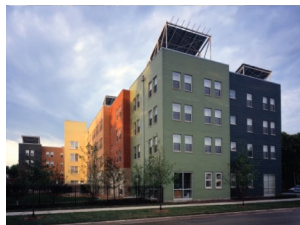
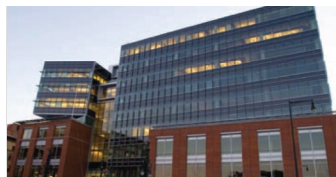


Removing Market Barriers to Green Development

Principles and action projects to promote widespread adoption of green development practices



Cover Images (clockwise from top left):

Aerial view of street incorporating natural drainage, Seattle, WA. This natural drainage pilot project was the first natural drainage system constructed by the City of Seattle. It was completed in the spring of 2001. Photo credit: Seattle Public Utilities

U.S. EPA Region 8 headquarter office, Denver, CO. The new Region 8 Headquarters, which is leased by EPA, features numerous environmentally friendly designs and systems. The Solicitation for Offers for the new facility included environmental provisions developed by the General Services Administration and EPA to ensure that the building promotes energy and water efficiency and uses environmentally preferable materials and design. Photo credit: U.S. EPA, Region 8

Hearst Tower, New York, NY. Completed in 2006, the 46-story Hearst headquarters floats above an existing six-storey Art Deco building and has a progressive environmental strategy—the tower was the first occupied commercial building in New York City to achieve a LEED gold rating. Photo credit: Nigel Young, Foster + Partners

Chicago Center for Green Technology, Chicago, IL. Chicago Green Tech is only the third building in the United States to be designed according to the LEED rating system using the highest standards of green technology available. It is the only one of the three that is a renovation of an existing building and the only one accessible by public transportation. Photo credit: City of Chicago

Anixter International distribution center, Alsip, IL. In 2007, this project became the first industrial-category building, and the second-largest building in Illinois to achieve LEED certification. The design earned certification points across thirteen sustainable criteria. Among them, the design utilizes a state-of-the-art energy management system and provides 100% natural light during daylight operations with a well-insulated roof that includes 150 skylights. Photo credit: AIA Northeast Illinois

Redevelopment of the South Waterfront district, Portland, OR. The South Waterfront is a new high-rise district under construction on former brownfield industrial land in the South Portland neighborhood south of Downtown Portland, Oregon. It is one of the largest urban redevelopment projects in the United States. SoWa is connected to downtown Portland by an extension of the Portland Streetcar. Photo credit: Portland Development Commission

Maplewood Raingarden street reconstruction, Maplewood, MN. In 1996, Maplewood installed its first rain garden to help manage stormwater. Today the city has over 450 home rain gardens and over 30 rain gardens on city land. Photo credit: City of Maplewood, MN

Wentworth Commons Apartments affordable housing, Chicago, IL. Located in the inner city urban community of Roseland, this 1.14-acre site provides 51 affordable rental apartments for 27 families and 24 single adults who are formerly homeless, disabled or economically poor. It is the first multi-unit residential building to receive LEED certification in the Midwest for sustainable, green design that promotes a healthier living and working environment. Photo credit: Mercy Housing Lakefront

Atlantic Station townhouses, Atlanta, GA. Atlantic Station is a LEED-qualified project on a former brownfield site with commercial and residential buildings. It is, at more than 130 acres, so big it has its own zip code. Eventually 10,000 people will live there. Photo: Atlantic Station

This report is available from the websites of the
Northeast-Midwest Institute and the Delta Institute:

<http://www.nemw.org>

<http://delta-institute.org>

U.S. EPA Region 5, December 2008.

Preface

Record fuel prices, soaring utility costs, and climate change impacts have sparked interest in sustainable development as a way to adapt to what many believe are indications of permanent economic and environmental changes. The direct impact these issues have on the health and budgets of Americans is causing many to reflect on their consumption, needs, and lifestyles, including where they live and work.

Buildings, of course, are where we live and work; in fact, a 2004 U.S. EPA study found that we spend over 90% of our time indoors. However, buildings do not exist in a vacuum, but are a part of their community where they are located. Development patterns in communities dictate transportation options and access, traffic patterns, and the environmental impact to our air, land, and water. Consequently, green buildings and sustainable development has emerged as components of the overall strategy to deal with the major environmental and resource issues we are facing today. For the purposes of this research initiative, we used the term “green development” to include site-specific green building strategies and community-wide sustainable planning and development practices.

While many of the ideas and technologies that green development promote have been around for years, market interest in these practices is a relatively recent trend. Whether this interest is attributable to an individual or organization’s concern for conservation, the environment, health, or economics, the market’s adoption of green development practices can provide benefits to the developers, the building occupants, and the surrounding community. In order to realize the benefits from green development, we must figure out how to remove barriers and facilitate the transition from interest to action.

McGraw-Hill Construction’s 2006 Green Building SmartMarket Report indicated that green buildings comprised approximately 2% of the U.S. construction market for both commercial and residential construction in 2005. The share of new construction starts is expected to grow to between 5% and 10% (of both commercial and residential) in 2010. While this growth is impressive, we should consider why a much greater proportion of construction and renovation is not being conducted in a green manner. This concern is especially relevant in light of some of the most urgent issues we are facing

including energy prices, climate change, and depletion of natural resources.

U.S. EPA Region 5 initiated a process to look at market barriers to green development practices, working with its partners the Northeast-Midwest Institute and the Delta Institute. This initiative grew out of EPA's brownfields experience, where we realized that specific adjustments to definitions or processes transformed the market for reusing environmentally impaired land. Similar to the lack of initial acceptance associated with brownfield redevelopment, we believe green development practices can gain wider market adoption if we can remove the barriers and make some key changes. In many ways, these efforts are converging as the focus of many brownfield redevelopment projects are evolving to include green buildings and sustainable redevelopment.

Our objective for the Market Barriers to Green Development initiative was to examine what current market dynamics inhibit mass adoption of these practices and what can and should be done to make green development the convention rather than the exception in the U.S. This report summarizes the experiences and ideas of our many participants and partners. The intended audience is professionals involved in all aspects of development and planning, as well as anyone who is interested in expanding adoption of green development practices in their community. We hope the ideas and action projects provides some food for thought as you seek ways to change the market for green development projects.

This document is divided into three sections. Section 1 provides an overview of the scope

and process of this project, findings from our first workshop to identify green development barriers, and a summary of green building principles. Section 2 delves deeper into each of the six principles and outlines recommended action projects to overcome the identified market barriers. Finally, Section 3 provides some thought about issues on the horizon and the next steps we should take to promote green development practices. The following summary documents from workshops related to the Market Barriers to Green Development initiative can be downloaded from the websites of the Northeast-Midwest Institute and the Delta Institute:

- *Identifying the Market Barriers to Green Development*, May 2007. This document provides further information on barriers identified during the first workshop.
- *Fostering Green Development Practices—Roles of the Public Sector*, February 2008. This document provides ideas and case studies of how the public sector can use projects to influence green development practices.
- *Using Incentives to Promote Green Building Practices*, July 2008. This document provides a summary of our working meeting to look at designing an incentive for affordable housing developers.

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1.1 Market Barriers to Green Development Initiative

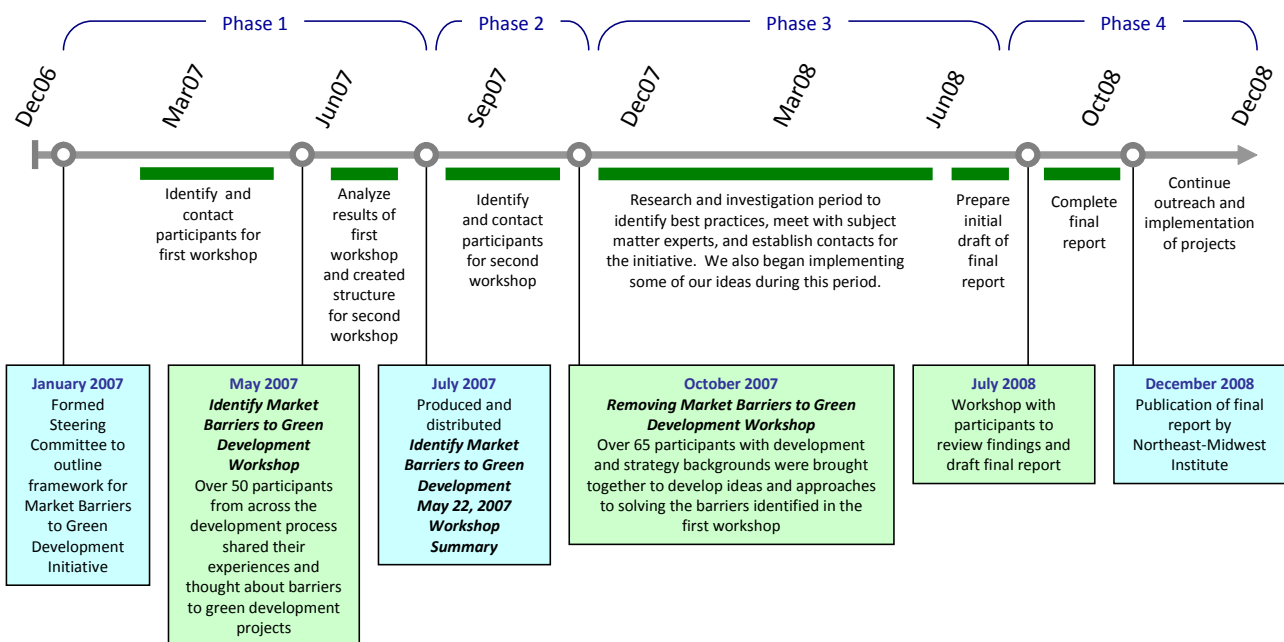
In late 2006, the U.S. Environmental Protection Agency's Region 5 assembled a steering committee to develop a process to identify and address market barriers to green development practices. The steering committee developed a process that involves the following four phases:

1. Identify the most significant market impediments to green development practices;
2. Develop strategies to eliminate/minimize targeted market barriers;
3. Research and begin to implement strategies to remove market barriers;

4. Communicate our findings and successes through white papers, reports, additional research, and outreach.

This report is the product of this process and examines how the market may intentionally or unintentionally create barriers to green development practices. This report will also offer ideas and recommendations for those who build, finance, and are in positions to approve or support green development in all our communities on how to eliminate these barriers to begin making green development the norm rather than the exception.

Market Barriers to Green Development Process



1.2 Defining green development

Buildings are a part of the environmental, economic, and social systems of communities and, as such, do not operate independent of their environment. How a building is designed and where it is located clearly affect the users of the building, the community, and the environment. However, even for those who don't live or work in a particular building, the impacts can be significant and can include traffic congestion, reduced street accessibility, and higher utility costs due to excessive use of energy and water. These are external costs that are borne by everyone. There are also global implications in how the built environment uses diminishing natural resources and how heavily it contributes to climate change. Therefore, green development strategies should examine impacts at the site, neighborhood, regional, and global levels. We strongly support the inclusion of the following strategies as part of green development: energy and water efficiency, reuse of materials and use of sustainable materials,

on-site stormwater management, healthy indoor air quality, building preservation and reuse, accessibility to public transportation options, infill and brownfield redevelopment, and smart growth principles.

Many developers and builders use third-party rating systems to help guide their projects. The rating systems typically focus on specific building types (residential, commercial, industrial), construction type (retrofit, interiors), or resources (energy, water) that help organize the various strategies that green building should include. At the U.S. EPA, we are actively engaged with these organizations and will continue to work with them to enhance their systems in future releases to incorporate feedback from this research initiative. However, this report does not address the relative merits of these various rating systems, focusing instead on the recognition of the value of green building approaches within the market.

