



Cost Benefit Analysis for High Performance Buildings

June 11, 2009

Introduction:

Paul Shahriari

What I do

- ✓ Consulting Services 
- ✓ Technology Development

ecologic³



Member of the US Green Building Council
since 2000

USGBC Faculty Member - retired

Co-Chair of USGBC Greenbuild Steering
Committee

Agenda

Green Marketplace Update

- ✓ Issues & Opportunities
- ✓ Inspiration vs Implementation

Sustainability

- ✓ The Triple Bottom Line
- ✓ The Role of Cost / Benefit Analysis

Tools that make it easy

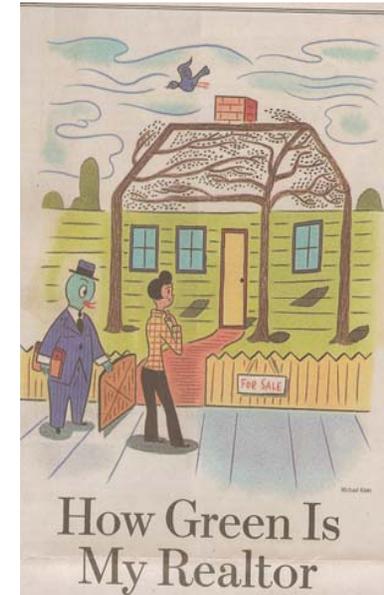
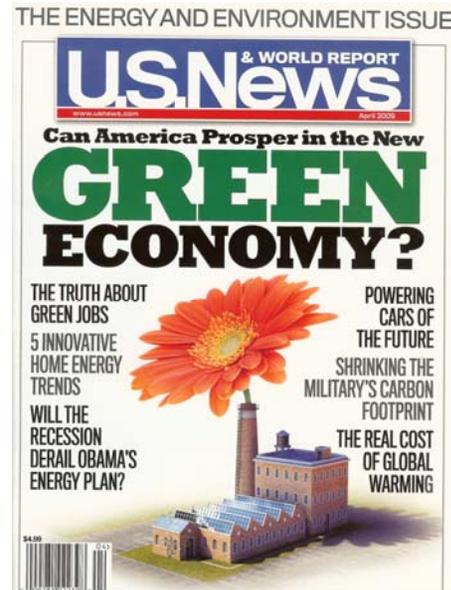
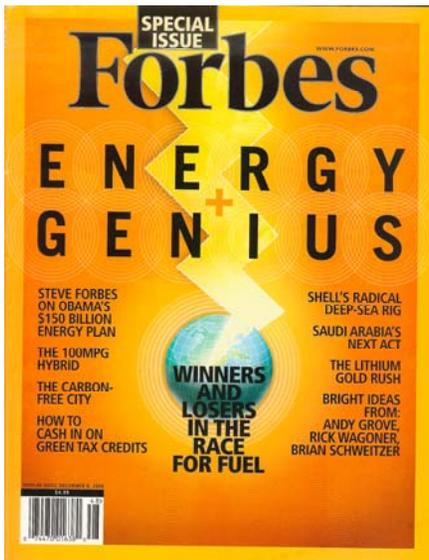
- ✓ Example Analysis

The Sustainability Journey



The Green Marketplace

Media Impact



The Green Marketplace

Political Landscape



Green Building creates
Green Jobs
for a
Green Economy.

New Energy for America

5 Million Green Collar Jobs

A Bold New National Goal on Energy Efficiency

American Energy

[Read the New Energy for America plan](#)

Watch Barack's speech in Lansing, MI on his new energy plan:



VISIT THE ENVIRONMENTALISTS
FOR OBAMA



LEARN MORE ABOUT CLEANTECH FOR OBAMA

The Green Marketplace

Political / Fiscal Landscape

Economic Recovery Bill – \$ 787 Billion

- ✓ Energy Efficiency in existing buildings can generate Billions in savings by 2030, according to McKinsey & Co.

Highlights of the Bill

✓ Green Schools	\$ 53.6	Billion
✓ Green Federal Facilities	\$ 5.55	Billion
✓ Home Weatherization	\$ 5.0	Billion
✓ Energy Efficiency in States & Localities	\$ 3.2	Billion
✓ Public Housing	\$ 4.0	Billion
✓ Retrofitting Assisting Housing	\$ 4.0	Billion
✓ Green Jobs	\$ 3.95	Billion
	\$ 79.3	Billion

Tax Incentives

- ✓ Energy-Efficient Existing homes
- ✓ Renewable Energy Production
- ✓ Treasury grants for energy investment
- ✓ Advanced Energy Investment Tax Credit

The Green Marketplace

Political / Fiscal Landscape

December 26, 2008

- ✓ US DOE announces the award of sixteen new Indefinite Delivery Indefinite Quantity Energy Savings Performance Contracts (ESPCs) that could result in up to \$80 billion in energy efficiency, renewable energy, and water conservation projects at federally owned buildings and facilities.

The 16 Energy service companies: (Max contract \$5B)

- ✓ Ameresco
- ✓ Chevron Energy Solutions
- ✓ Clark Realty Builders
- ✓ Consolidated Edison Solutions
- ✓ Constellation Energy Projects and Services Group
- ✓ Florida Power & Light Energy Service
- ✓ Honeywell International
- ✓ Johnson Controls Government Systems
- ✓ Lockheed Martin Services
- ✓ McKinstry Essention
- ✓ NORESKO
- ✓ Pepco Energy Services
- ✓ Siemens Government Services
- ✓ TAC Energy Solutions
- ✓ The Benham Companies
- ✓ Trane US

The Green Marketplace

A Basic Question: Where are we with Green?

The shape of lights to come? Not everyone's buying it

By Elizabeth Weise
USA TODAY

Their spiral design is a symbol of "going green," the movement to make homes and living more energy-efficient. And sales of compact fluorescent lights, or CFLs, are booming: They made up 20% of the U.S. light bulb market in 2007, the Environmental Protection Agency says, up from 11% a year earlier.

Sales probably will continue rising as traditional incandescent bulbs begin disappearing from stores because of Congress' mandate that light bulbs be at least 25% more efficient by 2012. Wal-Mart, Home Depot, IKEA and other major retailers now sell a range of CFLs, which typically use nearly 75% less energy than regular bulbs.

But now that more people are using CFLs, the bulbs' shortcomings are giving some consumers pause. Consumers are raising concerns about the

Sales booming, but few American homes have a fluorescent bulb

Cover story

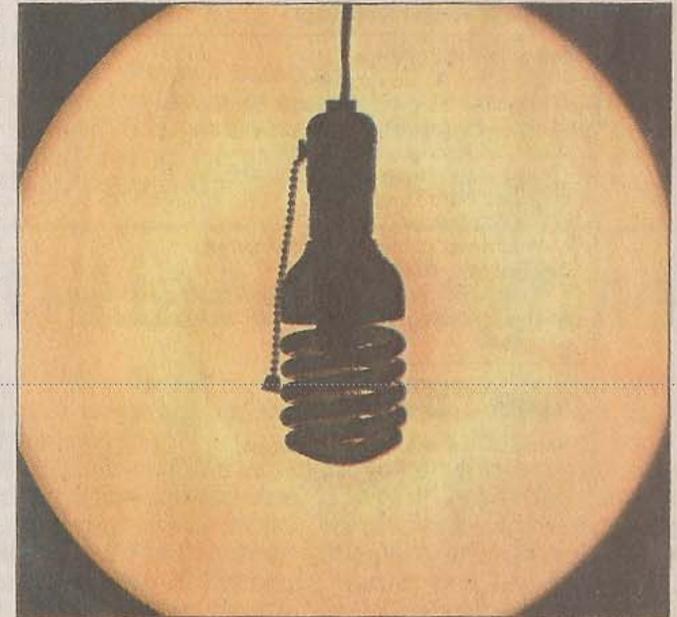
ers are turned off by the cost: \$3 to \$10, compared with about 50 cents for regular bulbs. Meanwhile, retailers such as IKEA are setting up recycling programs in response to concerns about how to dispose of CFLs, which contain mercury and could pose a health hazard if they break and are not cleaned up properly.

Such drawbacks help explain why, even though one in five bulbs sold in the USA is now a compact fluorescent, a lower percentage of American homes — estimates run as low as 11% — have at least one of the bulbs.

quality of light from such bulbs and say they often don't work well with dimmer switches, in certain light fixtures or in hot or cold conditions.

