

# Green Buildings Research White Paper

Fifth in a Series of Annual Reports on the Green Building Movement

## Where Building Owners, End Users, and AEC Professionals Stand on Sustainability and Green Building

This White Paper reports the results of 12 exclusive research studies of building owners, facility directors, end users, and AEC professionals in key sectors of the U.S. construction industry: healthcare, corporate offices, schools, higher education, hospitality, and residential.

In the following pages, you will learn where hospital officials, K-12 facilities directors, university planners, corporate real estate directors, school business managers, campus planners, hotel and restaurant executives, home builders, architects, engineers, and contractors stand on key questions related to green buildings:

- Do owners, end-users, and AEC professionals believe that green buildings cost more to build than conventional buildings?
- Do green buildings provide health and productivity benefits to occupants that other buildings do not?
- How much more would owners and end-users be willing to pay to have a sustainable school, hospital, university residence hall, restaurant, hotel, home, or office building?
- Are school boards, college trustees, hospital administrators, corporate real estate directors, home buyers, hoteliers, and restaurateurs more willing to invest in green building today than they were three or four years ago?
- Do the more than 2,500 respondents to these surveys believe their firms or organizations will be left behind if they do not become active in green building?

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Jean-Marc Lechêne  
President, Cement, North America Region



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# 1. AEC Industry Continues to Embrace Green Building, But Is It Still Only a Niche?

## Methodology

In August 2007, *Building Design+Construction* conducted an online survey of a scientifically drawn sample of 10,000 recipients of *BD+C* to determine their opinions, perceptions, and actions relative to sustainable design and green building. Eligibility to enter a drawing for a \$100 gift certificate was offered as an incentive. Valid responses were received from 631 respondents, compared to 872 in 2006, 524 in 2004, and 498 in 2003. In general, survey respondents represent the broader U.S. architecture, engineering, contractor, and building owner/developer community. For the most part, the 2007 survey questions duplicated those in previous *BD+C* Green Building Surveys conducted in 2003, 2004, and 2006; a few new questions were added this year. With more than 2,500 total respondents for all of the surveys conducted for this White Paper, the combined research represents the most rigorous data available on the attitudes and actions of the AEC community with regard to green building.

**W**hat a difference four years can make! In 2003, when *Building Design+Construction* conducted its first exclusive survey of where architects, engineers, contractors, and building owners stood on green building, fewer than one in 10 respondents (9%) said they considered their firms to be “very experienced” in sustainability. At the same time, one-third of those surveyed (33%) thought their firms were “somewhat” experienced in sustainable projects.

Over the course of succeeding surveys, in 2004, 2006, and this past August, the reported experience level moved up steadily (chart 1.2). By this year’s count, one in six respondents (16%) felt their firms were now “very” experienced in sustainable projects—a steady climb from ’04 (12%) to ’06 (14%), and significantly greater than the 9% recorded in 2003.

Looked at from the reverse angle, the percentage of respondents who said their firms had “no experience” or “little or no interest” in sustainable design declined from 19% in 2003, to just 4% in the most recent tally—another heartening finding for the green building movement.

Other results reinforce the growing interest in sustainability. More than 42,000 AEC professionals can now put “LEED Accredited Professional” after their names, a phenomenon reflected in the steady rise in LEED APs in our surveys—from 4% in 2003, to 17% today (chart 1.3).

Yet the most tangible piece of evidence in support of green building is this: in our first survey (2003), with

LEED for New Construction in place for barely three years, only one in nine respondents (11%) said their firms had successfully completed a LEED-certified project; in the current survey, one in four (25%) said their firms had put at least one U.S. Green Building Council LEED

Chart 1.1  
Where respondents work

	2007	2006	2004	2003
Architecture firm	34%	26%	30%	23%
General contractor/CM firm	16%	9%	7%	6%
Design/build firm	10%	6%	6%	7%
Owner/developer	8%	5%	5%	5%
Architecture/engineering firm	8%	12%	11%	12%
Government agency	5%	7%	7%	9%
Facility manager	3%	3%	3%	4%
Consultant	2%	2%	3%	3%
Project management	2%	1%	2%	1%
Engineering firm	2%	14%	10%	11%
Engineering/architecture firm	2%	5%	3%	5%
University/academia	1%	1%	2%	2%
Other	4%	5%	4%	4%
	Base: 631	Base: 872	Base: 523	Base: 495
	BD+C Green Building Surveys, 09/03, 09/04, 09/06, 08/07			
	© Reed Business Information			

BD&C’s Green Building Surveys represent the most comprehensive long-range study of the opinions and activity of the U.S. AEC community with regard to green building and sustainability. The 2007 survey, the fourth in a series of these longitudinal studies, shows a statistically significant increase in the number of architecture firm (34%) and contractor respondents (16%) compared to previous years, as well as a slight uptick in those from design/build firms (10%). The respondents represent a broad cross-section of the U.S. nonresidential building industry.

## Principal findings of the 2007 survey

- Ninety-four percent of respondents said the trend in sustainable building projects is “growing.”
- Nearly two-thirds of respondents (64%) said their firms were “very” or “somewhat” experienced in green building.
- One-fourth of those with green building experience were at firms that had achieved LEED certification for at least one project.
- “First cost” was a serious roadblock for respondents. Nearly four in five (78%) said their clients thought sustainability added “significantly” to first costs. By an even greater margin (86%), respondents themselves said they thought green buildings more costly to build than conventional buildings.
- Daylighting, automated lighting controls, recycled building materials, energy management, and low-VOC paints and finishes were the most highly used green elements in respondents’ projects.
- Nearly a third of respondents (31%) said they have trouble sourcing green products. There is still uncertainty in the marketplace as to what constitutes “green.”

plaque on a building (chart 1.3).

All of these results represent good news for the green building movement and for its advocates: the U.S. Green Building Council (promulgator of LEED), the Green Building Initiative (with its Green Globes rating program), the American Institute of Architects (whose Committee on the Environment has championed sustainability for more than three decades), and the numerous product certification systems that have sprung up to measure the “greenness” of building products—the EPA’s Energy Star system, Greenguard, the Carpet & Rug Institute, FloorScore, Scientific Certification System, and, more recently, MBDC’s Cradle to Cradle (C2C) Certification.

But while the curve in “market transformation”—the motto the USGBC uses to codify its chief goal—is up and to the right, the slope is a lot less steep than green building proponents might have hoped for. In launching LEED for New Construction in 2000, the USGBC stated that it would seek to have 25% of new projects certified under LEED; however, it has fallen far short of that mark, in terms of the total nonresidential construction market. Conservatively, something on the order of 20,000 commercial, industrial, and institutional buildings are constructed in the U.S. annually; that would put the total of such new buildings since 2000 in the 120,000-140,000 range. Thus, with 1,097 projects (including those outside the U.S. and Canada) certified

since 2000 for all programs—not just LEED for New Construction (820), but also LEED for Existing Buildings (59), Commercial Interiors (170), and Core & Shell (48)—LEED-certified buildings apparently represent less than 1% of the U.S. construction market.\*

It is true that the number of projects registered with LEED—7,711, as of October 4, 2007—would start to bring that impact factor more in the 5-7% range. However, many projects that register with LEED never complete the certification process—no one knows how many, since the USGBC doesn’t release that data. On the other hand, there are many projects that sidestep the LEED process but probably would have qualified for certification. To what extent these two factors cancel each other out is anyone’s guess.

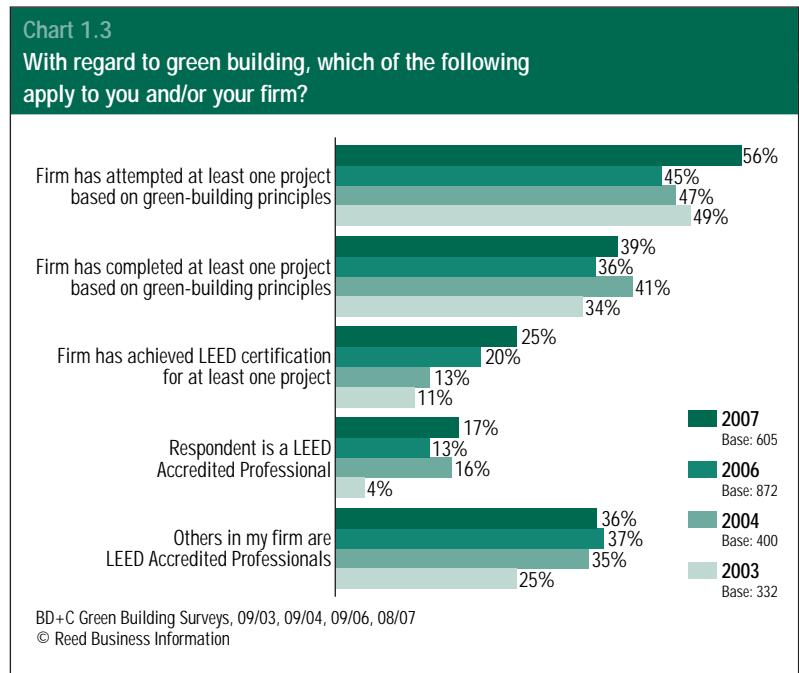
*\*Another 336 homes have been certified under LEED-H, but this represents a minuscule portion of the 1.3-2.0 million annual U.S. new housing construction. Source: U.S. Green Building Council, October 2007.*

### Assessing the financial benefit of green building on AEC firms

To get a more tangible—or more pecuniary—measure of green building activity in the AEC industry, this year for the first time we asked our readers to estimate the approximate dollar impact of green building on their businesses (chart 1.4). A significant majority of respondents (61%) said sustainable building projects represented less than 25% of their firms’ annual dollar volume, with another 15% saying they fell in the second quartile (25-49%). A minority of respondents (10%) stated that green building contributed half or more of their

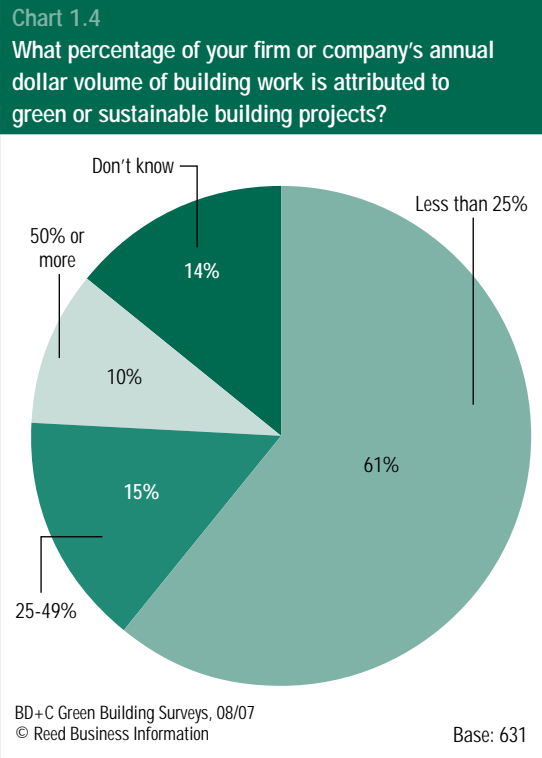


AEC firms’ experience in green building continues to grow, judging by survey data. The percentage of respondents who said their firms were “very” or “somewhat” experienced in sustainable projects grew significantly to 64%—nearly two out of three—reflecting a steady climb from 42% in 2003, 49% in 2004, and 59% last year. Still, those classifying their firms as “very experienced” remain a minority (16%), indicating that green building may still be considered a niche. At the same time, responses for firms that had no experience or little or no interest in sustainable projects continued to decline (4% in 2007, 9% in 2006, 13% in 2004, 19% in 2003).



One in four respondents (25%) reported that their firms had achieved LEED certification for at least one product, a significant step upward since 2003 (11%). For the first time, the percentage of respondents who stated that their firms had attempted at least one project based on green building principles tipped over into the majority (56%). The steady growth of respondents who had achieved LEED Accredited Professional status (4% in 2003 to 17% in 2007) also bespeaks greater involvement in green building among AEC professionals.

'The most tangible piece of evidence in support of green building is this: One in four respondents said their firms had put at least one U.S. Green Building Council LEED plaque on a building.'



This question, new to our White Paper surveys this year, adds weight to the argument that green building represents a niche opportunity for the majority (61%) of AEC firms, while an apparently aggressive group of firms (10%) seems to have jumped feet first into the sustainability fray.

**Chart 1.5**  
Has acquiring sustainable building expertise helped your firm attract new clients or projects?

	2007	2006	2004	2003
Yes	43%	39%	36%	32%
	Base: 631	Base: 856	Base: 468	Base: 423
<b>If so, how much?</b>				
Significant amount of new business	10%	11%	11%	6%
Some new business	41%	53%	40%	43%
Minor amount of new business	49%	36%	49%	52%
	Base: 269	Base: 337	Base: 164	Base: 126

BD+C White Paper Surveys, 09/03, 09/04, 09/06, 08/07  
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Over the past four years, expertise in green building has not led to a great influx of new business for AEC firms. The percentage of respondents who said that "being green" had helped their firms get new business was up slightly—to 43% in 2007, from 39% in 2006—but those reporting "significant" new business were a distinct minority (10%).

In response to a separate question, 45% said sustainable design expertise had helped their firms retain existing clients, compared to 42% in 2006—not a statistically significant difference; 46% said such expertise had helped their firms differentiate themselves from others, a significant difference from the 39% who reported this factor in 2006.

revenues. (Fourteen percent said they didn't know how much green building affected their revenue streams.)

This new set of findings seems to correlate with longitudinal data over the period 2003-2007. When we asked, "Has acquiring sustainable building expertise helped your firm attract new clients or projects?" (chart 1.5), 43% of this year's 631 respondents said it had, up slightly from 2006 (39%) and significantly from '04 (36%) and '03 (32%). In other words, green knowledge and skill could be viewed as bringing in the green.

But when we followed up with the 269 respondents who said such expertise had brought in new business, once again this group indicated a somewhat lukewarm response to green building from clients and prospects. Only 10% said green building expertise had brought in a "significant" amount of new business, with nearly half (49%) stating that they had benefited from only a "minor" amount of new business; the rest (41%) said expertise in sustainability had rung up "some" new business. These findings have remained fairly consistent over the last four years, and reinforce the argument that most AEC firms are not getting rich from their green building portfolios.

In fact, we know from anecdotal experience that a number of firms in *Building Design+Construction's* "Giants 300" list are betting that green building expertise and experience will differentiate them in the marketplace.

Large architecture firms are pushing their staffs to become LEED accredited. Among the *BD+C* Giants, Perkins+Will leads the way with 753 LEED APs, representing 61% of its staff. Gensler, the largest AEC firm by revenue (\$421 million in 2006), has 575 LEED APs, and such design firms as HOK, SmithGroup, HDR, Mithun, HKS, Harley Ellis Devereaux, and OWP/P are all planting the green flag. Among engineers, Arup, Environmental Services Design, and Stantec are strutting their sustainability credentials. Contractors Turner, Swinerton, Skanska, DPR Construction, Consigli, Gilbane, and Shawmut are making great strides in sustainable expertise. Today, the leading firms routinely divert 80-90% of construction and demolition waste from landfill—a remarkable achievement, considering that hardly any such recycling was going on as recently as five or six years ago.

Another factor that may be at work here is that more and more firms, both big and small, tell us that they are

just “doing green” routinely, without making a big fuss over it, or that they have “always” practiced that way; that is, they claim to have integrated sustainable design and construction into everyday practice. If this is truly the case, then it is a victory for those who advocate (as we do at *BD+C*) early and integrated involvement of the entire Building Team in projects.

Nonetheless, most of this year’s respondents claimed to perceive various forms of resistance to green building among their paying clients (chart 1.6). When asked to describe barriers to incorporating sustainability into their projects, more than three-quarters of respondents (78%) clicked the button marked “Adds significantly to first costs”—a remarkable (and statistically significant) jump from the year before (56%). This finding was backed up by the 60% who said the “market [is] not willing to pay a premium” for green building. Only a small percentage (4%) said sustainable design was not seen as a barrier among their clients and prospects.

### Still concerned about first costs

To drill down on the first-cost issue, this year we asked respondents (chart 1.7) whether they (not their clients) thought it would cost more to build a typical green project (for example, LEED certified) versus a “conventional” building. The result was astounding: 86% said they thought the green building would be more costly, with only a smattering (1%) saying a green building would cost less to build, and the remainder (13%) saying the costs would be about equal.

We then asked the 541 who replied that green buildings cost more to build than conventional ones what they thought the premium would be. The median differential range was an additional 6-10%; more than four in 10 (41%) stated that they thought green buildings would run more than 10% additional in cost compared to nongreen projects.

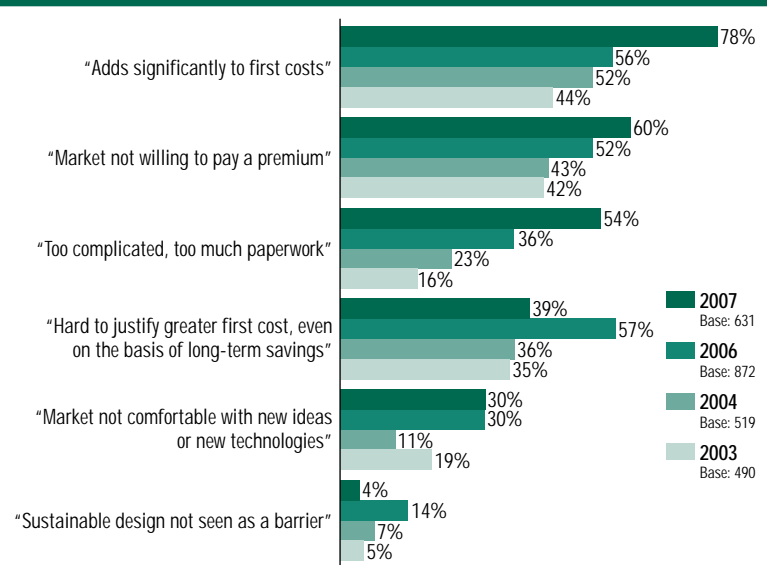
These findings are somewhat discouraging, especially in light of anecdotal evidence from experienced green building firms who tell us that a baseline green project—for example, one that could gain LEED certification or one Green Globe—should be deliverable within a conventional budget range. (The exception would be very high-end projects featuring a lot of elaborate “add-ons” with long-term paybacks, such as active photovoltaics.) Today, nearly a decade into the green building movement, the rule of thumb for experienced Building Teams is that most code-compliant new buildings probably could achieve 15 or 16 LEED points, and that getting another 10-11 points to achieve certification is usually not that difficult—especially when you get a point for having a LEED Accredited Professional on the team and another for the notorious “bike rack” credit.

This makes it even harder to understand why, accord-

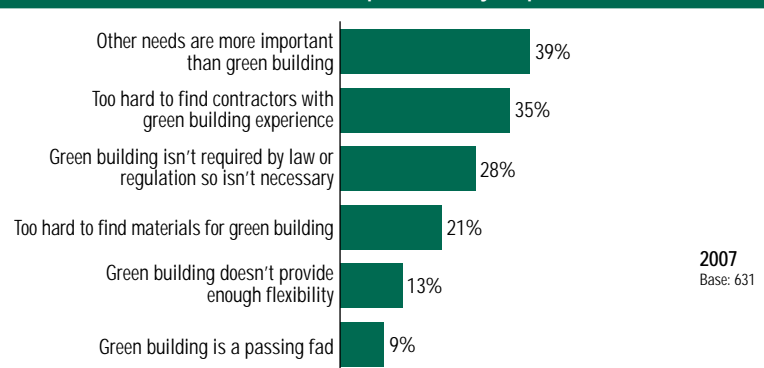
**‘If AEC firms misjudge the direction of the market and green building takes off, their laissez-faire stance could be a sure ticket to oblivion.’**

Chart 1.6

What are building owners and developers saying about barriers to incorporating sustainable or green design into their projects?



### Other concerns of owners and developers cited by respondents



BD+C Green Building Surveys, 08/07  
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When will the “first-cost bogeyman” go away? Despite numerous studies showing that green buildings need not cost more (or much more) than conventional buildings, and in the face of pragmatic experience from many AEC firms that are doing sustainable projects without cost increments, more than three-fourths of respondents (78%) cited client fear of additional first cost as the main obstacle to greening their projects. This is a huge leap from previous years (56% in 2006) and, coupled with the finding that 60% said the “market is not willing to pay a premium,” it indicates that the AEC community has a huge selling job on its hands to convince many owners and developers that sustainable development can be done affordably.

In answering a new set of questions for 2007, respondents pointed to “other needs” as being more important than green building to owners and developers.

1 *"The Cost of Green Revisited: Reexamining the Feasibility and Cost Impact of Sustainable Design in the Light of Increased Market Adoption,"* Lisa Fay Matthiessen and Peter Morris, Davis Langdon, July 2007.

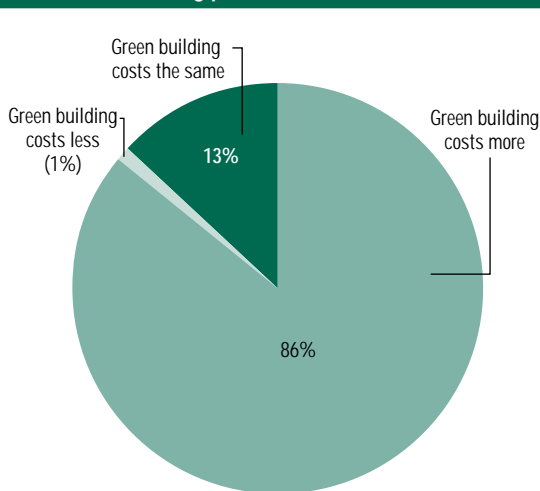
2 *"Costing Green: A Comprehensive Cost Database and Budgeting Methodology,"* Lisa Fay Matthiessen and Peter Morris, Davis Langdon, September 2004. [www.davislangdon-usa.com/pdf/USA/2004CostingGreen.pdf](http://www.davislangdon-usa.com/pdf/USA/2004CostingGreen.pdf)

3 *Of which two are notable: The "Kats" report, after its principal author, Greg Kats ("The Costs and Financial Benefits of Green Buildings: A Report to California's Sustainable Building Task Force,"* October 2003, [http://ectd.lbl.gov/emills/PUBS/PDF/Green\\_Buildings.pdf](http://ectd.lbl.gov/emills/PUBS/PDF/Green_Buildings.pdf), and "GSA LEED Cost Study: Final Report," Steven Winter Associates Inc., October 2004, [www.wbdg.org/cb/GSAMAN/gsaleed.pdf](http://www.wbdg.org/cb/GSAMAN/gsaleed.pdf).

ing to our respondents, clients and prospective clients still seem spooked by the green "first-cost" specter. Added to the anecdotal evidence is more rigorous analysis that additional "first cost" is more apparition than reality. This comes from a recent report<sup>1</sup> by Lisa Fay Matthiessen and Peter Morris of Davis Langdon, a follow-up to the real estate consulting firm's earlier study of the costs of green building.<sup>2</sup> The authors' chief findings:

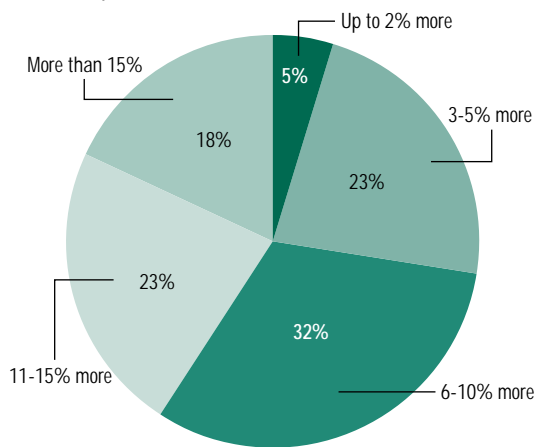
1. Many projects are achieving LEED within their budgets, and in the same cost range as non-LEED projects.
2. Construction costs have risen dramatically, but projects are still achieving LEED.
3. The idea that green is an added feature continues to be a problem.

**Chart 1.7**  
How does the initial cost of a green or sustainable building (i.e., LEED certified) compare to the cost of a building that does not employ green or sustainable building practices?



BD+C Green Building Survey, 08/07  
© Reed Business Information Base: 631

**If "more," how much more?**



BD+C Green Building Survey, 08/07  
© Reed Business Information Base: 541

The overwhelming belief among respondents that green buildings cost more than conventional buildings—86%!—is truly remarkable, especially in light of authoritative research studies showing that green projects, even ones in the LEED Silver category, can be done at little or no additional cost. Forty-one percent of this group put the additional cost at greater than 10%, despite evidence from the field that few green projects have had such a high incremental cost.

The authors conclude: "The 2006 study shows essentially the same results as 2004: there is no significant difference in average costs for green buildings as compared to non-green buildings. Many project teams are building green buildings with little or no added cost, and with budgets well within the cost range of non-green buildings with similar programs."

On the one hand, therefore, we have growing anecdotal evidence from the field (as well as data from various well-respected reports<sup>3</sup> cited in previous *BD+C* White Papers) to make the case that good-quality green building can be done within reasonable budgetary constraints. On top of that comes the highly respected consulting firm Davis Langdon stating categorically that there is no significant cost differential between green and non-green projects. Yet more than three out of four of our *BD+C* survey respondents see their clients unnerved by the prospect, however unrealistic, of higher first costs. This perceived client aversion to higher first costs from green building may be enough to keep AEC firms from structuring sustainable design and construction principles and practices into their proposals. If clients are fearful of the costs of green building, why upset the apple cart?

**The tried-and-true, the unconverted, and the bulge in the middle**

Looking broadly at the data from all four Green Building Surveys, the argument could be made that the classic bell-shaped curve is at work here. At one end of the curve are the nonbelievers, perhaps 10-15% of AEC professionals and firms who couldn't care less about green building, or think it's a passing fad, or who are otherwise disengaged; at the other end are the 10-15% of true believers who see green in everything they do.

That leaves a dromedarian hump in the center of the frame, some 70-80% of design and construction professionals and firms who are "somewhat" interested or motivated, but who have yet to be convinced that green building is right for themselves or their clients. Many firms in this group are standing on the sidelines, waiting for a signal to enter the game. Others are dipping their toes into a green project or two to test the waters. For whatever reason, however, many firms are just not buy-



## 'Looking ahead, more than four in five AEC professionals said their firms would be "somewhat" or "significantly" more active in green building in the next two or three years.'

ing into the "transformational" aspect of green building. Why is this so? Why, assuming our data is valid (and we have no reason to doubt it), are so many AEC firms still spectators when it comes to green building?

One reason may be that, given today's hectic—some would say frantic—pace of construction activity, business is so good that these firms can simply ignore the sustainability issue and still get plenty of work. Maybe they and their clients have more overriding concerns; in fact, 39% of respondents said that their clients would consider "other needs" more important than green building (chart 1.6). Or perhaps inertia is the problem: "This is the way we've always done it," these respondents are saying, in reference to how their firms approach the market, "and until our clients tell us otherwise (or the world turns upside down), we'll keep doing it this way."

Of course, if AEC firms misjudge the direction of the market and green building takes off, their laissez-faire stance could be a sure ticket to oblivion. In fact, survey data indicates that they are aware of this dilemma. When we asked respondents to agree or disagree with the state-

ment "My firm or organization will be left behind if it does not become active in green building and sustainable design" (chart 1.8), 61% agreed; 29% gave it a 4 ("agree"), 32% gave it a 5 ("strongly agree"). Nor do we mean to imply that the great bulk of AEC firms are purposely ignoring market signals that point to greater client acceptance of green building.<sup>4</sup>

It is remarkable, however, that with all the publicity green building has received in the last few years, coupled with all the recent publicity about climate change, so many survey respondents still seem cowed by their clients' phobia of higher first costs for green buildings. Clearly, many AEC firms need to do a better job of informing their client base of the benefits of green building and their own ability to keep costs in line.

This shortcoming is especially troubling in light of the response (chart 1.8) to a new question in the 2007 survey. This year, we asked respondents to rate their agreement with this statement: "Clients are more willing than they were 3-4 years ago to invest in green building projects." Twenty-three percent of respondents gave

<sup>4</sup> *The growing acceptance of the "new reality" of green building by the financial, corporate, and real estate development sectors is more fully developed in our November 2006 White Paper, "Green Buildings and the Bottom Line."* [www.BDCnetwork.com/whitepaper](http://www.BDCnetwork.com/whitepaper)

\* See "40,000 LEED APs and Counting," *Building Design+Construction*, July 2007, p. 71. <http://www.bdcnetwork.com/article/CA6459403.html>

Chart 1.8

### Key finding: Green buildings seen as healthier for occupants than conventional buildings

	2007	2006	2004	2003
Green buildings are healthier for occupants than conventional buildings	4.01	4.13	3.95	3.68
Owners should receive tax and/or other financial incentives for building sustainable buildings	4.00	4.27	4.14	3.86
Green buildings significantly reduce energy costs	3.92	4.13	3.92	3.76
The Federal government should devote more funding and support to green-building technology	3.77	3.98	3.76	3.41
My firm or organization will be left behind if it does not become active in green building and sustainable design	3.73	3.65	3.38	3.03
Clients are more willing today than they were 3-4 years ago to invest in green or sustainable building projects*	3.73	-	-	-
State and local building code authorities should adopt sustainability standards for new construction	3.65	4.08	3.77	3.57
Building a structure using sustainable design improves the overall quality and design of the building	3.65	3.74	3.59	3.32
Green buildings save money by reusing and recycling materials	3.41	3.67	3.40	3.34
Green buildings enhance worker productivity and job satisfaction	3.39	3.76	3.53	3.22
The life cycle cost of green buildings is less than that of comparable conventional buildings*	3.38	-	-	-
Green buildings are more profitable than comparable conventional buildings**	3.03	3.24	-	-
Green buildings cost no more to build than conventional buildings	2.49	3.00	2.63	2.74
	Base: 631	Base: 872	Base: 523	Base: 495

BD+C Green Building Surveys, 09/03, 09/04, 09/06, 08/07  
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\*New question in 2007 survey.  
\*\*New question in 2006 survey.

