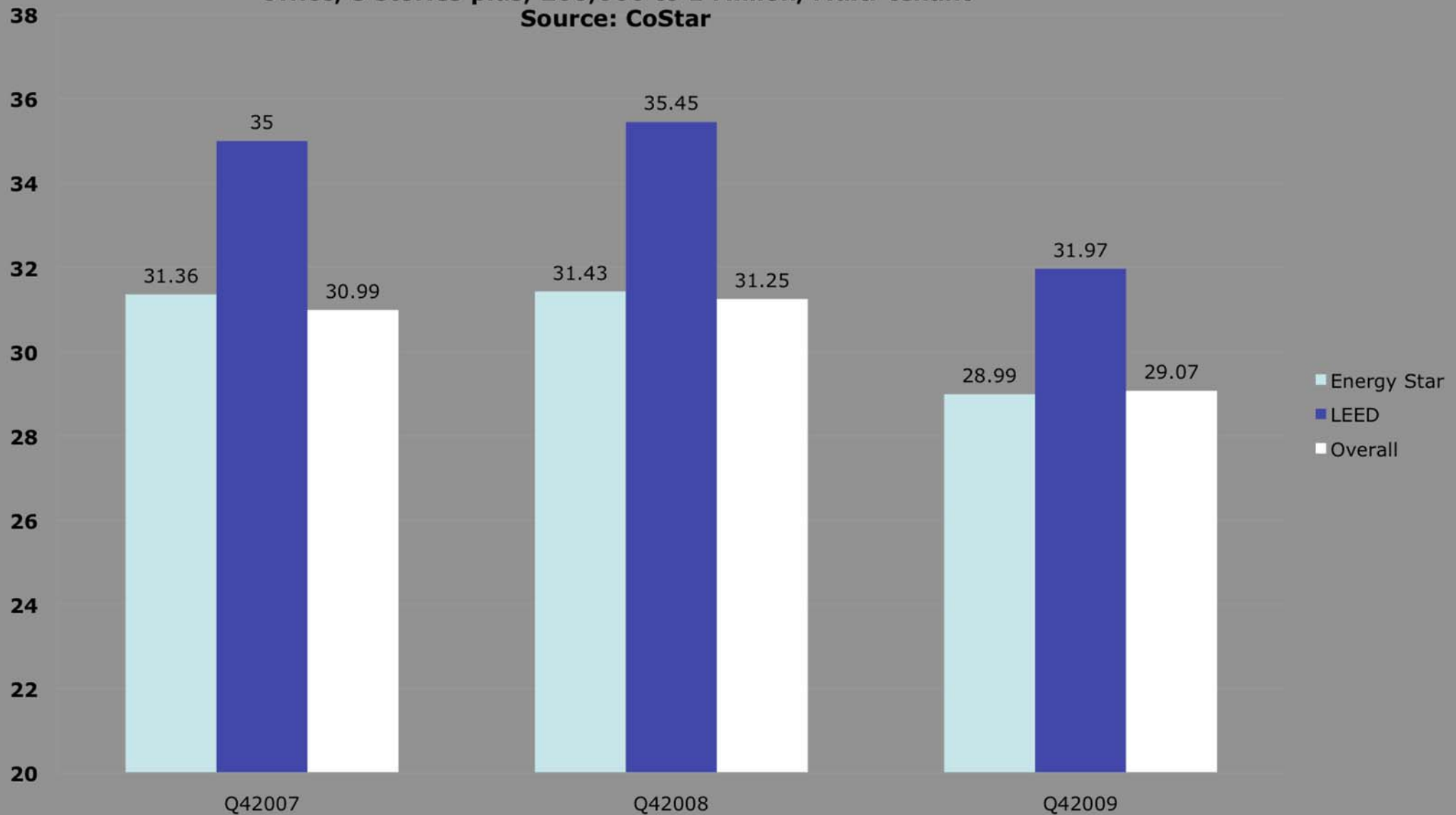


Cumulative LEED-EBOM Registrations



LEED Rent Premium

Gross Rents
Office, 5 stories plus, 200,000 to 1 Million, Multi-tenant
Source: CoStar