1.3 The case for green development

A building's location, construction methods, and ongoing maintenance have major implications for the environment. Collectively, the impact the built environment has on our lives and environment is significant:

- Buildings accounted for 39.4 percent of total U.S. energy consumption in 2002. Residential buildings accounted for 54.6 percent of that total, while commercial buildings accounted for the other 45.4 percent;
- Buildings accounted for 67.9 percent of total U.S. electricity consumption in 2002. 51.2 percent of that total was attributed to residential building use, while 48.8 percent was attributed to commercial building usage;
- Buildings in the United States contribute 38.1 percent of the nation's total carbon dioxide emissions, including 20.6 percent from the residential sector and 17.5 percent from the commercial sector;
- On average, Americans spend about 90 percent or more of their time indoors. Indoor levels of pollutants may be two to five times higher, and occasionally more than 100 times higher, than outdoor levels;
- Building-related construction and demolition (C&D) debris totals approximately 136 million tons per year, accounting for nearly 60 percent of total non-industrial waste generation in the U.S. (1996);
- Building occupants use 12.2 percent of the total water consumed in the United States per day. Of that total, 25.6 percent is used by commercial building occupants, and 74.4 percent by homeowners (1995).¹

Addressing development, building, and transportation issues is fundamental to EPA's mission of protecting our environment. By employing green development strategies when constructing new buildings and roads, retrofitting existing buildings, and promoting sustainable redevelopment of brownfields and infill development, we can reduce energy use, conserve potable water, increase recycling, decrease use of raw materials, preserve natural systems, improve indoor air quality, and reduce greenhouse gas emissions.

The benefits of greening the built environment are considerable. For example, a recent study completed

¹ U.S. EPA Green Building Statistics. <http://www.epa.gov/greenbuilding/pubs/gbstats.pdf>

by the U.S. Green Building Council and the New Buildings Institute found that buildings constructed to LEED (Leadership in Energy and Environmental Design) standards are 25–30% more energy efficient than existing non-LEED buildings. Along the same lines, commercial buildings that have earned the Energy Star (a joint program of the U.S. EPA and U.S. Department of Energy) use nearly 40% less energy than average buildings and emit 35% less carbon dioxide into the atmosphere. EPA’s findings from the recent “Lifecycle Building Challenge” indicate that 27% of existing buildings will be replaced between 2000 and 2030, and that 50% of buildings in 2030 will have been built since 2000. This furthers the case for making green building and sustainable development projects an important focus area.

Although the EPA’s primary mission is environmental protection, green buildings affect our economy and society as well. On

a micro level, a CoStar study that looked at occupancy and rental rates for commercial buildings showed that LEED and Energy Star buildings command higher rental rates, have lower vacancy rates, and have higher resale value for the owners, proving that consumers understand the value of green buildings.² On a greater scale, green development has the potential to become an engine for economic regeneration. Green development practices provide an important pathway to a stronger green economy where unnecessary spending—on energy, long commutes, waste disposal, producing new products when recycled or reused ones are just as good, disaster relief from extreme weather events, and other problems caused by traditional development patterns—is minimized and resources are freed up to invest in education and new jobs, technologies, products, and services that support new frontiers in sustainable development.

2 CoStar Commercial Real Estate Information. <http://www.costar.com/partners/costar-green-study.pdf>

1.4

Framing the issue: Identifying market barriers to green development

On May 22, 2007, the first of two workshops to examine market barriers to green development was held in Chicago, IL. The goal for the first workshop was to identify and describe the most significant market barriers to green development practices. In order to achieve this goal, we brought together a select group of approximately 50 experts familiar with both conventional and green development projects. The participants included architects, attorneys, appraisers, bankers, brokers, developers, equity providers, owner/operators, and others directly involved in the real estate development process.

Many of the barriers identified during the first workshop, whether actual or perceived, can be attributed to multiple failings within the market to recognize the value of green development. We found that the overriding reasons for most barriers fell into one of five major categories listed below.

Knowledge gaps in green development quantification

One of the major barriers that participants cited is the need for reliable performance, cost, and benefit information of green features. Without this information, it is

difficult for the market to justify the occasionally higher up-front costs for a green development project. Quantification of energy savings, lower utility bills, building longevity, lower environmental impacts, increased occupant productivity, and the public health benefits of green developments over those that are conventionally built is required if green development is to move from a being a niche market to the norm for construction projects in the U.S.

Communication shortfall

Participants from the first workshop offered a range of thoughts that point to misconceptions and uncertainty about green development and failures in the communication chain regarding the benefits associated with such projects. Developers cite a lack of demand from consumers for such features. Consumers, especially in the residential sector, typically place higher value on amenities such as space or finishes over less visible features such as energy efficiency, and may do so because they lack an awareness of what alternatives exist or the range of benefits that could be realized from green properties. Those who oversee or facilitate the exchange of property from developer to occupants—brokers, appraisers, property search specialists—rarely

possess the data, tools, or knowledge necessary to convey the value of green features to buyers or tenants.

Ownership structure and operating cost responsibility

Ownership and standard lease structures determine who captures the benefits from green features, primarily in terms of associated cost savings. Unfortunately, the beneficiaries of cost savings are often not the decision makers in charge of design, improvement, and development decisions. There is little motivation for a developer to build or install energy-efficient, transit-friendly, or on-site storm water management features, some of which will only have benefits over the longer-term, if they will be selling the building immediately after completion of construction. Under typical short-term leases where the tenant is responsible for utilities, owners may not want to go through the hassles or costs of energy efficient system retrofits.

Funding issues

When evaluating projects, equity and secondary markets often use criteria that are geared more toward conventional developments rather than green developments. For example time horizons are usually not long enough to capture the benefits that accrue over time from up-front investments. Also, it may be difficult to “package” or sell mortgages for non-conventional projects for the secondary markets. Market conditions often make green

development projects more challenging from a risk and return point of view.

Industry and government standards used in project evaluation, especially as they relate to factors such as cost escalation assumptions, can determine whether projects are financially feasible. Many of these accepted assumptions need to be revisited to ensure that they are not unintentionally impeding green development by lengthening the payback period.

Risks and process issues

The lack of expertise and resources for green building in many communities often creates an environment that lengthens development time frames. In the public sector, approvals and permitting processes, many of which are not equipped to handle green construction, may cause delays. Building codes that were written for conventional developments often do not allow more environmentally friendly systems. Additionally, when people have fears about legal liability, they often default to rules that are in place and well-tested rather than adjusting them to meet the different requirements of green systems. In the private sector, the difficulty in identifying appropriate architects, construction firms, attorneys, construction materials, and other sources can also lengthen the project schedule. Delays often lead to greater risks and higher costs, which many developers would rather avoid given tight budgets and time frames. However, experienced developers also mentioned that up-front collaboration between the architect, developer, contractor, and the owner/tenant minimized complications.

1.5 Principles for removing market barriers to green development

Throughout this process, we have encountered many communities, organizations, and individuals who have managed to overcome market and other barriers to successfully promote and build green buildings. We have aggregated and augmented some of these ideas and put forth some of our own findings that we hope will bridge the access, knowledge, and process gaps that are preventing widespread adoption of green development practices today. The following section outlines some of these ideas. A detailed summary of these approaches can be found in subsequent sections.

Green Development Principle 1:

Applying the integrated design approach is essential to creating a superior green development.

Integrated design is a key component of successful green building projects. Using this approach, developers are able to improve the end result by ensuring all building systems work cooperatively in the most cost effective manner. However, the process can be further improved by involving other project stakeholders, especially those that are involved in appraising, financing,

and insuring the property, and by developing a common vocabulary to improve communication among all stakeholders.

- Use integrated design to maximize impact of green features
- Use integrated design to minimize overall green development cost
- Involve market representatives and municipal building officials at the beginning of the integrated design process
- Use integrated design as a risk mitigation strategy
- Don't use third-party rating systems as a substitute for integrated design

Green Development Principle 2:

Green building and infrastructure cost less than conventionally built structures over their lifetime.

The lack of access to knowledge and materials, especially in parts of the country where green building is lagging, imposes initial costs that can be deal-breakers for many developers. This problem is compounded since many of the benefits of green buildings are realized over the longer

term. However, even if an organization is able to overcome the issue of first cost versus long term cost, the budgeting, accounting, and incentive practices within many organizations are not designed to recognize green development benefits. In order to truly capture the benefits green development practices can provide, these processes need to be adjusted so as to address all the factors that affect an organization's and community's bottom line.

- Adopt integrated design as a cost savings strategy
- Include maintenance and operation expenses when comparing costs
- Include other green development benefits when determining overall costs

Green Development Principle 3:

Incentives can stimulate the adoption of green development practices.

Many communities have used incentives to promote green development practices. Incentives are not limited to providing monetary grants or tax breaks. Many process-type incentives have been embraced and used successfully throughout the U.S. In designing incentives, it is important to put together a program that motivates the type of behavior that would not have happened if the incentive was not available.

- Offset the “learning curve” in new markets with incentives
- Design incentives to motivate or change behavior
- Offer monetary or process oriented incentives based on what works best in the market

Green Development Principle 4:

Regulatory processes and codes can help to promote green development practices.

Public and government policies can heavily influence whether green developments get built. Existing codes and standards in many municipalities do not account and adjust for green features. In this sense, they can be a barrier to more widespread adoption of green developments. Codes and ordinances can also be used as a regulatory tool to encourage green development by setting clear criteria that developers need to meet.

- Adopt and align codes to meet environmental goals
- Use codes, ordinances, utility fees, and process improvements to encourage green development practices

Green Development Principle 5:

Building transactions and leasing agreements can be designed to accommodate green building.

The relationship among developers, owners, and tenants disconnects investment cost from benefits received. However, the building transaction and bidding processes can be adjusted to encourage green building development. On the lease side, agreements can be structured to motivate tenant behavior as well as provide opportunities for owners to invest in green features. A few organizations in the U.S. and Canada have developed model language that can serve as templates for creating these leases.

- Change bidding process to require green features
- Create model language for lease contracts that includes provisions for green practices

Green Development Principle 6:

The cost, benefits, and performance of green buildings must be documented and communicated to expand the market for green development.

The benefits of green development are often not tangible; they are only evident over the longer period with lower operating costs, healthier tenants, and a positive environmental and social impact on the surrounding community. Educating consumers and organizations should be a part of the strategy to increase adoption of green development practices. However, there should also be tools that help those that are directly involved in marketing these properties to be able to easily communicate

the benefits to their clients. Additionally, knowledge on green development techniques and features cannot stop with architects. To support green development, all professionals that are involved in the building trade, whether they are equity or loan providers, brokers, appraisers, construction companies, permit approvers, or operations and maintenance personnel, will need to be educated on the specific features, performance, and care that set green buildings apart from conventionally built ones. A few organizations have started this process, but education and training programs need to quickly ramp up to meet this growing need.

- Expand market data to specifically address the performance and value of green features
- Make collection of performance data a priority
- Use third-party rating systems to help consumers recognize the value of green buildings
- Extend green building education beyond architects

2.1

Green Development Principle 1:

Applying the integrated design approach is essential to creating a superior green development

Designing and constructing a green building requires a higher level of expertise and coordination than conventionally built structures. In addition to the goal of creating a functional space, green buildings must also focus on the efficient use of resources. To realize the synergies across different building features and functions, green building projects should always use an integrated design approach. While this approach can be applied to any project, it is particularly suited to creating

successful green developments that are cost competitive.