Scoring 4 or more on a 5-point scale in these surveys is a strong indicator of belief on the part of respondents. Thus, the top two scores for 2007—that green buildings are healthier for occupants than "conventional" buildings (4.01), and that owners and developer should get special tax treatment for doing green buildings (4.00)—indicate strong support for these statements. Due to sample size, most differences from year to year are not statistically significant; overall results are largely consistent from year to year. Note: A mean score of 3.00 (on a scale of 5) would be considered neutral.

A new item for 2007—"Clients are more willing than they were 3-4 years ago to invest in green building projects"—gained a respectable 3.73 score, with 23% of respondents giving it a 5 ("strongly agree").

## Green building and the Talent War

AEC firms are ramping up their recruitment of professionals with green building work under their belts. This year, 24% of respondents said their firms had made an effort to hire professionals with sustainability experience—a significant jump from the 15% recorded just one year ago (chart 1.12, p. 12). This may be a reflection of the industrywide talent shortfall, which is currently the greatest barrier to growth among AEC firms. In fact, staffing shortages were found to be a growing factor thwarting firms from doing green projects: Nearly one in four respondents (24%) stated that “insufficient staff” had led their firms to forgo attempting a green building project (chart 1.9).

it their highest rating, 5 (“strongly agree”); overall, the statement garnered a positive 3.73. This finding should

**Chart 1.9**  
Have you tried to persuade clients or your organization to attempt a green building project?

	2007	2006	2004	2003
Yes	74%	66%	54%	42%
Base: 631 Base: 872 Base: 519 Base: 486				
<b>If yes, what happened?</b>				
Incorporated sustainable elements in a project but did not register it	54%	54%	40%	37%
Working on a sustainable design project	43%	35%	36%	35%
Looked at sustainable design principles, but did not employ them	35%	39%	34%	40%
Completed a sustainable design project	24%	21%	28%	20%
Base: 468 Base: 571 Base: 277 Base: 205				
<b>If no, why not?</b>				
“Perceived lack of interest by client or firm’s own management”	39%	39%	44%	41%
“Insufficient budget”	36%	32%	31%	29%
“Not sure of payoff”	34%	33%	26%	30%
“Not required”	31%	45%	35%	41%
“Insufficient staff”	24%	10%	17%	16%
Base: 163 Base: 301 Base: 231 Base: 260				
BD+C Green Building Surveys, 09/03, 09/04, 09/06, 08/07 © Reed Business Information				

A steadily growing percentage of respondents (74% in 2007, versus 42% in 2003) reported “pushing” green to either clients or their own firms. Of those who were advocating sustainability to clients or their firms, 26% were rebuffed for various reasons, most interestingly “insufficient staff.” This finding may be a reflection of the general shortage of qualified professionals being reported by AEC firms.

provide encouragement to those who, while aware of the brouhaha surrounding initial cost, are nonetheless sufficiently heartened to push the case for green building to their clients and prospects.

## AEC firms on the right road, although it may be a bit bumpy

Looking ahead, more than four in five AEC professionals (82%) said their firms would be “somewhat” or “significantly” more active in green building in the next two or three years (chart 1.10). Very few (3%) predicted their firms would be less active or not active at all in green building, with the remainder (14%) holding to the status quo (which itself could vary, depending on the respondent firm’s current level of activity). On a more positive note, three in four respondents (75%) gave high scores (4 or 5 on a 5-point scale) to a new question in the 2007 survey (chart 1.11), “What level of consideration

**Chart 1.10**  
How active in green building will your firm be in 2-3 years?

	2007	2006	2004	2003
Significantly more active	37%	30%	24%	16%
Somewhat more active	45%	47%	46%	44%
About the same as today	14%	18%	21%	26%
Less active	1%	1%	2%	2%
Not active at all in green building	2%	3%	6%	12%
Base: 631 Base: 863 Base: 508 Base: 489				
BD+C Green Building Surveys, 09/03, 09/04, 09/06, 08/07 © Reed Business Information				

A growing percentage of respondents (37% in 2007, versus 16% in 2003) saw their firms becoming “significantly more active” in green building in the next 2-3 years. Only a scattering (3%) said their organizations would be “less active” or “not active.” The response “About the same as today” may be ambiguous, since it does not indicate how active in green building the individual respondent’s firm already may be.

## More on first costs from the Davis Langdon study

In “The Cost of Green Revisited: Reexamining the Feasibility and Cost Impact of Sustainable Design in the Light of Increased Market Adoption,” Davis Langdon’s Lisa Fay Matthiessen and Peter Morris reviewed their own 2004 report on the initial costs of green building. Some additional findings from the new analysis:

- In many areas of the country, contractors have “embraced” sustainability and are no longer bumping up their bids to cover what they once perceived as higher costs for green building.
- Building Teams are using common sense in their choice of green strategies. In general, they are achieving LEED certification by using lower-cost technologies, while forgoing more elaborate and expensive strategies.
- Building Teams are taking a conservative approach to energy conservation. Matthiessen and Morris report that “few projects attempt to reach higher levels of energy reduction beyond what is required by local ordinances, or beyond what can be achieved with a minimum of cost impact.”
- Some Building Teams, especially less experienced teams shooting for LEED Gold or Platinum, continue to see sustainability as an add-on that justifies added cost. “Until design teams understand that green design is not additive, it will be difficult to overcome the notion that green costs more, especially in an era of rapid cost escalation,” the authors write.
- While average construction costs have risen 25-30% in the past three years, many projects continue to achieve LEED standards with budget.



### Defining Rooftop Sustainability

In the commercial roofing industry, reflectivity has been the dominant discussion point for several years, and the Duro-Last® Cool Zone® roofing system has set the standard for single-ply roof reflectivity and the resulting energy savings. Now the term “sustainability” is receiving a lot of attention, and once again, Duro-Last is raising the bar.

What does sustainability really mean for building owners, facility managers, architects, and other specifiers? For a roofing system to be considered sustainable, it must deliver the Five E's of high-performance roofing:

- Energy – With energy costs continuing to rise, it's more important than ever to select a roof that can reduce energy use and improve a building's efficiency in any climate.
- Environment – High-performance roofing minimizes the impact on the Earth's environment throughout the roof's life, while also helping to maintain a healthy, productive environment inside the building.
- Endurance – A high-performance roof meets or exceeds performance requirements for long life: all-weather reliability; chemical, fire, and puncture resistance; and ease of maintenance and repair.
- Economics – A high-performance roof has to make economic sense, not just at the time of purchase, but also in the long run. A true economic comparison analyzes the cost of a roof throughout its life-cycle.
- Engineering – Utilizing the right materials, design, and manufacturing process is the key enabler of the other four E's, resulting in a complete, integrated roofing system that can be installed quickly and easily and performs reliably over the long run.

Sustainable roofing is one of those rare cases where there does not have to be a tradeoff between “green” and performance, or “green” and cost. Sustainable roofing systems cost less over time because they reduce energy bills, minimize environmental impact, require less maintenance, and keep the weather outside, where it belongs. Case in point: the Cool Zone roofing system is a protective, performance-enhancing umbrella that protects buildings from the elements, reduces energy requirements, enables uninterrupted facility operations, and contributes to the health and productivity of the building occupants.

When you consider the Five E's, alone and together, sustainable roofing takes on a new meaning, and one very good definition emerges: the Duro-Last Cool Zone roofing system.

To learn more about the Five E's of high performance roofing, I invite you to visit our website at <http://www.duro-last.com/coolzone/>. Also, feel free to contact me with questions or comments at 800-248-0280, or [tholling@duro-last.com](mailto:tholling@duro-last.com).

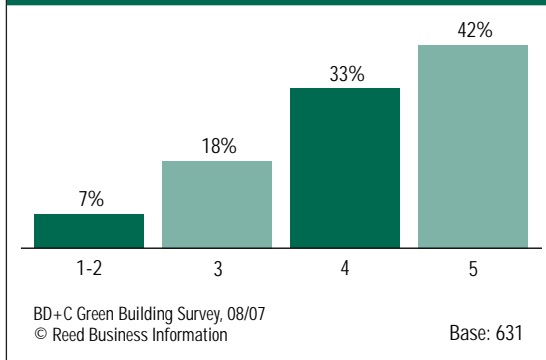
A handwritten signature in black ink, appearing to read "Thomas G. Hollingsworth".

Thomas G. Hollingsworth  
President  
Duro-Last Roofing, Inc.

should be given to sustainable or green design when a major building project is being contemplated?” Forty-two percent gave this response a 5 “strong” agreement.

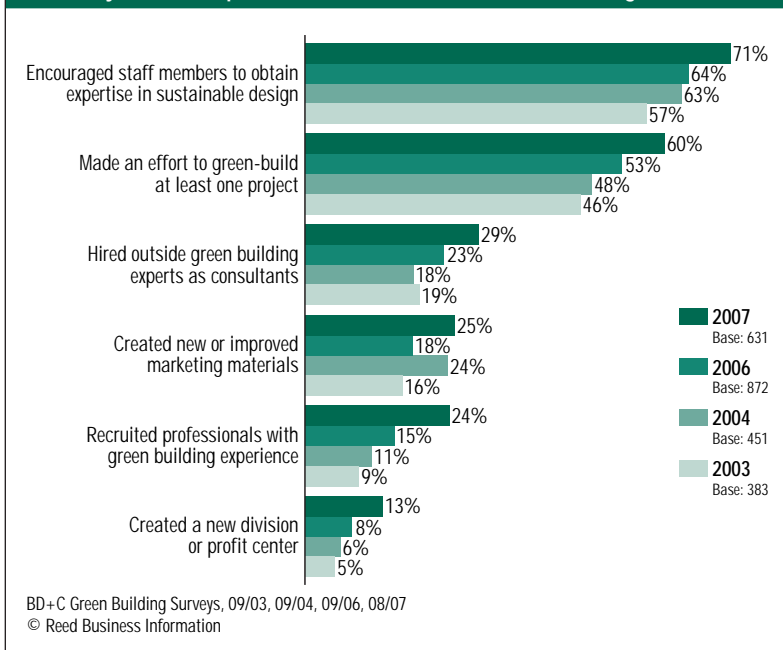
However, whether this positive attitude toward green building will translate into a windfall for AEC firms remains uncertain (chart 1.13). More than half of all

**Chart 1.11**  
What level of consideration should be given to sustainable/green design when a major building project is being contemplated? (5-point scale)



Three-fourths of respondents (75%) gave sustainability high marks for consideration (4 or 5 on a 5-point scale) when a project is just starting. Only a few gave it low marks (1 = 2%, 2 = 5%). However, based on other evidence, there is a significant gap between “consideration” of green design and actual implementation.

**Chart 1.12**  
How has your firm responded to the market for sustainable design?

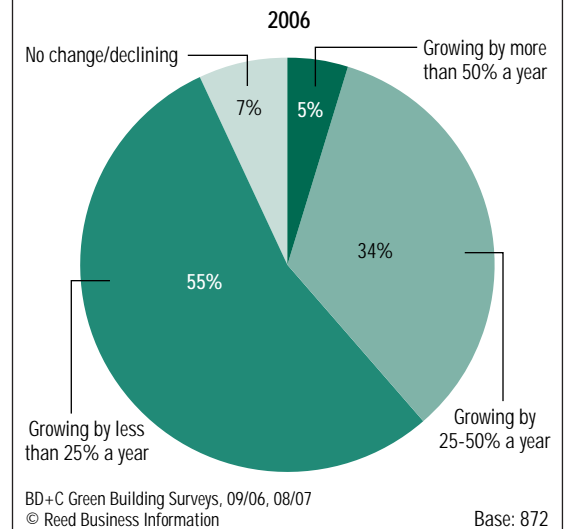
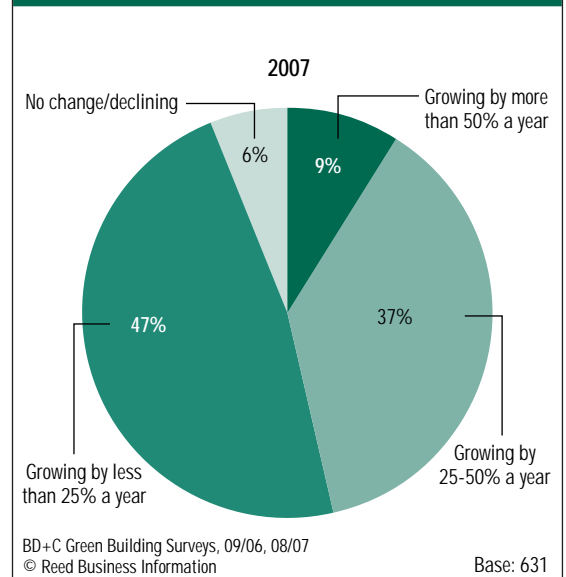


According to survey respondents, the overwhelming majority of AEC firms (71%) are encouraging their staffs to gain green building expertise, presumably through such means as LEED accreditation training and continuing education efforts. Yet while firms clearly are encouraging green training, only a small minority of respondents (13%) said their firms have set up a special unit or profit center devoted to green building—perhaps an indication that more firms are integrating sustainability into firmwide day-to-day activities.

respondents (53%) stated that the trend line in sustainable building projects is either flat or declining (6%) or increasing by less than 25% a year (47%). In 2007, relatively more saw green building ramping up at a rate of greater than 50% a year than in 2006—9% in '07, versus 5% in '06.

Putting the data together from the perspective of four years of surveys, it is fair to say that the green building movement has, in less than a decade, advanced from being just a gleam in its founders’ eyes, to a highly visible subsector of the \$524 billion nonresidential construction

**Chart 1.13**  
In your view, what is the trend in sustainable building projects?



Relatively modest growth in sustainable projects seems to be the predicted pattern based on BD+C Green Building Survey responses for the last two years. Only a small percentage of respondents (9%) predicted explosive growth (more than 50% a year) for green building.

Chart 1.14

Which of the following have you incorporated into recent building or renovation projects? Which do you plan to incorporate in future projects?

	Have used	Plan to use
Daylighting	71%	74%
Automated lighting controls	58%	68%
Recycled/renewable building materials	57%	64%
Energy management	56%	69%
Low-emitting paints/finishes/adhesives	55%	63%
Acoustics/soundproofing	52%	57%
Low-emitting carpeting	47%	59%
Environmentally sensitive landscaping	46%	58%
High-reflectance, high-emittance roof surfaces	45%	57%
Energy analysis/modeling tools	44%	54%
Environmentally responsive site design	43%	57%
Building commissioning	35%	44%
Reused construction and demolition waste	35%	51%
Green furniture, fixtures, equipment	32%	45%
Passive solar	30%	48%
Stormwater harvesting	29%	51%
Environmentally preferred purchasing	27%	35%
Waterless urinals	22%	37%
Geothermal heating/cooling	21%	35%
Green (vegetated) roof	19%	34%
Photovoltaics	18%	37%
Underfloor air distribution	13%	24%
Other	4%	4%
None of the above	6%	5%
	Base: 631	Base: 631

BD+C Green Building Survey, 08/07  
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AEC firms seem to be comfortable with technologies or systems that might be deemed “low-hanging fruit”: daylighting (71%), automated lighting controls (58%), low-VOC paints and finishes (55%) and low-VOC carpeting (47%). Not surprisingly, they have shied away from technologies that appear risky or less proven: passive solar (30%), waterless urinals (22%), geothermal systems (21%), vegetated roofs (19%), active photovoltaics (18%), and underfloor air systems (13%). In every case, however, respondents said they “planned to use” the product or system in future projects more aggressively than they are currently using them.

market, and all signs point to its continuing growth. It remains to be seen whether that growth will be realized more in terms of rhetoric than activity on—or above—the ground. Let’s hope it is less of the former and much more of the latter. BDC

Chart 1.15

How important are the following attributes when planning a sustainably designed or green building? (1 = Not important at all, 5 = Extremely important)

	Mean
Energy management	4.60
Elimination of toxic materials and substances	4.45
Indoor environmental quality	4.37
Daylighting	4.36
Building envelope design	4.33
Long-term operations and maintenance	4.27
Environmentally responsive site design	4.26
Water conservation	4.23
Environmentally sensitive landscaping	4.10
Life cycle cost analysis	4.06
Natural ventilation	3.96
Use of energy analysis/modeling tools	3.93
Recycled/renewable building materials	3.91
Building commissioning	3.75
Reused construction and demolition waste	3.69
Safety and security	3.66
Views of nature	3.61
Innovative design	3.60
Geothermal heating/cooling	3.47
Acoustics/soundproofing	3.42
	Base: 631

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The strong showing (4 or more on a scale of 5) for many commonsense building features or techniques, such as energy management (4.60), provides strong evidence that AEC professionals support their use in sustainably designed projects.

## AEC firms still struggling with fear of paperwork in LEED

The recent Davis Langdon study “The Cost of Green Revisited” calls out yet another concern of building owners and developers—the cost of documenting LEED credits. The authors note that this factor “remains a concern for some project teams and contractors,” especially the less experienced ones. Our recent Green Building Survey confirms this fear. The majority of respondents (54%) said their clients and prospects see green building as “too complicated” and requiring “too much paperwork” (chart 1.6). In the last couple of years, the U.S. Green Building Council has attempted to overcome this barrier by putting LEED documentation online; the Green Building Initiative’s Green Globes rating system has historically been online.

The Davis Langdon authors state that the concern about documentation requirements becomes abated “somewhat” among Building Teams as they become “accustomed” to the requirements. Nonetheless, our research, coupled with Davis Langdon’s findings, shows that AEC firms have a huge hurdle to overcome to convince their customers that the red tape associated with green building (in particular, the documentation necessary for LEED certification) need not be overly burdensome or costly.

# AEC Professionals Speak Out

## The role of AEC professionals in green building

Green building is rejuvenating the profession and giving clients better buildings.—Michael Purcell, assistant university architect, American University, Washington, D.C.

If we are truly being green, we should renovate and not build new.—Scott Thomas, partner, Zagrodnik + Thomas Architects, San Diego.

Too many people are paying lip service to green construction, but not following through. We should try harder in designing energy-efficient systems without the hype.—Hector Arcelus, GM, Powdersville Air, Easley, S.C.

The “green” movement is becoming an opportunity for a few people to make a lot of money on the backs of those who have always designed with the environment and the good of the end users in mind.—James Howard, LWPB Architects, Norman, Okla.

Many sustainable strategies will soon become standard practice in the industry.—Ron Mastalski, project manager, Strang, Inc., Madison, Wis.

Green building needs to be more about design than green-labeled materials. Good design should always be good to people and to the environment.—Edgar Montañez Perez, project manager/architect, IW Group, San Juan, P.R.

In the late 70s and early 80s, I was architect for many “green” buildings using passive solar and photovoltaics. After Reagan dumped the tax credits, nobody wanted it anymore. I am 72 and have always designed “sustainable” buildings that rest upon the earth lightly.—Edward D. Snow, architect/owner, Winthrop, Mass.

Green building should be standard if the planet is to survive!—John B. Adams, owner, JAG Architecture, La Mesa, Calif.

We need to get people to understand that the current energy sources are heavily subsidized and that buildings are a major source of emissions and consumption.—Keith Strand, owner/architect, New York, N.Y.

It's long overdue. Integrated practice should be SOP for all design firms.—Oran Mills, senior project architect, Antinozzi Associates, Bridgeport, Conn.

## Green building market considerations

I don't think it's a passing fad. It is here to stay.—Jeff Morrow, senior project engineer, Actus Lend Lease, Fort Campbell, Ky.

The green benefit of healthier and more productive employee workspaces doesn't get enough attention. Another benefit of green workspaces is increased employee retention. The jury is still out on how much more productive and healthy green workspaces are, but I think we'll find that this is overwhelmingly true.—Pierre Cowart, VP, LEED AP, Leopardo Construction, Hoffman Estates, Ill.

Our healthcare clients are now demanding green buildings. The marketplace has profoundly changed. There's no going back.—Billy Tindell AIA, LEED AP, BSA LifeStructures, Chicago.

Sustainable design is growing steadily, because we as designers have no other choice, and clients are beginning to realize this. It is the way of the future, as we are rapidly depleting our natural resources more and more each day.—Khristopher Tabaknek, designer, Harley Ellis Devereaux, San Diego.

Owners are the drivers. If they ask up front for green design and are willing to pay a little more for the design and construction, they can get it. Few owners ask and are often too tight-fisted to consider it.—Randall Boyd, architect, Fuqua & Partners Architects, Huntsville, Ala.

Almost all of our clients are nonprofits. They know we will design a building that is far greener than a conventional building. Do we typically incorporate features like PVs, grey water systems, and reclaimed materials? Not yet. We design “green” to produce a high-quality, low-maintenance, lower impact, and lower energy building.—Ana Gordon, project architect, Blue Sky Collaborative Architecture, Beverly, Mass.

We build speculative office/warehouse buildings in a very competitive market, so green is slow to phase in.—W. Watt Neal, partner, Wilson Hull & Neal, Atlanta.

This is a movement which is inevitable. It could more usefully be associated with intelligent, responsible design.—Patrick Morey, team coordinator, Perkins + Will, Dallas.

There's still a challenge trying to connect energy savings and efficiency with sustainability. The link hasn't been made that green building and energy efficiency fit hand in glove.—James L. Hoff, DBA, VP of quality, technology and product development, Firestone Building Products Co., Indianapolis.

LEED certification helps as a marketing tool.—Howard Alan, president/chief architect, Howard Alan Architects, Chicago.

Less green hype, more energy conservation.—Cliff Chisholm, senior architect, Place Architecture, Bozeman, Mont.

We see the future of green building as a strong market asset. We have integrated sustainable principles throughout our business.—Nell Boyle, director of sustainable practices, Breakell Inc., Roanoke, Va.

It takes either real financial incentive or environmental calamity to change the way Americans do things. One of the two will create greater interest and growth in sustainable, green development and construction.—Phil Ragan, project manager, Stonestreet Construction, Providence, R.I.

## Green building certification systems

LEED certification is time-consuming, cumbersome, very bureaucratic, and not conducive to new work or commissions.—Quentin Dart Parker, Archwork.com, Pacific Palisades, Calif.

The various green building rating entities give much of their credits for newly manufactured material and equipment, which means brand-new carbon dioxide in the air. The greenest building is the existing building one preserves and reuses.—George Siekkinen, historic preservation architect, Washington, D.C.

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### BUILDING GREEN? THEN BUILD IT RIGHT.

The Construction Specifications Institute (CSI) is the only industry organization providing the framework for integrating the entire building team. This is achieved by the preparation, administration and interpretation of construction documents, encompassing the *whole* building life cycle, from conception to deconstruction. An integrated building team offers the greatest opportunity for success in delivering green building design concepts such as the U.S. Green Build Council's LEED™ rating system.

CSI's Certificate & Certification program is widely recognized and accepted throughout the industry as providing invaluable project administrative documentation skills. This knowledge and expertise is vital to projects striving to meet sustainable design criteria; it results in improved project efficiency and can reduce associated liabilities and costs. CSI certifications help minimize errors and omissions and increase coordination between drawing and specifications.

The CSI Certificate & Certifications are:

- CDT (Construction Document Technology) Certificate
- CCCA (Certified Construction Contract Administrator)
- CCS (Certified Construction Specifier)
- CCPR (Certified Construction Product Representative)

When selecting sustainable project building team professionals, CSI Certification designations are additional qualifying considerations along with LEED AP to assure delivery of integrated whole building design strategies.

CSI's commitment to sustainability is further demonstrated by the formation of the CSI Sustainable Facilities Task Team and the subsequent development of *GreenFormat*™. Now in development, GreenFormat will provide an online data-reporting guide and format for collecting sustainable information on construction products. Manufacturers will be able to easily report on their products, and A/E/Cs will be able to easily compare products and accurately assess their potential affect on a sustainable project.

CSI continues to lead the industry in standards and formats, and to adapt to the needs of the building team as it faces the evolution of sustainable design.

Sincerely,

A handwritten signature in black ink, appearing to read 'Walter Marlowe', written in a cursive style.

Walter Marlowe, P.E., CSI, CAE  
CSI Executive Director/CEO

P.S. Visit CSI at Booth #1290 to learn more about *GreenFormat*™ and  
CSI's certificate and certification programs or visit us online at [www.csinet.org](http://www.csinet.org).

The logo for GreenFormat features the word 'GreenFormat' in a bold, black, sans-serif font. A small, stylized green leaf icon is positioned above the letter 'F' in 'Format'.

The most measurable thing in buildings is energy use. Buildings that are LEED certified, when you check them a year later, are they really energy efficient? I'm convinced that performance is where we need to go, not a prescriptive approach.—Paul R. Bertram, Jr., FCSI, CDT, LEED AP, director of environment and sustainability, North American Insulation Manufacturers Assn., Alexandria, Va.

It is extremely important to work with a LEED consultant that understands construction cost. Sustainable construction does come with a premium. The only way to break this premium is to push the industry to the next level, and challenge ourselves, consultants, subcontractors, and suppliers.—Mark Baird, associate project manager, Opus Northwest, Denver.

There's nothing for durability in LEED. You should get 10 points for doing a slate roof, because it will last 90 years. It's a joke in the roofing industry that a LEED-certified building means more future work. They all leak like a sieve.—Tom "Hutch" Hutchinson, AIA, FRCI, RRC, founder, Hutchinson Design Group, Barrington, Ill.

We're at that maturing point, not past the peak, for the whole green market and environmental issues. Some laggards aren't paying attention, but every convention has some green theme. When it's routine in a year or so, there's going to be a mad dash to find something new in green.—Drew Ballensky, GM, Duro-Last Roofing, Inc., Sigourney, Iowa.

It is imperative to develop a LEED category for parking structures.—Chris Morecraft, director of architecture, Walker Parking Consultants, Elgin, Ill.

Most clients that are educated about the benefits of building green don't have any reservations about building to LEED requirements—even if the building isn't registered or certified. It just makes sense financially.—Amy Pearce, project manager, Bovis Lend Lease, Houston.

After six years of architectural training, I find it somewhat of an insult to have to "get accredited" as a green professional—in much the same way a doctor would be affronted to have to get accredited as a "needle sticker-in-ner." This movement supports our professional goals of better, more socially and ethically responsible design.—Paul Bedington, president, Paul S. Bedington Architects, San Diego.

### Defining and choosing green products

Are green-labeled products truly green and sustainable, not just a scam?—Daniel Osborne, architect, San Francisco.

Accessing green building materials regionally, so that shipping costs don't unduly affect total project cost, is sometimes challenging. We are working hard to get upstream of the process to help owners make intelligent site selections.—Rob Graves, principal, Flad Architects, Madison, Wis.

Biggest issue is defining what is green—where to purchase materials, what is green to certain regions, delivery distances, resources, etc., what materials will be long-lasting and of quality over many years.—Kenneth E. Vives, RA, Tulsa, Okla.

The challenge is understanding which products are the best green products. Every product is "green" according to the manufacturer, but the best products are often difficult to distinguish.—Peter Levasseur, director of sustainable Design, EwingCole, Philadelphia.

Our work is developer driven, so green is determined on a strict cost/value

basis. Value is starting to lean toward green perception if not fact.—Jack Ablon, AIA, Dallas.

The downside of the green movement is this: Younger and less experienced staff see "green" as the end-all of their decision making. Once a product makes environmental claims for itself, any question of fitness for purpose, usefulness, or track record goes out the door. "Green" needs to be seen as one component of design, and certainly not the most important one.—Anne Whitacre, FCSI, specifications writer, Gehry Partners, Santa Monica, Calif.

I find overpriced materials and gimmicks every day. I have no problem finding all materials but it requires many hours of research to weed out the junk.—Thomas Bragg, environmental consultant, Habitat for Humanity, Dallas.

The reason I have trouble sourcing green materials is because many manufacturers aren't aware of the environmental attributes of the products they sell, or don't make the information available.—Joel McKellar, research assistant, LS3P Associates, Charleston, S.C.

No product with an intended life less than the design life would generally be green. Certainly not a 15-year roof on a 30-year building. The idea of a less-than-100-year construct is not in accord with basic sustainability.—Mark Delany, Ghoti & Co., Prescott, Ariz.

Chart 1.16

#### Do you have trouble sourcing or obtaining green building products?

	2007	2006	2004	2003
Yes	31%	33%	55%	55%
No	46%	38%	19%	16%
Don't know/Not involved	23%	30%	26%	29%
	Base: 631	Base: 872	Base: 519	Base: 486

#### If yes, why do you have trouble? (2007 respondents only)

The term "green" is not always clearly defined	72%
Can't get certain green products	43%
Don't know what's really green	42%
Don't know where to look	35%
Don't trust green labels	32%
	Base: 195

#### If no, why not?

Green products are readily available	73%
Certification labels (e.g., Greenguard, Energy Star) provide sufficient guidance	47%
Green-labeled products are well known in the market	38%
	Base: 293

BD+CGreen Building Survey, 08/07  
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Even though most building product manufacturers have come out with "green" products in recent years, nearly a third of respondents (31%, down from 55% in '03 and '04) said they still have trouble sourcing green products. The big bugaboo seems to be semantic: What does "green" mean? AEC respondents who have trouble sourcing sustainable products said they had trouble defining "green" (72%), and a substantial group (32%) said they don't trust green labels. However, 46% of respondents said they had no trouble sourcing green products.



# The Hardwood Council

## SUSTAINABLE SOLUTIONS FOR GREEN DESIGN AND BUILDING

In a recent readership survey, a whopping 94 percent of *BD+C* readers agreed that the trend toward green, sustainable buildings and materials is growing, along with client interest in creating a greener, healthier world.

