Federal Reserve Bank of Boston
2008 Issue 2

New England Community Developments

Emerging Issues in Community Development and Consumer Affairs

The Marriage of Green and Affordable

by Trisha Miller

Over the last few decades, green has gone from radical to mainstream. We see the impact of the movement everywhere–from the rapid growth of the renewable energy sector to countless green labels for consumer products in the marketplace. Green or sustainable design has also picked up momentum. This approach integrates materials and methods that promote environmental quality, economic vitality, and social benefits through design, construction, and operation of the built environment. Building green minimizes air and water pollution, global warming, and the depletion of natural resources, while simultaneously creating a healthier living environment and lowering operating costs and maintenance needs. Rising energy bills, transportation costs, and health-care expenses are contributing to the popularity of green design.

Developers across the country are beginning to apply green design to affordable housing. This budding practice has the potential to provide significant benefits to lower-income families, who pay proportionately more for energy and are disproportionately affected by health problems related to poor air quality. One organization working to bring green affordable housing to scale is Enterprise Community Partners, a not-for-profit institution that provides expertise and financing for affordable housing. This article discusses the case for uniting green and affordable, highlights the first national design and

Trolley Square in Cambridge, Massachusetts. Green homes open onto Cambridge Linear Park, a bicycle and walking path.

Inside

Trolley Square is a green mixed-use development built on the former storage site for the city's trolley cars.

construction criteria for green affordable homes created by Enterprise, and shares some of the lessons the organization has learned to date.

The Challenge of Our Built Environment

Our nation's buildings significantly impact our natural systems and the lives of residents. The buildings where we live, work, and study utilize vast amounts of energy, consuming between 30 percent and 40 percent of total energy used in the United States annually. Residential units, including owner-occupied houses and rental apartments, account for the largest share of energy use and greenhouse gas emissions among the different building types. A significant fraction of these residential units—20 percent (25 million units)—are occupied by low-income families.

Buildings consume between 30 percent and 40 percent of total energy used in the United States annually.

Home energy costs consume a larger portion of total income for lower-income families than they do for families with higher incomes.[1] Moreover, evidence shows that home energy and gasoline price increases are forcing many lower-income families into the untenable position of choosing between life's basic necessities. According to a 2008 survey conducted by the National Energy Assistance Directors' Association, 31 percent of low-income households reported keeping their homes at a temperature that they felt was unsafe so that they would be able to pay their energy bills.[2] Nearly 70 percent of the households reported that they reduced spending on food so that they could pay their energy bills, 31 percent reported that they reduced spending on medicine, and 61 percent reported that they reduced purchases of other basic household expenses.

In addition, air quality can be poor in many homes. The U.S. Environmental Protection Agency found that levels of air pollution inside the home can be two to five times higher–and sometimes up to 100 times higher–than outdoor levels.[3] Poor ventilation of mold, dust, and toxic materials that can include cleaning agents, gases from combustion and household stoves, paints, carpet chemicals, and adhesives can contribute to increased health risks. Poor air

quality inside the home is linked to higher rates of medical problems, including asthma, for low-income children. Unhealthy homes are also linked with higher rates of viral and bacterial infections for low-income children.

Recognizing the impacts of buildings on the environment and residents, Enterprise launched the Green Communities Initiative in 2004. Under the initiative, the group provides funding and expertise to help developers in all climatic regions of the United States learn to design, build, and rehabilitate affordable homes that are healthy, energy-efficient, and better for the environment. A key component of the Green Communities Initiative is the Green Communities Criteria, a roadmap for achieving health, economic, and environmental benefits for residents through cost-effective green design and construction.

The Green Communities Criteria

The Green Communities Criteria is the first national framework for environmentally sustainable affordable homes. It provides developers with a proven, cost-effective roadmap and green reference standard for new construction and rehabilitation of multifamily as well as single-family affordable homes. The criteria were developed in collaboration with the Natural Resources Defense Counsel, an environmental action group, and endorsed by a number of leading environmental, energy, green building, affordable housing, and public health organizations. The criteria reference established national standards, such as Energy Star, and are aligned with the Leadership in Energy and Environmental Design for Homes (LEED-H) national green rating system.[4] By design, the criteria are compatible with local green affordable housing programs run by Enterprise's partners, such as Southface's EarthCraft Multifamily program, based in Atlanta, Georgia.[5]

The Green Criteria contain mandatory and optional provisions. Under the program, a green project must meet a minimum number of criteria that include:

- Integrated design
- Suitable site, location, and neighborhood fabric (e.g., choosing a site close to retail services and orienting buildings to make the greatest use of solar heating and cooling)
- Site improvements
- Water conservation
- Energy efficiency
- Materials beneficial to the environment
- Healthy living environment
- Appropriate operations and maintenance (e.g., designing manuals for property managers and training for residents that explain the intent and use of green building features)

Over the last four years, Enterprise has invested more than $570 million in homes that are built or being built according to the Green Communities Criteria, creating more than 13,000 green affordable homes in more than 300 developments in 30 states. The program has tested the potential of integrating green materials and methods throughout the affordable housing development process. These efforts are helping to transform the market and generate long-term health and economic savings to underserved communities. Below we provide highlights of what we are learning in the field.

