

FEDERAL RESERVE BANK OF ATLANTA

GREEN Partners

IN COMMUNITY AND ECONOMIC DEVELOPMENT

GREEN PRIMER

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Making the Case: Signs Point to Green

As policymakers come to grips with hard questions about the sustainability of our current approaches to development, new strategies appear inevitable. The interests of businesses, governments, builders, consumers and financial institutions are converging to make green development part of the mainstream agenda. [pg 3](#)

A New Approach to Development

Green development is not an all-or-nothing concept. Developers can use a range of strategies to improve the quality of life in neighborhoods and limit negative environmental impacts. This article provides an introduction to green building standards. [pg 6](#)

The Bottom Line on Green

Is green building cost-effective? This question isn't easy to answer, but current research dispels some popular misconceptions about the cost of environmentally sound development. It suggests that long-term benefits outweigh slightly higher initial inputs for construction and design. [pg 9](#)

Early Steps toward Green Finance

Green finance is still in its infancy, but some innovative financial institutions are developing an arsenal of green products and practices that are being supported by government incentives for resource efficiency in development. [pg 12](#)

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Glossary

EXPLORING THE FUTURE OF GREEN DEVELOPMENT AND FINANCE

The momentum of green development has been swift. In 2002 there were just over 600 LEED, or Leadership in Energy and Environmental Design¹, registered real estate projects in the U.S. By 2005, this number grew to over 13,000 and as of early 2009 it stood at more than 20,000. And LEED registered projects represent only a portion of the buildings constructed to “green” standards. Florida’s Green Building Coalition, EarthCraft House and Communities, the National Association of Homebuilders National Green Building Program, and the Tennessee Valley Authority’s Energy Right program are just a few of the other initiatives that have been established to monitor and support green building in the Atlanta Fed’s District.

As green development strategies increasingly move from the drawing board to the building site, financial institutions will continue to play an important role in shaping the path for innovative development practices that will benefit neighborhoods, consumers and businesses. But green building is still relatively new to the scene, and lenders and community developers have plenty of questions.

This special issue of *Partners* is designed to be a *Green Primer*, offering answers to many fundamental questions about green development. What is it and why is it important—even during an economic recovery? Do green building costs add up to real dollar benefits? What are lenders doing to foster green projects? And how do we bring the benefits of green development to all people, regardless of income?

By describing the basics of green building, this *Primer* is intended to be a handy resource that can be shared with board members, policy makers, loan officers and community stakeholders. Think of it as a tool that can set the stage for an ongoing dialogue to help green development financing mature into a sound and equitable framework for improving the places where we live and work.

The Atlanta Fed has been exploring issues surrounding green development and the greening of our economy (see “Gearing Up for Green Jobs” in *Partners*, vol. 19, no. 1, 2009). As an institution we, too, are studying our impact on the environment in the Sixth District. In response, the Atlanta Fed has enhanced the recycling programs, added fuel-efficient cars to the fleet, increased the employee commuter subsidy program, changed the way our buildings are managed to reduce water and energy consumption, and will meet green building standards when remodeling our facilities.

The future of green development is a complex issue facing community and economic developers. I hope you find this *Primer* a useful resource, as the private, public and nonprofit sectors come together to figure out what it means to achieve a “triple bottom line”—one that balances financial, social and economic goals to create more sustainable places and investments.

¹ LEED is the U.S. Green Building Council’s certification program. It is among the most widely applied green programs in the world.



JUAN C. SANCHEZ

Vice President and
Community Affairs Officer

A stylized, handwritten signature in black ink that reads "Juan". The signature is fluid and cursive, with a large loop at the end.



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Making The Case: Signs Point to Green

WHY SHOULD WE CARE ABOUT GREEN DEVELOPMENT? ONE ANSWER IS THAT THREE CRITICAL ISSUES—UTILITY PRICE INSTABILITY, APPREHENSION ABOUT CLIMATE CHANGE, AND THE STRESS IN THE REAL ESTATE MARKET—ARE CHALLENGING THE SUSTAINABILITY OF OUR TYPICAL APPROACHES TO MAKING “PLACES”...THE NEIGHBORHOODS WE CALL HOME AND THE DISTRICTS WHERE WE WORK AND PLAY.

Local, national and global policy concerns are pressing us to ask hard questions: Are we serious enough about energy and water efficiency in our homes and businesses? Are we making communities that rely too heavily on the automobile? Are we providing enough housing choices? Are we being good stewards of our natural resources? Are we making development decisions that support the health and welfare of all Americans?

In discussions across the country these and other concerns are prompting more extensive exploration of green development and green building practices. As a result, “green” is becoming more than just an admirable concept. Increasingly, businesses, governments, builders, consumers and financial institutions are making green development part of the mainstream agenda.

Issues converge

Today, several issues are converging that fundamentally challenge the way we have been making places for the past fifty or more years. They include energy and resource consumption, environmental pollution and climate change, and the real estate market.

1 Energy and Resource Consumption

Every day we hear about the volatility of oil prices and the importance of energy independence.

According to the federal Energy Information Administration, heating oil prices rose from just 89 cents per gallon in 2000 to over \$3 in 2008. Even though energy costs have fluctuated, forecasts suggest that prices for gasoline, natural gas and heating oil will continue to increase. And, repeatedly, global conflicts, policy decisions and natural disasters have created hiccups in our access to traditional sources of energy, causing rushes and price jumps. Green development reduces the consumption of energy, water and virgin natural resources by eliminating inefficiencies, thereby creating buildings that are better able to weather price shocks.

2 Climate Change and Environmental Pollution

Reliance on fossil fuels for energy is prompting serious discussions. Consumption of fossil fuels produces carbon dioxide, which has demonstrated negative consequences for human health and the environment. Carbon dioxide drives the rise in greenhouse gas emissions (GHG) that are precursors to climate change—currently the subject of local, national and international debate and agreements. Consensus is growing among scientists, policy makers and business leaders that action is needed to stem rising GHG emissions and forestall climate change. The rising sea levels, increased intensity of weather events and changing patterns of precipitation associated with

WHAT DO WE KNOW ABOUT BUILDINGS?

39%

In the U.S., buildings account for 39 percent of energy use.

26%

Green commercial buildings consume 26 percent less energy and have 13 percent lower maintenance costs.

12%

Up to 12 percent of the non-residential construction starts in 2008 were green; industry projections suggest that by 2013 it could be as high as 25 percent.

SOURCES: Environmental Information Administration (2008). EIA Annual Energy Outlook; GSA Public Buildings Service (2008). Assessing Green Building Performance: A Post Occupancy Evaluation of 12 GSA Buildings; Kats, G. (2003). The Costs and Financial Benefits of Green Buildings: A Report to California's Sustainable Building Task Force; McGraw Hill Construction (2009). Green Outlook 2009: Trends Driving Change.

climate change all have tremendous implications for human health, the natural environment and the economy.