Use integrated design to maximize impact of green features

An integrated design approach requires that all stakeholders including designers, engineers, the construction team, environmental planners, and users are involved in the project and meet early in the development stages to address project goals, needs, and

Definition: Integrated Design

Integrated building design is a process in which multiple disciplines of design are integrated in a manner that permits synergistic benefits to be realized. The goal is to achieve high performance and multiple benefits at a lower cost than the sum of all the individual components. This process often includes integrating green design strategies into conventional design criteria for building form, function, performance, and cost. A key to successful integrated building design is the participation of people from different specialties of design: general architecture, HVAC, lighting and electrical, interior design, and landscape design. By working together at key points in the design process, these participants can often identify highly attractive solutions to design needs that would otherwise not be found. In an integrated design approach, the mechanical engineer will calculate energy use and cost very early in the design, informing designers of the energy-use implications of building orientation, configuration, fenestration, mechanical systems, and lighting options.

Designing, constructing, or renovating high-performance buildings requires a whole building approach. This approach differs from the traditional design/build process, as the design team examines the integration of all building components and systems and determines how they best work together to save energy and reduce environmental impact.

Source: Department of Energy

potential barriers. Bringing all stakeholders together early in the process allows the project team to take a “whole building approach,” which is central to the concept of integrated design. The whole building approach allows the project team to make a highly effective analysis of the project and to leverage synergies between various building functions and site characteristics. An example of this is orienting a building within a site to maximize natural light. This reduces the total need for artificial light and cooling capacity of the HVAC, therefore reducing the overall electrical load capacity required. Anticipating such features and including them in the design is the best way to create a successful green development while reducing the overall cost of the project.

The integrated design approach can also be used to avoid “over design”. Over design of buildings will add additional costs for features that are unnecessary or are already taken care of by natural environmental factors or parts of other systems in the building.

Table 1 compares the conventional design process with the integrated design process.

Use integrated design to minimize overall green development cost

Using an integrated design approach can minimize green building cost through all phases of a building’s lifecycle. Using this approach early in the concept phases of a green development can organize priorities to align with a project’s budget. During the design and construction phase it can help avoid cost overruns, minimize delays, and decrease change orders during construction. Finally, it can streamline operations and

Over-designing for Energy: A Historical Perspective

According to Alan Whitson of Corporate Realty Design and Management in Portland, Oregon, one of the most wasteful features in buildings today is the oversized electrical capacity. Buildings in the 1980’s found their electrical systems overwhelmed by the increase in electrical office equipment such as the desk-top computer, as well as the fax and copier machines. Upgrades to building mechanical and electrical systems to meet the increased demand proliferated. The building design community continued to design with this increased demand in mind, while at the same time the technology industry was making strides to reduce the power consumption of their products. In 1993, the EPA Energy Star program helped encourage the development of the sleep mode, further decreasing total power need. However the building industry has yet to catch-up with these strides in energy savings. Designers and engineers are not the only ones at fault; tenants looking for new space often rely on the rule of thumb number requirement of 4 to 6 watts of plug load capacity per square foot, when in reality most tenants need only under 2 watts plug load capacity per square foot.

Sources:

Whitson, Alan. “Oversized System Hampers Ability to Control Utility Costs.” *Business Xpansion*, February 2002.

Klein, Sarah. “The Green Behind Green.” *Crain’s Chicago Business*, October 2006.

maintenance of the building in the post-occupancy phase as well as provide lower utility and maintenance costs because of its superior design from the onset.

Involve market representatives and municipal building officials at the beginning of the integrated design process

A well-designed green building benefits from full recognition of its features as well

Table 1: Comparison of Conventional vs. Integrated Design Process

CONVENTIONAL DESIGN PROCESS	INTEGRATED DESIGN PROCESS
Involves team members only when essential	Inclusive from the outset
Less time, energy, and collaboration exhibited in early stages	Front-loaded time and energy invested early
More decisions made by fewer people	Decisions influenced by broad team
Linear process	Iterative process
Systems often considered in isolation	Whole-systems thinking
Limited or constrained optimization	Allows for full optimization
Diminished opportunity for synergies	Maximizes synergies
Emphasis on up-front costs	Life-cycle costing
Typically finished when construction is complete	Process continues through post-occupancy
Higher potential for cost overruns, delays, and change orders	Change orders are minimized due to early planning/iterative process

Revised from Busby, Perkins + Will and Stantec Consulting. "Roadmap for the Integrated Design Process."

as a smooth approval process from the local planning or buildings department. While it is crucial for all members of the integrated design team to share their knowledge and work together to ensure that the systems they put in place are complementary, it is also important to include market representatives and municipal building department officials who may financially support or approve the project. Market representatives such as

lenders, equity providers, brokers, appraisers, or insurers who are educated about a green building project can better market, value, finance, and insure the development. Working with the building department early on can make the approval process go smoothly or may offer perks or incentives that are exclusive to green development projects, such as expedited permitting or dedicated green project coordinators.

Definition: Building Information Modeling

Building Information Modeling (BIM) is an emerging technology, with the potential to support and streamline the integrated design process. BIM is a software tool that allows building professionals from divergent fields to better understand how changes in one building system will affect other building systems by creating electronic models to simulate these effects. This powerful tool can support the green building movement, the integrated design process, as well as lead to a greater understanding of a whole building approach. Using BIM in conjunction with cost modeling for green buildings may go a long way in making the case that green buildings can prove cost-effective. An initiative to train technicians in the use of BIM with a focus on green features and systems could accelerate the pace with which green buildings benefits are understood and adopted.

Source:
Sustainable Buildings Industry Council. "Whole Building: Route to High Performance." Building Operating Management. February 2007. <http://www.facilitiesnet.com/BOM/article.asp?id=6094>

Use integrated design as a risk mitigation strategy

An unfortunate consequence of the increase in green building projects is the corresponding rise in performance related liability issues. In a report by Marsh, a broker and risk management firm, the scope of risks and concerns over building green generally include failure to achieve a desired LEED certification, failure to deliver expected energy savings performance, improper installation of new products or faulty design issues, and delays from lack of green product availability.

Insurance companies are monitoring these developments to determine how they can

offer coverage to their clients. However, insurance coverage should never be the sole tool used to manage risk. A risk management plan should include multiple strategies, regardless of whether the project is a green development or a conventional one. An obvious rule is to not over promise what can be delivered—including a specified certification or exact utility savings. Communication and contractual language can help manage expectations. Using the integrated design approach can also be a powerful tool to understand client needs and requirements, evaluate and correct design flaws, determine proper green material usage and installation, and foster communication among all stakeholders. Having a better designed plan and process may also be

Case Study: Savings By Design—An incentive to help fund integrated design

Utility providers are also seeing the need to promote the more responsible use of energy to avoid energy shortages in the long term. California provides an example of a statewide utility effort to encourage building energy efficiency.

Savings By Design is a California utility-sponsored program to encourage high performance nonresidential building design and construction. The program promotes energy-efficient building design and construction practices by offering up-front design assistance as well as owner and design team financial incentives based on project performance.

- Design Assistance is offered to any projects and works to suit the needs of the project. Either a whole building approach, or the systems approach is used depending on the scope of the project and the stage during which assistance is sought.
- Owner Incentive is awarded for projects using either the whole building or the systems approach and which meet the minimum energy efficiency thresholds, generally 10% better than California's Title 24 standards. The maximum owner incentive per project is \$150,000.
- Design Incentive is awarded for projects using the whole building approach and a building energy modeling simulation. Qualifying projects must meet minimum energy thresholds, generally 15% better than California's Title 24 standards. The design incentive is calculated at one third of the owner incentive to a maximum of \$50,000

California's four largest utilities participate in the Savings By Design program: Pacific Gas and Electric Company, San Diego Gas and Electric, Southern California Gas and Electric, and Sacramento Municipal Utility District.

Sources:

<http://www.savingsbydesign.com>

<http://www.energydesignresouces.com> for case studies of projects that have used the Savings By Design program

favorably viewed by financing institutions and insurers.

Don't use third-party rating systems as a substitute for integrated design

Third-party rating systems, such as the USGBC's LEED, the Green Building Initiative's (GBI) Green Globes, and Energy Star provide useful frameworks for implementing strategies towards making developments greener. However, as some

developers and owners have realized, using these systems as checklists to obtain a desired certification level will not necessarily produce a high-performing building. Critics of third-party rating systems cite this flaw in such systems as contributing to the stock of buildings that are green in label only.^{3,4} While it is possible to put together various elements that will allow a building to be certified "green", many of the benefits associated with integrated design may not be realized.

Case Study: Chicago's Center for Neighborhood Technology

Chicago's Center for Neighborhood Technology is one of the first LEED certified renovations of an existing building. CNT's staff and design team documented their integrated design process. An integrated and informed team worked closely together throughout all the phases of the project; the team wrote a joint mission statement which formed the center of all design discussions.

Find out more about CNT's integrated design process at : http://www.wbdg.org/references/cs_cnt.php

3 Malin, Nadav, "Lies, Damn Lies, and... (Another Look at LEED Energy Efficiency)". BuildingGreen.com. September 2, 2008.

4 Gifford, Henry, "A Better Way to Rate Green Buildings". EnergySavingsScience.com. 2008.

RECOMMENDED ACTION PROJECTS

Expand integrated design discussions to include market representatives such as appraisers, funders, insurers, and other support resources

Market representatives may not contribute to the green design process, but their understanding of the design and process specifications can help provide the proper valuation and funding for the project. Municipal contacts can assist with code, regulatory, and incentive issues, as well as provide resources based on their experience with other projects. It is in the best interest for the development team to start working with these agencies early in the process.

Incorporate Building Information Modeling (BIM), which uses multidimensional, real-time, dynamic modeling software, to gather building data to decrease wasted time and resources during the design and construction phases

Advanced modeling tools allow simulation of proposed designs and systems before any construction takes place and should be used by the design team as part of the integrated design approach. For complex development projects, this can be invaluable in creating the best possible design, as well as save time and expenses by avoiding change orders.

Create and use a common glossary to facilitate project comprehension across various professions

Different professions have different terms for communicating their specifications and needs. When working with any large design team that involve those outside of your immediate profession, it is useful to have a common lexicon to speed understanding and avoid miscommunication.

Develop funding mechanisms which address up front integrated design costs

Financing loans for green building projects have generally proceeded without incident because lenders regard a better-designed and well thought out project favorably. Where there is a funding gap is in the initial integrated design process. Integrated design has primarily been funded internally by owners or companies with custom developments, or funded by grants such as those offered by Enterprise Community Partners for green affordable housing and Savings by Design. However, inclusion of integrated design into standard practice will not occur without easy access through mainstream funding organizations such as lending institutions or local governments. Grants, low interest loans, or other financial tools can help bridge the difference between the cost of activities under an integrated design approach vs. a conventional process that may just involve an architect or designer. These activities may include conducting charrettes, modeling building systems, and establishing periodic stakeholder meetings.

2.2

Green Development Principle 2:

Green building and infrastructure cost less than conventionally built structures over their lifetime

Initial investment cost is often cited as a major barrier towards widespread adoption of green development. A common practice to determine the costs between a conventional development and a green project is to aggregate the costs of all the comparable features. Using this methodology, it is not surprising that green developments are usually the more expensive option, given that premiums are often charged for newer products and services. However, such comparisons are flawed because they do not consider that green building

projects need to follow a more integrated design and construction process than what is typically required by conventional developments. Additionally, the most significant benefits associated with green developments, including external impacts on the community, are usually not realized until post construction. Recognizing these additional benefits and using full-cost accounting procedures provides a more fair assessment, as building expenses are never limited to just initial material and service costs.

Definition: Full Cost Accounting

Full cost accounting takes into consideration the implications of social, environmental and economic costs associated with any project. Often the social and environmental costs of decisions are not reflected properly in the monetary price paid for a decision. These externalized costs, however, are still incurred and paid for by everyone including those with no involvement in a project. If environmental regulation increases, many external costs will be internalized, and often at higher costs than if they had been avoided initially. Taking full costs into consideration can help development teams understand potential future vulnerabilities and anticipate costs or problems.

