Going Green: Tips, Tools and Examples from the Field

March 2009

By
Abigail C. Johnson
Abacus Property Solutions
Williamsburg, VA

with technical contribution by:
Jonathan Frank, AIA
Bay Design
Newport News, VA

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About NAIOP

NAIOP, the Commercial Real Estate Development Association, is the leading organization for developers, owners and related professionals in office, industrial and mixed-use real estate. NAIOP comprises 15,000 members in North America. NAIOP advances responsible commercial real estate development and advocates for effective public policy. For more information, visit www.naiop.org visit www.naiop.org.

The NAIOP Research Foundation was established in 2000 as a 501(c)(3) organization to support the work of individuals and organizations engaged in real estate development, investment and operations. The Foundation's core purpose is to provide these individuals and organizations with the highest level of research information on how real properties, especially office, industrial and mixed-use properties, impact and benefit communities throughout North America. The initial funding for the Research Foundation was underwritten by NAIOP and its Founding Governors with an endowment fund established to fund future research. For more information, visit www.naioprf.org.

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Disclaimer: Views expressed are those of the author, Abacus Property Solutions. Due to the fast-changing sustainability environment, information current at the time of data collection is subject to change in the future.

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Executive Summary

Overview

A successful green project means different things to different stakeholders. From a sustainable design standpoint, the goal of building green is to decrease or eliminate a building's environmental footprint. From an economic perspective, a building should produce incremental returns through cash flows and disposition value. As evident by the increase in registered projects in the U.S. Green Building Council's LEED® (Leadership in Energy and Environmental Design) rating system, mushrooming of sustainability consultants and significant media attention, the green building movement is expanding at a very rapid pace.

Until recently, LEED-certified buildings were concentrated in the construction of new facilities, primarily by public institutions and corporate end-users. During the last few years, large, commercial real estate companies, particularly REITs, have also begun to green their portfolio, spreading any incremental costs over their portfolios. In contrast, small-to-medium sized commercial real estate companies have been slower to embrace LEED and thus, represent a very small fraction of LEED-certified buildings. This gap in LEED adoption may be due partially to the lack of readily available information regarding soft and hard costs, payback and operational savings of specific green strategies.

Approach

Abacus Property Solutions (Abacus) applied for a grant from the NAIOP Research Foundation to identify green building strategies that reflect the economic returns required by commercial owners and developers. Abacus also evaluated the value of adopting these strategies and potential impact on LEED. For this project, Abacus reviewed an extensive list of existing reports and articles, conducted numerous interviews of real estate professionals and developed two surveys sent to green building experts and commercial real estate owners and developers, particularly in the office and industrial sectors. Responses from the "technical" survey produced valuable information on costs and payback periods of green alternatives to conventional construction practices, energy savings of green practices and their effects on related systems. From owners and developers who responded to the "investor" survey, Abacus garnered information on typical investment parameters, experience with LEED and/or Energy Star projects, and perceived value in buying or building a sustainable building.

Findings

Based on results from the technical survey results, Abacus was able to identify practices that would be economically feasible to most owners and developers:

Vehicular Pavement: Alternatives to Asphalt Pavement
- Concrete with non-cement additives: 6+ year holds

Pedestrian Pavement: Alternatives to Gray Concrete
- Gravel for short holds

Irrigation: Alternatives to Conventional Sprinkler System
- Drip irrigation for all hold periods

Windows: Energy-efficient window technologies
- Low-e and thermal break, considering climate for HVAC reduction
- Low-e for overall reduction in energy costs, taking into consideration climate

Roof: Reduction of heat transfer through roof
- Paint light color for non-rubber roof coverings

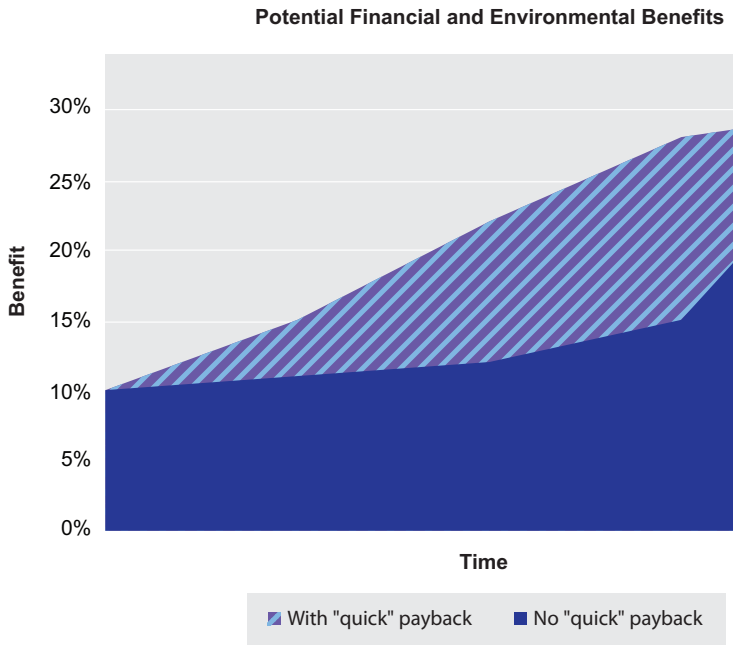
HVAC: Energy-efficient equipment and maintenance
- Air economizer for holds of at least 3 years, more definitely for 6 years or more
- Fan coil cleaning – no/low expense item with significant economic benefits

Interior Lighting: Energy-efficiency in existing buildings
- Ballast retrofit – particularly for full-service leases

Conclusions

One of Abacus' objectives was to illustrate – through analysis of specific sustainable strategies – that substantial savings can be achieved while also meeting financial goals of investors. To some critics, examining the economic value of green practices at the individual level would potentially result in greenwashing and discourage a holistic approach to green design, espoused by LEED. Interestingly, the vast majority of survey respondents indi-

cated that identifying these types of strategies would either encourage interest in LEED certification or have no effect on the standard. It has also been argued that this type of research has little value, as even laggards will be required to adopt LEED at some point. However, even if this eventually proves true, this perspective disregards the economic and environmental benefits achieved from earlier adoption of green practices by more commercial owners and developers.



Furthermore, when evaluating green building alternatives, technical experts and investors can both use these strategies to understand how small changes directly affect the bottom line:

"90 percent of the built environment are not high-end architectural projects where you have the budget to do this [energy modeling]. If you can train your real estate developers that strip malls need to have low-e glass instead of regular glass or that they need to have another five R- points in their roof insulation, you are going to make an the impact all over the country."

Richard Fitts, AIA, LEED AP, Partner – Design Collaborative

Introduction

Background

The idea for this project stemmed from the lack of available information regarding the quantifiable financial benefits of green buildings, applicable to commercial development. Abacus found that the existing studies on green building costs were typically based on Class "A" new construction built for public entities or corporate end-users. As a result, Abacus focused on identifying examples of green building practices that provide economic paybacks applicable to a broad spectrum of real estate investors.

Research Questions

Our analysis involved answering the following questions:

1. Can the costs and paybacks of specific green strategies be identified and what is the value of adopting these strategies?

2. Would access to cost/benefit and payback information engage more private investors and developers in the green building process?

3. What are the potential ramifications with respect to the USGBC's LEED rating system for using these strategies?

Methodology

1. Existing Literature review

Abacus studied existing benchmarking and green building costing reports, as well as numerous articles and Web sites to understand the quantity and type of cost/benefit data available to the public. Abacus reviewed research papers and reports that are often cited as references when discussing the benefits of green building such as *"The Costs and Financial Benefits of Green Buildings"* by Greg Kats and *"The Cost of Green Revisited"* by Davis Langdon. A list of sources is found in Appendix 1.

2. Interviews

Abacus conducted interviews with professionals from different sectors of commercial real estate including developers, architects, property managers, energy consultants and commercial brokers. Interview questions focused on verifying survey responses as well as gaining insight into their opinions on the LEED rating system and the value of estimating the financial benefit of specific green strategies. The complete list of interviewees is included in Appendix 1.

3. Surveys

Abacus, with the technical assistance of Bay Design, developed two surveys, sent out late Fall 2008 using the Survey Monkey Internet software program. Survey questions are located in Appendices 2 and 3.

a. "Technical" Survey

One of the main objectives of the "technical" survey was to identify specific green building practices, applicable to owners and developers. The survey addressed the following categories:

- site (pavement and irrigation)
- building envelope (windows, walls, roof)
- HVAC and interior lighting

It was designed so participants only answered the categories in which they had experience. The intent of the survey was to highlight topics relevant to commercial investors of industrial and office properties and was not meant to be comprehensive in scope. Effort was made to identify creative strategies or technologies less commonplace – for instance – than replacing incandescent light bulbs with compact fluorescents.

When feasible, Abacus asked participants to compare costs and paybacks of "conventional" strategies/practices to more green/sustainable alternatives. Questions were typically based on scales (i.e., much less to much more), ranges (i.e., 1-3 years) and rankings (i.e., 1=least expensive, 5=most expensive).

The survey was sent via e-mail to 782 green building experts, developers and designers, obtained from databases including the U.S. Green Building Council, James River Green Building Council, Energy Star, NAIOP and Abacus.

b. “Investor” Survey

One of the main goals of the “investor” survey was to gain insight into the investment parameters of commercial owners/developers with respect to the acquisition or development of a green building. Abacus included specific questions on hold periods and financial return parameters, as well as qualitative questions to gauge investor interest in green building and identify green measures requested by tenants.

Abacus distributed the survey via e-mail to 1,333 commercial owners and developers, receiving a total of 132 responses, approximately two-thirds of which were from the office and industrial sectors. To increase the chances of a high response rate, the survey was sent to a wide range of individuals from private investment firms, developers of varying size, public-owned companies (REITs) to insurance companies and pension funds. Therefore, the results reflect general indicators of investment criteria useful in evaluating the most applicable economically feasible green building strategies.

"Technical" Survey results

Response Summary

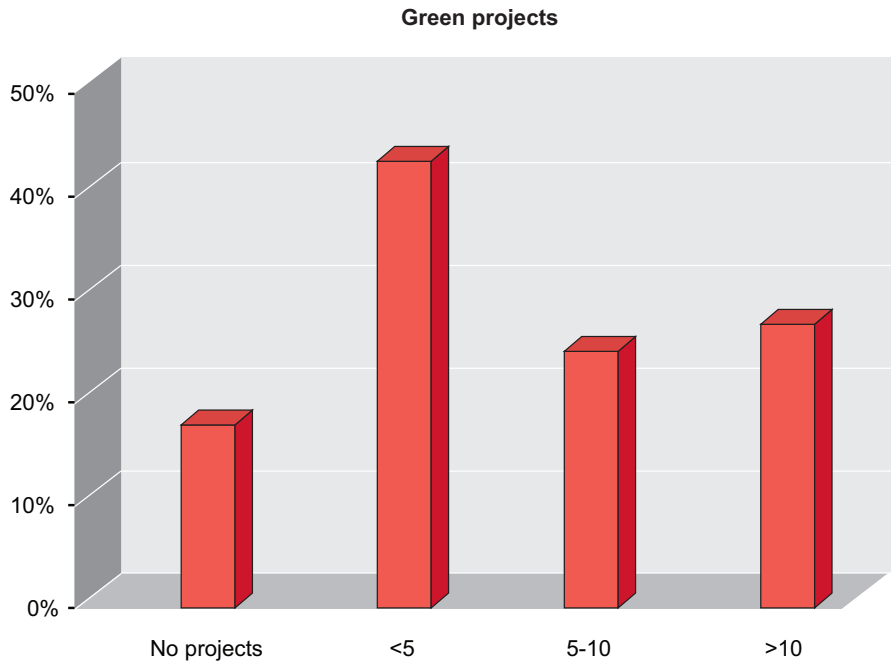
Abacus received 168 responses from the 782 online surveys, resulting in an overall response rate of approximately 21 percent. Abacus analyzed the distribution, median and mean data of all relevant variables using SPSS, a statistical software program.

Respondent Profile

Developers, architects, engineers, energy modelers and LEED consultants represented the majority of the respondents. Almost all respondents (99 percent) were at least 25 years of age, and nearly 60 percent were over 40.

The vast majority of the respondents (86 percent) had experience in developing or designing Energy Star and/or LEED certified projects Forty-six percent had experience with five or more projects and 40 percent had experience in less than five.

Graph 1



Technical Questions

In this section, Abacus summarized our findings using the following table format:

Topic	Survey Findings	Economically feasible?
Question description including answer choices	Most interesting findings, relevant to identifying financially attractive strategies. Percentage of respondents is shown in parenthesis.	Indicates findings that have potential payback period.