These issues are causing federal policy makers to consider mandatory limits on GHG emissions and a cap-and-trade system to meet goals. According to a report from Ernst & Young, "It is not a question of 'if' but 'when' new legislation will bite—and the when is likely to be within the next five years."¹

3 The Real Estate Market

The volatility of energy and utility costs is adding further stress to the bottom line as homeowners and businesses cope with repercussions from the troubled real estate market. Over the last few years the housing market has turned sharply. As of August 2009, average home prices were down approximately 30 percent from their peak in 2006, according to S&P/Case-Shiller U.S. National Home Price Index. Furthermore, mortgage delinquencies and foreclosures have risen sharply throughout the country, with especially high concentrations in several metropolitan areas. According to data from the Mortgage Bankers Association (MBA), foreclosure rates have been noticeably higher over the last decade than at any time in the past 50 years. The commercial real estate sector is experiencing the spillover effects as consumers have fewer discretionary dollars to spend.

Taken together, energy consumption, climate change and the foundering real estate market signal that "business as usual" may not be the mantra for new development in the coming years. The anticipated advent of more stringent regulation, changing energy prices, dwindling resources, and consumer and

corporate demand for efficient, environmentally friendly products and services all point to the need for innovation.

The momentum of demand

There is an opportunity to make a difference as new housing and commercial spaces continue to be built. A recent study indicates that by 2030 "about half of the buildings in which Americans live, work and shop will have been built after 2000."² That means the decisions about the designs, locations, materials and systems that shape this new construction will determine the quality of life for future generations.

Estimates indicate that green building generated between \$12 billion and \$20 billion in sales in 2008, accounting for a 6-to-10 percent share of the housing market, according to the 2008 McGraw Hill Construction report. This is up from \$7 billion in home sales (a 2 percent share) in 2005. The number of buildings registering for the U.S. Green Building Council (USGBC) rating system (Leadership in Energy and Environmental Design, or LEED[®]) jumped from 624 in 2002 to 13,741 in 2005, and the number achieving certification during that period climbed from 38 to 1,705.³ This exponential increase in the number of green buildings will contribute significantly to growth in the industry's knowledge pool and the potential to bring down incremental cost.

Even municipalities are setting ambitious goals. As of 2009, more than 1000 mayors have signed the U.S. Conference of Mayors Climate Protection Agreement, which makes energy efficiency a priority through building code improvements.⁴ In fact, a 2007 survey of mayors found that more than three out of four of the cities surveyed were taking steps



...more than 1000 mayors have signed the U.S. Conference of Mayors Climate Protection Agreement, which makes energy efficiency a priority through building code improvements.

to encourage the private sector to erect buildings that are energy efficient, healthy and constructed using sustainable building techniques.⁵

Consumers are also moving green building into the mainstream. According to research in 2008 by Robert Charles Lesser & Co. (RCLCO), the decisions of 36.4 percent of potential homebuyers are driven by a sense of environmental responsibility, a desire to save energy and achieve lower utility costs, interest in healthy environments or a combination of these concerns.⁶ These three elements are at the heart of green building, which features energy-saving systems and design, low-toxicity building materials, and less negative overall impact on the natural environment.

RCLCO places housing consumers in one of three categories:

- **Forest Greens**, who view environmental stewardship as the primary driver in the decision they make about their next home purchase, represent 6.1 percent of buyers.
- **Greenback Greens**, who are most interested in lower energy bills as they consider their next home purchase, account for 21.8 percent of buyers.
- **Healthy Greens**, who look to the potential health benefits of green construction as they decide about buying a home, make up 8.5 percent of those shopping for a home.

When RCLCO analysts combined the growing demand for green homes with pent-up demand for higher-density residential products (which are green because they reduce driving and eliminate the need for long commutes and therefore cut down CO₂ emissions), they project potential need for 4.5 million green units over a ten-year period.

Even commercial real estate owners and portfolio managers are expected to be pressured by potential regulatory incentives and mandates to seek more resource-efficient properties and building operations. Notably, the U.S. Small Business Administration has recently modified its lending priorities in recognition of the importance of improving energy efficiency for small businesses.⁷ Although the current recession is expected to slow demand for green products, there remain continued opportunities to retrofit existing buildings and improve management practices.

Consumer and corporate demand, when aligned with local, state and national policies, has the potential to change green building from a novel approach to standard operating procedure. This new context for development will call for rethinking how many in the real estate industry do business. ■

A New Approach to Development

Green Development is any development—whether residential, commercial or institutional, a single building or an entire neighborhood—that enhances the well-being of the community while incurring only a limited impact on the natural environment. The concept of green development can be most fully appreciated through a life-cycle perspective that begins at the conceptual phase of the project and carries through to design, construction, operations, maintenance, renovation, future reuse and even deconstruction.

Shades of green

Green development is not an all-or-nothing concept; shades of green are possible. While one building can meet a basic level of green by including energy-efficient appliances, water-saving fixtures and enhanced insulation, another building can reach a higher level of green by including all of these features plus double-glazed windows, low-emission materials, grey water reuse, solar panels and a green roof. Designers and developers can go even further by applying low-impact site development strategies, locating buildings near transit

TABLE 1. OBJECTIVES, STRATEGIES AND BENEFITS OF GREEN BUILDING

GREEN OBJECTIVES	STRATEGIES	BENEFITS
ENERGY EFFICIENCY	Use passive solar heating and cooling and natural ventilation; increase use of natural lighting to reduce need for artificial lighting; enhance penetration of daylight; use thermally efficient building envelope to reduce perimeter heating and size of HVAC; and use third-party rating agencies to ensure proper functioning of systems and recommend solutions	Reduced capital costs, reduced energy costs; superior lighting and thermal quality
WATER EFFICIENCY	Use captured rainwater for landscaping, toilet flushing, etc.; use low-flow fixtures; use closed-loop systems and other water reduction technologies, and treat and re-use grey water	Reduced water costs and reduced water consumption
TOXIN REDUCTION	Control sources of pollution, use low-emission and non-toxic materials	Superior indoor air quality; reduced health problems and costs; fewer occupant complaints and higher occupant productivity
WASTE REDUCTION	Eliminate unnecessary finishes and other products; use salvaged and recycled materials; select building products for durability, and design for adaptability	Improved environmental quality; longer building life cycle and reduced maintenance costs
SUSTAINABLE SITE SELECTION AND DEVELOPMENT	Locate within walking distance of transit, employment and shopping destinations; reduce site disturbance and soil erosion during construction; use natural drainage systems (e.g. swales); and landscape and orient building to capitalize on passive heating and cooling	Reduced transportation costs; reduced maintenance costs; reduced energy costs; improved environmental quality; preserves functioning of natural systems



services, designing buildings to maximize natural light, and utilizing waste-minimizing construction and demolition techniques. The list of greening strategies is lengthy. Skilled design and development teams can pick and choose approaches that best meet their needs and optimize the unique characteristics of the site and location.

Table 1 on page 6 outlines several key objectives of green building, potential strategies to accomplish the objectives, and associated benefits.