**ENERGY
USE**

30-50%

**CARBON
EMISSIONS**

35%

**WATER
USE**

40%

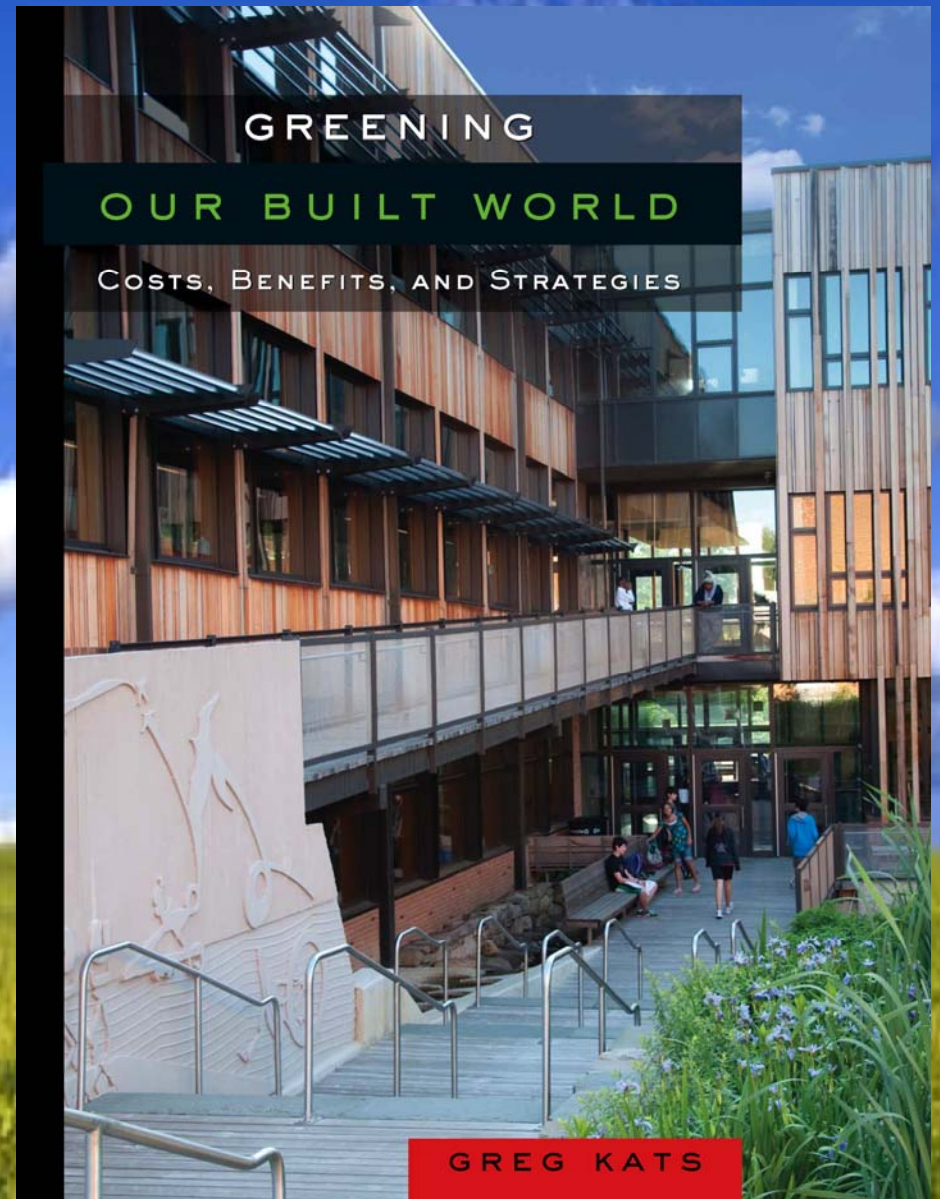
**SOLID
WASTE**

70%

Average Savings of Green Buildings

Greg Kats: Greening Our Built World

- 14% reduction in CO₂, 2025 vs. 2005
- NPV of green building: \$650 billion in U.S.
 - 5x to 10x cost premium
- 2020 Prediction:
 - Green buildings 95% of new construction
 - Green retrofits are 75% of all retrofits



Green Buildings Make Money Sense



Business Case for Green



Northfield Stapleton, Denver

LEED Silver



- Financial and Economic Return
- Risk management
- Marketing and public relations
- Productivity and health gains
- Recruitment and retention
- Sustainability concerns

Green Rebranding

- 🌿 LEED-EB ideal tool
- 🌿 Older office/retail properties
- 🌿 Save energy, water, waste costs
- 🌿 O&M focus
- 🌿 Payback possible within one year!
- 🌿 Low-cost green option



51 Stores
LEED-EB

CoStar Study Results



Clinton Presidential Library
Arkansas, LEED **Platinum**

Energy Star Buildings vs. Peers



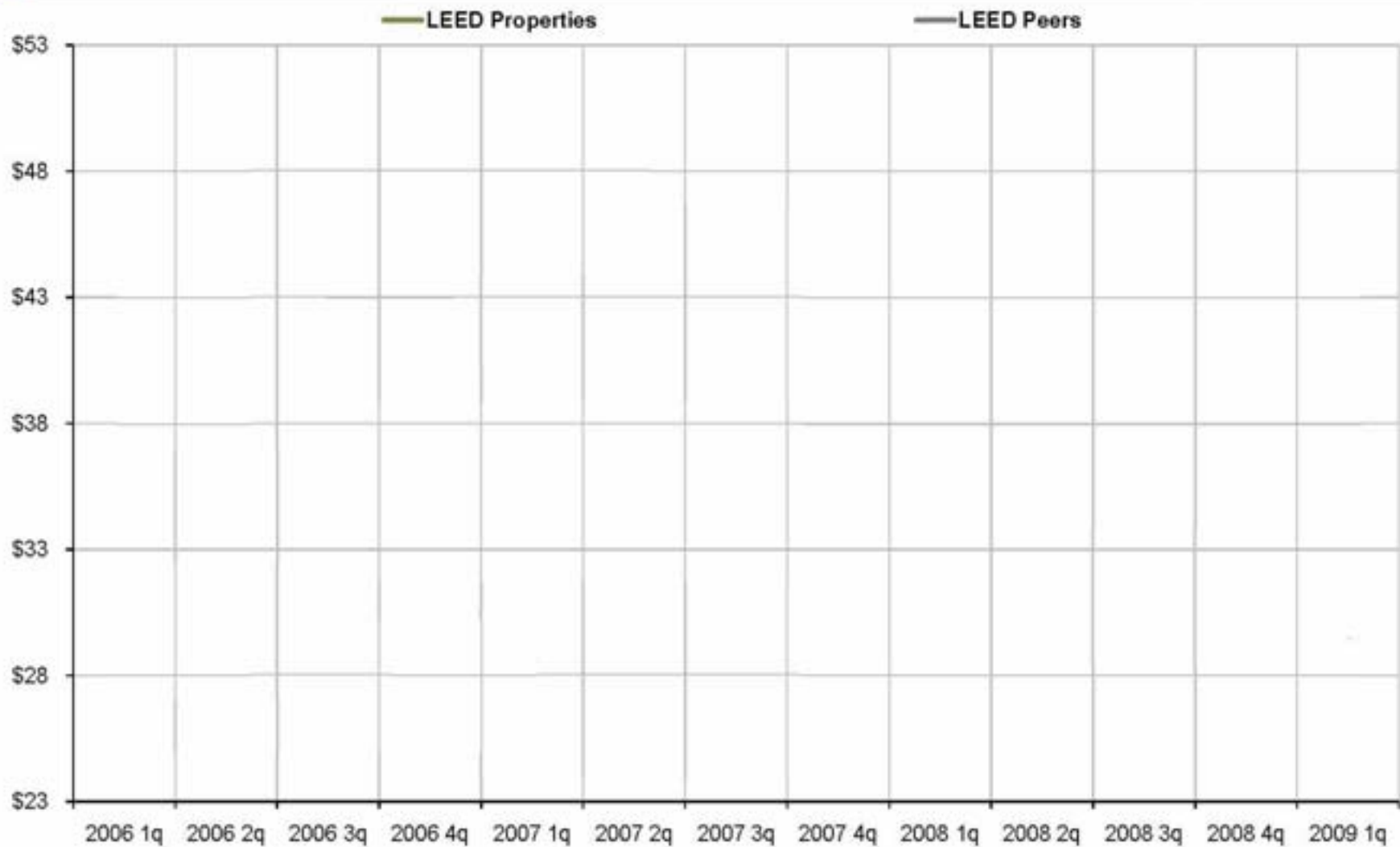
- \$2.40/sf rent premium
- 3.6% higher occupancy
- Selling for \$6/sf more