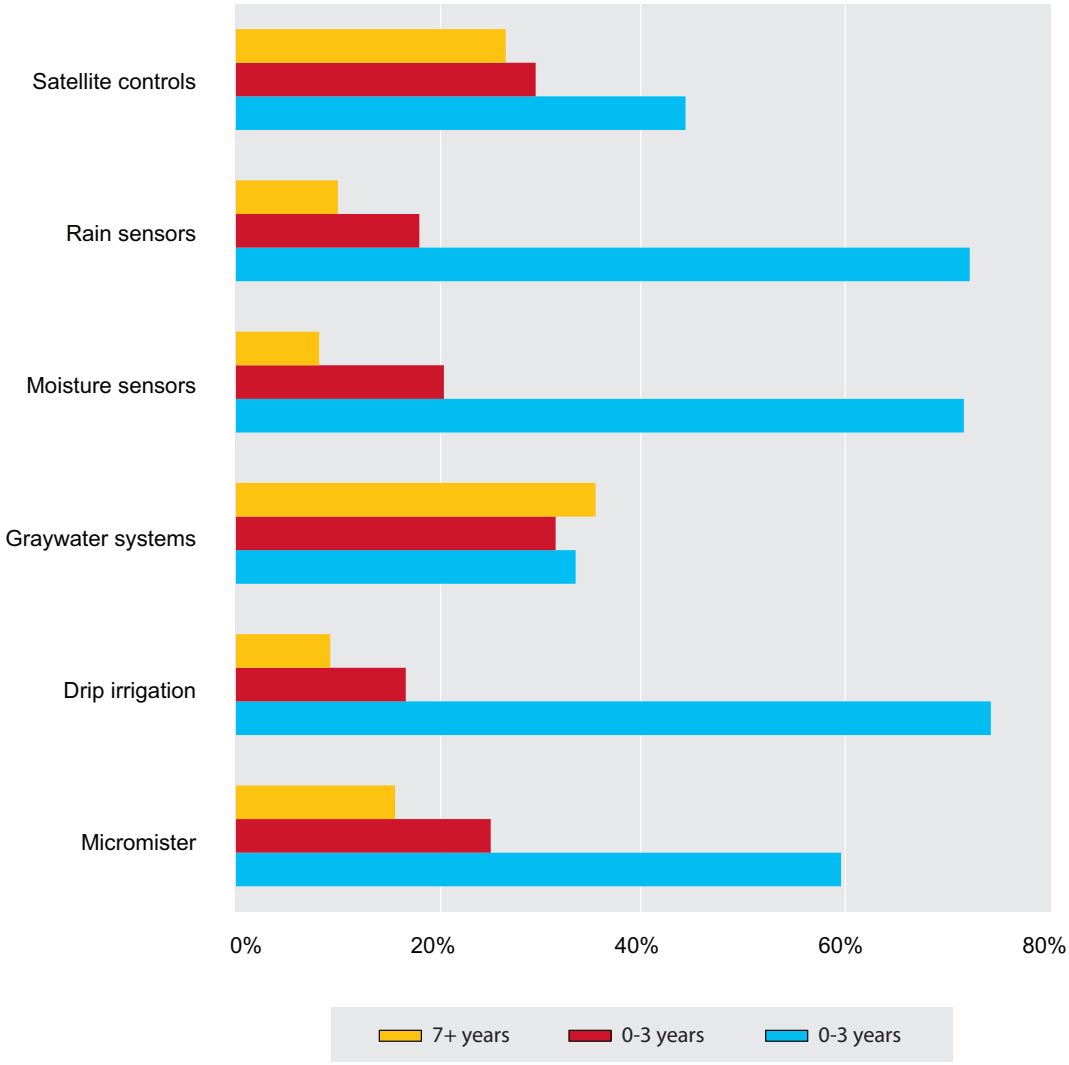
1. Site: Pavement and Irrigation Strategies

In this section, alternatives to vehicular and pedestrian pavement as well as to conventional irrigation are analyzed.

Topic	Survey Findings	Economically feasible?
Asphalt Pavement costs and payback vs. "green" alternatives including pervious pavement, open plastic grid, open concrete grid, and concrete with non-cement additives	• Concrete with non-cement additives more to install, less to maintain with payback of 6 years or less (62 percent) and three years or less (38 percent) • 50 percent+ indicated "Don't Know" regarding open plastic grid	• Yes, concrete with non-cement additives for 6+ year holds
Grey concrete pedestrian hardscape costs vs. "green" alternatives including compressed gravel, brick pavers, reflective materials and concrete with non-cement additives	• Gravel less to install, more to maintain • Concrete with additives and reflective materials more to install, less to maintain	• Yes, gravel for short hold periods • Yes, Concrete & reflective for longer holds
Conventional sprinkler system costs and payback vs. "green" alternatives including drip irrigation, graywater systems, micromister, moisture and rain sensors and weather satellite controls	• Drip irrigation less to install and maintain, with payback of 3 years or less (See Graph 2) (75 percent+/-) • Payback periods for rain and moisture sensors short but contradicted by high installation and maintenance costs • 50 percent+ indicated "Don't Know" regarding micromisters	• Yes, drip irrigation for all hold periods

Graph 2

Payback Period of Irrigation Systems



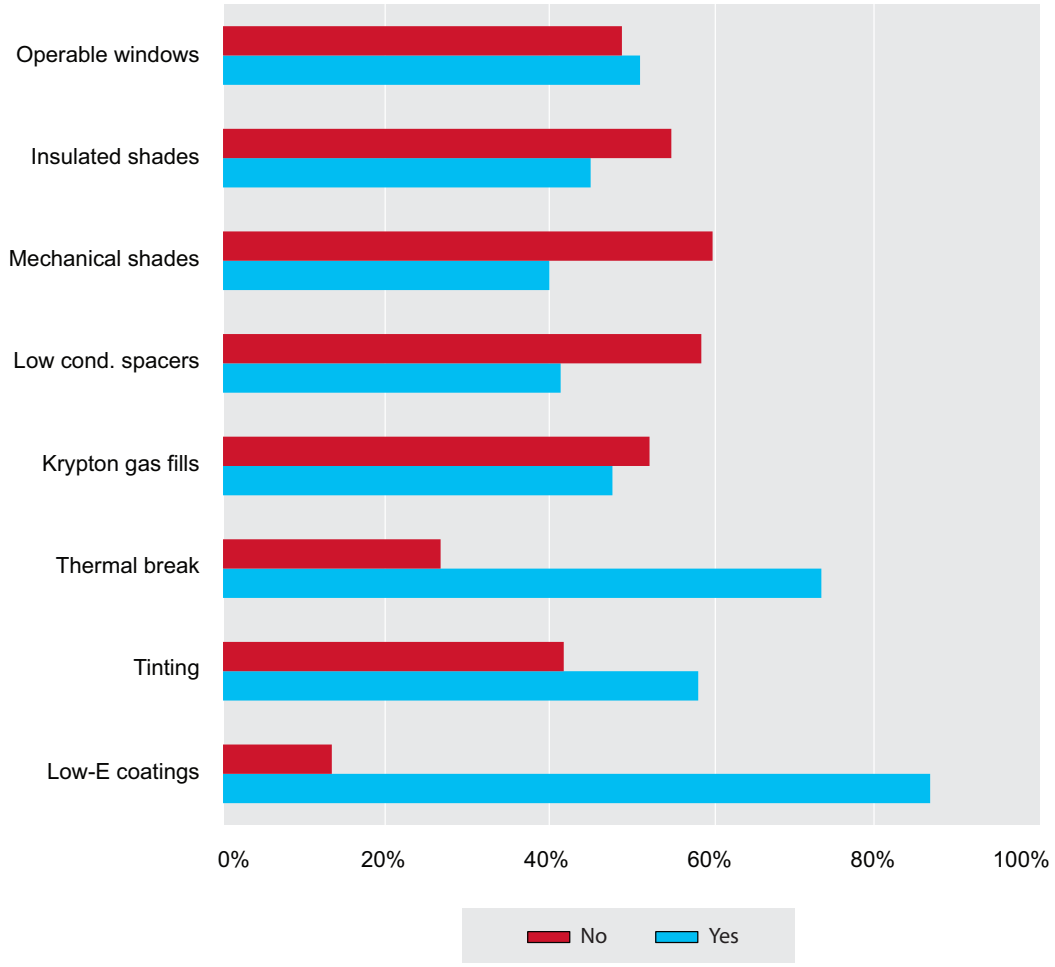
2. Building envelope: Windows

In this category, Abacus discusses how elements of the building envelope, windows, walls and roof, affect the energy consumption in buildings. This section discusses various energy efficient window technologies.

Topic	Survey Findings	Economically feasible?
Annual savings of various coatings in specific climate including: low-e low Solar Heat Gain (SHG), low-e moderate SHG, low-e high SHG, tinted and high performance tint	• Low-e low SHG had highest mean of the alternatives in Northeast, MidAtlantic and West Coast • In colder areas, low-e high SHG had the highest mean • High performance tint ranked highly on the West Coast	• Yes, low-e, taking into consideration specific climate
Reduce size of HVAC equipment using window technologies in specific climate.	• >50 percent indicated that Low-e (87 percent), thermal break (73 percent) and tinting (58 percent) can reduce HVAC size • >50 percent indicated "No" regarding low conductor spacers, mechanical and insulated shades. 49 percent said "No" for operable windows	• Yes, low-e and thermal break, considering climate

Graph 3

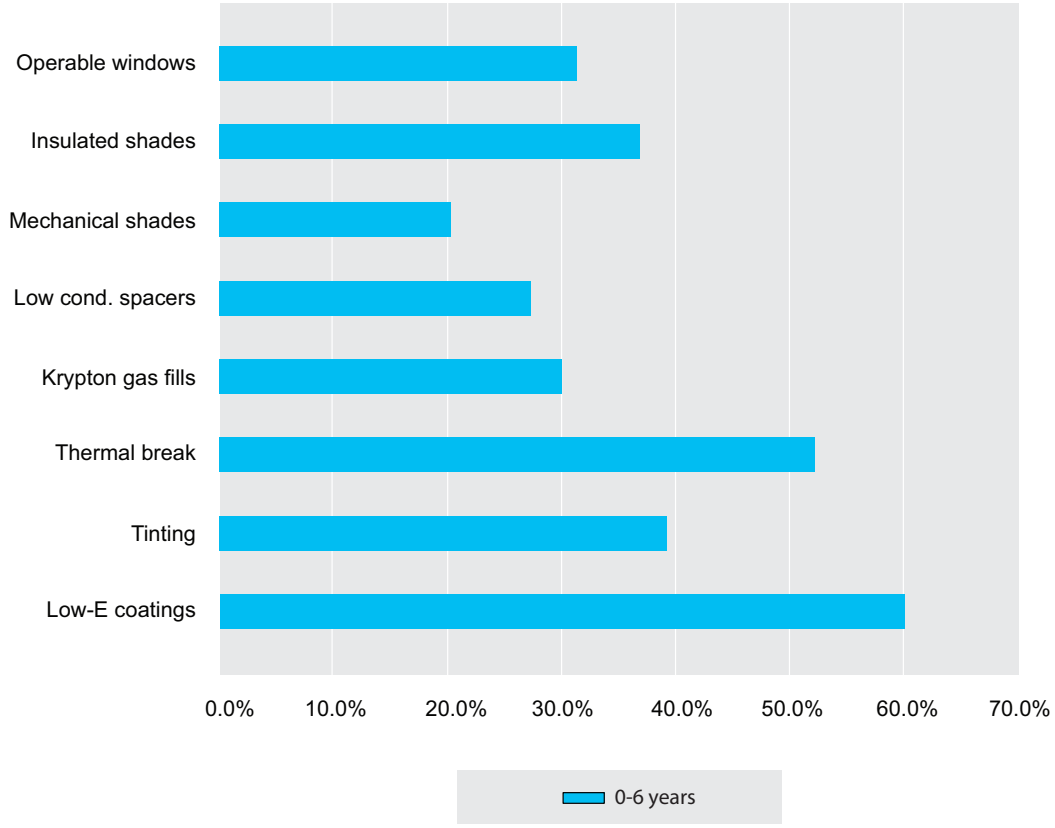
HVAC Reduction with Window Technologies



Topic	Survey Findings	Economically feasible?
Payback of window alternatives in Graph 4	• Majority indicated low-e (63 percent) and thermal break (55 percent) have paybacks of 6 years or less • More than 1/3 indicate low-e, thermal break and tinting have 0-3 year payback period	• Yes, low-e for medium holds

Graph 4

Payback Period for Window Technologies



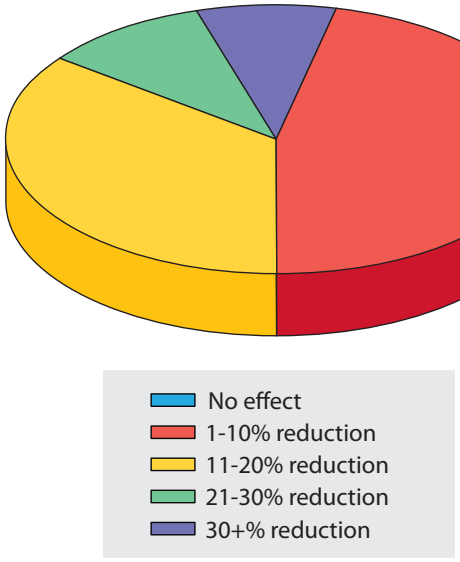
2. Building Envelope: Walls

These questions address wall strategies that may improve the performance of the building envelope.