And although fluorescent bulbs are less expensive to use in the long run, some consum-

Please see COVER STORY next page ▶

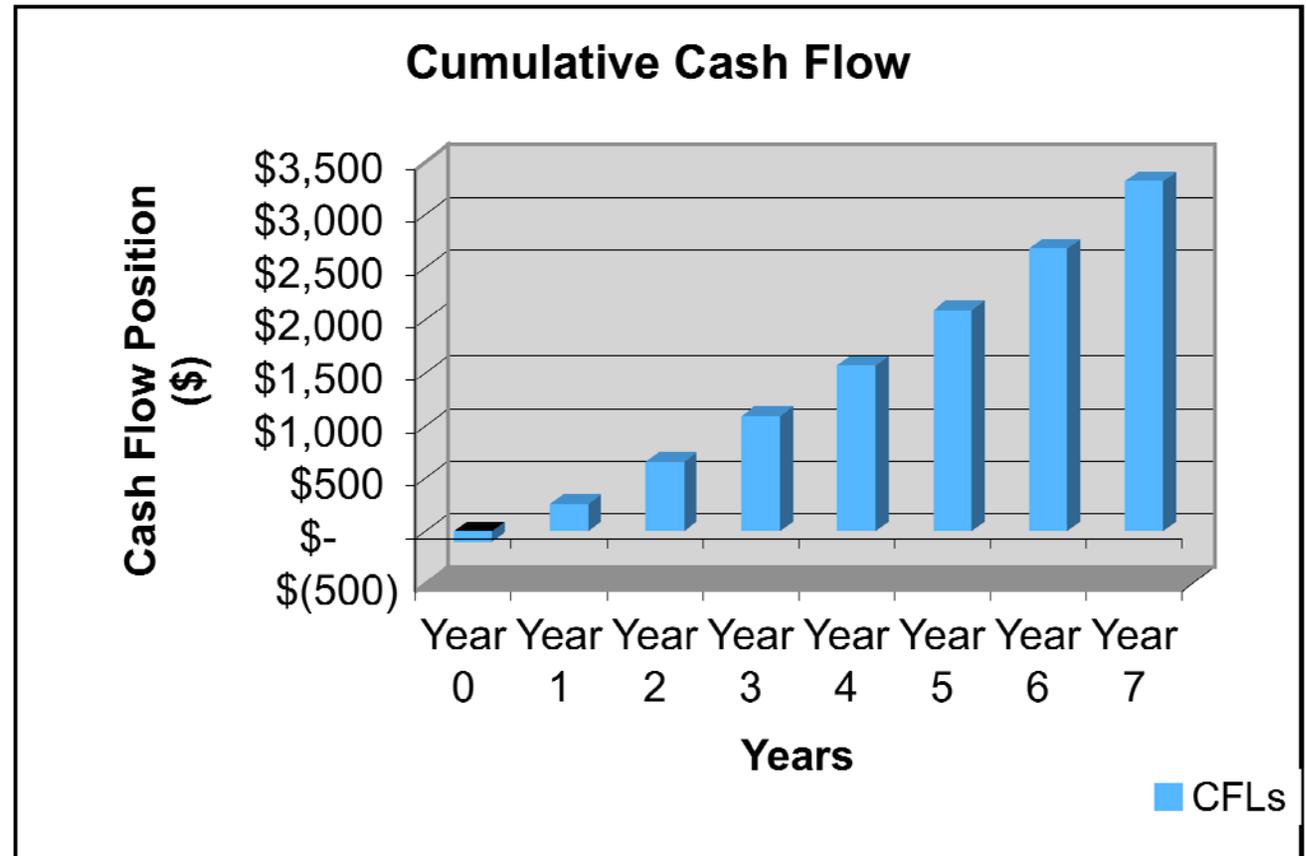


By Robert Hanashiro, USA TODAY

The Green Marketplace

A Different View

Energy Savings from CFL		
Energy Inflation Rate	10%	
	Monthly Savings	Yearly Savings
Year 1	\$30	\$360
Year 2	\$33	\$396
Year 3	\$36	\$436
Year 4	\$40	\$479
Year 5	\$44	\$527
Year 6	\$48	\$580
Year 7	\$53	\$638
Total Savings		\$3,415



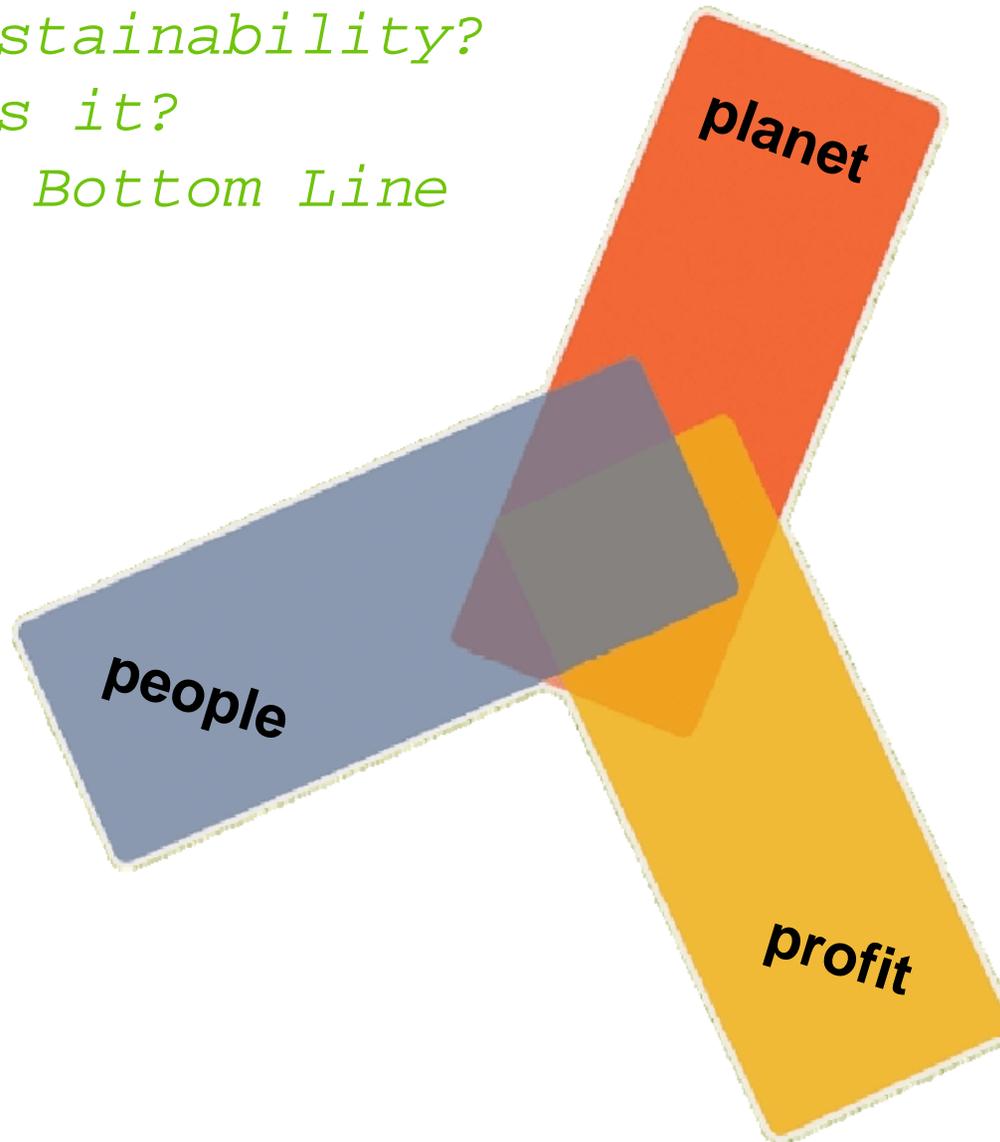
*125,000,000 Households in US doing this.....
 \$426,875,000,000 saved or spent on better things
 ROI of this investment 3415%*

Client Perspectives on Green Implementation

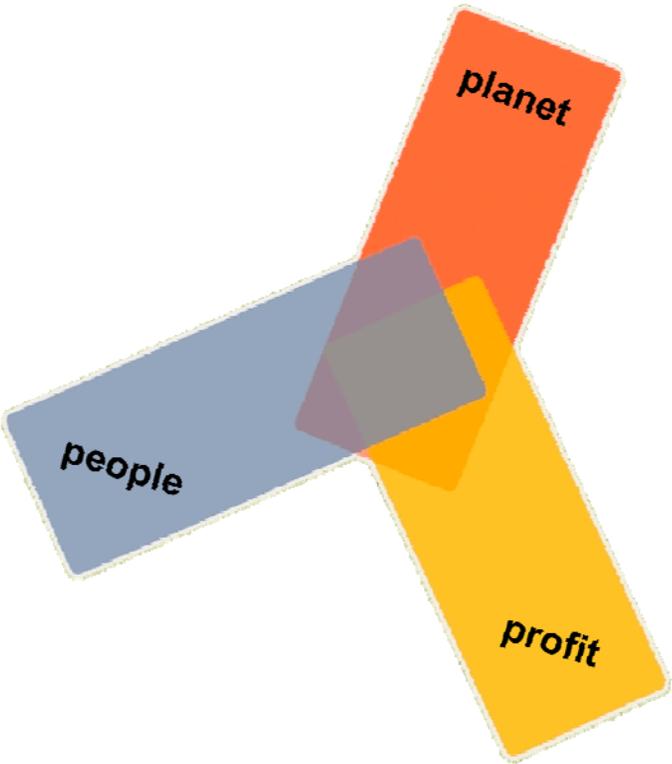
What is Sustainability?

