Towards a Sustainable Market

The Puerto Rico Chamber of Commerce

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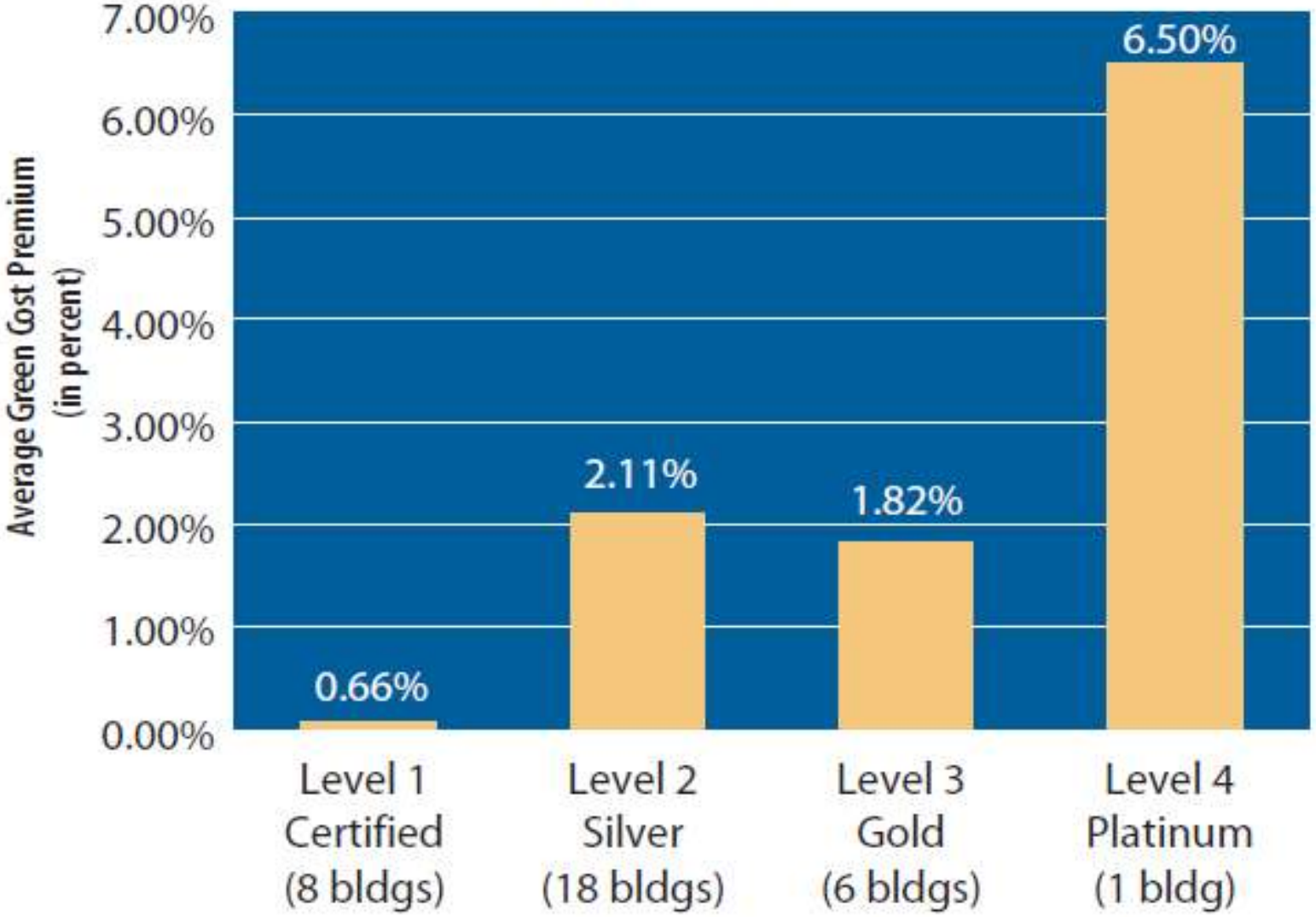
Principal, Pieri + Associates Architects

