DEMYSTIFYING THE COSTS AND BENEFITS OF GREEN HEALTH CARE FACILITIES

PERKINS+WILL
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CENTER FOR MAXIMUM POTENTIAL BUILDING SYSTEMS
Gail Vittori, LEED Fellow
Certified USDA organic Spanish peanuts

- No hydrogenated oils
- No added sugars
- No artificial ingredients
Certified USDA organic Spanish peanuts
No hydrogenated oils
No added sugars
No artificial ingredients
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Demystifying First-Cost Green Building Premiums in Healthcare

Study Authors:
Adele Houghton
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“So... does building a green hospital cost more?”
“Hmm…
*cost more than WHAT?*
*Do you mean…*

“…cost more than the exact same building without the sustainable features?…

“…cost more than the capital budget or available funding?…

“…cost more than other hospitals of comparable size and complexity?…

“…cost more to construct or to operate over its life span?…
There is a very large variation in costs of buildings, even within the same building program category.

Cost differences between buildings are due primarily to program type.

There are low cost and high cost green buildings.

There are low cost and high cost non-green buildings.
“Sustainability is a program issue rather than an added requirement…. Perhaps the most important thing to remember is that [it] is not a below-the-line item.”

Factors that influence feasibility and cost:

- Demographic location
- Bidding climate and culture
- Local and regional design standards, including codes and initiatives
- Intent and values of the project
- Climate
- Timing and implementation
- Size of building
- Point synergies
RANGE OF PROJECT SIZE AND TYPE

2008 LEED CERTIFIED HEALTHCARE COST PREMIUM STUDY
Projects by Size
2008 LEED CERTIFIED HEALTHCARE COST PREMIUM STUDY

First Cost Premium by Level of Certification – BEFORE Grants + Incentives

Certified: 4%
Silver: 5% (3.8%)
Gold: 5% (2.0%)
Platinum: 3%

AVERAGE 2.4%
2008 LEED CERTIFIED HEALTHCARE COST PREMIUM STUDY

First Cost Premium by Level of Certification – AFTER Grants + Incentives

Certified: 1% 0%
Silver: 3% 3.8%
Gold: 0.5% 0.5% 0.5%
Platinum: 2%

AVERAGE 1.15%
“….It’s telling us that all these things we hoped would happen—that we would have higher employee satisfaction, higher patient satisfaction, better retention of clinical employees and nurses, better physician recruitment—have scored higher due to the nature of this building.”

Richard Beam, Director of Energy Management Services
Providence Health & Services
"Because of the integrative design process, elements of the project were incorporated if they met several criteria: they might be green, but also low maintenance or met criteria for infection control, etc."

"The ‘first-cost premium’ inherently presents an item as a premium when it isn’t an add to the budget—in a process where we often don’t analyze the subtractions or synergistic savings. If orienting a building to optimize passive solar gain in winter reduces heating load with no impact on construction cost, where is that ‘savings’ tracked?"
THE SMALL HOSPITAL CATALYZES COMMUNITY AND INDIVIDUAL HEALTH AND WELLNESS

Kaiser Permanente
SMALL HOSPITAL, BIG IDEA
Building systems cost modestly more: operational savings save significantly more.
Cost Premiums for Green Building: Who’s Informing Whom?

Mapping the connections between 13 of the referenced studies, we found that a significant amount of the current research on green premiums inaccurately references or empirically cites data sets from earlier studies from each connection is noted by a yellow arrow. The research rests on the accuracy of a handful of earlier studies. While we have no intention of challenging the veracity of these studies, it is critical to note the vulnerability of research that relies on older, derivative data. This approach may compound assumptions or inadvertently pull findings out of context.
LEED HOSPITALS
Perspectives on Cost Premiums and Operational Benefits

Research update to 2008 study

15 LEED certified hospitals completed 2010-2012

Identified capital cost construction premium of achieving LEED certification
2012 COST PREMIUM STUDY
RESEARCH FRAMEWORK / METHODOLOGY

Gail Vittori, LEED Fellow
Co-Director
Center for Maximum Potential Building Systems
Intent: For respondents to provide hard data and responses in the most efficient way possible