Topic	Survey Findings	Economically feasible?
Annual energy reduction using light-colored exterior walls	• 60 percent +/- stated "Don't Know" • 30 percent: no effect • 60 percent: 0-10 percent reduction • 10 percent: 10 percent+ reduction	• Inconclusive due to low number of respondents • Maybe, independent research indicates potential
Annual energy reduction using exterior foam sheathing	• 46 percent: 0-10 percent • 54 percent: 11 percent+	• Potentially, warrants payback analysis

Graph 5

Energy Savings from Foam Insulation



2. Building Envelope: Roof

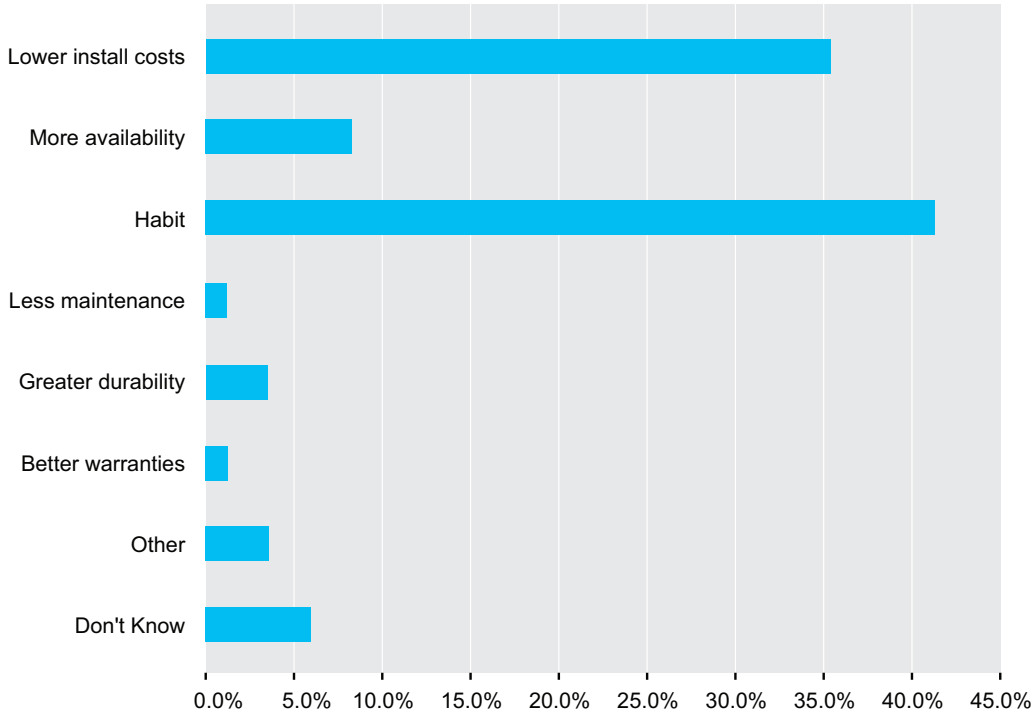
In this section, Abacus evaluated alternative roof coverings and insulation, and maintenance issues:

Topic	Survey Findings	Economically feasible?
Reduce heat transfer through the roof at minimal cost comparing the following strategies: adding rigid insulation, reflective coating, painting light color, installing vegetated roof and adding insulation AND coating/paint	• Paint light color has best relationship in both reducing heat through roof at low cost	• Yes, paint light color, particularly for non-rubber roofs, which do not complicate repairs
Reasons for choosing black over white membrane roofs including: Lower installation costs, greater availability, better warranties, greater durability, less maintenance and habit	• Habit (41 percent) and lower installation costs (35 percent) were primary reasons listed • None of other choices received more than 10 percent response rate	• Yes, if can show that installation is comparable • "Cool roofs" calculator can demonstrate climate-specific savings of white materials

Topic	Survey Findings	Economically feasible?
Paybacks of high performance roof cover boards ranging from less than one year to 10 years or more	• 50 percent indicate 6 years or less • 40 percent indicate 7-9 years • Over 50 percent selected "Don't Know"	• No, for short-medium holds

Graph 6

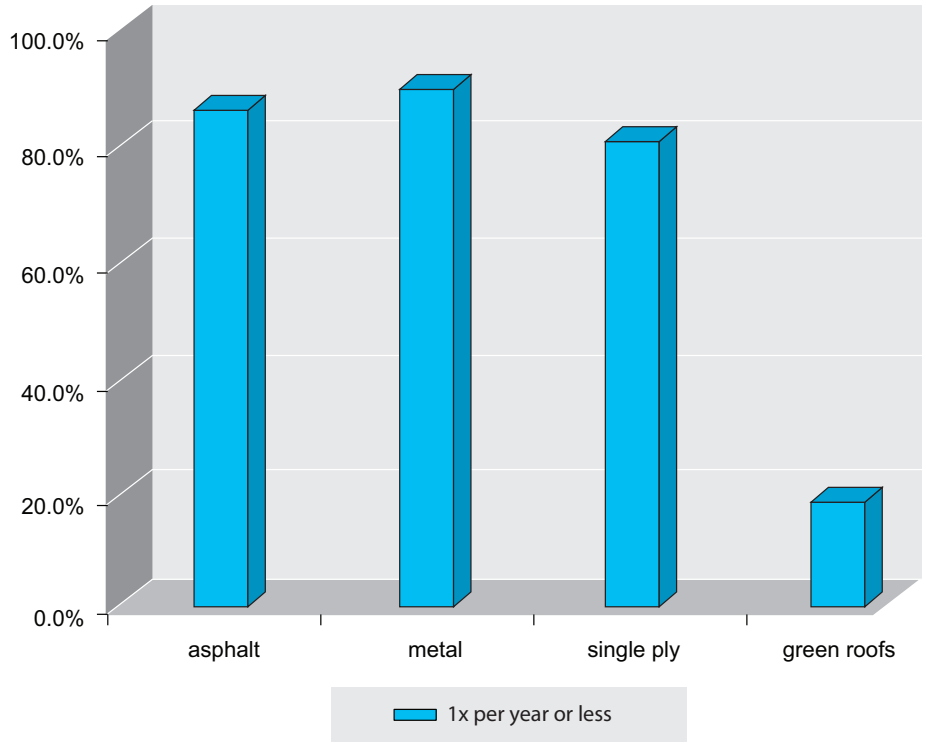
Black vs. White Roofs



Topic	Survey Findings	Economically feasible?
Frequency of roof maintenance	• 57 percent: monthly maintenance for green roofs vs. 2 percent for all others • 75 percent+ non-green roofs require maintenance once a year or less vs. 16 percent green roofs	• No, for green roofs in terms of maintenance costs

Graph 7

Frequency of Roof Maintenance



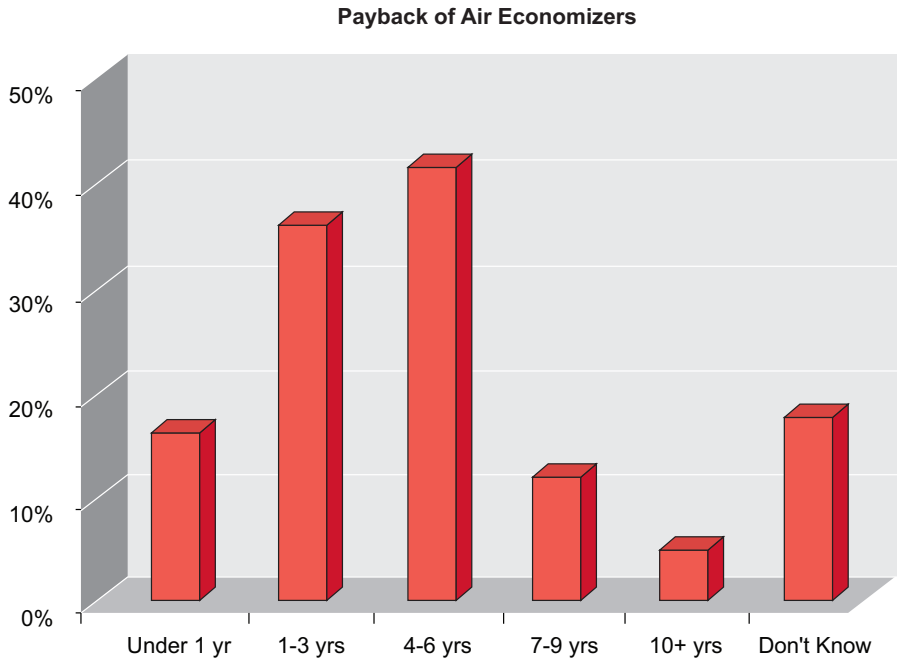
Topic	Survey Findings	Economically feasible?
Paybacks of white membrane roofs	• White CPSE had highest mean, indicated highest payback period • Mean of TPO, acrylic and reflective coating lower than other membranes. • Low response rate compared to other roof questions Inconclusive, results indicate that white CPSE has high payback period.	Inconclusive, results indicate that white CPSE has high payback period.

3. HVAC

This section discusses ways to improving the energy performance of HVAC equipment, thus increasing overall building sustainability and reducing operational costs.

Topic	Survey Findings	Economically feasible?
Comparison of annual energy saving strategies in existing buildings including: testing, adjusting and balancing; building automation software; energy modeling; and value commissioning	• Building Automation software had highest ranking, with energy modeling the lowest	• Potentially, building automation software
Use of radiant and filtration barriers above ductwork to lower HVAC equipment and energy costs	• 75 percent+: None or under 10 percent cost reduction • 66 percent: up to 10 percent in annual energy cost reduction • 25 percent 11 percent+ annual energy cost reduction	• Potentially, if incremental installation costs were minimal
Payback of air economizers	• Vast majority (87 percent) indicated 6 years or less and nearly half (48 percent) indicated 3 years or less	• Most likely, for holds of at least 3 years • Yes, for 6+ year holds • Proper maintenance essential

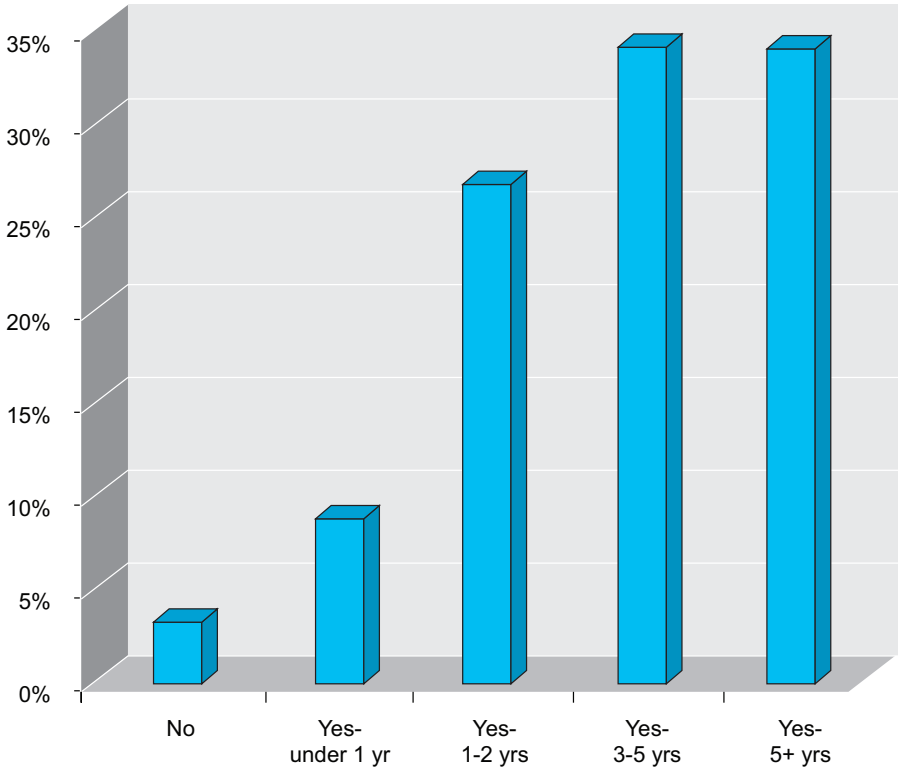
Graph 8



Topic	Survey Findings	Economically feasible?
Increase HVAC equipment life through annual fan coil cleaning	• Over 90 percent indicate 1+ year increase in equipment life • 66 percent indicate 3 + years	• Yes, cleaning is low/no expense item

