

Rural Voices

THE MAGAZINE OF THE HOUSING ASSISTANCE COUNCIL
Fall 2005 • Volume 10 / Number 3



Rural Housing Goes **GREEN**

Dear Friends,

This issue of *Rural Voices* is part of a Green Building/Healthy Homes Initiative launched by the Housing Assistance Council to promote the effective use of green building and healthy homes technologies in affordable rural housing. The first three articles in this issue provide basic information for those who are new to the subject. Then five segments on “Green Building Techniques” offer a variety of examples for beginners as well as those who already know what bioswales or blower door tests are and want to learn how other rural housing groups have used them.

The challenge of balancing higher initial costs against long-term savings is one of the common themes running throughout these articles. Several of the local organizations featured here have found funders that appreciate the value of using costlier materials such as triple-paned windows in order to reduce later energy costs for low-income residents. Articles from The Home Depot Foundation and The Enterprise Foundation describe their green building funding programs. (These foundations are funding HAC’s initiative, and a Home Depot Foundation grant made this issue of *Rural Voices* possible.) We hope that, as the news about successes spreads, additional funders will join the trend.

Another common theme is the difficulty of bucking the system and obtaining community support for new ways of constructing or rehabilitating homes. The organizations profiled here have seen local support grow as their successes have become tangible over time. Successes include easily measurable changes such as drastic reductions in use of heating fuel on a remote Alaskan island, and more subtle psychological shifts such as Texas colonias residents’ acceptance of adobe as an energy efficient material rather than a sign of poverty.

Few, if any, of these organizations use just one or two green building/healthy homes techniques. The magazine presents them in categories to illustrate specifics such as land planning or energy efficiency, but it should be noted that many of the profiled groups carry out other green activities in addition to those described here.

We look forward to working with the rural housing movement to enhance the connection between affordable rural housing and responsible use of resources.

Sincerely,



Arturo Lopez, Chair



Moises Loza, Executive Director



David Lollis, President

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Maria Luisa Mercado, Gideon Anders

Cover photo courtesy of Umpqua CDC/Heartwood ReSources.

This issue of Rural Voices has been printed on 100% post-consumer waste, processed chlorine-free paper and printed with soy-based inks.

HAC Facts

NOTES ABOUT SOME OF THE RECENT ACTIVITIES, LOANS, AND PUBLICATIONS OF THE HOUSING ASSISTANCE COUNCIL

HAC Training Reaches Underserved Populations

This summer and fall, HAC brought training on rural housing, economic development, and infrastructure to two populations who face some of the most difficult housing challenges in the country, and to local organizations interested in the popular self-help homeownership method. More than 150 housing practitioners attended workshops in Rapid City, S.D., Forrest City, Ark., and Washington Court House, Ohio, sponsored by the Rural Housing and Economic Development Gateway, a project of the Department of Housing and Urban Development and managed by the Housing Assistance Council.

The South Dakota session addressed issues specific to Indian lands and included trainers from the National American Indian Housing Council, housing organizations from several Indian reservations, state housing finance agencies, and HUD. Trainers in the Arkansas session provided specialized expertise on Mississippi Delta issues. The Ohio workshop, featuring tours of successful local projects, focused on self-help housing, which uses homebuyer labor to reduce the cost of constructing new homes.



Over 90 participants attended the RHED Gateway training in Forrest City, Ark.

KnowledgePlex and HAC Sponsor Preservation Discussion

Possible legislation addressing rural rental housing preservation was the primary focus of an online discussion on August 9 sponsored by the Fannie Mae Foundation's KnowledgePlex and HAC. Panelists included Russell Davis, Rural Housing Service Administrator; Demetria McCain of the National Housing Law Project; Richard Price of Nixon Peabody, LLP; and Leslie Strauss of HAC. Davis summarized a proposal sent to Congress in late July but not yet introduced as legislation. It would repeal restrictions on prepayment of Section 515 and 514 loans, create a new voucher program for 515 tenants displaced by prepayments, and enable 515 owners with loans made before January 1, 1992 to restructure their debts. The proposal is available at <http://www.rurdev.usda.gov/rd/cong/> and the presentation, including Davis's written responses to some follow-up questions, is at <http://www.knowledgeplex.org/xchat.html>.

Thanks to The Home Depot Foundation

HAC is grateful to **The Home Depot Foundation** for providing a grant to support HAC's Green Building/Healthy Homes Initiative, which seeks to promote the effective use of green building and healthy homes technologies in affordable rural housing. This grant funded the production of this issue of *Rural Voices*. It will also enable HAC to provide capacity building funds, training, and technical assistance to local rural housing development organizations to support their green building work. Information about the local groups selected for funding is available on HAC's website at www.ruralhome.org/services/TechAsst_GreenBuilding.php. HAC is grateful to The Enterprise Foundation as well for helping to finance HAC's initiative. Both The Home Depot Foundation and The Enterprise Foundation contributed articles to this issue of *Rural Voices*.

HAC Announces Green Building Grants

HAC's Green Building/Healthy Homes Initiative moved into high gear in August, awarding \$210,000 in grant money to 17 nonprofit housing development organizations across the rural United States. The projects supported by these grants include single-family and multifamily housing development, as well as housing rehabilitation. They demonstrate the use of green techniques in the rural housing development process including land planning, design, material selection, and water conservation. The grants will assist in the development of more than 150 units of single-family and more than 200 units of multifamily housing.

"The Green Building Initiative also gives the grantees access to technical assistance and training," explained HAC's executive director Moises Loza. "HAC is grateful to The Home Depot Foundation and The Enterprise Foundation for providing funding for this initiative."

HAC Responds to Hurricanes

HAC's board and staff continue to send thoughts and prayers, as well as personal donations, to the people and communities impacted by hurricanes Katrina and Rita. As an entity, HAC is collaborating with its more than 30 partner organizations in the disaster area in their work to rebuild homes and communities. Resources for survivors and donors are provided on HAC's website, www.ruralhome.org, along with *Picking Up the Pieces: Restoring Rural Housing and Communities After Hurricanes Katrina and Rita*, a guide for survivors and community organizations. Print copies of the guide are free from Luz Rosas, HAC, 202-842-8600, luz@ruralhome.org.

DEMYSTIFYING GREEN BUILDING AND ITS COST

by Kelly Caffarelli

The question we hear most often is, “Can housing be both ‘green’ and affordable?” We believe that the answer is an unqualified “yes.”

The Home Depot Foundation is excited and proud to have entered into a national partnership with the preeminent rural intermediary, the Housing Assistance Council. Our partnership focuses on promoting and supporting the concept of environmentally friendly housing production that is affordable, efficient, and healthy. This concept is often referred to as “green building.”

The Home Depot Foundation was created in 2002 to expand The Home Depot company’s community involvement in supporting philanthropic initiatives and to provide opportunities to strengthen relationships with its suppliers. The Foundation’s mission is to build affordable, efficient, and healthy homes while promoting sustainability by supporting nonprofit organizations with funding and volunteers.

This mission grew out of meetings with many of the national affordable housing intermediaries and advocacy groups, as well as national and regional environmental building certification organizations. Based on these meetings, we learned that this nation has a shortage of over five million housing units that are affordable for very low- to moderate-income families. We thought about the mostly negative impacts home building has over the long term on neighborhoods and the larger environment. From these discussions, our board determined to focus our grantmaking on supporting nonprofit housing developers that build homes that have a reduced environmental impact and benefit the residents by providing a healthy indoor environment and by being affordable, not only to purchase or rent, but to operate and maintain as well.

Since we have started encouraging this kind of building, the question we hear most often is, “Can housing be both ‘green’ and affordable?” We believe that the answer is an unqualified “yes.” We understand, however, that the right balance must be struck on each project to meet both the housing needs of the community and the desire to design and build a greener home.

Central to our mission is our conviction that environmentally responsible housing construction benefits not only the environment, but the tenants and homeowners as well. Accordingly, we encourage developers to consider ways to minimize negative impacts and enhance the potential benefits in a number of very practical ways:

- ▶ By improving the operating efficiency of housing units – that is, reducing the amount of energy and water needed with high-performing products while ensuring proper siting – utility costs are reduced and are more predictable, making homes more affordable.
- ▶ By improving indoor air quality through integrating proper ventilation and moisture control while avoiding products containing contaminants, homes can be built to safeguard the health of the residents, rather than contributing to the incidence of asthma, toxic poisoning, and other conditions requiring trips to the doctor and healthcare expenses.
- ▶ By improving the durability of housing units through the incorporation of products such as cement board siding, membrane roofing, and hardwood floors, we extend their lives and reduce maintenance costs.
- ▶ By improving accessibility – that is, locating homes near jobs, schools, and public transportation – residents enjoy reduced transportation costs, which can use as much as 40 percent of a family’s income.
- ▶ By reducing environmental impacts in a number of ways – selecting products made with sustainable materials, reducing construction waste through efficient framing techniques, using products that include recycled content, preserving or creating green space, and limiting the amount of non-porous ground cover – we create a healthier, more valuable community for everyone.

