

# Path to Sustainability

## High Performance Green Buildings



Sustainably Energizing New York's Creative Core  
July 17<sup>th</sup>, 2008



# High Performance Green Buildings

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## Optimized:

Natural Resources

Human Resources

Financial Resources

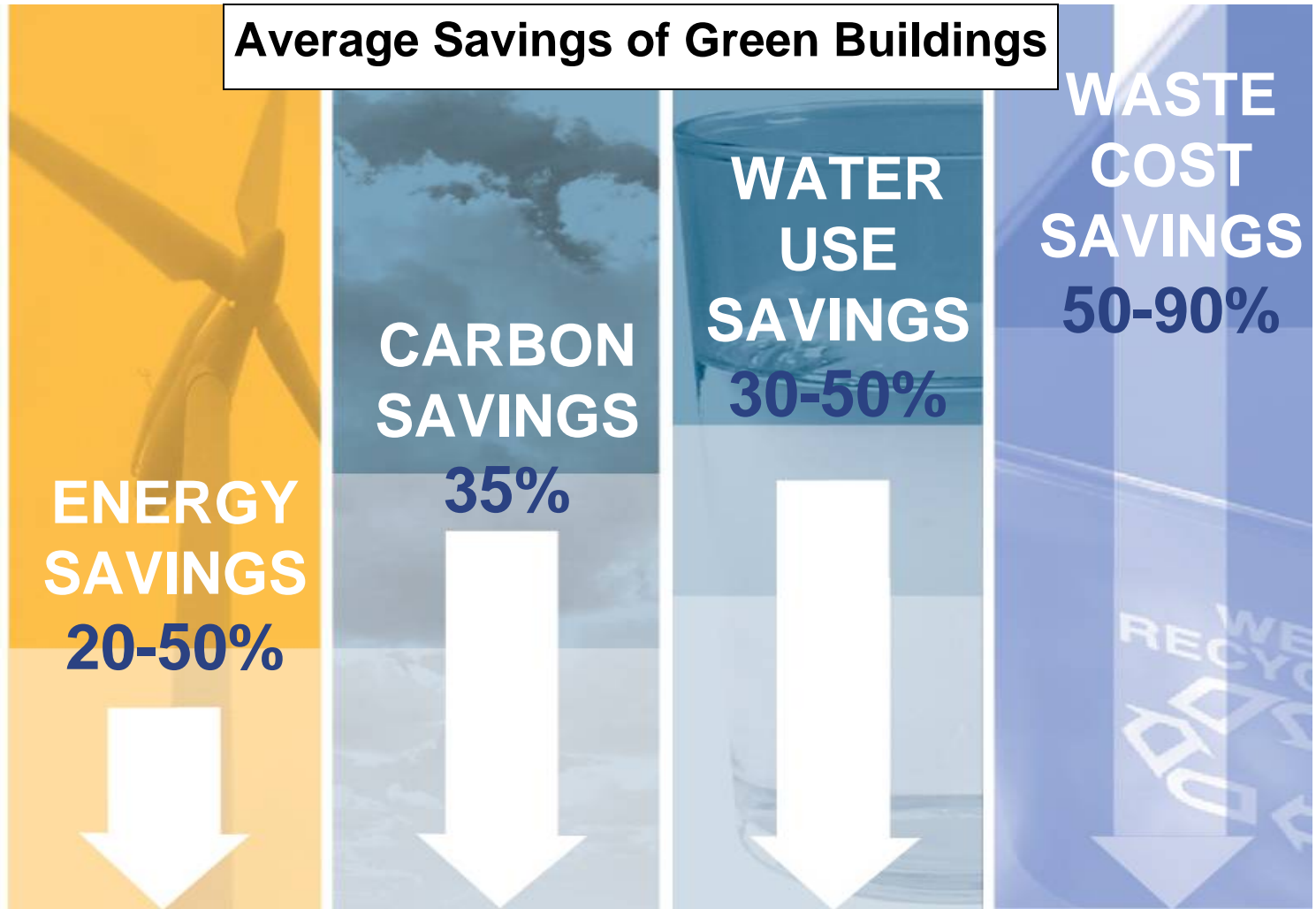


# Is a Green Building a High Performance Building?

Let's look at some statistics . . .

