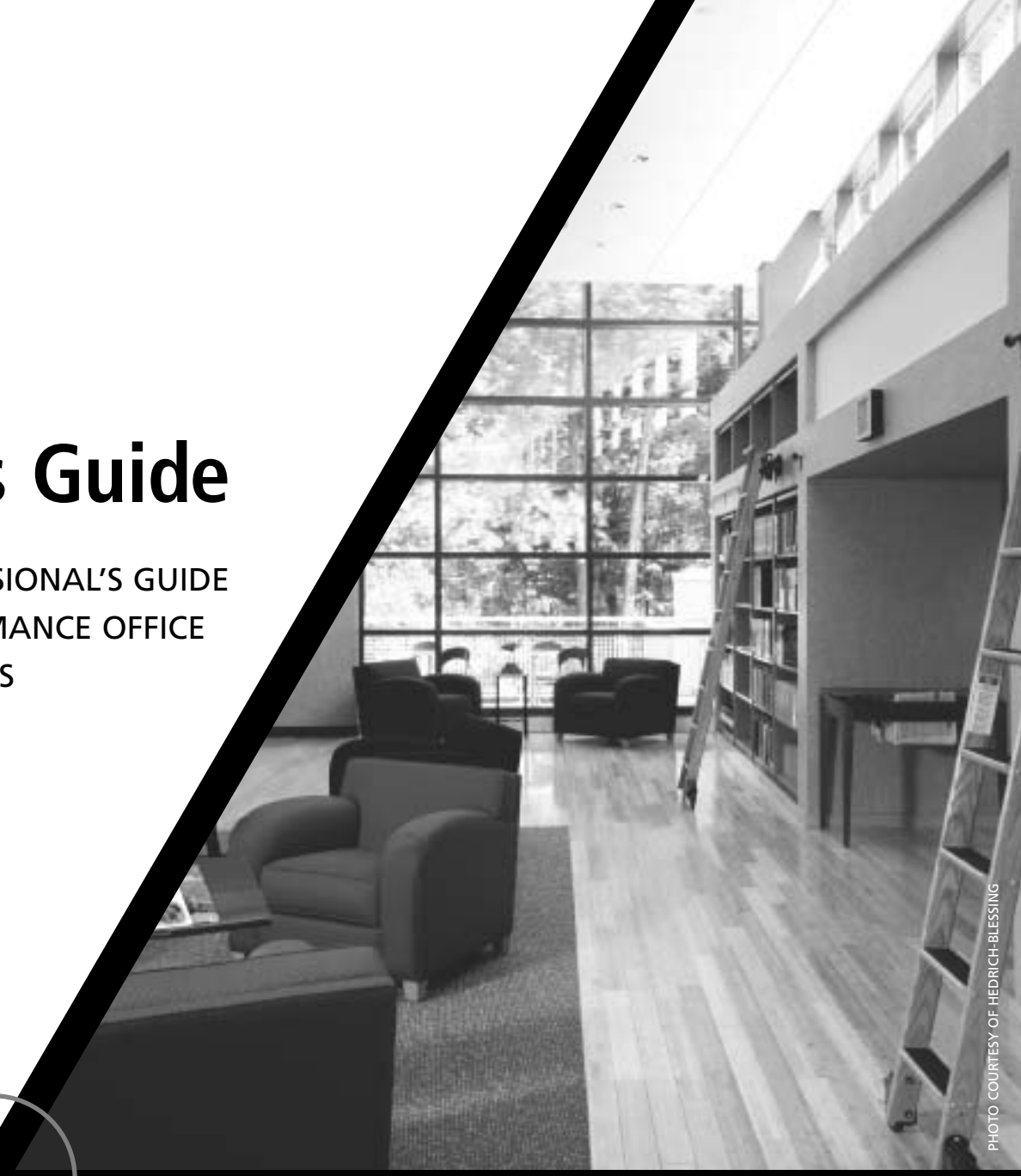
Benefits Guide

A DESIGN PROFESSIONAL'S GUIDE TO HIGH PERFORMANCE OFFICE BUILDING BENEFITS



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NATIONAL WILDLIFE FEDERATION HEADQUARTERS, RESTON, VIRGINIA

The design team used a rigorous financial analysis to select "state-of-shelf" technologies and materials. Annual energy savings are 40 percent more than a traditional building design, or approximately $60,000 for this 95,000 sq. ft. building. The building was oriented to best utilize daylight, with facades on the east and west nearly opaque. The building is also narrower, bringing offices closer to natural light. The building envelope includes low-E glazing and improved insulation. Detailed energy modeling achieved a 25 percent decrease in the size of the cooling plant. Efficient mechanical systems include evaporative condensers for rooftop air conditioning units, high-efficiency pumps and motors, and variable frequency drives. Efficient lighting and occupancy sensors are found throughout the building, and daylight dimming was used in the perimeter zones.

Courtesy of Hellmuth, Obata & Kassabaum

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PHOTO COURTESY OF ALAN KARCHMER

This *Benefits Guide* will assist architects and designers in working with real estate developers, corporate owners, and public sector or institutional owners who are building or renovating office buildings.

It is written to help dispel myths and misperceptions about building high performance. It provides market perspectives and benefits, and presents current financial information in the terms used by your clients—real estate investment and business professionals.

WHY A BENEFITS GUIDE?

If your firm designs office buildings, ask yourself this question:

What can I do to simultaneously increase client satisfaction and improve the marketability of my firm?

The answer is simple. Ask your clients what they want and give it to them with a process that consistently delivers a building that performs.

Even though it may be difficult for a client to distinguish between good, better or best building designs, you *can* differentiate your product. As the most successful service companies have discovered—including FedEx, Nordstrom and Disney—differentiation can be achieved by consistently delivering a superior product or experience the client values.

So what does your client value? Obviously, your clients want a building. They want it to fit their budget. They have a desired completion date, and they want a successful project that minimizes risk. On top of those basics, the market may demand other characteristics, such as views or signature architecture. But as a building designer, there are also many "invisible" benefits you can offer a client, such as:

- Lower Operating and Maintenance Costs
- Increased Building Valuation
- Corporate Productivity Gains
- Improved Occupant Satisfaction/Well Being
- Reduced Risk Factors
- Greater Market Attraction/Competitiveness
- Environmental Stewardship

This *Benefits Guide* provides information to help you explain the value of these "invisible" benefits to your client and help you differentiate your firm by consistently delivering these benefits to your clients.

TALKING TO YOUR CLIENT ABOUT THE BENEFITS OF HIGH PERFORMANCE

Your clients are most likely businesspeople. They look at the bottom line. But they also know the bottom line is more than just accounting. Marketing, sales, competitiveness, human relations, culture and asset value all factor into that bottom line.

The building you will design—whether it's a new building or a major renovation of an existing building—is not just a box that houses their business; it's an integral part of their organization, a productive asset that contributes to their bottom line. You know this, but does your client? It's critical that you talk to your client about their business, the benefits you can provide them through your design, and which benefits will best improve their bottom line and help them meet their goals.

The matrix below presents a range of high performance building benefits that have been well documented by environmental science and business research. Section 4 of this Guide discusses these benefits in detail. Use this matrix as a framework for talking with your client about how you can help them "Profit from High Performance[1]" on their next building project.

BENEFITS TO BUILDING HIGH PERFORMANCE

PHOTO COURTESY OF DOE / NREL

	BENEFIT TYPE			BENEFIT TO	
	FINANCIAL	OCCUPANT/EMPLOYEE	MARKET/SOCIETY	OWNER/OCCUPANT	DEVELOPER
Lower Operating and Maintenance Costs	✓	✓	–	●	◒
Increased Building Valuation	✓	–	–	●	●
Corporate Productivity Gains	✓	✓	✓	●	◒
Improved Occupant Satisfaction/Well Being	✓	✓	✓	●	●
Reduced Risk Factors	✓	–	✓	●	●
Greater Market Attraction/Competitiveness	✓	–	✓	◒	●
Environmental Stewardship	✓	✓	✓	●	◒

[1] Obtain a copy of the companion brochure to this Benefits Guide called "Profiting from High Performance" to share with your client.

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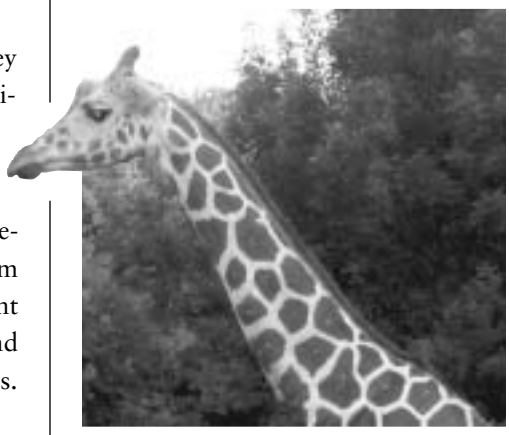

KANSAS CITY ZOO

Bob Berkebile, AIA, of the Kansas City firm BNIM Architects, exemplifies service to his clients. When he was awarded the commission to design a classroom as the entry to the Kansas City Zoo, Berkebile asked the President of the Zoo Board of Directors two questions: "Why would you bus kids from a school classroom across town to a zoo and put them in another classroom? Is that for the old zoo or the new zoo?" Posing those questions transformed the old zoo into a new environmental learning center for the community. BNIM was then chosen to lead the project to design the new zoo.

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"I saw an opportunity to distinguish my product in the market due to the growing awareness of the value of green buildings. Trying to effect change solely with numbers is not the best way. We have to change mindsets, ways of thinking. Just redefining our proposition as a company will mean more and more business."

Joe Van Belleghem, head of Canada-based BuildGreen Development, July 2004, Conservation Monitor "Building Green" by Mark Ohrenschall

HOW YOU CAN DIFFERENTIATE YOUR FIRM WITH HIGH PERFORMANCE

Call the buildings what you will—green, high performance, energy efficient or sustainable—the energy and environmental criteria for delivering projects with the benefits described above are not always clear. Do these buildings cost more to build? Do they cost less to operate? Do they create comfortable spaces that satisfy occupants?

Despite all the research in recent years, the answer is, "It depends on how you deliver them."

In most companies, a key success factor is the ability to quickly transform the company's culture to new business environments. Addressing energy and environmental issues in building design involves a similar transformation. The evolution of your design practice may make a difference between delivery, for the same first cost, of a project that just meets minimum codes and one that is environmentally sound.

Re-engineering and culture change are tools for helping the design industry respond to energy and environmental challenges. Buildings can be constructed to exceed national model energy codes by 30 percent, to achieve high standards of environmental responsibility, and to be within budget. The key reason these projects are so successful is the client's ability to trust an integrated design team to deliver the best design solution.

Transforming your practice to deliver high performance solutions to your clients will differentiate your firm in the architectural services marketplace. High performance can become your firm's "brand" if you can successfully change your practice. One way to achieve this market advantage is to start using *Advanced Buildings*™ resources on your next project.

Working on a high performance building project will reduce the learning curve and costs for future projects. The greater your knowledge and involvement with high performance design the greater the likelihood of a successful outcome.

In the process of moving toward high performance, you may discover that your firm needs to change some of its traditional approaches to the design and construction process. As a designer, you may lack the time and resources to create custom solutions that navigate the high performance design paths. Fortunately, the *Advanced Buildings* team has already evaluated the best practices most relevant to a range of projects, including office buildings.

Using whole-building patterns, design guidelines and predefined performance specifications, the *Advanced Buildings* set of resources provides you with the tools to implement integrated design strategies in your projects, save your clients energy and money, and deliver superior environmental quality. Making use of the *Advanced Buildings* resources allows your design team to stay focused on keeping

project costs down and gives you the assurance that you're providing your client with the savings and performance they expect.

Advanced Buildings tools and resources are described in more detail in Section 2, Creating High Performance.

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WHAT'S INSIDE THE ADVANCED BUILDINGS BENEFITS GUIDE

Creating High Performance. Discusses the characteristics of high performance buildings, design guidelines and rating systems, and the design process. Describes the *Advanced Buildings* project and resources that help designers, developers and owners create high performance commercial buildings.

Beyond the Myths. Discusses the issues associated with high performance office buildings, including myths and misperceptions about upfront costs, payback periods, energy efficiency improvements, company experience and risk.