Green building standards

For a building or neighborhood to be considered green, it must demonstrate qualities that enhance well-being while limiting impact on the natural environment. These two objectives can be approached in numerous ways and with varying degrees of thoroughness. Several standards have been developed to guide project teams in the design, construction and operational stages of green development.

A variety of standards have emerged for several reasons. The decentralized nature of building practices in the U.S. has left the responsibility of developing standards to private agencies (with the exception of Energy Star, developed by the U.S. Environmental Protection Agency). One benefit of having a multitude of standards is that sustainable design is very sensitive to context. The standards suitable for green

buildings in Seattle, Washington, can vary substantially from those applicable in Lubbock, Texas, for example. In addition, each standard operates differently and offers different services at different prices. Competition among standards allows the consumer to shop around for the best price and the most applicable services. A disadvantage accompanying a decentralized system of standards is that conflicting and possibly contradictory information can arise from independent sources that have developed their own standards. The absence of a single authoritative body of sustainable-building guidelines can lead to disagreement and uncertainty about the process of building sustainably.

The table on page 8 describes the scope of several national green building standards. All of the standards listed here use third-party verification to determine whether a project meets the established environmental standards. If the standards are met, the project receives certification from the organization affiliated with the standard. Each of the affiliates also provides consultation to aid in the process of creating a green project. In turn, most groups charge for their services and certification. The list below does not account for all the national standards. As green building becomes better recognized as a profitable way to build, new standards are emerging with increasing frequency. ■



This family proudly owns an EarthCraft House built by Atlanta Habitat. Since 2004, Atlanta Habitat has been certified as an EarthCraft House builder by the Greater Atlanta Home Builders Association and Southface Energy Institute. They use numerous measures to improve efficiency in home building and operations, including building walls in the warehouse to reduce scrap and to make easier use of cut-offs, using drought-resistant plants and shrubs, and requiring homebuyers to complete education classes on energy features, maintenance and proper use of appliances and fixtures. Photo Credit: Atlanta Habitat for Humanity

TABLE 2. GREEN BUILDING RATING SYSTEMS

NAME	TYPE	AFFILIATION	WEBSITE
AUDUBON SIGNATURE PROGRAMS	Neighborhood developments	Audubon International	www.auduboninternational.org/programs/signature
ENERGY STAR	Homes, home and office products (such as refrigerators, air conditioners, etc.)	U.S. Environmental Protection Agency (EPA)	www.energystar.gov
GREEN COMMUNITIES CRITERIA	New construction and rehabilitation of affordable housing	Enterprise Foundation	www.greencommunitiesonline.org
GREEN GLOBES	Commercial buildings	The Green Building Initiative (GBI)	www.thegbi.org/commercial
LEADERSHIP IN ENERGY & ENVIRONMENTAL DESIGN (LEED)	New construction, existing buildings, commercial, interiors, core and shell, schools, retail, healthcare, homes and neighborhood developments	U.S. Green Building Council (USGBC)	www.usgbc.org
NATIONAL GREEN BUILDING PROGRAM™	New residential construction and renovations (single- and multi-family), additions to single-family homes, and residential and mixed-use developments	National Association of Home Builders	www.nahbgreen.org

For more information on state and local green building programs and certifications visit the Partnership for Advancing Technology in Housing (www.pathnet.org/sp.asp?id=20978).

The Bottom Line on Green

THERE IS NO CLEAR, ACROSS-THE-BOARD RESPONSE TO THE QUESTION, “WHAT DOES GREEN COST?” TOO MANY VARIABLES STAND IN THE WAY OF A DEFINITE ANSWER.

Different building types, local climates, site conditions and various other factors make it impossible to address such a general question accurately. Definite answers are, however, possible about what *kinds* of costs are associated with green.

Two cost aspects of green building must be considered: the first is design and construction; the second is operations and maintenance. The common argument in favor of green building contends that the benefits from green operations and maintenance (higher property values, reduced utility costs and improved health of occupants) outweigh any increase incurred through the cost of designing and constructing a green building. Those less convinced about green building claim that the design and construction costs are significant compared to conventional buildings, while the potential benefits of more efficient operations and maintenance are overstated, or at least, unsubstantiated. Which perspective is more plausible?

Current research indicates that in many cases investment in green is financially justified. It suggests that green building, on average, increases construction costs by 2 to 3 percent (see studies in Table 3). However, examples of greening for no additional costs are becoming more and more prevalent. For example, of the 221 buildings analyzed in the *Cost of Green Revisited* (a 2006 report by Davis Langdon that included academic buildings, laboratories, libraries, community centers and ambulatory care facilities) no statistically significant difference was found between the per-square-foot costs for LEED-seeking versus non-LEED seeking buildings.⁸

Because many of the benefits associated with building performance are realized in the long run, more assessments

of the up-front costs of green building are available than of the long-run benefits. Nonetheless a few studies have already demonstrated that the savings associated with the operation and maintenance of green buildings are substantial enough to increase property values. ■



Barriers to Green Development

While the momentum behind green development is clearly building, several obstacles remain to making it a mainstream practice. These include:

- The perception—sometimes real and other times not—that it costs more to build green;
- A lack of awareness of the demand for green;
- Limited knowledge, research and resources to support investment in green development fully;
- Lack of understanding about green practices and operations in many sectors involved in real estate development —construction, architecture, engineering, operations, financial and others;
- The complexity of green strategies, which require a significant investment of time and resources to be applied effectively;
- And outdated planning and building codes.

Several organizations such as the U.S. Green Building Council, Enterprise Community Partners and others are working to understand and overcome some of these obstacles.

TABLE 3. HOW COST EFFECTIVE IS GREEN BUILDING?

STUDY	AUTHOR(s)	DESCRIPTION	DATE
The Economics of Low-Impact Development: A Literature Review	ECONorthwest	This literature review describes the methods used by economists to measure the costs and benefits of low-impact development (LID) and conventional stormwater controls, and it summarizes the literature that compares the costs and benefits of LID to that of conventional stormwater controls.	2008
Costing Green: A Comprehensive Cost Database and Budgeting Methodology	Lisa Fay Matthiessen and Peter Morris, Davis Langdon	This report compares data on building costs of LEED buildings to those of buildings with comparable programs that do not have sustainable goals (non-LEED), analyzes incremental costs of LEED buildings over starting budgets, compares costs of specific green measures and technologies, and presents guidelines for developing appropriate budgets to meet building program goals.	2004
Cost of Green Revisited: Re-examining the Feasibility and Cost Impact of Sustainable Design	Lisa Fay Matthiessen and Peter Morris, Davis Langdon	Building on Davis Langdon's 2004 publication, <i>Costing Green: A Comprehensive Cost Database and Budgeting Methodology</i> , this report looks at the costs of building green (LEED certified) and finds that there is no significant difference in average costs for green buildings as compared to non-green buildings. The largest obstacle to building green, according to the study, is the misconception that green features are added on to an otherwise complete project.	2007
What Does Green Really Cost?	Peter Morris, Davis Langdon	Starting from the premise that sustainable design can be achieved with little or no additional cost (based on eight previous studies), the article offers steps to manage green building in a cost-effective and efficient manner.	2007
The Dollars and Sense of Green Buildings 2006: Building the Business Case for Green Commercial Buildings in Australia	Green Building Council Australia	This report consolidates the findings of international case studies on green commercial buildings and adds new research from Australia, focusing on financial and social benefits to the owner, manager, developer, investor, financier, tenant and community. It also examines barriers and challenges to green commercial buildings and recommends action for industry and government.	2006
The Economic Benefits of Green Buildings: A Comprehensive Case Study	Robert Ries and Melissa M. Bilec in <i>The Engineering Economist</i> , 51: 259-295	This academic article collects longitudinal data on employee productivity, absenteeism, energy use and the finances of a precast concrete manufacturing facility located near Pittsburgh, Pennsylvania. The article statistically analyzes the results and demonstrates that the company made a correct decision to build a green facility.	2006

Table continues on page 11

TABLE 3. HOW COST EFFECTIVE IS GREEN BUILDING? (cont.)