Our grantmaking experience and travel throughout the United States to visit green building developments suggests that several factors impact the cost of incorporating green building design and products in affordable housing production. One factor is what we call the “**shade of green**” a nonprofit chooses to incorporate in the design of a development. Is the goal of the development to make sure that the units are energy- and resource-efficient with good quality indoor air, by utilizing paints and adhesives that are low in volatile organic compounds, linoleum flooring, or recycled-content carpet, or to include the full array of green technologies and design features available on the market today?

A second factor is the type of project and the timing of the incorporation of green building design into a project. Retrofitting green elements into a rehab project can be more costly than building construction to green standards upfront. Additionally, incorporating green aspects into the initial design reduces costs and allows for greater systems integration. Like any changes during construction or rehabilitation, green features cost less if they are built in upfront.

A third factor is the scale of the project. That is, are we talking about one to five single-family homes or a single-family subdivision or a rental project with five units or a large rental complex? With larger projects, it is possible to find and leverage economies of scale.

Through our Awards of Excellence for Affordable Housing Built Responsibly signature program, through our work with various certification initiatives, and through our relationship with numerous nonprofit housing developers throughout the country, we have learned that to incorporate the types of design features we are discussing results in initial incremental costs of between 3 and 5 percent. Our experience also suggests, however, that in both single-family and multifamily projects, the payback period for recouping these incremental costs is less than five years because of the reduction in operating and maintenance costs. Moreover, as developers, contractors, and members of the trades become more familiar and comfortable with the available green design elements and products, as well as proper use and installation, we believe these costs will be even less.

Nationally, we see a groundswell of interest in the concept of green building as measured by the number of government agencies and municipalities, nonprofit intermediaries, and private sector organizations adopting green building principles. We are getting much smarter about improving our communities, homes, and workplaces in terms of site selection, energy usage, water consumption, and indoor air quality. Right now a number of groups are working to develop their own green building guidelines and I believe that, over time, the building



Photo courtesy of The Home Depot Foundation

A Western Massachusetts Utility Company representative demonstrates to Kelly Caffarelli, Home Depot Foundation, how a home's roof-mounted solar panel converts solar energy to electric power.

industry will integrate the best ideas into one, which will be the standard. At that point, what we are encouraging will not be considered extraordinary building, but just good building.

While we are excited about the many exemplary projects that have been built incorporating these concepts, we also applaud the members of the financial services industry for the steps they have taken to recognize the added value of incorporating green building design and products in housing construction. Through new financing products, lenders are taking into account the cost savings of housing units related to things such as how energy efficient they are, how durable the products are that extend their lives, and where they are located in terms of access to public transportation and employment opportunities. Financing that provides incentives for buyers, builders, and lenders to “green up” their projects is the next step for the greening affordable housing movement.

We are very pleased that this issue of *Rural Voices* is devoted entirely to the concept of green building and provides examples of the remarkable and innovative work of nonprofit housing developers that have successfully combined affordability with environmentally responsible housing construction resulting in housing in which low- and moderate-income families thrive and grow. The Home Depot Foundation believes that incorporating green building features into affordable housing production is a form of stewardship and that we have a responsibility to consider the effects our present building efforts will have on residents and future generations. Further, we believe that we share an obligation to go beyond addressing the affordability of housing to include a focus on the long-term health and environmental impacts of housing design and construction. 🌱

Kelly Caffarelli is Executive Director of The Home Depot Foundation. More information about the foundation is available at www.homedepotfoundation.org.

GREEN COMMUNITIES INITIATIVE DEMONSTRATES CHALLENGES AND SUCCESSES FOR RURAL DEVELOPERS

by Dana Bourland

Green building offers a number of powerful potential benefits for low-income families . . . lower energy costs, healthier living environments, more durable and higher performing buildings, and more efficient use of existing infrastructure and natural resources.

The Enterprise Foundation's Green Communities™ initiative aims to make healthy, efficient, and sustainable building more mainstream in affordable housing for low-income people. Enterprise launched Green Communities in 2004 with a commitment of \$550 million and a goal to create 8,500 green affordable homes over five years. Several rural developments are among the first that have received funding under the program.

For example, Rural Ulster Preservation Company in Woodstock, N.Y. is building 62 for-sale and rental Green Communities homes for seniors and families that will not use any fossil fuels for heat, cooling, and domestic hot water as a result of including the first "geothermal" system in the state outside New York City. Another is Community Housing Partners Corporation in Blacksburg, Va., which is using cutting edge water management, healthy building, and energy efficiency techniques in the construction of 14 "sweat equity" for-sale homes.

Green building offers a number of powerful potential benefits for low-income families, affordable housing developers and managers, and entire communities. These include lower energy costs, healthier living environments, more durable and higher performing buildings, and more efficient use of existing infrastructure and natural resources. These and other benefits are available at only marginally higher development costs, even for developers with little experience in green building, so long as they are willing to try a new approach.

Green Communities provides developers of affordable homes a set of resources to encourage and enable them to "go green." These include grants of up to \$50,000 for planning and construction, low interest loans for predevelopment and site acquisition, equity investments through the Low Income Housing Tax Credit for construction (for rental developments only), and a range of project-specific technical support and broader training in green building. Nonprofit and for-profit developers, new construction and rehab, and for-sale and rental developments are all eligible for assistance. Enterprise strongly encourages rural developers to participate.

Green Communities assistance is available only to developers that commit to meeting the Green Communities Criteria. Some of the criteria are mandatory, and developers may also choose from a list of options to obtain the necessary point total to receive assistance. Enterprise worked closely with the Natural Resources Defense Council and many other experts in planning, design, development, and construction to develop the criteria. The criteria are very similar to the national green building standard promulgated by the U.S. Green Building Council (Leadership in Energy and Environmental Design or LEED) and draw heavily from leading local green building programs.

Through the criteria Green Communities aims to achieve three equally important goals: 1) drive development of affordable homes that have demonstrable health, economic, and environmental benefits for families and communities, 2) raise the bar for affordable housing providers through a comprehensive set of criteria, and 3) ensure that affordable developers can achieve the criteria at little if any higher development cost.

Perhaps the most important aspect of these criteria is that they are holistic, including both building design and construction elements as well as siting and location provisions. After all, the problems green development can help address – spiraling utility costs, unhealthy housing conditions, and poorly planned development to name just a few – are as much a function of where we build as how we build.

The second key overarching principle behind the criteria is that they are an integrated set of provisions. Perhaps the single most important thing a developer can do both to maximize the benefits of green building and to ensure that going green does not bust the development budget is to follow an "integrated

design” – sometimes referred to as a “whole building” or “total systems” – approach. This is not complicated at all, although it is new for many developers. Integrated design brings together the entire development team – developer, architect, contractor, engineer, manager, and operator and, ideally, future residents – at the first stage to set the green goals of the project and develop a specific plan for achieving them.

Among the building-related Green Communities criteria are a number of elements many affordable housing developers already incorporate. These include energy efficient building systems and appliances (generally meeting Energy Star standards), use of healthy building materials that do not contain volatile organic compounds such as formaldehyde, ventilation and insulation techniques to ensure good indoor air quality, and fixtures and appliances that conserve water. These features should be familiar to many rural developers, although at present some healthy building materials may not be as readily available in rural communities as in urban areas.

Some of the siting features of the Green Communities criteria are straightforward as well. A developers must do a basic environmental assessment of the site and avoid prime farmland or parkland. The developer needs to have a plan for controlling erosion and sedimentation during construction. And it must use plants and landscaping appropriate to the local climate that can be maintained with a water efficient system.

Enterprise’s early experience in Green Communities has shown that the biggest challenges in rural communities come down to a few issues: density, walkability, and proximity to existing infrastructure and services.

In terms of density, Green Communities requires an average minimum density of six units per acre for detached or semi-detached newly constructed homes, 10 for town homes, and 15 for apartments. Density is critical to advancing Green Communities priorities of more efficient land use, greater energy efficiency, and more walkable communities. Appropriate density can also lower development costs.

Walkability is important for encouraging a healthier lifestyle through physical activity and transportation alternatives to cars. Walkable communities can also be safer. Thus Green Communities requires sidewalks or other suitable pathways that connect the development site to the surrounding area.