Benefits of Building High Performance. Presents the business benefits of high performance office space, including energy savings, as well as non-energy benefits such as corporate productivity, occupant satisfaction, risk management and environmental stewardship.

Money Matters. Introduces the economics associated with high performance buildings, including approaches to evaluating the financial costs and benefits of high performance buildings, and building appraisals.

Resources. Lists where to find financial analysis tools, incentives and technical information on high performance buildings.

(top and above) **NATIONAL WILDLIFE FEDERATION HEADQUARTERS, RESTON, VIRGINIA**

Section 2

CREATING HIGH PERFORMANCE

CAMBRIA OFFICE BUILDING, EDENSBURG, PENNSYLVANIA

An integrated design process was used to build the 34,000 ft^2 Cambria Office Building for the Pennsylvania Department of Environmental Protection. This design concept evaluates and minimizes energy use and pollution created in the production of building materials; it also reduces the energy use and pollution the Cambria building will create throughout its lifetime. Installed air quality monitors are used to monitor temperature, humidity, and carbon dioxide inside the building. In addition, all building occupants have access to daylighting in their work environment and are able to control lighting and temperature in their individual work areas.

Photo Courtesy of DOE/NREL

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Each year, more and more quantitative evidence becomes available to support what forward-thinking building professionals have been saying for years: high performance buildings make tremendous sense for many compelling reasons.

- High performance buildings are more competitive, profitable and valuable than their conventional counterparts.
- When properly promoted, these buildings differentiate their designers, developers and owners in the marketplace, creating value by generating attention and goodwill.
- An integrated approach to design, construction and operation reduces risks.
- Flexible designs and components reduce the time and expense of accommodating changes to occupancy.
- Perhaps most importantly, high performance buildings support financial benefits associated with the health, happiness and productivity of their occupants.

But what exactly do we mean by **high performance**, and how does it differ from a **green** or **sustainable** building?

High performance is used to describe a building that uses less energy, provides superior indoor environmental quality, enhances worker productivity and well-being, and improves the bottom lines of the developer, owner and occupant(s).

Green and **sustainable** address energy, but also cover a broader range of resource efficiency issues, including water, building materials and recycling, to reduce the building's total environmental impacts. The U.S. Green Building Council's LEED™ (Leadership in Energy and Environmental Design) Green Building Rating System is the best known national building rating system for green buildings.

So are green buildings always high performance? Only if they deliver on their promised benefits. Delivering the benefits is where you come in, whether you're designing a new project or a major renovation. This section gives you the framework for understanding what high performance means in the context of office buildings, and how you can implement a process to consistently deliver high performance to your clients.

CHARACTERISTICS OF HIGH PERFORMANCE BUILDINGS

Compared to a conventional building that merely meets code, a high performance building is designed, constructed and operated to use less energy and provide superior indoor environmental quality. It may be eligible for ENERGY STAR® or LEED certification or qualify for a local utility incentive program. The specifics of how to achieve high performance vary, but most high performance office buildings share the basic energy efficiency and indoor environmental quality characteristics described below.

ENERGY EFFICIENCY

High performance buildings have energy performance in the top 25 percent nationally when compared to other buildings. They achieve that by following an inte-

grated design process, and by incorporating high-efficiency systems and conservation measures in the envelope, HVAC (heating, ventilation and air conditioning), lighting, controls and power systems. Some key considerations and characteristics in each of these areas are summarized here:

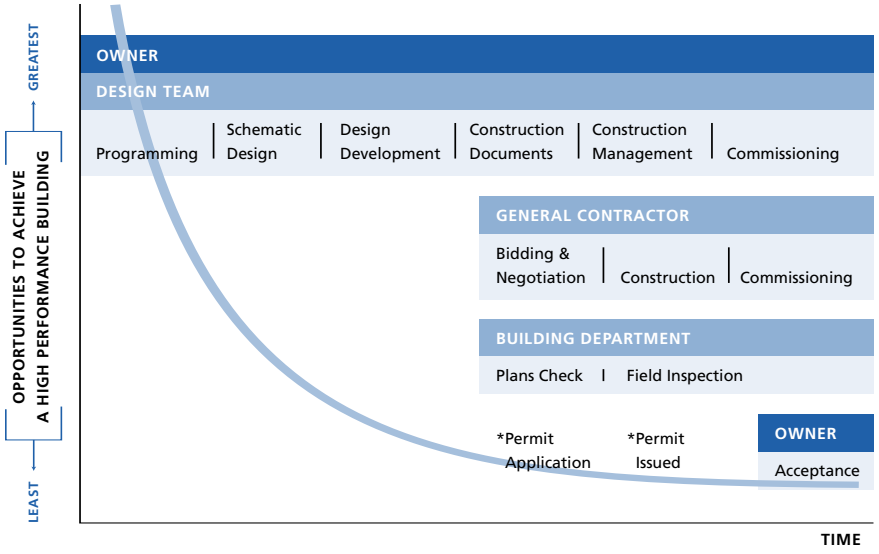
INTEGRATED DESIGN PROCESS

- Setting program and performance goals.
- Adoption of an integrated design process and goal setting from pre-design through occupancy.
- Tracking of energy and environmental performance implications throughout the design process.
- Acceptance testing of equipment installation and operation.
- Tracking performance targets, including energy, indoor environmental quality and occupant satisfaction, after building occupancy.
- Preparation of operations and maintenance manuals, and training of facility staff on system operations.

ENVELOPE

- Building orientation and massing for passive solar heating and cooling.
- ENERGY STAR roofs designed to reduce heat gain.
- Appropriate insulation in the roof, walls, floor, slab and/or doors.
- Proper orientation, location and characteristics of windows and/or skylights that make the most of daylighting and views while controlling heat gain and glare.

IMPACTS OF INTEGRATED DESIGN



The greatest chance for creating a high performance building at the least cost occurs early in the design process.

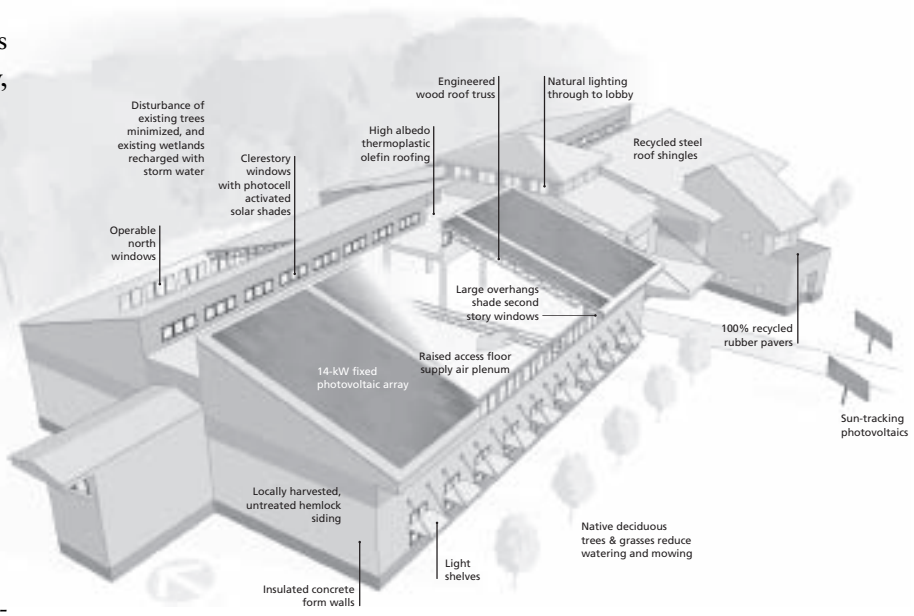
PHOTO COURTESY OF DOE/NREL

(left) Exterior of Cambria Office Building, Edensburg, Pennsylvania

(below) Illustration of Cambria Office Building showing key high performance features.

HVAC

- Natural ventilation (including operable windows) where appropriate to reduce or replace air conditioning.
- High-efficiency HVAC systems achieved through careful integration with the envelope and lighting system.
- Energy management control systems (EMCS) to monitor and control security, central plant equipment and space temperature.
- An Indoor Air Quality management plan to maximize effective indoor air quality and minimize the energy use of outdoor air systems.



COURTESY OF DOE/NREL

LIGHTING AND CONTROLS

- Effective electric lighting that reduces energy use while providing appropriate visibility and comfort.
- Effective daylighting design with automated controls to dim or turn off electric lights when daylight levels are adequate.
- Occupancy sensors to turn off lights and equipment when spaces are unoccupied.

PHOTO COURTESY OF CHRISTOPHER BARRETT OF HEDRICH BLESSING

POWER AND OTHER SYSTEMS

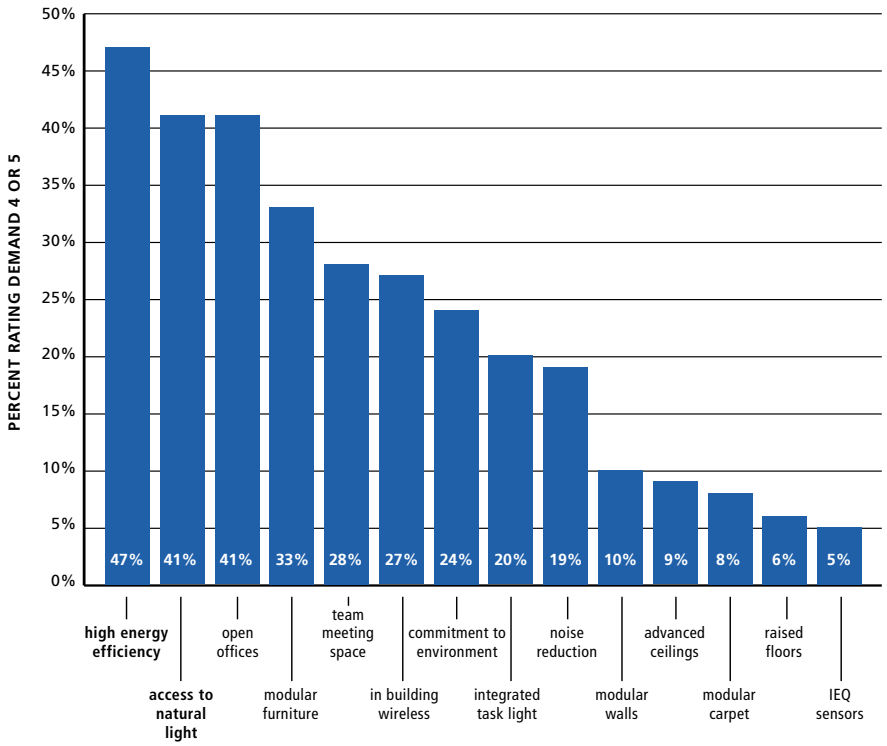
- ENERGY STAR refrigeration systems and office equipment such as copiers, computer monitors and printers.
- Electrical distribution efficiency through the use of ENERGY STAR transformers.
- Thermal massing and controls to reduce power consumption during critical peak summer demand periods.
- Onsite renewable energy generation such as photovoltaic or solar hot water.

SUPERIOR INDOOR ENVIRONMENTAL QUALITY

High performance buildings take a variety of approaches to improving indoor environmental quality, such as:

- Occupant control of temperature and lighting.
- Higher levels of air filtration.
- Carbon dioxide monitoring to regulate ventilation according to occupancy levels.
- Daylighting and views of the outdoors to enhance comfort, health and productivity.
- Controlling moisture and infiltration, including liquid and water vapor, contaminants, and building pressurization.

TENANT DEMAND FOR PROPERTY MANAGEMENT SERVICES



Tenants rated energy efficiency and access to natural light as high priorities in the 1999 BOMA survey "What Do Tenants Want."

- Construction practices and low-toxicity materials, finishes and furnishings that reduce indoor pollutants.
- Building design and operation that exceeds industry standards for indoor air quality (IAQ), including providing appropriate levels of outdoor air, and adhering to IAQ management plans during construction and building operation.

GUIDELINES AND RATING SYSTEMS

To help demonstrate to clients that they are getting the high performance benefits they expect, many designers are turning to voluntary performance guidelines such as LEED or the ENERGY STAR program, or local utility programs.

Whether a project is high performance and greatly exceeds standard practice in energy and environmental quality, or goes further into more comprehensive green design, depends on the goals set by the design team and building owner. Understanding the players and roles will help you navigate the high performance design process.