Adopt integrated design as a cost savings strategy

Adoption of an integrated design and whole building approach to green building capitalizes on concepts that will lower overall building costs including:

- Promotion of synergies between building systems that may minimize or eliminate the need for certain building features;
- Early incorporation and modeling of design features that may minimize change orders during;

later stages, where costs may be much higher;

- Production of a more efficient, durable structure, which will lower long term operating and replacement costs; and
- Using a commissioning agent to help verify the building's systems are performing correctly before occupancy.

Include maintenance and operation expenses when comparing costs

The perception that initial costs are higher may at least be partly due to the inaccessibility to green development knowledge, materials, and contractors. This is especially true in certain markets across the U.S., where a critical base of providers has not surfaced to meet this need. As green building service providers and products become more commonplace, the expertise premium for soft costs should decline and cost differential should narrow, much as it does for any emerging industry. Capital E's Green Building Costs and Financial Benefits study by Gregory Kats in 2003 showed that between 1995 and 2000, the premium to build a LEED Silver building dropped from 3–4% to 1–2% in Portland, Oregon and from 2% to no premium at all in Seattle, Washington. Follow-up studies in 2004 and 2007 by Davis Langdon, a construction consultancy, disproved the notion that greener buildings necessarily mean higher costs. Analyzing only the construction costs, both studies found that “there is no significant difference in average cost for green buildings as compared to non-green buildings.”⁵

Definition: Commissioning

“Commissioning is an up-front cost where a commissioning agent verifies that the building's systems are performing correctly before occupancy. Commissioning will help to reveal equipment problems early on, usually before one-year warranties are up, thus preventing long-term unknown problems for the life of the building. In return, the expenditure here ultimately results in savings on utility and maintenance costs during building operations.”

Southface. “Life Cycle Economics”
<http://www.southfaceonlinetraining.org/ecobenefits/>

Obviously, the specific systems that are used for a building will make a difference. It is also important to keep in mind that regional, and perhaps even local, capacity may offer better insight into the initial cost differential. Municipalities that have professionals with experience in the green development field and easy access to green contractors, knowledge, and materials will find the costs for green development to be more competitive.

Initial costs aside, the benefits of green buildings are most evident over the longer term, where a better designed and built structure can save the owner and tenants on operating and maintenance costs. The 2003 Kats study reports that “the total financial benefits of green buildings are over ten times the average initial investment required to design and construct a green building.”⁶ As with any long term purchase or investment that has an ongoing cost component—and a building definitely fits in this category—a more reasonable comparison of value will include the maintenance and operating costs.

5 Matthiessen, Lisa Fay and Morris, Peter, “Cost of Green Revisited.” Davis Langdon, July 2007

6 Kats, Gregory H., “Green Building Costs and Financial Benefits.” Massachusetts Technology Collaborative, 2003..

Include other green development benefits when determining overall costs

While lower maintenance and operation costs remain one of the key selling points of green buildings, there are also other benefits that should be factored into the overall cost. These include:

Higher occupancy, rental rates, and sales prices

A recent study by the CoStar Group, a real-estate information organization, found that buildings that are LEED or Energy Star certified had higher occupancy rates, rental rates, and sales prices than their conventionally built counterparts.⁷ This information is summarized in Table 2.

While there are differing opinions regarding the reliability of the CoStar Study,⁸ it does offer initial encouragement that the market values LEED or Energy Star buildings more highly. Developers, appraisers, and financial institutions should consider this information when assessing a development's potential market viability and risk.

Question the assumptions contained in escalation standards used for investment decisions

Return on investment (ROI) and other financial calculations are useful in capturing the longer term benefits that green buildings provide. However, as with any evaluation that involves estimating future costs or earnings based on historical information, the trend may not hold. Particular to green development projects are estimates for standards such as the anticipated annual increase in energy rates. While these standards are created by governments, organizations, or agencies to provide a rule of thumb, they may be outdated or may not truly reflect current market rates. By underestimating what energy, fuel, water, and other natural resources may be priced at in the future, the calculated return on investment period may be much longer than reality. This can affect a developer's decision to forgo including green features in favor of a cheaper alternative if the anticipated holding period for the property is shorter than the calculated return on investment period. It is important to examine the standards of escalation used to see if it is grounded in the most current market information.

Table 2: National Averages for Green and Non-Green Buildings

Rental and Occupancy Rates	Energy Star	Non-Energy Star	LEED	Non-LEED
2006 Occupancy Rates	90.0%	86.9%	91.1%	88.3%
2008 Occupancy Rates	91.5%	87.9%	92%	87.9%
2006 Rental Rates (p/sqft)	\$26.33	\$24.69	\$33.69	\$27.03
2008 Rental Rates (p/sqft)	\$30.55	\$28.15	\$42.38	\$31.05

Source: CoStar. <http://www.costar.com/partners/costar-green-study.pdf>

⁷ CoStar Commercial Real Estate Information. <http://www.costar.com/partners/costar-green-study.pdf>

⁸ Green Building Finance Consortium, "Quantifying "Green" Value: Assessing the Applicability of the CoStar Studies," June 2008.

Financial risks of not building green

Early adopters of green development technologies or methods may incur risks that may be avoidable with conventional practices. However, there are also risks associated with not building green that developers and property owners should consider, especially as buildings are long term investments that are not easily or cheaply replaced. These include:

- Obsolescence and changing market conditions can easily make developments fall out of favor with consumers. The property market collapse and recent spike in energy and oil prices has led to an equally dramatic downturn in demand for housing in far suburbs and large, fuel-guzzling automobiles;
- Effects of escalating costs for natural resources and utilities will be exacerbated for owners and tenants who are more dependent on usage to operate their properties. Those who use these resources more efficiently may still feel the effects of such changes, but at a more manageable rate; and
- Changing environmental regulation, including climate change policies, may necessitate retrofits to accommodate new guidelines to avoid penalties and fines. Redesigning and constructing existing space and features for new standards will be more difficult than incorporating these ideas initially.

It is important to weigh the potential risks and costs of not building green as they can likely affect a property's financial viability and should be taken into account when calculating the cost of a potential development.

Definition: Life-Cycle Cost Analysis Tool

Life-Cycle Cost Analysis (LCCA) is a tool for evaluating investments in the design of a building or the building's systems in order to determine economic performance over a lifetime. The analysis includes a comprehensive assessment of a building's lifecycle costs from the cradle to the grave including:

Initial costs:

- Planning
- Research and development
- Design and construction

Maintenance costs:

- Repair
- Replacement

Operation:

- Energy costs
- Water costs

Production

Other significant costs over the life of the facility, such as disposal or salvage

LCCA involves the calculation of all costs associated over the building's life span, and accounts for product value and replacement over time. It is also used to evaluate reduced costs and savings associated with an initial investment in design strategy or product that has contributed to that savings during building operations, maintenance, and disposal. For high performance buildings, it is an invaluable method for determining the overall economic gains of implementing certain design strategies that can pay for themselves over the life of the building. It can also help determine when those paybacks will occur.

The LCCA is required for all federal building and retrofit projects.

Source: Southface. "Life Cycle Economics"
<http://www.southfaceonlinetraining.org/ecobenefits>

Indirect costs and benefits

Indirect costs and benefits should also be looked at when determining the costs of building projects. The following are some aspects to consider:

- Development projects that consider their access to various forms of transportation, its on-site stormwater management, and its usage of municipal resources will reduce their environmental footprint on the site and the surrounding community,
- Infill and high-density developments minimize the need for new investment in infrastructure including roads and utilities. The initial and longer-term maintenance costs should be a serious consideration for municipalities permitting developments on greenfields and virgin land;

thus lowering the clean-up and replacement costs caused by flooding on the community;

Case Study: Capital Markets Partnership Adopt “Green Underwriting” Standards that Recognize the Value of Green Developments

There are usually barriers to financing green buildings in that lenders and underwriters tend to focus on initial capital costs and may not recognize the principal bottom-line enhancements that can be attributed to green buildings: operating cost savings, lower risks, and long-term enhancement of the property’s value.

The 70-plus member Capital Markets Partnership recently adopted “green underwriting” standards that allow lenders and real estate investors to account for these factors through a standardized quantitative rating system. According to Evolution Partners (the authors of the proposal), properties would be “assigned “CMP Green Score” from 0-100 based on the presence or absence of financially tangible criteria that influence the asset’s financial, operational, and market-risk profile.” The Green Score will be an overlay relative to current underwriting standards, and would take the following criteria into account:

- Asset features that lead to energy and water efficiency thus reducing current operating costs while also insulating tenants from future energy and water price volatility;
- Location-based attributes that affect a tenant’s commuting patterns and/or carbon footprint (gives credit for proximity to transit, density and connectivity/mixing uses); and
- Improved indoor environmental quality that can lead to increased rents, and reduced risk and liability exposure.

By rating these greening factors, lenders and underwriters can then assess bottom-line impacts, including:

- Higher rents and lower operating costs;
- Improved long-term asset value/reduced obsolescence; and
- Reduced default risk due to increased revenue potential, reduced operating expenses, exposure to energy price volatility, and base risk exposure from IAQ and mold.

The green underwriting standard was developed using ANSI-approved consensus protocols. The standard was finalized and unanimously approved in early September 2008 and is anticipated to be operational by December 2008.

Source: <http://www.capitalmarketpartnership.com/>

- As Americans spend a majority of their time indoors, better indoor air quality and environments may decrease absenteeism and improve productivity; and
- Being an environmental steward offers positive public relations.

RECOMMENDED ACTION PROJECTS

Adjust budgeting and accounting practices to ensure alignment with long-term costs and benefits

Disconnects within an organization's budgeting, accounting, and reward system may mask the most efficient decision on real estate transactions. An example of this may be that a corporate real estate department's goal is to find the best space at the lowest cost. However, without consulting other internal operations, that particular space may negatively impact areas such as maintenance and operation costs. Beyond reforming budgeting and accounting practices, indirect benefits such as occupant wellness, productivity, and satisfaction will also affect the overall value and attractiveness of a space. It is in the company's financial interest to account for their costs and benefits across the organization as a whole. As many organizations have realized, the expenses associated with these issues will affect the bottom line and may change the overall costs picture of competing properties. This approach should also be taught as part of the curriculum in our schools so that future business leaders will be familiar with full cost accounting concepts.

Acquire comprehensive post-occupancy data for financial benefits in order to develop cost models that are sensitive to indirect benefits and account for lifetime costs

Quantification of the benefits from green buildings, including information tied to specific features and information related to other indirect benefits such as health, can help promote more widespread adoption of green development projects and direct attention to particular research and investment gaps. Universities and organizations involved in green building can work with owners and operators to collect and disseminate this information.

Create a common reporting practice and metrics for case studies, which will allow comparable financial evaluations of green building

Data collection and evaluation is only useful if the consumers and users of this data can understand their measurement. With multiple sources of data, it is difficult to discern which numbers are reliable and trustworthy. This issue was one of the barriers identified in our workshop. Regardless of certification systems, the administrators for these systems, governments, and building owners and operators need to collaborate and agree to a common reporting practice and metrics for green buildings.

2.3

Green Development Principle 3:

Incentives can stimulate the adoption of green development practices

Higher up-front costs, lack of knowledge, or potential risks are often cited as reasons developers might reject green development practices. To overcome these barriers, governments—primarily on the local or state level—have offered incentives as a way to minimize or eliminate costs or issues related to their adoption. However, incentives should never be treated as “giveaways,” but rather as tools to motivate a desired behavior or outcome that would not have happened if the incentive was not available. Incentives can be used to generate interest, bridge knowledge gaps, and encourage green building practices over conventional ones.

Offset the “learning curve” in new markets with incentives

In new markets where the knowledge base and services for green development projects have not been established, incentives can be used to ease the initial cost differential or difficulty factor. Incentives can also be added to fund integrated design or bring in expertise for consultation. Additionally, a well-advertised or marketed incentive can bring positive publicity to such practices, offering developers an alternate design where they and the community may

both benefit. Incremental adoption of green projects will expand the knowledge base and services offered in the community.