Finally, Green Communities requires developments to have proximity to infrastructure and services, such as retail amenities,

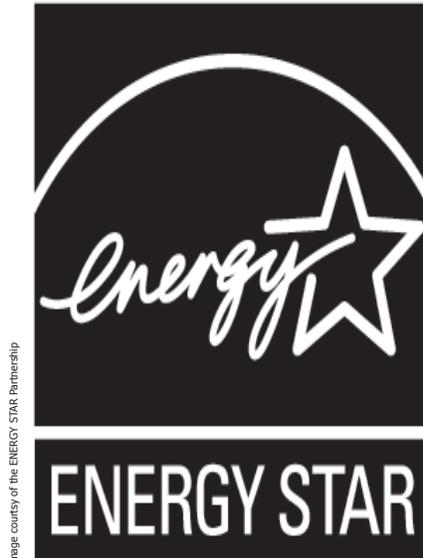


Image courtesy of the ENERGY STAR Partnership

The Environmental Protection Agency and the Department of Energy sponsor the Energy Star program. For more information visit www.energystar.gov or call 1-888-STAR-YES.

community facilities, and places of worship. (The program strongly encourages, but does not require, walkable access to public transportation.) These elements are important to ensure that Green Communities developments do not add to poorly planned development, which negatively affects families, communities, and the environment. Some of the worst consequences are felt in rural communities, as readers of this magazine can attest.

We recognize that developers serving rural communities with acute housing needs and a strong commitment to the goals of green building may be unable to achieve some of these criteria due to circumstances well beyond their control. In some cases we have worked with developers to overcome obstacles locally, such as zoning requirements, to enable them to participate in Green Communities.

Enterprise is strongly committed to working with rural groups in this initiative. Green Communities is in its initial stage

and Enterprise and our developer partners are still learning a lot about the most effective approaches in rural communities. We are closely tracking the experience of rural developers who are participating in the program. If we and our partners determine that experience and practicality demand a revision of Green Communities so it can better serve rural areas, we will pursue such improvement, without compromising on the core value of Green Communities. In any such effort we would actively seek the input of rural developers.

We are very pleased that the Housing Assistance Council is a major partner in Enterprise’s green building efforts. Enterprise is providing funding and sharing technical expertise to support HAC’s Green Building initiative. This support will provide nine organizations capacity grants and scholarships to attend HAC’s Green Building Conference in spring 2006. Both the pass-through funds and scholarships will increase awareness of environmentally sound practices in home construction among rural housing groups. 

Dana Bourland is Senior Program Director for The Enterprise Foundation’s Green Communities initiative. More information about the initiative is available at www.greencommunitiesonline.com.

GETTING STARTED ON GREEN AFFORDABLE HOUSING

By Edward F. Connelly

The most important thing to remember, and the common thread among these principles, is that greening is not something that is added onto a project after it is designed.

Over the past decade, there has been a virtual explosion of activity in the field of green building. It is hard not to be intrigued by the possibility of building projects that are more energy efficient, use recycled and sustainably harvested or responsibly manufactured materials, use less water, improve occupant health, preserve habitat and ecosystems, promote community, are of higher quality, and cost less to operate. Intriguing, yes; but is green building a luxury that is out of reach for affordable housing developers? Will building green add complexity, time, and cost to projects that are already difficult to complete?

Building green affordable housing certainly takes vision and commitment. But over the past few years projects all around the country have demonstrated that green affordable housing can be built cost effectively by developers without previous green building experience and without driving themselves crazy. The best testimonial is that all of the developers with green building experience we know would build green again. Following the principles outlined below will help affordable housing developers avoid the mistakes that the pioneers in this field have made and enable newcomers to the green movement to develop projects that are green and on time and on budget.

The following guiding principles for a green affordable housing project are the result of New Ecology Inc.'s experience over the past four years. NEI has helped developers in Massachusetts implement their vision of green affordable housing and studied dozens of projects in every region of the country. NEI's recently published report, *The Costs and Benefits of Green Affordable Housing*, analyzes the up-front and life cycle costs of 16 green affordable housing projects and demonstrates why building green affordable housing is cost effective.

The most important thing to remember, and the common thread among these principles, is that greening is not something that is added onto a project after it is designed. On the

contrary, a successful and cost effective green project weaves the concepts of greening into the project from its inception. Adding green features after a project is designed is inefficient and costly, ultimately adds less value to the housing, and misses opportunities to address many big picture issues, like siting, passive solar heating, daylighting, multi-purpose spaces, and modular or panelized construction, to name a few. A broad approach that recognizes and addresses interconnected challenges, such as housing affordability, sprawl, indoor environmental quality, loss of habitat, loss of community character, and resource and material waste, is required.

The following eight principles provide a framework for developing a green affordable housing project.

1 *Assemble a project team that is motivated to develop a green project and has the skills and experience to make it happen.*

A team with a diverse set of skills and as much experience as possible is best. Too often, affordable housing projects are not built as well or as green as they could be because of inexperience and lack of motivation on the part of the design team. Interview several potential candidates for each spot on the team, including architects, mechanical engineers, and general contractors/construction managers. Do the same for landscape architects and other engineers if they will play a large role in the project. Don't just hire an architect and let him or her select the other key players (even if they will eventually be subcontractors to the architect). Be involved in the process of selecting the people who will work on the project. Look for knowledge of greening, experience, desire to build green, and openness to working closely with other members of the design team. Add a green technical assistance provider to the team, especially if it is your first green project. Finally, be sure that the owner's project manager is ready, willing, and able to champion greening the project.

2 *Employ a multidisciplinary, integrated design process to incorporate environmental, social, and health concerns into a cost-effective design and development strategy.*

Get the best results from your team by using an integrated design process. In an integrated design process, the essential elements of the project, including goals and strategies for greening, are developed by a multi-disciplinary team that may include the owner, architect, builder, construction manager, engineers, landscape architect, finance partners, green consultant, development consultant, and building operations staff. While this process adds some complexity and cost to the front end of the project, there is increasing evidence that it provides the best opportunity for incorporating green features and sustainable design and results in a better project. Because potential issues are vetted by a multi-disciplinary team, integrated design can shorten approval times, increase certainty of estimates, reduce change orders, and result in fewer revisions of plans.

This approach results in projects that are more thoroughly and better designed. Developing this type of expertise within the community development system is the best way to affect the type of systems change necessary for mainstreaming sustainable development. In fact, developers that have used integrated design early in the development of projects have often fundamentally changed their behavior by approaching all of their future developments from a green design perspective.

3 *Use green project standards as a guide and measure of the proposed design, not as a cookbook or checklist.*

To help guide your team and take stock of your proposed design, use standards such as LEED (www.usgbc.org), The Enterprise Foundation's Green Communities Criteria (www.greencommunitiesonline.com), the Vermont Builds Greener program (geared to single-family rural housing) (www.bsr-vt.org/vermontbuiltgreenprogram.html), or some of the many others that may be adapted to a region of the country. Remember, these standards are not cookbooks – they are partial lists of possibilities. Don't be lured into just seeing how many points you can assemble. The design team should use these tools as a guide and list of suggestions, not as the be-all and end-all of greening.

4 *Perform cost/benefit analyses on key project components.*

Life cycle costing demonstrates to the development team the value of greening. NEI's *The Costs and Benefits of Green Affordable Housing* report demonstrates that green features that yield operating savings in energy consumption, water use, or

building maintenance often have a significant payback over the life of a project and a positive net present value, even when there is an increased first cost. This type of analysis should be an important part of the development of all green affordable housing, especially since the reduced operating costs make occupancy more affordable for residents.

Moreover, presenting this type of analysis to funders of affordable housing documents the value of green and healthy homes, and can help bring more resources to affordable housing development. In terms of cost/benefit, our research and experience has revealed that energy and water efficiency, indoor air quality, and durability are areas where investing in green features has the greatest financial return for the project. For this reason, attention to these areas is very important. Of course, this does not limit or inhibit the ability of a project to pursue other greening strategies.

5 *Take advantage of utility rebates, technical assistance programs, and foundation grants to support the greening efforts.*

Green building assistance programs are available in most regions of the country. Find out what is available in your region and take advantage of it at the beginning of your project. Technical assistance is often available from state or local programs, utilities, nonprofit organizations, and universities. An easy place to start is the green building links at the U.S. Green Building Council's website, www.usgbc.org. Be sure to investigate local Energy Star and utility conservation programs. An online guide to state renewable energy programs can be found at www.dsireusa.org.

6 *Build the standards, materials, and procedures developed in the design process into the contracts and specifications of the project. Clarify the purpose of the project with contractors and subcontractors, and work with them to ensure that they have the training and understanding to carry out the intention of the design.*

The intent of the project is ultimately carried out by the builders. This intent needs to be reflected in specifications and contracts. Build performance standards into the contract, such as passage of a blower door test. Select a general contractor who wants to build a green project and knows what that means, and work with the contractor and subcontractors to be sure they understand and are on board with the greening goals of the project. Develop ways to quickly answer questions and resolve issues before construction starts. Many green features have more to do with careful construction techniques, like air sealing and moisture control, and materials choices, like paints and sheet goods that are low in volatile organic compounds, than with groundbreaking design or new systems.

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GREEN BUILDING TECHNIQUES: LAND PLANNING AND SITE DEVELOPMENT



Photo courtesy of the Seattle Office of Housing

Bioswales, like the one in a Washington state neighborhood, reduce erosion and cleanse stormwater before it enters the watertable.