LEED Certified Buildings vs. Peers

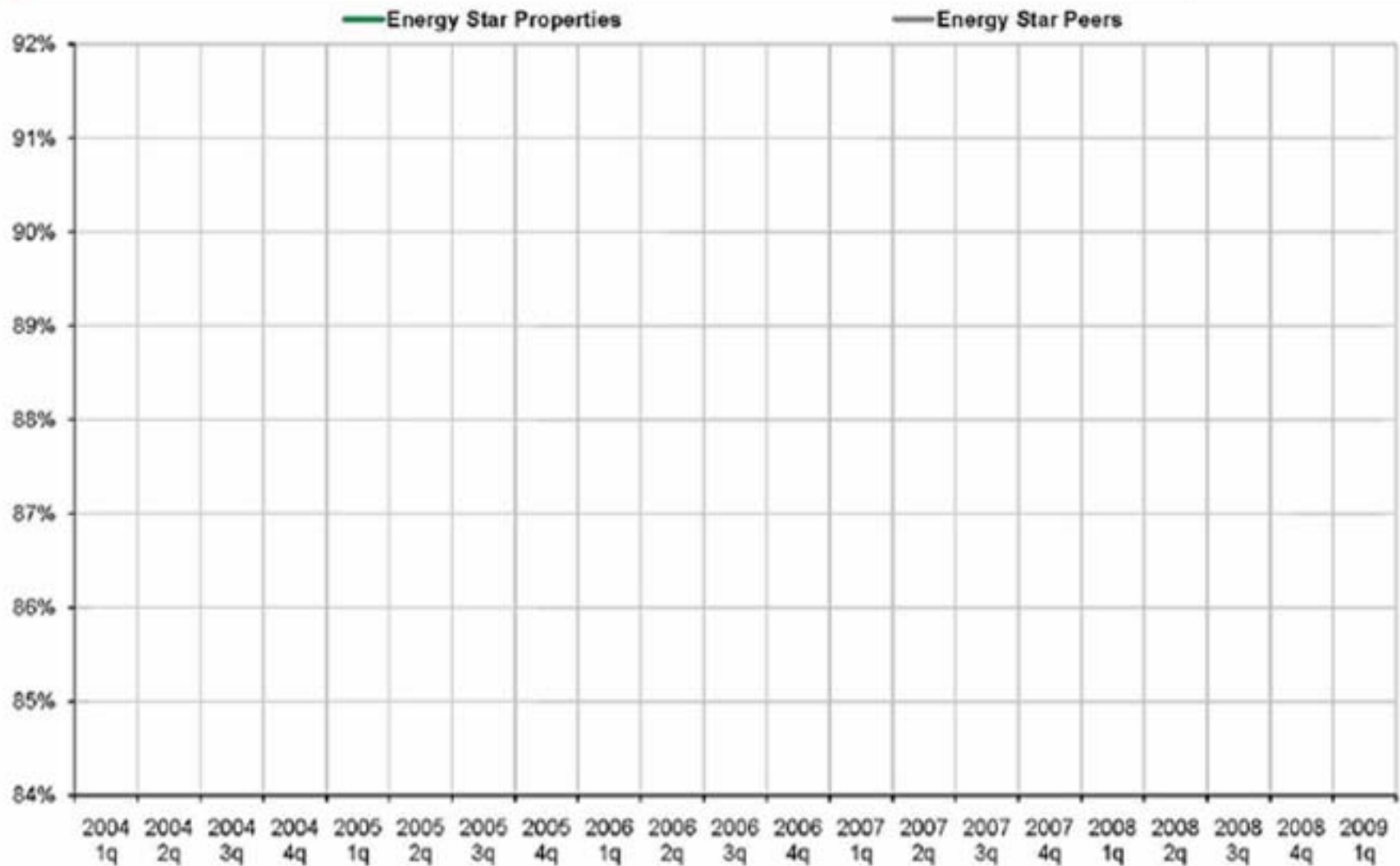


- \$11.33/sf rent premium
- 4.1% higher occupancy
- Selling for \$174/sf more!