LEED™

LEED (Leadership in Energy and Environmental Design) Green Building Rating System is a voluntary, consensus-based national standard developed by the U.S. Green Building Council. Since its inception in 2000, over 1,400 projects in the U.S. have used LEED as a basis for defining a green building. There are five credit categories to meet the system's framework of comprehensive green-building goals. *Advanced Buildings* focuses on energy and indoor environmental quality and can be a significant step toward LEED or other green goals.

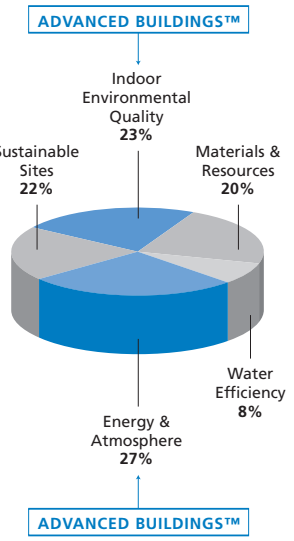
LINKS BETWEEN *ADVANCED BUILDINGS BENCHMARK* CRITERIA AND LEED

LEED CREDIT AREAS	POSSIBLE POINTS LEED 2.1	POSSIBLE LEED POINTS WITH *ADVANCED BUILDINGS*
Sustainable Sites	14	1
Water Efficiency	5	0
Energy & Atmosphere	17	14
Materials & Resources	13	0
Indoor Environmental Quality	15	5
Total Credits	**69**	**20**

Building a high performance office that meets the Advanced Buildings Benchmark criteria can contribute significant points toward LEED certification (credit for any project is subject to the approval of the U.S. Green Buildings Council).

Source: Paladino and Co., *Comparison of Advanced Buildings Benchmark and LEED.*

CATEGORIES AND DISTRIBUTION OF LEED POINTS



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ENERGY STAR® EXPANDS TO COMMERCIAL NEW CONSTRUCTION

The Environmental Protection Agency recently announced the expansion of its ENERGY STAR program to the design of new commercial buildings. Architecture firms will now be able to distinguish buildings that have been designed to be among the most efficient buildings in the country as "Designed to Earn the ENERGY STAR."

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The EPA references the Advanced Buildings Benchmark for design guidance as a tool for achieving the 'Designed to Earn the ENERGY STAR' label.

A recent study of the commercial sector found that leaders in energy management achieved superior stock market and financial performance over the past two years.

"Energy Management and Investor Returns: The Real Estate Sector," Innovest Strategic Value Advisors, 2002

ENERGY STAR®

ENERGY STAR is the U.S. Environmental Protection Agency's program to help businesses and individuals protect the environment through superior energy performance. The program includes energy target setting, scoring and assessment for commercial building performance. A label is awarded to buildings whose energy performance is in the top 25 percent nationally, when adjusted for certain key factors such as building size, space use, occupant density, location, weather and hours of operation. The building must also have good indoor environmental quality as certified by a professional engineer.

ENERGY STAR also provides a promotional logo for the title block on building plans. Architecture firms can display the "Designed to Earn the ENERGY STAR" graphic on qualified plans, demonstrating to your client that you are designing to a higher standard.

UTILITY PROGRAMS

Utility programs offer financial incentives to reduce energy consumption of new buildings. Those inducements can include technical resources, design assistance, financial grants to the design team, or direct funding or financing to reduce construction costs. For more information, contact your client's local utility company.

YOUR DESIGN PROCESS

According to a recent study[2] the majority of designers who design to a standard beyond minimum code do not track the performance of their completed buildings to see if those buildings are actually performing as expected.

The majority of owners, however, do track their energy costs. The study also found that designing to a certain percentage above code did not necessarily correlate with lower energy use compared to buildings that just met code.

Changes in the owner's program, construction change orders, start-up, and building operation all influence how your design performs. If you are promising to deliver a high performance building to your client, your design process must support that level of performance—from pre-design to post-occupancy. You need metrics that allow you to easily show your client that you delivered on your promise.

Advanced Buildings resources assist you in incorporating two important concepts into your design process. These concepts are the key to distinguishing the high performance design/construction process from the conventional approach. They are:

1. **Integrated design process,** which emphasizes teamwork and collaboration among building professionals from pre-design through post-occupancy; and

[2] New Buildings Institute, *Links Between Design Intent and As-Built Performance, 2003*

Wind NRG Offices, Hinesburg, Vermont

The offices at the front combine view windows with horizontal daylight glazing. The upper clerestory serves manufacturing space in the rear. High performance features include super insulated windows, daylighting with dimming controls and occupancy sensing throughout the building, radiant heating and cooling, energy recovery ventilation, wood-pellet fired boilers, a pond heat sink for cooling, and 67 kW of solar panels.

Photo courtesy of Andy Shapiro

2. **Commissioning**, which involves testing and verifying the building's performance.

These two concepts are discussed in more detail below.

INTEGRATED DESIGN PROCESS

Integrated design, in which the performance of the building as a whole is optimized, is arguably the chief tenet of an energy efficient and sustainable building plan. The traditional "design-bid-build" process of project delivery, on the other hand, often works against the development of high performance buildings. Traditional design process issues include:

- A sequential hand-off of the design from the architect to the building engineers (mechanical, electrical, structural and lighting).
- No formal feedback loop between the engineering considerations that affect operating costs and comfort, and the basic architectural design features.
- The mechanical engineer is often insulated from the decisions that the architect makes about the building envelope. Yet that set of decisions is critical in determining the size and cost of the HVAC plant, which can consume 20 percent or more of a building's energy budget.

In this traditional process, key design decisions are often made without considering long-term costs and performance or upfront opportunities for capital savings due to system integration.

An integrated design process considers the function and interaction of all building systems and components as a single entity, and, from the beginning of the process, brings together all the key players involved in designing and constructing the building. These players may include, but are not limited to, the architects, HVAC and electrical engineers, lighting designers, owner or owner's representatives, and project purchasing agents.

On many projects, building construction costs can be reduced through the use of an integrated design process. Those savings can help pay for the additional design work your firm may have to perform to deliver the added value to your client.

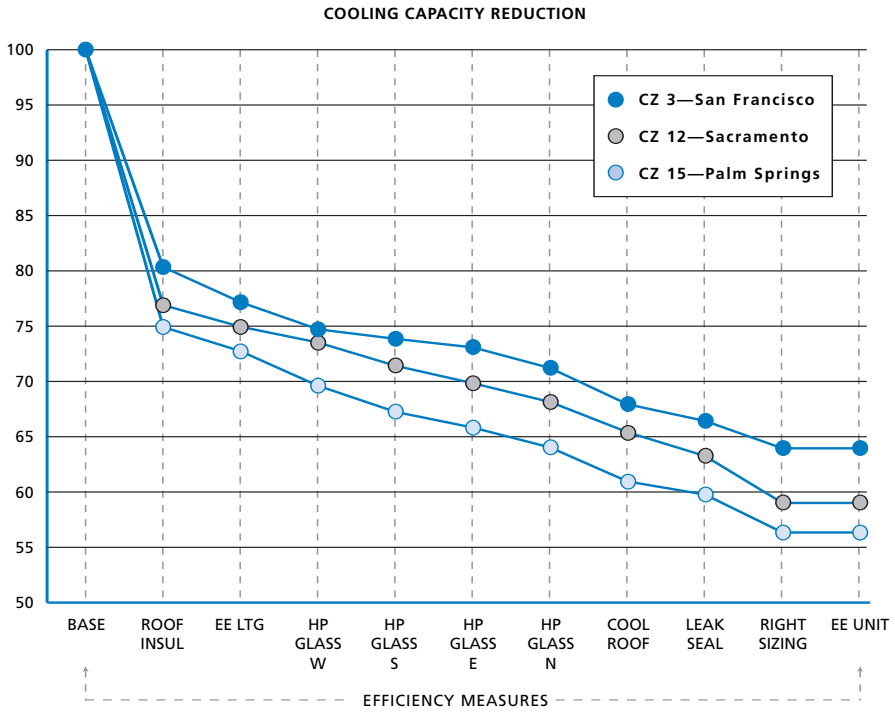
The integrated design process presented in *Advanced Buildings* is relevant for a range of building performance goals, from ENERGY STAR to LEED.

INTEGRATED DESIGN PROCESS—ADVANCED BUILDINGS RESOURCES

To assist your firm in taking the first step toward an integrated design process, *Advanced Buildings* has created the *Advanced Buildings Reference Guide* and Design Process Checklists. Those resources provide a set of maps, narratives and reference lists so that the design team can set clear expectations with the client and other team members. Design Process Checklists are developed for the following:

Pre-design—recognizes the benefits of charrettes by offering checklists for this process, to assist your team in answering the proper questions for a successful high performance design process.

INTEGRATED DESIGN REDUCES MECHANICAL LOADS



In a study of buildings in three climate zones (CZ), improving insulation, windows and roof options at early design reduced the mechanical system load by 37 to 44 percent, creating capital cost savings that can be used for other high performance design needs.

Source: Architectural Energy Corporation *Integrated Design of Small Commercial HVAC Design Guidelines* California Energy Commission Public Interest Energy Research (PIER) program, September 2003

Schematic Design—using nationally developed guidelines, prompts your team to evaluate key elements early and set achievable energy and environmental performance goals.

Design Development—emphasizes the need to evaluate and optimize various building systems prior to detailing for construction.

Construction Documents—recommend that your team looks ahead to the construction and start-up phase by reviewing constructability, specifying preapproved start-up tests, and setting clear performance targets that can be tracked and measured by the owner once the building is occupied.

Construction Phase—offers acceptance test procedures for major energy-consuming mechanical and lighting systems. These procedures can be performed by the architect, engineer, contractor or owner's agent.

Post-occupancy Phase—extends the design team involvement into the building operation through operator manual development and training, using the control system to monitor system performance and a one-year warranty review.

Each checklist provides your team with criteria for key decisions to consider at that particular phase of the design, actions to take regarding those decision criteria, and additional resources to help meet project goals.

Athena Holdings, LLC, Madison, Wisconsin

As the corporate headquarters of the firm that designed the facility, the Athena Holdings facility incorporates efficiency features that allows Planning Design Associates to showcase efficiency strategies to its clients. The 73,000 sq. ft. building features daylighting, task/ambient dimmable lighting system with 10 foot ceilings, high performance glazing, daylighting/occupancy sensors, waterside economizer that allows for cooling without a compressor, use of interior glass partitions for deeper penetration of natural light and skylighting in interior spaces. High efficiency boilers and fan motors, pumps and chillers, and fixed outdoor air quantity reduce operating costs and improve indoor air quality.

Photo courtesy of Planning Design Associates

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ADVANCED BUILDINGS RESOURCES

This Benefits Guide is just one element of the Advanced Buildings resources. Your design team may be using these other tools to deliver high performance buildings:

Benchmark (*WHAT* to do): Provides whole building, system and component performance guidelines that, used as a whole, provide performance improvements.

Reference Guide (*HOW* to do it): Includes specific technical information, system specifications, and information resources on the design process, envelope, lighting and daylighting, HVAC and power.

Benefits Guide (*WHY* to do it): Presents design process changes, myths, and business benefits to help design teams sell clients on building high performance. The first guide is targeted to smaller office buildings.

Profiting from High Performance (*WHY* to do it): Illustrates for your clients the compelling reasons for building high performance.

LEED Guide (*HOW* to use Benchmark with LEED): Shows you how to use Benchmark to achieve the high levels of energy and environmental performance set forth in the U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED) Green Building Rating System.

Technical Training Series (*HOW* to do it on your very next project): Provides curriculum for architects and designers on integrating high performance, lighting and daylighting, envelope, HVAC, and selling high performance.

poweryourdesign.com (*WHERE* to get it): Provides a user-friendly place to access all the *Advanced Buildings* resources.

COMMISSIONING

Commissioning is a process to ensure that the building systems are operating as intended. Design review, planning and performance testing and verification of all key energy and water-using systems must be performed before the end of construction. Commissioning typically includes a written report for the owner on the performance of all key systems and components. This documentation can be helpful later when troubleshooting problems with building operations.

COMMISSIONING—ADVANCED BUILDINGS RESOURCES

Advanced Buildings supports commissioning by providing pre-defined "acceptance tests" that the installing contractor, architect or engineer, or owner's agent can perform on various building systems and equipment. These tests confirm that the equipment was installed and calibrated properly and is performing according to the design intent.