Green site planning and design techniques integrate strategies to minimize environmental site impacts; maximize energy, water, and natural resource conservation; reduce construction costs; and promote alternative transportation. Incorporation of certain techniques results in sustainable and attractive living environments for households of all income levels that ultimately increase the equity and sense of well-being of the individual residents and the overall community.

Some key steps in the green site planning and design process include completion of a comprehensive site evaluation; institution of low-impact development by clustering buildings and preserving existing vegetation; management of surface water to maximize on-site treatment and filtration of storm water; use of native and drought tolerant plants and trees for landscaping,

limiting lawns to recreational areas; design and orientation of buildings to use renewable energy; and location of development to provide access to public transportation and bicycle and walking paths to reduce use of automobiles.

The following organizations have successfully used green land planning and site development techniques and concepts to develop rural affordable housing.

FRONTIER HOUSING

by Laura Ward

For 30 years Frontier Housing has worked to provide housing solutions for low-income families in eastern Kentucky. Founded in 1974 by a few young men who longed to improve the sub-standard conditions in which many rural families lived, Frontier Housing is now the largest nonprofit single-family housing provider in the state of Kentucky, having assisted over 850 families who might never have become homeowners otherwise. A provider of housing development, direct lending, mortgage bond loan origination, homebuyer education, and credit repair, in fiscal year 2005 Frontier helped 59 people improve their housing situations and served over 200 others with our counseling programs.

Frontier Housing serves a nine-county rural region of eastern Appalachian Kentucky. We currently operate out of three offices: our main office and the Homeownership Center located in Rowan County, and the Red River Extension Office located in Morgan County. We also serve Menifee, Wolfe, Fleming, Bath, Elliott, Magoffin, and Carter counties. Each of these counties has a poverty rate above the national average. According to the most recent U.S. Census, Bath and Fleming counties currently have the lowest percentages of those living below poverty, at 15.8 percent and 18.6 percent, respectively. Highest are Wolfe and Magoffin counties, with 35.9 percent and 36.6 percent below poverty. Additionally, seven of the counties we serve are designated “distressed” by the Appalachian Regional Commission. The median income for our service area is \$24,041, significantly less than the state median of \$33,672, or the national median income of \$41,994.

Green Techniques

In 2002, thanks to an endowment from the Kentucky Housing Corporation, the University of Kentucky created a program to assist in improving the quality of affordable housing in

Kentucky. This collaboration focused on exposing architectural students to affordable housing programs in the state and at the same time offered a studio for students to design homes. In the first year of the program, the university chose to work with Frontier Housing to develop a community located in rural Rowan County. This project soon became the Big Woods subdivision, containing the first Frontier homes fully incorporating elements of green design.

The students assisted Frontier in holding a series of town meetings to understand the needs and desires of the families who would be directly affected by the development. Additionally, Frontier invited the local business community to the meetings to demonstrate the potential for good community planning in an area where no planning or zoning existed. Over the span of nine months, Frontier Housing and the University of Kentucky College of Design worked to develop a set of design criteria for the site and houses. Students and faculty from the College of Design were asked to provide energy efficient, accessible, and affordable housing solutions for a 14-acre tract of land located in a largely underdeveloped area of the county.

The Big Woods subdivision will consist of 30 homes. Designed by award-winning architect Marilyns Nepomechie, with the wants and needs of community members and potential homeowners in mind, the homes will be developed in four phases over the span of five years. The entire infrastructure will be completed with Phase I (except for blacktopping the entire road) and this phase should be completed by 2006.

The final site plan arranges the 30 homes into four smaller groupings, or “pods,” with five to eight homes per pod. Each will have its own designated neighborhood open space. The design also introduces 30' x 100' planting setbacks that separate the buildable areas of contiguous lots, staggers lots so that the buildable space of each lot fronts on the planted setback of the lot across the street, alternates house placement from front to rear of the lots to maximize uninterrupted sightlines to the rural landscape, works with the natural grade of the site to accentuate privacy and natural vistas, provides generous community spaces interconnected by pedestrian walks, and employs a unique planting strategy with an intensive planting program of tree species native to the state.

The homes are expressly designed to increase energy efficiency, a necessary environmental consideration and an important design concept for low-income families. The homes will employ passive solar advantages with deciduous trees on their south sides and evergreen tree windbreaks to the north and west. Each home will be placed in an area specific to its energy needs, allowing maximum solar advantage for every individual lot. All

Big Woods homes will utilize Energy Star certified materials as windows, doors, and appliances. And because Frontier Housing should be a certified Energy Star builder by the time we begin construction, all the homes in Big Woods will be Energy Star certified.

Low-e glass will be used in all windows and each home will be carefully and thoroughly insulated to cut heating and cooling costs. We also plan to use cement siding and metal roofs on the homes. The cement siding is more fire and weather resistant than any other siding material, durable, low-maintenance, and attractive. Steel roofs are made from 60 to 65 percent recyclable material and are also extremely durable, low-maintenance, and energy efficient, reflecting heat to block heat transfer and melting snow and ice in colder conditions. The Home Depot Foundation has awarded Frontier Housing operational support for our efforts to employ these green building standards.

Responsible for landscaping the Big Woods subdivision, the Landplan Group of Lexington, Ky., has designed a space that will not interrupt the natural environment and will in fact contribute to the area. Planting of trees, flowers, and other plants native to this area will address Kentucky's large-scale reforestation effort and serve as an important example for many subdivisions, inspiring conservation and renewal of natural habitats.

To maximize the value of the land at Big Woods, we have made special efforts to enhance the quality of the land surrounding the subdivision. We have brought in sewer lines and upgraded the water line to benefit residents of the area and we believe that these smart growth techniques will improve the quality of life as well as the pocketbooks of all the families who will live in Big Woods.

Benefits

Using these green techniques, we are confident that there will be both short-term and long-term benefits for all parties involved in the Big Woods project. Frontier Housing has had the opportunity to work with an award-winning architect to create a subdivision unlike any other in this region. This mixed-income community of innovative, experimental, and affordable homes will provide an opportunity that exists nowhere else in this rural region of Kentucky. The project has enhanced our ability to provide a variety of homes to a wider market, creating a variety of new opportunities for Frontier Housing.

For our low-income homeowners, the energy-saving techniques used will drastically cut costs of heating, cooling, maintenance, and insurance, while also adding value to their homes and property. The same green techniques, as well as the planting and reforestation efforts, will contribute to our local environ-

ment, cutting down on waste, adding to the natural habitat, and creating a more hospitable community for our customers to live.

Challenges

Despite the many advantages of green building, many barriers still obscure the path to complete success. The most persistent setback is cost. Although the green techniques used often provide considerable savings for homeowners, the initial cost of these techniques is significantly greater than the cost of average vinyl siding, shingled roofing, windows, and doors.

But because we believe that all homeowners, regardless of their income, deserve quality built and energy efficient homes, we have worked to provide energy-saving appliances and techniques notwithstanding the cost. By offering development subsidy and lower rates to cover the costs of green building, and thanks to numerous grants and donations, we will still be able to provide superior quality homes to the future residents of Big Woods.

Affordability

Big Woods is a mixed-income development with no predetermined mix or targeted lots for low-income. The homes will be marketed to families with incomes between 60 and 130 percent of area median income.

Tucked away in the hills of Rowan County, the Big Woods subdivision will be a quiet addition to this rural community. The homes, designed to blend in perfectly with the traditional architecture of the area, might appear at first glance to be ordinary. But upon further inspection, it will become apparent that these homes are everything but ordinary. Tailored perfectly to fit the needs of residents while also including a wide variety of energy-saving appliances and building techniques, the Big Woods homes will be a testament to affordable green design. 

Laura Ward is an intern at Frontier Housing in the Programs Department. For further information about Frontier Housing, visit www.frontierhousing.org or call 606-784-6362.

SOWING SEEDS OF HOPE

by Cara Mae Cirignano

Sowing Seeds of Hope was formed in 1999 by a group of concerned citizens who wanted to do more to help alleviate the extreme poverty in Perry County, Ala. Over the years, eight task

forces have been developed, each focusing on a specific area of need. Four years ago the housing task force started rehabilitating aging houses for very low-income individuals with the help of outside church groups. The desire to provide homeownership opportunities led to a partnership with the Design Corps and the use of mutual self-help housing, a USDA Rural Development program through which low-income families can get low-interest mortgages and save money by providing the majority of the construction labor on their own homes.

Perry County is located in the heart of Alabama's Black Belt region, which stretches across the width of the lower half of the state, and is famous for its role in the civil rights movement as well as its current high poverty rate, which still exists largely along racial lines. The poverty rate among Perry County African Americans is four times the rate among whites, for a total of 35 percent of individuals living at or below the poverty level. The population of the entire county is roughly 12,000, with only 5,000 total in the two towns, Marion and Uniontown. As of May 2003, Perry County had the seventh highest unemployment rate in the state at 10.4 percent. Perry County provides a textbook example of rural poverty.