November 30, 2010

San Juan, Puerto Rico

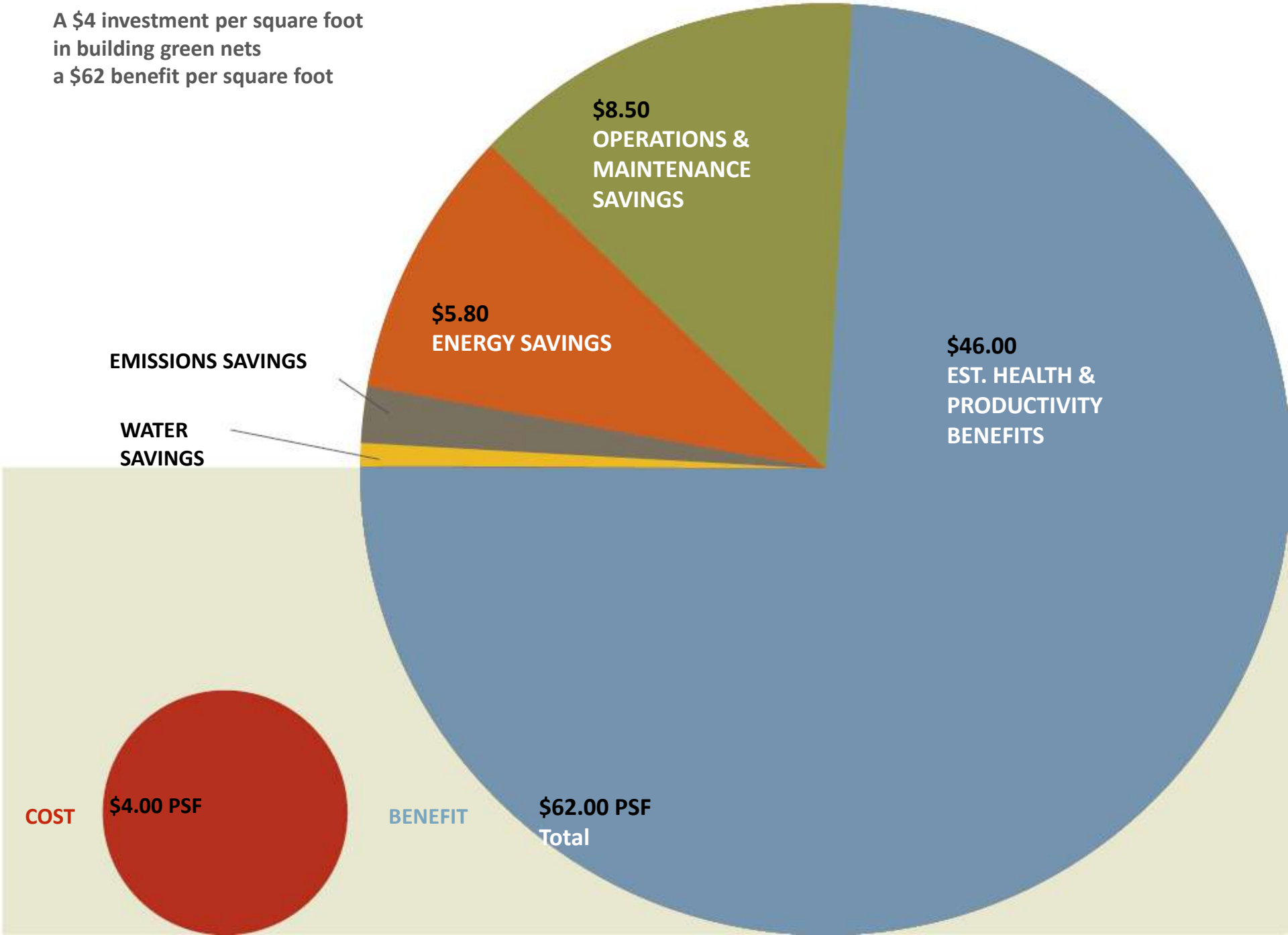
20%...