And the marketplace is responding. It's easier to build green than ever before. Product manufacturers are coming up with new green product lines almost every day – for everything from paints and finishes to carpeting and lighting fixtures.

But American hardwoods have been the preeminent green building material — the first choice of builders, architects and designers — for centuries.

- Healthy, non-toxic natural hardwoods bring a warm, enduring aesthetic to floors, furniture and cabinetry. They add character and health-enhancing, non-allergenic qualities to the home.
- Eco-conscious architects and designers use hardwoods because they are the definition of sustainability. Harvesting levels are far below levels of growth. Nearly twice as much hardwood grows as is harvested each year. Hardwoods renew themselves abundantly and naturally, sprouting from stumps, roots and seeds.
- Virtually every part of the log is used as lumber or by-products, and finished products are reusable, recyclable and biodegradable.
- Well-managed, sustainable forests are part of the solution to climate change and global warming. Trees produce oxygen, protect wildlife and water supplies, and reduce greenhouse gases in the atmosphere.

The American Hardwood Information Center at [www.hardwoodinfo.com](http://www.hardwoodinfo.com) offers a variety of practical, innovative ideas with American hardwoods. It's your one-stop Web portal to one of the greenest building resources available – hardwoods from continuously renewing American forests.

We're living in an era where people are more concerned than ever about the environment, and our connection to the natural world. Projects using green design and products foster this connection and help create a more sustainable world. Using renewable American hardwoods, the original green building material, is part of the solution for a healthier planet.

The Hardwood Council  
[www.hardwoodcouncil.com](http://www.hardwoodcouncil.com)

American Hardwood Information Center  
[www.hardwoodinfo.com](http://www.hardwoodinfo.com)

## Wrestling with the cost of green building

How much more a green building costs depends upon the specific site, the building needs, and the limitations. With some buildings, the “easy/cheap” credits aren’t available and thus the more expensive credits have to be taken. Other times, there’s no additional cost.—Krista Nelson, CSI, LEED AP, CDT, Anderson Brulé Architects, San Jose, Calif.

Green building is over-hyped in terms of its costs and benefits. Life cycle cost needs to be considered, and on a discounted cash-flow basis. True green building practices involve better use of space, which may actually avoid the need for construction or reduce project size.—Jeffrey Folinus, AIA, principal, The Folinus Collaborative, Atlanta.

While our retail tenants would benefit from reduced utility costs associated with green buildings, they find it difficult to pay higher rents required by the premium for increased construction costs to build their facilities.—Bob Frazier, VP of development, WS Development Associates, Chestnut Hill, Mass.

Economics is the issue—net present value. Most people are in the game for the maximized profit and sale of the building to others as soon as possible. It’s the money, stupid.—C. Thomas Williams, GM, Dubai Isles Development, Los Angeles.

Some architects are taking advantage of the sustainability trend by requesting additional fees even though their level of design effort hasn’t changed from conventional design.—Mark E. McDowell, VP of development, The Alter Group, Skokie, Ill.

Of course green buildings will cost more. We professionals need to better represent and promote what we receive in return—lower long-term operating costs; better quality air, lighting, and work environment; lower environmental impact; and usually better overall design.—Denis Delehanty, project manager, Gwinnett County, Lawrenceville, Ga.

Green building advocates argue that green design adds only up to 3% to the cost of construction. While this may be correct with regard to institutional-quality buildings, on our commercial projects—such as speculative office buildings and light industrial structures—the premium is significantly more.—Rob Thrun, VP of architecture and engineering, Al Neyer Inc., Cincinnati, Ohio.

Green building is a commitment to preserving our environment and should not be looked at solely on a “first-cost” basis.—Dennis E. Bopp, principal, Dennis E. Bopp Architect, Lexington, Ky.

## Regulatory aspects of green building

We have problems with recycling of some materials—specifically, drywall. We need to educate the government so there can be tax incentives not only for the builder but for those who handle/recycle the materials.—Adair B. Owen, LEED AP, preconstruction coordinator, Elkins Constructors, Jacksonville, Fla.

The more enforcement there is from the top, the more green buildings will happen and the more our world will pull back from the edge of environmental disaster.—Deborah MacPherson, specifier, WDG Architecture, Washington, D.C.; projects director, Accuracy&Aesthetics, Vienna, Va.

Green building will never be a standard unless the government steps up and creates guidelines, codes, and standards that force new construction to adhere to green principles.—Jamison Martin, estimator, Haselden Construction, Denver.

The private sector should drive this, with the federal government only giving tax breaks for truly energy-saving designs and materials. Too much of what is being done is feel-good stuff.—E. Ray Kothe, owner, Kothe Contractors and Construction Management, Baton Rouge, La.

I do not support the notion that green should be mandated by the government, nor should it be supported by tax incentives; neither of these is as “sustainable” as market demand, which may take longer to develop, but will likely stand the test of time.—Dieter Nurnberger, president, Dieter Nurnberger Associates, Westlake Village, Calif.

A key factor in the increase of green building would be implementation of federal and state tax incentives or grants. Tax incentives should be transferable to the designer/builder in the event that the owner is a tax-exempt organization.—L. Brunson Russum, Jr., project architect, FreemanWhite, Charlotte, N.C.

Green building is quickly becoming standard practice. Any responsible architect, engineer, landscape architect, or planner will readily embrace this commonsense approach to building. Current green building practices will soon be mandated by local, state, and federal codes as the baseline building standard.—Alfred Vick, assistant professor, University of Georgia, Athens.

‘While the curve in “market transformation” is up and to the right, the slope is a lot less steep than green building proponents might have hoped for.’

## LIFE (CYCLE) LESSONS

Green building gets a boost from life-cycle analysis, which looks at the life-long impacts of building products, materials and services and helps interested builders and designers make informed choices. PVC/vinyl has been extensively studied in comparison to other building materials and how these materials perform in competing products. The clear verdict: many vinyl building products offer the best choice for low-impact, high-performing applications. Why?

- PVC/vinyl is more than half derived from common salt, so it takes less fossil fuel to manufacture vinyl than many other building materials.
- Products made of PVC/vinyl are themselves highly energy efficient. Examples are reflective roofing membranes and window frames.
- PVC/vinyl is durable. It does not corrode. Siding and pipe can hold up for many decades without treatments or extensive repairs.
- PVC/vinyl is easily cleaned and maintained. Hospitals, schools and other institutions count on vinyl composition tile, sheet flooring, wall coverings, railing and cove base for a healthful environment as well as durability.
- PVC/vinyl is tough and reliable in hard-to-reach locations. Vinyl-jacketed wire has been the product of choice inside building walls for more than 50 years.

The affordability of low-impact products can also contribute to improved environmental performance. Savings from low-cost, low-impact products can be reinvested by building designers and owners in additional environmental improvements elsewhere in the construction or maintenance of their building.



Tim Burns  
President  
The Vinyl Institute  
Arlington, VA  
[www.vinylindesign.com](http://www.vinylindesign.com)

*The Vinyl Institute represents leading U.S. manufacturers of vinyl plastic and additives and advocates for the responsible management of vinyl resins, life-cycle management of vinyl products and promotion of the value of vinyl to society.*



## 2. Corporate America Setting Green Strategic Plans

### Methodology

In August 2007, *Building Design+Construction* surveyed a scientifically drawn sample of 5,000 members of CoreNet Global, an Atlanta-based association for corporate real estate executives and related professionals. CoreNet's end-user members manage more than 700 million square feet of real estate, worth an estimated \$1.2 trillion. Recipients of the online survey were asked to gauge their level of knowledge, interest, and activity with regard to green buildings and sustainable practices within their corporate real estate environments.

As an incentive, recipients were offered eligibility to enter a drawing for a \$100 gift certificate. *BD+C* also pledged a \$5 charitable donation for each of the first 100 responses. Respondents could select from the American Red Cross, Habitat for Humanity, or United Service Organizations (USO).

How times have changed in Corporate America! Once considered staunch opponents of anything that smacked of liberal environmentalism, U.S. corporations are embracing green building at a rapid pace in an effort to reduce operating costs, improve performance, and “walk the walk” with regard to social responsibility.

Bank of America, Citigroup, Hewlett-Packard, Nike, and Toyota are among the corporate giants that have captured national headlines for their green building efforts. But countless other U.S. companies are quietly applying green building and sustainable design strategies across their real estate portfolios.

This trend is evidenced by the results of *BD+C*'s recent survey of the CoreNet Global membership, where eight in 10 corporate real estate professionals said they have incorporated some level of sustainable design in recent construction and renovation projects, nearly one-third (32%) have done so “extensively,” and just 3% said they had no plans to implement green strategies in upcoming projects (chart 2.10). This translates to a significant amount of green building activity in the corporate office sector, considering that CoreNet's members control more than 700 million square feet of real estate, worth an estimated \$1.2 trillion.

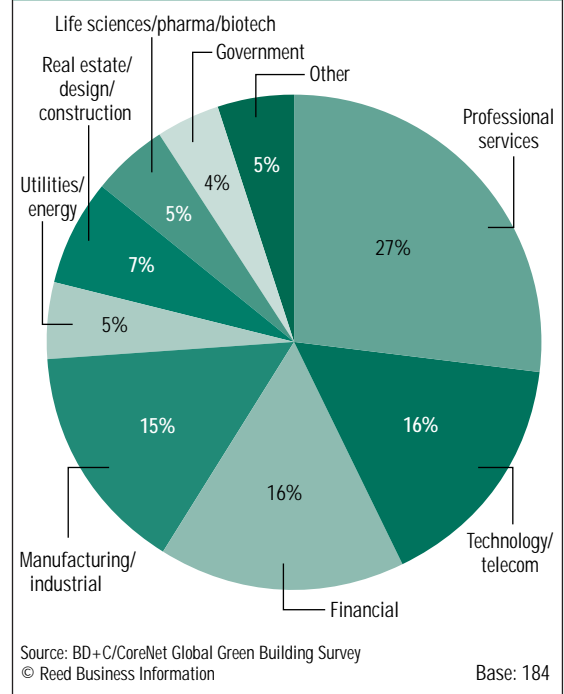
“There's a tremendous amount of interest in sustainability in the corporate real estate sector,” said Claudie C. Fanning, CoreNet's director of Global Research and Knowledge Communities. Fanning said that while many of CoreNet's member companies have been implementing green on a piecemeal basis for some time, the movement has shifted to the portfolio level.

“Energy and sustainability are clearly on the radar in the Csuite,” said Fanning. “Senior decision makers are begin-

ning to look at minimizing carbon footprints and shifting to a truly sustainable mindset for their entire portfolio.”

To this point, corporations are embracing a more long-term outlook on their real estate portfolios, seeing past potentially higher first costs in anticipation of operational savings and improved productivity down the

Chart 2.1  
What's your organization's primary business?



The survey base includes a diverse range of corporate markets, including telecom, financial, manufacturing, and professional services (e.g., accounting, law, and business consulting). “Other” includes facility management and IT integrated services firms.

### Principal findings of the 2007 survey

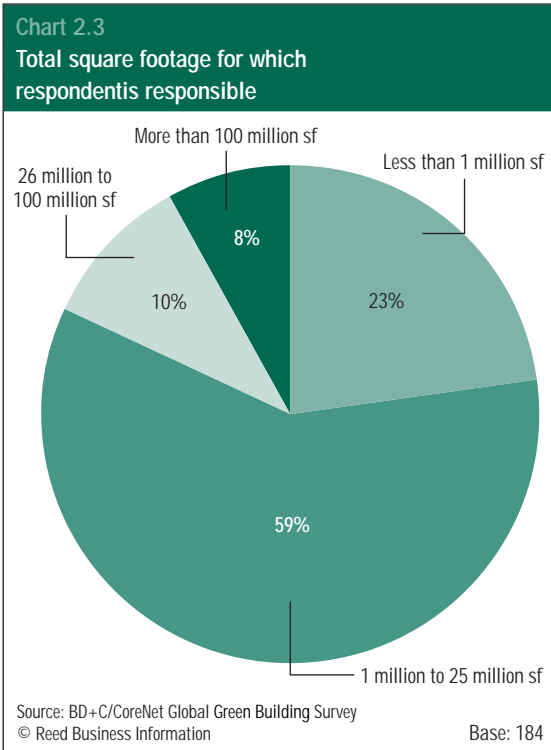
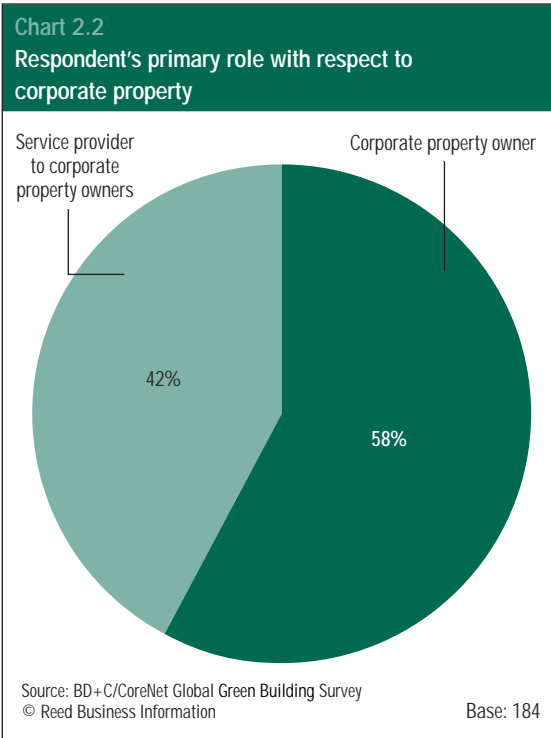
- Eight in 10 respondents have incorporated some level of sustainable design in recent projects, and nearly one-third (32%) have done so “extensively.” Just 3% of respondents said they have no plans to implement green strategies in upcoming projects.
- More than one-third (35%) of respondents said their company would be willing to spend 3-5% more for a green corporate building, and one in five said their company would spend 6-10% more. Just 6% said they would not take on any extra costs for green.
- Issues related to financing—specifically, higher first cost and return on investment—are seen as the most significant barriers to green in the corporate office market. About four in ten (41%) respondents cited higher first cost as a key obstacle to green, while one-third said poor ROI is a key hurdle.
- Respondents have a relatively high level of interest in green building, but very few can say they are experts in the field. Just over one-quarter (27%) of respondents said they were “very experienced” with sustainable design, and 30% said they had little or no experience.
- Strategies for reducing energy consumption and improving indoor environmental quality are among the green efforts most often implemented or planned by corporate real estate professionals.

road. A resounding 89% of respondents either “agree” or “strongly agree” that their corporations are more willing today than they were three to four years ago to

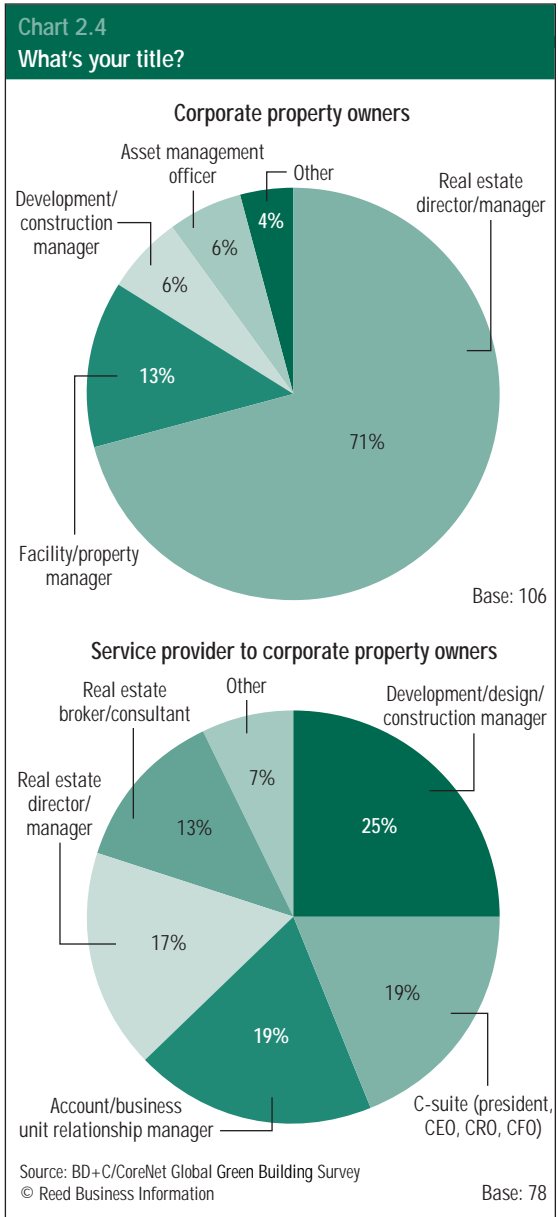
invest in green building projects.

The level of investment is significant as well. About one-third (35%) of respondents said their company would be willing to spend 3-5% more for a green building, and one in five (21%) said their company would spend 6-10% more. Just 6% said they would not take on any extra costs for green (chart 2.8).

“We believe that energy costs will continue to escalate rapidly, and addressing these issues now will help mitigate the cost impacts to our operations,” said respondent Sanford L. Smith, AIA, Corporate Manager of Real Estate and Facilities with Toyota Motor Sales USA, Torrance, Calif. The world’s largest automaker has three LEED-certified buildings—including a LEED Gold vehicle distribution center in Portland, Ore., and a LEED



About half (48%) of respondents operate at the corporate real estate director/manager level (chart 2.4), and nearly six in ten (59%) are responsible for between one and 25 million sf of office space (chart 2.3).



Silver government affairs office in Washington, D.C.—and seven LEED-registered projects in the works.

Smith said Toyota is willing to pay higher initial costs for high-performance building systems (such as HVAC, lighting, and controls) because they provide “superior performance that can meet our investment thresholds.”

If we have to pick between nice bathroom finishes and better equipment, we’ll chose better equipment because it will provide us with a competitive advantage over time,” said Smith.

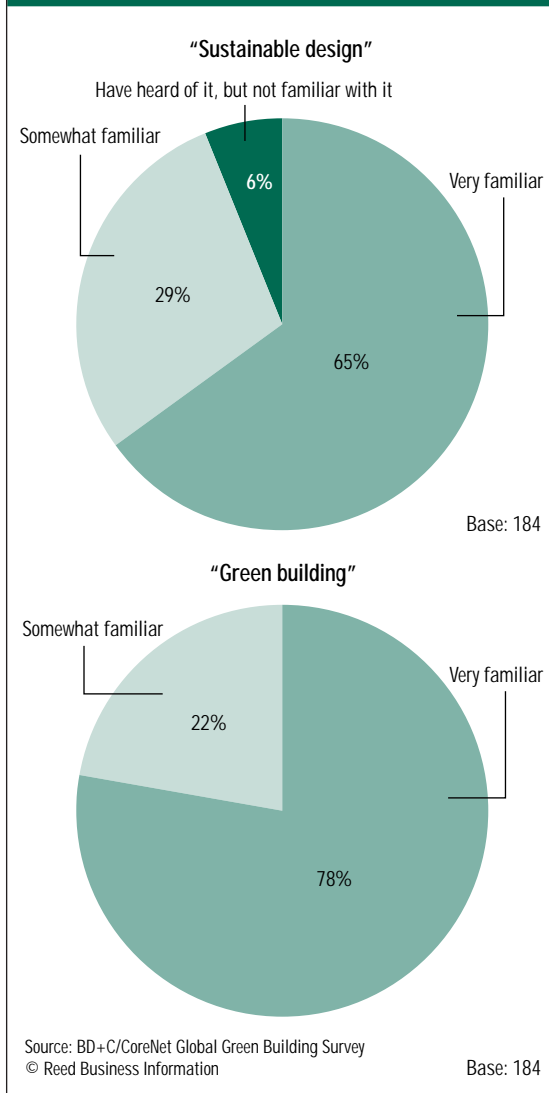
Jim Petsche, Director of Corporate Facilities with Nike Inc., concurs.

“Sure, the capital costs can be slightly more, but when

you look at the total cost of the operation of a building, most of the features added make solid economic sense,” said Petsche. “Add to that the perceived productivity increases from more-satisfied employees or tenants and you have a winning combination.”

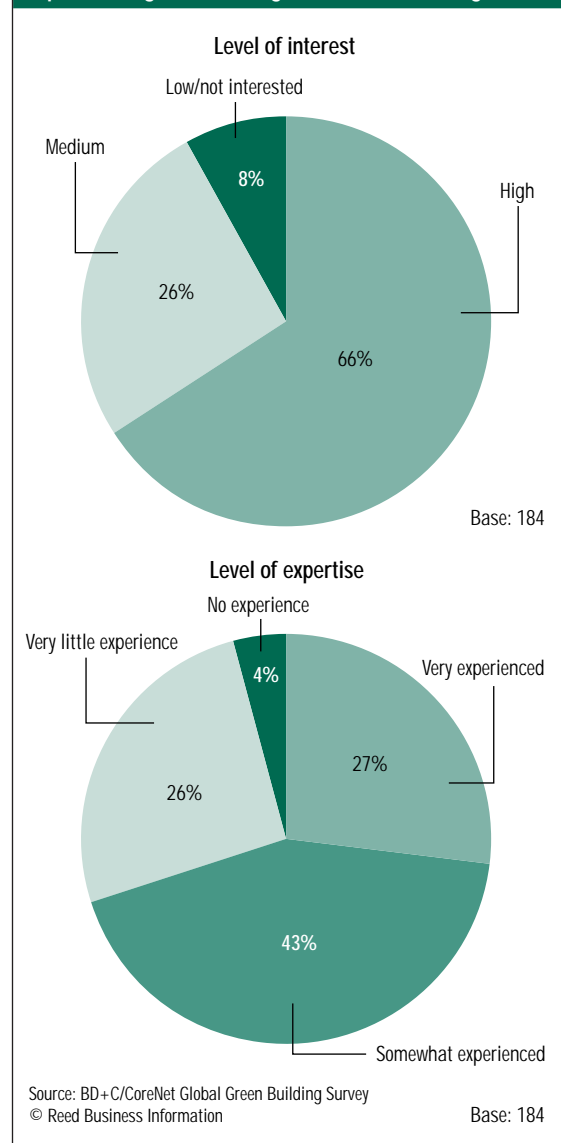
The public relations value doesn’t hurt either. Green building can counteract negative press and public perception that some corporations face with regard to the environment. Of the corporate real estate executives that have implemented green buildings, 84% said they

**Chart 2.5**  
How familiar are you with the terms:



More than three-quarters (78%) of respondents said they are “very familiar” with the term “green building,” while two-thirds said they have strong knowledge of the term “sustainable design.” All but 11 respondents said they have some level of familiarity with the terms.

**Chart 2.6**  
What is your company’s level of interest and expertise in green building or sustainable design?



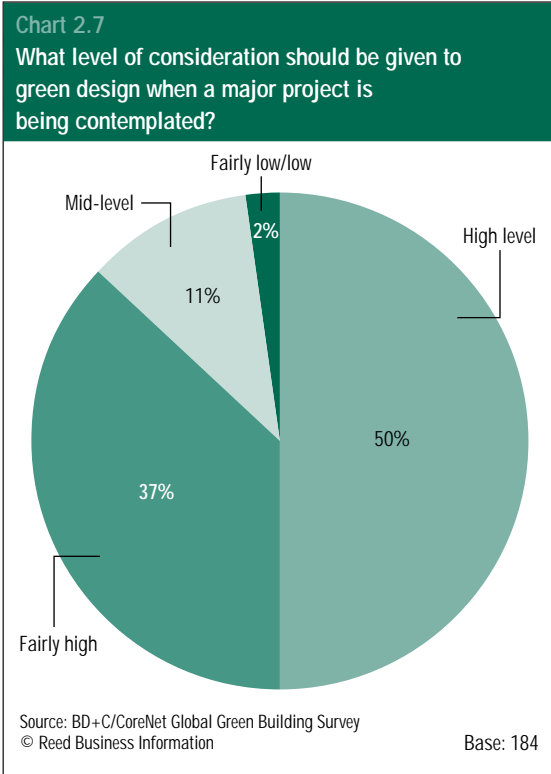
While corporate real estate professionals have a relatively high level of interest in green building, very few can say they are experts in the field. Just about one-quarter (27%) of respondents said they are “very experienced” with sustainable design, and nearly one-third (30%) said they have little or no experience.

have seen an improvement in community relations as a result of going green. Moreover, some 90% of respondents either “agree” or “strongly agree” that green corporate buildings have a PR/marketing advantage over comparable conventional corporate buildings, and 78%

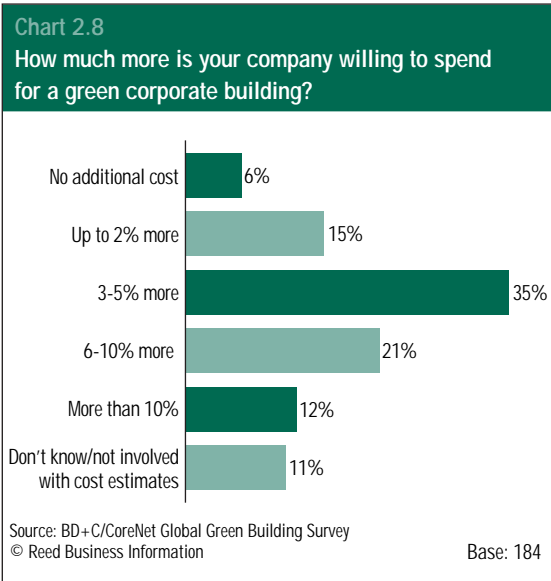
said green buildings enhance their company’s employee recruitment and retention efforts.

“The corporate real estate sector is at the point in the green learning curve where people are clearly able to get their minds around the PR value of these initiatives,” said CoreNet’s Fanning. He said that while the green community often writes off corporate sustainability efforts as “greenwashing,” most companies are going about it honestly. “Companies may approach green from a corporate-centric view, but that’s not to say they don’t come by sustainability honestly.”

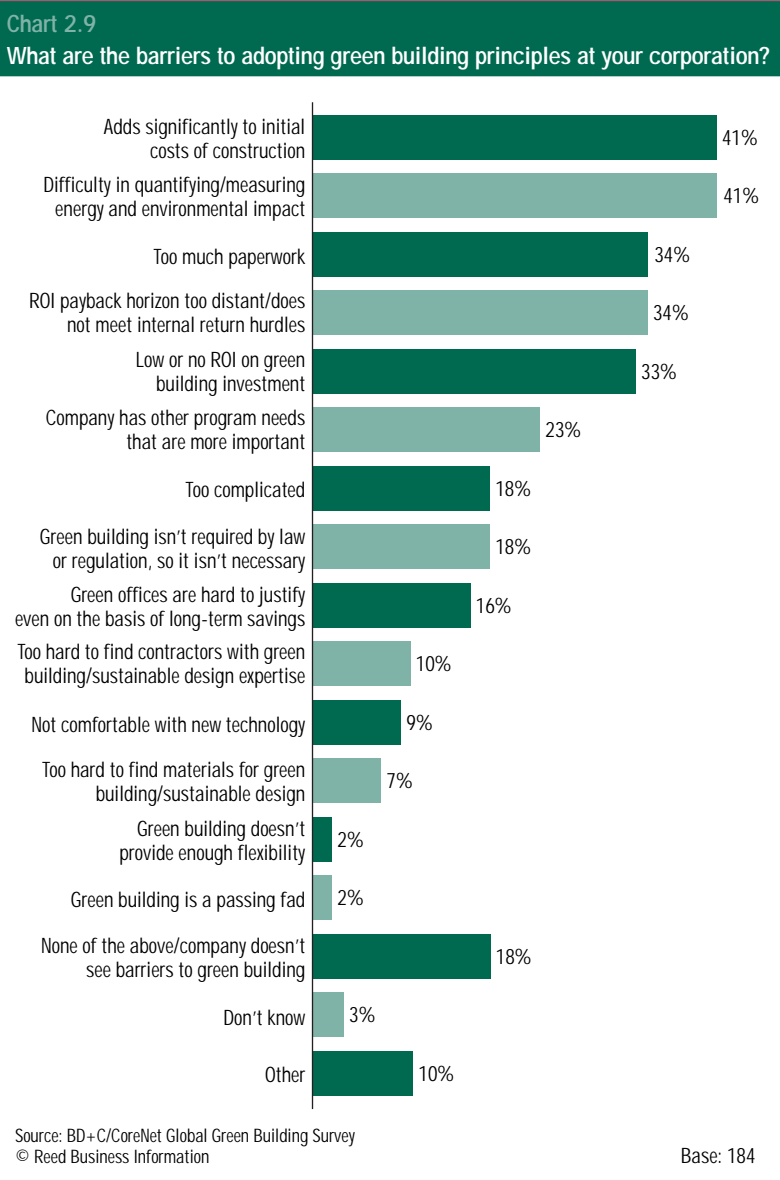
Reducing energy consumption is the primary green strategy employed by corporate real estate profession-



An overwhelming majority (87%) of respondents said sustainability deserves a “high” or “fairly high” level of consideration when major projects are being considered.



Despite their hard-nosed approach to the bottom line, U.S. corporations are willing to open up their pocketbooks to pay for green. More than one-third of respondents (35%) said their companies would be willing to spend 3-5% more for a green corporate building, and one in five said their company would spend 6-10% more.



Issues related to financing—specifically, higher first cost and return on investment—are seen as the most significant barriers to green in the corporate office market. About four in 10 (41%) respondents cited higher first cost as a key obstacle to green, while one-third said poor ROI was a key hurdle.

als. Of the respondents that have built sustainable buildings, 86% have applied automated lighting controls and 85% have used energy management systems, while 67% have incorporated daylighting schemes. Most respondents, however, remain hesitant investing in big-ticket energy-saving items like photovoltaics, underfloor air distribution, and geothermal heating/cooling. Just over one-third (36%) of respondents have incorporated underfloor air, only 21% have applied geothermal technology, and just 16% have used PVs.