Design incentives to motivate or change behavior

Incentives should be used to promote specific behavior that may not have occurred if the incentive was not available. It is important to design incentives as contracts, where dates, dollar amounts, or services are clearly presented, but also to make sure they are attractive and easy to use. Incentives do not need to be created from scratch; existing programs can be restructured to favor or require green or sustainable designs. Existing programs such as Tax Increment Financing (TIF) Districts, Community Development Block Grant (CDBG), Congestion Mitigation, and Air Quality (CMAQ) Improvement Program can all be further expanded to include provisions requiring green development.

An alternate way to promote green or sustainable practices is to tie them to economic or community development incentives. Public finance mechanisms can be used to subsidize private investment and

Case Study:

Iowa Provides Additional Tax Credits for Green Development in Brownfields & Grayfields

On May 15, 2008, Iowa Governor Chet Culver signed HF 2687 which provides tax credits for redevelopment of brownfields (24–30%) and grayfields (12–15%) of qualified total investment costs. The higher percentages are for sites that meet green development standards.

Source: Iowa House File 2687 (signed 5/15/2008)

promote a certain type of development. For example, a municipality can make location within walking distance to a rail station or transit stop a criterion for obtaining an economic development incentive. Linking green development requirements or incentives with existing incentives, such as those offered through brownfield redevelopment grants, can also be effective. Planning and development practitioners have an opportunity to simultaneously achieve multiple goals of business or community needs while enhancing environmental objectives.

Periodic evaluations of program effectiveness is required to determine if changes need to be made to the incentive or whether it is meeting expectations. To encourage use of the incentive, a counter requirement can be set up to eliminate codes and subsidies that support unsustainable behavior and practices. Incentives are generally most effective on the local level where they can be designed to meet local or regional environmental needs and standards. However, state or federal guidelines can also be used to set a minimum standard that local municipalities can build upon.

U.S. EPA Region 5 convened a meeting on July 31, 2008 to examine parameters to consider when creating financial incentives. This meeting was primarily focused on the affordable housing market, but many of the ideas are applicable to developments in general. The proceedings for this meeting are available for download from the websites of the Northeast-Midwest Institute and the Delta Institute.

Offer monetary or process oriented incentives based on what works best in the market

Incentives can be designed as a financial, time-saving, or regulatory benefit. Monetary incentives include tax breaks, grants, vouchers, and rebates. Non-monetary incentives include technical assistance, business planning assistance, marketing assistance, expedited permitting, regulatory relief, preferred loans, guarantee programs, and dedicated green management teams in building and planning departments.

Monetary incentives can offset any cost differential or provide savings for choosing green development over conventional development, making the adaptation to green development more feasible for property owners and developers.

By providing sales tax exemptions and property tax exemptions, the government either partially or wholly offsets the cost of purchasing, creating, installing, and building new green technologies. It is important to structure applicable exemptions prior to the investment to prevent the owner's property tax from increasing due to the improvement.

Other options for sharing the cost of green development practices include using vouchers, rebates, and grants. A voucher is a check for credit against future expenditures. A rebate is a credit for expenditures made in the past. A grant is a monetary gift, often used in a specific manner. These three monetary tools can be used to offset the cost of developers or property owners who are learning how to build green, or who are literally calculating the difference between conventional and green technologies in order to properly finance their projects. Furthermore, these tools can also be offered to tenants to promote purchases such as energy-efficient appliances.

Non-monetary incentives can save developers and property owners' time and money by

mitigating risk and process issues. These incentives include preferred loans, expedited permitting, zoning/floor area ratios, technical assistance, business-planning assistance, research and development assistance, marketing assistance, regulatory relief, and dedicated staff for green development in building and planning departments. Non-monetary incentives work especially well in situations where financial options are politically difficult to pass or where the existing infrastructure or regulatory atmosphere is complex or restrictive. They are also flexible and can be set up to fit local conditions.

Case Study: IL DCEO Incentive helped green Merchandise Mart

Resources for up-front technical assistance and capital improvements can provide a much needed incentive for buildings to implement green building initiatives. Annual operating budgets are generally not structured in such a way that long-term operating savings can be used to justify a considerable capital investment. The Illinois Department of Commerce and Economic Opportunity (IL DCEO) recognized this barrier and created a green building pilot program, providing funding for private sector LEED projects that achieve LEED Silver certification. This funding was provided to cover soft costs, primarily associated with technical assistance and design work.

One such building, the Merchandise Mart in Chicago, IL, participated in the IL DCEO green building pilot program. When they decided to consider LEED-EB (Existing Building) certification for their 4.2 million square foot commercial office building, they were pioneers in the sector. The paybacks associated with pursuing green building initiatives that would help them attain LEED-EB Silver Certification were unclear and ownership wanted to know what the expected returns would be, before they invested in such a large undertaking. The IL DCEO green building pilot program provided an important financial incentive that moved the project from concept to implementation and helped ease the owners' concern. Anticipated benefits include savings for the building, tenant satisfaction and retention, reduced environmental impacts, and positive public relations. The Merchandise Mart is now the largest LEED-EB Certified building in the world, and their leadership and success on green building initiatives has transformed the commercial office marketplace.

Incentives can provide an important and much needed stimulus for green development projects. Of course, the costs and benefits of providing such an incentive must be weighed and evaluated closely. However, in the case of a project that is likely to provide important data that can move the market towards more green buildings, provide a range of positive social, environmental, and economic impacts, or result in a model project that others can learn from, the case for incentives is strong.

RECOMMENDED ACTION PROJECTS

Create financial and non-financial incentives on the local level to target specific behavior

Local governments are in an ideal position to create incentives that will appeal to developers while furthering their own environmental goals. Depending on the local building and development conditions and the resources of the local government, incentives can be set up as monetary rewards, assistance with navigating the development process, or easements on development restrictions.

Augment existing public financing programs to encompass green development incentives

Tight budgets may prohibit the development of new public financing programs. One way around this is to augment existing local, state, and federal funding mechanisms to make green development practices a requirement or an award consideration in competitive situations. Using existing programs may also be more politically acceptable.

Track incentive successes and failures and adjust as required

Regardless of the incentive created, it is important to review their success and failure at furthering intended environmental and planning goals. Local, state, and federal agencies may work internally or with organizations skilled with administering, tracking, and fine-tuning these programs to conduct periodic reviews. This will ensure that their programs are adequately funded and the criteria for the incentive are properly set so that the results are aligned with these goals.

2.4

Green Development Principle 4:

Regulatory processes and codes can help to promote green development practices

Public policies and procedures can heavily influence whether developers incorporate green design into their projects. Existing codes and standards in many municipalities do not account and adjust for green development features, creating regulatory barriers that make permitting such projects difficult. In this sense, standards and codes can be a barrier to more widespread adoption of green development practices. However, codes and ordinances can also be used as a tool to encourage green development practices by setting criteria that developers and property owners need to meet.

Adopt and align codes to meet environmental goals

Conflicting codes impede green development

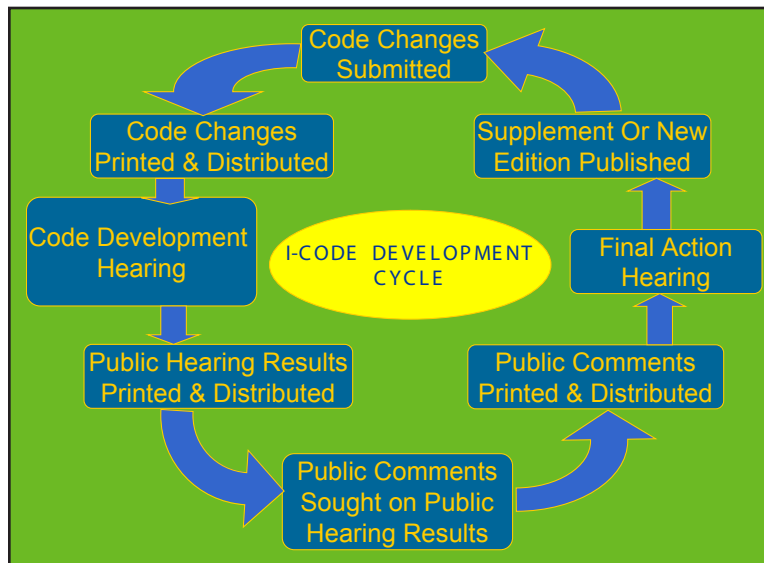
Building, stormwater, and energy codes are all established to provide minimum safety or performance standards. These are often issued by agencies such as the International Code Council (ICC), who partner with organizations such as the American Society of Heating, Refrigeration, and Air Conditioning Engineers (ASHRAE) or Illuminating Engineer

Society of North America (IESNA) to set engineering and safety standards. Individual codes are bundled and are offered to municipalities for adoption. Codes are updated on a standard cycle based on input from members. Municipalities can choose to update or alter their codes based on their needs, but there are no requirements that the most recent version of the codes be used.

Issues arise when codes are not up to date because the local government does not have the resources to update their codes or when different codes conflict. This is especially the case for green development projects where performance information may still be in its infancy or the latest code version the municipality has adopted does not account for newer systems. For developers, two common problems arise when working with municipal building departments that do not have codes that account for green technologies:

- (1) the staff's lack of knowledge of green technologies will delay review, approval, and permitting; and
- (2) development projects may still need to meet conventional building code requirements, thus increasing

Figure 1: I-Code Development Cycle



Source: International Code Council. <http://www.iccsafe.org>

costs and forgoing benefits that may have been realized with the greener approach. The second issue is common with on-site stormwater management systems.

How codes are created

Codes are often developed by an agency such as the International Code Council (ICC), who work with engineering organizations, or they are created by municipalities. Municipalities may extract parts of these codes to create a framework for their own codes. The ICC has a specific development cycle (I-Code Development Cycle, Figure 1) for their codes, which is as follows: code changes are submitted; code changes are printed and distributed; a code development hearing is held; the public hearing results are printed and distributed; the public comments on public hearing results; public comments are printed and distributed; a final action hearing is held; and a supplement or new edition is published.

Public comments are due within 45 days after changes to ICC codes are published. New editions of codes are published every 3 years, and supplements to codes are published every 18 months. The creation of new editions and supplements involves a range of stakeholders that include code officials, design professionals, trade associations, builders/contractors, manufacturers, and government agencies. Code officials have the ability to adopt new codes as they are published, but this may be time consuming and costly for most municipalities.

Once established, codes still require an ongoing process of improvement. Regular review and adaptive changes will help to accommodate new information on green system performance.

Performance vs. prescriptive codes

Municipalities have adopted performance-based codes and prescriptive codes to encourage or require green development.

Performance-based codes allow the design team to fulfill a performance requirement regardless of how they achieve the requirement. While this can encourage innovative solutions, it is also difficult for municipalities to implement because verification of performance compliance is resource intensive. Additionally, it may not achieve an overall superior design because innovation in one system may offer opportunities to neglect other areas and still achieve the established minimum performance standard.

Prescriptive codes dictate how the requirement should be fulfilled, which requires the design team to operate within set boundaries. Conventional codes are often prescriptive and provide a requirements checklist for designs. This can allow developments to meet regulatory standards, yet still produce an inefficient, poorly designed building.

Both performance-based and prescriptive codes have advantages and drawbacks. Municipalities should determine what the most effective method based on their particular situation or create hybrid codes to encourage innovation, while setting minimum feature standards.

Home rule states

Certain states are home rule entities that may allow local jurisdictions to have greater administrative roles in determining issues over state regulations. For these states, implementation of statewide codes is difficult because local municipalities may overrule them.