Figure 1
Average Green Cost Premium vs. Level of Green Certification for Offices and Schools



Source: USGBC, Capital E Analysis

A $4 investment per square foot
in building green nets
a $62 benefit per square foot



Standard Refrigeration, Inc.

San Juan, PR

LEED NC 2.1 Platinum
LEED-EB+OM Platinum
Energy Star Rating +95

67% energy savings

55% water savings

IEQ Focus
Conditioned and filtered outdoor air
Low emitting materials
90% spaces with view

10-year Simple Payback – Total Project Cost

EEM Payback at <2 Years

- First LEED Certified building in Puerto Rico
- Second LEED-EBOM project in Puerto Rico
- Fifth LEED Platinum Building In world

McNeil Healthcare, LLC

Las Piedras, Puerto Rico

LEED-EB 2.0

Certified 39 Points

29% Energy Intensity Reduction

55% Potable Water Savings

67% Solid Waste Reduction

- 16 Acre Conservation Area
- Stormwater Mitigation
- REC Credits
- Continuous Commissioning
- Comprehensive Recycling
- Green Cleaning
- Environmentally Preferable Purchasing Policy
- Continuous IAQ Management

Owner: McNeil Consumer Healthcare, LLC

- Second LEED Certified building in Puerto Rico
- First LEED-EB project in Puerto Rico
- First LEED certified Pharmaceutical cGMP facility in the world

Marriott Courtyard

Convention Center
District San Juan, PR

LEED NC v 2.2
Silver (2012)

+28 % Energy savings

+45% Potable Water Savings

+25 %
Stormwater Load Reduction

IEQ Focus
Low-Emitting Finish Materials
High Ventilation Rates
Natural Light + Views

Continuous VE Process

IAMT

Hospital Hermanos Melendez

Bayamon, PR

LEED NC v 2.2

Silver (2012)