In addition, post-occupancy reference lists ensure that building management, maintenance staff and operators have access to the correct information. The checklists also help the operators utilize the building control systems as a tool to maintain an efficient and comfortable indoor environment.

PHOTO COURTESY OF POTTER LAWSON ARCHITECTS, INC.

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THE VALUE OF COMMISSIONING

A recent report used nine case studies to illustrate why savings from commissioning exceeded the cost of commissioning. The report found that commissioning:

- Helped eliminate costly change orders
- Improved performance of building systems
- Reduced callbacks

Source: Robert Cox Dorgan and Charles Dorgan

PHOTO COURTESY OF POTTER LAWSON ARCHITECTS, INC.

Section 3

BEYOND THE MYTHS

CLEAR CREEK BUILDING, ASHLAND, OREGON

In Ashland, Oregon, heat gain can be the largest barrier to tenant comfort and energy efficiency in commercial buildings. This small office applies several strategies including an overhanging breezeway on the west side, reflective tinting on the west and south facing windows and a white reflective roof. Economizers flush the building with cool night air and the building's mass of concrete slabs and masonry walls help maintain comfort and save energy during the day. In addition, extensive daylighting with integrated lighting controls also reduces energy demand.

Photo courtesy of John Fields, Builder and Owner

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Many preconceived notions and inappropriately applied "rules of the game" play a major role in the continued waste of energy and resources in new buildings and those that undergo major renovations. Here are several of the myths that you may want to dispel at the start of your next project.

MYTH: THE DESIGN IS ALREADY ENERGY EFFICIENT.

Meeting code is just a starting point. Don't assume that your project's construction plans and specifications are already high performance just because they meet state or local building codes or include energy efficient components. Although meeting code and specifying energy efficient equipment can help reduce waste, those factors do not describe a high performance building. High performance considers the whole building as a system and brings together an interdisciplinary team at the outset to optimize the building's performance through integrated design and testing and verification of equipment.

MYTH: ENERGY EFFICIENCY ENHANCEMENTS DON'T MAKE AS MUCH SENSE TODAY AS IN YEARS PAST WHEN A LOT OF REBATES WERE AVAILABLE.

Incentives still make a big difference. In 2003, nearly $1.5 billion in rebates and other incentives were available nationally to building owners, representing a *32 percent increase* since 2000. Of course, you have to know where to look for this "free" money. Equipment rebates, design assistance and lending buy-downs are just some of the programs widely available. Check with your local utility or public benefits program representative for information on incentive programs and see the Resources Section of this Guide.

PHOTO COURTESY OF JOHN FIELDS, BUILDER AND OWNER

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TOP 10 DEFICIENCIES DISCOVERED WHEN COMMISSIONING NEW AND EXISTING BUILDINGS

- Incorrect scheduling of HVAC and lighting equipment
- Incorrect cooling and heating sequences of operation
- Incorrect calibration of sensors and instrumentation
- Lack of control strategies for optimum comfort and efficient operation
- Malfunctioning air and water-side economizers
- Under-utilized computer-based control systems
- Short cycling of HVAC equipment leading to premature failure
- Non adherence to design intent and missing building documentation
- Lack of training for building operators or service contractors on complex systems
- Missing specified and paid-for equipment

Source: Portland Energy Conservation, Inc.

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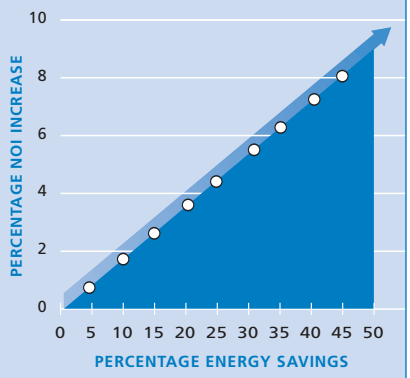
"If tenants understand what you're trying to do (invest in energy saving and indoor environmental features that will save operating costs), they are willing to pay for that."

Jerry Lea, Hines Development Corp. Washington Post Article May 17, 2003

IMPACT OF ENERGY SAVINGS ON NET OPERATING INCOME



Source: Environmental Protection Agency

MYTH: ENERGY COSTS ARE A "PASS-THROUGH" TO THE TENANT.

Income properties can benefit mightily from lower energy costs. Whether some or all energy expenses are a pass-through to a tenant depends on the kind of lease, as well as how the actual energy expense compares to any expense stop or base year in the lease.

In the case of new construction, the more efficient the building, the lower the base year or expense stop, which allows the owner to charge the same rent and net a higher profit, or reduce rents to make his space more competitive and quicken the pace of leasing. See Section 5, Money Matters, for more information about the allocation of expenses between owners and tenants.

MYTH: IT'S TOO DIFFICULT TO PREDICT THE OWNER'S SHARE OF ENERGY SAVINGS IF THE BUILDING IS AN INCOME-PRODUCING PROPERTY.

The owner's energy savings benefits should be just one more part of the income property calculation. In order to design a building that optimizes the real estate investor's return, you must discard conventional thinking about first cost and simple payback period. Instead, embrace more useful determinants of value, such as life cycle cost, net present value, net operating income and appraised value.

Fortunately, the financial elements of these calculations can be done with the same software that the real estate industry uses to model the cash flows and value of income-producing properties. Once the leases are modeled, sensitivity analyses are performed by rearranging the relevant variables, such as construction costs (with and without various levels of incentives), leasing assumptions, operating expenses and holding period. See Section 5, Money Matters, for details.

MYTH: ANY EFFICIENCY ENHANCEMENTS TO THE DESIGN MUST PAY FOR THEMSELVES WITHIN TWO YEARS TO BE WORTHWHILE.

Don't lose some of the highest returns on investment available on your project. In a world where the cost of designing and constructing a building is, typically, only 2 percent of the total cost of ownership for that building over a presumed 30-year life cycle, it makes little sense to focus solely on whether the simplified incremental investment equation meets an arbitrary two-year payback.

In the case of income-producing properties, the simple payback period (SPP) is especially irrelevant if you don't know whether the owner, the tenant, or both will capture the savings. A three-year SPP project where the owner captures all the savings as net operating income and increases the appraised value of the property can actually be a better investment than a two-year SPP project where the tenants capture all the savings and the owner structures the lease so they receive no return on the investment. (See *"Life Cycle Cost Analysis"* in Money Matters.)

MYTH: EXTRA COSTS UPFRONT MAKE THIS PROJECT UNATTRACTIVE.

Make sure the proper questions are being asked. The question usually posed is, "How much more does it cost?" That raises the question, "Compared to what?" Compared to comparable buildings, available funds, or the building without the design approach and features? The question itself is fundamentally wrong. The questions to ask your client is, "What do you want?" and "May we show you how to get it *within the budget available?*" If you ask your client if they want the benefits of high performance, the answer is inevitably, "yes!" It is critical that you include high performance as an overall program goal and not a below-the-line adder.

An extensive construction cost survey of over 100 buildings found that the majority of projects achieved "sustainable" building goals within their initial budget, or with very little additional funding. Design teams were able to get their clients to make choices within their allowable budget in order to accomplish high performance goals and values. In analyzing the construction cost data, the gross costs per square foot of buildings with green features and objectives (a much broader range of areas than just high performance energy and environmental quality) fell within the existing range of costs for the non-green or standard buildings of the same type.[3]

[3] Matthiessen, L. and Morris, P., "Costing Green: A Comprehensive Cost Database and Budgeting Methodology," Davis Langdon Adamson, 2003

PHOTO COURTESY OF POTTER LAWSON ARCHITECTS, INC.

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"You can do a high performance building without any additional cost in bricks and mortar, although you will spend more time and cost upfront on design over standard. The increased design cost is small as an overall project cost and can be recovered in reductions to equipment requirements, overall asset value of the property, productivity improvements and/or reduced operating cost savings."

Dennis Wilde, Gerding/Edlen Development Co., APEM Presentation 2003 in Portland, Oregon

"Hines Development Corp. estimates it has spent $0.45 to $1.30 a square foot, varying by building, above conventional construction costs to make mechanical and electrical systems in its buildings significantly exceed building codes." *New York Times*, 1/15/03

These two quotes demonstrate that there is no generic answer regarding cost. The two most recent cost studies found 0–2 percent average premium for green versus conventional building (Mathiessen and Kats, 2003 respectively). Even with a small increase in design costs, it is an excellent investment when analyzed as a total cost of ownership to gain the myriad benefits described in Section 4.

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One reason for doing green features at the rehabbed Security Building in St. Louis, Missouri, was to give the Lawrence Group hands-on experience and knowledge of the latest green-design techniques. "We've had clients asking about it, so we thought, 'What better way to learn and understand it than at our own building.'" Ohlemeyer doesn't have numbers on costs compared with savings for all the green features going into the Security building, however he expects the savings to outweigh the dollars spent. "Plus," he said, "we were going to do much of the renovation work, anyway, so why not do the socially responsible thing."

David Ohlemeyer, Principal at Lawrence Group architecture and design firm St. Louis Post-Dispatch 6-12-04

MYTH: WE DON'T HAVE THE EXPERIENCE FOR A HIGH PERFORMANCE PROJECT.

Incremental steps can lead to better design. The myth of experience is that it's too much work to change your design approach. But as a design firm, your expertise evolves as a series of incremental steps toward better design. Your first step may have been a project five years ago or five hours ago. In either case, the incremental improvements because of changing energy codes, client needs or new firm leadership have influenced your designs.

The important part of designing a high performance building is that you take that first step. For example, you may start by evaluating the daylighting potential of a project in the schematic design phase. This may take into account window needs for views, light, ventilation and aesthetics, and may lead you to separate view from daylight windows. Floor cross-section and ceiling height may also be adjusted to improve daylight penetration into the space. Finally, you may look at architectural shading, interior shades and glass specifications to reduce glare and improve occu-

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A DIFFERENCE THAT MAKES A DIFFERENCE

High performance buildings offer a way to create "a difference that makes a difference." Buildings that meet performance criteria such as *Advanced Buildings* Benchmark offer credibility to buyers who may be sensitive to greenwashing claims (greenwashing refers to an organization's efforts to appear more environmentally responsible than it actually is).

Performance guidelines, rating systems or other forms of documentation of the project's high performance reduce risk for buyers who may not have the ability or experience to judge a developer's claims for themselves. Those also provide a broker or agent with some way to back up his or her claims about the building's benefits. In the corporate or institutional setting, the independently established criteria offers Facilities Professionals something to hang their hats on when reporting to upper management about the new high performance building.

High performance or green building accomplishments also create a difference in the minds of local print and broadcast media, which can be used to help differentiate a project for prospective tenants. Free media is far more credible than advertising—and considerably cheaper!

pant comfort. Ultimately, your design integrates an effective daylighting design with controlled electric lighting.

In the end, you've taken your first step toward high performance.

MYTH: IT'S MUCH RISKIER TO BUILD A HIGH PERFORMANCE BUILDING.

A high performance design process decreases risk. Risk can be defined as "to incur the chance of harm or loss by taking an action." Yet the absence of action often results in risk. By ignoring an integrated design process that brings together the architectural, engineering and construction team, you increase the risk that a project will not perform as expected.

Technologies used in high performance buildings are far from risky or "bleeding edge." They usually represent proven off-the-shelf technologies that are reliable and cost effective when applied through an integrated design process. The Resources section can help provide additional data and case studies to increase confidence in the options you are selecting.

MYTH: HIGH PERFORMANCE DOESN'T MAKE SENSE ON SMALLER PROJECTS.

Some designers of smaller projects are assisting their clients in leading the way to achieving high performance or green ratings on a conventional budget. In Lake Oswego, Oregon, a 15,000-square-foot, three-story office building was built in 2000 for $130 per square foot; it received a LEED Certified rating. And in the Kansas City, Kansas, area, a speculative small-business office park of about 65,000 square feet was built in 2002 for less than $90 per square foot and achieved LEED certification. In both cases, the building developer was convinced he would be better off in the long-term with a fully documented and certified project. The Oregon building owner has a personal commitment to the environment and wanted to demonstrate that commitment with this project, which houses his own company's office and that of two of his colleagues. The Kansas developer anticipated that publicity associated with their LEED certification would help him find tenants with similar environmental concerns, and he was right.