Graph 9

Effect of Annual Fan Coil Cleaning

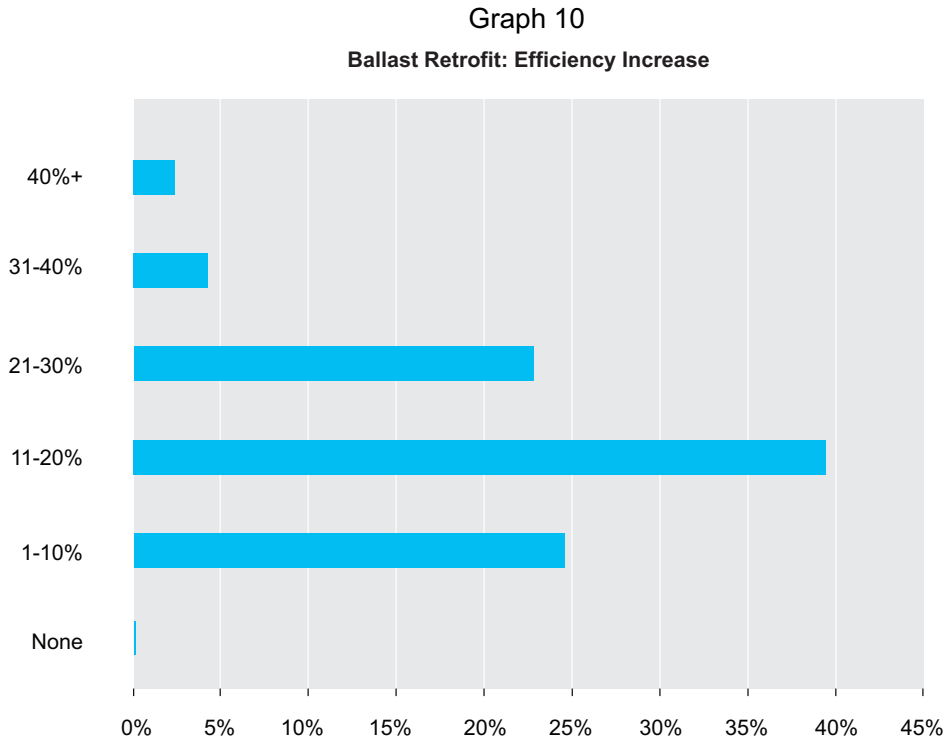


4. Interior Lighting

These questions address energy-efficient lighting strategies in the interior of a building.

Topic	Survey Findings	Economically feasible?
Effect of highly reflective ceiling materials on projected or actual annual energy usage	• 85 percent indicated 1-10 percent reduction; 31 percent indicated 11 percent+ reduction • 13 percent indicated "No Effect"	• Possibly, depending on additional material cost of ceiling tiles
Increase in efficiency through retrofit of electromagnetic ballasts with high efficiency electronic-type	• Nearly 3/4 (74 percent) said that retrofitting produces 11 percent + increase • 1/3: more than 20 percent • 1/4: 1-10 percent increase	• Yes, particularly for full-service leases

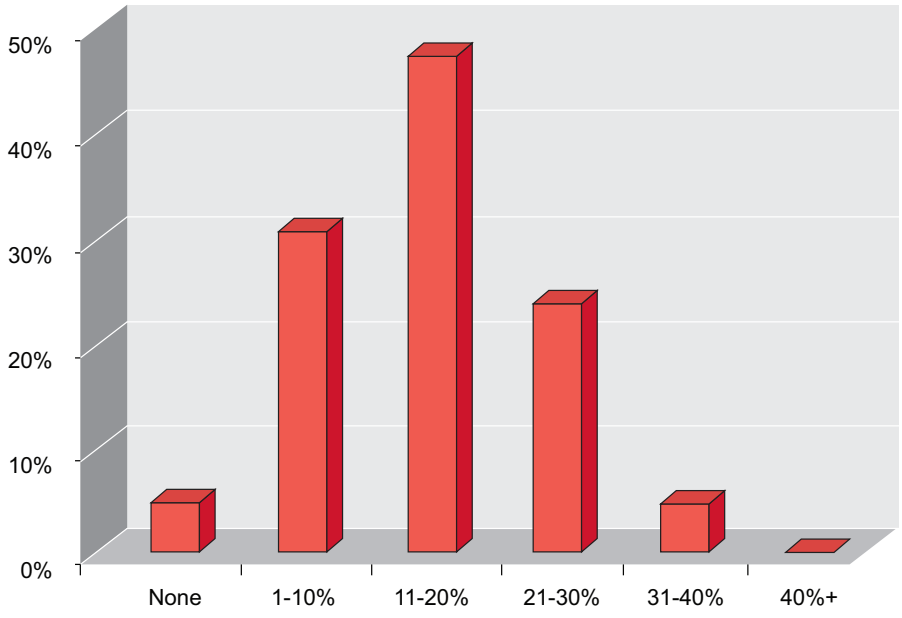
Graph 10



Topic	Survey Findings	Economically feasible?
Increase in energy efficiency through retrofit of glass skylights with translucent insulated daylighting systems	• Nearly 70 percent indicated 11 percent+ in efficiency • 29 percent indicated 1-10 percent • 98 percent indicated some increase in efficiency with retrofit	• Potentially, further study warranted

Graph 11

Skylight retrofit: Efficiency Increase



Opinion Questions – "Technical" Survey

In this section, Abacus included several opinion questions regarding financially attractive sustainable building practices and potential impact on LEED.

Abacus asked respondents if the strategies discussed in the survey would be used by more commercial real estate investors and developers if cost and benefit information were more widely available.

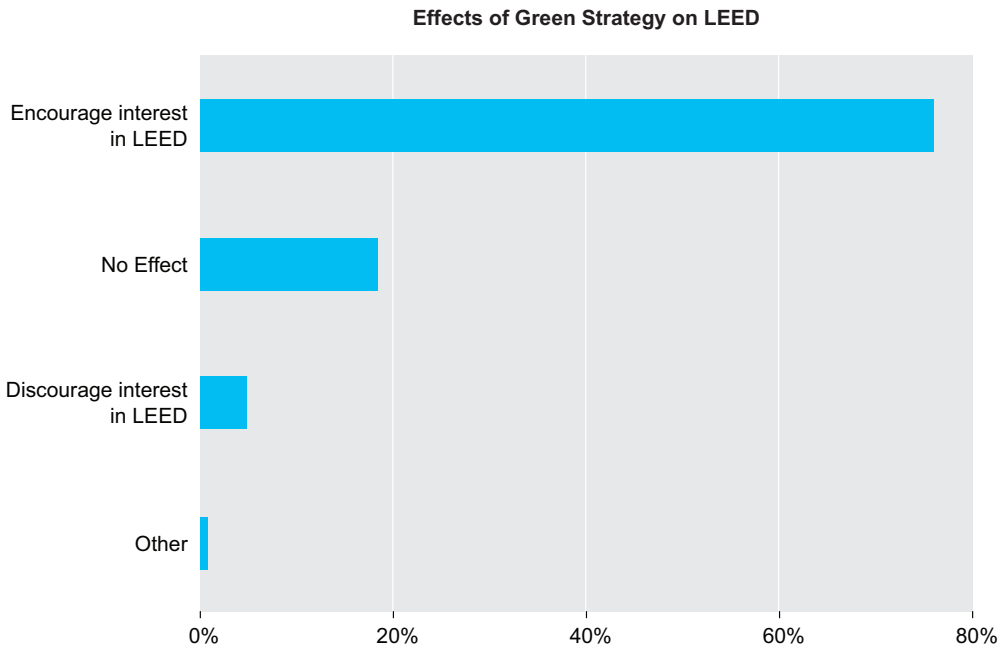
In response to this question, a sizeable majority (83 percent) indicated "Yes", 11.8 percent "Maybe", 3.1 percent "Don't Know" and only 2.4 percent "No". Respondents were given the opportunity to elaborate, and 23 did. Selected answers are highlighted below:

- Yes: "Shared actual cost experience, rather than modeled information or philosophical encouragement, will be the most important data in encouraging the private sector to spend money on energy-efficiency strategies and equipment."
- Yes: "There is a huge void of knowledge."
- Yes: "However the savings calculations would need to be generated locally in order to be credible."
- Yes: "Lighting strategies are easy and definitely considered low hanging fruit."
- Yes: "I was surprised at how little I knew about the effect of strategies which I think will reduce energy. The profession needs more research and data to understand average costs and the real impact of energy saving decisions. Thanks."
- Maybe: "Much of the information has to be better and more definitive than even what is presented here."
- Maybe: "I think this depends. It would be beneficial for developers who will go on to operate the building, but probably have less importance for private developers until the market completely takes on the concept."
- Maybe: "Commercial investors are caught between paying the first cost premiums and then seeing energy savings pass through to tenants. This is an economic disincentive for energy saving capital expenditures."

In the opinion section of the survey, Abacus also asked respondents how implementing green strategies with attractive paybacks would impact the USGBC's LEED green building rating system.

More than 75 percent of the respondents indicated that financially attractive green building strategies would encourage interest in LEED with 18 percent indicating "No effect" and less than 5 percent indicating that they would discourage interest. These results are surprising given that strategies that are not part of an integrated design are typically viewed in a negative light.

Graph 12



The last question in the technical survey asked respondents to share any green strategies that they have used in their buildings. Forty percent of survey participants responded to this question, indicative of the strong interest in the topic at hand. Abacus has included some of the most relevant answers below:

HVAC:

- "VFDs [Variable Fan Drives] on all HVAC equipment. Don't oversize UPS units for IT server rooms. DDC controls for VAV boxes. Daylight-sensitive lighting controls."
- "High efficiency HVAC units, including enthalpy control."
- "Predicting actual equipment loads (from computers etc.) in order to avoid oversizing of cooling."
- "Re-using exhaust for heating."
- "Utilization of high volume, low velocity air handling systems for HVAC with energy recovery wheels."

Interior Lighting:

- "A task-ambient lighting scheme with significantly reduced ambient light levels. Perhaps the single most important energy saving strategy (the Lowest-Hanging Fruit) is to specify high efficiency (above 65 percent) lighting fixtures."
- "Multi-switched ballasts."
- "LED lighting is coming and will quickly surpass CFLs."
- "Daylight sensors, T5 lighting."
- "27W T8 lamps in lieu of 32W. Higher temperature rating of lamps."

Water efficiency:

- "Ultra low consumption fixtures 1.28 water closets and pint flush urinals."
- "Stormwater reuse systems can have an economic payback by reducing water and sewer bills and reducing stormwater BMP costs."

Envelope:

- "Type of exterior wall construction with insulation and air barriers can increase R-value; operable windows can increase fresh air into spaces, in floor heating around building perimeter."
- "Air sealing techniques – nearly free Insulation/thermal break inspections at rough-in – a free strategy."

Maintenance:

- "Maintenance manuals and occupant training programs."
- "Simply reviewing the building operating plan as it compares to occupancy demands."
- "Flooring choices to reduce track-in of allergens, etc., which reduces cleaning costs."