Sowing Seeds and the Design Corps are targeting families who live in "trailers" or in public housing developments, which, unfortunately, are often the only housing choices available. We experience a full range of applicants from single young mothers to elderly couples barely surviving on minimum fixed incomes. The challenge of building green for these people is as simple as the low loan amount for which they qualify: if someone makes \$7,000 annually and can't pay much more than \$150 per month for housing costs, how do we build a home for them that is comfortable, affordable, and as green as we'd like it to be?

Designing a house for as little as \$20,000 has been done before and we plan to make it happen again, but working environmentally sound practices into the budget will be difficult in many cases. Ours is an area that not only has yet to witness nontraditional building techniques, but also harbors a general distrust of new ideas, and so our example-deprived context prevents the luxury of much wiggle room that could help us, for example, to negotiate a higher mortgage in exchange for lower energy bills. Strict rules imposed by Rural Development on the designs of self-help houses are also a barrier.

Green Techniques

The Design Corps Fellows are in a unique position to reap the wisdom of vernacular building types in the Deep South and at the same time benefit from Design Corps's knowledge of

The Design Corps is a 501(c)(3) organization located in Raleigh, N.C. that works to empower underprivileged communities through quality, affordable architectural services that utilize participatory design methods. Many of its efforts revolve around providing aspiring architects, Design Corps Fellows, the opportunity to be active in such communities. The Design Corps has over 15 years of experience in the design and implementation of low-income housing, always carefully considering the impact on the environment and quality of life for the inhabitants. In particular, it has focused on energy efficiency and the use of recycled materials in construction. The Design Corps has been working with Sowing Seeds of Hope to initiate a self-help housing program in Perry County, bringing its knowledge, experience, and problem-solving energy to the county through two on-site Design Corps Fellows. Cara Mae Cirignano arrived in Perry County last fall. She has a degree in architecture from Wellesley College with studio experience at the Massachusetts Institute of Technology. Erin O'Brian is a recent graduate of the University of Virginia.

and experience with progressive green building materials and techniques. The self-help program's framework, which allows for maximum communication between designers, builders, and clients from schematic design to ribbon cutting and beyond, provides an exciting opportunity to achieve a high level of enthusiasm and understanding for sustainable design and construction.

Each house will be carefully planned through a series of participatory design meetings and extensive communication between the client, the Design Corps Fellows, and the registered architects at and connected to the Design Corps. Design Corps Fellow Cara Mae Cirignano has already begun this process on the first house design, utilizing older structures in the area to discuss with the client the possibilities for resource conservation.

Incorporated into the general intent of meeting the unique spatial needs of each family will be the specific goal of minimizing environmental impact and utility bills, and maximizing comfort and health. We will achieve this goal through careful consideration and weighing of sustainable choices with respect to the construction budget, client resources for utilities and upkeep for the years to come, and client aesthetic and quality of life preferences. Even small choices can have a big impact on

energy conservation, so we will take advantage of sustainable methods whenever possible.

Site selection will be made based on proximity to town centers to reduce automobile dependence. We have already engaged landowners in both Marion and Uniontown in discussions of land that might be made available for our families. There is much enthusiasm for the idea of creating homes within the city limits to foster more activity and growth in the downtown areas. We hope to secure tracts of land for subdivision so that our houses can be built close together, in order to expedite construction and reduce energy and material waste. We will also pay attention to house placement on site with regard to existing vegetation, runoff, proximity to the road, and other considerations to minimize impact and, again, material and energy waste.

Energy efficiency will be a primary focus when designing our houses. First and foremost, we believe that designing a house that responds to the sun's energy is one of the simplest and smartest ways to conserve resources and create a beautiful home. Retention of the sun's heat in the summer and deflection in the winter will receive extensive consideration. We plan to make use of carefully placed, Energy Star qualified windows, clerestories, monitors, and other forms of fenestration to maximize day-lighting and control heat gain throughout the year. These openings will be coupled with overhangs that allow for air flow, and possibly adjustment for varying degrees of sun penetration as well. Natural ventilation will also be considered when placing openings. We will provide for cross-breeze and stack effect possibilities (i.e., ventilation at tops and bottoms of rooms, with the use of floor vents).

We are very interested in training our families to build with value-added and value-engineered products. Thus far, we have concentrated on researching the feasibility of using structurally insulated panels (SIPS) in our homes, because although they come at a greater initial cost than a wood frame system, they will cut construction time and effort considerably and provide a much greater R-value (i.e., better insulation). We have located two manufacturers within 200 miles of Perry County (one in Union, Miss. and another in Florence, Ala.). We are particularly interested in IHSN, Inc., in Florence, as they produce SIPS with fibrous cement cladding, which is much more durable and requires fewer additional layers than other typically used materials.

Other sustainable building systems, details, and practices that we hope to utilize include recycled materials, straw bales, low-flow water fixtures, energy efficient water heaters, Energy Star qualified lighting fixtures and appliances, and sealing of

TIPS FOR GREEN LAND PLANNING AND SITE DEVELOPMENT

-  Use bioswales to reduce erosion and filter storm water. A bioswale is a shallow trench planted with trees, shrubs, and ground cover that detains and filters storm water before it infiltrates the groundwater system, preventing flooding and the need for extensive built infrastructure.
-  Community gardens provide an attractive and community-building amenity. Include community garden space as part of the overall landscape design plan.
-  Location of trees on the east and west sides of a building can dramatically reduce cooling loads. Placement of shrub rows can block cold winter winds or help channel cool summer breezes into buildings.
-  Installation of permeable surfacing in areas such as driveways, pedestrian paths, etc., can reduce storm water runoff. When used extensively, permeable surfacing can reduce or eliminate the need for curb gutters and storm sewers.

air leaks, to name a few. We also plan to minimize construction waste by separating and retaining re-usable materials from every site for use in future houses. The development of effective and feasible green building practices for the self-help housing program in Perry County will be an ongoing experiment.

Benefits

The major benefits of these green techniques are lower energy costs and higher quality of life for our families. This is our number one goal. We hope that reaching this goal will also have a ripple effect, convincing builders and developers that green building is a feasible and desirable way to build affordable housing. We hope our example can attract the support of the community and businesses, enabling us to continue to build green, with an increasingly varied array of green building techniques.

Challenges

We are just at the beginning of our efforts to implement these green techniques. Once we begin making final design decisions, a major ongoing ethical dilemma will be the struggle between energy efficiency and cost efficiency. We will be asking our clients to make a certain leap of faith when, for example, we place SIPs on the roof instead of wood frame, telling them that ultimately they will reap the rewards of their investment. No doubt even more challenges await us than we anticipate, but we will strive to overcome them armed with evidence that the green techniques

we choose will ultimately benefit the homeowners, the community, and the environment.

Affordability

The first and foremost affordable green building technique that we offer to our families is free architectural services that focus on energy efficiency design. These services are made possible through the partnership between the Design Corps, Sowing Seeds of Hope, and the AmeriCorps VISTA program that pays the stipend of the Fellows. These design services are the key to making green houses possible.

Since green building materials and techniques involve upfront costs, we are looking for effective ways to keep within the budget without reducing quality. These strategies mainly involve general affordable design methods such as keeping the footprint to a grid, as well as aggressively soliciting donations.

We plan to use a small grant from HAC to begin to educate our families and community about green building, and to offset some green building costs for the first set of houses in hopes that their higher performance will help us continue to use those techniques in future houses. 

Cara Mae Cirignano is a Design Corps Fellow working with Sowing Seeds of Hope. More information about the Design Corps is available at www.designcorps.org.

GREEN BUILDING TECHNIQUES: MATERIALS

When building green, one of the primary goals is to provide safe, healthy, energy efficient homes while having the least amount of negative impact on the environment. Limiting the use of wood, using natural and local materials, and recycling previously used materials are all ways to reduce the impact on the environment. While wood is one of the most useful building materials, its usefulness has helped deplete its supply. A common technique in the construction of green homes is to use wood as sparingly as possible. Another option is to use certified sustainably harvested trees from forests that are carefully monitored to ensure the forests are well preserved.

The use of local materials is beneficial to the community both environmentally and economically. Patronizing area businesses supports the local economy, while reducing processing and transportation costs and environmental effects. Materials such as rocks, sand, adobe or rammed earth, straw bale, and scoria, a stone-like volcanic rock, are all good alternative building materials. Scoria and straw bale are both excellent for insulation purposes, and adobe is an extremely versatile substance that can be used for external construction, interior walls, and flooring. Finally, using recycled materials also cuts costs while protecting the environment. Reusing something that already exists saves precious energy, resources, and money that would otherwise be spent recreating it.

The following organizations have engaged in successful programs incorporating environmentally friendly materials in the development of rural affordable housing.