In the competitive leasing market for small office space, often even a slight edge over competitors can translate into a decision in favor of your offering.

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A field study in Massachusetts included interviews with various professionals involved in designing and constructing buildings that just met minimum energy codes. These quotes were volunteered during the interview process:

Architect: "The engineers are always the weak link in the process. And the contractors will do what they want to do anyway. This is all very troublesome."

Engineers: "The architects are the real problem here, you know. We are expected to comply with these codes and they don't even leave any physical space to fit in all the required systems."

Contractors: "The architects and engineers specify the systems and we're expected to make it all work in the field. Who gets the call at 3 a.m. when a system fails? Not the architect or engineer; it's us."

What Fortune 500 company would be successful if their teams shared those views? Integrated design is a way to reduce risk, not increase it.

Gary Epstein, Energy Resource & Solutions

Section 4

BENEFITS OF HIGH PERFORMANCE

PIER 56 MITHUN BUILDING, SEATTLE, WASHINGTON

A 27,000 sq. ft. warehouse was transformed to become the offices for Mithun designers and planners of Seattle. The firm held stakeholder strategy meetings prior to design and determined the space should be open, flexible, energy efficient and an example of the sustainable design principles Mithun encourages to clients. The open design is intended to promote and exemplify design collaboration while also increasing views, access to daylight, and enhancing the natural ventilation and passive cooling system. An acoustic consultant was involved early on to minimize noise in the space. Upgrades in shell insulation and glazing, lighting controls, and attention to green materials and indoor environmental quality has earned this building a reputation as not only sustainable, but as one of the most comfortable buildings in Seattle. All this for a $55 sq. ft. budget!

Photo courtesy of Lighting Design Lab

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High performance buildings have been documented to provide a range of valuable benefits to owners, tenants and other occupants, as well as to the building designers. The main benefits, which are discussed in detail in this section, are:

- Lower Operating and Maintenance Costs
- Increased Building Valuation
- Corporate Productivity Gains
- Improved Occupant Satisfaction/Well Being
- Reduced Risk Factors
- Greater Market Attraction/Competitiveness
- Environmental Stewardship

With tight budgets and compressed schedules, it can be a challenge to get your client to commit early on to a high performance design path. It's important that you clearly understand and can explain to your client why that early commitment is so important.

Although the benefits described in this section are all compelling, some very substantial ones occur early in the building's life cycle or are more easily quantified than others. If your client comes to understand the benefits that they can expect, and is then willing to make the commitment early in the design process, a high performance building can be a winning proposition for all involved.

LOWER OPERATING AND MAINTENANCE COSTS

The combination of properly sized mechanical systems, well-designed and installed envelope measures, prudent use of daylighting, and sensible control strategies plays a large role in reducing operating expenses. Downsized systems and better controls frequently enable a high performance building to reduce peak demand when utility prices are at their highest.

Many high performance buildings are designed to use 25 to 40 percent less energy than required by current codes; some buildings achieve even higher levels of efficiency. In most markets, that can translate into a savings of $0.40 to $1.00 per square foot per year in utility operating costs. Those savings quickly add to the bottom line. In an 80,000-square-foot building, for example, that can put an additional $32,000 to $80,000 per year into the net operating income.

INCREASED BUILDING VALUATION

In the case of income properties, reductions in operations and maintenance (O&M) expenses are extremely important drivers of additional profitability and value. Your client's share of those cost savings could be substantial under favorable leasing conditions and directly boost net operating income (NOI), which in turn would increase a property's appraised value by 10 times the annual cost savings, assum-

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FOUR YEARS AND FAILING

Recent studies of new commercial buildings (less than four years old) found numerous problems and high failure rates with the efficiency and operability of HVAC equipment. In some cases, there were problems with adequate ventilation to occupants as well.

The Advanced Buildings process places primary importance on equipment function and reliability. HVAC equipment is carefully tested and monitored during the construction phase and into the occupancy phase. This explicit process of documenting and reporting is a key part of an integrated design process and commissioning.

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Cox and Dinkins Engineering firm's new 12,000-square-foot building on Beltline Boulevard in Columbia, South Carolina, is designed to improve energy efficiency by 30 percent. Says Dinkins, "We've almost doubled our square footage since moving, yet our energy bills are only 20 percent more than before."

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In a recent research study on lighting and office workers, on average, people with dimming controls chose lower light levels than current design practice. Personal control also had a measurable impact on the motivation of office workers to perform on tasks. Normally, office workers' production declines over the course of a workday. However, the presence of personal control of their lighting increased motivation allowing workers to sustain their performance—they persisted longer on difficult tasks and were more accurate on tasks requiring sustained attention.

"Lighting Quality and Office Worker Productivity," Light Right Consortium, Albany, New York, 2003

ing a capitalization rate (Cap rate) of 10 percent. (These concepts are discussed in more detail in Section 5, Money Matters.)

Imagine a 75,000-square-foot building that saves $37,500 per year in energy costs ($0.50 per year per square foot, or 25 percent of the energy bill) versus a comparable building built to code. Assuming a capitalization rate of 10 percent, that could add $375,000 (or $5 per square foot) to the value of the building ($37,500/0.10 = $375,000).

Given the income approach to appraisal (see Section 5), reductions in the owner's share of operating expenses, and potential increases in revenues (caused by faster lease-up, higher base rents, and/or improved tenant retention/attraction) would all manifest as higher net operating income.

In addition, a higher NOI can support a higher appraisal, and the higher the appraisal, the larger the loan amount at a given loan-to-value ratio. The additional borrowing capacity is one way to finance the incremental cost (if any) of your client's high performance building.

CORPORATE PRODUCTIVITY GAINS

Improving the productivity of office workers directly benefits the company in terms of higher yields per person. Today's "knowledge workforce" is a major cost of products in our service economy.

Recently, there has been a great deal of anecdotal information and positive press on productivity benefits and employee satisfaction in high performance buildings. However, decision-makers concerned with the bottom line usually want numbers verified through valid scientific analyses and reviews. Luckily, the Carnegie Mellon University (CMU) Center for Building Performance and Diagnostics gathered and

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"I have been building and leasing out small commercial buildings for over 15 years. We have been improving the HVAC systems, using resource efficient building materials, and considering site-sensitive design. Each successive building is consuming less energy, and they are more comfortable and aesthetic for the occupant—and the buildings appraise for a lot more after occupancy and the passing of one year than when they appraised from plan before construction. Based on my experience the high performance features are a part of that value."

John Fields, Builder and Owner

reviewed thousands of studies about the impacts of building features on worker productivity as part of its Building Investment Decision Support (BIDS) tool development, and has compiled the results.

From these studies, four of the attributes associated with high performance building design—increased ventilation control, increased temperature control, increased lighting control and increased daylighting—have been "positively and significantly" correlated with increased worker productivity. Increases in tenant control over ventilation, temperature and lighting each provide measured benefits from 0.5 percent up to 34 percent, with average measured workforce productivity gains of 7.1 percent with lighting control, 1.8 percent with ventilation control, and 1.2 percent with thermal control.[4]

Additionally, significant measured improvements have been found with increased daylighting.[5] Recent research also found that an ample and pleasant view was consistently associated with better office worker performance, but glare from windows was associated with worse office worker performance.[6]

A good starting place for discussing the value of building design on employee productivity is to recognize that the market perceives value, that there is research documenting quantitative value and that assigning some value to the proposed project is reasonable. A 1 percent gain in worker productivity is acceptable as a conservative figure to assign dollars to the building's impact on corporate production.

For example, an office with a $50,000 per-year average worker cost would gain $500 per worker in production at a 1 percent improvement. If the average space per worker is 150 sq. ft. then the occupant gains $3.33 per sq. ft. ($500 gain ÷ 150 sq. ft.). Use your client's wage averages and office dimensions and determine the value.

IMPROVED OCCUPANT SATISFACTION/WELL BEING

Given that annual personnel expenses can be 100 times that of annual energy costs in a typical commercial building, keeping those occupants healthy, happy and productive can be among the most significant benefits of high performance buildings.

Enhanced occupant comfort and control have profound effects for the income-property developer or owner. Surveys performed by the Building Owners and Managers Association (BOMA) and other organizations have documented the importance that tenants place on thermal comfort, access to daylighting, and indi-

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Fortune Marketing found that 87% of the facilities executives believe that a high quality work environment increases worker productivity, morale, and safety. Furthermore, 93% believed that improved lighting could enhance worker productivity by 10% or more.

National Summit on Building Performance, Washington DC, 1996.

***

"They documented a 17 percent increase in productivity from their old building to their new building in terms of the number of claims that were processed. They made it a building where people had better lighting, had better temperature control."

Soren Simonsen, a principal of Cooper, Roberts, Simonsen Architecture. Salt Lake, Utah referring to a private insurance company. Utah Deseret Morning News, April 14, 2004

[4] Greg Kats, "The Costs and Financial Benefits of Green Building: A Report to California's Sustainable Building Task Force," Capital E, October 2003.

[5] Heschong Mahone Group, California Energy Commission Public Interest Energy Research (PIER), Studies on Schools, Retail and Offices, 2002–2003

[6] Heschong Mahone Group, California Energy Commission Public Interest Energy Research (PIER), *Windows and Offices*, 2003

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"People are your most expensive asset. If you can keep them happy, you save costs," Jo Carol Conover, project manager for the Hewlett building.

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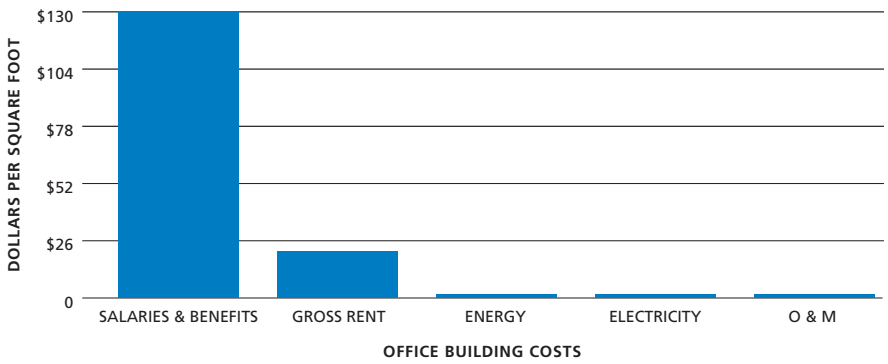
"Tenants' ability to control the temperature in their suite is the only feature to show up on both the list of most important features and the list where tenants are least satisfied."

"What Office Tenants Want," BOMA 1999

AVERAGE ANNUAL EXPENDITURES ($ / SQUARE FOOT)



Average office employee cost per year	Average square feet of office space per employee	Impact of 1% loss of productivity
$40,000 per year	150 square feet	$2.66 per square foot*

*BOMA and BOSTI estimate $2–$18

Because personnel costs far outweigh other costs per square foot to the owner or tenant, the buildings impact on those costs can be a financial gain or a loss.

vidualized control over HVAC and lighting. High performance building approaches hold great potential for enhancing tenant attraction and retention, thereby enhancing the value of the "box of leases."

Self-reported health conditions from a recent study showed that office workers with the best views were the least likely to report negative health symptoms while reports of increased fatigue were most strongly associated with a lack of view and glare.[7]

Whether you are designing for your client's own company, for their buyers or for their tenants—the people clearly count.

REDUCED RISK FACTORS

There is inherent risk in any business proposition. However, building with a high performance integrated design process helps reduce several business risk factors, including protection against energy price increases and reduced liability exposure.

PROTECTION AGAINST ENERGY PRICE INCREASES

The U.S. Department of Energy (DOE) estimates that commercial buildings account for 27 percent of total electricity consumption in the United States, and energy consumption is projected to increase signficantly through 2010. Partly due to electric utility sector deregulation, energy price volatility has increased in recent

[7] Heschong Mahone Group, *Windows and Offices*, California Energy Commission Public Interest Energy Research (PIER), 2003

years. Firms with superior energy management are less vulnerable to energy price fluctuations. Real estate companies face the following potential risks associated with energy consumption:[8]

- Uncertainty in the energy market and energy price increases.
- Possible future greenhouse gas emissions reduction regulations.
- Negative impacts on cash flow and shareholder value.