Improving indoor environmental quality is also important. Nearly seven in 10 respondents (69%) have used low-VOC products like carpeting, paints, and adhesives in recent projects, while 61% have outfitted offices with green furniture, fixtures, and equipment (chart 2.11).

Despite the relatively high level of optimism and activity among corporate real estate professionals when it comes to green building, they do run into their fair share of roadblocks along the way. Not surprisingly, the biggest barriers are related to financial issues, specifically higher first cost and return on investment. More than four in ten (41%) respondents cited higher first cost as a key obstacle to green, while one-third said an ROI that was either too low or too distant on the horizon would be a possibly insurmountable hurdle (chart 2.9).

As one corporate sustainability manager puts it: "Own-

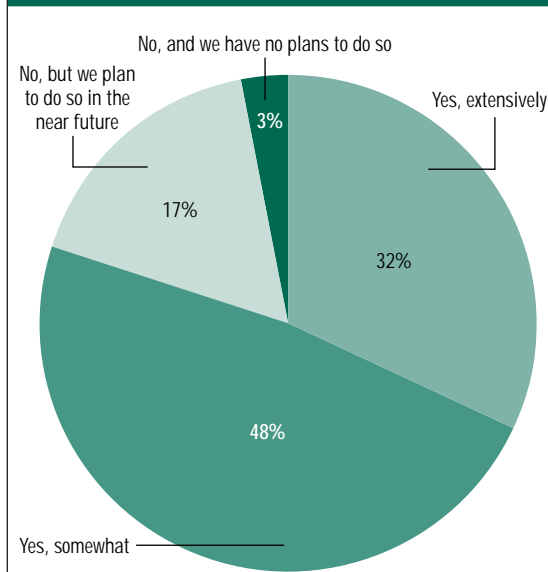
ers who are unfamiliar with the green building process have an exaggerated perception of the cost of green."

Concerns over the difficulty in quantifying and measuring the impact of green strategies also ranked high on the list of barriers. But judging by the verbatim comments from respondents, this issue has more to do with proving green building's worth to those in the Csuite than with finding and applying the systems to capture and analyze building performance.

"There's a lack of awareness and interest from those in the Csuite," said a respondent who works for a financial services company. Another respondent, who provides real estate services for a defense technology firm, said, "We need senior management buy-in."

It's hard to believe that just 10-15 years ago, sustainability was the furthest issue on the mind of corporate leaders. Green building is clearly becoming a vital piece of Corporate America's long-term business plans. BDC

**Chart 2.10**  
Have you incorporated sustainable design into recent corporate building or renovation projects?



Source: BD+C/CoreNet Global Green Building Survey  
© Reed Business Information

Base: 184

The corporate real estate market is going gangbusters on green. Eight in ten respondents have incorporated some level of sustainable design in recent projects, and nearly one-third (32%) have done so "extensively." Just 3% of respondents said they have no plans to implement green strategies in upcoming projects.

**Chart 2.11**  
Which green strategies have you incorporated or plan to incorporate in recent projects?

	Have done	Plan to do
Automated lighting controls	86%	81%
Energy management	85%	80%
Low-emitting carpeting	69%	64%
Low-emitting paints/finishes/adhesives	69%	64%
Daylighting	67%	63%
Recycled/renewable building materials	67%	68%
Building commissioning	61%	61%
Green furniture, fixtures, equipment	61%	62%
Energy analysis/modeling tools	58%	61%
Acoustics/soundproofing	55%	55%
Environmentally sensitive landscaping	52%	58%
Environmentally responsive site design	46%	47%
Environmentally preferred purchasing	46%	56%
Reused construction and demolition waste	46%	54%
High-reflectance, high-emittance roof surfaces	42%	44%
Stormwater harvesting	39%	45%
Underfloor air distribution	36%	40%
Waterless urinals	31%	37%
Geothermal heating/cooling	21%	26%
Green (vegetated) roof	20%	26%
Photovoltaics	16%	27%
Passive solar	14%	30%
None of the above	1%	4%
Other	3%	3%
Base	147	179

Source: BD+C/CoreNet Global Green Building Survey  
© Reed Business Information

Strategies for reducing energy consumption and improving indoor environmental quality are among the green efforts most often implemented or planned by corporate real estate professionals. Of the respondents that have built green office buildings, 86% have applied automated lighting controls and 85% have installed energy management systems, while about 70% have incorporated low-VOC products.





#### Dear Readers:

For many years, PIMA members have been committed to manufacturing polyiso insulation that combines high thermal performance with desirable environmental characteristics. Their products also meet rigorous safety standards. It is not surprising then that polyiso insulation is one of the Nation's most widely-used and cost-effective insulation products and has been cited by the U.S. Environmental Protection Agency for its responsible impact on the environment.

Polyiso insulation has the highest R-value per inch of thickness, moisture resistance, excellent dimensional stability, superior performance in fire tests – polyiso meets the strict standard of both FM Class Approvals 1 (FM 4450) and UL 1256, long term R-value (only roof insulation with third party certification), recycled content, zero ozone depletion potential and virtually no global warming potential.

When looking for building products that provide sustainability and support efforts to build better than the minimum standards, choose polyiso insulation.

#### Polyiso Insulation Has the Highest R-Value Per Inch

Inch for inch, polyiso has superior energy efficiency performance compared to other building insulation products. Because of its high R-value per inch—which is the measure of thermal resistance used to describe an insulating material's effectiveness—less polyiso is needed to maintain the same R-value. This results in:

- Thinner walls and roofs with shorter fasteners.
- Less change in building dimensions to meet a determined R-value.
- Immediate cost savings through a reduction in materials and labor.

#### Polyiso Products Are Certified

There is an increasing demand in the construction industry for certified building products - ones that meet a rigorous criteria and review. Many polyiso products are certified as part of the Polyisocyanurate Insulation Manufacturers Association QualityMark<sup>cm</sup> Program. The QualityMark<sup>cm</sup> Certification program is voluntary and allows polyiso manufactures to obtain independent, third-party certification for the Long Term Thermal Resistance (LTTR) values of their polyiso insulation products. Polyiso is the only insulation to be certified by this unique program for its LTTR value.

#### Polyiso Can Help You Meet and Exceed the Codes

For the first time in over 18 years, ASHRAE has proposed increases to the minimum required roof and wall insulation levels in Standard 90.1 – the national model energy code for commercial buildings. These new insulation values establish a new benchmark for commercial building energy efficiency.

**Architects, specifiers, building owners and certifying professionals will have a new standard of care to meet regarding commercial building energy efficiency. Polyiso insulation is the product of choice to both meet the new code levels and support those who understand the importance of building beyond the minimum standard.**

We hope you enjoy and learn a great deal from this white paper. For additional information about the important topics raised in this letter or to learn more about polyiso insulation visit [www.polyiso.org](http://www.polyiso.org), or contact a polyiso manufacturer.

Warmest regards,

A handwritten signature in black ink that reads "Jared".

Jared O. Blum  
President PIMA

## 3. Greener Days on the Horizon for Healthcare Providers

### Methodology

In August 2007, *Building Design+Construction* surveyed a scientifically drawn sample of users of the Green Guide for Health Care (GGHC), a self-certifying LEED-type system that covers both construction and operations of healthcare facilities. For comparative purposes, *BD+C* also surveyed a random sample of readers of *Modern Healthcare* magazine. Recipients of the online survey were asked to gauge their level of knowledge, interest, and activity with regard to green buildings and sustainable practices in their institutional environments.

As an incentive, recipients were offered eligibility to enter a drawing for a \$100 gift certificate. *BD+C* also pledged a \$5 charitable donation for each of the first 100 responses. *Modern Healthcare* respondents could select from the American Red Cross, Habitat for Humanity, or United Service Organizations (USO). Charitable donations on behalf of GGHC respondents went to the GGHC.

Despite making significant strides toward the greening of hospitals during the past few years, the \$46 billion healthcare construction sector lags behind other major building markets when it comes to adopting green building and sustainable design principles.

Slightly more than half of healthcare professionals (52%) said they have incorporated some level of sustainable design into recent hospital construction or renovation projects, and just 11% have done so “extensively,” according to *BD+C*’s exclusive survey of two healthcare professional groups: users of the Green Guide for Health Care (GGHC), a self-certifying LEED-type system that covers both construction and operations of healthcare facilities, and readers of the industry trade publication *Modern Healthcare* (chart 3.2).

Moreover, less than one in five respondents (19%) said their institution has implemented the LEED rating system on recent projects, and just 4% have applied LEED on all projects (chart 3.3). The Green Guide for Health Care is slightly more popular, with one in four respondents having implemented the program, but just 5% have applied GGHC on all projects (chart 3.4).

*BD+C*’s survey results are a clear indication that, despite progress by early adopters, sustainability is still in the infancy stage in the healthcare sector.

However, greener days are on the horizon for the healthcare market. Despite the low adoption rate, only a small minority of respondents (12%) said they have absolutely no plans to implement green in the future,

and a correspondingly high percentage of respondents (86%) said their hospital has a “medium” or “high” level of interest in sustainable design.

“We have clearly seen a shift from skepticism toward recognition that sustainability is important,” said Tom Badrick, sustainability coordinator with Legacy Health System, Portland, Ore. Badrick said that while Legacy Health’s green plans are “not very formalized yet,” the healthcare provider sees sustainable design as a long-term strategy for setting itself apart from the competition.

“Our customers, employees, and prospective employees are fairly knowledgeable about sustainability,” said Badrick. “Sooner rather than later, they will factor in environmental stewardship as part of how they choose their healthcare provider or employer. Sustainability will be a competitive advantage.”

Legacy Health is not alone in its thinking. More than two-thirds of respondents (68%) either “agree” or “strongly agree” that green hospitals have a marketing or public relations advantage over comparable conventional hospitals. Moreover, 56% of those surveyed agree that green hospitals are more desirable to patients than standard facilities, and about half (49%) said going green would give their hospital a competitive edge over conventional hospitals in their service area.

Winning business is great, but for many early adopters, the impetus for going green goes well beyond budgets, profits, and market share. It’s about creating environments that promote healing and provide the best possible medical care.

### Principal findings of the 2007 survey

- More than half of the total 185 respondents for both studies (52%) have incorporated some level of sustainable design in recent hospital projects. However, just 11% of those surveyed said they have incorporated green “extensively.” On a positive note, only 12% have no plans to implement green in the future.
- The general perception that green adds significantly to the cost of construction is seen as the biggest barrier to green hospitals, with nearly two-thirds of respondents (65%) citing cost as an obstacle to green.
- The opinion among respondents is that going green can be a costly venture. Nearly half of respondents (47%) said their healthcare organization would expect to pay a 3-15% premium for a green hospital, and just 8% expect the cost differential between a green and a non-green hospital to be negligible.
- Less than one in five respondents (19%) said their institution has implemented the LEED rating system on recent projects. Just 4% have applied LEED on all projects. Green Guide for Health Care is slightly more popular, with one in four respondents having implemented the program.
- Strategies for improving indoor environmental quality and reducing operations and maintenance costs are top priority when planning a green hospital. A resounding 69% of those surveyed said improved IEQ and the elimination of toxic materials are “extremely important” strategies, while 57% said reducing O&M costs is extremely important.

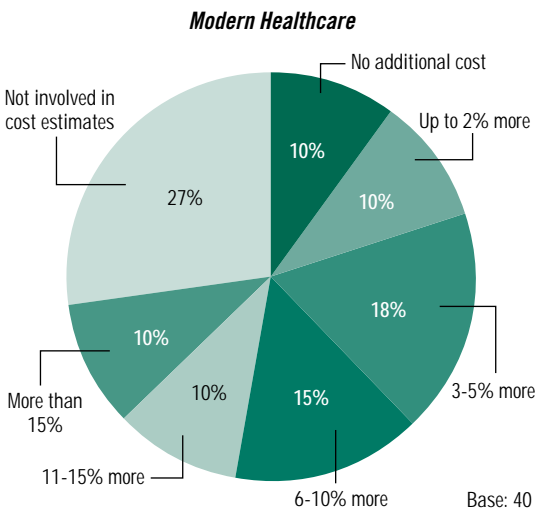
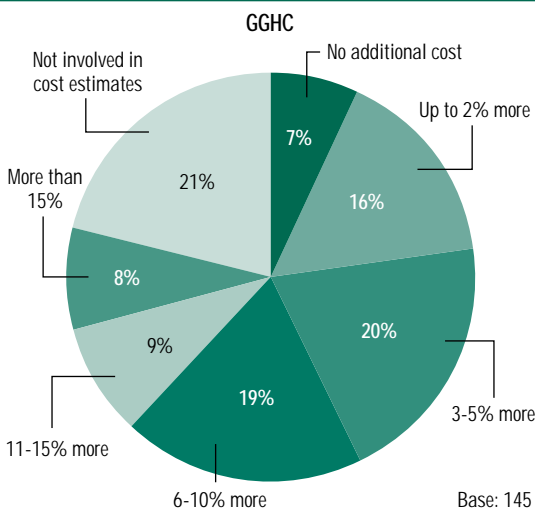
“As healthcare providers, building green and improving indoor air quality are inherent to our core missions,” said Carrie Frederick, director of Performance Excellence with Palomar Pomerado Health, Escondido, Calif.

Healthcare providers like PPH are placing greater emphasis on sustainable design strategies that can potentially improve the indoor environmental quality in hospitals. A resounding 69% of respondents said improved IEQ and the elimination of toxic materials are

“extremely important” strategies when planning a green hospital. Likewise, employing low-impact construction practices to minimize dust and debris (51%), implementing daylighting schemes (44%), and specifying materials that can be maintained using non-toxic cleaning agents (41%) were also deemed extremely important strategies by respondents.

The need to reduce energy consumption (as well as water use and waste generation) is another factor push-

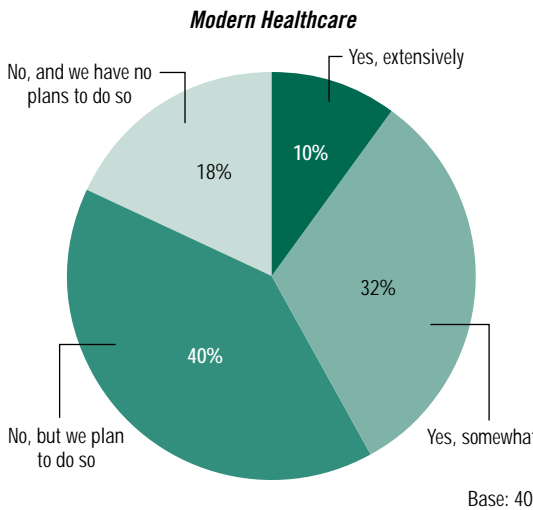
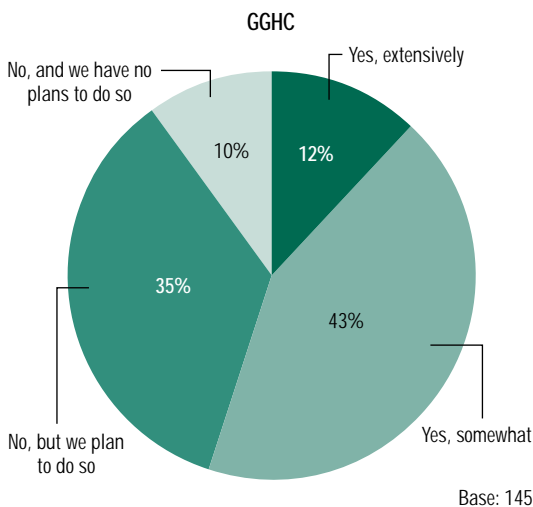
**Chart 3.1**  
What initial cost differential would your institution expect to pay for a green hospital?



Source: BD+C/GGHC/Modern Healthcare Green Building Surveys, 08/07 © Reed Business Information

The general opinion among the respondents is that going green can be a costly venture. Nearly half of respondents (47%) across the two groups said their healthcare organization would expect to pay a 3-15% premium for a green hospital. Only 8% of those surveyed expect the cost differential between a green and non-green hospital to be negligible.

**Chart 3.2**  
Have you incorporated green concepts into recent hospital building or renovation projects?



Source: BD+C/GGHC/Modern Healthcare Green Building Surveys, 08/07 © Reed Business Information

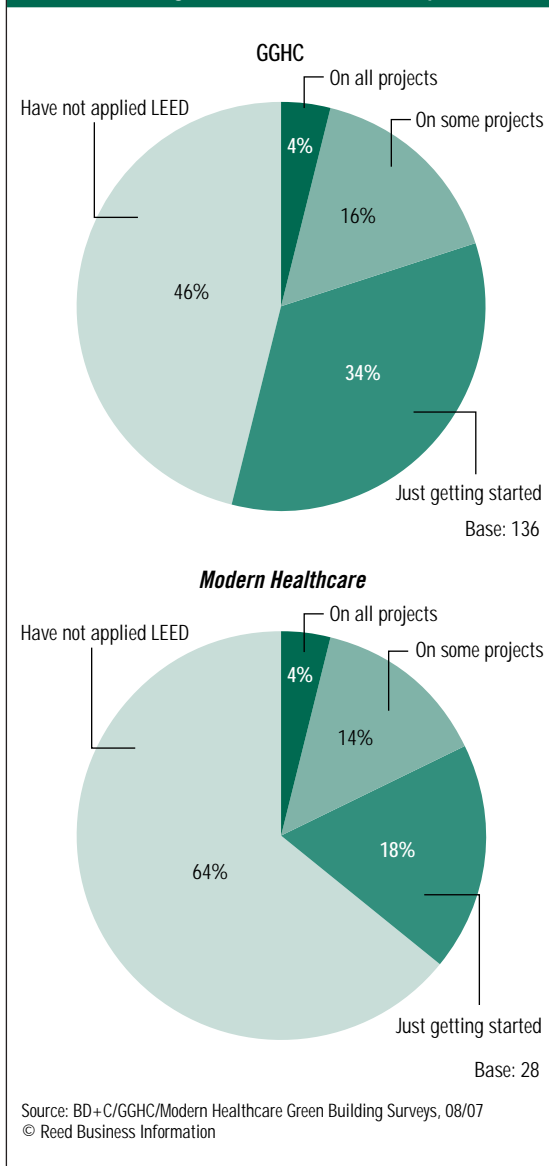
Judging by the amount of green building activity thus far, it's safe to say that sustainability is clearly in the infancy stage in the healthcare sector. Just 11% of respondents across the two groups said they have incorporated green concepts "extensively" in recent hospital construction or renovation projects, and 48% said they have not taken any action. On a positive note, just 12% of respondents said they have no plans to implement green in the future.

ing the greening of hospitals. Nearly three-quarters of respondents (74%) either “agree” or “strongly agree” that sustainable design significantly reduces energy costs, and about half (49%) said they believe energy conservation measures to be “extremely important” attributes of green hospitals.

“Energy efficiency measures really help drive return on investment,” said Deborah J. Rohde, FACHE, VP of Facilities and Construction with Advocate Health

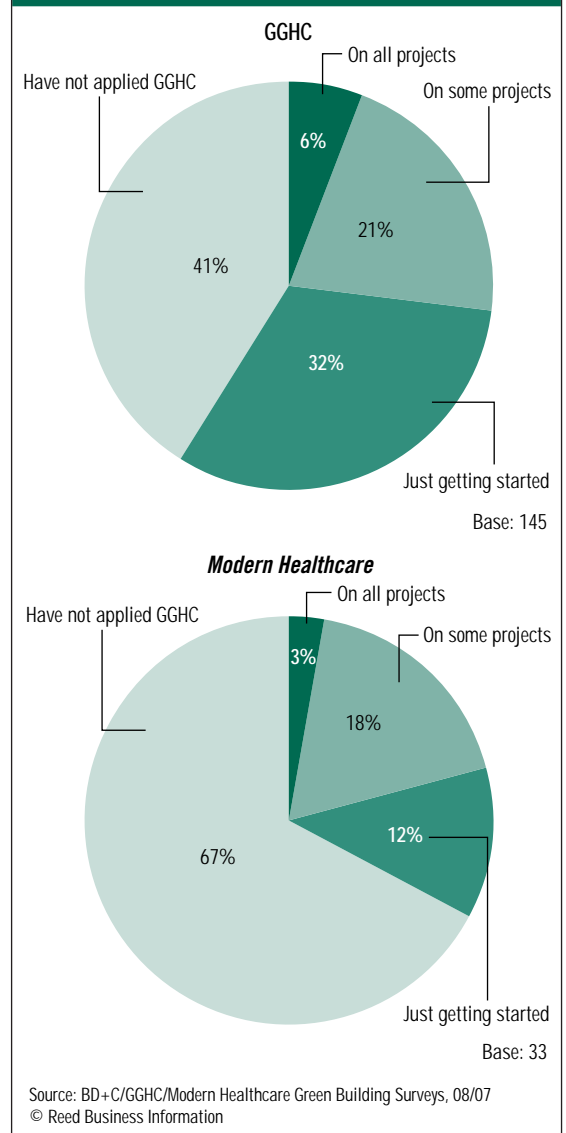
Care, Oak Brook, Ill. Rohde said the ongoing utility savings achieved by incorporating power-reducing features like occupancy sensors and energy-efficient lighting into AHC’s new, \$200 million LEED Gold patient tower in Park Ridge, Ill., will more than cover the initial green investment costs. “The premium was about 3%, and we have an eight-year payback on our

**Chart 3.3**  
To what extent is your institution implementing LEED in the design and construction of hospitals?



Less than one in five respondents (19%) across the two survey groups said their institution has implemented the LEED rating system on recent projects, and just 4% said they have applied LEED on all projects. Respondents affiliated with GGHC are more active with LEED than are *Modern Healthcare* readers. Nearly two-thirds (64%) of *MH* readers said they have not applied LEED, compared to 46% of GGHC respondents.

**Chart 3.4**  
To what extent is your institution implementing the Green Guide for Health Care in the design and construction of hospitals?



While more popular in the healthcare sector than LEED, the Green Guide for Health Care also feels the effect of the cautious approach to new ideas among hospital officials. Just one-quarter of respondents across the two survey groups said their institutions had implemented GGHC in recent projects, and just 5% have applied the program on all projects. As expected, respondents affiliated with GGHC are significantly more active with the program than are *Modern Healthcare* readers. Nearly six in 10 GGHC respondents (59%) have used the program to some extent, compared to just one-third of *MH* readers.

LEED Gold facility,” said Rohde.

### With so much to gain, why are healthcare providers relatively slow to adopt green strategies?

Concerns over higher initial costs are a major reason. The general opinion among the respondents is that go-

ing green can be a costly venture. Nearly half of respondents across the two groups (47%) said their healthcare organization would expect to pay a 3-15% premium for a green hospital, and just 8% of those surveyed expect the cost differential between a green and non-green hospital to be negligible (chart 3.1).

The perception that green adds significantly to the cost of construction is seen as the biggest barrier to applying sustainable principles to the healthcare sector, with nearly two-thirds of those surveyed (65%) citing first cost as an issue (chart 3.5). “If it costs more, green is not likely to happen,” said one respondent, a project engineer for a medical center in Iowa.

Faced with shrinking capital budgets and rising construction costs, many healthcare administrators are quick to dismiss any building features that may be viewed as frivolous. Factor the skyrocketing costs of healthcare and the ongoing demand for the latest medical equipment and technology, and it’s no wonder why hospital administrators have been slow to adopt sustainability practices.

“Even when the first costs are relatively reasonable, the unprecedented escalation of construction costs challenges the commitment to assuming the additional expense,” said PPH’s Frederick.

Also standing in the way of green adoption is the fact that many healthcare providers are not entirely sold on the health benefits of sustainable design. Because so few hospitals have elected to build green—only 73 healthcare facilities were registered with LEED as of October 4, 2007, according to the USGBC—little hard data exists directly linking sustainable design to improved patient outcomes, greater patient satisfaction, and reduced medical errors.

“Green building becomes difficult to sell when there is scant data available, especially on the enhancement to the patient experience in a hospital that employs green strategies,” said respondent Jennifer Kearney, director of Energy Programs with New York-Presbyterian Hospital,

Chart 3.5

#### What are the barriers to adopting green building principles at your institution?

Adds significantly to initial costs of construction	65%
Clinical program needs are more important than green building	43%
Too much paperwork	28%
Hospitals have unique design and operational concerns	28%
Green facilities are hard to justify even on the basis of long-term savings	26%
Too hard to find contractors with green building/sustainable design expertise	26%
Too complicated	18%
Not comfortable with new technology	16%
Too hard to find materials for green building/sustainable design	12%
Green building conflicts with or complicates compliance with existing laws or regulations	10%
Green design/operations may introduce increased infection control risks	10%
Green building is a passing fad	3%
Green building doesn't provide enough flexibility	1%
None of the above/my organization doesn't see barriers to green building	8%
Don't know	8%
Other	9%

Base: 145

Source: BD+C/GGHC Green Building Survey, 08/07  
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The general perception that green adds significantly to the cost of construction is seen as the biggest barrier to applying sustainable principles to the healthcare sector, with nearly two-thirds of GGHC respondents (65%) citing cost as an obstacle to green. “If it costs more, green is not likely to happen,” said one respondent, a hospital project engineer. Clinical issues can also get in the way of green efforts, at least in the eyes of about half of the respondents (43%). Note: Only GGHC users responded to this set of questions.

## GGHC's growth signals a healthy market for green hospitals

A clear indicator of the growing demand for green buildings in the healthcare sector is the continued success of the Green Guide for Health Care program. Since its launch in October 2004, GGHC has registered 138 projects, representing more than 33 million square feet of construction across 34 states and seven foreign countries. During the past year alone, GGHC has registered 33 projects (a 31% gain), and many more projects are coming down the pike, according to Adele Houghton, AIA, LEED AP, project manager for the Green Guide for Health Care.

“Sustainability is really building momentum in the healthcare sector, and I think we’re going to see a surge in activity in 2008,” said Houghton. “Healthcare organizations are starting to incorporate green strategies into their mission statements and operating plans. They see it as a community stewardship opportunity that is closely connected to their mission to provide health.”

Acute-care facilities make up about 60% of GGHC-registered projects, with the remainder mostly split between medical office buildings and specialty hospitals. Nearly two-thirds of registered projects (60%) are pursuing credits in both the construction and operations sections of GGHC’s self-certifying program.

<sup>1</sup> Available for purchase at: [www.zweigwhite.com](http://www.zweigwhite.com).

which has several LEED-registered projects under construction, including a LEED Silver heart hospital at its Columbia Presbyterian campus. “I’ve specifically looked for statistics that would correlate rates of infection to LEED indoor air quality standards or patient length of stay in a green hospital versus a standard hospital.”

Chart 3.6

Which green strategies have you incorporated or plan to incorporate in recent projects?

	Have done	Plan to do
Elimination/reduction of toxic materials/products	74%	66%
Daylighting	73%	69%
Indoor environmental quality	71%	60%
Low-impact construction practices	68%	56%
Building envelope design	65%	50%
Safety and security	65%	61%
Acoustics/soundproofing	64%	63%
Places of respite, including healing gardens	63%	50%
Specifying finish materials that can be maintained using non-toxic cleaning agents	63%	54%
Views of nature	61%	58%
Building commissioning	57%	52%
Elimination/reduction of asthma triggers and toxins	56%	59%
C&D waste diversion	54%	50%
Green/healthy building materials	54%	60%
Innovative design	54%	43%
Durability	53%	53%
Life-cycle cost analysis	53%	55%
Native plant landscaping	53%	45%
Integrated design	51%	47%
Stormwater management	51%	46%
Water conservation in domestic fixtures	51%	58%
Long-term operations and maintenance	49%	56%
Environmentally responsive site design	48%	48%
Water conservation in medical equipment/building systems	46%	50%
Pollution prevention program	45%	53%
Flexible/adaptable spaces	44%	49%
Structured parking	44%	34%
Energy conservation/carbon-neutral strategies	40%	50%
Combined heat and power	36%	32%
Developing a green operations plan	33%	47%
Green hospital utilized as an education tool	20%	27%
Heat island mitigation	19%	20%
Natural ventilation	19%	34%
On-site renewable energy production	13%	23%
Geothermal heating/cooling	6%	13%
Base:	80	131

Source: BD+C/GGHC Green Building Survey, 08/07  
© Reed Business Information

Of the respondents that have incorporated green into recent projects, nearly three-quarters (74%) have implemented strategies for eliminating and reducing toxic materials, while 73% have included a daylighting scheme. Respondents are still hesitant to incorporate big-ticket, nontraditional strategies, like geothermal heating/cooling, natural ventilation, and on-site renewable energy production (photovoltaics, wind power, etc.). Note: Only GGHC users responded to this set of questions.

Of the respondents that have applied sustainable strategies, half said they are “not sure” if patient outcomes have improved as a result of going green, and 20% haven’t seen any improvement. Moreover, just 16% of respondents “strongly agree” that green hospitals contribute to improved patient outcomes, and more than a third (35%) either “disagree” or “strongly disagree” that sustainable design contributes to a reduction in medical errors.

**All issues aside, the future looks bright green for the healthcare sector.** Sustainable design and programs like GGHC and LEED are gaining more and more popularity among U.S. healthcare providers. Somewhere around 200 healthcare projects are being designed to GGHC or LEED standards. That’s a healthy sign of activity for green building in the healthcare sector. BDC

### Evidence-based design may drive demand for sustainable design

The green building movement may be the hottest trend in the U.S. construction sector, but a related movement—evidence-based design—has piqued the interest of hospital executives, physicians, and healthcare Building Teams for quite some time.