ORGANIZACIÓN PROGRESIVA DE SAN ELIZARIO

by Tony Araujo with Leslie Newman

Organización Progresiva de San Elizario works to improve living conditions in the colonias of San Elizario, a rural community located on the outskirts of El Paso, Texas. We focus on

self-help housing. Through our program, families build solar-passive adobe homes. After completing a community project to re-finish the San Elizario mission using adobe, we built four solar-passive adobe homes with contractors through a pilot project in 2000. Building on this experience, we launched our self-help adobe program in 2002.

OPSE serves families living in the 29 colonias in San Elizario. The majority of families in San Elizario are Mexican-American, and the median income is \$20,145. Forty percent of families live below the poverty line. Unable to afford rental payments in the city or qualify for traditional mortgage financing, families purchase lots in colonias outside city limits and often build their own homes, room by room, over time. Houses are often makeshift and dangerous because families lack the funds to buy proper tools and materials, as well as formal construction training.

While the San Elizario mission was originally constructed of adobe, concrete had been used more recently to replaster the exterior. When this concrete started to erode, OPSE organized a community project to return the mission to adobe. While many older residents of the community were familiar with adobe techniques, these techniques were not documented, and the community had begun to lose knowledge of the traditional maintenance requirements. OPSE brought specialists from



Photos courtesy of the Organización Progresiva de San Elizario



OPSE's homes are built using adobe bricks. The interior of one home is shown above and to the right is an adobe home under construction.

Mexico who were familiar with adobe techniques to help older residents of San Elizario teach younger generations in the community how to restore the mission.

Through our adobe self-help program, 15 families constructed their own homes through our first building cycle. Five families are currently building, and a total of 24 families will build their homes over the course of our second two-year cycle. All the families are low-income and live in the San Elizario area. Families construct homes using adobe bricks and a solar-passive home design.

Green Techniques

We believe adobe is the best building material in El Paso County for a number of reasons:

- ▶ Adobe bricks are made from readily available material: sand, clay, and straw.
- ▶ Adobe is affordable: bricks for a 1,200 square foot home cost approximately \$1,000.
- ▶ Adobe is energy efficient: it creates thermal mass, leading to lower heating and cooling costs.

Combining adobe with a solar passive design makes our homes even more energy efficient. The solar passive design focuses on the placement of the house on the lot. Homes are rotated on the lot to face within 30 degrees of true south to maximize solar heat in the winter, and block higher sun rays in the summer. Twenty-foot overhangs block more summer rays, making the house cooler. In the winter, the sun enters the windows, making the house warmer. Glass areas in the east, west, and north walls are minimized, further reducing heating and cooling costs.

Challenges

While many families in our community are currently interested in participating in our self-help adobe program, some families initially associated adobe with poverty in Mexico. At the same time, many families in the area remembered their grandparents' adobe homes, and how cool they were in the summer. These memories, combined with information about the cost savings and our attractive design, have led to acceptance in our community.

Benefits and Affordability

Our green building techniques make homes more affordable for families, in both the short and long terms. Adobe costs less than other materials, such as brick or wood-frame, for home

construction. In the long term, our solar passive design combines with the energy efficiency of the adobe to reduce ongoing utility cooling costs. 

Tony Arayo is the executive director of Organización Progresiva de San Elizario. Leslie Newman is a community development consultant based in Oakland, Calif. who specializes in self-help housing. She has been working with OPSE since 2000.

homeWORD

by Betsy Hands

homeWORD uses innovative, sustainable, and replicable methods to develop affordable housing and asset-building strategies for those most in need. homeWORD has developed eight affordable housing projects in Missoula and Billings, Mont. that range from single-family homes to multifamily rental housing. All these housing projects were designed to be energy efficient, environmentally and economically sound, respectful of residents and the community at large, and empowering to low-income families.

homeWORD also believes in creating community-building opportunities for residents, neighborhoods, and stakeholders to ensure healthy and community-valued affordable housing. homeWORD manages two Homeownership Centers that provide comprehensive services that help low-income women and families purchase and retain their first homes. Within the Homeownership Centers, homeWORD provides a comprehensive range of services including one-on-one counseling, homeownership and financial fitness classes, downpayment assistance, and pre-purchase and foreclosure prevention counseling.

homeWORD's holistic approach to affordable housing grew out of the simple notion that you cannot build for the future by destroying the environment. Because homeWORD recognizes the intrinsic link between long-term environmental costs, affordability, and community revitalization, it has made a commitment to green building. All homeWORD projects include strategies for resource and energy efficiency, waste reduction, smart land use, sustainable transportation systems, healthy indoor air quality, and community sensitive design. Each homeWORD project builds on the past experience of the previous projects, and the subsequent green features demonstrate a growing understanding and knowledge of green building practices. A closer look at homeWORD's newest project, Orchard Gardens, will illustrate a growing understanding of the

application of sustainable building materials as well as buying local products.

homeWORD works in both eastern and western Montana with offices in Missoula and Billings. Orchard Gardens, currently under construction, is located in Missoula County. This project is a pivotal housing development in a high growth area outside the city of Missoula. The area is well known for its rich history and culture of agricultural life. Orchard Gardens will have 35 units of affordable rental housing financed through Low Income Housing Tax Credits, serving households that earn 50 percent or less of the area median income. There are five buildings on the property including a straw bale community barn, which are all clustered around a common area and public art display. Through a variety of traditional and non-traditional funding sources, homeWORD prioritized building a model housing development utilizing the latest concepts and technologies available in green building.

homeWORD begins its projects with an intensive upfront planning process, which includes a community design charrette (an intensive, participatory planning session), an eco-design charrette, and establishment of tough green building goals for all professionals involved in the project. homeWORD contracted with a sustainable building consultant and an energy modeling consultant to inform its decisions around green building practices. Through this planning process, Orchard Gardens was developed with the U.S. Green Building Council's LEED standards (using LEED's Application Guide for Lodging because USGBC had not yet unveiled criteria for residential projects of this scale).

For the purposes of this article, Orchard Gardens illustrates some great examples of incorporating sustainable materials into any project. homeWORD selects materials that meet a number of standards: 1) they are rapidly renewable, 2) they are durable and easy to maintain, 3) they are local and sustainable, 4) they generate no toxic off-gassing, 5) they have recycled content, and 6) they have energy and resource efficient qualities. Since materials often cannot meet all of these criteria, it is important to know your priorities and goals before making decisions regarding selection of products. homeWORD's priorities are as follows: 1) durable and easy to maintain, 2) locally produced, 3) non-toxic, supporting a healthy indoor air environment, and 4) sustainable and innovative while resource and energy efficient.

Green Techniques

homeWORD's use of local and sustainably harvested lumber for its rough framing is an excellent example of good material selection. Western Montana has a growing interest in find-



homeWORD uses strawbales in the construction of a community center.

ing ways to harvest and use lumber in a sustainable manner to conserve resources for future generations. While it is possible to buy certified lumber that meets LEED criteria for green building, homeWORD wanted to be more deliberate in its approach to using lumber. By working closely with a local forester whose mission is forest restoration, homeWORD felt the lumber could provide more than good forest stewardship standards. This source of lumber helps revitalize the economies of our community and reduces the amount of fossil fuels needed for transporting lumber, which is often the most unsustainable aspect to purchasing materials.

Orchard Gardens has other materials that meet the homeWORD criteria and priorities. The concrete throughout the project is made with fly ash, a coal combustion by-product found here in Montana. When mixed with water and lime, fly ash can be converted into a concrete-like material shown to be stronger, more durable, and less environmentally damaging than traditional concrete. Most interestingly, the foundation of the straw bale community barn is made of 100 percent fly ash, although normally fly ash makes up between 20 and 30 percent of the mixture.

The cabinets throughout Orchard Gardens are wheatboard, an interior grade, engineered panel made from wheat byproduct. Wheatboard is an incredibly green product because it uses a

rapidly renewable material (wheat straw), it is formaldehyde free with no volatile organic compound resins used, and it is a fairly local product manufactured in western North Dakota. It is also highly durable and looks great in all of homeWORD's housing developments.

At Orchard Gardens, homeWORD combines more conventional looking materials with the nontraditional materials to provide a balance of examples in the green building arena. homeWORD's structural insulated panels (SIPs) are considered a smart choice for resource efficiency because they provide excellent insulation values as well as a strong structural system that can be easily installed by a conventional contracting company if educated on how to install. Insulated ("R-control") SIPs can be used for walls, roofs, and floors and can resist loads caused by wind, snow, and seismic activity. They are made of expanded polystyrene insulation laminated to oriented strand board.

For roofing material, homeWORD selected a metal roof with 3 percent recycled content for its durability and easy maintenance characteristics. For less traditional materials, the community building is a structural straw bale barn. The building uses bamboo to hold the straw bales in place. Not only is straw bale highly insulative, but it is also a rapidly renewable material that is non-toxic. Straw bale buildings have become a popular type of green building for residential construction, and the community barn provides a demonstration for unusual techniques, such as the 100 percent fly ash foundation and structural straw bale construction.