45 questions
1-2 hour time commitment
SUBJECT HOSPITALS - 15 TOTAL

15 subject hospitals - 9 design firms

Stantec (Anshen Allen)
HKS
Health Facilities Group
Mahlum
Perkins+Will

NBBJ
Kahn Associates
ESA
Shepley Bulfinch
SUBJECT HOSPITALS – 15 TOTAL

- Mercy Medical Center West Lakes Hospital
- Yale New Haven Smilow Cancer Hospital
- Johnston Memorial Replacement Hospital
- Boone Hospital Center
- Hughes Spalding Redevelopment
- Rockingham Memorial Hospital
- Rush University Medical Center Tower
- Kiowa County Memorial Hospital
- St. Elizabeth Hospital
- Texas Health Presbyterian Flower Mound
- Tradition Medical Center
- West Bloomfield Hospital
- Laguna Honda Hospital Replacement Program
- Ahuja Medical Center
SUBJECT HOSPITALS – 15 TOTAL

+$3 billion construction cost

+5.2 million square feet
COST PREMIUM PERCEPTIONS
WHAT ARE THE BIGGEST BARRIERS TO CONTROLLING FIRST COST GREEN PREMIUMS ON A PROJECT?

Cost Control Barriers

- Project team's lack of experience with LEED
- Mid-stream attempt to pursue LEED
- Lack of a clear green/LEED design goal
WHAT ARE THE BIGGEST BARRIERS TO CONTROLLING FIRST COST GREEN PREMIUMS ON A PROJECT?

When did the project team decided to pursue LEED?

Concept Design – 26%
Schematic Design – 60%
Design Development – 7%
Construction Documents – 7%

Was LEED included in the original project budget?

Yes – 47%
No – 53%
COST CONTROL BARRIERS
LEED Overachievement

LEED Level Targeted?
2 Certified
11 Silver
2 Gold
0 Platinum

LEED Level Achieved?
1 underachieved
5 achieved target
9 overachieved
2 Certified
5 Silver
7 Gold
1 Platinum
“Hmm… cost more than WHAT? Do you mean…”

All projects that declare zero cost premium define the cost premium as an increase to the budget.

There is no consistency to the construction features that are included in a capital cost premium.

There is no standard method for calculating a premium.

Components of a green construction premium are continually evolving as hospital baselines change.
LEED HOSPITALS: PERSPECTIVES ON COST PREMIUMS AND OPERATIONAL BENEFITS

There is no single definition for capital cost green premium

Defining a Capital Cost Premium
COST PREMIUMS
CAPITAL COST PREMIUMS

ALL SUBJECT HOSPITALS - 15 TOTAL

LEED CERTIFICATION LEVEL

CERTIFIED  SIlVER  GOLD  PLATINUM
1.00%     5.00%     4.00%     5.00%
0.00%     0.20%     0.80%     1.20%
0.00%     0.00%     0.00%     0.30%
0.00%     0.00%     0.00%     0.00%
CAPITAL COST PREMIUMS

ALL SUBJECT HOSPITALS - 15 TOTAL

LEED CERTIFICATION LEVEL

PREMIUM

1.24%
CAPITAL COST PREMIUMS

LARGE SUBJECT HOSPITALS > 100,000SF - 13 TOTAL

LEED CERTIFICATION LEVEL

PREMIUM

Certified: 1.00%
Silver: 1.00%
Gold: 4.00%
Platinum: 1.20%

CAPITAL COST PREMIUMS

LARGE SUBJECT HOSPITALS > 100,000 SF - 13 TOTAL

LEED CERTIFICATION LEVEL

PREMIUM

Certified: 1.00%
Silver: 0.00%
Gold: 0.80%
Platinum: 1.20%

0.67%
CAPITAL COST PREMIUMS, 2008-2012
LEED HOSPITALS: PERSPECTIVES ON COST PREMIUMS AND OPERATIONAL BENEFITS

CAPITAL COST PREMIUM = SOFT COST PREMIUM + HARD COST PREMIUM
SOFT COST PREMIUM COMPONENTS

**56%** Commissioning

**66%** Energy modeling

**53%** LEED Fee - contractor

**72%** LEED Fee – architect / engineer

**91%** LEED Registration and review fees

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TOP 5 SOFT COSTS

Most cited as contributing to LEED cost premium regardless of impact to budget
SOFT COST PREMIUMS COMPONENTS

**SMALL HOSPITAL EXAMPLE - 100,000 sf**

- **56%** Commissioning
- **66%** Energy modeling

**BEST PRACTICE / NOT LEED SPECIFIC**

- **91%** LEED Registration and review fees

- **53%** LEED Fee - contractor
- **72%** LEED Fee – architect / engineer

**LEED SPECIFIC**

= .15 - .3%
SOFT COST PREMIUMS COMPONENTS

**LARGE HOSPITAL EXAMPLE - 500,000 sf**

- **56%** Commissioning
- **66%** Energy modeling

**BEST PRACTICE / NOT LEED SPECIFIC** = .1 - .2%

- **53%** LEED Fee - contractor
- **72%** LEED Fee – architect / engineer
- **91%** LEED Registration and review fees
HARD COST PREMIUMS