STUDY	AUTHOR(s)	DESCRIPTION	DATE
<p>The Costs and Financial Benefits of Green Buildings: A Report to California's Sustainable Building Task Force</p>	<p>Greg Kats, Capital E</p>	<p>This report finds that an upfront green investment of 2 percent of construction costs in state buildings typically yields a life-cycle savings of over ten times the initial investment. Savings come from lower energy, waste disposal and water costs, lower environmental and emission costs, lower operations and maintenance costs, and savings from increased productivity and health.</p>	<p>2003</p>
<p>The Costs and Benefits of Green Affordable Housing: Opportunities for Action</p>	<p>New Ecology, Inc.; Tellus Institute</p>	<p>Through a literature review and a series of case studies this paper identifies the benefits that greening affordable housing can provide, discusses the limitations of conventional project financial analysis that focuses too exclusively on “first costs,” and suggests use of life-cycle costing techniques.</p>	<p>2003</p>
<p>Incremental Cost, Measurable Savings: Enterprise Green Communities Criteria</p>	<p>Dana L. Bourland, Enterprise Community Partners, Inc.</p>	<p>This report shares findings from the evaluation of 27 affordable housing developments across the United States that meet the Enterprise Green Communities Criteria. The study finds that the projected “lifetime” utility cost savings—averaging \$4,851 per dwelling unit discounted to today’s dollars—are sufficient to repay the average \$4,524 per-unit cost of complying with the Criteria.</p>	<p>2009</p>
<p>Doing Well by Doing Good? Green Office Buildings</p>	<p>Piet Eichholtz, Nils Kok, John M. Quigley, in University of California, Berkley Institute of Business and Economic Research Working Paper Series (No. W08-001)</p>	<p>This paper provides the first evidence on the economic value of the certification of green buildings based on market transactions. The authors find that buildings with “green ratings” command substantially higher rents and selling prices than otherwise identical buildings.</p>	<p>2009</p>
<p>Assessing Green Building Performance: A Post Occupancy Evaluation of 12 GSA Buildings</p>	<p>Kim M. Fowler, Emily M. Rauch, U.S. General Services Administration</p>	<p>This study of sustainably designed buildings found that they cost less to operate, have excellent energy performance and have occupants that are more satisfied with the overall building than the occupants in typical commercial buildings.</p>	<p>2008</p>
<p>Does Green Payoff?</p>	<p>Norm Miller, Jay Spivey and Andy Florance. CoStar</p>	<p>This study compares Energy Star and LEED-certified buildings to conventional office properties using CoStar database and finds that sustainable buildings are more valuable.</p>	<p>2008</p>
<p>Quantifying “Green” Value: Assessing the Applicability of the CoStar Studies</p>	<p>Scott Muldavin, Green Building Finance Consortium</p>	<p>This report provides guidance to the real estate industry on the interpretation and use of data and research supporting green building investment.</p>	<p>2008</p>

Early Steps toward Green Finance

THE EVOLUTION OF GREEN FINANCE—A SYSTEM OF PUBLIC AND PRIVATE SECTOR FINANCING OPTIONS TO PROMOTE SUSTAINABLE DEVELOPMENT—WILL BE CRUCIAL IN SUPPORTING ENVIRONMENTALLY SOUND DEVELOPMENT PRACTICES.

Thus far government incentives and small, local and boutique financial institutions have led the way in embracing green development and creating targeted green lending programs. Some larger lenders are recognizing the market potential of this sector as well, and several are making major commitments to support green development. However, as an industry green financing is still maturing.

Banks are finding ways to go green

Many banks are adopting green practices. According to the 2008 IBT Market Pulse Survey, nearly three-quarters of financial institution executives surveyed said they plan to build a new branch or undertake major remodeling in the next year or two, and 75 percent of those are considering green building materials and practices. These executives reported that the move to green practices is led by a sense of environmental stewardship, a need to lower operating costs and a desire to be responsive to an issue that is important to their customers. By serving as role models for other green development projects, banks are providing education about sustainable buildings and demonstrating how to incorporate the savings from these buildings into standard underwriting practices.

In addition to implementing green practices in their own construction efforts, financial institutions are providing support for green development through financing for environmentally conscious multi-family and commercial developments, small businesses, and single-family home mortgages. They are also making loans for energy-efficient home improvements and helping to



market the green development model by educating their partners about the green model.

Smaller community banks have thus far been the real leaders in supporting green development. These institutions are more likely to offer favorable loan terms for green development. Incentives include reduction in interest rates and closing costs, higher loan-to-value ratio, or a longer amortization period for commercial or multi-family projects that adopt green principles. New Resource Bank, a community bank founded in 2006 in San Francisco, was the first bank in the country to focus specifically on supporting green businesses and sustainable personal banking. The Bank provides one-eighth of a percent discount on loans for projects that are built to U.S. Green Building Council standards and a no-down-

payment lending program to homeowners to install solar panels. It also offers a Solar Certificate of Deposit (CD) solely used to fund solar projects. Recognized by the U.S. Environmental Protection Agency in 2009, New Resource Bank is often regarded as an example of what community banks can do to support environmentally conscious building. Other “green” community banks include First Green Bank in Eustis, Florida and Green Bank in Houston, Texas.

Multi-family and commercial development

A number of banks are now offering construction and permanent financing to support environmentally conscious and green certified commercial and multi-family development. Wells Fargo has loaned over \$2 billion to LEED-certified projects, and Bank of America has pledged \$20 billion to support environmentally sustainable business activity over the next 10 years, with a key focus on financing LEED-certified projects. Most of the larger institutions are likely to offer standard loan terms for green projects; but by using underwriting models that account for increases in net income connected with the savings gleaned from green development practices, they are able to provide better financial terms for borrowers.

Single-family housing

A growing number of financial institutions are exploring creative products to promote energy-efficient single-family housing development and mortgages. Energy-efficient mortgages have become the most common green finance product. They qualify borrowers for slightly larger loans by adding projected savings on utility costs back to the borrower’s income. This increases their borrowing capacity. Borrowers are required to get an energy audit to confirm the projected utility savings.