Inside the buildings, there is a strong emphasis on using non-toxic materials and resource and energy efficient appliances and plumbing. Using non-toxic materials has always been a priority for homeWORD when choosing materials. For example, volatile organic compounds, or VOCs, are considered toxic and are highly evaporative chemical substances that produce noxious fumes. They are known to be carcinogenic, contribute to the depletion of the ozone, and are associated with numerous adverse health effects. homeWORD wanted to use no-VOC paints and used Green Seal paints to ensure a high standard. Green Seal provides credible, objective, and unbiased information in order to help a purchaser choose environmentally responsible products.

Flooring offers a great variety of green choices, and Orchard Gardens has some great examples that can be applied to any housing project. The carpets have low VOC content and recycled content, and all the adhesives and joints sealants have no or low VOC content. All the kitchen and dining areas will have floors of marmoleum, a natural product made of linseed oil,

wood flour, pine rosin, jute, and limestone. Besides its beauty and color selection, it is easy to maintain and hygienic. It is also completely biodegradable when it is replaced. All the tiles used in the project are recycled content tile.

Finally, homeWORD emphasizes reducing energy and resource consumption not only through good building design, but through purchasing the right products. As many affordable housing developers are starting to realize, energy use has an absolute dollar value that goes into the savings or other needs for low-income families served. It is easy to do the right thing when looking at which appliances to use. At Orchard Gardens, all appliances will have the Energy Star products. A newer innovative feature is the dual flush toilet that homeWORD is installing in each bathroom. This allows a person to manually control the amount of water flow per flush to prevent wasting water. An apartment could conserve up to 67 percent of the water used by a conventional toilet.

Benefits

The benefits of homeWORD's Orchard Gardens development are numerous. In addition to supporting the local economy and preserving the natural beauty of the area by working with a local forester devoted to forest restoration, Orchard Gardens also provides an attractive and healthier indoor environment for residents. Energy efficient construction and the use of Energy Star appliances, along with dual flush toilets, conserve energy and water resulting in monetary savings for residents.



This home built by homeWORD incorporates several green techniques.

TIPS FOR USING GREEN MATERIALS

-  Choose low-maintenance building materials. Durable roof coverings include fiber cement composites, asphalt shingles, plastic shakes, and metal shingles. Vinyl siding and fiber-cement siding are alternatives to exterior wood siding. Recycled plastic lumber can be used for exterior decking.
-  Buy locally produced building materials; transportation is costly. Local hardwoods, for example, are preferable to tropical hardwoods.
-  Use building products made from recycled material. These reduce solid waste, cut energy consumption in manufacturing, and save on natural resource use. Some examples include cellulose insulation and recycled content drywall, floor tile, and carpeting.
-  Use efficient structural systems that reduce the quantity of materials used. Evaluate use of 24" on-center framing, which can result in substantial savings in per linear foot costs and reduced labor in wallboard finishing. Consider using engineered wood for floor, roof, and rim joists; engineered wood reduces tree waste without losing required structural performance.

Challenges and Affordability

There are many factors to consider when selecting sustainable materials for an affordable housing development. homeWORD strives to design and build affordable housing using a holistic approach and also demonstrates how to incorporate the triple bottom line, which means paying attention to social equity and environmental conservation and strengthening the local economy when developing housing.

Housing plays a huge role in a community and its economy, and developers should consider ways to purchase materials that support their local economies. Green building must not only include sustainable materials but also try to look at the

big picture of energy use, land use, and building an asset for the community that will last for years to come. homeWORD's selection of materials reflects this broader vision of sustainable building. 

Betsy Hands is the Program Manager at homeWORD. More information about the organization is available at www.homeword.org.



RURAL VOICES

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GREEN BUILDING TECHNIQUES: RESOURCE CONSERVATION

Resource conservation is an important component of rural green building activities, especially in areas where transporting building materials to remote sites proves challenging and expensive. Reducing building waste and recycling construction and demolition debris offer financial benefits to contractors and nonprofit developers. Employing good waste management strategies during construction and renovation projects can offer financial dividends while diverting significant amounts of used building materials from landfills. Builders also have available an increasing number of building materials made from recycled content (cellulose insulation, plastic lumber, tiles).

Using large volumes of water increases maintenance and lifecycle costs for building operations and increases consumer costs, including those for municipal supply and treatment facilities. Reduction in water use can lead to more stable water rates. And by handling reduced volumes, water treatment facilities can delay expansion and maintain stable water prices. Water efficiency measures include using low-flow devices and expanding use of non-potable water for landscape irrigation. For instance, captured rainwater from roof run-off and gray water from sinks and showers can easily be used for landscape watering.

The following organizations have engaged in successful programs incorporating green building techniques to conserve resources in the development of rural affordable housing.

OPAL COMMUNITY LAND TRUST

by Elisabeth C. Byers

The mission of Of People And Land (OPAL) Community Land Trust is to acquire and own land so that islanders in need

may have access to permanently affordable homes and workplaces. Based in Eastsound, Wash., OPAL collaborates with others, develops infrastructure and housing, and stewards the land in a manner that is cooperative, stable, environmentally sensitive, and socially responsible.

OPAL builds houses for homeownership and rental housing and delivers rental assistance, energy assistance, and weatherization funds to qualified households.

OPAL has been committed to the values of green building and low impact development since its inception in the late 1980s. All of OPAL's projects have incorporated low impact development techniques that have minimized the effect on the land of our newly constructed neighborhoods. We have employed techniques such as preserving land in and around houses with native vegetation, minimizing the overall footprint of buildings, roads, and parking on the land, and installing water catchment systems to use rainwater roof run-off for irrigation and flushing toilets.

Only in the past few years, however, have green and healthy building materials become more affordable, enabling us to incorporate a greater percentage of healthier construction materials into the homes we build. In 2005, OPAL adopted its first "Green Building Guidelines" that articulate what we have been able to do in our projects and guide our future development. These guidelines will evolve as we learn from our experience, and as new products are time-tested and become more affordable.

OPAL Community Land Trust is located on Orcas Island, one of the San Juan Islands along the northwest coast of Washington state – an area with mild winters. Orcas Island is about 60 square miles and has a year-round population of about 4,500 people. San Juan County consistently ranks as the county with the highest median income and the highest land cost in the state, as well as one of the lowest wages. It has a three-month drought season in the summer that makes water conservation a priority. Since the county is accessible only by boat or plane, building costs are high because of additional delivery charges and labor prices are high because most builders construct custom homes for higher-priced markets. The lack of competition in the lower cost housing market and the scarcity of options for materials suppliers makes utilizing green materials and techniques that much more difficult.

OPAL's Lahari Ridge project incorporates a number of green elements. The project is six single-family homes that are affordable for households earning less than 80 percent of the county median income. The six families purchasing Lahari Ridge homes, all of whom have single heads of household, have an

average income of \$27,000 or about 55 percent of the county median.

Green Techniques

The 5,000-square-foot lots are clustered around a common driveway and located to minimize disturbance to the existing topography and native vegetation. During construction, access to each building was limited to an area no greater than ten feet around the building footprint in order to preserve native vegetation and minimize the need for landscape restoration. The houses are small – 840 square feet – and designed with single-wall construction, roof trusses, and no interior support walls so that each may be easily and affordably adapted from a studio to a one-bedroom or a two-bedroom configuration. Each home has a 1,000-gallon water tank located under a porch that captures rainwater runoff from the roof and makes that water available for flushing toilets. Materials used in construction include metal roofs (more durable and better suited to water catchment), “marmoleum” flooring, formaldehyde-free insulation, and certified green cabinets (which were assembled and installed by the homeowners in a workshop with our project manager and general contractor).

Benefits

The benefits of these techniques are numerous. The houses fit into the landscape and landscape planting is less expensive, because so little of the surrounding landscape and native vegetation is disturbed. The buildings are healthier to live in because the products used have much less off-gassing than comparable products. The buildings will also last longer and be less expensive to maintain because of the more durable materials.

Challenges

The biggest challenge has been cost. The water catchment system, including the metal roof, added about \$6,000 to the cost of each house. We will cover that additional cost by additional fundraising. When surveyed, our supporters and donors say they value green materials and low-impact development and some have contributed additional funds for green products, when used in a prudent manner.

Affordability

We are covering the additional costs of green building materials by raising additional funds from our members and from foundation grants. It is only through this support in addition to the support we are already getting that we have been able to make this commitment. Until marketplace competition brings



Photo courtesy of OPAL Community Land Trust

Water catchment systems are installed with each home. As shown here, the system allows the water to run off the roof, through a drainpipe, into a 1,000 gallon water tank.

the total price down on these materials, this will be the only way to continue with this commitment. 

Elisabeth C. Byers is OPAL Community Land Trust's Executive Director. More information about the organization is online at www.opalclt.org.