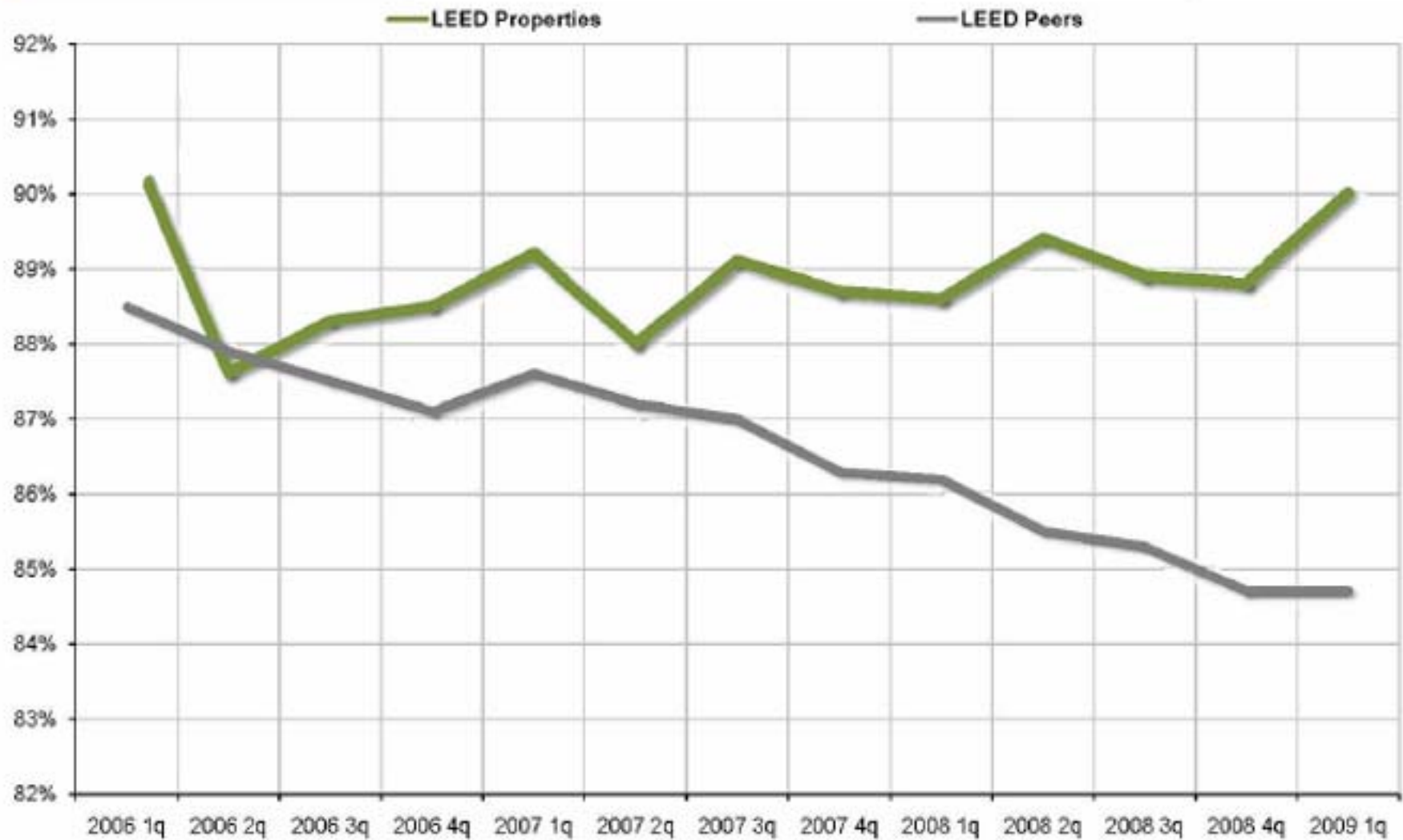
LEED Direct Rental Rates vs. Peers



ENERGY STAR Occupancy Rates vs. Peers



LEED Occupancy Rates vs. Peers



RICS Study Results



Marks & Spencer

Plan A

Because there
is no Plan B



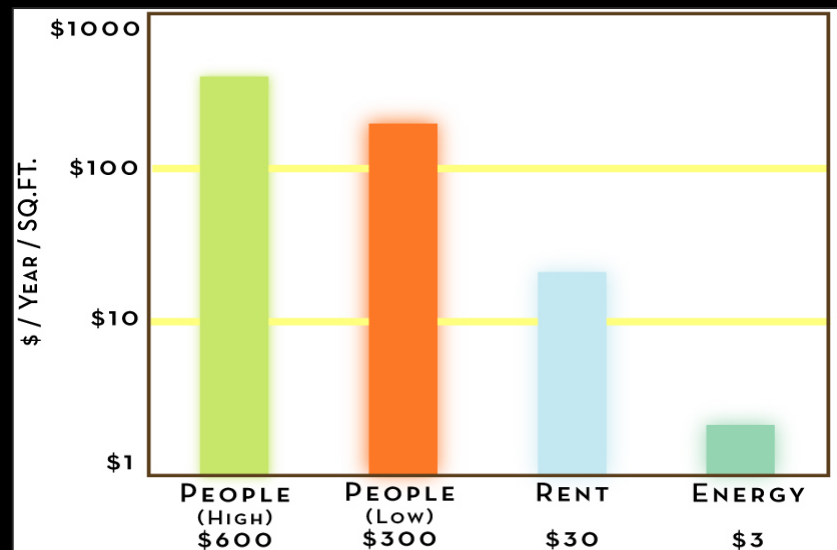
2008 Data: 893 certified buildings, 10,000 non-certified within ¼ mile

Conclusions:

- Effective rent 6% higher
- Sales price 16% higher
- Green upgrade would add \$5.5 million to average value

Productivity Counts

- Most costs are “**people costs**”
- Studies show 3-7% gain in workplace productivity
 - A 1% gain in productivity pays all the energy bills
 - A 10% gain in productivity pays for the entire building (or the technology)!