Who defines it?

The Triple Bottom Line



Organizations defining their goals



The Team and their projects



architect



engineer



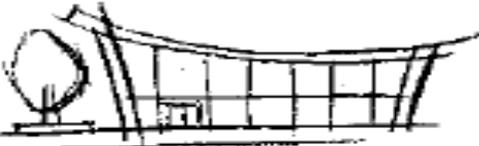
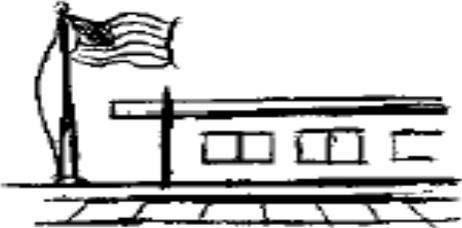
consultant



construction manager

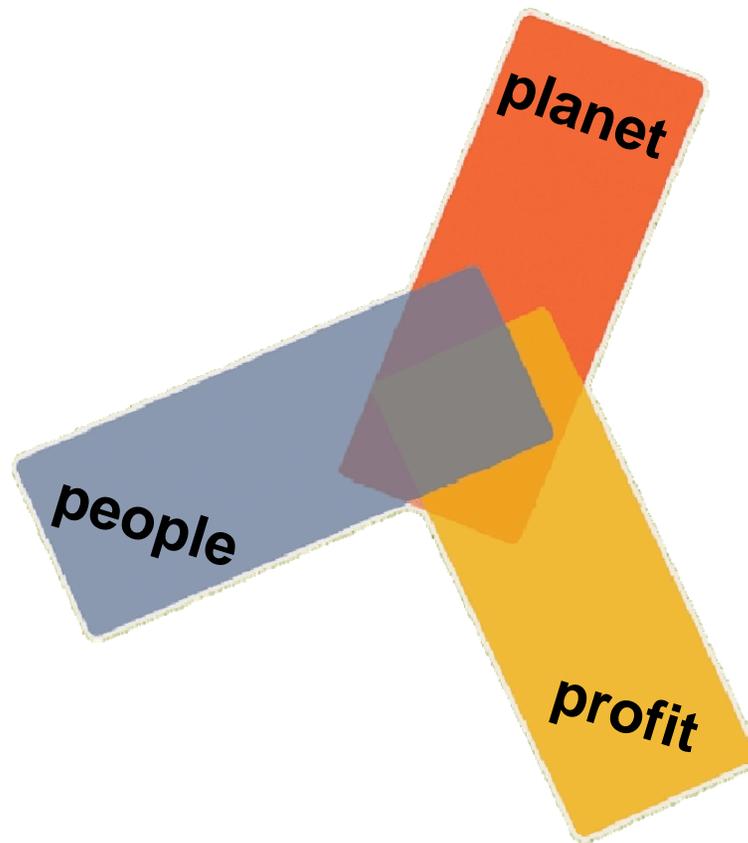


facility manager



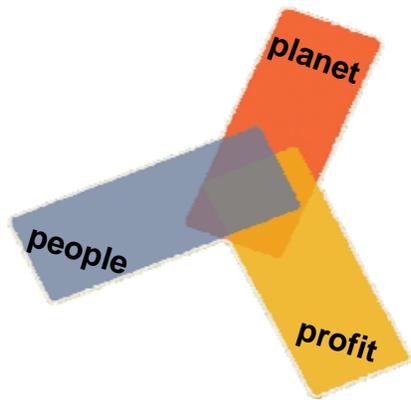
What the Future Holds?

Several observations and thoughts

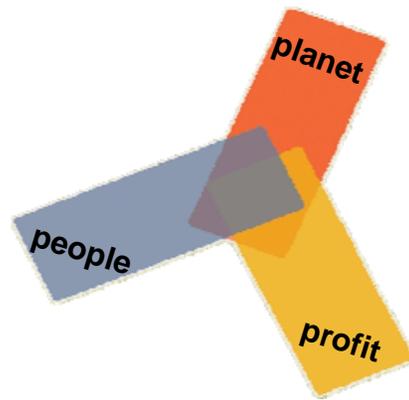


What the Future Holds?

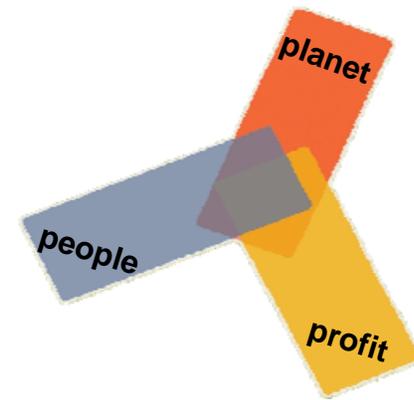
Align your offering with your customer's needs



*Organizations /
People*



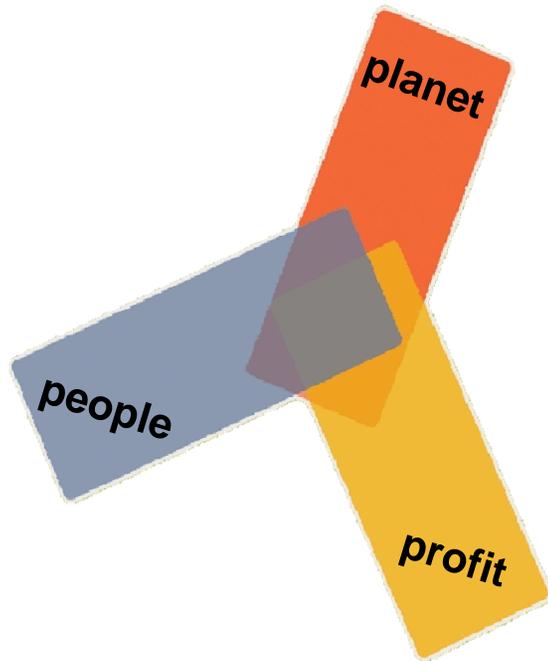
*Projects /
Purchases*



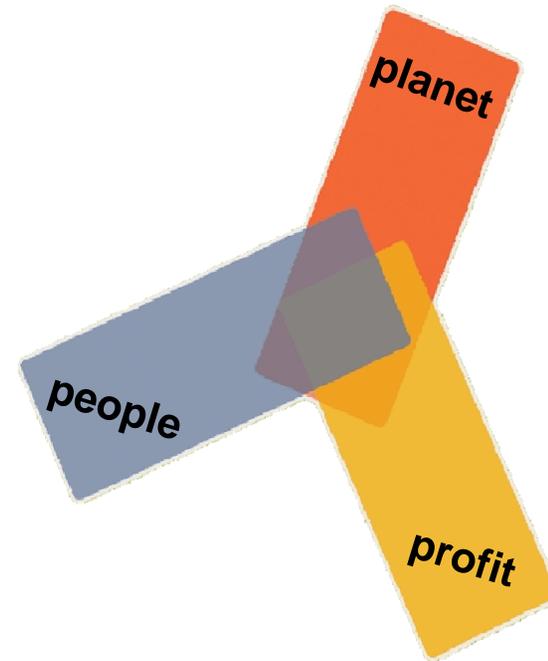
*Products /
Services*

What the Future Holds?