In addition to offering green mortgages, some financial institutions are providing incentives for buyers of energy-efficient homes. Bank of America offers \$1000 off closing costs for customers who buy Energy Star-compliant homes. Several institutions also finance energy-efficient improvements such as solar panels, new windows, better insulation and more effective heating systems.

Other avenues for green lending

In addition to lending for green development, financial institutions are starting to offer green lending products for

other energy efficient choices. A number of financial institutions nationwide are now providing financing incentives for the purchase of hybrid cars. With rising energy costs, banks are recognizing the value of making loans for cars that are more likely to hold their resale value. Some banks, including Bank of America, are offering forgivable loans to their associates for the purchase of hybrid cars as an employment bonus.

Financial institutions are also creating special lending programs for businesses that promote environmental sustainability. Banks are familiar with the idea that projects emphasizing both financial and social benefits provide double returns for community development lending. Now they are beginning to consider the possibility of a triple bottom line that emphasizes the environmental return of a project as well. ShoreBank Pacific is a Washington-chartered bank that provides deposits, loans and consulting services to help businesses grow and become more environmentally sustainable. They worked with a business called Farm Power Northwest, which is recycling local farm and food waste into renewable electricity.

On a smaller scale, Georgia Green Loans, a new program started by Appalachian Community Enterprises, Inc., a Community Development Financial Institution (CDFI), provides loans to start or expand an eco-friendly business.⁹ With funding from the U.S. Small Business Administration, the program is able to make loans in amounts from \$500 to \$35,000 to businesses, including a family farm that grows organic vegetables, a restaurant that serves only locally-grown produce, an installer of solar panels or home insulation products, a manufacturer of biofuels or a renewable energy entrepreneur.

Finally, several banks are offering consumer products such as credit cards that are tied to contributions to environmentally responsible causes. Some, like New Resource Bank in San Francisco, are using all of their deposits to provide financing for green projects or companies.

Government incentives for green development

The second part of the green financing equation is government incentives to foster sustainable development and building. Either through grants and rebates, tax credits, fast track permitting or other strategies, the public sector is encouraging green building.

Most recently, legislation set forth by the federal government is playing a role in shaping green development. Through the American Reinvestment and Recovery Act (ARRA) of 2009, the federal government has made significant investments in domestic renewable energy and the weatherization of federal buildings and homes. Table 4 outlines several of programs and tax credits established by ARRA to advance green building and retrofits.

State and local efforts to advance green

Local and state governments, as well as utility companies, are beginning to offer programs and incentives to promote green building. Some local governments offer property assessment financing for energy-efficient improvements. In these instances, the fund is typically established by a state or local bond issue. The homeowner receives the improvement dollars from the local government and repays them through a supplemental property tax payment. In a similar scenario, utility

TABLE 4. ARRA PROGRAMS AND TAX CREDITS FOR GREEN BUILDING AND RETROFITS

PROGRAM	PURPOSE	APPROPRIATION	ADMINISTERING OFFICE
ASSISTED HOUSING GREEN RETROFIT PROGRAM	To support energy efficiency measures in developments that receive federal project-based assistance	\$250 million	Department of Housing and Urban Development (HUD) - Office of Affordable Housing Preservation
ENERGY EFFICIENCY AND CONSERVATION BLOCK GRANT PROGRAM	To fund local and state governments to develop and implement projects that improve energy efficiency and reduce energy use and emissions in their communities	\$3.2 billion	Department of Energy - Energy Efficiency and Renewable Energy
PUBLIC HOUSING CAPITAL FUND (FORMULA AND COMPETITIVE)	To support physical improvements like new building systems (heat, water and electrical), structural systems (roofs and exteriors), and rehabilitation work that corrects building deficiencies and improves the living conditions for public housing residents	\$4 billion	HUD - Public Housing Agencies
STATE ENERGY PROGRAM	To provide grants to states to improve energy efficiency to reduce energy costs and consumption	\$3.1 billion	Department of Energy - Energy Efficiency and Renewable Energy
WEATHERIZATION ASSISTANCE PROGRAM	To reduce the cost of energy efficiency upgrades for properties owned or rented by low-income families	\$5 billion	Department of Energy - Energy Efficiency and Renewable Energy
RESIDENTIAL ENERGY EFFICIENCY TAX CREDIT	To increase the energy tax credit for homeowners who make energy-efficient improvements to their existing homes	30% of qualified expenditure (\$1,500 maximum)	Internal Revenue Service
RESIDENTIAL RENEWABLE ENERGY TAX CREDIT	To provide a non-refundable energy tax credit to help individual taxpayers purchase qualified residential alternative energy equipment	30% of qualified expenditure (no maximum credit)	Internal Revenue Service

on-bill financing establishes a system in which homeowners pay for energy-efficient measures through surcharges on their monthly utility bills. These programs overcome the obstacle of upfront improvement costs by stretching the payments over time. Moreover, these programs tie the costs of the energy-efficiency measures to the home instead of the original borrower. If the homeowner moves, the new residents who will benefit from the improvements incur a portion of the costs.

These types of programs are not without their challenges. Because mortgage liens are subordinate to property taxes in the event of a foreclosure, mortgage lenders may have concerns about weakening their position when the improvement costs are added to the assessment. On the flip side, lenders for energy-efficient retrofits may see this as a benefit. These types of issues will need to be resolved in order to make such programs part of the mainstream.

Several states have also implemented interest rate buy-down programs. These programs use public subsidies to reduce interest rates on loans issued by participating lenders that homeowners use to finance energy-efficient improvements. Louisiana's Home Energy Loan Program (HELP) provides homeowners with a five-year loan to improve the energy efficiency of their existing home. The State's Department of Natural Resources subsidizes one-half of the financing for the energy-efficient improvements, making the loan more affordable.

Green finance slowed by obstacles

While some banks have made a strong commitment to green lending, the lending industry overall has not widely embraced this market. The lack of knowledge, experience and data continues to hinder the development of green finance, although efforts on all of these fronts are making advances.

For example, proponents of green development argue that a life-cycle approach is the most useful method for determining a project's financial viability. This approach considers both the initial capital costs and the ongoing operating expenses to assess the economics of the project accurately.

A primary concern is the lack of data to support the potential costs savings associated with different green building features, as well as dealing with the potential risk associated with longer term projections of cost savings.

In the absence of hard figures, banks struggle with valuing green buildings and capturing the costs savings in their underwriting models. More systematic data that goes beyond anecdotal evidence is needed to help banks evaluate the economics of a project, and efforts are underway to enhance this evidence base.

This issue is compounded as the appraisers who work with banks may be unfamiliar with green building practices. Appraisers seldom have the data necessary to support higher valuation of green buildings or the reduced operating expenses, so they struggle to appraise green buildings using techniques designed for appraising conventional buildings. The Appraisal Institute and others are tackling this issue by offering education aimed at improving appraisers' knowledge of green building practices and providing tools to assess its value.