Green Cost Premium



🌱 Green cost premium

- Current range: <2%
- One retail client: 1.5% - 2.0% for new LEED, slightly more to retrofit
- Compare with benefits

The Obvious Question

- If green buildings are such a good thing, why aren't we seeing all buildings built/operated this way?
- A few answers:
 - Higher costs in a lowest-first-cost environment, particularly outside the CBD
 - Split incentives between tenant and landlord (in rental commercial space)
 - Competition for investment capital inside a corporation
 - Difficulty/risk of borrowing for new green buildings and green/energy upgrades

Solution: New Financing Approaches

- PACE (Property-Assessed Clean Energy)
 - Simple concept: public bonds or funds pay for energy upgrades; repaid over 20 years on property tax
 - Avoids giveaway debacles
 - Owner is “cash flow positive” from Day One
 - Cost of improvement is borne by property, not owner
 - 10-year paybacks are still valuable vs. 2-3 years otherwise
 - Tenants effectively pay (via operating cost recovery) for energy savings, avoiding “split incentive”
 - 12 states already; San Francisco issued \$150 million bonds

Building Energy Performance Reports Needed

A 0-25

B 26-50

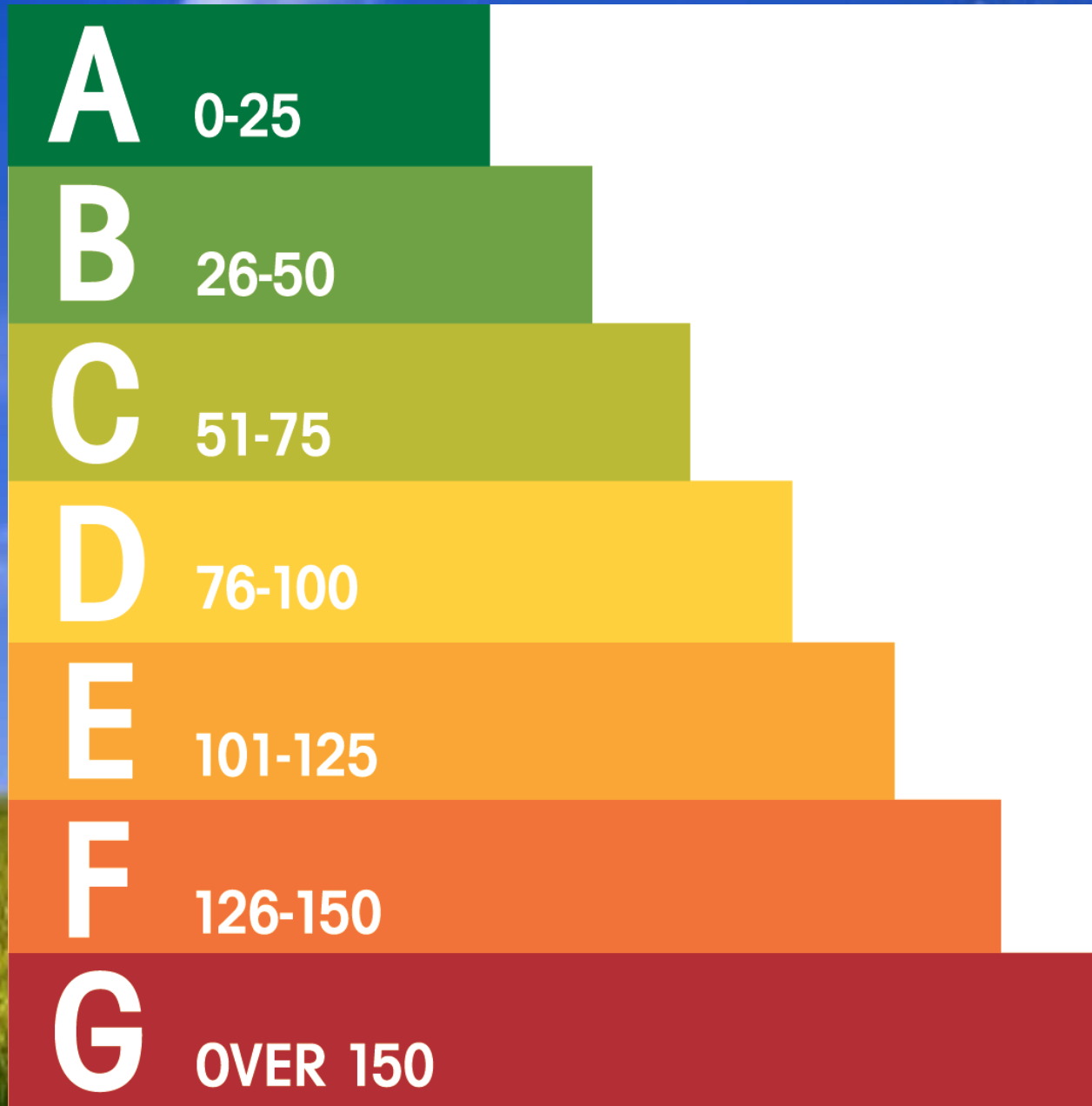
C 51-75

D 76-100

E 101-125

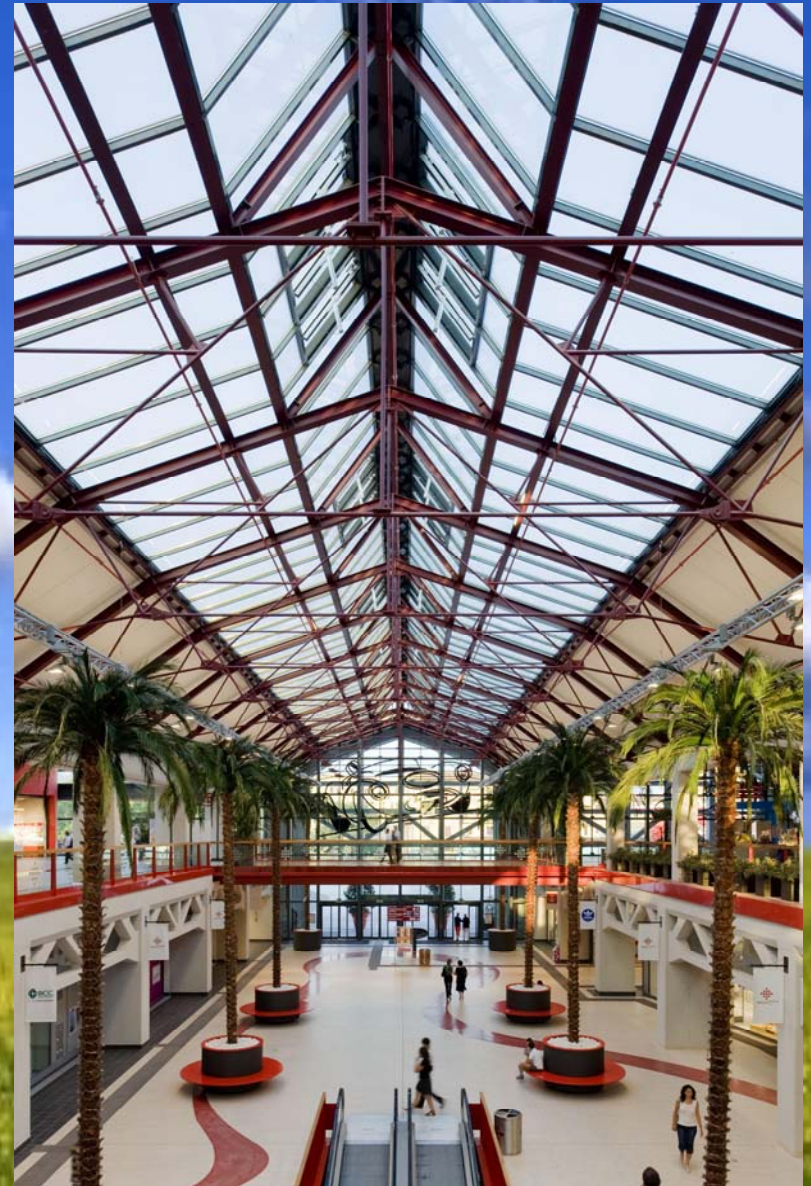
F 126-150

G OVER 150



Without Performance Reporting, We Know Nothing

- “What gets measured, gets managed”
- If building energy use is this important to our collective future, why not know what’s going on?
- Without reports, we are flying blind/can’t fix
- Why should governments put their faith in green building without performance reports?



Greening Existing Buildings: The Next Big Challenge

A GreenSource BOOK

Greening Existing Buildings



Jerry Yudelson

Foreword by Paul von Paumgarten, Johnson Controls

- Over 4,100 buildings registered for LEED-EB
- Requires performance reports
- CBRE (50+ Buildings)
- Chicago Merchandise Mart (360,000 m²)
- Empire State Building

Empire State Building

🌿 Key Players:

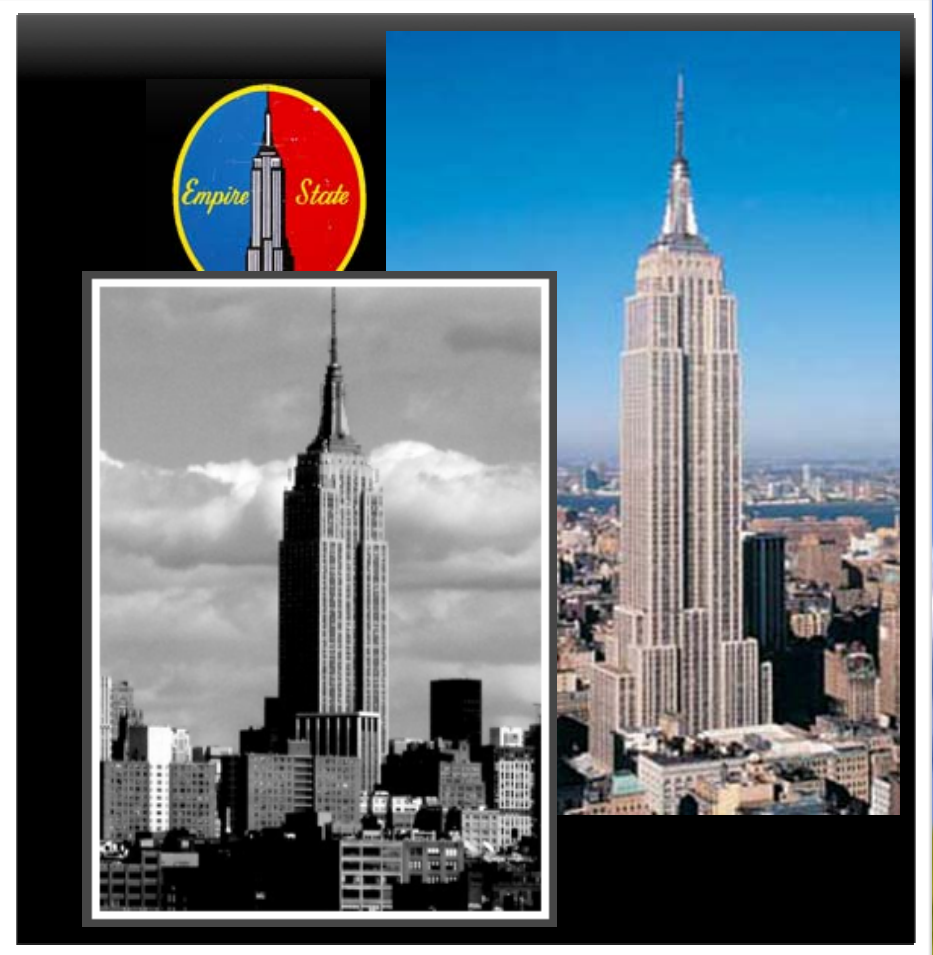
- 🌿 Jones Lang LaSalle
- 🌿 Johnson Controls
- 🌿 Clinton Climate Initiative

🌿 Completion: late 2010

🌿 38% expected energy savings

🌿 \$4.4 Million Savings!