“Investor” Survey results

Response Summary

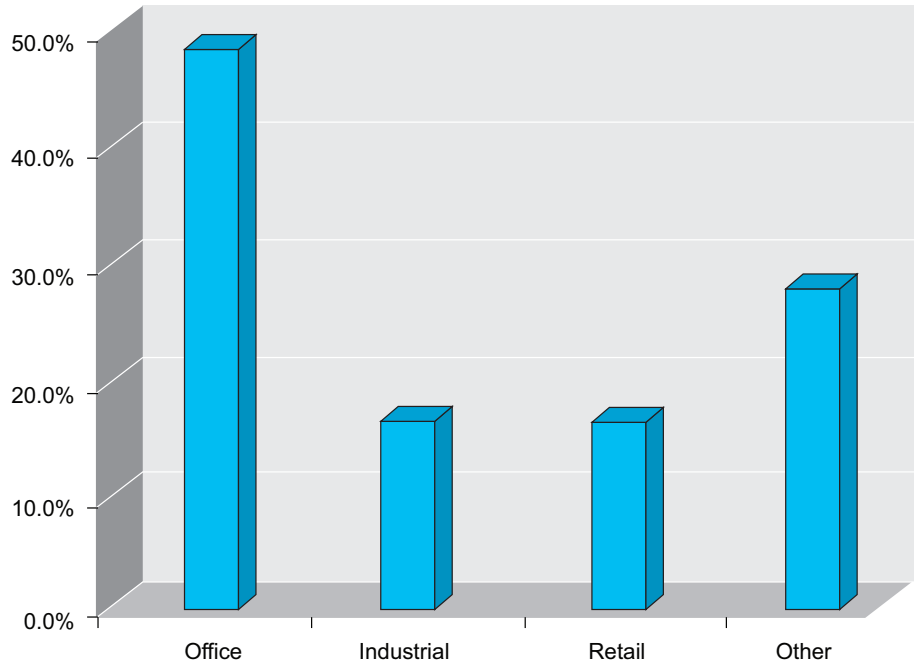
Of the 1,333 surveyed, Abacus received a total of 132 responses, resulting in a response rate of 10 percent. In this survey, a number of questions were asked regarding hold periods and yield requirements, whether these criteria would change when dealing with a green building, and what features of green buildings they considered most valuable.

Respondent Profile

In general, respondent companies owned medium-to-large portfolios, approximately two-thirds of which were office and industrial. The other categories were “retail” and “other” which consisted of a variety of property types. Respondents were fairly evenly represented from all regions of the US and Canada.

Graph 13

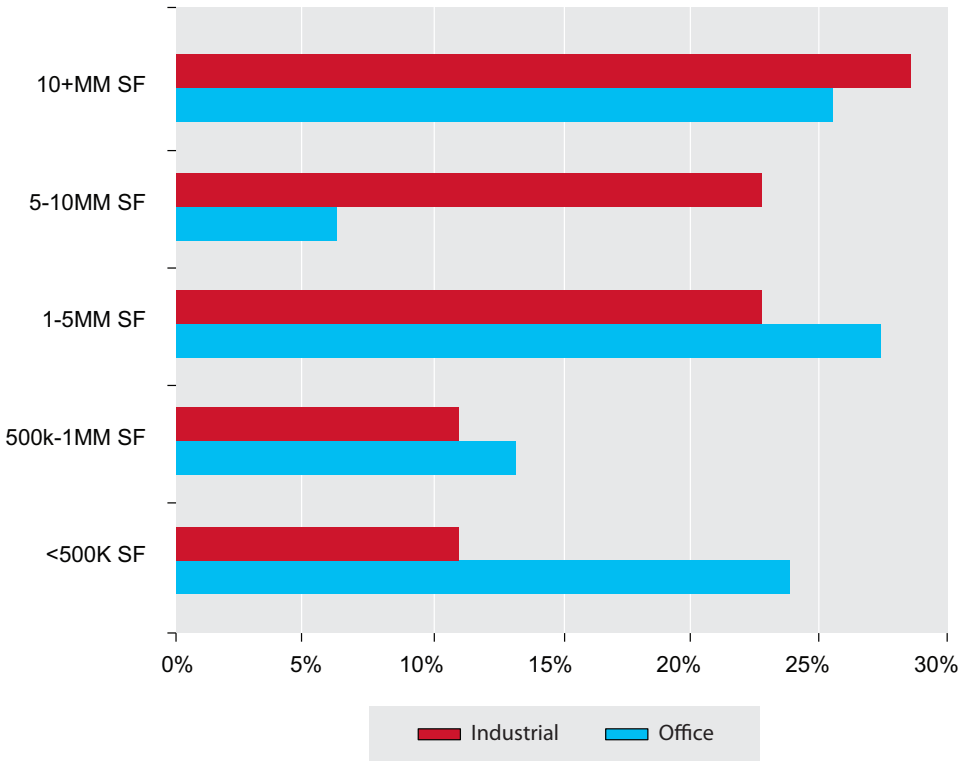
Portfolio Type



The portfolio size of the respondents ranged from less than 500,000 sq. ft. to more than 10 million sq. ft., with nearly 60 percent of the portfolios valued at more than $100 million.

Graph 14

Size of Portfolio



Investment Criteria

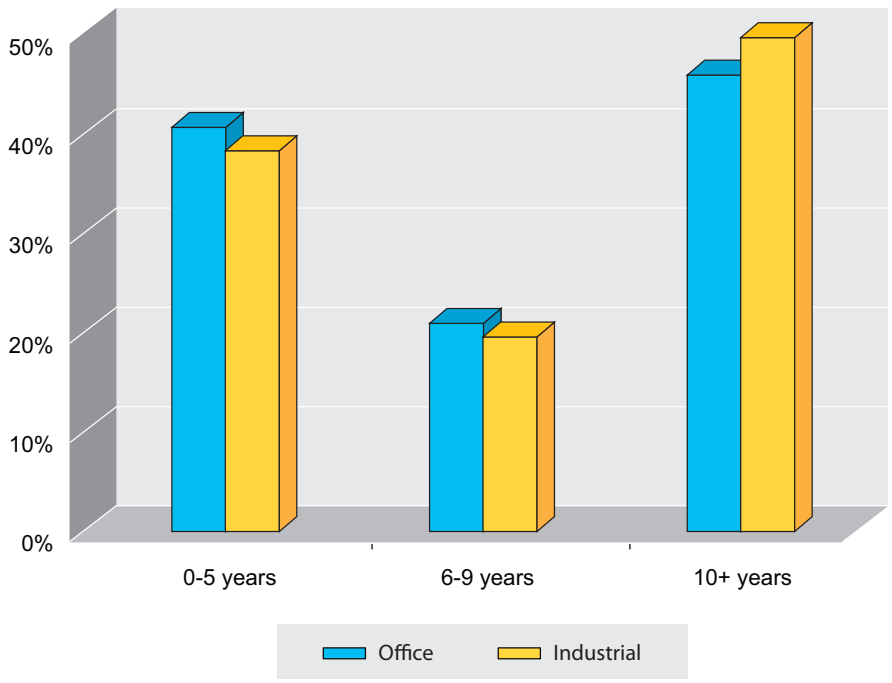
Abacus asked respondents about their typical hold period, return on asset (ROA) requirements based on hold period and yield requirements.

Typical Hold Period

Abacus asked respondents to indicate their typical hold period for purchasing or developing an investment property based on property type. Hold periods concentrated the most between 0-5 years and 10+ years, indicative of the variety in the respondent sample. Over 60 percent of both office and industrial investors/developers indicated hold periods for six years or more. Although fairly similar, industrial investors tended to have longer hold periods than office owners.

Graph 15

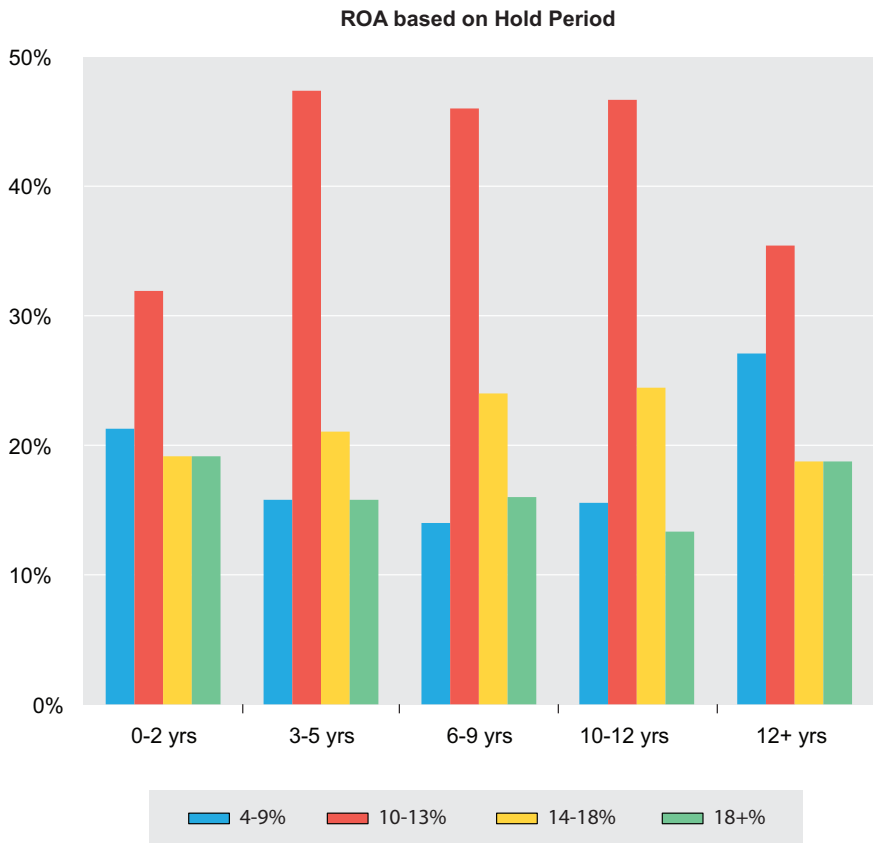
Typical Hold Period



Return on Assets (ROA)

Over 80 percent had required ROA of 10 percent or greater, with 42 percent requiring 10-13 percent and 38 percent requiring 14 percent or greater. Participants were also asked to indicate their ROA requirements based on their hold period.

Graph 16

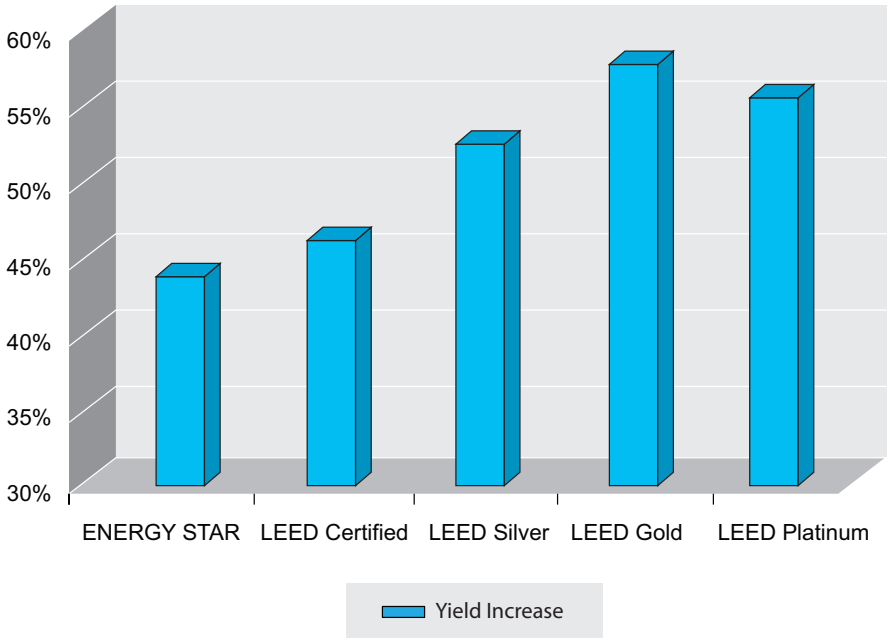


Exit Yield Requirements

Respondents were asked what percentage their yield requirements would increase or decrease when selling an Energy Star or LEED-certified building. The largest percentage of respondents indicated "No Change" in yield requirements when selling a green building – 57 percent for Energy Star qualified and 43 percent for LEED-certified buildings. Exit yield requirements trended upwards with the level of LEED certification, with virtually no respondents indicating that yield requirements would decrease for any type of green building.