+21 % Energy savings

+50%

Potable Water Savings

+50 %

Stormwater Load Reduction

IEQ Focus

Low-Emitting Finish Materials

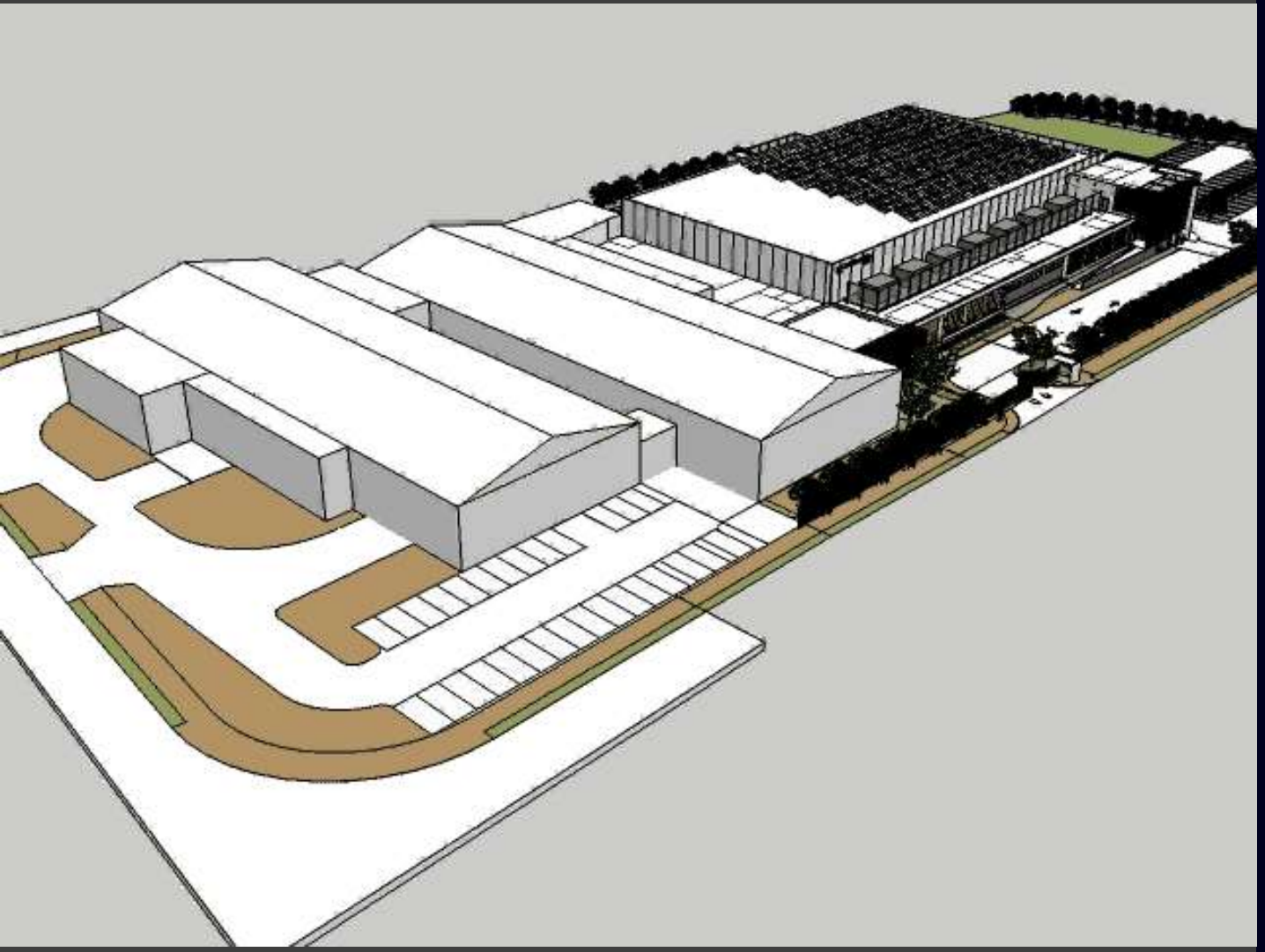
High Ventilation Rates

Natural Light + Views

Continuous VE Process

Sartorius Stedim Filters

Yauco, Puerto Rico



LEED NC v 3 2009

Gold (2011)

22 + 8 %

Energy savings

- Efficiency = 22%
- Renewables = 10%

Integrated Water Management Design

+85 %

Potable Water Savings

Heat Island Reduction

Native and Adaptive Landscaping

LCA Materials Selection Protocol

IEQ Focus

- OA Ventilation Control
- Low VOC Finishes
- Daylighting Controls

Parametric Energy Modeling + Water Balance

Primary EEM Parameters	Baseline "Market" Case	ASHRAE Case	Design Case
Window system	.7 SHGC Glass / U=1.0	0.25 SHGC Glass / U=1.2	0.35 SHGC Glass / U=.80
Perimeter Wall	Mass Wall Only - furred, no Insul.	Steel Frame Wall, R-13 Insulation	Mass Wall Furred with R-11 Insul.
Roof Membrane	Modified Bitumen SBS Built-up	TPO "Cool Roof" Membrane	TPO "Cool Roof" Membrane
Roof insulation	R-12 Roof	R-15 Roof,	R-20 Roof,
Lighting Power Density (LPD)	1.3 LPD / 1.0	1.3 LPD / 1.0	0.8 LPD
Controls	Room Thermostatic Control	Room Occ Ctrls / BAS	Room Occ Ctrls / BAS
Chiller Plant	.75 kw/ton chiller (400 Tons)	Rooftop Package Units - 400 t, EER =10.0	0.50 kw/ton chillers (300 Tons + VSD)
Chilled Water Loop	Primary/Secondary Loop	Package	Primary Loop w/ VSD Pumps
Fresh Air Supply	AHU with VAV	Package	DOAS - Enthalpy Wheel (80 Tons)
Renewable Energy Source	-	-	138 Kw Photovoltaic Array