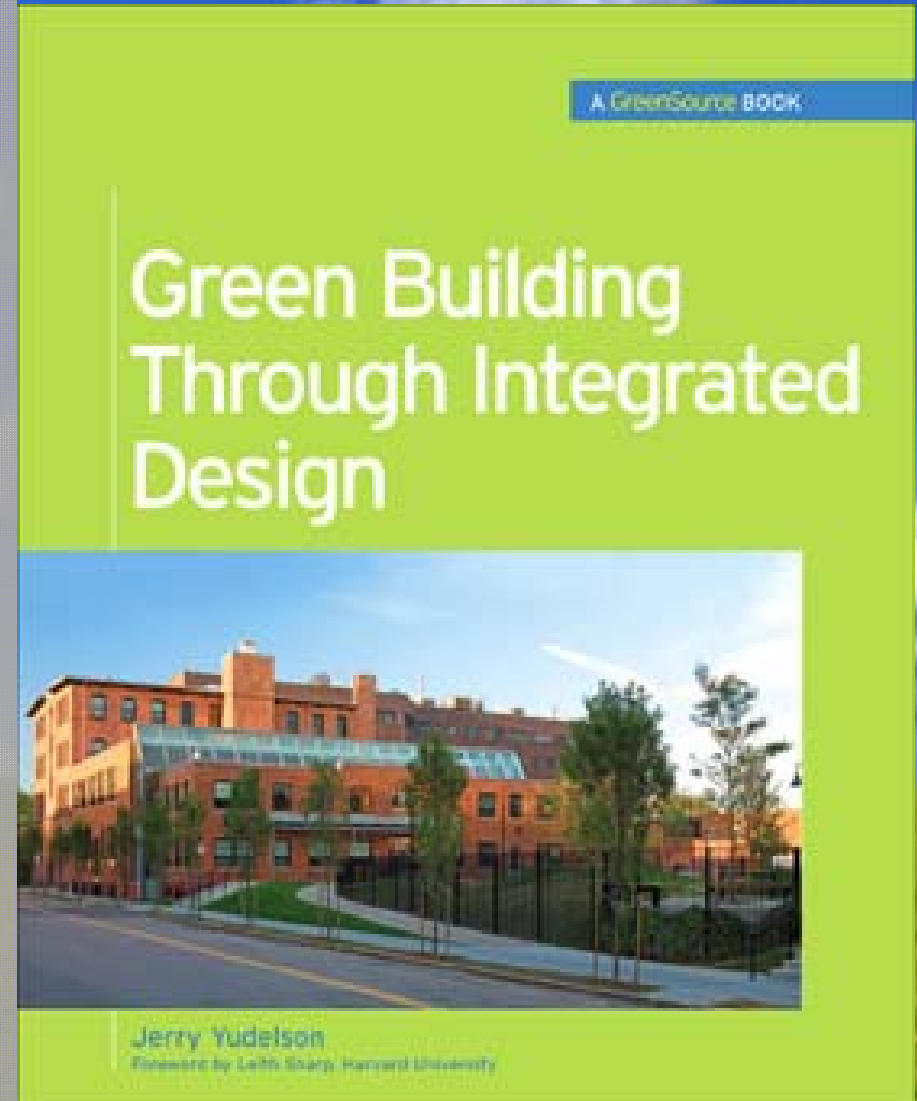
🌿 Goal: LEED-EB Gold



Learning from Lean Manufacturing

- Lean Themes

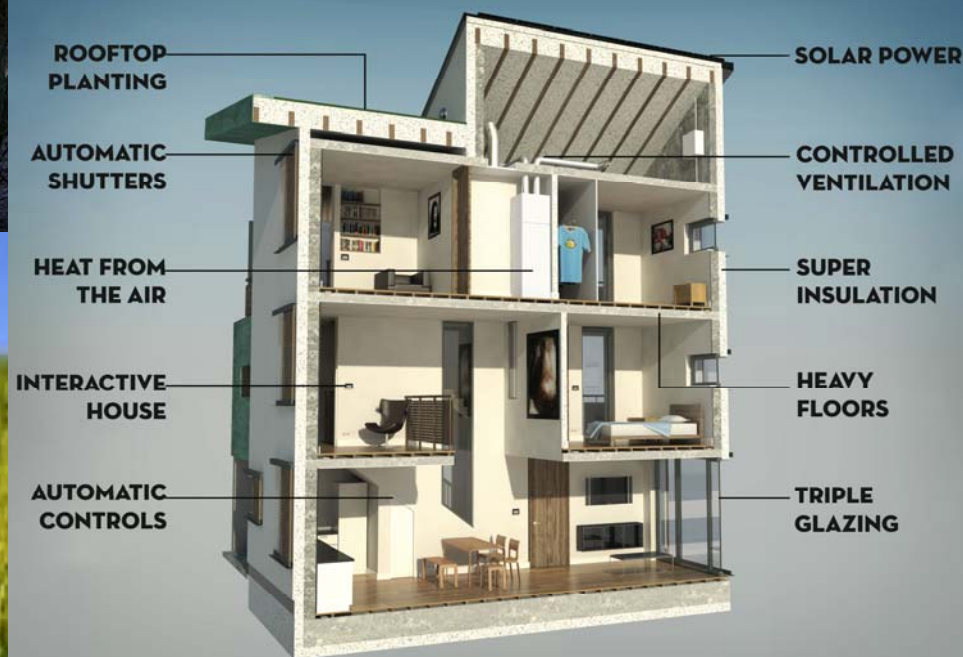
- Boeing 767: \$130 million ea.
 - Each plane performs identically
 - Compare with two 600,000-sq.ft. buildings
- Reduce energy use/carbon footprint
- Eliminate waste
- Build in resiliency
- Need to make *champagne* on a beer budget!
 - => Process change
- Key issue: get green cost premium down to zero, using *integrated design process*



Conclusion?