High performance helps to mitigate the risks of future increases in energy prices, especially those during peak summer periods. High performance strategies that mitigate fuel price risk include:

- Energy efficiency and advanced controls.
- Off-peak energy storage in thermal energy systems (e.g., making ice during the night, then using the ice to help cool the building during peak air-conditioning periods).
- On-site renewable energy generation from micro turbines, cogeneration systems, or renewables, such as photovoltaics.
- Demand-responsive buildings that use controls and thermal mass to reduce power consumption during critical peak summer periods.

REDUCED LIABILITY EXPOSURE

High performance buildings are easier to operate and maintain. By conducting comprehensive functional systems testing prior to occupancy, your client can expect

[8] Innovest Strategic Value Advisors, "Energy Management & Investor Returns: The Real Estate Sector," October 2002.

PHOTOS COURTESY OF POTTER LAWSON ARCHITECTS, INC.

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ENERGY COSTS AND FUTURE PRICES

The truth is that energy is not going to get any cheaper. Let's look at the economics of the power plants used to supply energy in commercial buildings. Deregulation in the 1990s supported the construction of thousands of megawatts of new base-load gas-fired power plants to run on low-cost natural gas. Easy financing allowed new plant construction to reach all-time high and inflated the purchase prices of existing plants. That resulted in a glut of base-load capacity in parts of the country with a high percentage of heavily financed power plants. It also drove natural gas prices to an all-time high because of increased demand by power plants.

Poor investment performance on these new plants, transmission restrictions and the economic disincentives for construction of peak-load power plants have resulted in a very stressed utility grid. And Wall Street is reeling in debt and bankruptcy from failed deregulation schemes at Enron and other companies. So electricity prices and reliability are likely to remain volatile for the foreseeable future.

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"The building design will burnish Genzyme's corporate identity, culture and work force." Henri A. Termeer, Genzyme Corp. CEO regarding high performance features in their new Boston, MA headquarters designed to use 38 percent less energy and 32 percent less water and incorporate improved indoor environment and comfort.

New York Times, 4/28/04

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"If a buyer or tenant is considering side by side two comparable projects, and you have more (green) features in a building, you're going to have a definite advantage in terms of the marketplace."

Dennis Wilde, Gerding/Edlen Development Co., Portland, Oregon July 2004, Conservation Monitor "Building Green" by Mark Ohrenschall

a smoother running building for years with reduced repair costs. In addition, the training documentation provided to your client will enable new personnel to more quickly learn to run the facility at peak efficiency. This documentation can help your client demonstrate to prospective tenants or occupants the measures taken that contribute to a safe and healthy indoor environment, and also to substantiate best practices in the case of sick-building syndrome claims.

The U.S. Environmental Protection Agency estimates indoor pollution to be two to five times (and occasionally more than 100 times) higher than outdoor levels. Indoor environmental problems not only affect occupant comfort and productivity, they also create sizable litigation exposure. The average settlement, in a study of 44 such claims, was over $500,000.[9] High performance buildings are well positioned to reduce indoor air quality (IAQ) problems and potential related liability. HVAC systems can be designed to enhance IAQ by increasing air changes and filtering rates. Intelligently planned and properly installed building envelopes can reduce or eliminate the infiltration of mold-enhancing moisture.

As a designer, liability exposure can bite you in three ways:[10]

- Negligence
- Sale of a product
- Contract language

The first way to reduce liability is to change your practices. By adopting a set of practices that includes a systematic way of evaluating the impact of your design and specifications that assure your building performs as intended, you reduce liability. Remember, even if you didn't install a particular piece of equipment, if it fails, the product liability extends through the entire supply chain.

Working proactively to adopt high performance building processes also builds trust in the relationship with the customer.

GREATER MARKET ATTRACTION/COMPETITIVENESS

Clients that undertake high performance building projects continue to receive positive publicity about their building's many benefits: greater occupant comfort, operating expense savings and implied social responsibility. For owner-occupant clients, that can improve their brand recognition; position their organization as efficient, creative and forward thinking; and demonstrate that they add value to their community. That positive attention could lead to landing another client or making an additional sale, or make it easier to attract, hire and retain employees.

[9] Chen and Vine, *A Scoping Study on the Costs of Indoor Air Quality Illness: An Insurance Loss Perspective*, Lawrence Berkeley National Laboratories, 1998

[10] ASHRAE Journal, vol. 44, no. 10, p. 65–67, October 2002

Improved indoor environmental quality is frequently marketed to buyers, tenants and other occupants through project-specific literature such as brochures, building signage and company websites. The poweryourdesign.com website provides information to assist you in creating promotional messages for your firm and your clients.

Income property owners clearly gain a marketing advantage and sometimes free press. In addition, certifications such as LEED and ENERGY STAR increase the credibility of owner's claims. Moreover, because reduced operating expenses are a well-publicized aspect of high performance buildings—and most tenants and brokers focus on total occupancy cost, not base rent—that type of publicity helps your client sign leases. Great press about faster leasing, lower operating expenses, reduced insurance exposures and other factors might even convince a lender to offer more favorable credit terms that reflect the project's reduced risk profile.

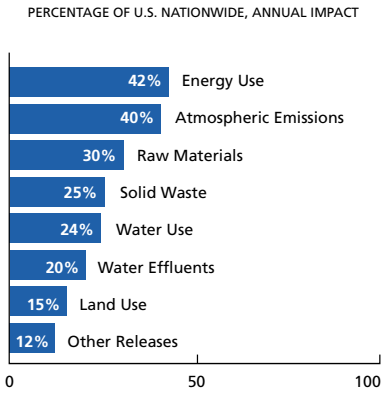
ENVIRONMENTAL STEWARDSHIP

Buildings fundamentally affect the local environment and the health of the planet. In the United States, buildings use over 40 percent of our total energy, two-thirds of our electricity and nearly 25 percent of our water. They fill up our landfills, and transform land that provides valuable ecological services. Atmospheric emissions from the use of energy, the second greatest building environmental impact, lead to acid rain, ground-level ozone, smog and global climate change.

Owners and designers of commercial buildings have a unique and significant opportunity to help reduce their environmental impacts for the life of the building, which could be 100 years or longer. High performance or green building owners and designers are demonstrating their environmental leadership in hundreds of cases across the country. Customers, tenants, the press and the community at large are noticing that leadership.

(left) **Columbia River Gorge**

ENVIRONMENTAL IMPACT OF BUILDINGS



Source: World Watch Institute, 2003

power your design

"How do we go down a different path? We've got a mantra in our company: step by step. It's little pieces, seeking to balance the interests of people, profit and the planet."

Hank Ashforth, Ashforth Pacific Co., Portland, OR July 2004, Conservation Monitor "Building Green" by Mark Ohrenschall

Section 5

MONEY MATTERS

BOLDT CORPORATE HEADQUARTERS, STEVENS POINT, WISCONSIN

Boldt Construction Company increased coordination with the design team to deliver buildings with greatly improved efficiency and reduced environmental impact. Their 23,000 sq. ft. office building and warehouse features a 30 percent more efficient HVAC system, a 30+ R-value envelope, and a focus on natural light and occupant control of their space. In this northern climate, daylighting was a key design strategy incorporating high performance glazing with reduced visible light transmittance to reduce glare from low-angle sun and enhanced solar heat gain coefficient. The windows are shaded to reduce the solar heat gain and improve the availability of diffuse daylighting for interior illumination. Lighting is controlled through daylighting, occupant sensors and occupant PC-based controls. This building received a LEED Silver rating for its focus on energy efficiency, use of natural materials, recycling construction waste and use of daylighting.

Photo courtesy of Boldt, Inc.

Advanced Buildings™

The central issues in evaluating the possible additional capital investment in a high performance office building usually revolve around spending a few more upfront design and construction dollars to gain significantly more in reduced energy costs and increased asset value throughout the life of the building. Even with fixed budgets, many, if not all, of the high performance features in the *Advanced Buildings Benchmark*™, or other high performance features, can be included in a project if the proper planning and design commitments are made early on.

This section covers two subject areas:

1) **Four Keys to High Performance**—a high-level list of issues to consider when assessing financial impacts of high performance buildings.

2) **Financial Analysis of High Performance Buildings**—a more detailed discussion of four areas related to the financial analysis of building ownership: a) Discounted Cash Flow, b) Life Cycle Analysis, c) Modeling Income Property and d) Appraising High Performance.

Being knowledgeable and engaged in the owner's economic perspective and concerns will increase your firm's ability to make the business case for delivering a high performance building.

FOUR KEYS TO HIGH PERFORMANCE FINANCE

Getting the correct answer about whether a high performance building is going to deliver financially for a client requires that the proper questions are asked and the right information is input into the calculation. In the analysis of high performance, it is especially important that these four key factors are correctly addressed:

1) Include the *complete set* of expected benefits.

2) Do not overestimate the costs of high performance.

3) In the case of income property, correctly allocate costs and benefits between tenant and owner.

4) Make sure that an appraisal fairly represents the value of high performance.

KEY #1. INCLUDE THE *COMPLETE SET* OF EXPECTED BENEFITS.

The savings in energy costs are the most obvious financial benefit and are usually included in a high performance financial analysis. However, sometimes ONLY energy savings are included in the equation. This Guide discusses many other business benefits that need to be represented in the financial calculation whenever possible.

The variables in a financial model likely to be affected positively by pursuing a high performance design in an income-producing property include:

PHOTO COURTESY OF BOLDT, INC.

- General vacancy loss
- Marketing expenses
- Market rental rates
- Tenant improvements
- Leasing commissions
- Renewal profitability
- Months vacant
- Rent abatements
- Base years (expense stops) for new leases
- Capital expenditures reserve
- Operating expenses
- Insurance premiums
- Real estate taxes
- Capitalization rate

PHOTO COURTESY OF BOLDT, INC.

Design firms can establish in-house expertise on the financial variables affected by high performance. Using one of the financial analysis tools described in the Resources section, you can learn how to create a quick model that compares high performance to standard practice.

KEY #2. DO NOT OVERESTIMATE THE COSTS OF HIGH PERFORMANCE.

A high performance design path frequently can appear more expensive than it actually is. The anticipation of higher-than-actual costs could be due to a relative lack of experience or familiarity with products, suppliers or processes. As more and more buildings follow the high performance path, greater availability and knowledge of high performance system components are found in the industry at large. In many markets, there are several suppliers and contractors that can work with you to give you an accurate estimate of what the additional cost, or cost savings, will be in the bid for a high performance product.

At a June 2004 presentation on "The Economics of Green Building" in Portland, Oregon, presenter Tom Paladino of Paladino & Company asked approximately 40 architects and designers in attendance how many had built high performance or green buildings. Approximately 35 raised their hands. When asked how many got "extra budget" to do so, only three hands remained up.

The cost study by Davis Langdon Adamson referenced earlier in this Guide concludes, "There is no one-size-fits-all answer [on cost]. Each building is unique and should be considered as such when addressing costs and feasibility." The factors that influence potential costs for high performance building are complex and include:

- Demographic location
- Bidding climate and culture
- Local and regional design standards
- Intent and values of the project

- Climate
- Timing of implementation
- Size of building
- Synergies of measures
- Experience of the design team
- Dedication and involvement of the owner

Chasing the cost question leads to thinking of high performance as a below-the-line "add-on" and thus something that can be "cut off" later if construction costs exceed budget. In the absence of the right process and strong commitment, simply adding funds will not achieve a high performance building. If you keep the discussion focused on program goals, outcomes, benefits and total budget, the high performance features are more likely to be continually validated as a core part of the project.

Remember that incentives for high performance design and implementation can reduce the effective cost of these measures. These subsidies come from utilities, federal and state agencies, nonprofit organizations and other sources. (See the Resources section for a list of contacts.) Accurate costing of high performance requires that the anticipated incentive payments be included.

KEY #3. CORRECTLY ALLOCATE COSTS AND BENEFITS BETWEEN OWNER AND TENANT.

In the case of a high performance income property, a key question is the allocation of financial flows between parties and over time. Generally, the type of lease and its terms will determine those flows and their financial implications. In the "Income Property" section below, variations of leases and how to analyze their financial impact are discussed.

Although the percent of allocation of some benefits varies by lease type, keep in mind that there is no scenario where the owner does not receive gains from high performance design. For more information, see the matrix of benefits in this Guide's Introduction, as well as Section 3 (Beyond the Myths) and Section 4 (Benefits of Building High Performance).