Annual Electricity Consumption - kWh x 1000

Energy Use	"Market" Building"	ASHRAE Baseline	Proposed Design
Space Cool	551	484	170.1
Heat Reject.	125	-	17.6
Hot Water	23	19	3.4
Vent. Fans	253	438	272.8
Pumps & Aux.	171	-	86.9
Ext. Usage	58	21	4.9
Misc. Equip.	1,276	1,276	1,267.30
Task Lights	41	41	41.1
Area Lights	267	295	151.4
138 Kw Photovoltaic Array	-	-	(215)
Total kWh x 1000	**2,764**	**2,574**	**1,800.50**
			2,015.50

Energy Use	"Market" Building"	ASHRAE Baseline	Proposed Design
Estimated Annual Energy Consumption @ $.21 / kWh	**$ 580,440**	**$ 540,561**	**$ 423,255**
			$ 378,105
Estimated Annual Energy Savings @ $.21 / kWh			
Simple EEM	**$ 157,185**	**$ 117,306**	
EEM+PV	**$ 202,335**	**$ 162,456**	
Percent Improvement (EEM)	27%	22%	
Percent Improvement (EEM+PV)	**35%**	**30%**	

LEED Projected Costs = A Value Proposition

Soft Costs				
Project Registration with the GBCI*	$	900	?	
Certification Costs	$	2,250	?	
Energy Modeling Studies	$	15,000	?	
Building Systems Commissioning	$	50,000	?	
Architecture Fees**	$	-		
Sub-Total – LEED Soft Costs	**$**	**68,150**	?	?

Design Case - Primary LEED Measures		First Cost / (Savings)	Annual Savings	ROI
Permeable Paving at Parking	$	35,000	N/A	
Concrete Pavement	$	(5,000)	N/A	
Bicycle Racks	$	1,500	N/A	
Interior Finish Materials - Recycled, Local, Low Emitting	$	-	N/A	
Non-Potable Water Harvest - 218,000 Gal Rainwater Cistern	$	85,000	$ 56,000	1.52
Sub-Total LEED Measures	**$**	**116,500**	**$ 56,000**	**2.08**

Design Case - Energy Efficiency Measures		First Cost / (Savings)	Annual Energy Savings	ROI
Window system - 0.35 SHGC Glass	$	53,838	$ 19,250	2.80
Perimeter Wall Insulation- R-11	$	38,695	$ 27,125	1.43
Roof Membrane - TPO "Cool Roof" + insulation - R-25	$	79,219	$ 9,310	8.51
Solar Shading Devices at Office Windows	$	167,020	$ 13,750	12.15
Chillers – 2 x 150 Tons w/ VSD. Performance = 0.50 kw/ton Variable Primary Chilled Water Loop	$	(62,500)	$ 28,000	(0.45)
Enthalpy Wheel (80 Tons) Fresh Air Supply	$	76,000	$ 13,000	5.85
Lighting Power Density (LPD) = 0.78	$	(148,573)	$ 39,250	(3.79)
Lighting Controls - Daylighting (office) / Occupancy (ALL)	$	18,500	$ 7,500	2.47
Smaller Electrical Substation - From 2,500 KV to 2,000 KV	$	(250,000)		N/A
Sub Total – Energy Efficiency Measures	**$**	**(27,801)**	**$ 157,185**	**(0.18)**
138 KW Photovoltaic Array	**$**	**750,000**	**$ 45,000**	**16.67**
Whole Building Simple Payback	**$**	**906,849**	**$ 258,185**	**3.51**
Estimated Value of Avoided Costs over 20 Year Period	$	906,849	$ 5,163,700	**$ 4,256,851**

* GBCI is Green Building Certification Institute, the Certifying body of the U.S. Green Building Council

**The Architecture firm's experience with LEED projects enables them to integrate LEED tasks into the design process.

Legacy Homes
Waukeegan, Illinois

LEED for Homes Platinum (82 points!)