Another issue raised by banks is the need for experienced development teams for green projects. Because of the slightly higher incremental costs associated with green development, developers may face narrower margins. Therefore, banks want to see that the developer's expertise and track record with green building ensures they can manage the increased costs effectively. Green certification alone is not sufficient evidence of expertise for many lenders who provide these types of loans. Because relatively few green projects have been completed, only a rather small number of green developers can satisfy lenders' experience requirements, although their numbers are rapidly rising.

An additional hurdle for financial institutions is their own lack of knowledge about different green building certifications. Greater education will help lenders understand what these designations ultimately mean for construction costs and building values.

Green development is a complex issue facing community and economic developers and the financial institutions that are partnering with them. Over the coming years, many policies, programs and partnerships will be needed to help green development financing mature into a sound and equitable framework for improving communities. ■

The Greening of Affordable Housing

STUDIES INCREASINGLY SHOW THE BENEFITS OF GREEN HOUSING, AND AFFORDABLE HOUSING ADVOCATES ARE WORKING TO BRING THOSE BENEFITS TO ALL PEOPLE, REGARDLESS OF INCOME. BUT HOW AFFORDABLE IS GREEN HOUSING?

While some examples suggest the construction costs of going green are nearly nonexistent, the common wisdom among developers is that using green practices adds between 2 and 5 percent to the total project cost. The good news is that these additional costs are likely to decrease over time as development teams gain experience. Rising demand for resource-sensitive materials, systems and practices is also anticipated to drive down costs.

Studies are increasingly illustrating that added construction costs can be offset by lower operating costs, as built-in efficiencies reap benefits through lower energy and water bills. For a homeowner, that means a slightly higher mortgage payment can be justified by a lower energy bill, as shown in Table 5.

Snapshots

Examples often provide the best insight. The projects described here illustrate three different ways developers in the Southeast have tackled the greening of affordable housing. As these examples show, green affordable housing developments present a great opportunity for nonprofits, for-profits and energy-related entities to work together to create unique developments that improve communities by providing low- and moderate-income families with affordable, sustainable housing. They also demonstrate that green developments do not necessarily have to be “all green” or “no green.” The transition from conventional building to green building can occur in small steps. By adding just one green feature to each new development, a developer can build a repertoire of green expertise.

TABLE 5. COMPARING COSTS OF CONVENTIONAL VERSUS GREEN BUILDING

	STANDARD NEW HOME	SAME HOME WITH ENERGY IMPROVEMENTS
Home price	\$150,000	\$154,816
Loan amount (10 percent down, 8 percent interest)	\$135,000	\$139,334
Monthly payment*	\$991	\$1,023
Energy bills	\$186	\$93
True monthly cost of homeownership	\$1177	\$1116
Monthly savings	—	\$61

*Estimated mortgage payments are based upon principle and interest only and do not include taxes and insurance. Values indicated here are for example only and will vary from home to home. Source: HUD, www.hud.gov/offices/hsg/sfh/eem/eemhog96.cfm, 2001



MERRYPLACE

MerryPlace is a mixed-income development that has a workforce housing component available to families earning no more than 140 percent of the area median income. All affordable housing residences in MerryPlace meet the Florida Green Building Coalition green development standard, making this one of the first certified-green, affordable housing communities in Florida. This development includes several green features such as waste minimization and recycling of materials during the construction phase, landscaping with native plants, high-efficiency drip irrigation, extra building insulation, and Energy Star appliances and fixtures.

LOCATION: WEST PALM BEACH, FL

COMPLETION DATE: DECEMBER 2008 (PHASE 1)

PROJECT COST: \$22,000,000

PROJECT SITE: 14-ACRE MEDIATED BROWNFIELD REDEVELOPMENT SITE WITH 128 SUBSIDIZED RENTAL AND 117 OWNERSHIP UNITS (52 CONDOS, 47 TOWNHOUSES, 14 SINGLE-FAMILY DETACHED HOMES, 4 MIXED-USE RETAIL BUILDINGS)

FUNDING PARTNERS: LOW INCOME HOUSING TAX CREDITS, BANK OF AMERICA, CITY OF WEST PALM BEACH, WEST PALM BEACH COMMUNITY REDEVELOPMENT AGENCY

OTHER PARTNERS/CONSULTANTS: PALM BEACH COUNTY DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT, FLORIDA HOUSING FINANCE CORPORATION, FLORIDA PUBLIC UTILITIES, GRAND BANK & TRUST OF FLORIDA, COMMUNITY LOAN FUND, FLORIDA SOLAR ENERGY CENTER

OWNER/DEVELOPER: MERRYPLACE DEVELOPMENT, LLC; BANC OF AMERICA COMMUNITY DEVELOPMENT CORPORATION; WEST PALM BEACH HOUSING AUTHORITY

MORE INFORMATION:

<http://merryplace.org/>



OPERATION NEW HOPE

Operation New Hope reports developing the first affordable LEED-certified homes in Florida. The average cost to construct a home was \$165,000. However, subsidies from the City of Jacksonville and other programs allowed Operation New Hope to reduce the average final purchase price to \$90,000. Green features include fiberglass insulation blown into the wall cavities, drought-tolerant landscaping, low-odor paint, water-conserving toilets, Energy Star appliances, light-reflecting windows, foundational slabs made with recycled concrete, and waste minimization and recycling during the construction phase.

LOCATION: JACKSONVILLE, FL

COMPLETION DATE: JULY 2009

PROJECT COST: \$825,000

PROJECT SITE: A RESIDENTIAL INFILL PROJECT WITH 5 SINGLE-FAMILY DETACHED HOMEOWNERSHIP UNITS

FUNDING PARTNERS: CITY OF JACKSONVILLE, STATE (OF FLORIDA) HOUSING INITIATIVE PARTNERSHIP, HOMEOWNERSHIP POOL PROGRAM, HEAD START TO HOME OWNERSHIP, LOCAL INITIATIVES SUPPORT COALITION-JACKSONVILLE, EVERBANK

OTHER PARTNERS/CONSULTANTS: JACKSONVILLE ELECTRIC AUTHORITY, U.S. GREEN BUILDING COUNCIL-NORTH FLORIDA CHAPTER, HOME ENERGY SERVICES, R.P. WITT CONSTRUCTION

OWNER/DEVELOPER: OPERATION NEW HOPE COMMUNITY DEVELOPMENT CORPORATION

MORE INFORMATION:

<http://operationnewhope.com/>



ADAMSVILLE GREEN SENIOR APARTMENTS

The Adamsville Green Senior Apartments are being built to the EarthCraft multifamily standard, which requires multifamily developments to score at least 200 points to receive certification. This development will score more than 300 points, placing it among regional leaders of green affordable housing. In addition to being built green, the majority of the units in the Adamsville Green Senior Apartments will be designed to accommodate those with physical disabilities. This development will include a roof-mounted solar photovoltaic system to generate power for the building and a rainwater cistern to provide water for irrigation. Another unique feature is the inclusion of two identical stairwells, one with an LED lighting system and one with conventional EnergyStar lighting. Each stairwell will be metered separately, allowing site managers to monitor and quantify experienced savings between the LED and conventional lighting.