36%  Stormwater Management - Quality
44%  High Performance Roofing
50%  Low Flow Bathroom Fixtures
50%  Optimized Energy Systems
62%  Bicycle Storage

TOP 5 HARD COSTS
Most cited as contributing to LEED cost premium regardless of impact to budget
HARD COST PREMIUMS

In total, 40 different hard cost components were noted by at least 1...
Your LEED Cost Premium Definition ≠ Mine
HARD COST PREMIUMS

36%  Stormwater Management - Quality
44%  High Performance Roofing
50%  Low Flow Bathroom Fixtures
50%  Optimized Energy Systems
62%  Bicycle Storage

OPERATIONAL PERFORMANCE + MUNICIPAL BENEFIT
OPERATIONAL PERFORMANCE
Energy and Water Savings

SUBJECT HOSPITAL
LEED Gold
0% Reported Cost Premium

-20% = $7 million
Energy Cost Savings Reduction
Operational Savings 2012-2022
OPERATIONAL PERFORMANCE
Energy and Water Savings

SUBJECT HOSPITAL
LEED Gold
0% Reported Cost Premium

-20% = 49,000 tons
Energy Cost Savings Reduction
CO2 Avoided 2012-2022
OPERATIONAL PERFORMANCE
Energy and Water Savings

SUBJECT HOSPITAL
LEED Gold
0% Reported Cost Premium

-20% = 37,000 acres
Energy Cost Savings Reduction

of forest offset 2012-2022
OPERATIONAL PERFORMANCE
Energy and Water Savings

SUBJECT HOSPITAL
LEED Gold
0% Reported Cost Premium

-20% Energy Cost Savings Reduction
37,000 acres of forest offset 2012-2022

"Modeled Savings" vs. "Actual"
MUNICIPAL / COMMUNITY BENEFIT

Yes - 47%
No - 53%

What Kinds of Benefits?

General 1
Energy 2
Stormwater 4

ROCKINGHAM MEMORIAL HOSPITAL
Landfill Gas Project

LEED NC Gold / Reported 4% Cost Premium
FINANCIAL INCENTIVES

62% LEED projects in the 2008 study received green building related financial grants / incentives
- Local Utility
- Private philanthropic
- Municipal

20% LEED projects in 2012 study received green building related grants

“no respondents reported that the lack of a grant or incentive prevented them from achieving a desired LEED certification level”
Rush University Medical Center

- Chicago, IL
- 806,000 sf
- 386 patient beds
- 2012 completion
- Perkins+Will

0% reported capital cost premium
LEED was included in Basis of Design but didn’t inform a budget increase

Targeted LEED Silver, achieved LEED Gold
  - Largest LEED Gold hospital at the time

LEED costs were never isolated because the project stayed within original budget

Hospital was provided substantial financial benefits/ incentives to achieve LEED

Direct Incentive tied to LEED Silver min.
Green Roof required for
Chicago Green Permit Process
(fee waiver and expedited) + staff/patient amenity
Comprehensive Stormwater Management system informs municipal benefit and cost savings
Kiowa County Memorial Hospital
• Greensburg, KS
• 50,000 sf
• 15 patient beds
• 2011 completion
• Health Facilities Group

5% reported capital cost premium
KIOWA COUNTY MEMORIAL HOSPITAL

• 2007 - Original Kiowa Hospital was destroyed by tornado w/ 95% of the town

• Town dictated all municipal buildings were required to achieve LEED Platinum

• Hospital was not required, but decided to meet the same standard

• Public infrastructure destroyed = opportunities for project synergies
KIOWA COUNTY MEMORIAL HOSPITAL

- LEED was included in Basis of Design
- Targeted LEED Gold, achieved LEED Plat
- LEED costs were never isolated due to special nature of the project
- Received substantial grants, incentives and corporate sponsorships for “green materials”
  - FEMA 75%
  - Kansas DOE 10%
  - USDA 15%
- Team estimated cost premium of 5%
On-site Wind Turbine provides 40% of base load electricity, new town wind farm provides remainder. Reduces energy load on municipal electricity generation.
On-site bioswales treat stormwater and greywater, solves significant sewage and drainage problems for the town.
Regulatory Requirement
Funding Requirement
Occupant Health & Safety
Operational Efficiency
Community Benefit
Environmental Perf.
Civic Leadership

VALUE PROPOSITION
WHY DID THE OWNER DECIDE TO PURSUE LEED?