Home Energy Standards (HERS) Index of 60
- Heat Recovery Ventilation
- Radiant Floors
- Super Insulated

Built in Established Neighborhood

Rain Gardens + Native Landscaping

35 %
Potable Water Savings

LCA Materials Selection Protocol

IEQ Focus
OA Ventilation Control
Low VOC Finishes
Daylighting Controls

Tunneling through the Cost Barrier

What do these projects have in Common?

From Day 1…

- Abiding support from senior decision makers
- Clear green design goals – owner + team alignment of purpose
- Project scope includes systems and finishes
- LEED process starts during conceptual design
- The project can meet all of the prerequisites

This Age, what does it demand of me?”

-Joshua Cooper Ramo
The Age of the Unthinkable


12
1
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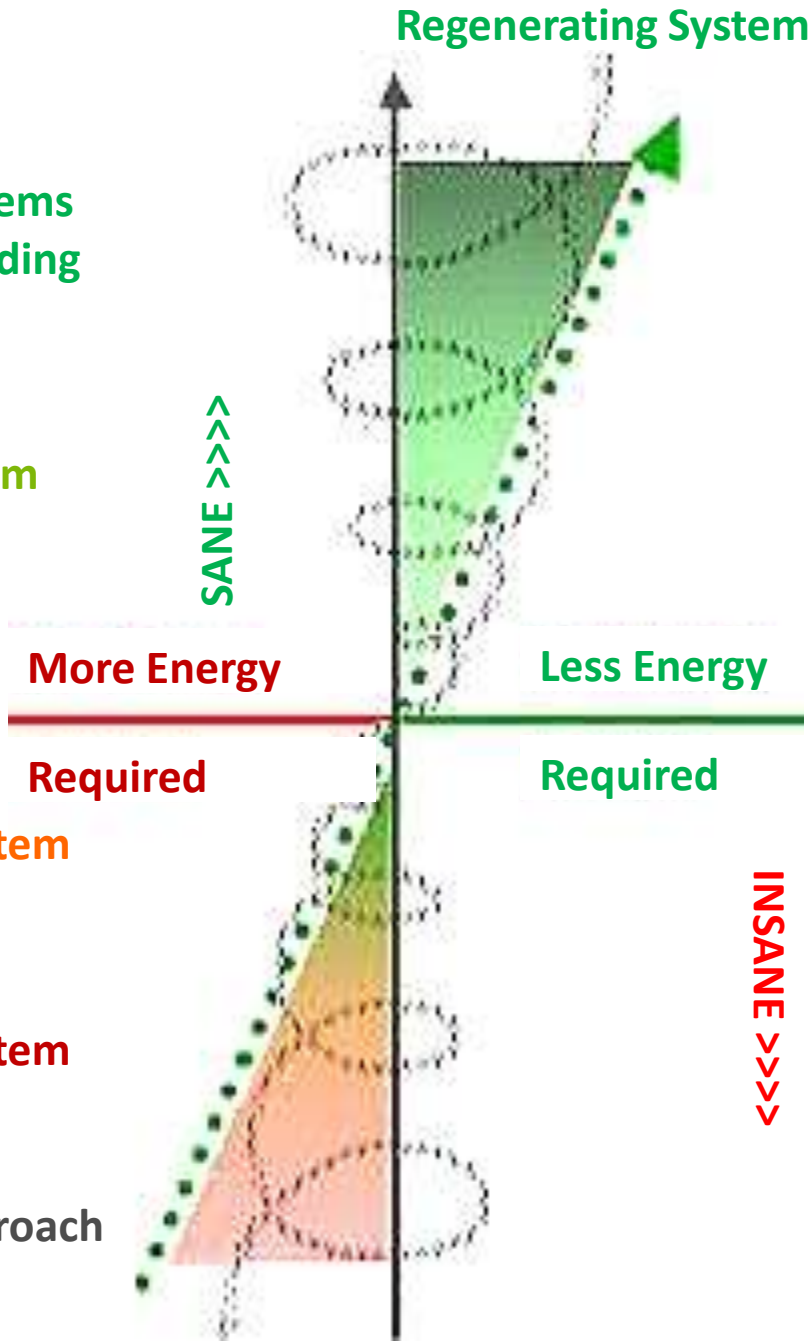
11
The Future is Now