Evidence-based design—the process of applying hospital design approaches, backed by quantifiable data, that contribute to improved patient care and clinical outcome—has been a growing trend in the healthcare market for nearly a decade.

Now healthcare design experts are making the connection between EBD and sustainable design, which should eventually drive demand for green features in hospitals, according to a recent healthcare market report by AEC business management consultant ZweigWhite, Natick, Mass.

“Evidence-based design and sustainable design have similar philosophies and features, such as using natural light and planting healing gardens,” said Christopher Klein, editor of “The 2007-2010 Health Care Market for Design & Construction Firms” (July 2007).<sup>1</sup> Klein added: “Wider adoption of evidence-based design is leading to wider adoption of green building elements.”

The 210-page report also covers the business case for green in healthcare and details the efforts of the early adopters of green hospitals, including Kaiser Permanente, Boulder Community Hospital, and Dell Children’s Medical Center of Central Texas.



### XPS: One Outstanding Product – Many Green Benefits

Sustainability is a major focus in building science these days and for good reason—conserving our resources will keep Planet Earth healthy for generations to come. Extruded polystyrene foam (XPS) insulation is at the forefront of this movement because it is ideal for “green” projects.

Lightweight, strong, energy efficient and economical, XPS can be used throughout the building envelope—in foundations, under slabs, in walls and in roofs—to deliver several major environmental benefits in a single product. The beneficial attributes of XPS include:

- **Moisture management.** XPS is a homogeneous, hydrophobic, closed-cell material that inherently resists moisture absorption. When installed in **walls**, the thermal and moisture resistance of XPS shifts damaging dew points to the exterior, thus minimizing the potential for condensation within a wall. XPS is also an “enabling insulation” for **green roof designs**. It resists moisture while maintaining its R-value. The high compressive strength of XPS supports the weight of the roof garden and related foot traffic. In fact, XPS is the only foam plastic insulation recommended in industry standards for use in garden roof systems also called protected membrane roof assemblies (PMRA).
- **Thermal efficiency.** In **walls**, a continuous layer of XPS over steel stud framing minimizes the thermal bridge effect, thereby reducing heating and cooling costs. Used as wall sheathing, XPS serves as continuous insulation, covering studs and other un-insulated parts of the wall. XPS can be designed in a system to form an air barrier that reduces air infiltration, a significant cause of energy loss. XPS is highly suitable for use beneath white **reflective roof membranes**. These assemblies reduce the urban heat island effect by maximizing reflective benefits. Using XPS also reduces building costs and material consumption because it does not require a cover board under white membranes. When **LEED** certification is a consideration, the stable thermal efficiency of XPS can contribute to exceeding ASHRAE 90.1 minimum standards, which is the single highest scoring opportunity in LEED.
- **Reusability.** With protected membrane roofing systems, the durability of XPS allows it to be reused when aging membranes are replaced. This eliminates the use and cost of new insulation while saving landfill space and valuable natural resources. One example of such savings can be found at the Dallas/Fort Worth International Airport where more than 80 percent of the airport’s 17-year-old XPS insulation was reused in a new roof.

The capabilities of XPS allow architects and builders to use *one* product to address *three* major green building concerns, making it a highly-efficient solution. For energy savings, moisture control, durability and reusability in a single product—XPS is an excellent green solution. As the building industry increasingly turns to environmentally sound products, it just makes sense to choose and use a material that captures the essence of sustainability.

Susan Herrenbruck  
Executive Director, XPSA

## 4. Higher Education Reaches the Tipping Point in Green Building

### Methodology

In August 2007, *Building Design+Construction* surveyed a scientifically drawn sample of the members of three major higher education professional organizations: the Society for College and University Planning (SCUP), the Association for the Advancement of Sustainability in Higher Education (AASHE), and the Association of Higher Education Facilities Officers (APPA), formerly the Association of Physical Plant Administrators.

Together, the three groups represent a diverse professional workforce within the U.S. higher education sector. Recipients of the online survey were asked to gauge their level of knowledge, interest, and activity with regard to green buildings and sustainable practices at their institutions.

Note: For SCUP and APPA, data from the 2004 *BD+C* "Progress Report on Sustainability" survey is also presented.

**G**reen building activity is bustling like never before at U.S. universities and colleges, with adoption rates nearing the 90% plateau and signs that the barriers to green may finally be fading.

Eighty-five percent of university employees said they have incorporated sustainable design and green building principles in recent building projects at their institutions, and just 5% said they have no intentions of implementing green strategies in campus facilities (chart 4.6), according to *BD+C*'s recent survey of three higher education professional organizations: the Society for College and University Planning (SCUP), the Association for the Advancement of Sustainability in Higher Education (AASHE), and the Association of Higher Education Facilities Officers (APPA), formerly the Association of Physical Plant Administrators.

Green building adoption rates among SCUP and APPA members rose sharply from 2004, when *BD+C* last queried the groups. Nearly half of SCUP respondents (47%) said they have incorporated sustainable strategies "quite extensively" in recent building projects, up from 26% in 2004. Similarly, 42% of APPA members have implemented green extensively, a significant increase from the meager 14% who said they did so in 2004. The green adoption rate among AASHE members is at a healthy level as well, with 86% having incorporated sustainable design in recent projects, 40% having done so extensively.

The historically high adoption rate among the three organizations may provide proof that the green building

movement has not only reached but actually surpassed the tipping point in the higher education sector.

"Universities have always built good buildings with a

4.1 A breakdown of respondents' institutions			
	SCUP	APPA	AASHE
Urban	43%	44%	46%
Suburban	22%	29%	20%
Mixed/multiple locales	18%	14%	16%
Rural	17%	13%	17%
Base	134	131	455
Public	67%	64%	65%
Private	33%	36%	35%
Base	134	131	455
Four-year	91%	88%	90%
Two-year	9%	12%	10%
Base	134	131	455
<2,500 students	10%	13%	16%
2,500 to 7,499	16%	23%	19%
7,500 to 14,999	31%	26%	18%
15,000 or more	42%	38%	47%
Base	134	131	455

BD+C/AASHE/APPA/SCUP Green Building Surveys, 09/04, 08/07  
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Respondents mostly work for large, public, four-year schools.

### Principal findings of the 2007 survey

- 85% of respondents said their institutions have incorporated sustainable design and green building principles in recent building projects. Just 5% said their colleges and universities have no plans to incorporate green in future building projects.
- Both SCUP and APPA members have seen a sharp increase in green building projects, compared to 2004. Nearly half of SCUP respondents (47%) said they have incorporated sustainable strategies "quite extensively" in recent building projects, up from 26% in 2004, while 42% of APPA members claimed to have implemented green extensively, up from 14% in 2004.
- Almost half of respondents (47%) said their institutions would be willing to pay up to 5% more for green, and about one-fifth said they would fork out an additional 6-10%. Just 9% of respondents across the three groups said a cost premium for green is not acceptable.
- Relatively low-cost approaches for reducing energy consumption—including energy management, automated lighting controls, and daylighting—topped the list of sustainable action items that have been implemented or are planned for upcoming projects. Strategies for improving indoor air quality were also popular.
- Most of the respondents that have incorporated green into recent building projects were simply not sure if it has improved student performance. About one-third of respondents (32%) saw improved performance in the classroom as a result of going green, while about half (47%) said they don't know if it has impacted performance.



## 'As much as those in higher education complain about lack of funding, the sector is relatively well funded, especially compared to K-12.'

—Richard Franz, architect, David E. Shambach Architects Inc., Tucson, Ariz., former Director of Facilities Planning, Pima Community College

view toward the long-term life of their structures, and they're starting to realize that it's a very small step to go from good buildings to good green buildings," said Richard Franz, architect with David E. Shambach Architects Inc., Tucson, Ariz., and formerly Director of Facilities Planning at Pima Community College in Tucson.

Franz said the university sector's long-term outlook with regard to campus buildings, coupled with the fact that multiple funding sources are available to schools for campus expansions and improvements, make the higher education sector ripe for green building activity.

"As much as those in higher education complain about lack of funding, the sector is relatively well funded, especially compared to K-12," said Franz. Unlike K-12 school districts, universities have several ways to raise money for buildings and infrastructure, including state funding sources, bond levies, and alumni donations.

Some respondents claimed that going green actually helps with fundraising efforts. "Many times we'll see more donor support than otherwise for a green project," said respondent Gerry Bomotti, SVP for Finance and Business at the University of Nevada, Las Vegas. Fundraising efforts have helped pay for the construction and

operation of two LEED-registered buildings at UNLV: a science and technology lab and a classroom building for the school's Greenspun College of Urban Affairs.

"We do pay more for green, but the focus on up-front capital costs is not the only factor we look at," said Bomotti. "If you consider a full and complete analysis of the

### 4.3

#### How familiar are you with the term "sustainable design" or "green building"?

	SCUP 2007	SCUP 2004	APPA 2007	APPA 2004	AASHE
Very familiar	71%	78%	60%	55%	65%
Somewhat familiar	28%	17%	36%	39%	32%
Have heard of it	1%	4%	4%	6%	3%
Never heard of it	—	1%	—	—	—
Base	134	294	131	217	455

BD+C/AASHE/APPA/SCUP Green Building Surveys, 09/04, 08/07  
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Compared to 2004, respondents from both SCUP and APPA today said they were generally more familiar with the terms "sustainable design" and "green building." All survey respondents, including AASHE members, said they are familiar with both sustainable design and green building.

### 4.4

#### How would you describe the level of expertise with green buildings at your institution?

	SCUP 2007	SCUP 2004	APPA 2007	APPA 2004	AASHE
Very experienced	19%	25%	22%	9%	20%
Somewhat experienced	54%	40%	49%	42%	50%
Not much experience, but interested	24%	26%	27%	38%	24%
No experience	3%	10%	2%	11%	6%
Base	134	293	131	215	455

While fewer SCUP members said their institution was "very experienced" with green building this year than in 2004, the overall experience level apparently is higher today than three years ago. Nearly three-quarters of SCUP respondents (73%) said their school had some level of experience with green building, up 8% from 2004, and the number of respondents with "no experience" declined from 10% down to just 3%. APPA members appear to have made the most progress in sustainable design, with nearly a quarter (22%) having stated that their institution is "very experienced," up from 9% in 2004.

### 4.5

#### What level of consideration should be given to green design when a major project is being contemplated?

	SCUP 2007	SCUP 2004	APPA 2007	APPA 2004	AASHE
4-5 Top 2	91%	87%	88%	74%	94%
3 Mid-range	7%	9%	11%	18%	3%
1-2 Bottom 2	1%	4%	2%	8%	3%
Base	134	294	131	216	455

Nine out of 10 respondents across the three groups said green design deserves strong consideration in the design of campus buildings, a moderate increase among SCUP members and a strong increase among APPA respondents compared to 2004 data. AASHE members feel most strongly about green, with 94% ranking it at the top end of the scale and just 3% saying it deserves minor consideration.

### 4.2

#### What role do you serve at your university/college?

	SCUP	APPA	AASHE
Facilities director/manager	24%	58%	11%
Facilities designer/planner	23%	3%	3%
Construction/capital projects manager	16%	8%	—
University/college administrator	12%	12%	18%
Architect/designer	11%	2%	—
Engineer	1%	2%	1%
Consultant	1%	—	1%
Sustainability coordinator/officer	1%	2%	15%
Facilities operations & maintenance staff	1%	5%	3%
University/college business official	1%	—	3%
University/college board member	1%	—	—
Student	—	—	10%
Other	7%	8%	35%
Base	134	131	455

BD+C/AASHE/APPA/SCUP Green Building Surveys, 09/04, 08/07  
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Nearly half of SCUP respondents (47%) are facilities directors and designers, and about six in 10 APPA respondents (61%) perform the same role. AASHE respondents are more diversified, with about one-fifth (18%) being school administrators, 15% sustainability coordinators, 11% facilities directors and designers, and 10% students.

benefits, including increased fundraising, lower operating costs, and getting a higher-quality facility, we may not really be paying more for green.”

Further indication that green building is flourishing

in the university sector is the fact that many of the traditional barriers to green seem to be slowly fading.

First cost, for instance, remains a persistent obstacle, with about half of respondents claiming that sustainable design adds significantly to the initial cost of construction (chart 4.11). However, an overwhelming majority of respondents (88%) either “agree” or “strongly agree” that colleges and universities are more willing today than they were three to four years ago to invest in green building projects. How much more?

About half of respondents (47%) said a premium of up to 5% would be acceptable, and about one-fifth (17%) said they felt their institutions would devote an additional 6-10% for green. Just 9% of respondents across the three groups said a cost premium for green would not be acceptable (chart 4.8).

“Generally, if a LEED-related point has a payback of seven to 10 years, it makes sense for the institution to invest in that point,” said respondent Andrew S. McBride, AIA, LEED AP, university architect at the University of Richmond, Va., which has five LEED-registered projects in the works. “Much beyond that point and there are likely other reasons that would motivate the institution to make that type of investment.”

Moreover, other common barriers to green—including claims that the sustainable design process is too complicated and that green buildings are hard to justify even on the basis of long-term savings—were cited by a surprising small percentage (between 15-19%) of respondents (chart 4.11). In fact, besides higher first cost, the only other barriers that received substantial attention from respondents are related to “other school priorities” (38%) and concerns about the amount of paper-

4.6

Have you incorporated sustainability into recent building projects?

	SCUP 2007	SCUP 2004	APPA 2007	APPA 2004	AASHE
Yes, quite extensively	47%	26%	42%	14%	40%
Yes, somewhat	43%	47%	38%	53%	46%
No, but we plan to do so	6%	11%	15%	16%	9%
No, and we have no plans to do so	4%	15%	5%	18%	5%
Base	134	296	131	217	455

BD+C/AASHE/APPA/SCUP Green Building Surveys, 09/04, 08/07  
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Both SCUP and APPA members reported seeing a sharp increase in green building projects over the last three years. Nearly half of SCUP respondents (47%) said their institutions had incorporated sustainable strategies “quite extensively” in recent building projects, up from 26% in 2004, while 42% of APPA members reported extensive green implementation, a significant increase from the 14% who said they did so in 2004. Less than 5% of total respondents across the three groups said they have no plans to incorporate green in future building projects. SCUP members are the most active, with 90% of respondents having implemented some level of sustainability into recent projects, followed closely by AASHE (86% adoption rate) and APPA (80%) respondents.

4.7

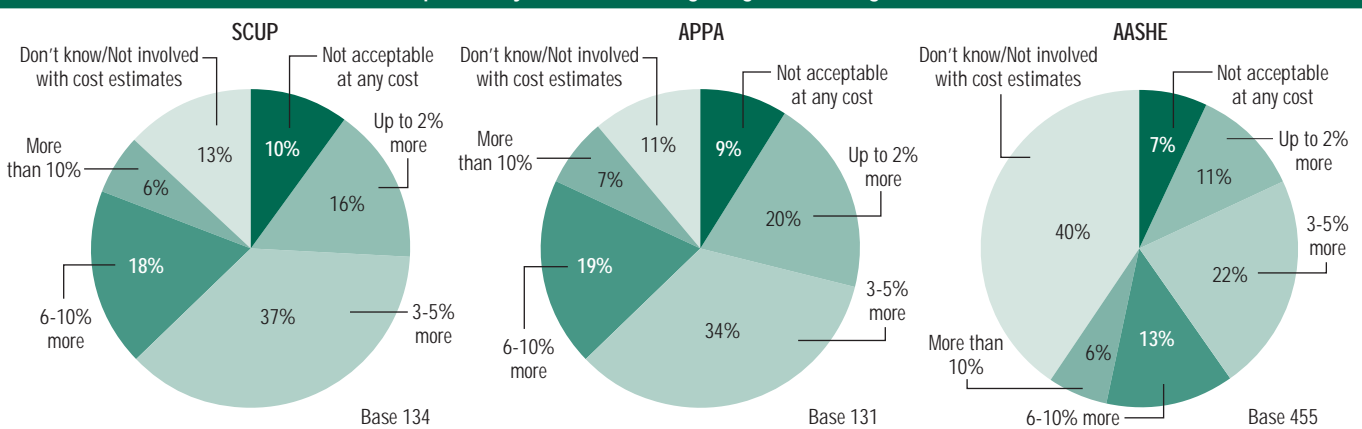
If you have used sustainable design in building projects, has it improved student performance?

	SCUP 2007	SCUP 2004	APPA 2007	APPA 2004	AASHE
Yes	27%	25%	29%	9%	40%
No	21%	9%	29%	16%	12%
Don't know/Not sure	52%	66%	42%	76%	48%
Base	121	210	105	140	390

Most of the respondents that had incorporated green into recent building projects could not state with certainty if green building has benefited student performance. AASHE members reported the most success, with 40% of those surveyed having seen improved performance in the classroom as a result of going green.

4.8

What initial cost differential would be acceptable to your institution to get a green building?



BD+C/AASHE/APPA/SCUP Green Building Surveys, 09/04, 08/07  
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When it comes to paying a premium for green buildings, nearly half of respondents (47%) across the three groups said they believed their institutions would be willing to pay up to 5% more for green, while 18% said they anticipated a willingness to pay an additional 6-10%. Just 9% of respondents across the three groups said a cost premium for green would not be acceptable to their college or university.

work required to certify green buildings (30%). This last concern should quickly fade as the U.S. Green Building Council's LEED, the Green Building Initiative's Green Globes, and other green building certification programs continue to simplify the certification process with the use of electronic submittals and reduced paperwork.

**How are universities overcoming the obstacles to green?**

Greater knowledge and expertise in green building seems to be a major factor in respondents' attitudes and actions. Seventy-one percent of respondents across the three groups said their school had some level of experience with green building, and one-fifth of those surveyed described their college or university as "very experienced" in green building. For SCUP and APPA members, the overall experience level in 2007 was higher than three years ago. Nearly three-quarters of APPA members (71%) said their institution had some level of experience with green building, up 20 percentage points from 2004, while 73% of this year's SCUP respondents said their school had experience with green, up eight percentage points from 2004 (chart 4.4).

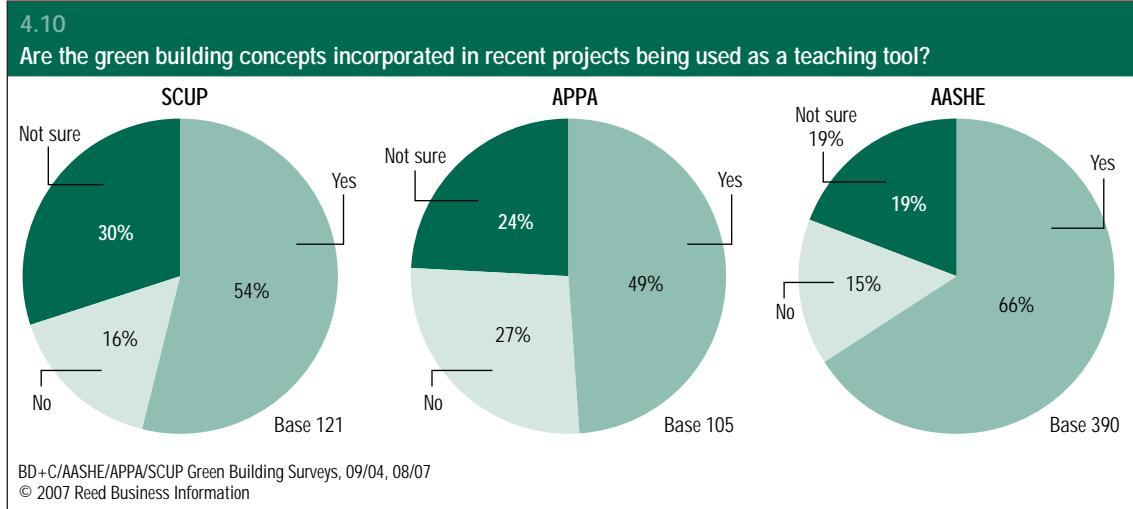
Although the desire to improve student performance is certainly a key driver of green building activity at universities, the link between sustainable design and student performance remains largely unproven to more than two-thirds of respondents (68%). About half of those surveyed that have implemented green buildings at their school are simply unsure of the effect sustainable strategies have had on student performance, while 20% said they flat out haven't seen improvement as a result of going green (chart 4.7).

AASHE members reported the highest return for student improvement based on green building, with 40% of those surveyed saying that had seen better student performance in the green classrooms than in conventional

**4.9 Which green strategies have you incorporated or plan to incorporate in recent projects?**

	SCUP		APPA		AASHE	
	Have done	Plan to do	Have done	Plan to do	Have done	Plan to do
Energy management	91%	84%	89%	90%	75%	70%
Automated lighting controls	86%	82%	87%	87%	74%	63%
Daylighting	83%	81%	83%	82%	71%	65%
Low-VOC paints/finishes/adhesives	75%	78%	70%	77%	61%	60%
Low-VOC carpeting	69%	75%	73%	78%	56%	60%
Building commissioning	69%	72%	74%	79%	49%	47%
Energy analysis/modeling tools	68%	69%	62%	69%	54%	58%
Recycled/renewable building materials	64%	68%	64%	72%	60%	64%
Environmentally sensitive landscaping	61%	71%	62%	72%	57%	59%
Environmentally responsive site design	60%	66%	44%	59%	43%	55%
High-reflectance, high-emittance roof	43%	57%	44%	60%	34%	42%
Acoustics/soundproofing	50%	57%	64%	72%	44%	43%
Green furniture, fixtures, equipment	51%	62%	47%	64%	51%	55%
Reused construction and demolition waste	46%	61%	42%	54%	42%	50%
Waterless urinals	32%	36%	38%	35%	41%	39%
Stormwater harvesting	37%	59%	34%	48%	34%	44%
Environmentally preferred purchasing	32%	42%	42%	54%	44%	53%
Passive solar	27%	43%	27%	42%	31%	43%
Green (vegetated) roof	25%	36%	23%	30%	28%	37%
Photovoltaics	17%	29%	18%	29%	25%	35%
Geothermal heating/cooling	17%	21%	14%	28%	19%	23%
Underfloor air distribution	13%	19%	12%	23%	12%	17%
None of the above	1%	2%	3%	2%	4%	7%
Other	7%	5%	9%	6%	13%	18%
Base	121	129	105	125	390	433

Relatively low-cost approaches for reducing energy consumption topped the list of sustainable action items that have been implemented or are planned for upcoming higher education construction or renovation projects. Energy management, automated lighting controls, and daylighting were the green features most often implemented or planned by the survey respondents. Indoor air quality is also important, with low-VOC interior products like carpeting and paint scoring high on the list.



About half of the SCUP and APPA respondents that have incorporated green design into recent building projects said the concepts are being used as a teaching tool. Two-thirds of AASHE respondents said green building principles are being incorporated into the curriculum.

## 'Many times we'll see more donor support than otherwise for a green project.'

—Gerry Bomotti, SVP for Finance and Business, University of Nevada, Las Vegas

ones. A possible explanation for this somewhat significant discrepancy is AASHE's member demographic, which likely includes more faculty and students than SCUP and APPA membership groups, said Tom Kimmerer, executive director of AASHE.

"What you may be seeing here is the effect of asking teachers if their students have improved," said Kimmerer.

Respondents seemed reasonably confident, however, that green buildings could help reduce operational costs, especially those related to energy consumption. Eighty-one percent of respondents across the three study groups said they either "agree" or "strongly agree" that green buildings significantly reduce energy costs, and 79% stated that these buildings operate more efficiently than comparable conventional college buildings.

In fact, energy-reduction strategies are among the sustainable action items most often implemented or planned for construction or renovation projects. About 80% of respondents across the three groups have implemented approaches for reducing energy consumption, including energy management systems, automated lighting controls, and daylighting schemes (chart 4.9).

Strategies for improving indoor environmental quality, such as specifying low-VOC interior products like carpeting and paint, are also key goals of university sustainable building programs. About two-thirds of respondents (67%) said their organizations had incorporated low-VOC products to help improve IEQ. BDC

### 4.11 What are the barriers to adopting green building principles at your institution?

	SCUP	APPA	AASHE
Adds significantly to initial costs of construction	56%	58%	55%
Too much paperwork	39%	27%	24%
Other program needs are more important than green building	36%	39%	38%
Not comfortable with new technology	21%	8%	21%
Green building isn't required by law or regulation so isn't necessary	19%	15%	23%
Too complicated	16%	17%	18%
Too hard to find contractors with green building/sustainable design expertise	19%	16%	18%
Green buildings hard to justify even on the basis of long-term savings	14%	18%	14%
Too hard to find materials for green building/sustainable design	8%	10%	7%
Green building doesn't provide enough flexibility	5%	8%	4%
Green building is a passing fad	2%	2%	3%
None of the above/institution doesn't see barriers to green building	21%	24%	16%
Don't know	3%	2%	7%
Other	14%	7%	19%
Base	134	131	455

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Cost remains the most significant barrier to the adoption of green strategies, with more than half of respondents from the three groups claiming that sustainable design adds significantly to initial costs of construction. Extra paperwork required to certify buildings is also cited as a chief obstacle, but this barrier should quickly fade as LEED, Green Globes, and other green building certification systems continue to simplify the certification process with the use of electronic submittals and reduced paperwork.

### 4.12 How important are the following attributes when planning a green university building?

	SCUP	APPA	AASHE
Energy management	4.85	4.74	4.84
Long-term operations and maintenance	4.64	4.42	4.55
Building envelope design	4.64	4.51	4.28
Indoor environmental quality	4.52	4.34	4.48
Building commissioning	4.45	4.32	3.92
Elimination of toxic materials and substances	4.49	4.41	4.52
Environmentally responsive site design	4.36	4.08	4.37
Life cycle cost analysis	4.41	4.20	4.39
Daylighting	4.43	4.34	4.48
Environmentally sensitive landscaping	4.21	3.99	4.30
Water conservation	4.26	4.24	4.41
Safety and security	4.17	4.26	4.16
Use of energy analysis/modeling tools	4.13	4.10	4.16
Recycled/renewable building materials	3.91	3.81	4.14
Natural ventilation	3.87	3.74	4.03
Reused construction and demolition waste	3.71	3.62	3.96
Acoustics/soundproofing	3.61	3.78	3.65
Building utilized as a teaching tool	3.53	3.45	4.06
Innovative design	3.41	3.44	3.60
Views of nature	3.45	3.42	3.81
Geothermal heating/cooling	3.05	2.99	3.24
Base	134	131	455

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Respondents across the three survey groups rated energy management as the most crucial attribute of a green university building. Long-term operations and maintenance, building envelope design, and indoor environmental quality also ranked high. Note: A mean score of 3.00 (on a scale of 5) would be considered neutral.



## Printing for Professionals

The movement to go green has never been stronger. Businesses are continually striving to improve operating models to further reduce their impact on the environment. For AEC firms, this can include embracing eco-friendly, sustainable equipment capable of producing the highest quality prints—with output equaling, or often surpassing, the less “green” printing equipment of decades past.

Today, high-quality, ultra-efficient, large format printing solutions that support responsible paper use, low-emissions, energy conservation and reusable components are making their way into the market. They are engineered to help architects, engineers, and contractors increase sustainability and improve end products, with the overarching benefit of enabling them to reach their environmental goals.

### **Océ Technology: Designed with the Environment in Mind**

Océ, through its full range of large format printing solutions, meets head on the need for sustainable, environmentally sound business solutions. As part of the Dow Jones Sustainability Index since 2004, which enables Océ to be a qualified and eligible investment option for “green funds,” Océ products are designed with ecosystem preservation in mind and offer the following:

- **Low emissions, reduced waste:** Océ is committed to engineering products with low ozone emissions, dust, noise emissions, and toner waste, as well as systems with inherently economical resource consumption on a per print basis.
- **Reusability:** Océ considers sustainability throughout its design and manufacturing processes. Components are designed for re-use and recyclability to gain maximum utilization and minimize landfill use. Products are manufactured with consideration for energy consumption and preventing waste during the manufacturing process.
- **Radiant fusing:** This energy and timesaving technology eliminates warm-up time, guaranteeing that high-quality printing starts as soon as a printer receives a job—offering the fastest cold-to-start print time available on any large format product.
- **Modular, upgradeable design:** Constructing products using a modular, open-architecture approach prevents equipment from prematurely entering the “waste stream.”
- **High degree of productivity:** Created to ensure the highest level of quality, reliability, speed, and ease of use, while at the same time requiring low energy input to operate, Océ large format printing equipment helps to decrease a company’s overall waste production and energy consumption.
- **Maximum paper handling efficiency:** With multiple paper size concurrent loading and printing options, Océ equipment helps AEC firms produce less paper waste by ensuring the right size prints, with the right images and optimum quality level, are printed the first time.

For more information on how Océ can help your firm produce quality print output and promote sustainability to help benefit the environment, call 800-714-4427, visit [www.oceusa.com](http://www.oceusa.com), or email [us.info@oce.com](mailto:us.info@oce.com).

## 5. K-12 School Officials Still Learning ABCs of Green Design

### Methodology

In August 2007, *Building Design+Construction* surveyed a scientifically drawn sample of members of the Council of Education Facility Planners International (CEFPI) and the Association of School Business Officials (ASBO). Recipients of the online survey were asked to gauge their level of knowledge, interest, and activity with regard to green buildings and sustainable practices within their school districts and facilities. A total of 197 valid surveys were received. As an incentive, recipients were offered eligibility to enter a drawing for a \$100 American Express gift check. *BD+C* also pledged a \$5 charitable donation for each of the first 100 responses. Respondents could select from the American Red Cross, United Service Organization (USO), or the CEFPI Foundation and Charitable Trust.

**K**-12 schools represent one of the single largest sectors in the nonresidential construction industry. School construction spending (both modernizations and new construction) increased in 2006 to \$25 billion, compared to \$23.5 billion in 2005, according to American School & University.<sup>1</sup> Even so, more school construction is still needed to stave off record rising student population.