- Civic Leadership, 31%
- Community Benefit, 23%
- Operational Efficiency / Reduced Costs, 8%
- Environmental Performance, 8%
- Funding Requirement, 8%

Sustainable Design Drivers
WHY DID THE OWNER DECIDE TO PURSUE LEED?

Sustainable Design Drivers

- Civic Leadership, 31%
- Community Benefit, 23%
- Environmental Performance, 8%
- Operational Efficiency / Reduced Costs, 8%
- Occupant Health & Safety, 23%
- Funding Requirement, 8%

MEASURABLE
MEASURING OPERATIONAL BENEFITS

POST OCCUPANCY EVALUATIONS

OPERATIONAL SAVINGS

STAFF BENEFITS

PATIENT BENEFITS

Energy
Water
Retention
Absenteeism
Satisfaction
Satisfaction
Length of Stay / Recovery Time
MEASURING OPERATIONAL BENEFITS

POST OCCUPANCY EVALUATIONS

OPERATIONAL SAVINGS

STAFF BENEFITS

PATIENT BENEFITS

Design Firm

Hospital

Energy
Water
Retention
Absenteeism
Satisfaction
Satisfaction
Length of Stay / Recovery Time
POST OCCUPANCY EVALUATIONS

Post Occupancy Evaluation

Yes 29%
No 71%
OPERATIONAL UTILITY SAVINGS
What’s Being Measured?

Research Survey

Water Savings
53%

Energy Savings
80%

Healthcare Facilities Management Ma

Water savings

YES
41%

NO
54%

DON'T KNOW
5%

Energy savings

YES
69%

NO
28%

DON'T KNOW
3%

% Selected by Respondents

2013 Sustainable Operations Survey
IMPROVED HEALTH OUTCOMES

IMPACT OF DAYLIGHT

- 1/3 Day Shorter Hospital Stay
  - (all patients)
- 1 Day Shorter Hospital Stay
  - (women only)
- 4.5% fewer mortalities
  - (all patients)

LESS
- Intakes of pain medication
- Recorded Pain
- Anxiety
- Fatigue

BETTER
- Satisfaction with their rooms
- Physiological responses
  - lower blood pressure and heart rate

"Dying In The Dark: Sunshine, Gender And Outcomes In Myocardial Infarction." K M Beauchemin and P Hays 1998

"Effects of Flowering and Foliage Plants in Hospital Rooms on Patients Recovering from Abdominal Surgery" Seong-Hyun Park and Richard H. Mattson
EVALUATING OPERATIONAL BENEFITS
Who’s Measuring What?

- Staff Absenteeism: 33%
- Staff Retention Rates: 40%
- Staff Satisfaction: 60%
- Length of Stay / Recovery Time: 33%
- Patient Satisfaction: 53%
Dell Children’s Medical Center

- Austin, TX
- 170 patient beds
- 2007 completion
- Karlsberger
STAFF RECRUITMENT

- Attracts top talent.

"The new facility has contributed to attracting new pediatric specialists."

- Douglas Waite, Seton CFO

- “34% of Americans prefer their employer to make ‘a conscious effort to promote socially and environmentally friendly practices’ and 31% would take a pay cut to do so.”

- Eileen D. Gunn, "Is Your Company Really Eco-Conscious?"
U.S. News & World Report - October 6, 2008
Staff Retention

- Average staff turnover ranges from 10-15% nationally
- Nursing turnover rate was 2.4% for Dell Children’s in the first year
- New hospitals can experience up to 30% staff turnover in the first year
- It can cost Dell Children’s more than $70,000 to replace one nurse.
RESULTS FROM DELL CHILDREN’S POST-OCCUPANCY EVALUATION

Employee Engagement  ↑ 5%
Health and Well-Being  ↑ 5%
Frequency of Undesirable Health Outcomes  ↓ 4%

From: Debra D. Harris, Ph.D. RAD. Return on Investment of a LEED Platinum Hospital. 2014

Dell Children’s Medical Center of Central Texas Healing Garden — ©Mark M. Swedner, Seton Healthcare Family
RESULTS FROM DELL CHILDREN’S POST-OCCUPANCY EVALUATION

Turnover Rate:

↓ 3.57% vs. national average

↓ 6.53% vs. original hospital

Each Percentage Point

= $331,800 IN SAVINGS

Total Annual Savings $2.17M

From: Debra D. Harris, Ph.D. RAD. Return on Investment of a LEED Platinum Hospital, 2014
Injuries + Illnesses:

- **7%** vs. original hospital
- **3%** vs. other new hospitals in Seton Network

*Savings from original to new hospital: $4.5M/year*

_FROM: Debra D. Harris, Ph.D. RAD. Return on Investment of a LEED Platinum Hospital. 2014_