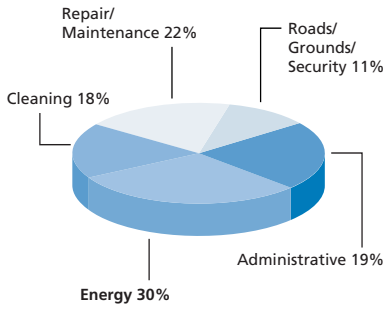
KEY #4. APPRAISALS MUST FAIRLY REPRESENT THE VALUE OF HIGH PERFORMANCE.

Owners of high performance buildings must not rely on industry averages for the inputs into a property appraisal. As a design team member, you can use the *Advanced Buildings* and ENERGY STAR resources (and others in this section and the Resources section that follows) to build the case that supports a higher valuation based on substantially lower energy costs, especially in the case of income-producing properties.

In income property, the building is the business, and utility costs can amount to 30 percent or more of total operating expenses. Any verifiable reduction in the owner's

ENERGY COSTS ARE TYPICALLY THE LARGEST OPERATING EXPENSES

AVERAGE SHARES OF TOTAL OPERATING COST
Average of Urban & Suburban
Non-Government U.S. Buildings



Source: 2002 BOMA Experience Exchange Report

(above and above right)
Jean Vollum Natural Capital Center, Portland, Oregon

Transforming an 1895 warehouse into contemporary office and retail space in the heart of a competitive commercial district included a comprehensive vision of the building as a marketplace for environmentally and socially responsible goods, services and ideas. The Natural Capital Center created inviting open central areas for the "community of tenants" and promoted the synergies of the building features, social values and tenant well being, comfort and productivity. The result was 100 percent pre-leased office space at above market rates during a period of high commercial vacancy in the city. Features of this 70,000 sq. ft. building include use of natural daylight through horizontal glazing and skylights, energy-efficient HVAC, operable windows and a green roof.

Photo courtesy of Mark Ohrenschall, Con.WEB

share of those operating expenses goes straight to NOI, which is directly factored into the calculation of appraised value. Even certain indirect benefits, such as improved tenant retention/attraction and higher base rents, are already incorporated into the NOI, so they too find their way into the appraisal calculation.

FINANCIAL ANALYSIS OF HIGH PERFORMANCE BUILDINGS

This section serves as a primer to help the design team and development team understand in greater depth some of the financial issues of special concern to the owners and developers of high performance projects. Your ability to present the financial case for high performance can be critical to obtaining an early commitment from the owner/developer to design and construct a high performance building.

The issues discussed in this section include:

- Discounted cash flow analysis
- Life cycle cost analysis
- Modeling income property
- Increased building value

DISCOUNTED CASH FLOW ANALYSIS

Discounted cash flow analysis is a fundamental technique for real estate investors. An investment recommendation will not be taken seriously unless the projected costs and benefits are expressed as cash outflows and inflows over time, each of which is "discounted back to Date 0," otherwise known as the "present value" or "PV."

Simply put, a discount rate is an interest percentage that equates the value of a dollar received one year in the future to its value today. For capital projects that span multiple years, discount rates must be compounded. For example, a cash flow with

an assumed discount rate of 10 percent that occurs two years in the future is divided by $(1 + 10\%)^2$ or 1.21, meaning that each dollar received at the end of Year 2 is equivalent to approximately $0.83 today.

The concept of discounting applies to both cash outflows and cash inflows, and a timeline must be created, showing each cash flow at the appropriate point along the timeline. Finally, the outflows and inflows for each year should be combined, so that each of those yearly totals can be reduced to present value, using the agreed upon discount rate and compounding where necessary.

Any discounted cash flow analysis for income properties should be done after each of the cash outflows and inflows have been allocated between the owner and tenants. Specifically, both the proposed capital expenditure and the projected savings must be allocated on a month-by-month, tenant-by-tenant, and common-area basis. Each amount must then be entered in the appropriate position on the project timeline.

In the case of expense-reducing renovations, any portions of the capital expenditure (Cap Ex) that can be passed through to the tenants should be reflected as cash inflows to the owner in the years in which they occur. Similarly, any portions of the Cap Ex that cannot be passed through to the tenants should be entered as cash outflows where appropriate on the timeline.

A discounted cash flow analysis for an income-producing property would be incomplete without considering any increase in property value that results if some of the efficiency improvement's annual savings accrue to the owner. A decrease in the owner's share of operating expenses typically boosts the property's net operating income (NOI). The higher NOI can support an increase in the appraised value of the property, which should be included as a cash inflow in the year in which the owner expects to sell or refinance the property.[11]

LIFE CYCLE COST ANALYSIS

Life cycle cost analysis (LCCA) offers an easy-to-understand and reliable platform for evaluating investment alternatives in a manner that considers all ownership costs. LCCA is well suited for evaluating design alternatives that feature different levels of efficiency and different initial costs; operation, maintenance and repair expenses; and service lives. This method can be used for any capital investment decision in which higher initial outlay is traded for future benefits. The ultimate purpose of life cycle costing is to provide decision-makers with information that more accurately portrays the costs and benefits of each project.

A life cycle cost analysis can include one-time amounts, such as planning/construction, capital replacement, major repair and disposal costs, and resale or salvage

PHOTO COURTESY OF CHRISTOPHER BARRETT OF HEDRICH BLESSING

PHOTO COURTESY OF CHRISTOPHER BARRETT OF HEDRICH BLESSING

[11] Reprinted with permission from *HPAC Engineering*. January 2003, M. Jewell article on Energy Efficiency Economics

DEP Office Building, California, Pennsylvania

This new 21,186 square foot building relies on significant daylighting strategies, an east-west solar orientation, a robust thermal envelope including insulated concrete forms along with high performance windows and an efficient HVAC system to reduce energy consumption by a projected 40 percent. Raised access flooring allows underfloor air delivery, occupant control, and flexible cabling and reconfiguration of spaces. Lighting power density averages less than 0.65 watts per square foot. Cooling capacity was reduced to 31 tons, equating to 632 SF per ton, or a 50 percent reduction!

Photo courtesy of L. Robert Kimball & Associates

value. Generally, it will also include annually recurring amounts, such as energy or routine operations and maintenance (O&M) costs. Another way to divide the relevant costs is by "investment-related costs" such as initial investment, cash incentives, capital replacement and residual value; and "operations-related costs" such as energy and O&M. Life cycle cost analysis is superior to simple payback period, which ignores capital replacement, residual value, life cycle utility costs and O&M costs.

There are a number of free or low cost tools for the simplified assessment of life cycle cost in commercial construction. The National Institute of Standards and Technology (NIST), the U.S. Environmental Protection Agency (EPA), and the U.S. Department of Energy (DOE) have developed some helpful tools. (See Resources for a list of websites offering LCCA tools.)

MODELING INCOME PROPERTY

The owner/developer commonly builds a discounted cash flow valuation model to evaluate the financial feasibility of a contemplated project and to qualify for financing. Industry-standard software packages, such as Argus® and DYNA®, perform those analyses in a way that tracks every lease and every assumption, including those relating to the time value of money.

For income properties, the life cycle costing, or cash flow valuation model, takes on two additional degrees of complexity:

1) The allocation of investments and returns between the owner and tenant, and

2) The time frame for developing, leasing, holding and disposing of the income property.

Addressing these issues is critical to accounting for the benefits of the high performance income property, and is discussed in more detail below.

KEY #1: DIVIDING THE COSTS AND SAVINGS

Leasing conventions vary widely on the topics of operating expense sharing and whether capital improvements that reduce operating expenses can be passed through to tenants.

There are three major subsets of leases in the U.S. office sector. Given the proper approach, energy efficiency—a key component of high performance—can be pursued profitably with all three. They are:

- **Net leases**, which require the tenant to pay for everything.
- **Gross leases**, which require the owner to pay for everything.
- **Fixed-base leases**, which require the owner to pay a certain amount of operating expenses (defined by a "base year" or "expense stop") and the tenant(s) to pay the rest.

PHOTO COURTESY OF JIM WESTPHALEN

Northern Power Office Building in Waitsfield, Vermont

Northern Power Systems (NPS), Waitsfield, Vermont, 30,000 sq.ft. office headquarters maximizes daylighting use and minimizes energy use. Dimming ballasts are controlled by photosensors to reduce lighting power in response to increased daylight levels.

Building envelope measures reduce heating and cooling loads. These included orientation along the solar meridian, external shading, upgraded insulation, triple-glazed windows, a low U-value "curtain wall" system and air sealing. The heating load fell from 875 MBh to 510 MBh (42 percent reduction) and the cooling load from 62 tons to 46 tons (26 percent reduction).

There are two keys to determining the true value of a proposed energy efficiency improvement in a commercial office building: 1) knowing how each lease divides the costs and savings between owner and tenant(s), and 2) knowing how the owner's share of savings affects both current and future returns.

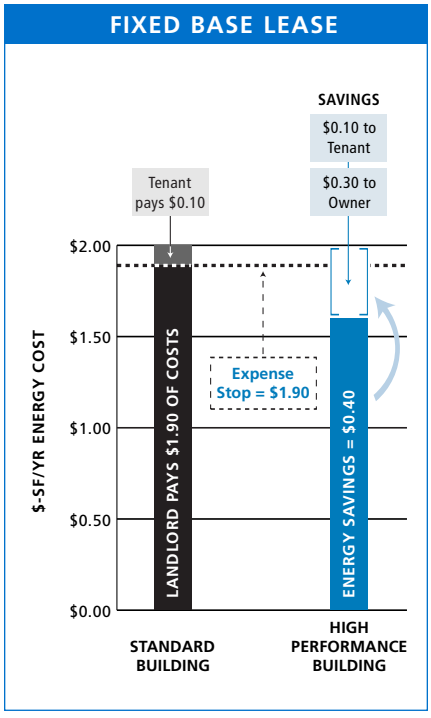
KEY #2: DECISION TIME FRAME

Income-property developers, lenders, brokers and other related stakeholders rarely look beyond a time frame of 10 or 15 years, which is less than half the life cycle of an average office building. Fortunately, in most cases, you needn't go beyond a few years to assemble a compelling case for high performance buildings. That is especially true for income properties, where profitability and asset value are based on a wide variety of assumptions such as occupancy levels, market rental rates, and the allocation of operating and capital expenses between owner and tenants.

Argus or DYNA can provide an excellent near-term framework to consider the incremental cash outflows and inflows involved with high performance buildings. Many developers fail to accurately assess, and provide lenders with, the financial impact of their high performance building. Changing model variables to reflect the incremental costs and benefits can quickly demonstrate to your client the profound difference in profitability between high performance and conventional design paths.

INCREASED BUILDING VALUE

The financial value of a commercial real estate asset can be increased due to the high performance features and design process adopted by the owner and design team. There is, however, a distinction between how that value is increased in an income-producing building versus an owner-occupied building.



In this Fixed Base Lease example, a standard office building with an expense stop of $1.90 was remodeled into a High Performance building. The savings benefit the landlord *and* the tenant.

In income-producing buildings, where the value is generally determined using the Income Approach to Appraisal—which takes the net operating income (NOI) and divides it by the capitalization rate—any decrease in the owner's share of operating expenses (energy, repairs and maintenance, etc.) should increase NOI, increasing appraised value in the process, assuming a stable capitalization rate. (This is because you're dividing a larger NOI number by the same Cap rate percentage.)

In owner-occupied buildings, the owner's own bottom line may be increased one or both of the following ways:

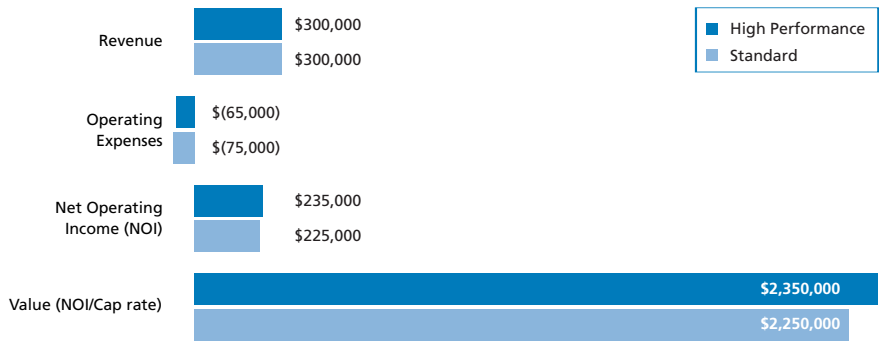
1) The building may be more valuable in that a potential buyer of that building would appreciate the prospect of lower operating costs, higher occupant comfort, etc., going forward.