Results from certified project data for LEED certified facilities

## Average Savings of Green Buildings



# Green Buildings And Energy Efficiency

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Certification level	Number of buildings	Predicted energy cost savings
Certified	172	24%
Silver	132	32%
Gold	103	41%
Platinum	13	56%

**Source:** New Buildings Institute for USGBC.

Analysis of 420 LEED-NC version 2 certified buildings through July 2005

# So the answer is yes, right? Well, most if the time . . .

Example: Lewis and Clark State Office Building, Jefferson City, MO



Lewis and Clark State Office Building  
Jefferson City, Missouri



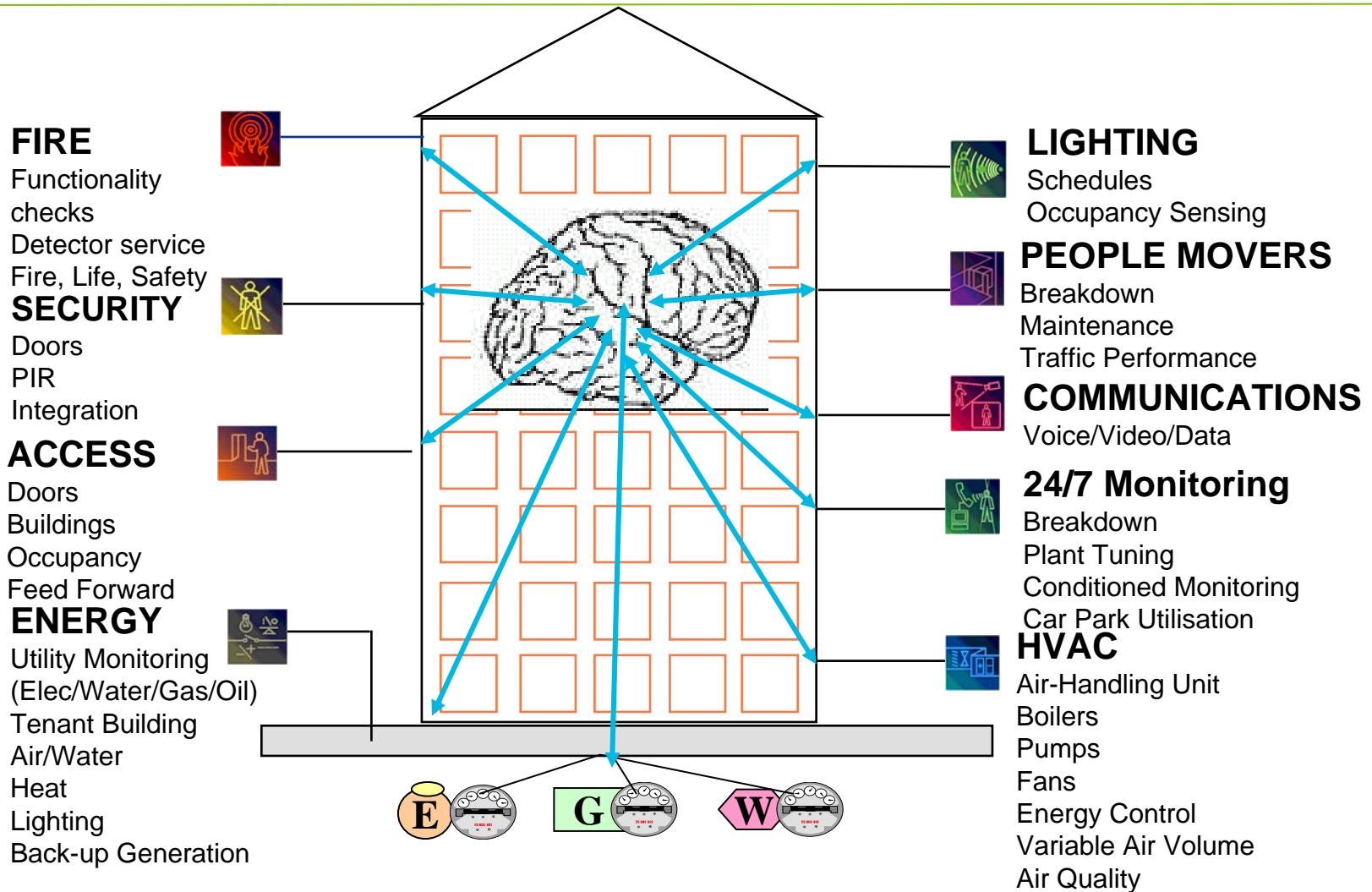
## ■ The Good News

- LEED Platinum Design
  - Extensive daylighting
  - Recycled rainwater for toilets
  - Native plant landscaping
  - PV roof collectors (2.5% of building's total energy use)
  - Raised flooring to minimize heating and cooling waste
  - Recycled construction materials, locally purchased wherever possible
  - Energy cost expected to be nearly half other state buildings (\$0.81 psf vs. \$1.50 psf)