Case Study: Speeding up the Permit Process

The Chicago Department of Construction and Permits (DCAP) created an expedited permitting process for projects that incorporate green building strategies. Applicants can receive permits within 2-4 weeks, compared to the traditional 4-6 weeks, a significant time-savings. DCAP strongly encourages applicants to schedule a meeting with expert staff once the production construction documents has begun. Upon meeting, staff walk the applicant through the expedited permitting process, identify what information the applicant must submit, and identify certain technologies or strategies that the applicant may incorporate into the design of the building. In addition, applicants may receive benefits from three tiers depending upon the project type (e.g., market rate multifamily vs. 20% affordable multifamily). Benefits from these tiers range from expedited permitting (goals of <30 days) to waiving consultant review fee and expedited permitting (goal of <15 days).

For more information about Chicago's Expedited Permitting Program, please contact the City of Chicago Department of Buildings.
<http://www.cityofchicago.org>

Code improvement focus areas

Code improvements have progressed in some areas, such as energy efficiency, but still require further resources in other aspects of development projects. Some of the more urgent needs include stormwater management issues, site and location planning, and transportation and parking needs and requirements. All of these areas have an environmental impact and financial cost to the community and require attention to ensure longer term environmental, social, and economic sustainability goals.

Use codes, ordinances, utility fees, and process improvements to encourage green development practices

Regulatory guidelines and processes are areas where incentives or allowances can be adjusted to encourage green practices. Many communities have crafted green ordinances that can be readily adopted or adjusted for local needs. Processes and regulations related to ordinances need to be easy to understand and implement. The following are some tools and examples that can serve as a springboard to allow for and encourage green development. However, they must be approached from a standpoint where they can make a significant difference to a developer.

- *Floor area ratio*

One tool municipalities have used to leverage green development is floor area ratio (FAR) bonuses. FAR bonuses increase the building's allowable building density, meaning a developer can add floors or more usable space in the building. These bonuses may be granted in exchange for such features as installation of a green roof or fulfilling defined green standards. Developers and property owners may recoup some or all of their expenditures on the green development designs with the increased rentable/saleable space resulting from FAR bonuses.

- *Expediency*

Some municipalities have chosen to create expedited permitting programs, shortening waiting periods. Such a program allows developers and property owners who integrate "green features" into the design and site selection of the

building to bypass the normal permitting system, with a guaranteed approval or denial within a certain period of time. However, this incentive may only work where permitting time is an issue within the municipality and if there is a team with knowledge on green building design.

- *Impact fees and performance bonds*

Impact fees and performance bonds may also be used as a tool to encourage green development. Impact fees are payments required by local governments of new development for the purpose of providing new or expanded public capital facilities required to serve that development. Performance bonds can be used as leverage to guarantee satisfactory completion of a development, as well as a guarantee that funds are available to complete the project if a developer/property fails. The performance bond shifts the responsibility for controlling, monitoring, and enforcement to individual producers and consumers who are charged in advance for the potential damage.

Although impact fees and performance bonds may not directly encourage adoption of green features, they hold the developer or property owner accountable for the effects of their development. Additionally, funds raised from impact fees can also be used to subsidize green developments. The American Planning Association has comprehensive information on impact fee standards.

- *Green tutor and green go-to-staff*

"Green tutors", or dedicated staff in the planning or building department, are growing in popularity. Green tutors meet with the developer or property owner

at the beginning of the development process, walk them through the permitting processes time line, identify what information they will need to provide in the application, and identify a range of incentives for which the development may be applicable. Planning departments may scale staff time to the maturation of the market, or a consortium of cities may share a staff of green tutors depending on demand.

For a green tutor program to be the most effective, it is important for the applicant and green tutor to meet at the beginning of the planning process. This will allow any challenges to be addressed before the plan is solidified, as altering plans can prove to be time consuming and costly. Furthermore, it will allow the green tutor the time to address opportunities to integrate different green development elements into the building's design.

Effective green tutor programs designate staff from each municipal department

to meet regularly and address how green development can be accounted for in codes and ordinances more effectively. This process helps streamline departmental operations and break down operational silos that can cause conflicting codes.

On a national level, federal dollars can be tied to requiring large infrastructure projects to incorporate green principles. For buildings, all General Services Administration (GSA) new construction projects and substantial renovations must be certified through the LEED Green Building Rating System of the U.S. Green Building Council. Other construction projects, such as transportation infrastructure and water treatment plants, need to go beyond National Environmental Policy Act (NEPA) impact reviews to create designs that integrate environmental features up front.

RECOMMENDED ACTION PROJECTS

Lead by example—incorporate green development requirements into plans and projects

Governments at all levels can show leadership in green development by including sustainability requirements for all their building projects. Many public buildings have become showcases for successful green building technologies because governments are willing to share their experiences and building performance information. By being a steward of green development practices, governments can use the experience to shape all future land and building development within their jurisdiction to be aligned with their environmental and economic goals.

Work with standards organizations to ensure accommodation for green technologies

Organizations such as the International Code Council (ICC) work with researchers to develop new standards and codes as they are requested by municipalities or members. Municipalities can help promote green building by working with standards organizations to continually develop and improve codes for green practices, working with researchers who may need performance information to refine standards, and adopting newer codes that include accommodation for green building. This will allow more green building plans to be assessed through a typical review rather than an exception, freeing valuable time for developers and minimizing their frustration with the regulatory process.

Modify regulatory codes and mechanisms to create incentives for green building

Two common approaches to adjusting regulations are allowing a higher floor area ratio or lowering minimum parking requirements. Both of these approaches allow more intensive development of the site and can allow a developer to build and sell additional units. However, there are other ways that regulatory mechanisms can be used to promote green building. Some cities have turned a particularly cumbersome process, such as permitting, into a benefit (expedited permitting) that can be accessed by green project developers. Other cities are looking at lowering the tax burden on owners who manage and treat their stormwater on site and may not use a municipal service as intensively. These examples are just a few of the ways that governments have been able to use their regulatory structure to further environmental and planning goals.

Develop in-house programs to help businesses and internal offices navigate the green building development process; offer “green tutor” assistance to developers

Dedicated programs in local planning and construction departments to help green project developers navigate the various regulatory steps can make a significant impact on whether such projects get built—and let the community know that green development is a priority. It may be easier to begin by educating and training a small dedicated staff that will focus on green development issues and personally work with developers. Make sure to open up communication channels across different departments and align various programs to ensure there are no conflicting procedures.

2.5

Green Development Principle 5: **Building transactions and leasing agreements can be designed to accommodate green buildings**

The relationship between the developer, owner, and tenant creates split incentives that do not promote investment in green development. Developers are hesitant to incorporate features that may increase costs or create permitting hassles if the market does not value such features or if the benefits accrue only after their association with the property is terminated. However, the development bidding process and leasing language can be changed to make investments in such features more feasible.

When developers build with the intention of selling properties upon completion, the decision to add green features is weighed against the premium that the market will pay for such features. As the investment time horizon for the developer does not extend to the savings that are typically realized during the post-development period, the developer relies on the valuation by the user, the appraiser, and the lender. This requires a new set of valuation and budgeting tools, as well as better communication across disciplines and stakeholders to understand the potential for savings that offset the up-front costs. Transparency and complete

information in the marketplace gives developers a better gauge for the demand of green buildings and offers consumers the tools to make informed choices.

Change bidding process to require green features

The bidding process and request for proposals on development projects often discourage green building unless it is specifically required by the owner. In the interest of limiting the costs to create the proposal as well as making the project more financially attractive among other bids, developers are hesitant to form an integrated design team or may cut green features that drive up costs.

Property owners who are seeking bids for their green building project should consider the experience and approach of the development team. A bid that demonstrates a commitment to the integrated design approach and consideration for whole building design will produce a better product and may reduce change order costs. These goals can be written into contractual agreements once they are set so that the final product reflects

Case Study: Requiring Sustainable Building Practices for City Subsidized Structures

The Chicago Department of Zoning and Land Use's Sustainable Development Policy illustrates how cities can take a leadership role in advancing green development. The policy requires sustainable building practices in new public buildings, planned developments, and privately funded structures that are subsidized by the City of Chicago. Managed and implemented by the Department of Zoning and Land Use, the policy includes requirements for green roofs, LEED certification, energy efficiency performance, and/or stormwater management, depending on the type of building. The Department provides resources to help development teams meet these requirements, including fact sheets, worksheets, design guidelines, and lists of providers and financial incentives.

For more information about Chicago's Expedited Permitting Program, please contact the City of Chicago Department of Zoning.
<http://www.cityofchicago.org>

the intentions that were decided in the process. Governments can take a leadership role and require all their projects to meet minimum standards for green building. This can set an example for private developers and allow a municipality to establish more environmentally sustainable development policies.

Create model language for lease contracts that includes provisions for green practices

Crafting a "Green Lease" is a task that is gaining a lot of attention in the sustainable building and operating community. Understanding that the lease establishes the ground rules for the relationship between the owner/operator and tenant, the objective is to create a framework that will be economically sustainable for all parties without compromising the mission of environmental sustainability.

The lease structure dilemma

In the commercial building sector, an important step to overcoming the barrier of split incentives is to examine current net and gross lease structures. The gross lease,

which incorporates energy and utility costs into the base rent, provides little feedback to the user regarding utility consumption. Moreover, gross leases provide little incentive to reduce consumption since tenants will not directly benefit from savings. Conversely, the net lease may provide incentives for the user to conserve, but it does not provide incentives for the owner or operator to make capital investment outlays for more efficient operating systems as they will not benefit from the savings and recoup the costs of the investment. This separation of investor costs from user benefits is often referred to as split incentives. Under these lease arrangements,

Building Information Technology

A number of software building information tools currently exist to monitor building resource consumption in real time, tracking environmental performance and financial savings for green buildings, as well as proper functioning of building systems. Lucid Design's Building Dashboard and Quality Attributes Software's iBPortal are just two examples of the technology that is making building energy and water use more visible. This technology can also be used as a tool for communication and target setting with tenants as they begin to understand their demand patterns.

savings that can be achieved if both investments were made in energy efficient operating systems and if overall energy demanded was reduced is concealed.

Energy costs as a percentage of total costs look very different for the average commercial tenant when compared to the average commercial building. While a tenant may only spend 1–2% of their budget on energy, a building's energy costs typically account for approximately 30% of total costs.⁹ For the average individual tenant, retrofits that reduce energy costs by 30% (average for LEED buildings) would not yield large savings overall, whereas from a

building owner's or operator's perspective the aggregate savings (including re-investment potential or interest rates applied to those savings) provides a significant incentive to reduce energy costs.¹⁰ In comparing the tenant's versus the building owner/operator's incentives for energy efficiency, we see that the net lease's incentive to the tenant (savings in energy and utility bills) is not as strong as the gross lease's incentive to the owner/operator (greatly reduced operating costs). However, direct feedback on utility usage for tenants is an integral component of understanding and reducing demand to meet environmental goals.

Case Study: Sample Green Lease Language

A building in a large city dedicated to green business tenants may not be a typical for-lease commercial building. However it is an interesting case study that can provide insight into the usage of green leases.

Green Business Building (building name has been changed) is committed to a green mission, as well as the proper functioning and maintenance of its LEED certification. It has included the following language within the commercial lease:

Energy Conservation. Landlord shall have the right to institute such policies, programs, and measures as may be necessary or desirable, in Landlord's discretion, for the conservation and/or preservation of energy or energy related service, or as may be reasonably required to comply with any applicable codes, rules and regulation, whether mandatory or voluntary.

Under Tenant's Alterations it clearly mandates that all work performed within the premises must be "in accordance with the Tenant Design and Construction Guidelines compatible with the 'green' mission of the Development".