Wentworth Commons in Chicago, Illinois. The newly constructed building is the first supportive housing development in the Midwest to achieve the LEED certification.

Highlights from the Field

Architects and developers of the 300-plus Green Communities developments have underscored a recurring theme: the value of introducing integrated design early in the development process. We know that by the time that the first 1 percent of a proj-

ect's up-front costs is spent, up to 70 percent of its life-cycle costs may already be committed.[6] This reinforces the need to adopt regional and national green building standards as guides for early planning and design. Early integration of green design involves exploring the possibilities of green for the project and developing buy-in with the full spectrum of development stakeholders as early as possible.

Trolley Square's resident guide to green living has become a template for green development across the country.

Integrated design offers the greatest opportunity to demystify the construction process and democratize design through direct community participation. It also leads to enhanced building performance and economic benefits. As Ed Connelly from New Ecology, a Massachusetts-based green consulting organization, explains to Enterprise: "Decisions about layout, heating systems, landscaping and draining, health issues, water issues—none of these should be decided in silos. Everybody should know what everyone else is doing. This results in a better project." Ideally, the entire project team will share a commitment to sustainable design and be able to consider these priorities in the context of the site, regulatory constraints, and the development goals of the interested parties and funding sources to achieve cost-effective green solutions.

Plaza Apartments in San Francisco. A view of the rooftop solar panels on this mixed-use development that includes low-income housing.

Enterprise is developing a national green affordable housing portfolio that includes a wide variety of building types: a mixed-use real estate development in Boston; new rental construction in the suburbs of Portland, Oregon; homeless housing on an infill site in downtown San Francisco; single-family homes in Blacksburg, Virginia; supportive housing in rural New Mexico; and the revitalization of public housing in Cleveland. Below we highlight three Green Communities developments, showing how the project team worked to integrate green design into affordable housing.

Trolley Square–Cambridge, Massachusetts

Trolley Square in Cambridge, Massachusetts, is a flagship project for integrated, sustainable design, consisting of 32 rental apartments, eight home-ownership townhouses, and street-level retail space. The innovative, transit-oriented development is located on the former site of the city's trolley car barns. While the trolley cars have long since disappeared from this Boston metro landscape, the new development has direct access to the current mass transit system and pedestrian corridors. Homes open onto Cambridge Linear Park, a bicycle and walking path.

Environmental sustainability was at the forefront of the development team's planning efforts. The project was developed by Homeowner's Rehab Inc. (HRI), a not-for-profit affordable housing organization that has built more than 1,500 units of affordable housing in the Cambridge area. According to HRI's senior project manager, Jane Jones, "The mission of HRI is to produce quality affordable homes for our residents that are energy efficient, do not negatively impact the environment, and at the same time help reduce monthly bills and operating costs." The development team took into consideration all aspects of the Green Communities Criteria, from recommendations on where to build to ideas on what types of materials to use in construction and how to train residents to make the most of green building features. The criteria were particularly useful in enabling the team to weigh the costs of building methods and materials against their potential energy efficiency, cost savings, and health impacts to residents. Ultimately, the team selected durable and resource-efficient materials for exterior siding, cabinets, doors, hardware, and flooring, and incorporated a wide range of energy conservation features which

meet or exceed Energy Star guidelines.

Trolley Square grew out of an initial collaboration among Cambridge's Community Development Department, the green consulting firm New Ecology Inc., HRI, and the local neighborhood. All of these partners are working to help residents realize the benefits of sustainable homes. For example, partners have worked together to pioneer a Resident Guide to green living that helps residents capture the direct savings of the healthier and more energy efficient homes—this guide has become a template for green developers across the country. Just two years after completion of the development, the project is fully occupied and residents are experiencing sizeable energy and water savings. Currently, these partners are using grant support from Enterprise to design green training guidelines to be used with current and future residents to ensure that the full health, economic, and environmental benefits are realized throughout the project's lifecycle.