## ■ Unanticipated Side Effects

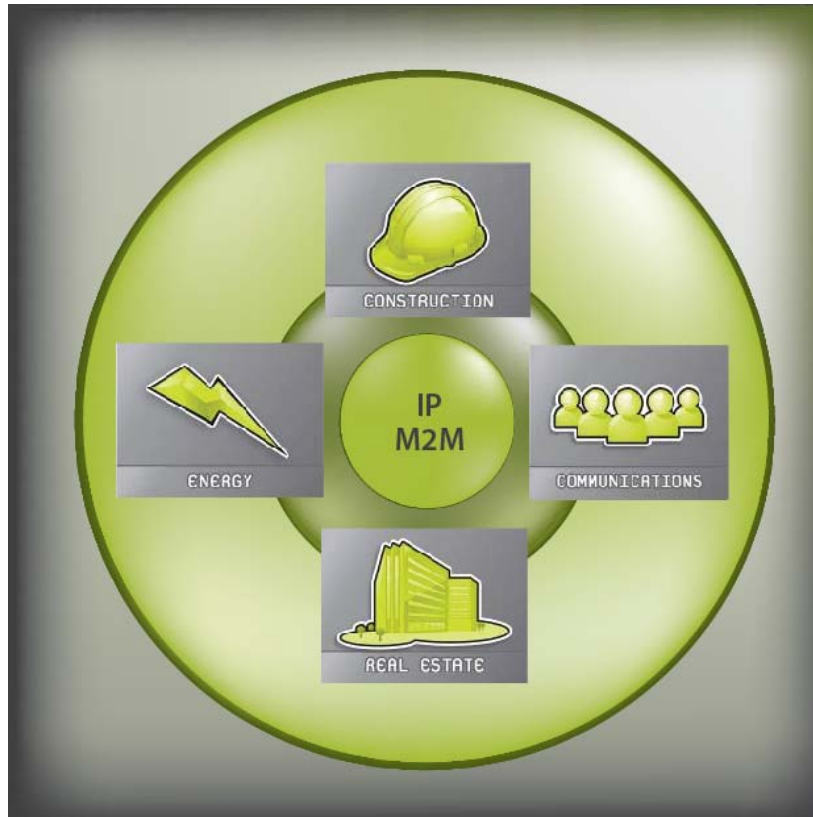
- A post-occupancy audit (POE) conducted in winter, 2007/08 revealed
  - Tenants found that the glare and acoustics of the building made it difficult to work in the facility
  - Lack of on-site parking resulted in \$149,000 per year cost to operate transportation shuttle for employees
  - Higher housekeeping costs due to additional window cleaning (\$1.39 psf vs. \$1.25 for all office buildings)
  - Total annual operating costs higher as a result (\$7.04 psf vs. \$6.50 psf for all state office buildings)
  - Actual energy costs \$1.12 psf for Lewis and Clark Building vs. \$1.75 psf for all state office buildings

# The Key to High Performance Buildings –Systems Integration and Real-Time Information



# Case Study – State of Missouri

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## Key Facility Data Sources

- Building Information Modeling
- Synthetic Metering
- Communications
- Video
- Enterprise Energy Management
- Condition Assessment and Planning
- Enterprise Resource Planning
- Business Process Management
- Computerized Maintenance Mgmt.

# Case Study – State of Missouri

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Management of the state's public buildings was aided by a merger of the Division of Facilities Management with the Division of Design and Construction.

In the past, the state has had a fair amount of funding for maintenance of buildings, but had little understanding of its **real needs** because of unreliable information from state agencies.

***Now, a sophisticated software program tracks up-to-date information about the condition of all state facilities — and alerts managers when preventive-maintenance tasks need to be performed.***

*You weren't getting a real picture of the condition of the buildings," says **David Mosby**, director of the combined office.*

# Case Study – State of Missouri

## ESCO 2.0 - ROI

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### Savings from Traditional ESCO self-funded energy projects:

Sq. Ft. – 16,336,715

One Time Cost - \$1.10 per sq. ft.

### **Guaranteed Annual Savings**

- Energy - \$.17 per sq. ft.
- Operations - \$.40 per sq. ft.