Every school day more than 50 million children and six million adults enter the nation's public schools, yet this huge market segment has been a somewhat cautious early adopter of green building, given its massive size. Health benefit studies have shown sustainable design provides young students a better learning environment. Long-term energy savings that can be provided to cash-strapped districts through green building have led to some innovative school buildings and school construction programs. However, according to market research firm ZweigWhite,<sup>2</sup> more than half of the nation's schools were built at least 40 years ago and most of them have not had significant retrofits to fix outdated energy consumption and other systems. Thus, there appears to be plenty of unmet need for greening and sustainability in America's school infrastructure.

Student enrollment has risen for 20 consecutive years while spending for existing facilities has remained stagnant, so it's not surprising that many of the nation's children (particularly in growth states like California and Florida) go to school in overcrowded, dilapidated facilities. While the need for construction continues to be strong, many school districts are simply delaying, reducing in scope, or postponing construction activity due to rapidly rising construction costs and unforeseen market conditions.

Even in this somewhat pessimistic environment, green schools are being built and research into their effect on students and the education process is coming to light. As of September 2006, 166 school buildings were at least certified under the U.S. Green Building Council's LEED for New Construction rating system, with more than 250 in the certification pipeline. Many of these school projects are being completed without excessive spending. A 2006 study<sup>3</sup> by the Capital E Group looked at 30 certified green schools and found that the typical premium for constructing a green/sustainable school building is 1.65% of the building's total cost, roughly \$3 more per square foot based on 2006 construction materials costs.

Findings like these and success stories from green

**Chart 5.1**  
Most respondents represent large suburban public school districts in a variety of sizes

	2007		2004	
	ASBO	CEFPI	ASBO	CEFPI
Suburban	56%	56%	43%	55%
Urban	21%	34%	23%	34%
Rural	23%	16%	33%	10%
<1,000 students	8%	2%	–	–
1,000-2,499	17%	8%	23%	8%
2,500-7,499	35%	15%	40%	18%
7,500-14,999	10%	20%	20%	18%
15,000 or more	29%	54%	17%	57%
Base:	48	149	30	273

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In the K-12 survey, suburban districts (56%) and public school systems (96.5%) dominate, with a wide variation in student population.

### Principal findings of the 2007 survey

- Nearly all respondents (95%) are familiar with high performance/green/sustainable schools; 87% also expressed interest in such schools.
- More than a third (34%) said their districts would pay 3-5% more in additional costs to gain approval of green/sustainable schools; in 2004, only 8% said they would pay a 3-5% premium for green schools.
- 82% of respondents have incorporated green concepts into recent designs for their schools.
- Two-thirds of respondents (67%) said that the biggest barrier to getting high performance/sustainable/green schools in their district was that it "adds significantly to initial costs of construction."
- Energy management, automated lighting controls, acoustics, and low-VOC carpeting and finishes are among the most popular sustainable action items that have been implemented or are planned for upcoming school construction or renovation projects.

<sup>1</sup> "33rd Annual Official Education Construction Report." Joe Agron, American School & University, May 2007. [http://asumag.com/Construction/university\\_rd\\_annual\\_official/index.html](http://asumag.com/Construction/university_rd_annual_official/index.html)

<sup>2</sup> "2005-2008 K-12 School Market for Design & Construction firms," ZweigWhite Research, Natick, Mass., June 2005.

<sup>3</sup> "The Costs and Benefits of Greening America's Schools," Greg Katz, Capital E Group, September 2006. [www.cap-e.com](http://www.cap-e.com)

## 'Vast majorities of school business executives and facilities directors agreed that green schools are healthier for occupants, significantly reduce energy costs, and allow for better design quality.'

schools suggest that the K-12 school market follows other segments of the U.S. construction market to re-

semble a bell curve. Early adopters and advocates are at one extreme, those who have not heard of or are not interested in green building are at the other, and the vast majority are still cautiously waiting to see where green building is going and how it can be cost-effective in their districts.

Chart 5.2

### Respondents cover school business and facilities roles

	2007		2004	
	ASBO	CEFPI	ASBO	CEFPI
Architect/designer	2%	36%	–	44%
Construction manager	–	14%	–	–
Consultant	–	12%	–	6%
Engineer	–	5%	–	4%
Facilities director/manager	19%	17%	17%	14%
Facilities designer/planner	–	5%	3%	4%
Facilities maintenance	–	4%	–	1%
School business/official	54%	1%	57%	2%
Superintendent/administrator	10%	1%	13%	3%
Other	8%	12%	–	–
Base:	48	149	30	273

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Respondents' job responsibilities fall closely in line with the organizations to which they belong—business officials in ASBO, facilities planners in CEFPI.

Chart 5.6

### How would you describe the level of interest about green buildings in your school district?

	ASBO	CEFPI
High	44%	40%
Medium	46%	44%
Low	10%	14%
None/not interested in green building	–	1%

Chart 5.7

### How would you describe the level of expertise about green buildings in your school district?

	ASBO	CEFPI
High	13%	25%
Medium	58%	43%
Low	25%	28%
None/not interested in green building	4%	5%
Base:	48	149

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Most respondents said they are interested in green building, and most respondents said the level of expertise in green building in their districts was either high or medium.

### Are districts willing to pay a premium for green schools?

Franklin Brown, AIA, LEED AP, planning director of the Ohio School Facilities Commission, said that his

Chart 5.3

### How familiar are you with the term "high performance/sustainable/green schools"?

	2007		2004	
	ASBO	CEFPI	ASBO	CEFPI
Level of familiarity				
Very familiar	33%	70%	27%	69%
Somewhat familiar	60%	27%	40%	27%
Have heard of it, but not familiar with it				
	6%	3%	–	–
Never heard of it	–	1%	3%	1%

Chart 5.4

### ... the CHPS Best Practice Manual?

Level of familiarity				
Very familiar	25%	21%	3%	2%
Somewhat familiar	38%	35%	13%	27%
Have heard of it, but not familiar with it				
	38%	25%	47%	25%
Never heard of it	33%	19%	37%	26%

Chart 5.5

### ... the LEED green building rating system developed by the U.S. Green Building Council?

Level of familiarity				
Very familiar	27%	62%	17%	57%
Somewhat familiar	46%	30%	33%	29%
Have heard of it, but not familiar with it				
	23%	5%	27%	8%
Never heard of it	2%	3%	23%	6%
Base:	48	149	30	273

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CEFPI members displayed the highest level of familiarity with sustainability, CHPS, and LEED among the groups surveyed.

**Chart 5.8**  
**What level of consideration should be given to green design when a major project is being contemplated?**

	ASBO	CEFPI
5 highest level of consideration	47%	40%
4	36%	42%
3	10%	13%
1-2	7%	6%
Base:	48	149

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Both groups showed a high level of support for consideration of green features in school buildings.

**Chart 5.9**  
**What initial cost differential, if any, would be acceptable to your district to gain approval of a sustainable/green school?**

2007	ASBO	CEFPI
None, would not pay additional cost	13%	15%
Up to 5%	54%	60%
Up to 10%	71%	77%
11-15%	75%	79%
Over 15%	4%	–
Don't know/not involved with cost estimates	8%	6%
Base:	48	149
2004	ASBO	CEFPI
Up to 5%	10%	39%
Up to 10%	43%	30%
Up to 15%	10%	7%
Up to 20%	7%	3%
>20%	–	1%
Base:	30	273

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The percentage of school business officials and designers/facilities directors who thought their districts would be willing to pay up to 5% more for a green school also increased dramatically since the 2004 BD+C Green Building Survey.

state has been mandating green building practices since 1997, under the Ohio School Design Manual. Every architect agreement requires that design firms comply with a 2,400-page set of standards. It incorporates such best practices as energy recovery (heat wheels), triple glazed windows with internal shading devices, carpeting that meets the California standard for emissions, occupancy sensors in every space that has more than one light fixture, sound-field enhancement in every classroom so no student is ever more than six feet from a teacher's voice and low VOC coatings for high indoor air quality.

Among CEFPI respondents (who consist largely of

**Chart 5.10**  
**Which of the following, if any, do you think are barriers to high performance/sustainable/green schools in your district?**

	ASBO	CEFPI
Adds significantly to initial costs of construction	73%	62%
Too much paperwork	23%	42%
Other programs are more important (than green building)	35%	30%
Hard to justify on basis of long-term savings	27%	24%
Isn't required by law or regulation so is unnecessary	27%	28%
Too hard to find contractors with building/design expertise	27%	26%
Too hard to find green/sustainable building materials	23%	9%
Not comfortable with new technology	17%	19%
Too complicated	10%	20%
Green building doesn't provide enough flexibility	4%	3%
Green building is a passing fad	2%	5%
None of the above, district sees no barriers	13%	11%
Base:	48	149

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Even though the percentage of school business officials and designers/facilities directors who thought their districts would be willing to pay up to 5% more for a green school increased dramatically since the 2004 BD+C Green Building Survey, most respondents from both groups still said "adds significantly to the initial cost of construction" was the biggest barrier to high performance/green/sustainable schools.

## Ohio passes first LEED Silver requirement for new school construction

In September, the Ohio School Facilities Commission set the target for all future state funded schools to be designed to the LEED Gold level, with LEED Silver being the minimum acceptable standard. "It is our intent to register 250 new or renovated Ohio school buildings with the USGBC within the next three years," said Franklin Brown, AIA, LEED AP, planning director.

With \$4.1 billion targeted for school facilities under Ohio Governor Ted Strickland's education plan, the commission's action virtually guarantees that at least that number of school buildings will be registering for at least LEED Silver within the next two years.

This is believed to be the first time LEED has been required for construction of schools statewide. Brown said there are several projects under way in Ohio that are registered with the USGBC and on their way to certification, including the Pleasant Ridge Elementary School for the Cincinnati Public School District, a Montessori School designed by Steed Hammond Paul Architects in Cincinnati. Pennsylvania, Maryland, and New Jersey have passed laws encouraging school districts to pursue sustainable design through financial incentives for implementation of LEED principles. For more on the Ohio law, visit [www.osfc.state.oh.us/news/news.html#leed](http://www.osfc.state.oh.us/news/news.html#leed).



architect/designers, facilities managers and staff, contractors, and consultants—see chart 5.2), 87% said that they had incorporated some form of green, sustainable, or high-performance concepts into their districts' K-12 projects. Despite the anticipated concern over higher first costs, a surprisingly large percentage of respondents said they thought their school boards would pay more to be able to have sustainable schools (chart 5.9). In fact, more than half of all respondents said they thought their districts would pay up to 5% more for a sustainable school. The percentage of school business officials and designers/facilities directors who thought their districts would be willing to pay up to 5% more for a green school also increased dramatically since the 2004 BD+C Green Building Survey. Sixty percent of CEFPI respondents said they would be willing to pay up to 5% more for a green school, up from 39% in 2004, and 54% of ASBO respondents said they would as well, up from 10% in 2004.

“There is no question that there is a ‘getting started’

cost for most design firms,” said Brown, of the Ohio School Facilities Commission. “However, after a firm has done a few buildings to, say, the LEED Silver or Gold level, and learned how to do them efficiently with a fully integrated design team, the cost should be equal or less than what they are doing projects for now. On the other hand, the benefits to the building owner are astounding.”

Vast majorities of school business executives and facilities directors also agreed that green schools are healthier for occupants, significantly reduce energy costs, and allow for better design quality (see chart 5.13). All these seem to provide ample reasons for those engaged in building, operating, and financing school buildings to want to see more green in their K-12 facilities.

### LEED for Schools replaces LEED-NC

School buildings have unique needs that set them apart from other building types, making it difficult for

Chart 5.11

#### Which of the following have you incorporated into recent school building/renovation projects?

Base: respondents who have incorporated high performance/sustainable/green concepts into recent school district's/firm's recent school designs.

	ASBO		CEFPI	
	Have implemented	Plan to implement	Have implemented	Plan to implement
Energy management	86%	79%	88%	85%
Automated lighting controls	76%	79%	81%	83%
Daylighting	70%	63%	83%	88%
Acoustics/soundproofing	65%	63%	75%	77%
Low-VOC carpeting	57%	56%	68%	76%
Low-VOC paints/finishes/adhesives	54%	58%	70%	76%
Energy analysis/modeling tools	51%	51%	59%	65%
Building commissioning	46%	58%	64%	64%
Recycled/renewable materials	41%	40%	63%	61%
Environmentally responsive site design	32%	30%	59%	66%
High-reflectance, high-emittance roof surfaces	32%	37%	49%	62%
Environmentally sensitive landscaping	30%	35%	–	–
Environmentally preferred purchasing	27%	35%	27%	30%
Waterless urinals	24%	42%	37%	41%
Geothermal heating/cooling	22%	37%	36%	39%
Reused construction/demolition waste	22%	30%	34%	44%
Passive solar	16%	26%	29%	36%
Green furniture, fixtures, equipment	14%	30%	30%	43%
Stormwater harvesting	14%	28%	40%	49%
Photovoltaics	8%	19%	15%	27%
Green (vegetated) roof	5%	14%	12%	21%
Underfloor air distribution	3%	7%	16%	19%
None of the above	–	5%	1%	1%
Other	–	–	8%	7%
No answer	–	–	–	–
Base:	37		128	

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Energy management, daylighting, and automated daylighting controls topped both the lists of implemented and planned for green features from respondents.

## 'States such as Pennsylvania and New Jersey have passed laws encouraging school districts to pursue sustainable design through financial incentives for implementation of LEED principles.'

them to achieve certification through one-size-fits all ratings systems. A typical K-12 school combines a variety of spaces—classrooms, offices, a library, a gymnasium, a cafeteria, and an auditorium—under one roof, and green rating systems are trying to accommodate the special nature of schools.

For example, the Los Angeles Unified School District's Collaborative for High Performance Schools (CHPS, or "chips") uses a pass/fail system that requires 32 of 81 points on a sustainability scorecard. A new US-GBC program, LEED for Schools, launched in 2006, is now the only certification for K-12 buildings in the LEED family. Previously, K-12 buildings were eligible for certification under LEED for New Construction.

Both rating systems take into account classroom acoustics, master planning, mold prevention, maximum efficient use of daylighting, and environmental site assessment. LEED for Schools is based on LEED-NC and requires 29 of 79 LEED points for certification.

States such as Pennsylvania and New Jersey have passed laws encouraging school districts to pursue sustainable design through financial incentives for implementation of LEED principles. While this type of legislation is encouraging, nearly all cost decisions about school construction are still controlled at the local district level, so rock-solid evidence of the advantages of

green building is necessary to make cash-strapped school boards, some of which do not consult with their facilities professionals about planning new construction, accept higher initial project costs. With the clear need for new facilities that currently exists, there's certainly the potential for a rapid turnaround and adoption of green school buildings. BDC

Chart 5.12

On a scale of 1 to 4, with one being "much worse" and 4 being "much better," to what extent, if any, do you feel each of the following has changed as a result of the sustainable/green concepts you incorporated into your building projects?

Base: respondents who have incorporated sustainable/green concepts into recent projects.

	ASBO mean	CEFPI mean
Community relations	3.63	3.37
School's operating performance	3.41	3.43
Teacher performance	3.20	3.35
Student performance	3.14	3.35
Student attendance	3.29	3.29
Base:	37	128

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Chart 5.13

Using a five-point scale where 1 is "strongly disagree" and 5 is "strongly agree" please indicate the extent to which you agree or disagree with the following statements.

Statement	ASBO mean	CEFPI mean
Green schools are healthier for occupants than Conventional schools.	4.08	4.11
Green schools significantly reduce energy costs.	3.79	3.97
Sustainable design improves the overall quality and design of a school.	3.96	4.00
Green schools operate more efficiently than comparable conventional schools.	4.00	3.89
Green schools have a public relations advantage over comparable conventional schools.	4.17	3.80
School districts are more willing today than they were 3 to 4 years ago to invest in green/sustainable building projects.	3.88	3.72
My school district will be left behind if it does not become active in green building and sustainable design.	3.38	3.25
Green schools save money by reusing and recycling materials.	3.43	3.42
Green schools enhance recruitment and retention of teachers and staff.	3.44	3.23
The life cycle cost of green school buildings is less than comparable conventional school buildings.	3.68	3.15
Green schools cost no more to build than comparable conventional schools.	2.48	2.44
Base:	48	149

BD+C/ASBO/CEFPI Green Building Surveys, 09/04, 08/07  
© 2007 Reed Business Information

Most respondents agreed that green schools are healthier for occupants than comparable conventional schools and significantly reduce energy costs.

# GREEN BUILDING INITIATIVE™

## Letter from the President

At the Green Building Initiative (GBI), we know that a compelling reason to design and build green is cost. Energy-efficient, healthier and environmentally sustainable structures don't have to cost substantially more to build than their non-green counterparts and yet they have the potential to deliver significant operational savings.

We also recognize that achieving our mandate of accelerating the adoption of sustainable design and construction practices depends, in part, on demonstrating the economic benefits of high performance structures.

Consider these results from the *BD+C* reader survey:

- 78 percent of respondents believe that green building adds significantly to first costs,
- 60 percent say the market isn't willing to pay a premium, and
- 39 percent say green building is hard to justify even on the basis of long-term savings.

The problem—and the reason we believe many building owners, facility managers, home builders and others remain skeptical about the financial payback—is twofold:

1. Buildings designed to achieve high performance objectives often fail to perform as expected, and
2. Buildings that do perform well tend not to be analyzed and promoted in great enough detail, reinforcing the impression of green building as a purely altruistic goal instead of a solid business investment.

At the GBI, we're working to address both of these issues by gathering and promoting data that shows, not only that building and buying green has financial advantages, but where those advantages lie.

As a first step, we are now marketing a new module of our Green Globes environmental assessment and rating system—Green Globes for Continual Improvement of Existing Buildings—to help ensure that high performance designs result in high performance buildings. Used with Green Globes for New Construction or as a stand-alone green management tool, the new module allows users to create a baseline of their building's performance, evaluate interventions, plan improvements, monitor success, and compare multiple buildings within a portfolio.

We are also seeking opportunities to support research that provides practical benefits to the mainstream design and building community. For example, we're currently asking building owners or facility managers who have achieved 20 percent increases in energy efficiency to participate in a before and after analysis. We'll use the results to identify cost-effective strategies that others can use to achieve similar results, and to ensure that the tools we offer through GBI continue to reflect best practices. To participate in the study, please contact Vicki Worden at [vworden@thegbi.org](mailto:vworden@thegbi.org). For more information on GBI, visit [www.thegbi.org](http://www.thegbi.org).

Sincerely,



Ward Hubbell  
President

## 6. Hotel Industry Slowly Overcomes Reservations about Green Building

### Methodology

In August 2007, *Building Design+Construction* surveyed a scientifically drawn sample of 5,165 readers of *HOTELS* magazine, a sister publication to *BD+C* and a leading source of information for hoteliers competing in today's \$140 billion U.S. hospitality marketplace. Recipients of the online survey were asked to gauge their level of knowledge, interest, and action with regard to green buildings and sustainable practices within their hotel organizations and related businesses.

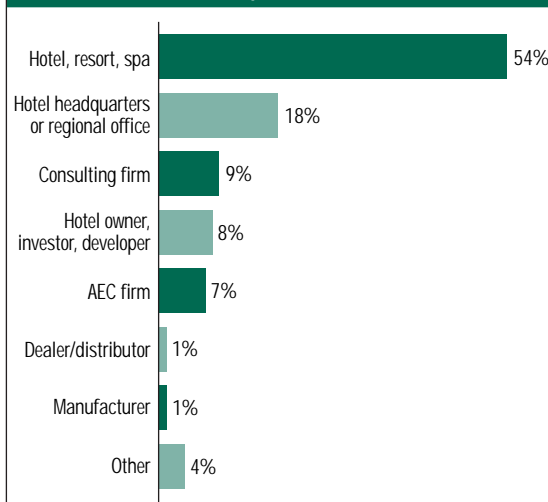
As an incentive, recipients were eligible to enter a drawing for a \$100 AMEX gift certificate. *BD+C* also pledged a \$5 charitable donation for each of the first 100 responses. Respondents could select from the American Red Cross, Habitat for Humanity, or United Service Organizations (USO).

The \$140 billion U.S. hospitality industry is taking a cautiously optimistic approach to sustainable design and green building. While hotels still struggle to define their attitudes toward sustainability and green, wondering if they should concentrate on physical infrastructure or focus more on operational aspects, the industry's familiarity with and increased interest in green building bodes well for the

sector, according to an exclusive August 2007 survey of more than 5,165 corporate managers, operators, and purchasing agents in the hospitality industry by *BD+C* and *HOTELS* magazine.

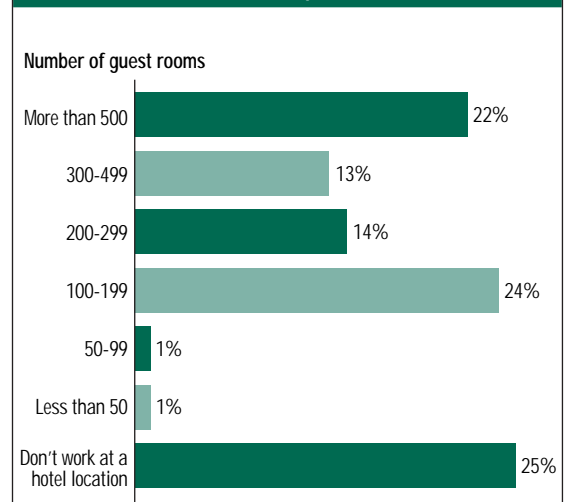
An overwhelming majority (88%) of survey respondents said that they were somewhat or very familiar with green building, and an equally high percentage (80%) said that they had a medium to high level of interest in

Chart 6.1  
Businesses at which respondents work



BD+C/HOTELS Green Building Survey  
© 2007 Reed Business Information

Chart 6.2  
Size of hotel at which the respondents work



BD+C/HOTELS Green Building Survey  
© 2007 Reed Business Information

### Principal findings of the 2007 survey

- Slightly more than half (51%) of respondents have incorporated green building concepts in recent hotel buildings or renovations, while another 33% said they plan to in the near future; 16% have no plans to do so.
- More than half of respondents (58%) cited significant initial construction costs as the biggest obstacle they face with regard to green building and sustainable design.
- A majority of respondents (65%) said that they would give green building and sustainable design significant consideration on their next new or major hotel renovation project, but another 35% said they would give it only minor consideration.
- More than three-fourths of respondents (77%) felt strongly that hotels are more willing today than they were three to four years ago to invest in green/sustainable building projects.
- Hotel guests were cited as the most significant influence by 65% of respondents that incorporated sustainable/green concepts in recent building or renovations. The AEC community was cited as a major influence by only 26% of respondents.
- Energy use is a major concern for hotels, with energy management cited by 75% of respondents as the sustainable/green concept they have already incorporated, and 53% citing it as the concept they soon plan to incorporate.

# Attitudes toward green hotels are encouraging, showing that respondents are willing and able to look beyond barriers and see significant advantages to building and operating sustainable hotels.

green building and sustainable design (chart 6.3). However, reflecting the industry’s cautious approach to green, only 10% said that their hotels were very experienced in green building and sustainable design practices—exactly the same percentage as those reporting absolutely no experience whatsoever with green building and sustainable design. The majority of respondents fall squarely in the middle, with 39% saying their hotels had modest experience and 41% saying their hotels had little green or sustainable experience, according to the survey.

Another sign of the industry’s cautious forward momentum concerns new hotel construction and major remodeling/renovation projects. While a majority of respondents (65%) said that they would give green building and sustainable design significant consideration when it came to those projects, there are still those who remain unconvinced, with 35% of respondents saying

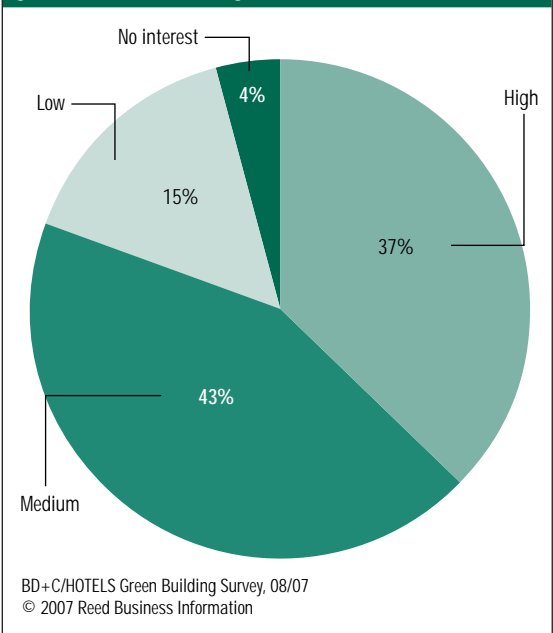
they would only give green/sustainable elements minor consideration.

“Personally, I am surprised that nearly half of hotels surveyed only express medium levels of interest in this matter,” says Larry Traxler, VP Architecture & Design for Hyatt Hotels Corporation. “I see [green building] as potentially the biggest swing in design and operation mindsets in the 20 years I’ve been involved in the hospitality industry,” he says. “It can truly revolutionize our industry and should be a primary focus for all designers, operators, and developers.”

While not all survey respondents reflect Traxler’s level of commitment to greener hotels, the responses are encouraging in that they show the hospitality industry is interested, but the numbers also show that green building and sustainable design still face obstacles to implementation.

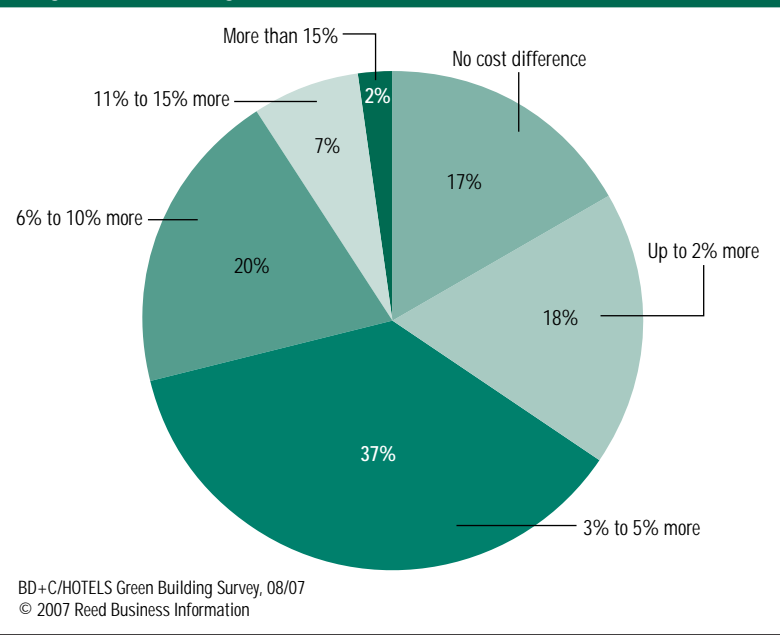
The most daunting of these is cost, with more than half (58%) reporting that they thought sustainable design would add significant initial construction costs. While some added costs were considered acceptable, 17% of respondents said they were unwilling to accept any additional construction costs. Of those saying initial

**Chart 6.3**  
What is your hotel's level of interest in green/sustainable design?



The majority of respondents showed some interest in green/sustainable design (chart 6.3), with 80% expressing interest levels in the high to medium ranges. However, those expressing little to no interest rated a significant 19%. The overall lukewarm results surprised a Hyatt Hotels executive, who views green building as something that can revolutionize the industry. Added costs could be one reason that interest in green design is mixed. Respondents say they are willing to accept slight cost increases, but most indicate that added costs should be less than 5% (chart 6.4).