LOCATION: ATLANTA, GA

COMPLETION DATE:

TO BE COMPLETED BY AUGUST 2010

PROJECT COST: \$12,000,000

PROJECT SITE: 90 APARTMENT UNITS FOR SENIORS 62 YEARS OR OLDER (81 DESIGNATED FOR SENIORS AT OR BELOW 60 PERCENT OF THE AREA MEDIAN INCOME, 9 MARKET-RATE UNITS)

FUNDING PARTNERS: GEORGIA DEPARTMENT OF COMMUNITY AFFAIRS, STATESIDE CAPITAL, RBC CAPITAL MARKETS, ATLANTA DEVELOPMENT AUTHORITY, ATLANTA HOUSING AUTHORITY

OTHER PARTNERS/CONSULTANTS: CARINGWORKS, INC., PRISM, SOUTHFACE ENERGY INSTITUTE

OWNER/DEVELOPER: ADAMSVILLE GREEN LIMITED PARTNERSHIP AND PROGRESSIVE REDEVELOPMENT, INC

MORE INFORMATION:

<http://www.prihousing.org>

Partners in Green Affordable Housing

NeighborWorks America's Think Green, Act Green

www.nw.org/network/aboutUs/green/default.asp

Launched in February 2008, this program focuses on advancing environmental responsibility across the community development industry and bringing more "green" benefits to low- and moderate-income families. NeighborWorks America uses its prominent role as an educator and facilitator of community development to deliver training in green approaches for the community development industry with the goal of promoting sustainable housing. It also provides a network of more than 230 local organizations with tools and resources to make green considerations a component in all of their programs.

Enterprise Community Partnership's Green Communities

www.greencommunitiesonline.org

Calling for systemic change in green affordable housing, Enterprise announced a groundbreaking \$4 billion commitment to launch the next generation of its Green Communities initiative. Building on its own commitment, Enterprise issued a national "call to action" to public, private and nonprofit sectors to make all affordable housing—new and existing—green by 2020. The next generation of Enterprise Green Communities aims to be the catalyst for unprecedented health, economic and environmental benefits for families in neighborhoods across America. Enterprise plans to create, preserve or retrofit 75,000 green homes and community and commercial buildings within the next five years.

Local Initiatives Support Corporation (LISC) Green Development Center

www.lisc.org/section/goals/healthy/green_dev

The Center provides financial resources, technical information, partnership opportunities, and education to LISC programs and community developers to support green design, construction, and management principles in low- and moderate-income neighborhoods. LISC believes that greener buildings are key components in achieving sustainable communities of choice and opportunity—good places to work, do business and raise children.

Glossary

GREEN DEVELOPMENT HAS A LANGUAGE ALL ITS OWN. HERE IS A GLOSSARY OF TERMS YOU MAY ENCOUNTER AS YOU LEARN MORE ABOUT GREEN BUILDING AND DEVELOPMENT.¹

ADAPTIVE REUSE: Renovation that changes a building or site so it can be used in a new way.

BIODEGRADABLE: Substances that break down naturally and are absorbed into the eco-system.

BROWNFIELDS: Abandoned, idled, or under-used industrial and commercial facilities or sites where expansion or redevelopment is complicated by real or perceived environmental contamination. They can be in urban, suburban or rural areas. EPA's Brownfields Initiative helps communities mitigate potential health risks and restore the economic viability of these sites.

BUILDING DENSITY: The floor area of the building divided by the total area of the site (square feet per acre).

CARBON DIOXIDE: Carbon dioxide (CO₂), an atmospheric gas that is a major component of the carbon cycle, is produced through both natural processes and human activities, such as the combustion of fossil fuels to create electricity. Carbon dioxide is the main source of the greenhouse effect, and thus it contributes to climate change.

CARBON FOOTPRINT: The environmental impact of carbon dioxide produced through human activity, measured in units of carbon dioxide.

CARBON NEUTRAL: Not producing any carbon emissions or, if producing carbon emissions, offsetting them elsewhere. This designation can be applied to companies, individuals or activities.

CARBON OFFSET: A financial instrument aimed at a reduction in greenhouse gas emissions. Carbon offsets are measured in metric tons of carbon dioxide-equivalent. One carbon offset represents the reduction of one metric ton of carbon dioxide or its equivalent in other greenhouse gases. There are two markets for carbon offsets. In the larger, compliance market, companies,

governments or other entities buy carbon offsets in order to comply with caps on the total amount of carbon dioxide they are allowed to emit. In the much smaller, voluntary market, individuals, companies or governments purchase carbon offsets to mitigate their own greenhouse gas emissions from transportation, electricity use and other sources.

CARRYING CAPACITIES: The limit on the number of species, ecosystems or habitats possible given the supply and availability of resources in a given area. In human settlements, this term also refers to the limits beyond which the quality of life, community character, or human health, welfare, and safety will be impaired; it includes, for example, the estimated maximum number of people that can be served by existing and planned infrastructure systems, or the maximum number of vehicles that can be accommodated on roadways.

CLIMATE CHANGE: Climate change refers to any significant shift in measures such as temperature, precipitation, or wind that last for an extended period of decades or longer. Climate change may result from natural factors, such as changes in the sun's intensity or slow changes in the Earth's orbit around the sun; natural processes within the climate system such as changes in ocean circulation; human activities that change the atmosphere's composition, such as burning fossil fuels; or changes in the land surface through deforestation, reforestation, urbanization or desertification.

CRADLE-TO-CRADLE: A term used in life-cycle analysis to describe a material or product that is recycled into a new product at the end of its defined life.

CRADLE-TO-GRAVE: A term used in life-cycle analysis to describe the entire life of a material or product up to the point of disposal. It also refers to a system that handles a product from creation through disposal.

FOSSIL FUELS: These come in three major forms— coal, oil and natural gas. Because fossil fuels are a finite resource and cannot be

¹ This glossary is generated from a variety of references, including those from the U.S. Environmental Protection Agency (www.epa.gov/greeningepa/glossary.htm and www.epa.gov/heatisland/resources/glossary.html), the City of Seattle (www.seattle.gov/DPD/GreenBuilding/OurProgram/Resources/Greenbuildingglossary/default.asp), and Unitil Corporation, a public utility holding company (www.unitil.com/green/articles/Primer_Glossary.pdf). It has been reprinted with permission.

replenished once they are extracted and burned, they are considered non-renewable. Fossil fuels are the nation's principal source of electricity. They are popular largely because of their low cost.

GEOTHERMAL ENERGY: Heat that comes from the earth.

GRAYWATER: As defined by the Uniform Plumbing Code, graywater is "untreated household wastewater which has not come into contact with toilet waste. Grey water includes water from bathtubs, showers, bathroom wash basins, and water from clothes-washer and laundry tubs. It shall not include wastewater from kitchen sinks or dishwashers." The International Plumbing Code defines graywater as "wastewater discharged from lavatories, bathtubs, showers, clothes washers, and laundry sinks." Some states and local authorities include kitchen sink wastewater in the definition of graywater.