Rules and Regulations further makes known the responsibility of the user to maintenance of the building's certification, in this case LEED, "Tenant acknowledges that the Development is certified for Leadership in Energy and Environmental Design (LEED), and as such may have Rules and Regulations that are different from those typical of other commercial projects in the "Large City" Area. Tenant agrees to comply with and observe all of the construction rules and regulations and the operational Rules and Regulations".

9 Whitson, B. Alan, "Lease Structure Hinders Energy Efficiency." Facilities Management Resources, The BOMA Magazine. June 2005.

10 Ibid.

Operating under a gross lease also challenges owners and operators to engage tenants in conservation and demand reduction of energy. Communicating to tenants how utility, insurance, and maintenance savings affect rents is important. Providing direct feedback, such as through sub metering, can demonstrate usage costs to tenants.

Create a system of co-benefits

Creating a system of co-benefits that will provide incentives to both the tenant and owner/operator is key to the success of green buildings and to increasing energy efficient measures, while also promoting conservation. A system for cooperative action and channels for communication needs to be in place, clearly outlining costs and benefits, and how those will be shared appropriately. The tenant requires direct feedback regarding usage, and also an owner/operator who will correctly reward that tenant's efforts. For example, an owner/operator cannot merely apply costs based on square footage if trying to promote usage conservation; the reward system has to be much more transparent and linked to proactive measures taken by the tenant.

Tenants play an integral role in promoting greener practices in commercial buildings. Lead tenants, or a group of tenants, can communicate the priority of a healthy and sustainable environment to owners and operators. This is most evident today in requirements for green office and institutional space in the federal, state, and municipal sectors. However, any tenant can enter into negotiations for ongoing improvements in the building(s) they occupy. Communicating to owners and operators these preferences will help them better understand the demand for greener space.

Several agencies and organizations, including REALpac (Real Property Association of Canada) and the California Sustainability Alliance have developed leasing structures that begin to address the issue of split incentives. They provide good starting points to change the leasing relationship so that owners and tenants can both gain benefits from investment in green systems.

RECOMMENDED ACTION PROJECTS

Require green building and integrated design approach for all bids

One way that public building projects, as well as other building projects that use a competitive bid process, can improve the quality of their projects is to make integrated design a requirement. While integrated design can create a better built structure at an overall lower cost due to tighter integration of building systems and reduction in change orders, developers may be hesitant to initiate this process because it shifts the cost up-front— an expenditure they feel they may not be able to recuperate if they do not win the project. By requiring an integrated design process just as any other feature or construction method, a municipality will demonstrate leadership that other developers can follow.

Factor in the following when evaluating project proposals:

- *Experience of design team with green buildings and their ability to deliver products with less cost overruns and change orders*
- *Anticipated post construction building costs for operation and maintenance*

Successful green development projects are unique in that they require a design team that has experience with different building systems, materials, goals, and approach. It would be difficult for a design team without green building experience and knowledge to build a structure that capitalizes on all the economic and environmental benefits. Choose a team with a portfolio of successful green building projects and work with them to determine what building operations, maintenance, and costs may look like during occupancy.

Use green lease templates to define owner/tenant responsibilities

New leasing language developed by various municipalities and entities can be useful guidelines for green buildings. These leases can help create the proper motivation to alter tenant and owner behavior. Sample leases are available from REALpac and the California Sustainability Alliance.

2.6

Green Development Principle 6:

The cost, benefits, and performance of green buildings must be documented and communicated to expand the market for green development

Expand market data to specifically address the performance and value of green features

Adoption of green development practices by the market, including developers and consumers, requires education on the expected performance of green development features. Armed with this information, consumers can better gauge the value of their “purchases”—much like they do with automobiles, where not only the purchase price is offered, but information regarding mileage efficiency, maintenance, insurance, and depreciation are relatively easy to obtain. For homes, offices, and industrial spaces, investments that are much more expensive, there is much less transparency regarding maintenance and operations costs. Consumers and market representatives, such as appraisers, therefore generally ignore the value of these features. The result of this leads to the perception that green development practices offer

little if any additional value in the market.

Consumer market needs

Drastic increases in energy costs in recent years disprove the idea that environmental and energy-efficient features should be treated as afterthoughts. The 2008 housing market collapse is at least partially due to these higher costs. Homeowners strapped by the increase in utility costs in their homes and gas costs for transportation find that they do not have enough cash flow to meet their mortgage and property tax payments. While information on projected maintenance, operations, and transit cost may not have prevented the housing market collapse, it would have at least been registered into the overall affordability and value of a property.

The Energy Performance Certificate (EPC) currently being phased in throughout the European Union mandates that buildings undergo an energy audit, and that the score or the EPC be included with the building information for prospective renters or

buyers. This provides consumers with access to full information about the building's energy needs and can motivate owners to update systems. This concept is gaining momentum in the U.S. and will allow consumers to better value green features when conducting a property search.

Tools needed for market representatives

Consumers are only a part of the equation when valuing green properties. Along the process chain of developing, financing, marketing, and insuring, representatives require information tools on green building performance to properly value development projects. Brokers need to be able to convey the features and performance to their clients. Bankers rely on the appraisal report to determine how much financing can be offered for a project. Insurers need quantification information to determine whether projects

can be insured and at what price. There are still many information gaps that need to be addressed to help the market fully value green development projects.

Make collection of performance data a priority

Green development performance information is important to market adoption of green practices. Collecting and providing this information will help those who may need validation on green project investments and will create a positive feedback loop to the green building community to improve design and features for future projects. In addition to cost and performance data within a building, information on occupant health, satisfaction, and commuting patterns can make the case for better indoor air quality and location choice. Local and regional performance

Table 3: Results of Green Building Familiarity Survey

Who knows what?

Architects have been central to the green building movement, and unsurprisingly, nine out of eleven interviewees rated architects as having a good or excellent understanding of the field, giving them an average 4.2 out of five. Planners ranked second with an average score of 3.6, six of the eleven interviewees ranking them as good or excellent. Appraisers scored lowest, at 1.8, below real estate brokers at two and lenders at 2.1. Three of the projects, however, had no involvement with third-party lenders, appraisers or real estate brokers.

CASE STUDY	AVERAGE											
	A	B	C	D	E	F	G	H	I	J	K	AVERAGE
Lender	4	1	2	2	2	1	-	3	2	-	-	2.1
Architects	4	5	5	4	4	3	5	4	2	5	5	4.2
Appraisers	5	1	-	2	2	1	-	-	2	-	-	1.8
Planners	3	4	4	3	3	3	5	4	2	4	5	3.6
Developers	2	1	4	5	2	4	1	4	2	4	2	2.8
Tenants	2	2	3	3	3	2	-	3	2	5	2	2.7
Brokers	2	1	-	2	2	1	-	4	-	-	-	2.0
Average score	2.86	2.14	3.6	3	2.57	2.14	3.67	3.67	2	4.5	3.5	
	2.8					2.14	3.67	2.8	4			

- A Green on the Grand, Kitchener, Ontario, Canada – Office building
- B SAS building, Toronto, Ontario, Canada – Office building (UC)
- C Ottawa Paramedics building, Ottawa, Ontario, Canada – Office building
- D Vancouver Island Technology Park, Victoria, British Columbia, Canada – Office building
- E 260 Townsend, San Francisco, California, United States – Office building
- F Philips Eco-Enterprise Centre, Minneapolis, Minnesota, United States – Office/Industrial building
- G Mountain Equipment, Co-op Store, Montreal, Quebec, Canada – Retail store
- H The Solaire, New York City, New York, United States – Residential apartment building
- I Cranberry Commons, New Westminister, British Columbia, Canada Co-housing project – Residential apartment building
- J Oberlin College, Oberlin, Ohio, United States – Educational facility
- K CK Choi building and Lui Centre, Vancouver, British Columbia, Canada – Educational Facilities

KEY

- 1 No understanding
- 2 Limited understanding
- 3 Understanding
- 4 Good understanding
- 5 Excellent understanding

UC Under construction

Source: Green Value Report / Green buildings, growing assets. Royal Institution of Chartered Surveyors, 2005. <http://www.rics.org/greenvalue>

data is especially useful to determine best practices given specific climate or geographic features. Additional information that recognizes the impact that buildings have on their surrounding community, including traffic patterns and congestion, utility and road buildup, and stormwater flows and habitat changes will provide an even stronger case for green development.

Use third-party rating systems to help consumers recognize the value of green buildings

Third-party rating systems provide an easily recognizable way for consumers to identify

Case Study: Jones Lang LaSalle Creates In-House Sustainability University

Jones Lang LaSalle, a financial and professional services firm specializing in real estate services and investment management, recently announced an in-house Sustainability University which will provide green training for employees. Those who attend will leave with basic green knowledge, but many will also study for LEED and Building Research Establishment Environmental Assessment Method (BREEAM) accredited professional exams. Lauralee Martin, Jones Lang LaSalle's global chief operating and financial officer, says that Sustainability University grew out of internal and external interest in green development: "Interest in, and concern about, environmental sustainability continues to gain momentum with our clients, prospects, investors, and the professionals who take pride in working for Jones Lang LaSalle. Our service capabilities and industry-leading position allow us to deliver real value and drive change that minimizes the environmental impact of commercial real estate while serving the economic requirements of successful businesses."

Source: <http://www.joneslanglasalle.com>

green buildings. Developers have already started using these systems to market their buildings. Although rating systems are not a guarantee of performance, they can initiate dialog between different stakeholders on the features and benefits that have been incorporated into a property.

Extend green building education beyond architects

Green building education needs to reach beyond designers and architects for the market to begin embracing green practices for every project they initiate. While we can present the market for green buildings as a supply and demand curve (as demand for green building features increases, developers will increase the supply to meet this need), we cannot simplify the training and education that will be required to produce this shift.

The 2005 Green Value study conducted by the Royal Institution of Chartered Surveyors (RICS) for the American and Canadian market found that knowledge of the green building field varied considerably among professions who deal with development issues. Table 3 shows the results to RICS' survey question. The results of this survey underscore the need to educate market representatives such as lenders, appraisers, and brokers on green development issues because they determine property value and viability. Without a green building knowledge base, they will not be able to evaluate such projects accurately and effectively. In addition to the marketing and finance fields that support these projects, development of green building education is

most urgent in the engineering, construction, maintenance, and operations fields.

Development of green collar jobs

The transition from conventional building to green building will require skilled workers who can build, install, and maintain the systems to ensure the development is constructed as designed and will operate efficiently in the future. Existing workers, primarily professional and blue collar employees, can expand their skill set to include green systems and techniques to ready themselves for an evolving market. Professional and trade union organizations are invaluable networks that can assist in disseminating information on green building to their members and can act as a liaison between green building education organizations and workers. Widespread adoption of green development practices will bring about significant opportunities in these fields, but a workforce knowledgeable about the practices and tools needs to be in place beforehand.

Working with educational institutions

Developing a mind set for sustainable development begins in schools. An educational institution's curricula can equip students with the necessary knowledge on sustainability issues, while its actions and practices can demonstrate environmental stewardship. Many universities are beginning to add sustainability directors to their staff who oversee all aspects of university activities to make sure they are aligned with the school's sustainability goals, including green development projects. The addition of green building design, technology, and economics have been added to the architecture, design, and engineering curriculum in

Case Study: IBEW 103 Trains Members in Renewable Energy Technologies

Another group leading the way in green building education is the International Brotherhood of Electrical Workers Local 103. Headquartered in Dorchester, Massachusetts, the IBEW Local 103 offers courses for members and local contractors in wind and solar engineering and installation. All IBEW apprentices are trained in renewable energy technologies. Not only does IBEW Local 103's apprenticeship training facility offer courses in green building and renewable energy, it acts as a billboard for high performance building. Located just off a busy expressway, many Boston commuters are greeted twice a day by the building's large solar array and 100 kW wind turbine. Local 103 takes its visibility within the community seriously, and as new renewable technologies are added to the Dorchester site, the union will remain at the cutting edge of the industry.