**Chart 6.4**  
What do you consider an acceptable initial cost difference between a non green hotel and a green hotel?



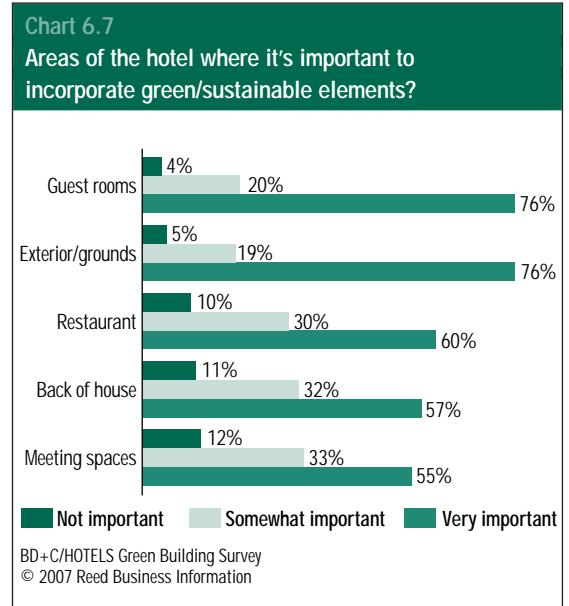
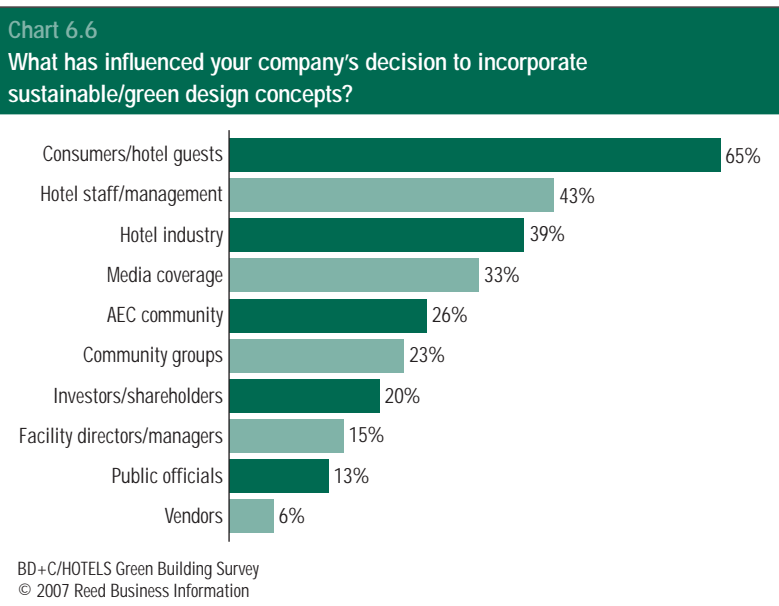
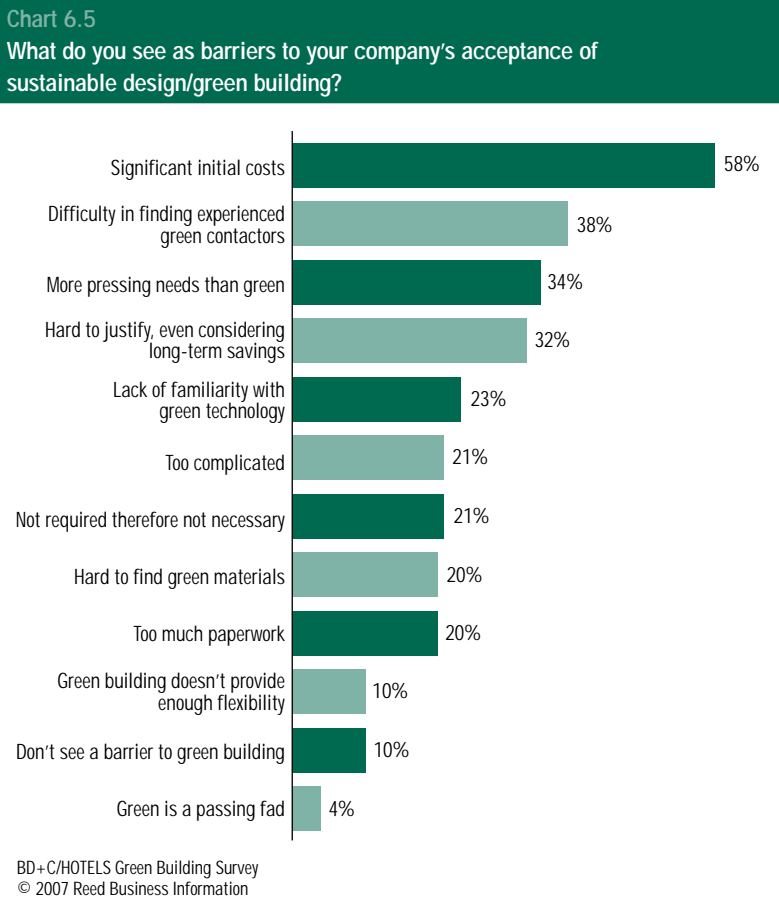
construction costs are palatable, 37% found it acceptable to pay up to 3-5% in initial cost increases, while 20% found it acceptable to pay as much as 6-10% in additional costs to build a green hotel. Any cost increases

beyond 10% were found acceptable by only 9%.

“Without a doubt, innovation is more expensive at the beginning,” says Traxler of Hyatt Hotels Corporation. “Most early adopters can accept the fact that it costs a little more to be at the front of the pack,” he says. And being an early adopter is important to Jim Root, general manager of spa operations at Sea Island Resorts in Sea Island, Ga. “Our industry can be a lifestyle leader or we can simply wait and be regulated into followers.”

While an initial cost increase was a significant obstacle to green hotels, difficulty in finding contractors with green building or sustainable design experience was seen as problematic by 38% of respondents; 34% said they had more pressing concerns than going green; 32% said that green building expenses were hard to justify even taking into account long-term savings; and 20% didn’t like the volume of paperwork involved. It is also noteworthy that a scattering of respondents (4%) thought that interest in green building would go away, citing it as a passing fad (chart 6.5).

Attitudes toward green hotels are encouraging, showing that respondents are willing and able to look beyond barriers and see significant advantages to building and operating sustainable hotels. And that’s as it should be, according to Traxler. “It is almost a full-time job keeping up with this rapidly progressing field of interest, one that we’re dedicating considerable new resources to.” Adds Hervé Houdré, general manager of Washington,



Once again, respondents noted that added costs—in this case significant initial costs—are a barrier to going green (chart 6.5). Thirty-eight percent also say that even factoring in long-term savings, sustainable design elements are hard to justify. Consumers, however, can help persuade hotels to pursue a green agenda, according to 65% of respondents (chart 6.6) who noted that hotel guests influenced their company’s decision to incorporate green design concepts. With that in mind, it seems natural that the majority of respondents (76%) cited guest rooms as one of the two most important area to incorporate sustainable elements (chart 6.7).

## Of possible concern to the AEC community, only 26% of respondents cited architects, designers, or engineers as the main reason for their decision to incorporate sustainable/green concepts.

D.C.'s Willard InterContinental Hotel, "We are just at the beginning," he says, "it is not an opportunity but a responsibility of the hospitality industry to lead in terms of sustainability initiatives."

Houdré's comment reflects the respondents' attitudes about taking a lead in sustainability, with a large number (77%) feeling strongly that hotels are more willing today than they were three to four years ago to invest in green/sustainable building projects, although only a little more than half (55%) thought that their organization would be left behind if it does not become active in green building and sustainable design.

Other favorable attitudes include 79% of respondents strongly agreeing that green hotels significantly reduce energy costs and another 71% strongly agreeing that green hotels give them a competitive advantage compared with conventional hotels when it comes to marketing and public relations. However, the marketing only works when green efforts are truly authentic. "Any cosmetic effort to be perceived as green that is not supported by authentic intent is something to avoid," says Sea Island Resorts' Root.

The survey backs up Root's comments, showing that guests aren't always swayed by a sustainable sales pitch. Only 39% of respondents felt strongly that green hotels attract more guests, although 78% of respondents said they feel strongly about a green hotel's ability to increase guest satisfaction. Green guest rooms are considered one of a hotels most important features, tying with exterior and grounds in level of importance. Only 28% of respondents said they strongly agreed that green hotels played a significant role in employee retention and recruitment, although 68% said they strongly agree that green hotels make for happier employees.

For those hotels having already incorporated sustainable/green concepts in recent hotel building or renovations (51% have incorporated elements; 33% plan to in the near future; and 16% have no plans to do so), 65% reported doing so mainly for their customers—their paying guests. Other influences cited include hotel management (43%) and industry or trade associations (39%). Of possible concern to the AEC community, only 26% of respondents cited architects, designers, or engineers as the main reason for their decision to incorporate sustainable/green concepts (chart 6.6).

In reporting on which sustainable/green concepts they

had already incorporated into hotels, respondents' top three items all targeted energy use: 75% had incorporated energy management, 64% had installed automated lighting controls, 47% had employed energy modeling tools, and 46% had made the most of daylighting. Among hotels that had not yet incorporated sustainable/green elements but planned to do so, 53% said they would incorporate energy management tools and 48% planned to use automated lighting controls (chart 6.8). BDC

Chart 6.8

Of the following sustainable/green concepts, which ones have you already incorporated or plan to incorporate into your hotels?

	Already incorporated	Plan to incorporate
Energy management	75%	53%
Automated lighting controls	64%	48%
Energy analysis/modeling tools	47%	35%
Environmentally preferred purchasing	47%	33%
Acoustics/sound proofing	46%	34%
Daylighting	46%	31%
Recycled/renewable building materials	46%	40%
Environmentally sensitive landscaping	41%	31%
Green furniture, fixtures, fittings	39%	38%
Low-VOC paints, finishes, adhesives	36%	33%
Low-VOC carpeting	27%	28%
Geothermal heating/cooling	22%	19%
Environmentally responsive site design	21%	26%
Reuse construction and demolition waste	18%	18%
High reflectance roof surfaces	15%	21%
Storm water collection	14%	21%
Waterless urinals	14%	15%
Building commissioning	13%	14%
Green roof	13%	21%
Passive solar	13%	21%
Photovoltaics	7%	13%
Underfloor air distribution	4%	12%
None of these items	2%	8%
Other items	7%	6%

Source: BD+C/Hotels Green Building Survey  
© 2007 Reed Business Information

A trend emerged when respondents noted sustainable concepts they had already incorporated into their hotels: The top three items—energy management, automated lighting controls, and energy analysis/modeling tools—focused on energy use (chart 6.8). Those same three features scored high with respondents who said they have not yet incorporated them but plan to. Interestingly, some of the sustainable/green concepts considered commonplace, such as low-VOC paints, finishes, adhesives and low-VOC carpeting were incorporated by only 36% and 27%, respectively, with only a small percentage planning to incorporate them. Also worth noting: Waterless urinals were incorporated into more hotels than were green roofs.

# 7. Restaurant Industry Finally Gets Cookin' on Green Building

## Methodology

In August 2007, *Building Design+Construction* surveyed a scientifically drawn sample of 10,207 readers of *Restaurants & Institutions* magazine, a sister publication to *BD+C* and a leading source of food and business-trend information in the \$537 billion restaurant and foodservice industry. Recipients of the online survey were asked to gauge their level of knowledge, interest, and activity with regard to green buildings and sustainable practices within their restaurant and foodservice businesses.

As an incentive, recipients were offered eligibility to enter a drawing for a \$100 gift certificate. *BD+C* also pledged a \$5 charitable donation for each of the first 100 responses. Respondents could select from the American Red Cross or United Service Organizations (USO).

Virtually a non-player during the first decade of the green building movement, the \$537 billion restaurant and foodservice industry seems to finally be taking notice of the benefits of green building and sustainable operations.

Three of four restaurant managers and operators said they're interested in green building, and more than one-third (34%) have applied green building principles in recent restaurant construction or renovation projects, according to a recent survey of more than 10,000 corporate managers and operators in the foodservice and restaurant industry by *BD+C* and *Restaurants & Institutions*.

Of those that haven't applied green strategies yet, more than a third (35%) said they're planning to do so on their next construction or renovation project (chart 7.7).

Damon's Grill, a regional casual dining chain based in Columbus, Ohio, is one such company. "We are putting more time and resources in developing a prototype

to be green and efficient, but we are just at the beginning stages," said respondent Carl T. Howard, CEO of Damon's Grill. Howard said the company, which operates 86 locations across 20 states, is looking at everything from using energy-efficient light bulbs and recycling heat from kitchen fume hoods to installing tankless hot-water heaters and automated lighting controls.

What's driving the sudden uptick in interest and de-

Chart 7.1  
What is your role in your restaurant business?

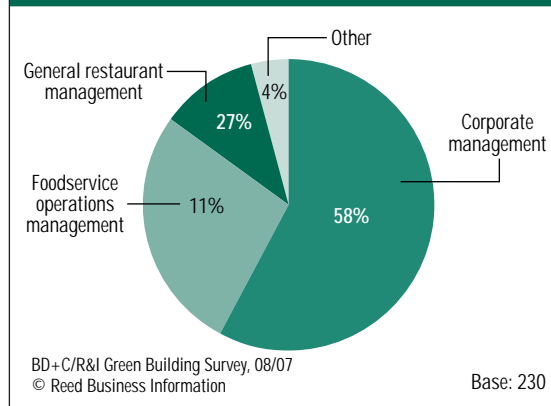
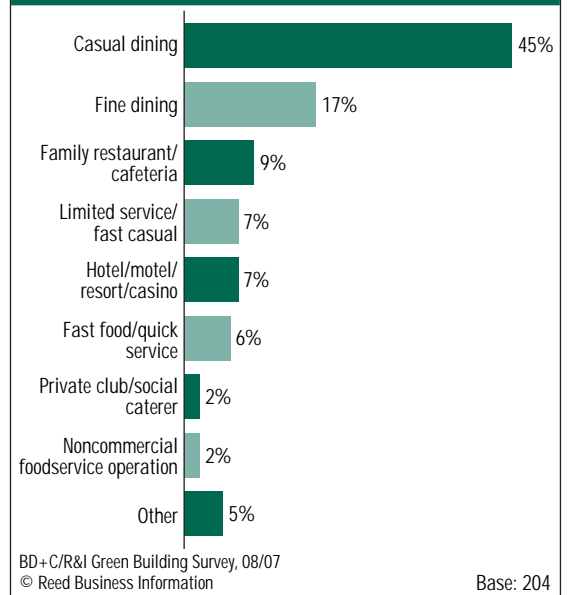


Chart 7.2  
What type of restaurant do you work for?



Respondents to the *BD+C/R&I* survey are exclusively management-level employees within mostly casual dining, fine dining, and family establishments. The vast majority (88%) work for privately owned, independent companies, and most (64%) operate only one or two restaurants. Three-fourths have gross annual sales of \$1 million or more, and 30% take in more than \$5 million a year.

## Principal findings of the 2007 survey

- More than one-third of respondents (34%) have applied green building principles in recent restaurant construction or renovation projects, while another 35% said they plan to implement sustainable strategies in upcoming projects.
- Nearly three-quarters of respondents (72%) said they were interested in sustainable design and green building, but very few (9%) could claim to be experts in the field. Nearly two-thirds of respondents said they have a "low" level (43%) or "no expertise" (22%) in green building.
- More than half of respondents (52%) said they would pay an extra 3-10% in construction costs to build a green restaurant, while 18% said they would not fork out any additional money to go green.
- A solid majority (60%) of those surveyed said the perception that green building "adds significantly to initial costs of construction" was a barrier to the greening of restaurants. Finding green building/sustainable design expertise was also a top concern, with 38% of respondents citing it as a barrier.
- Energy management, automated lighting controls, and acoustics are among the most popular sustainable action items that have been implemented or are planned for upcoming restaurant construction or renovation projects.



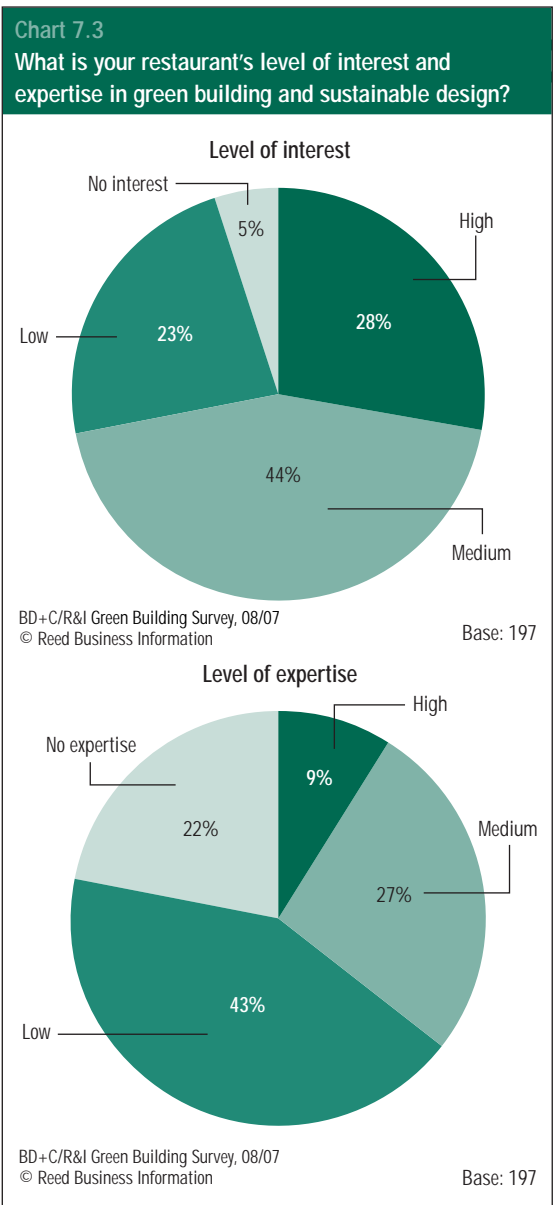
mand green restaurants?

The prospect of reducing energy consumption is by far the leading driver, according to the survey, which comes as no surprise considering that energy usage is the third-leading expenditure for restaurants (behind labor and food), accounting for 3-5% of overall costs. More than six in 10 respondents (61%) either “agree” or “strongly agree” that green restaurants significantly reduce energy costs.

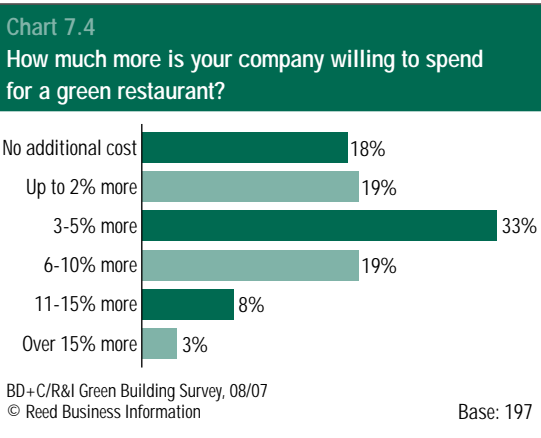
Moreover, energy-related strategies top the list of green building elements that have been implemented or are planned by respondents. A solid majority of respondents (58%) have incorporated energy management strategies into their restaurants, and roughly half (52%) said they’re

using automated lighting controls (chart 7.6).

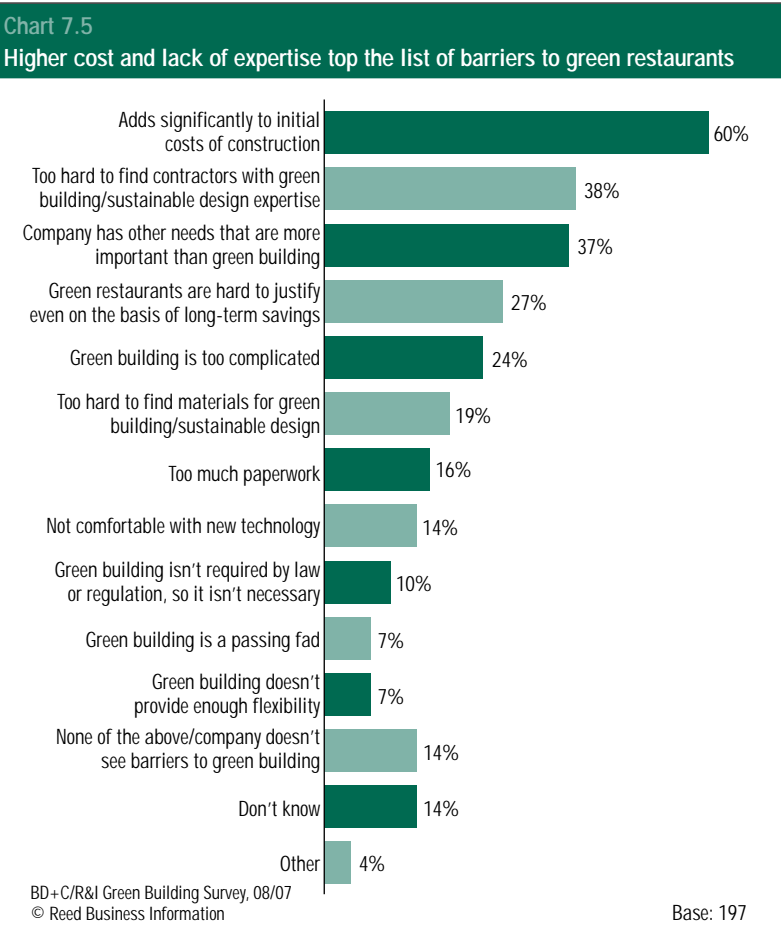
“At the end of the day, profitability and return on investment are the driving forces,” said respondent Mark Lietz, founder and senior principal of PNL Consulting Group, a consultant to the food and beverage industry. Lietz said that, despite growing interest in green, the



While the majority of respondents (72%) had a medium to high level of interest in green building, very few (9%) described themselves as experts in the field. In fact, nearly two-thirds of respondents say they had little or no expertise in green strategies.



More than half of respondents (52%) said they would shell out an extra 3-10% in construction costs to build green, and 11% said they would pay 11% or more for green.



Concern over additional construction costs was by far the biggest barrier to applying sustainable principles to the restaurant market, with six out of 10 respondents citing cost as an obstacle to green.

sustainability movement is still being viewed “somewhat skeptically” by many in the industry. “Food and beverage players have been through a number of ‘fads,’ like the Atkins Diet craze a few years back, that some capitalized on and some lost their shirts on.”

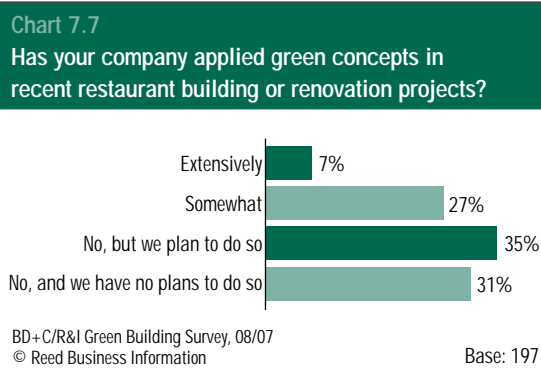
**7.6**  
Which green strategies have you incorporated or plan to incorporate in recent projects?

	Have done	Plan to do
Energy management	58%	60%
Automated lighting controls	52%	41%
Acoustics/soundproofing	45%	37%
Environmentally sensitive landscaping	45%	30%
Recycled/renewable building materials	45%	40%
Environmentally preferred purchasing	39%	33%
Daylighting	34%	31%
Low-emitting paints/finishes/adhesives	31%	25%
Green furniture, fixtures, equipment	27%	27%
Environmentally responsive site design	25%	21%
Energy analysis/modeling tools	22%	33%
Reused construction and demolition waste	19%	21%
High-reflectance, high-emittance roof surfaces	18%	15%
Passive solar	16%	19%
Low-VOC carpeting	15%	18%
Stormwater harvesting	15%	12%
Waterless urinals	13%	19%
Geothermal heating/cooling	12%	13%
Photovoltaics	9%	5%
Vegetated roof	7%	4%
Building commissioning	4%	4%
Underfloor air distribution	4%	5%
None of the above	4%	12%
Other	12%	4%

Base: 67      Base: 135

BD+C/R&I Green Building Survey, 08/07  
© Reed Business Information

Energy management and automated lighting controls topped the list of sustainable action items that have been implemented or are planned for upcoming restaurant construction or renovation projects. Acoustics was also a key issue, with nearly half of respondents (45%) indicating that they have implemented sound-deadening and soundproofing initiatives in recent projects.



To Lietz’s point, concerns over higher first costs and the lack of substantiation that green features will pay off in a reasonable amount of time are seen as major barriers to sustainability in the restaurant industry. Six of 10 respondents cited higher initial cost as a chief obstacle to green, and a quarter (27%) said the cost of building green restaurants is too hard to justify (chart 7.5).

“If I could honestly anticipate savings gained from a remodel using green methods, I would take that to any financial backer with confidence,” said respondent Phil Dickinson, owner of the Landmark Cafe & Creperie in Galesburg, Ill. “But saying ‘I am pretty sure this will help us to trim our costs’ does not carry much weight in financial circles, unless they have a personal belief in green.”

Despite the industry’s concern over higher first costs, a surprisingly large percentage of respondents said they would pay more for a sustainable restaurant. One-third said they would be willing to spend 3-5% more, and 19% said they would fork out 6-10% more for green (chart 7.4).

Another major barrier to the greening of the restaurant industry in the eyes of these respondents is the lack of outreach from the AEC community. More than one-third of respondents (38%) said it’s too hard to find contractors with green building expertise. And with minimal education from AEC professionals, many restaurant operators are at a loss trying to plan and execute sustainable strategies. Two-thirds of respondents said they have little or no expertise in sustainable design, and just 9% can say they have a “high” level of expertise in the field (chart 7.3).

Dickinson put it best: “I have general knowledge of the concept of green, but as I plan most of the building renovations myself, I am utterly lost in how to incorporate green features in my building.” BDC

**7.8**  
To what extent do you feel each of the following has changed as a result of the sustainable/green concepts you incorporated at your restaurant?

Community relations	3.51
Guest satisfaction	3.43
Employee satisfaction	3.37
Operating performance of the building	3.30
Operating performance	3.26
Operating and maintenance costs	3.20
Investor relations	3.14
Profitability	3.08

Base: 67

BD+C/R&I Green Building Survey, 08/07  
© Reed Business Information

More than one-third of respondents (34%) have applied green building principles in recent restaurant construction or renovation projects, while 35% said they plan to implement sustainable strategies in upcoming projects (chart 7.7). Those that have applied green building principles cite improved community relations, guest and employee satisfaction, and operating performance as the top benefits for going green (chart 7.8). Note: A mean score of 3.00 (on a scale of 5) would be considered neutral.

# NAIMA

**NORTH AMERICAN INSULATION  
MANUFACTURERS ASSOCIATION**

## INSULATION MATTERS

More than 80 percent of those surveyed in this year's BD+C green buildings research reader survey indicated that they anticipated being at least "somewhat more active" in green building in the next few years. Thirty-seven percent said "significantly more active," and 94 percent felt the trend in sustainable building products is "growing." Even though new housing starts are not where we'd all like them to be, there is certainly increased momentum in many sectors for enhancing building energy codes, cutting greenhouse gas emissions, and mitigating climate change. There's a sense of inevitability that within the next short stretch of years, "green" will find its place into the common vernacular with the building team in the forefront of changing the way we live and how we think about our world.

Buildings, it has been estimated by groups like the PEW Center for Global Climate Change, are the largest contributor to greenhouse gas emissions. In *A Cost Curve for Greenhouse Gas Reduction*, McKinsey reports, "that almost a quarter of possible emission reductions would result from measures [such as better insulation in buildings] that carry no net life cycle cost—in effect they come free of charge." Adding insulation to new and existing commercial and residential buildings seems to me the first environmental choice for achieving green or sustainable objectives.

Because adding insulation to buildings and homes is an energy efficiency win-win when it comes to cost and results and should be looked at as the first environmental choice for any climate change strategy, the North American Insulation Manufacturers Association will support a 20 by 2020 initiative this fall in hopes of bringing awareness to the building and construction team, government and business leaders, and anyone concerned with increasing energy efficiency. The 20 by 2020 initiative commits to targeting a 20 percent reduction in current energy demand and, consequently, green house gas emissions, through the use of fiber glass and rock and slag wool insulation in new and existing buildings and homes by the year 2020. It's simple: Insulation Matters. How do we get there?

There are a number of critical strategic goals that can guide us toward huge gains in energy efficiency and thus better manage if not decrease the number of prospective new power plants that need to be constructed. One is building codes. Working with homebuilders, government agencies, engineers, green building certification groups, and code councils to enhance building codes to an acceptable level so that new and existing homes and commercial buildings are more energy efficient is a top priority. Advocating on the state and federal levels for tax incentives for homebuilders and home owners is another. Marketing fiber glass and rock and slag wool insulation products as the first environmental choice for a sustainable future also is high on the list. I should point out that fiber glass insulation uses up to 40 percent recycled content and slag wool between 70 and 75 percent. And we can't forget about sponsoring surveys like the one driving the analysis in this white paper.

Insulation matters. The North American Insulation Manufacturers Association will celebrate its 75th anniversary in 2008. Insulation has mattered for a long time, long before energy efficiency became a popular concept and long before anyone ever thought about climate change. Albeit not as glamorous as automobiles, air travel, and the internet, it has its place as one of the great inventions of the 20th century.



Ken Mentzer  
President and CEO  
North American Insulation Manufacturers Association

## 8. Residential Sector Brings Green Building Home

### Methodology

In June 2007, *Professional Builder* magazine, a Reed Business Information publication affiliated with *Building Design+Construction* that focuses on new residential construction, surveyed a random sample of its subscribers, including home builders, developers, contractors, and modular/section home manufacturers. The recipients were asked about defining, marketing, selling, and building green in the residential sector. A total of 291 usable surveys were completed. *Professional Builder* encouraged responses by donating \$10 to Habitat for Humanity for each of the first 250 surveys submitted.

With green building and environmental issues starting to impact home buyers' attitudes, the editors of *Professional Builder*, a sister publication to *BD+C*, wanted to know what take builders in the residential construction industry would have on sustainability. In a survey of *Professional Builder* readers, 90% of who were home builders, builder-developers, or general contractors, the editors were able to get a better assessment of where the residential industry stood on building green.

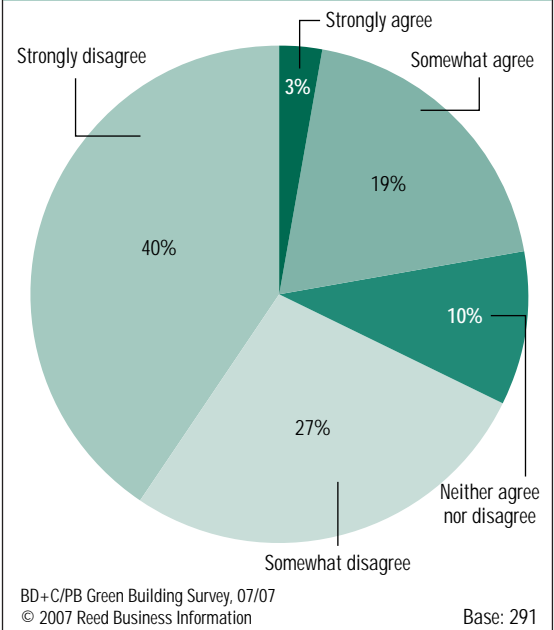
When asked to define a green home (with multiple answers permitted), nearly half of respondents (46%) said that a home must meet criteria established by a national certification program in order to be called green (chart 8.3). Another 41% said a specific percentage of the building materials must be green, and 29% said that the home must meet criteria established by a local green building program. It is apparent from the level of response that home builders favor some sort of third-party green building program setting the standard for what counts as a green home.