GREEN POWER: Renewable energy resources such as solar, wind, geothermal, biogas, biomass and low-impact hydro generated power.

GREEN PRICING: Customers pay a small premium for electricity generated from green power resources. The premium covers the increased costs incurred by the electric utility for adding green power to its mix.

GREEN ROOF: Green space contained on or integrated with a building roof. Green roofs maintain living plants in a growing medium on top of a membrane and drainage system. Green roofs are considered a sustainable building strategy because they can reduce stormwater runoff from a site, modulate temperatures in and around the building, provide thermal insulation, and create habitat for wildlife and open space for humans, among other benefits.

GREENFIELDS: Sites that have not been previously developed or graded and remain in a natural state.

GREENHOUSE EFFECT: The process that raises the temperature of air in the lower atmosphere due to heat trapped by greenhouse gases such as carbon dioxide, chlorofluorocarbons and ozone.

GREENHOUSE GAS: Any gas that absorbs infrared radiation in the atmosphere. Greenhouse gases include water vapor, carbon dioxide, methane, nitrous oxide, halogenated fluorocarbons, ozone, perfluorinated carbons and hydrofluorocarbons.

GREENWASH: Misleading information disseminated by an organization to present an environmentally responsible public image.

IMPERVIOUS SURFACE: A surface that sheds the precipitation falling on it, rather than infiltrating it. Impervious surfaces can lead to excessive stormwater runoff and limit the amount of stormwater that remains onsite or recharges local aquifers.

INFILL: Infill development is the economic use of vacant land, or restoration or rehabilitation of existing structures or infrastructure, in already urbanized areas where water, sewer and other public services are in place.

INTEGRATED DESIGN: A holistic process that considers the many disparate parts of a building project by examining the interaction among design, construction, and operations to optimize the energy and environmental performance of the project. It considers all relevant issues simultaneously in order to solve many problems with one solution. The goal of integrated design is developments that can heal damaged environments and become net producers of energy, healthy food, clean water and air, and healthy human and biological communities.

LIFE CYCLE ANALYSIS (LCA): The assessment of a product's full environmental costs, from raw material to final disposal, based on consumption of resources, energy and waste. Life cycle analysis is used to evaluate the relative performance of building materials, technologies and systems.

PASSIVE SOLAR: Strategies for using the sun's energy to heat (or cool) a space, mass or liquid. Passive solar strategies do not require pumps or controls to function. One example is a window oriented for solar gain and coupled with a wall for thermal storage.

PHOTOVOLTAIC (PV) CELL: An electronic device consisting of layers of materials capable of converting light directly into electricity.

POLLUTION: Generally, the presence of a substance that, because of its chemical composition or quantity, prevents the functioning of natural processes and produces undesirable environmental and health effects.

RENEWABLE ENERGY RESOURCES: Sources that can keep producing energy indefinitely without being used up. To qualify, a resource must rely on naturally existing energy flows such as sunshine, wind and water. The energy source, or "fuel", must be replaced by natural processes at a rate equal to, or faster than, the rate at which it is consumed.

URBAN HEAT ISLAND EFFECT: The measurable increase in ambient urban air temperatures resulting primarily from the replacement of vegetation with buildings, roads and other heat-absorbing infrastructure. The heat island effect can result in significant temperature differences between rural and urban areas.

Resources

Energy Star, U.S. Environmental Protection Agency and U.S. Department of Energy: www.energystar.gov

ENERGY STAR is a joint program of the U.S. EPA and DOE designed to cut energy costs and protect the environment through energy-efficient products and practices. ENERGY STAR ratings apply to appliances as well as homes and other buildings.

State Energy Programs, U.S. Department of Energy: www.eere.energy.gov/state_energy_program/

The site provides descriptions of state renewable energy and energy efficiency projects that are funded by DOE's State Energy Program (SEP). This site hosts the High-Performance Buildings Case Studies Database, U.S. Department of Energy (www.eere.energy.gov/buildings/database), which includes data on various factors that affect a building's performance, such as energy, materials, and land use.

U.S. Green Building Council: www.usgbc.org

The U.S. Green Building Council is a nonprofit consortium responsible for the Leadership in Energy and Environmental Design (LEED) Green Building Rating System™, a program that encourages sustainable green building and development practices by creating performance criteria and implementing tools to assess them.

National Association of Home Builders' (NAHB) Green Building Program: www.nahbgreen.org

The National Green Building Program helps NAHB members move green building into the mainstream by regularly incorporating energy efficiency, water and resource conservation, sustainable or recycled products, and indoor air quality into building practices.

Southface Energy Institute: www.southface.org

Southface is a nonprofit corporation providing environmental education, technical assistance, training and hosts Greenprints, the affordable green building conference and tradeshow.

Energy Efficient Mortgages, U.S. Housing and Urban Development: www.hud.gov/offices/hsg/sfh/eem/energy-r.cfm

The Energy Efficient Mortgages Program (EEM) makes it possible for homeowners to save on utility bills by helping them finance the cost of adding energy-efficiency features when they purchase FHA-insured homes or refinance their mortgages.

Residential Energy Services Network: www.natresnet.org/

RESNET is a national network of mortgage companies, real estate brokerages, builders, appraisers, utilities, and other housing and energy professionals. This site offers state contact information for certified energy raters and lenders who know how to process energy-efficiency mortgages. RESNET coordinates the Mortgage Industry National Home Energy Rating Standards (HERS).

Database of State and Federal Incentives for Renewables and Efficiency (DSIRE), North Carolina State Solar Center: www.dsireusa.org

DSIRE is a comprehensive source of information about state, local, utility and federal incentives that promote renewable energy and energy efficiency.

Green Building Finance Consortium: www.greenbuildingfc.com

The Green Building Finance Consortium (GBFC) is a group of corporations, real estate companies and trade groups that provide independent research and analysis of investment in green or energy-efficient buildings. The site includes a searchable research library.

NOTES

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- For more information about visit the U.S. Conference of Mayors Climate Protection Center at www.usmayors.org/climateprotection/.
- U.S. Conference of Mayors. 2007. *Survey on Mayoral Leadership on Climate Protection*. www.usmayors.org/climateprotection/climatesurvey07.pdf.
- RCLCO. 2008. *Measuring the Market for Green Residential Development*. www.usgbcncr.org/Documents/MarketforGreenResidentialDevelopment.pdf.
- As part of the Energy Independence and Security Act of 2007, Congress added three new public policy goals to the U.S. Small Business Administration (SBA) 504 Loan Program to assist businesses invest in energy-efficient improvements. For more information visit www.sba.gov/financialassistance/borrowers/guaranteed/CDC504lp/index.html.
- See pages 10 and 11 for several of the recent studies on the financial costs and benefits of green building.
- For more information about the Georgia Green Loans program visit www.georgiagreenloans.org.

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