Source: <http://www.ibew103.com>

some universities, but may still be absent in other areas such as business. To encourage curriculum development, Congress recently passed all provisions of the Higher Education Sustainability Act (HESA) as part of the new Higher Education Opportunity Act of 2008 (HR 4137). HR 4137, signed into law by President Bush on August 14, 2008, creates a pioneering "University Sustainability Grants Program" at the Department of Education. It will offer competitive grants to institutions and associations of higher education to develop, implement, and evaluate sustainability curricula, practices, and academic programs.

Creating a common vocabulary

Communication is a key element of any development project. Therefore, we urge integrated design teams to speak with each other frequently in order to create a fully

Case Study: Cape Cod Community College

Cape Cod Community College (CCCC) has offered courses in energy auditing and small-scale renewable energy systems for many years. Starting in the fall of 2008, CCCC students will be able to matriculate with three certificates in renewable energy technology, including small wind, solar thermal, and solar PV. Although CCCC teaches some courses on-site, the majority of the technology labs take place at one of two local vocational high schools. In helping these schools build and operate renewable energy labs, CCCC has been able to share the cost of instructors and facilities. Because the high school classes end in the early afternoon, these labs are then open for multiple college level courses for the rest of the day. The labs are also open for rental by local contractors and professional associations for professional development workshops.

Students in the vocational technical renewable courses are awarded college level credit for some of their work and can matriculate directly into advanced technology courses at CCCC. CCCC renewable energy certificate graduates can enter the workforce with respected professional certifications (including HERS and NABCEP) in addition to their associates degree, or matriculate into four-year environmental degrees offered by local colleges. CCCC's educates more renewable energy technicians than any other Massachusetts school.

Source: <http://www.capecod.mass.edu>

integrated high-performance building. However, communication is complicated by the fact that all professionals in the development community have their own specialized vocabulary. That specialized vocabulary—terminology specific to each discipline—has evolved to meet a need to describe a critical component of the development process that is part of the building landscape and should be respected and not necessarily replaced. Nevertheless, to bridge that divide, it is critical that all parties

become familiar with the basic vocabulary central to the work of their colleagues. For example, although an architect might think “asset” diminishes a sophisticated design—and a building is surely more significant than a line on an investment sheet—the term is an important reminder that finance is integral to the green process. Creating a glossary or dictionary for a green building project team is an important method to bridge the remaining language barriers and can translate to cost and time savings.

Sample Green Development Vocabulary

Absorption: *Time required to lease a certain number of units in a specific market*

Appraisal: *Value of a property according to an expert*

Benchmarking: *Applying standards by which something can be measured or judged*

Capital cost: *Costs required to buy land and materials and to bring a building to commercial viability*

Capitalization rate: *Calculation of the Annual Cash Flow divided by capital costs*

Churn: *Turnover of tenants in a building*

Gross Lease: *Lease structure in which costs of maintaining the building are paid by the owner*

Life Cycle Cost: *Total cost of owning, operating, maintaining, and disposing of a building or component over a given time frame*

Net Asset Value: *The value of an asset minus the value of its liabilities*

Net Lease: *Lease structure in which the lessee pays the operating expenses of the space including utilities and maintenance*

Net Operating Income: *A property's net income after operating expenses*

Net Present Value: *Method of appraisal of long-term projects by calculating the value of an investment by adding the present value of expected future cash flows to the initial cost of the investment*

Net Usable Area: *Square footage available to lessees*

Operating Costs: *Recurring expenses related to the maintenance and upkeep of a building*

ROI: *Return on Investment*

Simple Payback: *How long an energy efficient investment's savings will pay back for the cost of energy system. Does not include future savings*

Yield: *Net income from an investment expressed as a percentage of its cost*

RECOMMENDED ACTION PROJECTS

Create a research effort, in concert with other ongoing efforts, to document the costs and performance of green projects

Green building performance and cost information is crucial to adoption of green building practices. Research organizations and universities have led many of the efforts to gather and analyze information that will be invaluable to green building advocates and developers. Many need support to help fund, organize or participate in these efforts. The federal government, private foundations, and trade groups can support these efforts with funding, while it is the responsibility of green building owners and operators to participate and share their development's performance information.

Accurate, comprehensive, geographically relevant data provides one of the strongest cases for incorporating green features into building projects and can help provide justification for return on investment projections. This is especially true for new developers or owners, or those that may be located in regions of the country where green development is more sporadic.

Use existing lines of communication and data sources to document the performance of green buildings; augment (or develop) information tools that the market already accepts as standards to include green building information

Many of the tools that are currently used in the market can be enhanced to include green building information. Making available information such as estimated energy usage, water usage, and other utility, maintenance, or operation costs available will help consumers make an educated choice about their purchases. For example, estimated utility costs can be listed on MLS listings to provide information to potential purchasers on how much they can expect to pay in utilities, in addition to their mortgage, property tax, and insurance. The benefit of using an existing system, versus creating a new system, is established market acceptance and a built-in distribution network.

Develop green training and/or certification programs for market representatives such as appraisers, brokers, and lenders to help them recognize and communicate the value of green building features and benefits

Market representatives often control the construction, value, funding, and sale of development projects. While some of these influential professionals have taken steps to educate themselves on green building issues and understand the possible need to approach their work in such a way to accommodate any green development differences, many view green building features as insignificant to a property's value, or worse, as liabilities. Trade and umbrella organizations have taken notice and are working to address this gap by

creating relevant training courses to educate their members, but much more needs to be done to bring these important roles up to speed on the specifics of green building issues so that the benefits these developments provide are reflected in their valuation.

Engage in public education connecting green building with climate change, environmental degradation, and energy usage

Include green development issues as part of discussions surrounding climate change, energy independence, environmental degradation, and natural resources depletion. All of the issues are connected and need to be considered as a part of any overall management strategy. This can help drive public knowledge, demand, and market acceptance of the benefits of green development.

3.1 Issues just over the horizon

Those who are involved in the development field are experiencing many of the barriers covered in our study right now. A lot of work needs to be done to remove these barriers and adjust the market to accommodate current green development strategies. However, the concept of green development is one of continuous improvement, where new ideas and technologies offer opportunities to further sustainability goals.

Future opportunities in green development

Future changes to environmental policies will present opportunities to develop new products and services in the green development field. Higher accountability for emissions, waste, runoff, and usage may boost interest in sustainable development practices. Some of the more innovative ideas that are being discussed by leading organizations include:

Incorporating energy efficiency and location efficiency criteria

Sharp increases in utility and fuel prices underscore the significant portion of expenses that go towards energy usage and driving; those who live in higher density housing closer to work with plentiful transportation options were often the least impacted. Mortgage and loan underwriters are

beginning to look at including these expenses as part of their affordability criteria. For development projects that use public funding mechanisms, there is already a movement to include LEED or Energy Star as prerequisites; this may be expanded to include energy and location efficiency criteria to further influence land use planning.

Developing strategies for the sustainable reuse and redevelopment of land

Location is usually acknowledged as a component of an overall green development strategy with its contribution to lowering vehicle miles traveled and offering building occupants various transportation options. Brownfields and other environmentally impaired sites are often in highly desirable locations within or near central cities and with established road and utility infrastructure. While programs such as LEED recognize brownfield redevelopment as a strategy, sustainable redevelopment of these sites is an opportunity that has not been fully explored. From reuse and deconstruction to redevelopment, every process can be completed in a more sustainable manner. Sustainable brownfield redevelopment offers an opportunity to examine how

Case Study: South Waterfront, Portland-Transit Oriented Development in a former Brownfield

The South Waterfront (or SoWa) is a new high-rise district under construction on former brownfield industrial land in the South Portland neighborhood south of Downtown Portland, Oregon. It is one of the largest urban redevelopment projects in the United States. SoWa is connected to downtown Portland by an extension of the Portland Streetcar, and to the Oregon Health and Sciences University (OHSU) campus atop Marquam Hill by the Portland Aerial Tram.

SoWa is part of the Portland Development Commission's North Macadam Urban Renewal District. The first phase of the South Waterfront is the \$1.9 billion "River Blocks" development. Construction began in early 2004. The full build-out of the district envisions many residential (primarily condominiums) and medical research towers ranging in height from 6 stories to 35+ stories.

Besides its location in a former brownfield and with access to public transportation, the development will incorporate many green features including:

- Solar panels and a Trombe Wall, which preheats a building's hot water
- Bioswales and ecoroofs
- Non-toxic paints, wheat based products, and low VOC adhesives to ensure better indoor air quality
- Sustainably harvested wood and rapidly renewable materials
- Water conservation strategies for indoor plumbing and use of drought resistant plants and trees
- Wildlife habitat restoration

The OHSU Center for Health and Healing is targeting LEED Platinum, a first for medical and research facility of this type, size, and complexity. The integrated design of the building achieves significant energy savings—more than 60 percent below the Oregon Energy code.

More information about SoWa can be found at:
<http://www.southwaterfront.com>

we can conduct land planning and development on a continuous lifecycle basis.

Incorporating embodied energy into development projects

When existing buildings are torn down to be replaced by a new building, the embodied energy, or the energy that is required to manufacture the original building is lost. New buildings require a lot of energy with

respect to materials and transportation—even for the greenest of structures. It would take many years for any new green building to recuperate the lost energy from an existing one. Under a cap and trade or carbon exchange system, carbon emissions saved through the reuse of our existing structures may provide market opportunities to focus on retrofitting our existing building stock to be greener.

Case Study: Using Carbon Offsets Sale to Help Build Green Affordable Housing

Silver Gardens, an environmentally responsible affordable housing development, is the first in the nation to receive funding from a ground-breaking new initiative created by Enterprise Community Partners that taps the booming market for voluntary “carbon offsets.” This initiative will help low-income families experience the health, economic, and environmental benefits of living in affordable green homes.

The newly formed Enterprise Green Communities Offset Fund™ is purchasing carbon offsets for at least 330 tons of carbon dioxide that will not be released into the environment due to the green design and construction of this pioneering development in downtown Albuquerque. The green measures integrated into Silver Gardens will both save residents more money and emit less CO₂ by using 15–20% less energy than similar projects built using conventional technologies and approaches.

Through the Fund, Enterprise Community Partners, a national nonprofit, raises charitable contributions from organizations, individuals and events to purchase carbon offsets from developers of green affordable housing projects. Fully 100 percent of all contributions to the Fund go to community-based groups for activities that reduce energy use and global warming pollution in homes for low-income people and result in verified carbon emissions reductions. All Fund proceeds support activities that directly reduce carbon emissions below the level that otherwise would be achievable.

Contributors to the Fund receive credit for verified emissions reductions that can offset their own carbon generating activities and may take a tax deduction for their contribution. The Fund employs rigorous measurement and verification procedures to determine and certify offsets that are aligned with international best practices. The Fund “retires” the verified emission reductions it purchases, meaning the reductions cannot be bought or sold during the period of the Fund’s purchase.

Source:

http://www.enterprisecommunity.org/about/media/news_releases/documents/2008/july/offset_fund.pdf

3.2 Conclusion

Green development practices can yield positive environmental, economic, and health benefits to us and our communities. With the overall advantages that such practices offer, it would seem clear that every building project would choose to incorporate green features into their plans. Our hope is that implementation of the recommendations of this report will bring us closer to this goal.

Our objective for this report is to highlight how many processes and tools are still not equipped to handle the unique challenges that green development entails. Our participants have presented ideas on

how to overcome these issues based on our research, observations, and discussions. Those of you who are closely involved in specific processes and tasks that support development projects may recognize other barriers or gaps to greater adoption of green development practices. We encourage you to work with your community or organizations that support green development to find solutions. Continued collaboration among the market and private interests, research institutions, and government—and a level playing field that gives every opportunity for green developments to financially succeed—is the best measure of success.

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