2) The owner's reduced operating costs (and probable higher productivity, etc.) would improve his/her own business's bottom line (assuming that it's not a non-profit), which would make the business being operated in that building more valuable.

More specifically, if the business is publicly traded, higher earnings at a unchanged price/earnings multiple should imply higher share price. If it is a privately held company that is eventually sold for a multiple of EBITDA (earnings before interest, taxes, depreciation and amortization) it would command a higher sales price, since lower operating expenses and higher employee productivity should result in higher EBITDA.

In this latter case, it is the occupant's business that is becoming more valuable, in much the same way that the building would become more valuable as an NOI-producing asset in the income-property example. In many real estate scenarios one

APPRAISED VALUE AS A FUNCTION OF NET OPERATING INCOME



In this example, a 25,000 sq. ft. building produces revenue of $300,000. With $0.40 sq. ft. savings in operating expenses to the landlord, the high performance building reduces operating costs by $10,000 a year increasing the NOI by an equal amount. At a 10 percent Cap rate, the building value is increased by $100,000 in an income-approach appraisal.

Tomotherapy, Madison, Wisconsin

Through close coordination of the designer, the developer and the occupant, this 70,000 sq. ft. three-story office building was able to incorporate efficiency features often thought to increase the cost—without doing so!

The building maximizes use of daylighting by raising ceilings to 10 feet, controlling the window-to-wall ratio, and using a clerestory to allow natural light into central areas. Daylighting controls paired with an ambient/task lighting strategy using T-5 indirect lighting fixtures provide savings when the abundant natural light illuminates the space. High performance insulating glass was selected to control visible light transmittance and reduce solar heat gain. This resulted in a reduced cooling load that is provided by a system that uses a waterside economizer that operates without the use of a compressor.

High efficiency boilers, high efficiency motors on fans, pumps and chiller and an energy recovery wheel for heat exchange provides for an overall design strategy that is >20 percent more efficient than comparable buildings in the climate. Fixed outdoor air quantity independent of loads provides more fresh air and a healthier indoor environment for occupants.

Photo courtesy of Planning Design Associates/The Gialamas Company

might see a case where the landlord receives an income-property-style boost in his building's asset value, *and* tenant(s) enjoy a business-profitability-and-increased-business-value effect as a result of lower tenant operating costs, higher employee productivity, etc.

INFLUENCING APPRAISALS

Appraisers typically use more than one appraisal approach to arrive at a defensible valuation for a commercial property. There are three principal approaches to appraisal:

- Market or Comparison Approach
- Cost Approach
- Income Approach

Here we discuss income-producing office buildings, where the Income Approach is most commonly used for the appraisal. One of the appraiser's roles is to validate revenue and expense figures to derive a reliable estimate of net operating income. The NOI is divided by the appropriate capitalization rate to determine the value of that property to a real estate investor. As part of this process, the appraiser will likely investigate figures that appear to be unusually low or high. In the case of energy costs, appraisers often rely on financial statements, tax returns or other historical records obtained from the building owner.

In the absence of better information, the appraiser's solution might be to use a "standard" value from an industry-standard resource, such as BOMA's *Experience Exchange Report*. Although those data, by definition, represent average values and are not normalized for weather, occupant density, operating hours and other important variables, many appraisers consider them to be the handiest and most reliable information to use in a pinch.

Other information the appraiser might use to substantiate the energy line item for a property include equipment reference guides, multiple years of billing histories, design

REAL ESTATE PROS GET ON BOARD WITH HIGH PERFORMANCE

Real estate professionals are increasingly recognizing the importance of keeping their expertise up to date as the building industry shifts toward higher performance. The Appraisal Institute, in cooperation with ENERGY STAR® and the Institute for Market Transformation, has begun offering continuing education seminars for appraisers, real estate agents and CPAs on high performance, energy efficiency and commercial property valuation. For information, go to www.imt.org/Appraisers/PVcontEDUC.htm.

SAVING 30 PERCENT OF ENERGY COSTS CAN INCREASE NET OPERATING INCOME (NOI) BY ALMOST 6 PERCENT

IMPROVING ENERGY PERFORMANCE MAKES BUILDINGS:		
MORE COMPETITIVE	**MORE PROFITABLE**	**MORE VALUABLE**
• Lower occupancy costs • Enhanced comfort and productivity	• Better tenant retention and attraction • Lower vacancy rates result in higher rent revenue	• Higher rent revenue increases cash flow • Lower operating costs increase cash flow

simulation of building energy performance, normalized energy bills, or verification of energy efficient features (through visual inspection or an independent audit).

To maximize the valuation, the owner should provide the appraiser with an annotated accounting of the building's lower O&M expenses; a detailed list of special features such as access to daylight, superior HVAC and lighting systems and controls, and any other productivity-boosting features; and, if available, any special publicity that the building's unique design has generated. Prior to the building's start up, estimates of lower O&M expenses can be made using design-based energy simulations. Also, if providing the appraiser with data or analyses developed by project team members or other industry experts, include documentation about their expertise, such as:[12]

- Assurance of technical competence (e.g., professional license or other related training or experience)
- Assurance of legal responsibility for the contents of that analysis
- Assurance of coverage by professional liability insurance

Taking those additional steps will increase the likelihood that the appraiser will consider the additional input on energy costs to be authoritative and reliable enough to be incorporated into his or her appraisal calculations.

[12] Chao, M. and Parker, G., *Recognition of Energy Costs and Energy Performance in Commercial Property Valuation—Recommendations and Guidelines for Appraisers,* Institute for Market Transformation, December 2000

WILLIAM & FLORA HEWLETT FOUNDATION, MENLO PARK, CALIFORNIA

The Hewlett Foundation Building was designed to save energy and increase the comfort of occupants through individually controlled systems such as operable windows, localized manual floor diffusers, and natural light control throughout the workspace. The building's heating, ventilation, and air-conditioning system delivers fresh conditioned air via a highly efficient raised floor system. Ample daylight reduces the use of energy for lighting and contributes to an open interior atmosphere. Spectrally selective window glazing, motion sensors to shut down unnecessary lights when rooms are unoccupied, and photovoltaic panels on the roof all help the building exceed the already stringent California Title 24 energy efficiency standards by a projected 35 percent.

Photo courtesy of Wm. & Flora Hewlett Foundation

Advanced Buildings™

power your design

"With the Foundation's long-standing interest in the environment, our goal was to create a building that reflects our values by supporting the emerging green building industry and by providing a healthy and productive workplace."

Mary H. Jaffe, Director, The William and Flora Hewlett Foundation

INCENTIVES

- **U. S. Department of Energy (DOE), Financing Solutions & Incentives Office of Energy Efficiency and Renewable Energy (EERE)** provides links to useful resources about financing and incentives for energy efficiency and renewable energy projects. **eere.energy.gov/financing**
- **Database of State Incentives for Renewable Energy (DSIRE)** is a comprehensive source of information on state, local, utility and selected federal incentives that promote renewable energy. **dsireusa.org**
- **Rebate Administration—RealWinWin's Rebate Administration** is a success-fee-based service that performs all the steps necessary to find and capture dollars for your eligible projects. **realwinwin.com/rebateadmin.asp**
- **Your local utility**

FINANCIAL ANALYSIS TOOLS

- **Greening the Building Life Cycle** offers an extensive international listing of life-cycle-related tools and programs. **http://buildlca.rmit.edu.au/links.html**
- **DOE's Building Energy Software Tools Director** offers tools for building owners and designers to evaluate energy efficiency features. **eree.energy.gov/buildings/tools_directory/**
- **eVALUator** is an easy-to-use Windows™-based program that calculates the life-cycle benefits of investments that improve energy efficiency, employee productivity, and tenant satisfaction. **energydesignresources.com/resources/131**
- **Financial Value Calculator:** ENERGY STAR® has developed this calculator tool to enable you to quantify and communicate what improved energy performance is worth to your company. **http://208.254.22.6/ia/business/FVCv1_110201.xls**
- **QuikScope:** ENERGY STAR offers this site for property managers of existing buildings who are looking to make their properties more energy-efficient, profitable and valuable. **http://208.254.22.6/index.cfm?c=business.bus_quick_scope**
- **Portfolio Manager; ENERGY STAR** offers an environment for tracking energy performance and benchmarking buildings across your portfolio. **energystar.gov/index.cfm?c=evaluate_performance.bus_portfoliomanager**
- **NOI Builder®—RealWinWin's NOI Builder** is a fee-based service that performs a detailed analysis of proposed upgrades for their financial benefits for the owner. **realwinwin.com/noibuilder.asp**

PHOTO COURTESY OF WM. & FLORA HEWLETT FOUNDATION

EFFICIENCY AND GREEN BUILDING RESOURCES

- Alliance to Save Energy: ase.org
- American Council for an Energy Efficient Economy: aceee.org
- American Institute of Architects: aia.org
- American Society of Heating, Refrigerating and Air-Conditioning Engineers: ashrae.org
- Architectural Energy Corporation: archenergy.com
- BetterBricks: betterbricks.com
- Building Commissioning Association: bcxa.org
- Building Owners & Managers Association International: boma.org
- Center for Renewable Energy and Sustainable Technologies: crest.org

Thrivent Financial Bank, Appleton, Wisconsin

PHOTOS COURTESY OF POTTER LAWSON ARCHITECTS, INC.

- Daylighting Collaborative: daylighting.org
- Energy Center of Wisconsin: ecw.org
- ENERGY STAR—New Construction: energystar.gov/index.cfm?c=business.bus_index
- Environmental Building News: buildinggreen.com
- Environmental Design+Construction: edcmag.com
- Illuminating Engineering Society of North America: iesna.org
- National Association of State Energy Officials: naseo.org
- National Institute of Building Sciences: wbdg.org
- Natural Resources Defense Council: nrdc.org
- New Buildings Institute, Inc.: newbuildings.org
- Northeast Sustainable Energy Association: nesea.org
- Northwest Energy Efficiency Alliance: neea.org
- RealWinWin: realwinwin.com
- Rocky Mountain Institute: rmi.org
- Sustainable Buildings Industry Council: sbicouncil.org
- U.S. Green Building Council: usgbc.org
- U.S. DOE—Energy Efficiency and Renewable Energy: eere.energy.gov

ADVANCED BUILDINGS SPONSORS

Alliant Energy: **alliantenergy.com**

Burlington Electric: **burlingtonelectric.com**

California Energy Commission: **energy.ca.gov**

Efficiency Vermont: **efficiencyvermont.com**

Energy Center of Wisconsin: **ecw.org**

Energy Foundation: **ef.org**

Iowa Energy Center: **energy.iastate.edu**

Madison Gas and Electric: **mge.com**

National Grid, USA: **nationalgridus.com**

New York State Energy Research & Development Authority: **nyserda.org**

Northeast Energy Efficiency Partnerships: **neep.org**

Northwest Energy Efficiency Alliance: **nwalliance.org**

NSTAR: **nstaronline.com**

Southern California Edison: **sce.com**

U.S. Department of Energy: **energy.gov**

U.S. Environmental Protection Agency: **epa.gov**

Vermont Department of Public Service: **state.vt.us/psd**

Vermont Gas: **vermontgas.com**

WE Energies: **we-energies.com**

Wisconsin Department of Administration: **doa.state.wi.us**

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WHAT'S INSIDE THE ADVANCED BUILDINGS™ BENEFITS GUIDE

Creating High Performance. Discusses the characteristics of high performance buildings, design guidelines and rating systems, and the design process. Describes the Advanced Buildings project and resources that help designers, developers and owners create high performance commercial buildings.

Beyond the Myths. Discusses the issues associated with high performance office buildings, including myths and misperceptions about upfront costs, payback periods, energy efficiency improvements, company experience and risk.

Benefits of Building High Performance. Presents the business benefits of high performance office space, including energy savings, as well as non-energy benefits such as corporate productivity, occupant satisfaction, risk management and environmental stewardship.

Money Matters. Introduces the economics associated with high performance buildings, including approaches to evaluating the financial costs and benefits of high performance buildings, and building appraisals.

Resources. Lists where to find financial analysis tools, incentives and technical information on high performance buildings.