Align your offering with your customer's needs



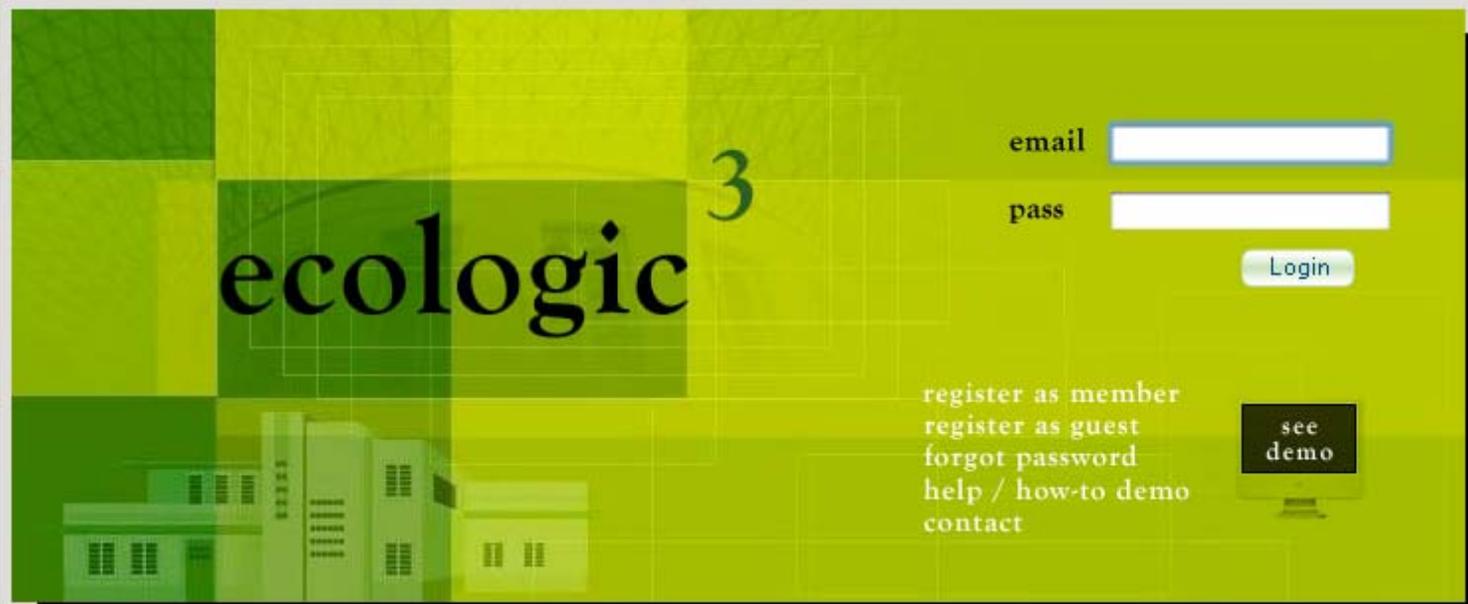
*Your Client's
Need*



*Your Products /
Services*

Align with your customer needs

LEED Cost/Benefit Analysis



email

pass

Login

register as member
register as guest
forgot password
help / how-to demo
contact

see demo

news

welcome to ecologic3, the only commercially available software package that allows project teams from across the world to collaborate in the analysis of the LEED-NC rating system and the various levels of certification.

ecologic3 creates a path through the USGBC's LEED system credit by credit as if lead by a virtual consultant. Creating a collaborative environment in which all participants contribute to the green building process no matter where in the world they are. Show users the cost/benefit analysis of building green and allows users to define the variables in addition to life cycle values.

ecologic3 is a solution for owners, developers, architects, engineers and construction professionals.

ecologic3 is no longer available for individual license purchase. All current license holders will be supported through the end of your contract terms. The platform is available for vertical application licensing/purchase. The following licenses are available: Real Estate Brokerage, Development, Architecture, Engineering, Construction, Manufacturing.

ecologic3 is a technology partner of the USGBC.

ALIGN WITH YOUR CUSTOMER needs

LEED Cost / Benefit Analysis

Subtotals - LEED Credit Cost Summary \$ 447,935.00 \$ 1,275.00 \$ 750.00 \$ 9,334,007.00 \$ 9,783,967.00

Credit Description		Architectural Design Work	Engineering Design Work	Consulting Design Work	Construction Cost Impact	Subtotal
Sustainable Sites						
Prereq 1	Construction Activity Pollution Prevention	\$ 0.00	\$ 0.00	\$ 0.00	\$ 0.00	\$ 0.00
Credit 1	Site Selection	\$ 30,000.00	\$ 0.00	\$ 0.00	\$ 30,000.00	\$ 60,000.00
Credit 2	Development Density & Community Connectivity	\$ 0.00	\$ 0.00	\$ 0.00	\$ 0.00	\$ 0.00
Credit 3	Brownfield Redevelopment	\$ 6,000.00	\$ 0.00	\$ 0.00	\$ 100,000.00	\$ 106,000.00
Credit 4.1	Alternative Transportation: Public Transportation Access	\$ (2,700.00)	\$ 0.00	\$ 0.00	\$ 0.00	\$ (2,700.00)
Credit 4.2	Alternative Transportation: Bicycle Storage & Changing Rooms	\$ 11,936.00	\$ 0.00	\$ 0.00	\$ 198,940.00	\$ 210,876.00
Credit 4.3	Alternative Transportation: Low Emitting & Fuel Efficient Vehicles	\$ 8,770.00	\$ 0.00	\$ 0.00	\$ 146,160.00	\$ 154,930.00
Credit 4.4	Alternative Transportation, Parking Capacity	\$ 0.00	\$ 0.00	\$ 0.00	\$ 300.00	\$ 300.00
Credit 5.1	Site Development, Protect or Restore Habitat	\$ (3,000.00)	\$ 0.00	\$ 0.00	\$ (50,000.00)	\$ (53,000.00)
Credit 5.2	Site Development, Maximize Open Space	\$ 0.00	\$ 0.00	\$ 0.00	\$ (10,000.00)	\$ (10,000.00)
Credit 6.1	Stormwater Design, Quantity Control	\$ 1,560.00	\$ 0.00	\$ 0.00	\$ 26,000.00	\$ 27,560.00
Credit 6.2	Stormwater Design, Quality Control	\$ 3,000.00	\$ 0.00	\$ 0.00	\$ 50,000.00	\$ 53,000.00
Credit 7.1	Heat Island Effect, Non-Roof	\$ 0.00	\$ 0.00	\$ 0.00	\$ 93,333.00	\$ 93,333.00
Credit 7.2	Heat Island Effect, Roof	\$ 0.00	\$ 0.00	\$ 0.00	\$ 1,500.00	\$ 1,500.00
Credit 8	Light Pollution Reduction	\$ 0.00	\$ 0.00	\$ 0.00	\$ 14,875.00	\$ 14,875.00
Water Efficiency						
Credit 1.1	Water Efficient Landscaping, Reduce by 50%	\$ 1,000.00	\$ 0.00	\$ 0.00	\$ 0.00	\$ 1,000.00
Credit 1.2	Water Efficient Landscaping, No Potable Use or No Irrigation	\$ 0.00	\$ 0.00	\$ 0.00	\$ 0.00	\$ 0.00
Credit 2	Innovative Wastewater Technologies	\$ 750.00	\$ 1,275.00	\$ 750.00	\$ 4,000.00	\$ 6,775.00
Credit 3.1	Water Use Reduction, 20% Reduction	\$ 0.00	\$ 0.00	\$ 0.00	\$ 0.00	\$ 0.00
Credit 3.2	Water Use Reduction, 30% Reduction	\$ 0.00	\$ 0.00	\$ 0.00	\$ 0.00	\$ 0.00
Energy & Atmosphere						
Prereq 1	Fundamental Commissioning of the Building Energy Systems	\$ 0.00	\$ 0.00	\$ 0.00	\$ 125,000.00	\$ 125,000.00
Prereq 2	Minimum Energy Performance	\$ 0.00	\$ 0.00	\$ 0.00	\$ 0.00	\$ 0.00
Prereq 3	Fundamental Refrigerant Management	\$ 0.00	\$ 0.00	\$ 0.00	\$ 0.00	\$ 0.00
Credit 1.1	Optimize Energy Performance	\$ 1,134.00	\$ 0.00	\$ 0.00	\$ 18,900.00	\$ 20,034.00
Credit 1.2	Optimize Energy Performance	\$ 1,862.00	\$ 0.00	\$ 0.00	\$ 31,033.00	\$ 32,895.00
Credit 1.3	Optimize Energy Performance	\$ 2,698.00	\$ 0.00	\$ 0.00	\$ 44,966.00	\$ 47,664.00
Credit 1.4	Optimize Energy Performance	\$ 3,480.00	\$ 0.00	\$ 0.00	\$ 58,000.00	\$ 61,480.00
Credit 1.5	Optimize Energy Performance	\$ 3,480.00	\$ 0.00	\$ 0.00	\$ 58,000.00	\$ 61,480.00
Credit 1.6	Optimize Energy Performance	\$ 5,700.00	\$ 0.00	\$ 0.00	\$ 95,000.00	\$ 100,700.00
Credit 1.7	Optimize Energy Performance	\$ 5,700.00	\$ 0.00	\$ 0.00	\$ 95,000.00	\$ 100,700.00
Credit 1.8	Optimize Energy Performance	\$ 22,740.00	\$ 0.00	\$ 0.00	\$ 379,000.00	\$ 401,740.00
Credit 1.9	Optimize Energy Performance	\$ 7,920.00	\$ 0.00	\$ 0.00	\$ 132,000.00	\$ 139,920.00
Credit 1.10	Optimize Energy Performance	\$ 7,920.00	\$ 0.00	\$ 0.00	\$ 132,000.00	\$ 139,920.00
Credit 2.1	On-Site Renewable Energy	\$ 10,000.00	\$ 0.00	\$ 0.00	\$ 300,000.00	\$ 310,000.00
Credit 2.2	On-Site Renewable Energy	\$ 5,000.00	\$ 0.00	\$ 0.00	\$ 900,000.00	\$ 905,000.00
Credit 2.3	On-Site Renewable Energy	\$ 5,000.00	\$ 0.00	\$ 0.00	\$ 1,500,000.00	\$ 1,505,000.00
Credit 3	Enhanced Commissioning	\$ 0.00	\$ 0.00	\$ 0.00	\$ 0.00	\$ 0.00
Credit 4	Enhanced Refrigerant Management	\$ 0.00	\$ 0.00	\$ 0.00	\$ 0.00	\$ 0.00
Credit 5	Measurement & Verification	\$ 2,400.00	\$ 0.00	\$ 0.00	\$ 40,000.00	\$ 42,400.00
Credit 6	Green Power	\$ 0.00	\$ 0.00	\$ 0.00	\$ 100,000.00	\$ 100,000.00