Graph 17

Increases in Exit Yield Requirements



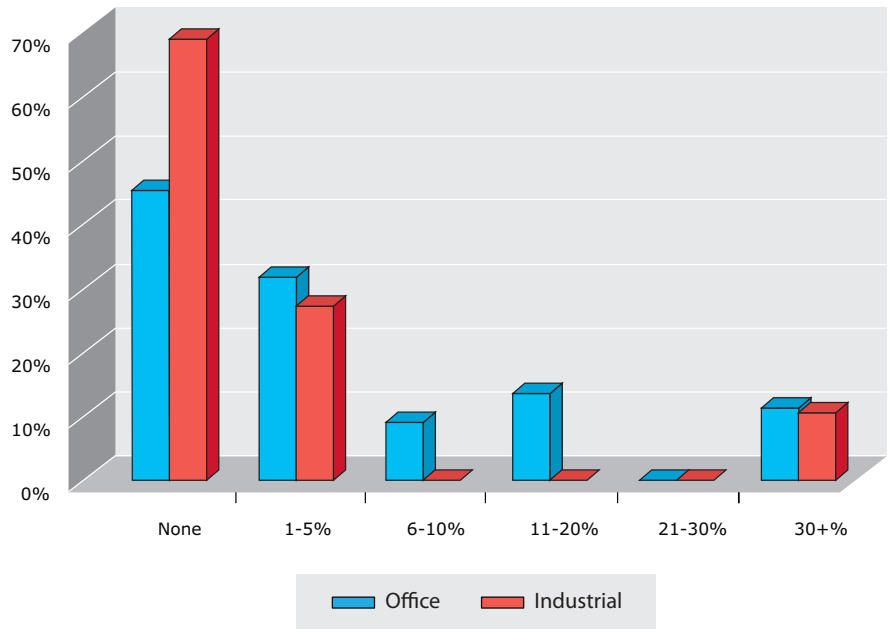
Green Building Strategy Questions

Abacus also wanted to gain insight into why a developer would want to own or build a green building and address tenant requests for green features.

Approximately 54 percent of the respondents who completed the survey had LEED buildings(s) in their portfolio with 18 percent indicating that 10 percent+ were LEED certified. A greater number of respondents had Energy Star buildings in their portfolio (69 percent) than LEED, with 37 percent indicating that more than 10 percent of their portfolio was Energy Star qualified. Not surprisingly, a larger number of office properties in the sample were LEED certified.

Graph 18

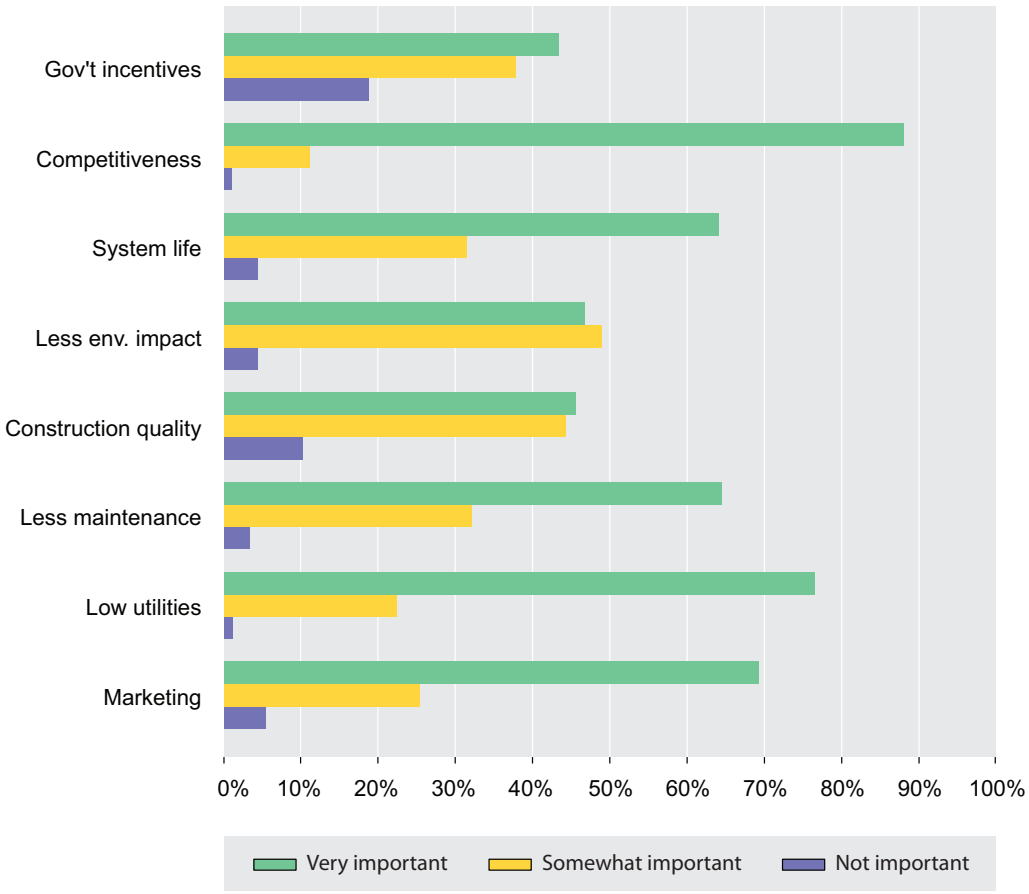
Percentage of Green in Portfolio



When asked what factors would motivate them to buy or construct a LEED building, the largest percentage of respondents indicated increased competitiveness/marketability, lower operating costs and lower capital expenditures as "Very Important."

Graph 19

Motivation to buy/build LEED



Similarly, Abacus asked respondents to check all potential benefits of applying strategies with quick paybacks. At 92 percent, the ability to market green building performance to tenants and buyers was by far the most important benefit of this approach.

Tenant Demand

Respondents were asked to indicate all green building features in which their tenants expressed interest. **Owners indicated that energy efficient lighting and HVAC systems were the most requested by their tenants, followed by:**

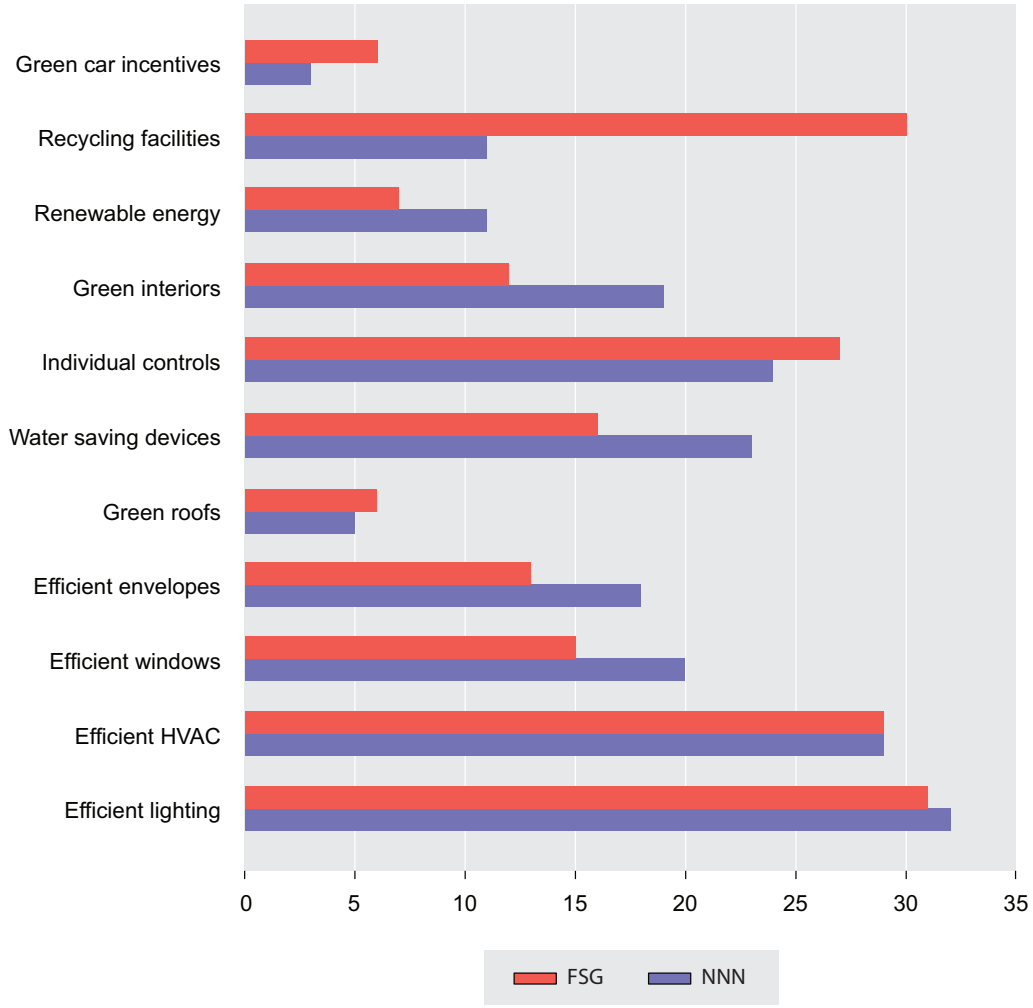
- controls over individual lighting and temperature
- recycling
- green interior finishes
- water-saving devices

Relatively few tenants expressed interest in green roofs, availability of renewable energy sources or incentives to use "green" vehicles.

Abacus further analyzed the data by lease type, full service gross (FSG) and triple net (NNN). Recycling facilities were requested to a much higher degree for tenants on full-service leases. Differences were not statistically significant for HVAC, lighting or individual controls. *Please note that respondents were able to select more than one lease type for each green feature.*

Graph 20

Tenant Demand by Lease Type



In addition, tenant demand was analyzed by lease type AND property type. Because office investors represented a much larger percentage of the total respondents compared to industrial (more than three times), Abacus calculated the data based on percentages instead of total number of responses. The data corroborates that energy-efficient HVAC systems, envelopes and water-saving devices are in demand by both full-service and triple net tenants. Although full-service gross tenants do not pay electricity and HVAC costs for their space, they are typically responsible for a portion of the CAM (Common Area Maintenance) charges, which would be affected by inefficient envelope or lighting systems.

Opinion Questions – "Investor" Survey

Investors were asked about how implementing green strategies with attractive paybacks would affect the USGBC's LEED green building rating system. More than 60 percent of the respondents indicated that these types of strategies would encourage interest in LEED certification with 32 percent indicating "No effect" and 0 percent indicating that they would discourage interest.

The last question asked respondents to share any financially feasible green building strategies that they have used in their buildings, some of which are listed below:

HVAC
- "Energy audits"
- "Looking at variable frequency drives. Building management system definitely helped."

Lighting
- "T-12 replacements – very short payback. Evaluate and improve lighting set times."

Water Efficiency
- "Follow up replace aerators on sinks and diaphragm flush kits to reduce water."
- "Tankless water heaters."

Envelope
- "White reflective roofing membranes."
- "Tinted and thermal pane windows."

Maintenance
- "Composting – It reduces the size and frequency of pick-up for our trash containers."

General
- "Lighting retrofits, "Variable drives, control system upgrades, HVAC re-commissioning, waterless urinals all have very short payback periods and are no brainers."
- "Building Green often means meeting the minimal standards that other builders meet and then improving on them to meet certification. Therefore, green building exceeds the performance projected by the rating."

Conclusions

From the research findings, Abacus gained insight into the value of financially feasible green building strategies for both design professionals and real estate owner/developer. This project is just the tip of the iceberg; the logical next step the development of costs per square foot of these strategies. Conclusions on the value of these strategies and their impact on LEED are summarized below:

1. Increase knowledge of financial benefits of green building

- "The [architectural] profession needs more research and data to understand average costs and the real impact of energy saving decisions," *Architect with experience in 5-10 LEED/Energy Star projects from technical survey.* This statement is supported by other results in the technical survey where more than one-third of respondents answered "Don't Know" in areas in which they had indicated sustainable design experience. This suggests a dearth of readily available information relating to ranges of cost, payback and efficiencies of green building strategies.

2. Engage the private owner/developer

- Accentuate the marketing potential of green buildings – the aspect of greatest interest to owners and developers.

- Address the "Green Roof Syndrome": Vegetated roofs are frequently cited as an example of why green buildings are cost-prohibitive. Although green roofs may have long payback periods, it would be highly valuable if a design professional could demonstrate to his clients that other strategies – such as painting the building's black roof white – would result in 20 percent annual cost savings and 4-6 year payback: "Payback [first, maintenance and replacement costs] is all I need for someone to convince me to spend more money on a particular system vs. a system I would normally put in," *John Loper, Senior Development Manager, Fritz-Duda Company.*

3. Improve performance of existing buildings and smaller, less complex buildings

Best application of these strategies includes:

- Existing buildings, particularly with older envelope and M/E/P systems. *Beckie Birtcher, a senior property manager with CBRE*, commented that 1970s-era office buildings are typically expensive to retrofit to LEED standards due to their inefficient envelopes and obsolescent HVAC systems: "LEED is your Cadillac and we need something down on the Chevy level for some of the older buildings."

- New or Existing buildings under 20,000 square feet or under 50,000 square feet with unsophisticated M/E/P and envelopes. In these designs, soft costs – energy modeling, sustainable design fees and building and commissioning – are usually a much higher percentage of total costs per square feet than in larger or more complex structures. As a result, making a building sustainable to LEED standards for these property types can be difficult to pencil.