Galen Terrace–Washington, DC

Most of the 124 million housing units that exist in the United States were built before green was in our lexicon. For this reason, it is imperative that we develop and promote green approaches to preserving our aging housing stock, including affordable units. Older units use roughly 25 percent more energy than newly constructed units of the same scale. Moreover, the majority of very low-income families live in older housing.

The project team behind the renovation of Galen Terrace Apartments took on the task of providing a green retrofit for this formerly dilapidated housing complex in Washington, DC. The National Housing Trust joined forces with Enterprise Preservation Corp., Somerset Development Company, and the Galen Terrace Tenants Association to revitalize the existing 83-unit affordable housing community in the heart of historic Anacostia. The neighborhood is among the lowest-income and highest crime rate areas in the District of Columbia. The residents of Galen Terrace and the development team worked tirelessly to integrate green building principles into an innovative grassroots revitalization plan for Galen Terrace and the surrounding neighborhood that would address safety, improve the quality of housing, increase energy efficiency, and create a healthier living environment.

Galen Terrace received a $56,000 per unit renovation financed with private activity bonds, low-income housing tax credits, soft loans provided by the District of Columbia, and a Green Communities grant from Enterprise. The project included a comprehensive review by an energy auditor to identify and help incorporate all cost-effective energy improvements that offered a payback within 10 years. These plans included installing geothermal heat pumps, Energy Star qualified appliances, energy efficient light fixtures, and daylight sensors. Other elements such as hot water heaters, pipes, reflective roofing, carpeting, and rain water collection barrels were selected to meet or exceed the Green Communities Criteria. The developers provided renters with a green home guide, required under the criteria, and a training session to explain and review green building features, operations, and maintenance. The training is helping residents become the environmental stewards of their community and capture the full health and economic benefits of green rehabilitation.

Hotel Essex in San Francisco, California. The seven story hotel has been converted into green apartments for homeless individuals with disabilities.

Schiff Residences–Chicago, Illinois

Located on the former site of the notorious Cabrini-Green public housing complex, the Margot and Harold Schiff Residences emerged as the antithesis of concrete-era public housing. Schiff provides quality affordable housing and supportive services to formerly homeless, disabled, and very low-income single adults.

This modern, 96-unit galvanized steel building was designed by preeminent architect Helmut Jan and completed in 2006. A small prairie on site helps to soften the appearance of the steel exterior and counter the urban heat island effect of the area. One of the most dramatic green features of this project is a set of aero turbines–the first battery-free wind power generators in the world. This roof-mounted wind turbine system provides a portion of the energy required to power the building. Schiff is also Chicago's first residential development to house a gray water system that captures runoff from sinks, tubs, and showers and recycles the runoff in an underground treatment plant.

Besides renewable wind and water technologies, the project incorporates additional energy-efficiency and renewable-energy systems on site. For example, the project includes an adaptive "skin" exterior–highly insulated metal panels and interior sunshades used to control daylighting. The building also incorporates solar thermal panels, which are expected to result in energy savings of more than 30 percent compared with conventional domestic water heating systems.

Project developer Mercy Housing Lakefront concludes that the green methods and materials incorporated in the Schiff Residences represent 3.8 percent of the total project costs, which came in at just under $18 million. The projected energy savings is between 22 percent and 25 percent annually. The developer's creative top-to-bottom approach to utilizing renewable energy and efficiency measures generates a direct pocketbook savings for residents, many of whom were formerly homeless and currently earn less than 30 percent of area median income.

Green construction and rehabilitation can generate substantial long-term savings from lower energy and water use, as well as contribute to better health outcomes for communities.

Evaluating the Costs and Benefits of Going Green

Enterprise is engaged in ongoing and extensive efforts to evaluate the true costs of implementing the Green Communities Criteria. A post-construction assessment of 18 Green Communities developments conducted by Advanced Energy, a not-for-profit energy efficiency consulting firm, reveals that the development costs of building the sustainable homes is only marginally higher–two to four percent higher on average.[7] Data suggest that these costs can come down considerably with experience. Civil engineers and architects who have completed their first green development will likely transfer their knowledge of green building materials and techniques to future developments. In addition, the evaluation has shown most of the marginally higher construction and rehabilitation costs are attributable to measures that generate financial savings, such as energy and water efficiency features, or enable developments to incorporate integrated design.

The pilot study also underscores the importance of integrated design for achieving green benefits. The report shows that performance targets must make it into a project's plans and specifications if the project is to achieve substantial environmental performance and energy savings. For example, when the Green Communities Criteria were included in the original plans and specifications, these features were found 95 percent of the time in the completed buildings. For criteria not found in the original plans or specifications, this figure dropped to 37 percent. The study also concludes that involving stakeholders early on in the development of the designs and specifications has proved critical to mitigating cost overruns and decreased performance resulting from using nonconforming building methods and materials.