Align with your customer needs

LEED ecologic³



Work Space | **Summaries** | Financials | Tasks | Reports | Project Admin | My Profile | Help | Logout

Credit Status Summary | Credit Cost Summary | **Credit Benefit Summary** | Credit Impact Summary

Project Name: GreenBuild 06 Demo
LEED NC 2.2

Welcome Paul Shahriari



Credit Benefits Summary

General Benefits

Marketing / PR value \$

LEED Cost Rebate (If Applicable) \$

Length of Analysis

Type of value to be calculated

[View Table](#)

Category

Credit Description	Type of Savings	Year 1 Benefits Value	Benefit value based on 10 years	Return on Investment
Sustainable Sites				
Prereq 1 Construction Activity Pollution Prevention		\$ 0.00	\$ 0.00	0.00%
Credit 1 Site Selection		\$ 0.00	\$ 0.00	0.00%
Credit 2 Development Density & Community Connectivity		\$ 0.00	\$ 0.00	0.00%
Credit 3 Brownfield Redevelopment		\$ 0.00	\$ 0.00	0.00%
Credit 4.1 Alternative Transportation: Public Transportation Access		\$ 0.00	\$ 0.00	0.00%
Credit 4.2 Alternative Transportation: Bicycle Storage & Changing Rooms		\$ 0.00	\$ 0.00	0.00%
Credit 4.3 Alternative Transportation: Low Emitting & Fuel Efficient Vehicles		\$ 0.00	\$ 0.00	0.00%
Credit 4.4 Alternative Transportation, Parking Capacity	MCR	\$ 5,000.00	\$ 54,748.60	18,249.53%
Credit 5.1 Site Development, Protect or Restore Habitat		\$ 0.00	\$ 0.00	0.00%
Credit 5.2 Site Development, Maximize Open Space		\$ 0.00	\$ 0.00	0.00%
Credit 6.1 Stormwater Design, Quantity Control		\$ 0.00	\$ 0.00	0.00%
Credit 6.2 Stormwater Design, Quality Control		\$ 0.00	\$ 0.00	0.00%
Credit 7.1 Heat Island Effect, Non-Roof		\$ 0.00	\$ 0.00	0.00%
Credit 7.2 Heat Island Effect, Roof	EUR	\$ 10,200.00	\$ 128,294.50	8,552.97%
Credit 8 Light Pollution Reduction		\$ 0.00	\$ 0.00	0.00%
Water Efficiency				
Credit 1.1 Water Efficient Landscaping, Reduce by 50%	WUR	\$ 1,200.00	\$ 13,139.67	1,313.97%
Credit 1.2 Water Efficient Landscaping, No Potable Use or No Irrigation	WUR	\$ 2,400.00	\$ 26,279.33	437.99%
Credit 2 Innovative Wastewater Technologies	MCR,WUR	\$ 4,800.00	\$ 52,558.66	775.77%
Credit 3.1 Water Use Reduction, 20% Reduction	WUR	\$ 2,400.00	\$ 26,279.33	840.94%
Credit 3.2 Water Use Reduction, 30% Reduction	WUR	\$ 6,000.00	\$ 65,698.33	328.49%

Align with your customer needs

LEED ecologic³



- Work Space
- Summaries
- Financials
- Tasks
- Reports
- Project Admin
- My Profile
- Help
- Logout

- Credit Status Summary
- Credit Cost Summary
- Credit Benefit Summary
- Credit Impact Summary

Project Name: GreenBuild 06 Demo
LEED NC 2.2

Welcome Paul Shahriari



Credit Impact Summary

Category: All

Subtotals - LEED Credit Impact Summary \$ 449,960.00 \$ 9,363,132.00 \$ 3,094,822.18

C	S	G	P	N	Credits	Design/ Engineering/Consulting related Credit Cost Impacts	Construction related Credit First Cost Impacts	Benefit value based on 10 years	Return on Investment	User Comments
25	38	51	68	1	Certified - 26 - 32 points, Silver - 33 - 38 points, Gold - 39 - 51 points, Platinum - 52 or more points					
Sustainable Sites										
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Prereq 1 Construction Activity Pollution Prevention	\$ 0.00	\$ 0.00	\$ 0.00	0.00%	
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Credit 1 Site Selection	\$ 30,000.00	\$ 30,000.00	\$ 0.00	0.00%	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Credit 2 Development Density & Community Connectivity	\$ 0.00	\$ 0.00	\$ 0.00	0.00%	
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Credit 3 Brownfield Redevelopment	\$ 6,000.00	\$ 100,000.00	\$ 0.00	0.00%	
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Credit 4.1 Alternative Transportation: Public Transportation Access	\$ (2,700.00)	\$ 0.00	\$ 0.00	0.00%	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Credit 4.2 Alternative Transportation: Bicycle Storage & Changing Rooms	\$ 11,936.00	\$ 198,940.00	\$ 0.00	0.00%	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Credit 4.3 Alternative Transportation: Low Emitting & Fuel Efficient Vehicles	\$ 8,770.00	\$ 146,160.00	\$ 0.00	0.00%	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Credit 4.4 Alternative Transportation, Parking Capacity	\$ 0.00	\$ 300.00	\$ 54,748.60	18,249.53%	
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Credit 5.1 Site Development, Protect or Restore Habitat	\$ (3,000.00)	\$ (50,000.00)	\$ 0.00	0.00%	
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Credit 5.2 Site Development, Maximize Open Space	\$ 0.00	\$ (10,000.00)	\$ 0.00	0.00%	
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Credit 6.1 Stormwater Design, Quantity Control	\$ 1,560.00	\$ 26,000.00	\$ 0.00	0.00%	
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Credit 6.2 Stormwater Design, Quality Control	\$ 3,000.00	\$ 50,000.00	\$ 0.00	0.00%	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Credit 7.1 Heat Island Effect, Non-Roof	\$ 0.00	\$ 93,333.00	\$ 0.00	0.00%	
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Credit 7.2 Heat Island Effect, Roof	\$ 0.00	\$ 1,500.00	\$ 128,294.50	8,552.97%	
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Credit 8 Light Pollution Reduction	\$ 0.00	\$ 14,875.00	\$ 0.00	0.00%	

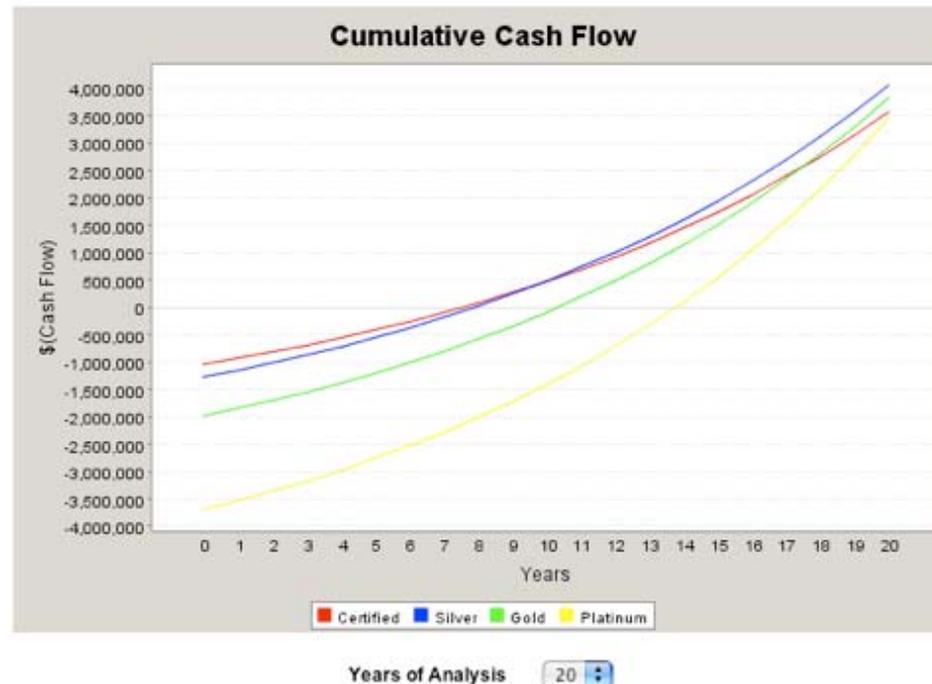
Align with your customer needs

LEED ecologic³

The screenshot shows the Ecologic3 software interface. At the top, there is a navigation bar with tabs for 'Work Space', 'Summaries', 'Financials', 'Tasks', and 'Reports'. Below this is a sub-menu with 'Annual Cash Flow', 'Cumulative Cash Flow', 'Net Present Value', and 'Annual Cash Flow Analysis By Credit'. The main content area displays the project name 'GreenBuild 06 Demo' and 'LEED NC 2.2'. A welcome message 'Welcome Paul Shahriari' is visible. On the right, there are three small image thumbnails showing office equipment.