While the U.S. Green Building Council's LEED certification program is the most widely used rating system in the nonresidential design and construction industry, residential builders have much more choice. Respondents were asked to describe their level of experience with eight different national certification programs. Of these, the EPA's Energy Star program was the most popular, with 57% saying they had had experience using the program and would probably use it again. The National Association of Home Builders program (29%) and LEED for Homes (16%) were also popular choices in terms of positive experiences.

Whether having so many green rating programs is a

good thing or a bad thing remains debatable. On one hand, having greater variety should ideally make green building flourish: Builders would have different sets of standards to choose from and could accommodate them to meet the needs of specific projects. On the other hand, there's a chance these programs could end up

Chart 8.1  
Is green building a fad?



When asked whether or not "green building is a fad," two-thirds of respondents (67%) disagreed with the statement. Respondents were asked to rate the extent of their agreement on a 1 to 5 scale, with 5 meaning "strongly agree" and 1 meaning "strongly disagree." The mean score of all the responses was 2.19, indicating disagreement; in other words, home builders said they felt green building was going to be around for some time.

### Principal findings of the 2007 survey

- Nearly half of respondents (46%) said a green home is one that meets criteria established by a national certification program, while 41% claimed that a green home must contain a specific percentage of green building materials.
- Of the eight third-party green building programs listed in the survey, the EPA's Energy Star program was found to be the most popular, with over half of the respondents (57%) saying they had used it and would do so again. Runners-up included the NAHB's program, with 29%, and LEED for Homes, with 16%.
- Two-thirds of respondents (67%) said they did not think of green building as a fad. In addition, 80% said that environmental goals are important when planning a new residential development; 86% said such goals are more important today than they were five years ago.
- Though 69% said that green building is important to their marketing strategy, 52% also said that green building had had no effect on their home sales.
- The vast majority (92%) claimed that green features increase the overall price of a house; 38% said that the price is driven up by 6-10%. In addition, 30% said that buyers were to some degree unwilling to pay extra for green features; 29% said buyers were willing to do so; and 41% said buyers were neither willing nor unwilling to pay extra for green features.

competing with one another instead of fostering green building in general. Then there's the question: Who would decide which program or programs would be the "chosen" ones? Government regulators? Consumers? Local officials?

As to the question of market penetration, 41% of respondents said their local housing market had a green building program of some kind, while 36% said their market did not have a program and 23% weren't sure. Of those who did have a home builder association green program, 53% said they use it, 47% said they do not. Based on these findings, it is possible to project about 20% penetration of green building in the single-family housing market, but this might be overstating the case.

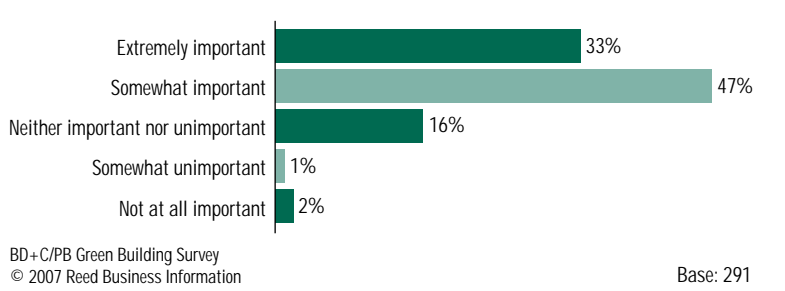
Judging by the data in charts 8.1 and 8.2, the rising importance and popularity of green building is evident. When asked whether they agree or disagree with the statement "Green building is a fad," a healthy two-thirds of respondents (67%) disagreed—40% "strongly," 27% "somewhat." Eighty percent rated environmental goals as being important, either "extremely" (33%) or "somewhat" (47%), when planning a new residential development; only 3% cited such goals as unimportant. In addition, 86% of respondents claimed that environmental goals are more important today than they were five years ago. Assuming these respondents represent the national home builder community, then green building should be here to stay.

**Green is nice, but does it sell?**

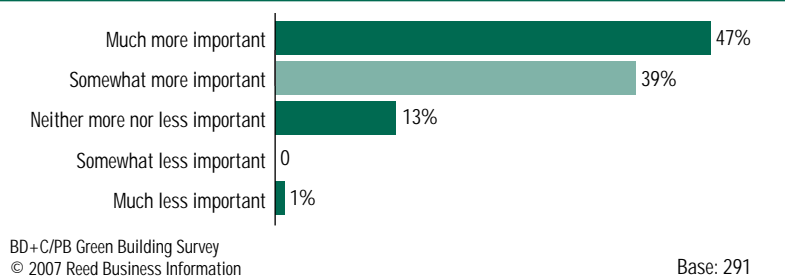
In the residential construction industry, the overriding factor is the marketability of the end product. All the goodwill that might go into making a newly constructed home energy efficient and sustainable essentially means nothing if you can't sell it. As shown in table 8.6, about half of respondents (52%) said that green building has

had no effect on their home sales; one-fourth (25%) claimed that it had "moderately" improved sales; and 18% said that it had increased traffic to the sales site. While 69% said that green building is important to their marketing strategy, the answers were split when it came to how willing buyers were to pay for extra green features: 41% said buyers were neutral on the question,

**Chart 8.2**  
How important are environmental goals when planning a new residential development?

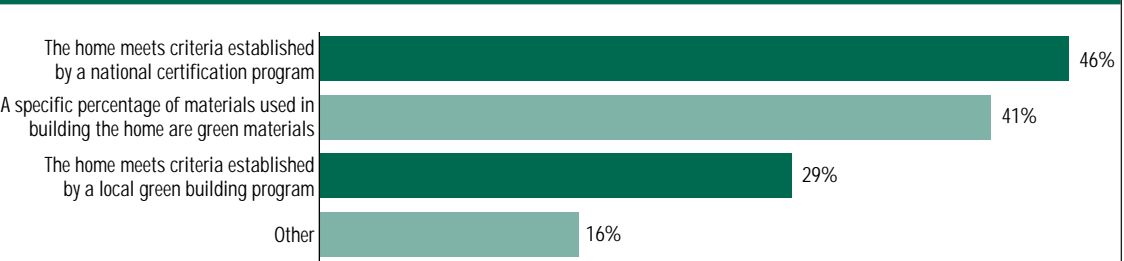


**When planning a new residential development today vs. five years ago, how has the importance of environmental goals changed?**



Eighty percent of respondents stated that environmental concerns are either "somewhat" (39%) or "extremely" (47%) important when planning a new residential development. On top of that, another 86% believed that environmental goals are more important (either much or somewhat more) than they were five years ago in terms of planning a new residential development. These strong showings may signal a growing enlightenment toward sustainability in the home building industry.

**Chart 8.3**  
How do you define a green home?

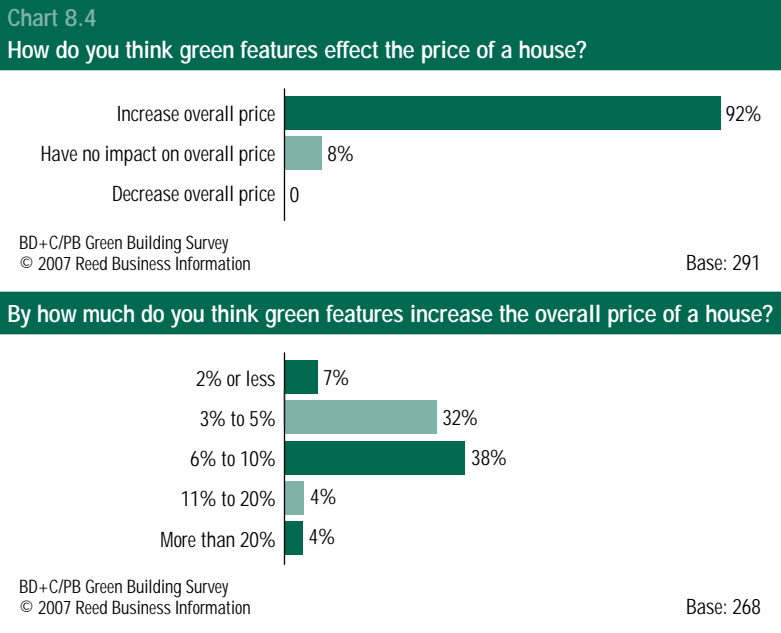


BD+C/PB Green Building Survey  
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While survey respondents were allowed to choose more than one response, nearly half (46%) stated that a green home is one that meets criteria established by a national certification program. Another 41%, however, said that a specific percentage of materials used in building must be green. In terms of company sizes, 53% of builders that build more than 10 homes a year voted in favor of the national certification program, while 48% of builders who build less than 10 homes a year preferred a specific percentage of green materials.

while 30% said buyers would be unwilling to spend more for a green home. Still, 29% of respondents said

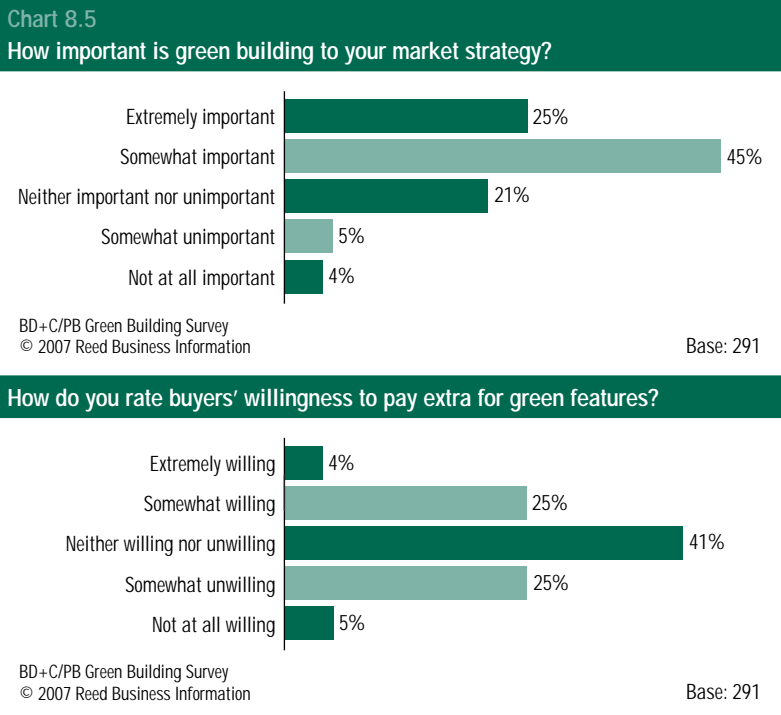
they thought buyers would be willing to pay more for green features (chart 8.5)



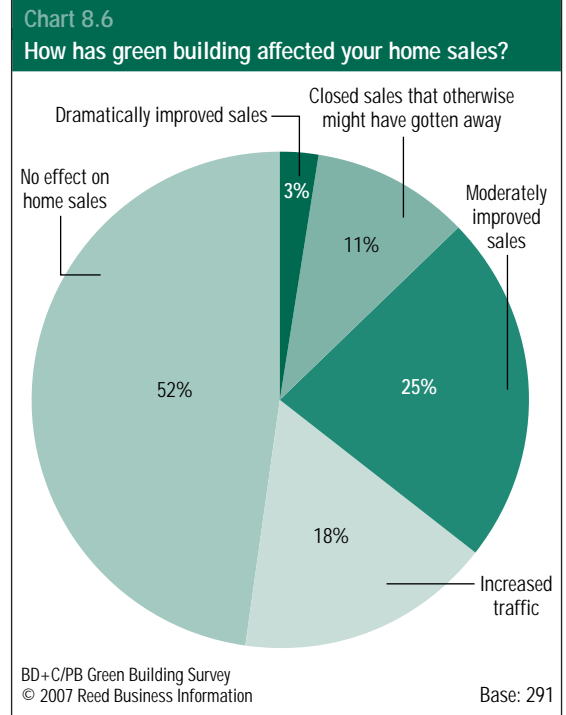
An overwhelming majority of respondents (92%) said that green features add to the price of a house, with the other 8% claiming that they have no impact on the price; no one said that green features decrease a house's overall price. Of the 268 respondents who saw a first-cost premium for green building, 32% claimed that green features increase a house's price 3-5%, while 38% stated that the price is increased between 6-10%. In the extremely price-sensitive home-building market, perceived cost dividends of such magnitude are hard to tolerate.

This seems like a bit of a disconnect. Green building seems to be useful to home builders as far as marketing goes, especially considering the rapid growth in popularity of green everything. However, home buyers don't seem to be quite as open to the idea of green as the builders would like. As chart 8.4 indicates, the cost of the green materials needed to build a green home is definitely an issue. Ninety-two percent of those surveyed said they believed that green features increased the price of a house. How much? Thirty-eight percent said by 6-10%, and 32% said by 3-5%. With buyers not exactly jumping at the chance to pay extra for green features (as shown in chart 8.5), bumping up the sales price to pay for sustainable features is not going to work in the marketplace.

To some extent, these issues can be chalked up to an industry responding to a huge change in the way it does business. As the builders said themselves, green building is not simply a passing trend. If it continues in the same growth pattern that it has experienced in the last five years, then awareness and popularity will only go up, as will the appeal of a sustainable home and lifestyle. What's important is that the builders continue to stress the importance of green building in their marketing strategies; in time, they'll start to see more sales volume in green homes. BDC



A slight disconnect appears in these responses. When asked about the importance of green building to their marketing strategy, 70% respondents cited that it was either extremely or somewhat important, with 21% feeling neutral on the subject. However, only 29% stated that buyers are either extremely or somewhat willing to pay extra for green features in their homes, while 41% chose neutral, and 30% chose unwilling.



Despite stating that sustainable goals are important to new developments, 52% of respondents claimed that green building has not had an effect on sales. On the other hand, 25% said that sustainable goals had caused sales to moderately improve, and 18% said that green goals had at least increased foot traffic to their sales offices.

## 9. Where Respondents Stand on 10 Key Issues

To assess whether opinion on green buildings varies across industry groups, we asked respondents to rate 10 “control” statements on a scale of 1 (“strongly disagree”) to 5 (“strongly agree”). A mean score in the ones or two’s would indicate disagreement with the statement; anything in the high threes or fours would signify agreement. A mean composite near 3.00 would be considered neutral.

	AEC Industry Members	Restaurant Executives	Hoteliers	Corporate Real Estate Executives	College and University Facility Executives					K-12 Facility Executives		Hospital Executives	
	BD+C	R&I	HOTELS	CoreNet Global	AASHE (colleges)	AASHE (suppliers)	APPA (colleges)	SCUP (colleges)	SCUP (suppliers)	ASBO	CEFPI	GGHC	Modern Healthcare
<b>Base</b>	<b>631</b>	<b>197</b>	<b>168</b>	<b>184</b>	<b>455</b>	<b>86</b>	<b>131</b>	<b>134</b>	<b>122</b>	<b>48</b>	<b>149</b>	<b>145</b>	<b>40</b>
<b>Green buildings cost no more to build than comparable conventional buildings.</b>	2.49	2.42	2.58	2.57	2.88	3.21	2.59	2.46	2.88	2.44	2.48	2.57	2.48

This chart has to be read carefully because, with one exception, all respondent groups rated it below 3 (range: 2.42-2.88); in other words, by disagreeing with the statement that green buildings cost no more to build than conventional buildings, it can reasonably be inferred that most respondent groups believe that green buildings do in fact cost more to build than conventional buildings. The exception was AASHE “suppliers” (design firms, product manufacturers, etc.), who drifted slightly into the positive side of the scale (3.21).

Once again, we see owner and user groups across major building sectors expressing fear that sustainable design will bump up the initial cost of their projects, and we see AEC professionals (represented by the *BD+C* respondents) agreeing with them (2.49). This fairly strong response comes despite a growing number of case studies and research—notably the two reports by Davis Langdon cited earlier—that point to neutral cost impact on well-designed green projects.

It’s hard to know why this apprehension about first costs persists. Maybe the fear-mongering of the early days of LEED-NC, when some experts predicted LEED buildings would cost up to 25% more than conventional buildings, hasn’t worn off. Perhaps the respondents just haven’t had enough experience building green projects. This could certainly be the case for restaurateurs, hoteliers, and hospital officials, who are just starting to embrace sustainable design. But can we say the same for those involved in building schools, college buildings, and corporate offices? These sectors have been among the pioneers of green building, yet many in these fields seem to be mesmerized by outdated information.

For AEC professionals, these findings are a clarion call for greater education about the true costs of green building. AEC professionals must arm themselves with the facts and be prepared to bombard clients with the truth about real first costs of green projects—and then they must prove the case in the field.

1 See our November 2005 White Paper, “Life Cycle Assessment and Sustainability.” Free download: <http://www.bdcnetwork.com/contents/pdfs/BD@CLCAWhitePaper.pdf>

2 Paul Torcellini and colleagues at the Department of Energy’s National Renewable Energy Lab have made the most rigorous investigations of energy performance in sustainable buildings. See [www.nrel.gov/buildings](http://www.nrel.gov/buildings)

3 See Sandy Mender, AIA, “Thinking Inside the Box: The Case for Post-Occupancy Evaluation,” *Building Design+Construction*, November 2006. [www.BDCnetwork.com](http://www.BDCnetwork.com)

	BD+C	R&I	HOTELS	CoreNet Global	AASHE (colleges)	AASHE (suppliers)	APPA (colleges)	SCUP (colleges)	SCUP (suppliers)	ASBO	CEFPI	GGHC	Modern Healthcare
	<b>Base</b>	<b>631</b>	<b>197</b>	<b>168</b>	<b>184</b>	<b>455</b>	<b>86</b>	<b>131</b>	<b>134</b>	<b>122</b>	<b>48</b>	<b>149</b>	<b>145</b>
<b>The life cycle cost of green buildings is less than comparable conventional buildings.</b>	3.38	3.02	3.14	3.66	4.07	4.13	3.40	3.78	4.03	3.15	3.68	3.38	–

All respondent groups scored on the plus side on this statement about life cycle costs, although restaurateurs (3.02) and hoteliers (3.14) just squeaked by. AASHE participants (4.07) and suppliers (4.13) strongly supported it.

Life cycle costing (and its big brother, life cycle assessment) is a complex subject.<sup>1</sup> The fact is that, less than a decade into the green building movement in the U.S., nobody really knows how these buildings—and the technologies and products that make them work—will hold up over the long haul. For example, there were some early blunders with some low-VOC paints that failed to stand up to a sponge wiping. More than a few supposedly energy-conscious buildings have fallen short in the energy savings predicted by modeling.<sup>2</sup> Even a technology as benign as daylighting has proven not all that easy to execute without unanticipated negative impacts like heat buildup and glare.<sup>3</sup>

In actual practice, many progressive Building Teams are learning which technologies work well and which to avoid like the plague. New products, such as quiet wind turbines and super-energy-efficient bathroom hand dryers, are coming on line every day. But the durability and long-term performance of products like bamboo flooring and strawboard wall partitions remain a question mark in some practitioners' minds.

Everyone agrees on one point: No building can be called green that has to be torn down or heavily retrofitted in 10 or 15 years' time due to poor design, construction, or product durability. We'll have to wait a few years to see if any such "green building horror stories" start making headlines.

	BD+C	R&I	HOTELS	CoreNet Global	AASHE (colleges)	AASHE (suppliers)	APPA (colleges)	SCUP (colleges)	SCUP (suppliers)	ASBO	CEFPI	GGHC	Modern Healthcare
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<b>Green buildings significantly reduce energy costs.</b>	3.92	3.67	4.07	4.28	4.45	4.29	3.88	4.19	4.30	3.79	3.97	4.10	-

This was a no-brainer for most respondent groups, who gave it scores in the high 3's and well into the 4's. The restaurant group was the least convinced about energy savings (3.67), possibly because restaurants consume huge amounts of energy over long hours of operation. Hospitals, too, are 24/7/365 energy hogs, which is probably why GGHC respondents gave this statement a strong positive score (4.10). Corporate real estate executives see the energy savings in green buildings (4.28), as do college facility designers and operators: a 3.88 from APPA members, a 4.19 from SCUP members, and a whopping 4.45 from AASHE respondents—one of the highest composite scores in all the surveys.

All the green ratings programs stress energy conservation. It's where the points are in LEED and Green Globes, and it's what Energy Star is all about. It's not surprising, then, to see all respondents attaching such credibility to this statement.

	BD+C	R&I	HOTELS	CoreNet Global	AASHE (colleges)	AASHE (suppliers)	APPA (colleges)	SCUP (colleges)	SCUP (suppliers)	ASBO	CEFPI	GGHC	Modern Healthcare
<b>Base</b>	<b>631</b>	<b>197</b>	<b>168</b>	<b>184</b>	<b>455</b>	<b>86</b>	<b>131</b>	<b>134</b>	<b>122</b>	<b>48</b>	<b>149</b>	<b>145</b>	<b>40</b>
<b>Green buildings save money by reusing and recycling materials.</b>	3.41	3.42	3.73	3.74	4.00	3.76	3.40	3.61	3.70	3.42	3.43	3.89	-

All respondents were positive about green buildings reusing or recycling materials (range: 3.40-4.00), with AASHE respondents once again at the high end (4.00). There is an upward trend in the diversion from landfill of construction and demolition waste, a practice clearly supported by respondents here.

	BD+C	R&I	HOTELS	CoreNet Global	AASHE (colleges)	AASHE (suppliers)	APPA (colleges)	SCUP (colleges)	SCUP (suppliers)	ASBO	CEFPI	GGHC	Modern Healthcare
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<b>Green buildings are healthier for occupants than comparable conventional buildings.</b>	4.01	3.40	3.77	4.32	4.48	4.50	3.94	4.19	4.52	4.08	4.11	-	-

The perceived health value of green buildings drew strong positive response from every group, although hoteliers were slightly less fervent than others (3.77). All other groups scored this statement near or above 4.00, with some scores well into the stratosphere, notably those of AASHE respondents (4.48) and suppliers (4.50) and SCUP suppliers (tied for the highest score in all the surveys, 4.52). Note: See pp. 26-30 for more detailed discussion of this topic by GGHC and *Modern Healthcare* respondents.

Because Americans spend about 90% of their daily lives indoors, the chief contribution to health from green buildings theoretically should come from improved indoor air quality, through the reduction of volatile organic compounds, more-frequent air exchanges, the elimination of tobacco smoke, etc. These seem like commonsense measures, but the scientific case for their effectiveness in reducing asthma and other respiratory illnesses has yet to be made for recent (post-2000) LEED or other green-rated buildings.<sup>4</sup>

Earlier this year, the U.S. Green Building Council announced that it would devote \$1 million to research into the health benefits of green buildings. If the resulting studies provide credible evidence that green buildings significantly enhance the health of occupants, the green building movement will have struck gold: government officials, health insurers, corporations (which pay the bulk of the nation's health costs, through insurance premiums and lost sick days), and the medical community, not to mention the general public, all will clamor for sustainable design and construction.

<sup>4</sup> William Fisk and colleagues at the U.S. Energy Department's Lawrence Berkeley National Laboratory have done some of the best work in this area.



	BD+C	R&I	HOTELS	CoreNet Global	AASHE (colleges)	AASHE (suppliers)	APPA (colleges)	SCUP (colleges)	SCUP (suppliers)	ASBO	CEFPI	GGHC	Modern Healthcare
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<b>Green buildings enhance owner or occupying entity's recruitment and retention of employees.</b>	3.39	2.84	3.04	3.98	4.00	3.97	3.43	3.67	3.89	3.23	3.44	3.38	2.88

Positive but not overwhelming results in support of this statement (range: 2.84-4.00), with AASHE's true believers once again leading the pack (4.00), followed a split second later by CoreNet Global respondents (3.98) and, earning the bronze, AASHE suppliers (3.97).

Two groups at the low end of support for this statement—restaurants (2.94) and hotels (3.04)—have grave difficulty attracting and keeping employees. Turnover for hourly workers in the restaurant sector runs 110% a year; hourly hotel workers are also quite transient. The typical quick-service order taker or hotel housekeeper is much more likely to be swayed by a \$.50 an hour salary bump than whether their restaurant or hotel has passive photovoltaics on the roof.

Hospitals, too, struggle mightily to recruit and retain key staff, especially nurses. That's probably why *Modern Healthcare* readers gave a lukewarm 2.88 score to this statement, and why GGHC respondents were not much more enthusiastic (3.38). In general, hospitals have been slow to adopt green building principles; when they do, we hear reports of nurses clamoring to work at these facilities, attracted at least in part by the improved daylighting, better outdoor views, green roofs and healing gardens, and other sustainable features. However, the very newness of these hospitals, with the anticipation of state-of-the-art equipment and technologies, may also be a strong attractive force. Here's where post-occupancy surveys of nurses in green hospitals could really pay off.

	BD+C	R&I	HOTELS	CoreNet Global	AASHE (colleges)	AASHE (suppliers)	APPA (colleges)	SCUP (colleges)	SCUP (suppliers)	ASBO	CEFPI	GGHC	Modern Healthcare
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<b>Sustainable design improves the overall quality and design of a building.</b>	3.65	3.34	3.60	4.07	4.52	4.44	3.77	4.15	4.47	3.96	4.00	4.12	-

Duh! We would have been shocked had this statement not garnered high ratings across the board. One of the great benefits of sustainable design is the way it encourages—some would say forces—Building Teams to come together early in the design process. Experienced Green Building Teams say that this process invariably reduces conflict, especially when the owner or developer is involved.

The outliers here are the restaurant (3.34) and hotel (3.60) respondents, although their scores are still in positive territory. These sectors are just starting to get involved in green building. Notable, too, are the somewhat underwhelming scores for AEC professionals (3.65) and APPA respondents (3.77); one would have expected more enthusiasm about this statement from these groups.

	BD+C	R&I	HOTELS	CoreNet Global	AASHE (colleges)	AASHE (suppliers)	APPA (colleges)	SCUP (colleges)	SCUP (suppliers)	ASBO	CEFPI	GGHC	Modern Healthcare
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<b>My company, firm, organization, or institution will be left behind if it does not become active in green building and sustainable design.</b>	3.73	2.65	3.63	3.85	4.21	4.27	3.73	3.90	4.07	3.25	3.38	3.78	3.02

Mixed results here. The higher education respondents seem worried that their institutions could lose ground—perhaps in the quest for top faculty, the best students, or research grants—if they're not on the green bandwagon. AASHE suppliers (4.27) and respondents (4.21) once again led the way, with SCUP suppliers (4.07) and respondents (3.90) not far behind, followed closely by APPA respondents (3.73).

At the other end of the scale are *Modern Healthcare* readers, representing “mainstream” hospital executives. Their neutral 3.02 rating stands in contrast to the fairly strong 3.78 score from the presumably more green-committed GGHC respondents. Then there's the restaurant people, whose 2.65 likely indicates they have bigger worries than whether to install waterless urinals in the men's room.

	BD+C	R&I	HOTELS	CoreNet Global	AASHE (colleges)	AASHE (suppliers)	APPA (colleges)	SCUP (colleges)	SCUP (suppliers)	ASBO	CEFPI	GGHC	Modern Healthcare
<b>Base</b>	<b>631</b>	<b>197</b>	<b>168</b>	<b>184</b>	<b>455</b>	<b>86</b>	<b>131</b>	<b>134</b>	<b>122</b>	<b>48</b>	<b>149</b>	<b>145</b>	<b>40</b>
Green buildings have a marketing or public relations advantage over comparable conventional buildings.	3.90	3.51	3.96	4.48	4.35	4.36	3.97	3.99	4.23	4.17	3.80	3.86	-

All groups saw the marketing and public relations boost that comes from green buildings. A Toyota dealership in Texas got national media coverage for gaining LEED certification. The head of real estate for a major bank in the East says that every time they build a new LEED-certified branch, the media show up in droves for the opening. Of note is the corporate real estate sector's extremely high 4.48 rating, a clear sign that Fortune 1000 companies are plugging green building into their corporate sustainability agendas.

	BD+C	R&I	HOTELS	CoreNet Global	AASHE (colleges)	AASHE (suppliers)	APPA (colleges)	SCUP (colleges)	SCUP (suppliers)	ASBO	CEFPI	GGHC	Modern Healthcare
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Companies and institutions are more willing today than they were 3 to 4 years ago to invest in green or sustainable building projects.	3.73	3.58	4.03	4.35	4.34	4.34	4.09	4.25	4.29	3.88	3.72	4.01	3.60

At last! The proof of the pudding! These numbers (range: 3.58-4.35) demonstrate widespread agreement that building owners and real estate directors are more willing to invest in green than they were just a few years ago. Corporate real estate executives showed the highest response (4.35), just ahead of AASHE respondents and suppliers (both 4.34). Generally strong positive scores for hospitals, schools, hotels, and restaurants also indicate growing interest in green building among decision makers in these sectors.

## Key findings across the 2007 survey results

- Respondents are still worried about possible higher initial costs for green buildings.
- They're generally sanguine about the energy savings from green buildings.
- They believe that green buildings may deliver health benefits for occupants.
- They appreciate the marketing and PR bonanza that green buildings often garner.
- They see companies, institutions, and building owners more willing to invest in green buildings today than they were just a few years ago.

# White Paper Research Partners

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Robert Cassidy, Editor-in-Chief of *Building Design+Construction*, will present the major findings of *BD+C's* fifth annual report on green building, entitled "Green Buildings Research White Paper," at 1 p.m., Wednesday, November 7, in the Greenbuild Press Room at McCormick Place West Convention Center, as part of the U.S. Green Building Council's Greenbuild Expo and Conference. Space is limited, so early arrival is recommended.

Greenbuild attendees are invited to participate in the one-hour discussion.

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The entire contents of "Green Buildings Research White Paper" and four previous White Papers can be downloaded in .pdf form at: [www.BDCnetwork.com/whitepaper](http://www.BDCnetwork.com/whitepaper)

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