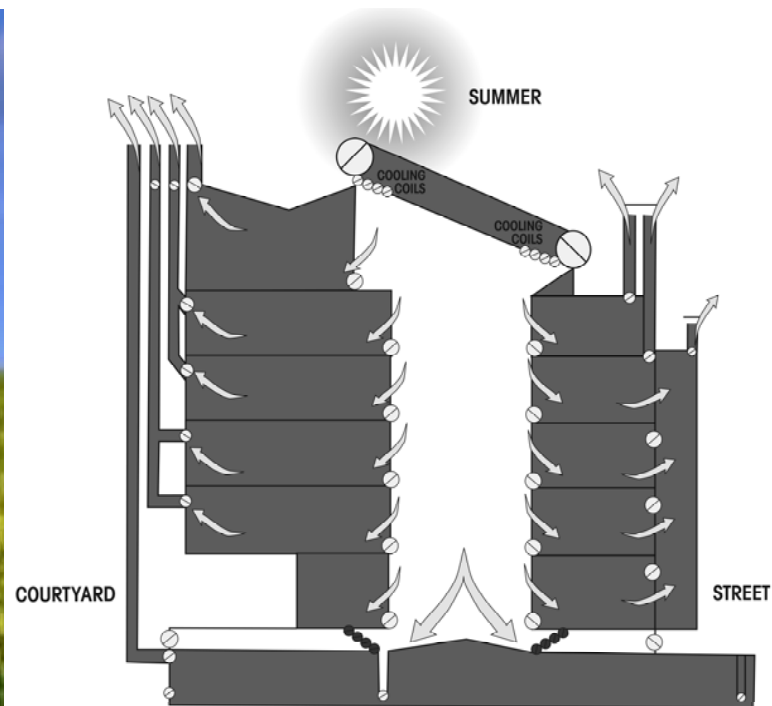
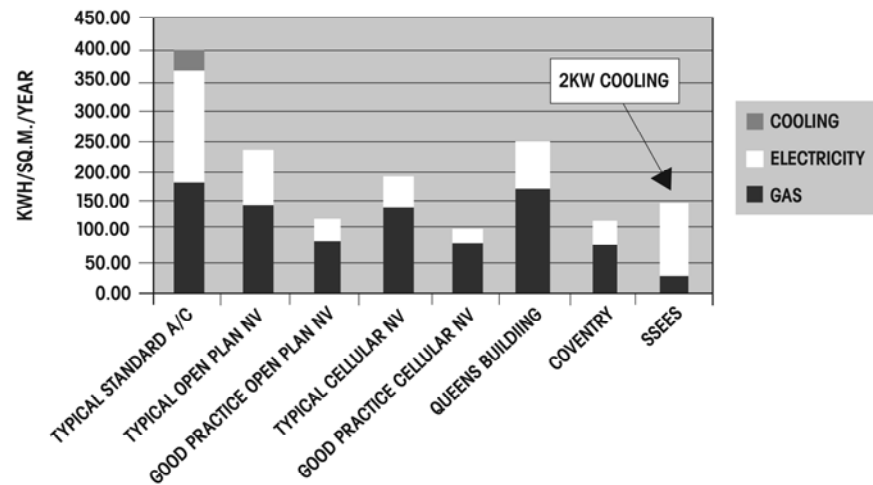
- Benefits are clear; need to overcome cost concerns
- Need to demonstrate cost-effectiveness in financial terms
 - ROI vs. Payback
 - Increase in Building Value
 - Risk Mitigation
 - Non-financial measures
- Increased concern over actual building performance
 - Stay connected to the project via Cx
 - Set up for LEED-EB certification

European Examples



- UK has mandated:
 - Energy labeling
 - All new social housing zero carbon by 2016
 - All new private housing zero carbon by 2018
 - All new building zero carbon by 2019
 - We talk about 80% reductions by 2050

Great Buildings – UCL London



School of Slavonic Studies, Univ.
College London, Short & Assoc.

Great Buildings



Frankfurt Airport, Lufthansa HQ,
Ingenhoven Architekten

- 50% less energy use
- 100% certified wood
- 0% PVC
- 9 winter gardens
- 100% rainwater recovery/reuse
- 100% daylight/views
- Quiet, comfortable, productive

European Examples

- Technology Innovations
 - High-performance building envelopes
 - Intelligent façades
 - Double-skin façades
 - Separate ventilation from space conditioning
 - Use radiant heating/cooling
 - On-site renewables with CHP/cogeneration plants
 - Integrated thermal mass



European Investment Bank, Luxembourg
Ingenhoven Architekten

European Examples



- Radiant vs. convective space conditioning
 - Separate ventilation from space conditioning
- Underfloor Air Distribution
- Chilled beams/chilled ceilings
 - Integrated passive design
 - Allow for active or passive cooling but keep floor open

The Future is Green!



Sidney Crosby, Pittsburgh Penguins
2009 Stanley Cup Winners
2010 Winter Olympics Winners

- 🌱 If you want to score, skate to where the puck is headed, not to where it is now.
- 🌱 Ask yourself: what will the built environment look like in 2012 to 2014?
- 🌱 Re-orient your business and skills for the New Normal

A Final Word

“An invasion of armies can be resisted,
but not an idea whose time has come”

- Victor Hugo, 19th century French writer

Jerry Yudelson

Yudelson Associates

March 2010

THANK YOU!



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