Cumulative Cash Flow Graph

Definition: Cumulative Cash Flow is the value of an investment (measured in terms of the cash you will put into and receive from it) adjusted for the time value of money. In Ecologic3 the first costs associated with the 4 levels of LEED Certification are totaled together in Year 0. The \$ values in subsequent years are subtotal of the previous year's cash flow position and that year's benefit value.



What the Future Holds?

Align your offering with your customer's needs

Invented for life  **BOSCH**

Green **thinking**
Bosch and the environment

Energy Savings Calculator

Below are the results of your energy savings analysis based on your product choice, energy and water costs and predicted use of the appliance. You can change your selection by clicking the "Change Products" button below to discover how efficient the entire line of Bosch appliances is.

Integra® 800 Series Dishwasher



Estimates for dishwasher model: SHX98M05UC

Energy use per load: 0.88 kWh
Energy cost per load: \$0.22

Savings over standard dishwashers per year:
\$53.17

Using this *dishwasher* 7 times a week, you will save...

	Per Load	Per Week	Per Month	Per Year	Lifetime ¹
Standard Cost ²	\$0.31	\$2.19	\$9.55	\$114.61	\$1375.35
Bosch Average Cost	\$0.16	\$1.17	\$5.11	\$61.43	\$737.20
Total Savings	\$0.14	\$1.01	\$4.43	\$53.17	\$638.151

¹ Lifetime savings based on an average appliance lifespan of 12 years.

² Standard energy and water consumption based on DOE 2005 standard usage figures.

Savings calculated using an energy cost of \$0.14/kWh and a water cost of \$0.005/gal.

Nexxt 800 Series Washer



Estimates for washer model: WFMC8400UC

Energy use per load: 0.46 kWh
Water use per load: 13.24

Energy cost per load: \$0.06
Water cost per load: \$0.06
Savings over standard washers per year: \$55.22

Using this *washer* 7 times a week, you will save...

	Per Load	Per Week	Per Month	Per Year	Lifetime ¹
Standard Cost ²	\$0.31	\$2.19	\$9.55	\$114.61	\$1375.35
Bosch Average Cost	\$0.16	\$1.13	\$4.94	\$59.38	\$712.66
Total Savings	\$0.15	\$1.05	\$4.60	\$55.22	\$662.695

¹ Lifetime savings based on an average appliance lifespan of 12 years.

² Standard energy and water consumption based on DOE 2005 standard usage figures.

Savings calculated using an energy cost of \$0.14/kWh and a water cost of \$0.005/gal.

The Lunera Marketplace – A

project

Sustainable Lighting Summary

eBay Data Center Utah

4/11/09



Project Summary

Total Project Costs	\$36,400	
Total Area	13,272	SF
Electricity Costs	0.05	\$/kWhr
Electricity Escalation Rate	5%	Yearly APR
Total Operating Hours (8hrs x 365)	2,920	Hours/year
Analysis Duration	10	Years

Economic Summary

ROI Year 1	43%	
ROI Year 2	91%	
ROI Year 3	136%	
Payback with accelerated depreciation	2.34	Years
Lighting Energy Cost Saving %	62%	
Total Operating Cost Savings %	82%	

LEED Summary

LEED Credit Point Potential	1-5	Based on LEED NC 2009
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Sustainability Summary

Estimated Carbon Emission Reduction	316	Tons over 10 years
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What the Future Holds?

The Future of Green Development - Lessons from the UAE



SEE WHAT WE ARE BUILDING



- Palm Jumeirah
- Palm Jebel Ali
- Palm Deira
- The World
- Waterfront
- Jumeirah Islands
- Jumeirah Village
- Jumeirah Park
- Jumeirah Heights

- Ibn Battuta Mall
- Discovery Gardens
- International City
- The Gardens
- Al Furjan
- Dragon Mart
- Dubai Promenade
- Mina Rashid
- The Universe

What the Future Holds?

The Future of Green Development - Lessons from the UAE



Window Design Sustainability Worksheet

Created By: Paul Shahriari

Assumptions for Villas:

Estimated Energy Consumption kWh / SF	5.75
Estimated Electrical Cost per \$/kWh	0.025

User Input
System Calc

Monthly Impact Analysis based on 14 villas of each type being built

								
	Central Pool Spanish	Grand Courtyard Mediterranean	Grand Lobby Mediterranean	Great Rotunda European	Grand Staircase Mediterranean	Gallery View European	Gallery View Mediterranean	Central Garden Villa
Gross Building Area for a single villa (sf)	9,337	8,627	8,761	8,404	8,759	9,669	9,326	8,524
Gross Building Area for 14 villas of this type (sf)	130,718	120,778	122,654	117,656	122,626	135,366	130,564	119,336
Estimated Monthly Energy Consumption (kWh)	751,629	694,474	705,261	676,522	705,100	778,355	750,743	686,182
Estimated Monthly Electrical Cost (\$)	\$18,791	\$17,362	\$17,632	\$16,913	\$17,627	\$19,459	\$18,769	\$17,155
Estimated Energy Conservation ¹ (kWh/Month)	-150,326	-138,895	-141,052	-135,304	-141,020	-155,671	-150,149	-137,236
Estimated Energy Cost Conservation (\$/Month)	-\$3,758	-\$3,472	-\$3,526	-\$3,383	-\$3,525	-\$3,892	-\$3,754	-\$3,431
Estimated Green House Gases Reduction ² (kg CO ₂ /Month)	-37,581	-34,724	-35,263	-33,826	-35,255	-38,918	-37,537	-34,309

Note¹: Energy Savings estimated at 20% overall reduction as a result of Pella Windows

Note²: It is estimated that 250g of CO₂ is generated by the production of 1kWh of electricity in Dubai

What the Future Holds?

The Future of Green Development - Lessons from the UAE

Nakheel Development Review

Monthly Impact Analysis for developments listed below

						
	Jumeirah Point Villas	Palm Deira	Palm Jebel Ali	Dubai Waterfront	The Universe	The World
# of Units	112	3500	3000	3000	2000	750
Gross Building Area for a single villa (sf)	Actual area used	8,500	8,500	8,500	8,500	8,500
Gross Building Area for 14 villas of this type (sf)	999,698	29,750,000	25,500,000	25,500,000	17,000,000	6,375,000
Estimated Monthly Energy Consumption (kWh)	5,748,264	171,062,500	146,625,000	146,625,000	97,750,000	36,656,250
Estimated Monthly Electrical Cost (\$)	\$143,707	\$4,276,563	\$3,665,625	\$3,665,625	\$2,443,750	\$916,406
Estimated Energy Conservation¹ (kWh/Month)	120,893,403					
Estimated Energy Cost Conservation (\$/Month)	\$3,022,335					
Estimated Green House Gases Reduction² (kg CO²/Month)	30,223,351					

What the Future Holds?