Thank You!

Global Warming Action Matrix

	Action Taken?	
Global Warming is	Yes?	No?
False?	Total Global Economic Cost 1% GGNP (Jeffrey Sachs) Worst Case – Changes cause worldwide economic crisis…Hmm	No problem – But the preponderance of independent scientific consensus indicates that **this scenario is improbable.**
True?	Total Global Economic Cost 1% GGNP (Jeffrey Sachs) Effective action begins the process of arrest and reversal of negative climate impacts! A new clean green economy emerges and prospers	Progressive erosion of natural, social and economic systems, eventually leading to catastrophic collapse The end of the world as we know it… 

Global Warming - Proof



Regenerative Design
Humans intentionally partnering with Nature – Actively Co-Evolving the Whole System

Restorative Design
Humans doing things to Nature – Assisting with the evolution of sub-systems

Sustainable Design
Neutral – "100% less bad" (Wm. McDonough)

Green High Performance Design
Relative Improvement
LEED, Green Globes, BREEM

Conventional System
"One step better than breaking the law" (Croxton)

From: Integrative Design Collaborative

Understanding Green Building

Approach:

- Holistic / systems thinking
- Align Purpose
- Establish a vision + set goals
- Identify opportunities & challenges

Design Team:

- Multidisciplinary (green building expert)
- Include systems consultants from project outset

Collaboration & Tradeoffs:

- Identify synergies between systems, design strategies, & technologies

Integrative Process

Understanding Green Building

Embrace the Process with an Open Mind

It is about Work Well Done, not LEED Points

- Mindset - Owner: Buy-in and long term commitment
  Sustainability Team: attitude, will, persistence
- Process - Integrated, interdisciplinary, all parties engaged early
- Tools - Team management + guidance,
  metrics, benchmarks, modeling programs
- Techniques / Products – Materials and methods