- Buildings without highly trained staff. Installation of expensive technologies in the quest for optimal building performance can often backfire. According to *Rebecca Aarons-Syndor, a senior consultant with Sustainable Design Consulting*, "Often, the more sophisticated the technology, the larger the gap between predicted and actual building performance because the facilities or operations people haven't been taught how to use the equipment in the building so they do things, which make [the situation] worse instead of better."

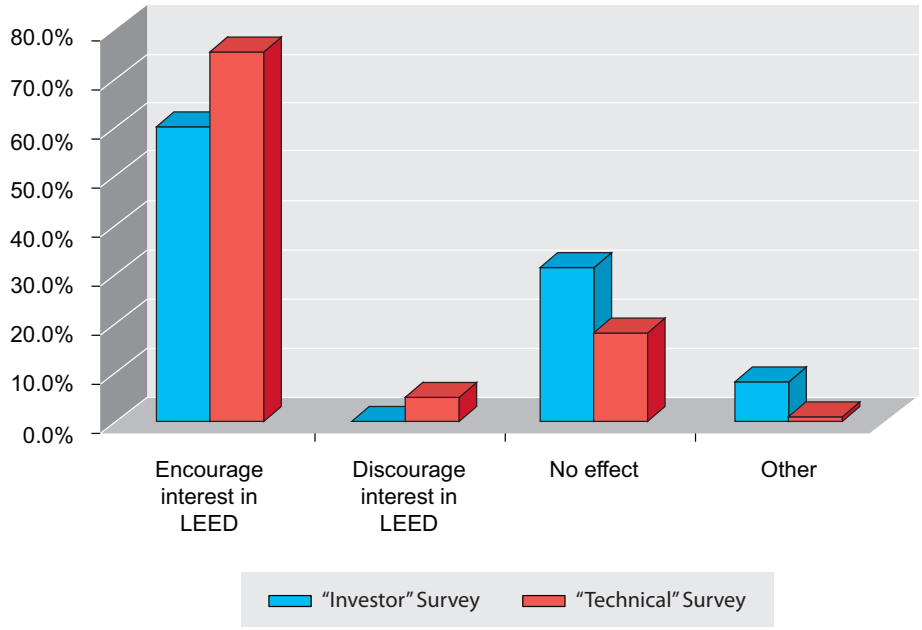
4. Ramifications for LEED

"Rising tide raises all boats," *Architect responding in technical survey*

Taking into account results from both surveys, the vast majority of the respondents (72 percent+) believed that a payback-oriented strategy would encourage interest in LEED certification. A very small percentage (3 percent) indicated that it would discourage interest in LEED and approximately 25 percent stated that this strategy would have no effect. Economically feasible green practices can serve as an educational tool, which will encourage interest in green building and thus, in obtaining LEED certification.

Graph 21

Effect on LEED of Quick Payback Strategies



Appendix 1

Sources

Manuals and Reference Guides

IFMA Benchmarks V Research Report-Annual Facility Costs, International Facility Management Association, 2008

Sustainable Building Technical Manual, USDOE/EPA, 1996

Energy Efficiency, Water and Waste-Reduction Guidebook for Manufacturers, National Association of Manufacturers, undated

Advanced Energy Design Guide for Small Warehouses and Self-Storage Buildings, ASHRAE, 2008

Advanced Energy Design Guide for Small Office Buildings, ASHRAE, 2004 *Reference Guide for New Construction and Major Renovation Version 2.2*, USGBC,
October 2007

Existing Building O&M rating system, USGBC, 2008

Understanding LEED Project Costs and Returns, USGBC, June 2008 Seminar

Core Performance Guide, New Building Institute, 2007

Wisegeek.com
Wikipedia.com

Research Papers

Economics of LEED for Existing Buildings (LEED-EB) for Individual Buildings – A White Paper, Leonardo Academy Inc., April 2008

White Paper on Sustainability, Building Design and Construction, November 2003

Cost of Green, Davis Langdon, 2004

Cost of Green Revisited, Davis Langdon, 2007

Johnson Controls Energy Efficiency Indicator Research, IFMA North America, April 2008

The Costs and Financial Benefits of Green Buildings, Greg Kats, Capital E, October 2003

Turner's Green Barometer 2008, Turner Construction, 2008
Deliver the Green, Leonardo Academy/IFMA, 2006

Does Green Pay Off?, Norm Miller, University of San Diego, Jay Spivey/Andy Florance, CoStar

Energy Performance of LEED for New Construction Buildings, New Building Institute, March 2008

Doing Well By Doing Good? Green Office Buildings, White Paper, Piet Eichholtz, Nils Kok, John Quigley, University of California Berkeley, April 2008

Additional Sources

"True Cost of Building Green," Greg Kats interview in *Buildings*, April 2006

"High Performance Green Building: New Materials and Methods" *Building Design and Construction*, Webcast 2008

"Selling Green in the Spec Office Market," Dave Barista, Managing Editor, *Building Design and Construction*, March 2008

"The Green Survey: Greening US Buildings" (USGBC, Real Estate Media, BOMA), John Salustri, *Globe St.*, November 2007

"Prologis' Jeff Schwartz," John Salustri, Globe St., July 2007

"Design Issues and Considerations for Improving Sustainable Roof Design", AIA Convention presentation, 2007

Various articles from Building Design and Construction website, AIA.org, DOE/EPA.gov, usgbc.org, American Council for Energy Efficient Economy, Center for the Built Environment, Better Bricks.com

Tools

"CostWorks 2009" for Green Buildings, RS Means, 2009

CBECS database, Energy Information Administration, Department of Energy (DOE)

"DOE Cool Roofs Calculator", DOE's Oak Ridge National Laboratory

"COMFEN 1.0", DOE's Lawrence Berkeley National Lab Windows and Daylighting software *Climate Change Business Journal Green Building Survey*, CCBJ, 2008

Efficient Windows Collaborative, Lawrence Berkeley National Lab and University of Minnesota's Center for Sustainable Research

Interviews

Rebecca Aaron-Sydnor, Sustainable Design Consulting (LEED Consultants), Richmond, VA
Fred Antaki, Broker/owner, Main Street Advisors, Santa Cruz, CA
Jim Armstrong, Siemens, Energy Engineer, Boston, MA
Doug Beiswenger, Allied Retail Partners (Developer/Owner), Newport Beach, CA
Chris Bendit, Commercial Broker, GVA Advantis, Newport News, VA
Rebecca Birtcher, Property Manager, CB Richard Ellis, Newport News, VA
Richard Fitts, Principal, Design Collaborative (Architects), Virginia Beach, VA
John Loper, Project Manager, Fritz Duda, (Developer/Owner), Irvine, CA
Evan Mills, Researcher in Commercial Building R&D, Lawrence Berkeley Lab, Berkeley, CA
Mark Mulvaney, Senior VP, Harbor Group International (Developer/Owner), Norfolk, VA
Nils Petermann, Project Manager, Efficient Windows Collaborative guy from Green Alliance
Gary Schefksy, Investment Advisor, New Luna Ventures, San Francisco, CA
Randy Strickland, Construction Manager, College of William & Mary, Williamsburg, VA
Dana Synder, Facility Manager, Old Dominion University, Norfolk, VA
Phil Waier, RS Means, Mechanical and Structural Engineer, Boston, MA

Appendix 2

Technical Survey

Question 1: Please check which category best describes your business or profession?

Architecture/Planning
Engineering
Owner/Construction
LEED Consultant
Real Estate Consultant
Other

Question 2: In which sectors are you the most active?

Office
Office/R&D
Flex space
Manufacturing
Warehouse/distribution
Retail
Multifamily
Hospitality
Healthcare
Government
Mixed use
Other
Other (Please specify)

Question 3: Where are most of your buildings located?

Northeast
Mid-Atlantic
Southeast/South
Midwest
Southwest/Rockies
West Coast
Alaska
Hawaii
Canada
US Territory
Multiple Locations

Question 4: What is your experience in the design, development or financing of green buildings (Energy Star™ and/or LEED™ certified)?

No projects
Less than five
5-10
More than 10

Question 5: What is your age?

Under 25
25-40
41-55
56-70
Over 70

Question 6: What is your gender?

Female
Male

Question 7: Have you incorporated these or other alternative pavement strategies in your projects?

Yes
No

Question 8: In your opinion, how do the following compare to the COST of installing standard asphalt pavement on parking and drive areas?

	Much less	Less	No difference	More	Much more	Don't know
Pervious pavement						
Open concrete grid						
Open plastic grid						
Concrete with non-cement additives						

Question 9: In your experience, how do these alternatives compare to the annual COST of maintaining standard asphalt pavement?

	Much less	Less	No difference	More	Much more	Don't know
Pervious pavement						
Open concrete grid						
Open plastic grid						
Concrete with non-cement additives						

Question 10: Taking into consideration first costs, future replacement costs, and ongoing maintenance, what would you estimate to be the payback period of these pavement strategies?

	Under 1 year	1-3 yrs	4-6 yrs	7-9 yrs	10+ yrs	Don't know
Concrete with non-cement additives						
Open concrete grid						
Open plastic grid						
Pervious pavement						

Question 11: Although the use of gray concrete for exterior sidewalks and patios is still very common, there are a number of increasing popular alternatives. In your experience, how do the following strategies compare to the COST of installing standard gray concrete?

	Much less	Less	No difference	More	Much more	Don't know
Concrete with non-cement additives						
Compressed layered gravel						
High albedo (reflective) materials						
Brick pavers						

Question 12: In your opinion, how do they compare to the annual COST of maintaining gray concrete?

	Much less	Less	No difference	More	Much more	Don't know
Concrete with non-cement additives						
Compressed layered gravel						
High albedo (reflective) materials						
Brick pavers						

Question 13: Have you incorporated irrigation strategies other than a conventional sprinkler system in your projects?

Yes
No

Question 14: How do the following options compare to the COST of installing a conventional sprinkler system for non-lawn areas?

	Much less	Less	No difference	More	Much more	Don't know
Micromister						
Drip irrigation						
Graywater systems						
Moisture sensors						
Rain sensor systems						
Weather satellite controls						

Question 15: In your experience, how do these alternatives compare to the annual COST of maintaining a sprinkler system?

	Much less	Less	No difference	More	Much more	Don't know
Micromister						
Drip irrigation						
Graywater systems						
Moisture sensors						
Rain sensor systems						
Weather satellite controls						

Question 16: Taking into consideration first costs, future replacement costs, and ongoing maintenance expenses, what would you estimate to be the payback period of these irrigation alternatives?

	Under 1 year	1-3 yrs	4-6 yrs	7-9 yrs	10+ yrs	Don't know
Micromister						
Drip irrigation						
Graywater systems						
Moisture sensors						
Rain sensor systems						
Weather satellite controls						

Question 17: Have you designed and/or installed energy efficient window systems in your buildings?

Yes
No

Question 18: Considering your specific climate, how do the following window technologies rank in terms of ANNUAL energy savings, with 1 providing the least savings and 5 the greatest. Assume windows are double paned, gas-filled, set in aluminum frames with thermal break.

Low-E low solar heat gain
Low-E moderate solar heat gain
Low-E high solar heat gain
Tinted
High performance tint

Question 19: In your climate zone, have you been able to reduce the size of your HVAC equipment by implementing any of the following strategies?

	Yes - 1-20%	Yes - 21-40%	Yes - 40%+	Yes - Unknown %	No
Low-E coatings					
Tinting					
Frames with thermal break					
Krypton gas fills					
Low conductance spacers					
Mechanical window shades with timers or sensors					
Insulated shades/heat absorbing blinds					
Operable windows					

Question 20: In your climate zone, taking into consideration first costs, future replacement costs, and ongoing maintenance, what would you estimate to be the payback period of these window technologies?

	Under 1 year	1-3 yrs	4-6 yrs	7-9 yrs	10+ yrs	Don't know
Know						
Low-E coatings						
Tinting						
Frames with thermal break						
Krypton gas fills						
Low conductance spacers						
Mechanical window shades with timers or sensors						
Insulated shades						
Operable windows						

Question 21: Have you designed and/or installed energy efficient wall systems in your buildings?

Yes
No

Question 22: If you have employed light-colored exterior wall materials including light-colored paint into your buildings, what effect did this strategy have on ANNUAL energy usage?

	No effect	1-10% reduction	11-20% reduction	21-30% reduction	30+% reduction	Don't know
Annual energy use						

Question 23: If you have added exterior foam sheathing as continuous insulation to upgrade the wall thermal performance, what effect did this strategy have on ANNUAL energy usage?

	No effect	0-10% reduction	11-20% reduction	21-30% reduction	30+% reduction	Don't know
Annual energy use						

Question 24: Have you used roofing systems or technologies designed to decrease operational or maintenance expenses in your buildings?