The Future of Green Development - Lessons from the UAE

Nakheel Development Review

Lifetime Impact Analysis

					
Jumeirah Point Villas	Palm Deira	Palm Jebel Ali	Dubai Waterfront	The Universe	The World

Estimated Lifetime Energy Conservation kWh	36,268,020,810
Estimated Lifetime Energy Cost Conservation	\$2,465,422,496
Estimated Lifetime Green House Gases Reduction kg CO₂	9,067,005
Value of CO₂ on carbon market	\$181,340,104

Project

Practical projects proving the business case for Green



Florida High Performance Green House

A practical showcase for green design, construction, technology and materials



Project

Proving the business case for Green is going to

Project Floorplan



Current Sponsors

- **Bosch Home Appliances** – Kitchen Suite
- **Lunera LED Lighting**
- **Armstrong Flooring** – Wood & Linoleum
- **The Mohawk Group** – Ceramic Tile
- **The Tapco Group** – Siding & Shutters
- **Steelcase** – Home Office Furniture
- **El: environmental language** - Furniture
- **Ceramic Tiles of Italy** – Ceramic Tiles
- **Kohler** – Plumbing Fixtures
- **KraftMaid** – Cabinetry
- **Windows** – Kolbe & Kolbe
- **Electrical Contractor** – Corporate Electric
- **Structural Insulated Panels** – SIPS Team USA



Project

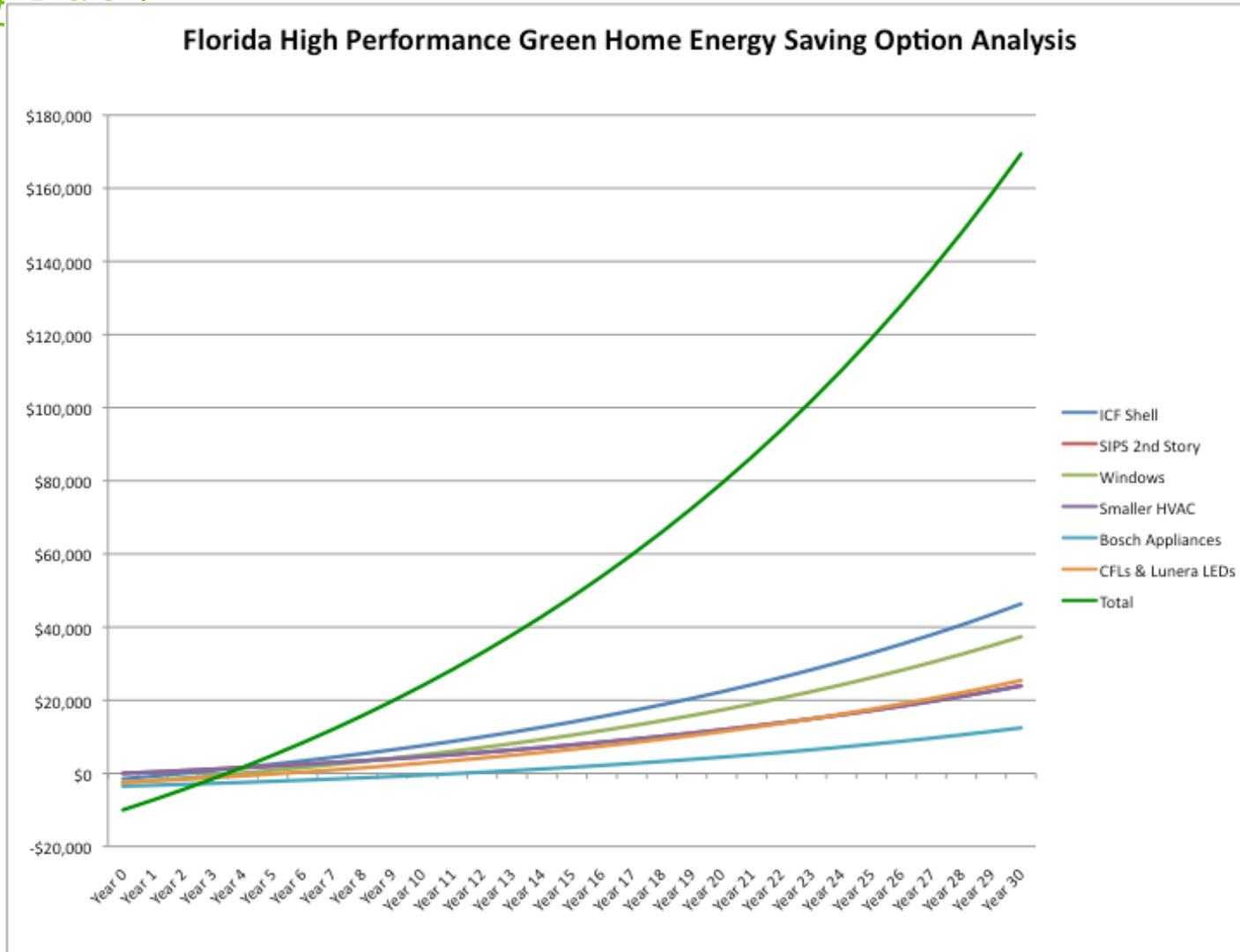
Proving the business case for Green is going to be critical

Florida High Performance Green House Operating Costs Savings							
Energy Cost Inflation Estimate	5%						
	ICF Shell	SIPS 2nd Story	Windows	Smaller HVAC	Bosch Appliances	CFLs & Lunera LEDs	Total
Monthly Cost Savings	\$ 60	\$ 30	\$ 50	\$ 30	\$ 20	\$ 35	\$ 225
Yearly Cost Savings	ICF Shell	SIPS 2nd Story	Windows	Smaller HVAC	Bosch Appliances	CFLs & Lunera LEDs	Total
First Cost Impact	-\$1,500	\$0	-\$2,500	\$0	-\$3,500	-\$2,500	-\$10,000
Year 1	\$720	\$360	\$600	\$360	\$240	\$420	\$2,700
Year 2	\$756	\$378	\$630	\$378	\$252	\$441	\$2,835
Year 3	\$794	\$397	\$662	\$397	\$265	\$463	\$2,977
Year 4	\$833	\$417	\$695	\$417	\$278	\$486	\$3,126
Year 5	\$875	\$438	\$729	\$438	\$292	\$511	\$3,282
Year 6	\$919	\$459	\$766	\$459	\$306	\$536	\$3,446
Year 7	\$965	\$482	\$804	\$482	\$322	\$563	\$3,618
Year 8	\$1,013	\$507	\$844	\$507	\$338	\$591	\$3,799
Year 9	\$1,064	\$532	\$886	\$532	\$355	\$621	\$3,989
Year 10	\$1,117	\$558	\$931	\$558	\$372	\$652	\$4,189
Year 11	\$1,173	\$586	\$977	\$586	\$391	\$684	\$4,398
Year 12	\$1,231	\$616	\$1,026	\$616	\$410	\$718	\$4,618
Year 13	\$1,293	\$647	\$1,078	\$647	\$431	\$754	\$4,849
Year 14	\$1,358	\$679	\$1,131	\$679	\$453	\$792	\$5,091
Year 15	\$1,426	\$713	\$1,188	\$713	\$475	\$832	\$5,346
Year 16	\$1,497	\$748	\$1,247	\$748	\$499	\$873	\$5,613
Year 17	\$1,572	\$786	\$1,310	\$786	\$524	\$917	\$5,894
Year 18	\$1,650	\$825	\$1,375	\$825	\$550	\$963	\$6,188
Year 19	\$1,733	\$866	\$1,444	\$866	\$578	\$1,011	\$6,498
Year 20	\$1,819	\$910	\$1,516	\$910	\$606	\$1,061	\$6,823
Year 21	\$1,910	\$955	\$1,592	\$955	\$637	\$1,114	\$7,164
Year 22	\$2,006	\$1,003	\$1,672	\$1,003	\$669	\$1,170	\$7,522
Year 23	\$2,106	\$1,053	\$1,755	\$1,053	\$702	\$1,229	\$7,898
Year 24	\$2,211	\$1,106	\$1,843	\$1,106	\$737	\$1,290	\$8,293
Year 25	\$2,322	\$1,161	\$1,935	\$1,161	\$774	\$1,355	\$8,708
Year 26	\$2,438	\$1,219	\$2,032	\$1,219	\$813	\$1,422	\$9,143
Year 27	\$2,560	\$1,280	\$2,133	\$1,280	\$853	\$1,493	\$9,600
Year 28	\$2,688	\$1,344	\$2,240	\$1,344	\$896	\$1,568	\$10,080
Year 29	\$2,822	\$1,411	\$2,352	\$1,411	\$941	\$1,646	\$10,584
Year 30	\$2,964	\$1,482	\$2,470	\$1,482	\$988	\$1,729	\$11,114
Total Savings	\$47,836	\$23,918	\$39,863	\$23,918	\$15,945	\$27,904	\$179,385