Integrative Process

You can’t do green design ‘to’ someone –
It needs to be done ‘with’ everyone

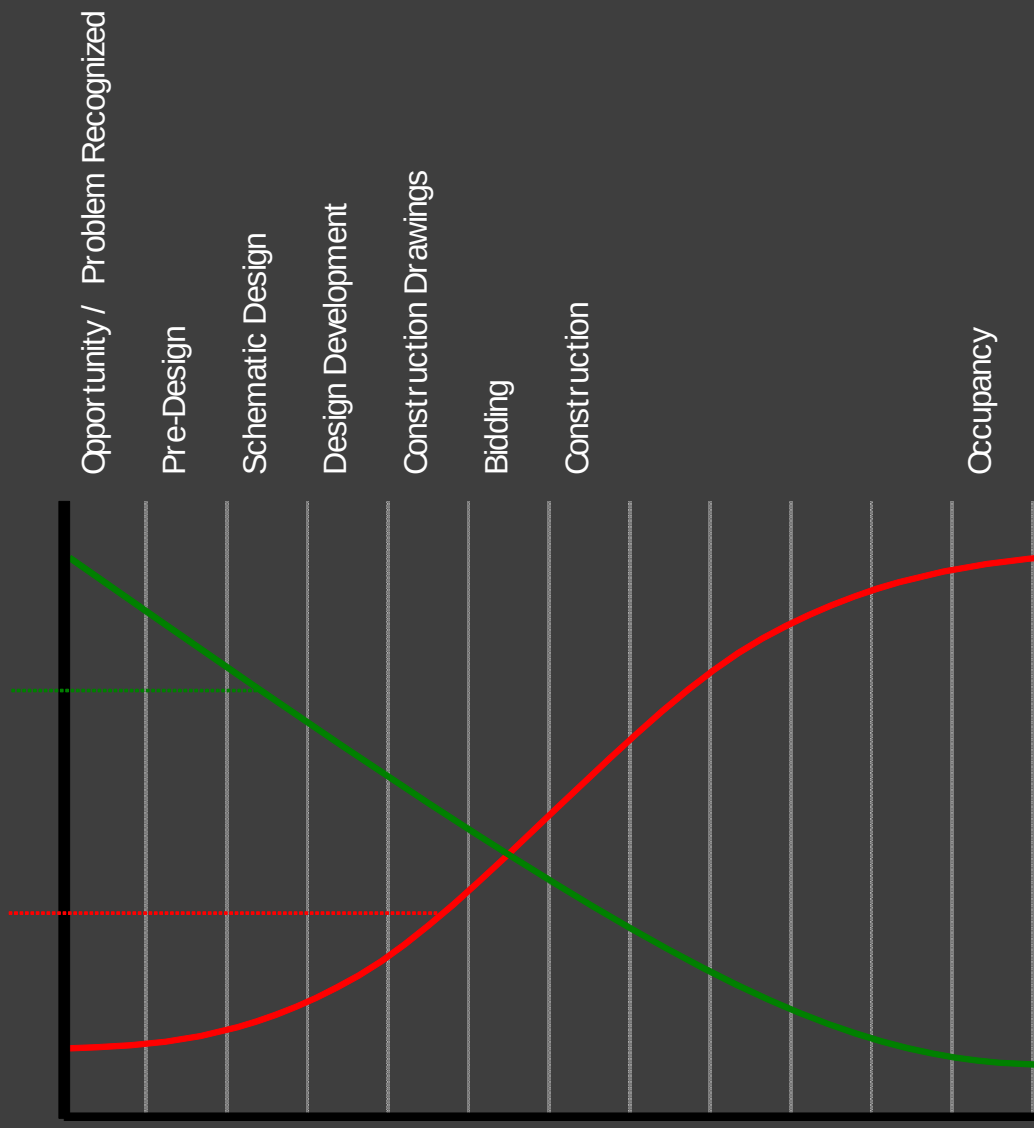
This is about moving from being ‘experts’ to being ‘co-learners’

We need to move from an unacknowledged competitive stance to a genuine cooperative stance.

Instead of stating what you know, introduce what you don’t know.

If you don’t feel insecure doing this work, you’re not doing this work.

Adopt Energy Efficiency and Ecological Design Strategies **Early**



Opportunites for Cost-effective Ecological Design Solutions

Costs raise if Ecological Design Solutions are addressed later in the Design Process

Project
Standard Refrigeration Co. Inc.
San Juan, PR

Owner:
Standard Refrigeration Inc.

Building type:
Office building.

Size:
2-story building
9,500 sq ft

Date of completion:
September 2006

ROI Project:
10 Years
(Energy Savings Pay for Building)

LEED NC 2.1
Platinum

67%
energy savings

55%
water savings

IEQ Focus

90%
spaces with view

Standard Refrigeration has always enjoyed being on the cutting edge of construction.

Their new headquarters was the first building to be classified as **GREEN** in Puerto Rico by the United States Green Building Council, attaining a **Platinum** certification level.

In this world there are only two tragedies. One is not getting what one wants, and the other is getting it.

nature knows no good or evil. It only understands balance and imbalance.

What is a cynic?

A man who knows the price of everything and the value of nothing

Oscar Wilde,