Another study of 16 green affordable housing projects by New Ecology Inc. and the Tellus Institute, a not-for-profit sustainable development research and policy organization, takes a longer view of the costs and benefits associated with green sustainable design.[8] Their evaluation looks at the life cycle of an affordable housing development and shows that green affordable housing can be more cost-effective than conventional affordable housing. The costs of going green can be significant in the short term, but green affordable homes can generate substantial long-term cost savings from lower energy and water use, as well as contribute to better health outcomes for low-income and minority communities.

Our Sustainable Future

New policies for green affordable housing have contributed to market transformation, including an expansion of the sector's playing field. Projects like Trolley Square, Galen Terrace, and Schiff Residences are proving that green and affordable are compatible in a variety of housing environments. In addition to the green policy efforts of not-for-profit organizations like Enterprise, more than 120 municipalities across the United States have adopted green building policies for publicly funded construction, and 12 cities, including Boston, Washington, DC, and San Francisco, have extended their regulations to privately funded construction. Still, there is a lot of work to be done to strengthen green building codes and create incentives that will stimulate additional investment in green housing, including affordable housing. Moreover, the affordable housing community and policymakers will benefit from additional research that assesses the relative impact of various approaches to green affordable housing on resident health, energy costs, and the natural environment.

In addition to the recovery of the housing market and broader economy, climate change and rising home energy prices will dominate our domestic policy agenda in the years ahead. The first four years of the Green Communities Initiative have demonstrated across multiple regions that it is possible to improve the quality of affordable housing by creating healthier living environments and lowering carbon emissions, all the while producing cost savings. The task ahead will be to further integrate policies and advances in the broader green movement with those in housing and neighborhood redevelopment, a task that will require continued bold responses to the challenges of our built environment.

Trisha Miller *is deputy director of the Green Communities Initiative at Enterprise Community Partners.*

Sources

American Housing Survey, U.S. Census Bureau, 2005.

Annual Energy Review, U.S. Department of Energy, Washington, DC, 2003.

Costs and Benefits of Green Affordable Housing Study, New Ecology Inc., Boston, 2005.

Enterprise Green Communities Project Assessment Study, 2007 - 2008, Enterprise Community Partners, Columbia, MD, 2008.

Green Buildings: Why Build Green? U.S. Environmental Protection Agency, Washington, DC, 2005.

Harker, Lisa. "Chance of a Lifetime: The Impacts of Bad Housing on Children's Lives." *Shelter*, September, 2006.

Hawkins, A., A. Lovins, and L. Lovins. *Natural Capitalism – Creating the Next Industrial Revolution*, Little Brown, London, UK, 1999.

The Increasing Burdens of Energy Costs on Low-Income Consumers, American Gas Association, Washington, DC, September 26, 2007.

Indoor Air Quality: Basic Information, the U.S. Environmental Protection Agency, http://www.epa.gov/iaq/voc.html.

Lamore, Rex, Terry Link, and Twyla Blackmond. "Renewing People and Places: Institutional Investment Policies that Enhance Social Capital and Improve the Built Environment of Distressed Communities." *Journal of Urban Affairs*, 28 (5), 2006.

2008 Energy Costs Survey, Energy Programs Consortium and National Energy Assistance Directors' Association, Washington, DC, 2008.

Testimony of the National Energy Assistance Directors' Association on the Low Income Home Energy Assistance Program before the U.S. Senate Subcommittee on Children and Families, U.S. Senate, Washington, DC, March 2008.

Williams, S. *Bringing Home the Benefits of Energy Efficiency to Low-Income Households: The Case for a National Commitment*, Enterprise Community Partners, 2008.

Endnotes

[1] According to the American Gas Association (2007), families eligible for federal home energy assistance spend one-fifth of their income on home energy bills–six times more than the proportion that families with higher incomes spend.

[2] Energy Programs Consortium and National Energy Assistance Directors' Association (2008).

[3] *Indoor Air Quality* U.S. Environmental Protection Agency.

[4] Energy Star qualified products meet energy efficiency guidelines issued jointly by the U.S. Environmental Protection Agency and the U.S. Department of Energy.

[5] The EarthCraft House program is a green building program that aims to provide healthy, comfortable homes that reduce utility bills and protect the environment (http://www.southface.org).

[6] Hawkins et al. (1999).

[7] *Enterprise Green Communities Project Assessment Study* (2008).

[8] New Ecology Inc. (2005).