GREEN RESIDENTIAL SHOWCASE

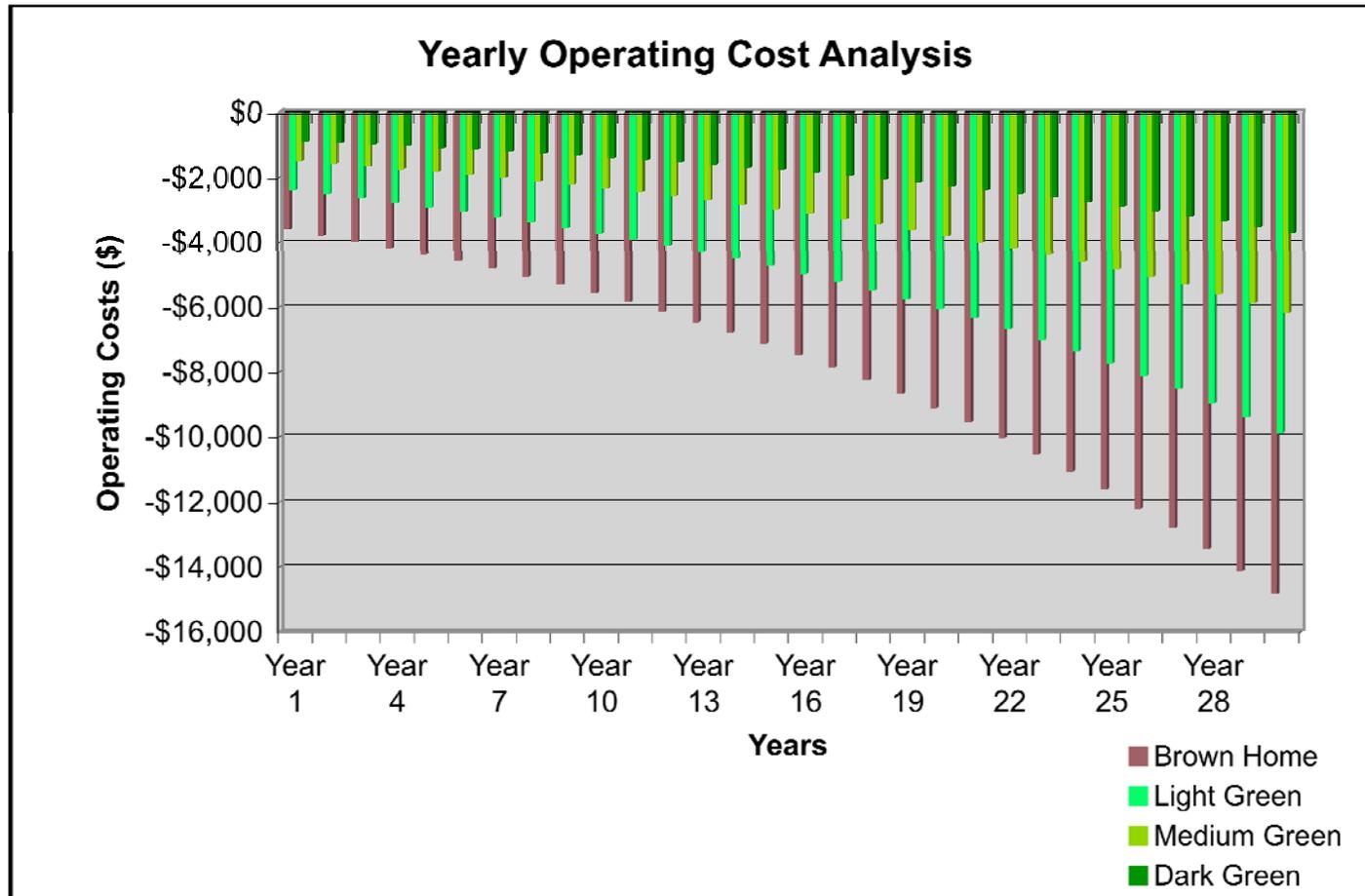
Project

Proving the business case for Green is going to be critical



Green Residential Showcase Project

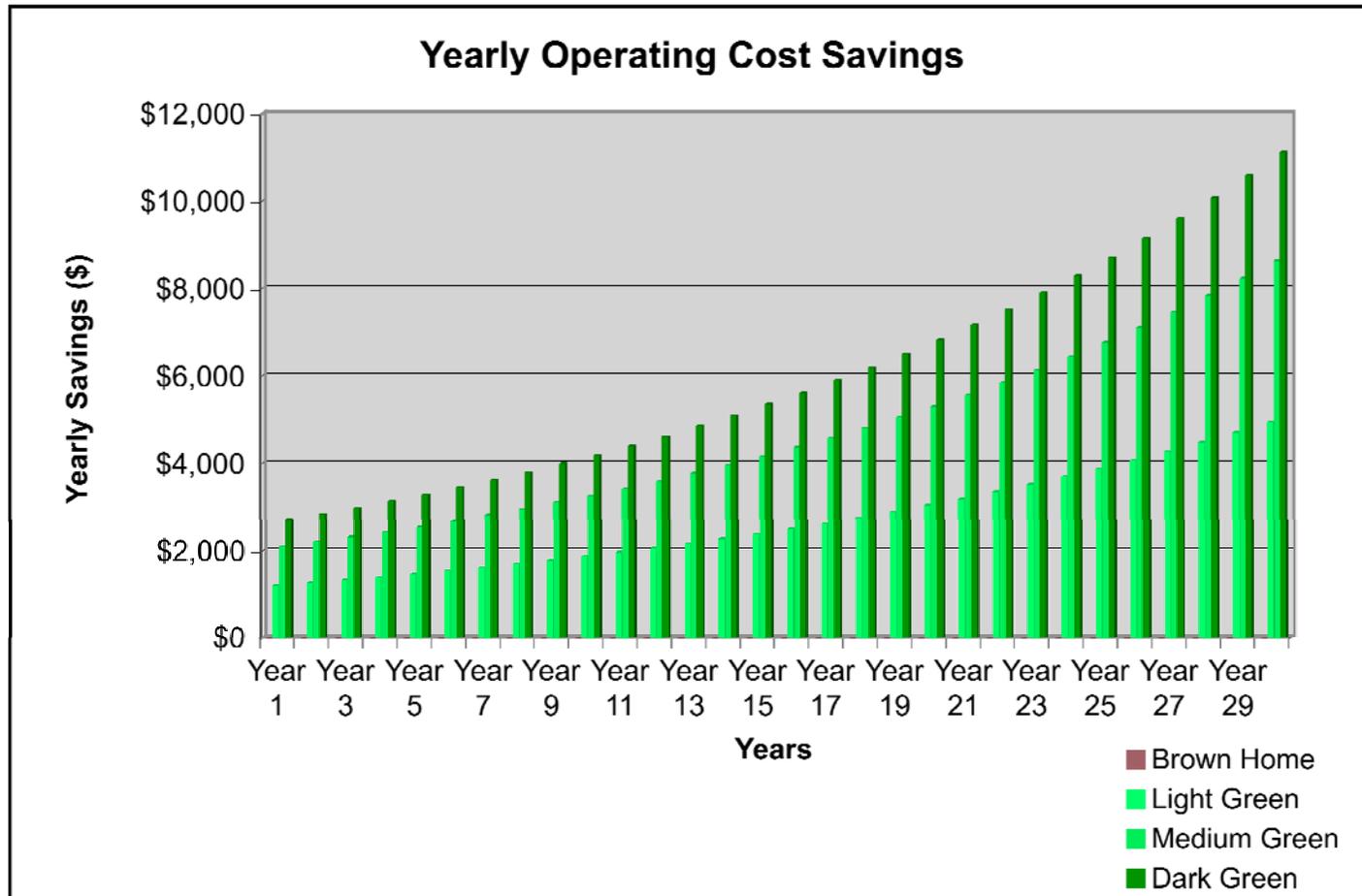
Proving the business case for Green is going to be critical



	Brown Home	Light Green	Medium Green	Dark Green
Monthly Cost	\$ (300)	\$ (200)	\$ (125)	\$ (75)
Total Costs	-\$239,180	-\$159,453	-\$99,658	-\$59,795
Total Cost Savings	\$0	-\$79,727	-\$139,522	-\$179,385

Green Residential Showcase Project

Proving the business case for Green is going to be critical



	Brown Home	Light Green	Medium Green	Dark Green
Monthly Cost Savings	\$ -	\$ 100	\$ 175	\$ 225
Total Costs Savings	\$0	\$79,727	\$139,522	\$179,385

Green Residential Showcase Project

Proving the business case for Green is going to be critical

	Brown Home	Light Green	Medium Green	Dark Green
Monthly Cost				
Savings	\$ -	\$ 100	\$ 175	\$ 225
Total Costs				
Savings	\$0	\$79,727	\$139,522	\$179,385

Total Opportunity for Home Operational Savings over 30 years

Light Green Total Savings	\$9,965,827,125,452
Medium Green Total Savings	\$17,440,197,469,541
Dark Green Total Savings	\$22,423,111,032,267

Future Trends *Things to consider*

- Alignment with customers is critical
- Cost / Benefit Analysis is going to drive green
- Greening of our lives is a long journey
- Making green easy for your customer is the biggest thing.

Thank You

Any Questions?



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