Energy Simple Pay Back in 6.5 Years

Total Pay Back in 1.9 Years



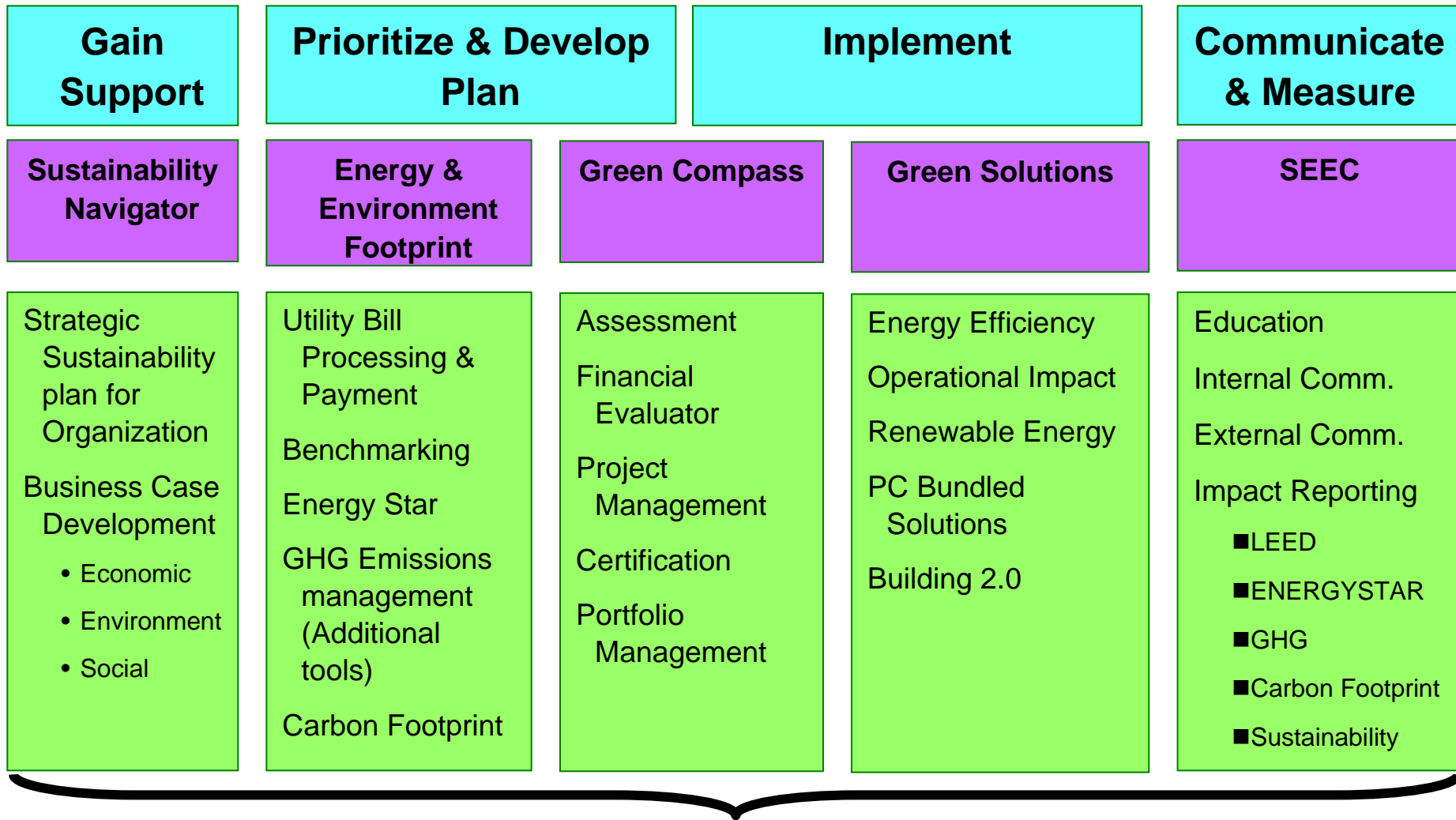
# Case Study – State of Missouri

## Total Savings Recap

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	Annual	One Time
Real Estate	\$14.3 M	\$20.9 M
Operations	\$1.6 M	
Construction	\$1.7 M	
ESCO/Guaranteed	\$10.2 M	
Actual Utility	\$3.7 M	\$1.3 M
<b>TOTAL</b>	<b>\$31.5 M</b>	<b>\$22.2 M</b>

# JCI Best Practices for creating High Performance Green Buildings



**A Comprehensive Portfolio Based Approach to Intelligent & Sustainable Buildings**





# Green Solutions that improve Building Performance

Some examples to incorporate

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Optimize building orientation

Use sustainable landscaping

**Try day cleaning and green cleaning**

**Install a Green and/or White Roof**

**Get the building Energy Star rated**

Use moisture-control barriers and air barriers on the exterior

**Pack in high R-value insulation**

Design-in low-e glazed windows

Install skylights and light shelves

**Provide task ambient lighting, get light where occupants need it**

Put in time clocks, occupancy sensors, and dimming ballasts.

Use scotopic enhanced lighting

Install harmonic canceling transformers in the electrical system

Think underfloor air distribution

**Try variable-speed drives**

**Control your plug load**

Specify "UVGI" (ultraviolet germicidal irradiation) and electronic air cleaners

**Check out waterless urinals and low-flow plumbing fixtures**

Look into gray water recovery and UV treatment for drinking water

**Deploy a building management system (with sub-metering)**

Design with movable walls and wireless sensors and controllers

**Use low- VOC carpet tiles**

Install high-performance ceiling tile

Use sound masking, overhead or under the raised floor

**Pay for the efficient skinny LCD monitors**

Specify eco-friendly products

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**THANK YOU!**