Yes
No

Question 25: Based on your specific climate, rank the following strategies based on ability to reduce heat transfer through a roof, with 1= least reduction and 5= most reduction.

Additional rigid insulation
Application of reflective coating
Painting surface light color
Installation of vegetated roof over existing roof
Additional insulation AND reflective coating or light paint

Question 26: Rank the cost of adding the following alternatives to an existing roof, with 1= least cost per sq. ft. and 5= most per sq. ft.

Additional insulation
Application of reflective coating
Painting surface light color
Installation of vegetated roof over existing roof
Additional insulation AND reflective coating or light paint

Question 27: In most climates, the use of roofs with high solar reflectivity and thermal emittance ("cool roofs") is one of the most effective ways to reduce HVAC loads in a building. In your opinion, what is the main reason why black membrane roofs are still such a popular choice over their white counterparts? Choose one.

Lower installation costs
Greater availability
Better warranties
Greater durability (roof life)
Less maintenance required
Habit
Other
Don't know
Other (Please specify)

Question 28: The use of high performance roof cover boards has seen a resurgence due to improvements in their resistance to water and mold, extending the life of roof insulation and membrane. Considering installation, maintenance, warranty and all other associated costs, what is your estimate of the payback period for high-performance cover boards?

Under one year
1-3 years
4-6 years
7-9 years
10+ years
Don't know

Question 29: In your experience, how often do you have to maintain the following roof types?

	Never	Weekly	Monthly	Twice a year	Every year	Less than every year	Don't know
Asphalt-based							
Metal							
Single-ply rubber							
Other single-ply (PVC, TPO, etc.)							
Extensive green roof							
Intensive green roof							

Question 30: Rank the following in terms of payback period (installation, maintenance, replacement, utility costs) with 1=shortest payback and 6= longest payback period.

White PVC (polyvinyl chloride)
White CPE (chlorinated polyethylene)
White CPSE (chlorosulfonated polyethylene, e.g., Hypalon)
White TPO (thermoplastic polyolefin)
White elastomeric, polyurethane, or acrylic coatings
White reflective coating on asphalt-based roofs

Question 31: Rank the benefit of these roof detection tools, with 1= least beneficial and 4= most beneficial?

Infrared analysis
Electrical capacitance
Nuclear moisture detection
Electric Field Vector Mapping (EFVM)

Question 32: Have you been involved in the design and/or implementation of strategies aimed at improving the supply of heating, cooling or ventilation in a building?

Yes
No

Question 33: There are a number of ways to improve the energy performance of an existing building. In your opinion, how do the following technologies rank in terms of providing the greatest ANNUAL energy savings, with 1= least savings and 4= greatest.

Testing, Adjusting, and Balancing (TAB)
Building automation software
Energy modeling software
Value commissioning (VCx)

Question 34: Radiant and filtration barriers, when placed above the ductwork and below the roof assembly can create a semi-conditioned space for the ductwork. In your experience/opinion, to what extent do these barriers LOWER the following costs?

	No cost reduction	0-10% reduction	11-20% reduction	21-30% reduction	30+% reduction	Don't know
Annual HVAC maintenance costs						
Annual energy costs						
Overall HVAC replacement costs						

Question 35: An air economizer uses outdoor air for cooling in lieu of mechanical cooling when the temperature of the outdoor air is low enough to meet the cooling needs. Taking into consideration first costs, future replacement costs, and ongoing maintenance, what would you estimate to be the payback period of the air economizer?

Under 1 year
1-3 years
4-6 years
7-9 years
10+ years
Don't Know

Question 36: One strategy for controlling ventilation in an office building (with evenly-occupied zones) is the installation of carbon dioxide sensors in the return ductwork. In your opinion, to what extent can these sensors improve performance of the HVAC equipment, thus lowering annual energy costs, with 1= smallest extent and 5= largest extent?

	Smallest extent 1	2	3	4	Largest extent 5	Don't know
Carbon dioxide sensors						

Question 37: In your experience, does annual fan coil cleaning extend the life of the HVAC equipment?

No
Yes- under 1 year
Yes- 1-2 years
Yes- 3-5 years
Yes- 5+ years
Don't know

Question 38: One example of how different building systems can affect one another is the use of HVAC condensate for gray water building uses. In your experience, what reduction (%) in potable water use is typically achieved? Choose one building when answering.

None
0-20%
21-40%
41-60%
60+%
Don't Know

Question 39: Another example is the use of MERV (minimum efficiency reporting value) filters on return air handlers. While primarily viewed as improving Indoor Air Quality, MERV filters when upgraded from 14 to 15, can lower energy costs by reducing air flow restrictions for variable-air-volume system motors. In your experience/opinion, to what extent can this upgrade reduce your overall HVAC energy costs with 1= smallest extent to 5= largest extent?

	Smallest extent 1	2	3	4	Largest extent 5	Don't know
MERV upgrade						

Question 40: Are you involved in the design and/or maintenance of lighting systems?

Yes
No

Question 41: If you have incorporated highly reflective ceiling materials in your buildings, what was the effect on either projected or actual annual energy usage?

Increased usage
No effect
1-10% reduction
11-20% reduction
20+% reduction
Don't Know

Question 42: In your experience, which strategy produces the greatest energy savings in open plan office buildings?

Automatic time scheduling
Occupancy sensors (Manual ON/Automatic OFF)
Don't Know

Question 43: In your estimation, what increase in efficiency is achieved by retrofitting electromagnetic ballasts to high efficiency electronic-type?

No increase
1-10%
11-20%
21-30%
31-40%
40+%
Don't know

Question 44: In your experience/opinion, what increase in energy-efficiency can be achieved by retrofitting glass skylights with translucent insulated daylighting systems for existing buildings?

No increase
1-10%
11-20%
21-30%
31-40%
40+%
Don't Know

Question 45: In your opinion, would the strategies discussed in this survey be used by more commercial real estate investors and developers if cost and benefit information were more widely available?

Yes
No
Maybe
Don't know
Feel free to elaborate below

Question 46: What are the potential effects of a Low Hanging Fruit strategy on the USGBC's LEED™ green building rating system?

Discourage interest in LEED certification
No effect
Encourage interest in LEED certification
Other
Feel free to elaborate below

Question 47: Are there any Low Hanging Fruit-type strategies not addressed in this survey that you have used in your buildings? Please share them with us in the space below.

Congratulations! You have completed the survey! We will send you the results of the survey in the next few months as part of our research report. If you would like us to use a different email address, please enter it below:

Appendix 3

Investor Survey

1. What is the predominant property type that you own and/or develop?

Office
Industrial
Retail
Other (please specify)

2. Where are most of your buildings or developments located?

Northeast
Mid-Atlantic
Southeast/South
Midwest
Southwest/Rockies
West Coast
Alaska
Hawaii
US Territory
Canada
Mexico
Overseas
Multiple regions
Multiple regions (please specify)

3. How many square feet does your company currently own and/or have under development?

less than 100,000 sq. ft.
100,000-500,000 sq. ft.
501,000-1 million sq. ft.
1.01-2 million sq. ft.
2.01-5 million sq. ft.
5.01-10 million sq. ft.
10.01-20 million sq. ft.
20 million + sq. ft.
Don't know

4. What is the estimated total value of your company's portfolio?

Under $1 million
$1-5 million
$6-10 million
$11-20 million
$21-50 million
$51-100 million
$100+ million
Don't know

5. In purchasing or developing an investment property, what is your typical hold period?

	0-2 years	3-5 years	6-9 years	10-12 years	12+ years
Office					
Industrial					
Retail					
Other					
Other (please specify)					

6. When purchasing a project, what kind of return on assets (%) do you typically require based on your hold period (yrs)?

	Under 4%	4-6%	7-9%	10-13%	14-18%	18+%
0-2 years						
3-5 years						
6-9 years						
10-12 years						
12+ years						

7. What percentage would your required GOING-IN yields either increase or decrease when purchasing or developing a green building?

	-3% and below	-2 to -1%	No change	+1 to +2%	+3% and above	Don't know
ENERGY STAR						
LEED Certified						
LEED Silver						
LEED Gold						
LEED Platinum						

8. What percentage would your required EXIT yields either decrease or increase when selling a green building?

	-3% and below	-2 to -1%	No change	+1 to +2%	+3% and above	Don't know
ENERGY STAR						
LEED Certified						
LEED Silver						
LEED Gold						
LEED Platinum						

9. Please indicate the importance of the following reasons that would motivate you to buy or build a LEED building over a non-LEED building.

	Not important	Somewhat important	Very important	N/A
Marketing potential				
Lower utility costs				
Lower maintenance requirements				
Higher construction quality				
Reduced environmental impact				
Extended life of building systems				
Increase competitiveness				
Government incentives				

10. In your estimation, what percentage of your portfolio has achieved green status?

	None	1-5%	6-10%	11-20%	21-30%	30+%	Don't know
ENERGY STAR							
LEED							

11. Please check all green building features in which your tenants have expressed interest.

	Triple-net	Net except HVAC repair	Full-service gross	Response
Energy efficient lighting systems (i.e. automatic sensors)				
Energy efficient HVAC systems (i.e. building automation)				
Individual controls over lighting and temperature				
Energy saving window systems (i.e. highly insulated glass)				
Water saving devices (i.e. low-flow fixtures)				
High performance envelopes (highly insulated walls, roofs)				
Vegetated "green" roofs				
Availability of renewable energy sources (i.e. wind, solar)				
Green interior finishes (i.e. low VOC products)				
Recycling facilities				
Incentives to use green vehicles				
Other (please specify)				

12. Please indicate how you could benefit from application of "Low Hanging Fruit" strategies. Check all that apply.

Obtain better financing terms
Increase leverage
Reduce equity requirements
Renegotiate maintenance contracts
Market building performance to tenants and buyers
Increase investor distributions
Renegotiate lease agreements
Apply for government incentives
Change capital expenditure schedule
Other
Other (please specify)

13. Would implementing a "Low Hanging Fruit" type strategy affect your decision to apply for LEED certification?

Discourage interest in LEED certification
No effect
Encourage interest in LEED certification
Other – Please elaborate in the space below.

14. Are there any cost-effective strategies that you have used in your buildings that you would like to share?

Congratulations! You have completed the survey! We will send you the results of the survey in the next few months as part of our research report. If you would like us to use a different email address, please enter it below:

Appendix 4

Glossary:

Air economizers – A duct or damper arrangement and automatic control system that together allow the use of outside air directly to reduce or eliminate the need for mechanical cooling during mild or cold weather.

CFL – a small, compact fluorescent lamp, with a single base that provides the entire mechanical support function.

CPSE – Chlorosulfonated polyethylene is a self-curing elastomer, single-ply roofing material, used as a liquid coating or a membrane sheet.

Electromagnetic and electric ballasts – Electromagnetic ballasts use electromagnetic induction to provide the starting and operating voltages of a gas discharge light. They limit the flow of current to the light but do not change the frequency of the input power. The lamp then illuminates on each half-cycle of the power source, which can cause flickering. Electronic ballasts are a more modern type of lighting ballast using solid-state circuitry to transform voltage. Unlike electromagnetic ballasts, electronic ballasts can also alter the frequency of power, which greatly reduce or eliminate any flicker in the lamps. Because it uses solid-state circuitry instead of magnetic coils, electronic ballasts are more efficient and run cooler.

Enthalpy control – In an air economizer system, the enthalpy control checks to see if both the temperature (sensible heat) and the humidity (latent heat) are low enough to be used for cooling.

Green interior finishes – Environmentally friendly wall coverings, ceilings and flooring materials. Does not typically include furniture.

Krypton gas fills – Krypton gas placed between window or skylight glazing panes to reduce the U-factor by suppressing conduction and convection.

Low conductance spacers – Spacers hold apart layers of glass of a window unit. Low –conductance spacers refer to spacers made of materials, which conduct heat less and therefore, reduce heat loss.

Low-emittance (Low-E) coatings – Microscopically thin, virtually invisible, metal or metallic oxide layers deposited on a window or skylight glazing surface primarily to reduce the U-factor by suppressing radiative heat flow.

Solar Heat Gain – Solar radiation admitted through a window or skylight, both directly transmitted, and absorbed and subsequently released inward.

Thermal Break – An element of low conductance placed between elements of higher conductance to reduce the flow of heat. Often used in aluminum windows.

TPO – Thermoplastic polyolefin is a polymer-based, single-ply membrane used in the roofing industry.

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2201 Cooperative Way, 3rd Floor
Herndon, VA 20171-3034

tel 703.904.7100
www.naioprf.org