NORTH CAROLINA RURAL COMMUNITIES ASSISTANCE PROJECT, INC.

by Nina Ann Baccanari

The mission of the North Carolina Rural Communities Assistance Project, Inc. is to provide outreach, advocacy, onsite training, and technical assistance for rural North Carolinians, focusing on water, wastewater, solid waste, and affordable housing issues affecting low- and moderate-income communities. More specifically, we monitor and contribute to state and local policies regarding public health and environmental issues, support activities and initiatives that improve and sustain equitable

economic and social systems in an environmentally sound manner in rural North Carolina, and educate North Carolina residents and organizations about water, wastewater, solid waste, and related public health and environmental issues.

For more than a decade, NCRCAP has co-created solutions with thousands of rural North Carolinians who have experienced some of the most severe water, waste disposal, and housing conditions in the state. NCRCAP has worked to bridge the chasm among rural community residents, political leaders, and funding agencies in order to facilitate solutions and build the capacity of low-income rural communities. NCRCAP acts as a liaison between local and state governments, community organizations, and individuals experiencing water and wastewater needs and the housing problems that can be associated with these conditions.

NCRCAP's Safe Housing Initiative assists individual households throughout Chatham and Randolph counties in North Carolina. All households have incomes that are very low, no more than 50 percent of the county's median household income. According to 2000 census data, these counties are predominantly rural, with 80 percent and 61 percent of their population located in rural areas, respectively. Census data also indicate high levels of poverty in each county. In the total project area, 9.2 percent of households are below poverty. Approximately 6.9 percent of all non-minority households are below the poverty level, while 18.9 percent of the minority population lives in poverty.

The Safe Housing Initiative program addresses the health and safety hazards related to inadequate housing found in rural areas, focusing primarily on families who live without indoor plumbing or have inadequate water or wastewater facilities. NCRCAP performs rehabilitation work on individual houses scattered throughout the counties. Students taking a beginning home building course from Central Carolina Community College construct bathroom additions for very low-income households that lack complete indoor plumbing and do not have spare rooms that can be easily converted into bathrooms.

After a bathroom is completed, it is transported to the participating home, set on a permanent foundation, and attached to the home according to county standards. NCRCAP also installs wells and septic systems and completes housing repairs to ensure the families' health and safety. NCRCAP has begun to incorporate green building activities to conserve rural resources. Since participating families live in existing homes, we do not experience challenges such as high land costs that impact our ability to utilize green techniques. Our primary challenge is the home itself, as many of our families are living in severely deteriorated housing conditions.



Photos courtesy of North Carolina Rural Communities Assistance Project, Inc.

Shown above on left, an 8' x 12' bathroom addition is lifted off of the truck to prep it for installation next to the home. To the right, a homeowner proudly stands in the doorway of his new bathroom addition.

In its most recently ended program year, NCRCAP completed renovation work on eight single-family homes. In the 2005-2006 program year, NCRCAP proposes to perform rehabilitation work on six single-family homes.

Green Techniques

Land planning and design techniques: Safe Housing Initiative rehabilitation projects are by nature smaller and less disruptive than new home construction projects. Each 8' x 12' bathroom addition generally attaches to a home in an already cleared area of the yard, preserving the natural environment and minimizing

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TIPS FOR RESOURCE CONSERVATION

- Minimize job-site waste. Centralize cutting operations to reduce waste and simplify sorting. Set up clearly marked bins for different types of usable waste. Find out where materials can be taken for recycling and educate the building crew about recycling procedures. Reducing the net weight of construction waste can reduce the landfill tipping fee cost to the project.
- For exterior water conservation, limit lawns to play and recreational areas and use native and drought tolerant plants and trees for landscaping. Install a rainwater catchment system for non-potable water reuse for landscape irrigation.
- For interior water conservation, install water-efficient equipment such as water-conserving toilets, shower-heads, and faucet aerators to reduce water use and reduce demand on septic systems or sewage treatment plants.

GREEN BUILDING TECHNIQUES: ENERGY EFFICIENCY

Energy efficiency is no doubt the best-known component of green building. Using energy efficient building products and systems can save consumers money and reduce the emissions of greenhouse gases. Well-insulated and ventilated homes block pollutants such as moisture, dusts, pests, pollen, and radon from entering, thus creating a healthy environment. The use of energy efficient heating/cooling systems, appliances, lighting, ventilation, and insulation materials in housing construction and rehabilitation produces cost effective, healthy, and durable homes.

There are a number of rating and labeling systems in place to help consumers and builders select energy efficient products. Energy Star, which was created by the Department of Energy and the Environmental Protection Agency, is the most well known and widely used. The Energy Star label is awarded to building materials, equipment, and systems that exceed the minimum national efficiency standards where such standards exist for specific products and to entire homes that meet or exceed a specific standard. Using Energy Star-labeled heating/cooling systems, appliances, lighting, and building materials creates comfortable and energy efficient homes without sacrificing features, style, or comfort.

The following organizations have engaged in successful programs incorporating energy efficient construction and appliances with the development of affordable housing in rural communities.

UMPQUA CDC/HEARTWOOD RESOURCES

by Betty Tamm

Umpqua Community Development Corporation is a nonprofit organization in southwestern Oregon founded in 1991 to provide affordable housing and promote community and economic development, micro-enterprise, and business development with a focus on human solutions, restoration, preservation, and sustainability. Green building concepts permeate all our activities from a subsidiary business we started, Heartwood ReSources, to our new housing development and housing rehabilitation programs.

Heartwood ReSources, a wholly owned affiliate of Umpqua CDC started in March 2002, is a deconstruction and salvage nonprofit company. It is seen as leading our community in use and re-use of building materials. The deconstruction of homes, barns, and buildings and the salvage of salable wood and many other home improvement materials is reducing the impact on the landfill. It also provides alternatives to high cost lumber and materials for low-income families who wish to build, repair, or renovate their homes. Recently Heartwood received the 2005 Recycler of the Year Award from the Association of Oregon Recyclers.

Umpqua CDC and Heartwood ReSources serve 8,264 square miles in the rural communities of Douglas, Coos, and Curry counties in Oregon. The average median income of the three counties is \$31,627. Our target population is very low- to moderate-income people (those with 80 percent or less of area median income).

Green Techniques

In 2003, Umpqua CDC completed Calapooia Crossing, a solar subdivision with 11 multifamily rental units for low-income tenants and five single-family homes for first-time homebuyers. This was our first experience at providing active and passive energy saving features, which included:

- ▶ photovoltaic panels on the laundry room to produce electricity, with a net metering system (the meter runs backwards when the sun is shining);
- ▶ a passive solar design with south facing windows for winter sun and awnings to prevent summer sun intrusion;
- ▶ solar water heating on two rental units and one house; radiant floor heating from the solar hot water; polished concrete flooring as a heat sink for the solar input (and to reduce maintenance costs);
- ▶ underslab insulation;
- ▶ energy efficient appliances;
- ▶ GFX heat recovery in the water piping; and
- ▶ fluorescent lighting.



The Calapooia Crossing subdivision includes both active and passive energy saving features.

The highest winter utility costs for residents averaged \$33/month for solar units compared to \$100/month for non-solar. The ongoing savings of these low utility bills for lower-income tenants is profound; however, the initial costs and planning were much higher than expected.

Through the development of Calapooia Crossing we learned how to use Business Energy Tax Credits, the Oregon Energy Trust, and weatherization funds from Oregon Housing and Community Services, a state agency. We are using these programs again for three housing projects in 2005-2007.

Two of the new projects, Hillside Terrace in Coquille and Jefferson Park in Cottage Grove, will involve the acquisition and rehab of USDA Rural Development Section 515 rental complexes that were at risk of being sold at market rates, displacing their long-term, very low-income residents. Our work will preserve 40 units at Hillside Terrace for very low-income residents and 53 units at Jefferson Park for seniors and people with disabilities.

Rehab of these 30-year-old, run-down, unhealthy buildings (mold is sometimes a factor) will include simple things like installing new fans and exterior vents to reduce moisture, supplying new screens to encourage natural ventilation, and using lighter colored roofing to reduce solar heat gain. Doors, windows, decking, roofing, cabinets, appliances, and fixtures will be replaced with more energy efficient models, resulting in lower costs for the tenants. New materials with low volatile organic compounds, limiting the emission of harmful gases, will be used in the flooring and paints. Other energy saving measures such as lighting, plumbing, and Energy Star appliances will be included. Residents will be informed and educated on our efforts and what they can do to reduce their energy costs.

Heartwood ReSources will do the deconstruction, salvaging salable materials. These provide inventory for our used building materials retail store. And Heartwood can provide recycled, salvaged wood and unique materials for cabinets and other parts of the rehabbed units. Thus the rehab will not only create affordable, energy efficient housing, but will also have a positive impact on the community by diverting demolition debris from the landfill.

The third project, Coddington Place in Coos Bay, will provide 10 residential units for women and children who are victims of domestic violence. Coddington Place will be new construction using solar applications and green techniques including a bioswale for stormwater run-off, triple pane windows, passive and active solar heating and cooling, and insulation higher than required by code. The triple pane windows are far higher than code, but a full set of beautiful new windows was donated to Heartwood so we designed them into Coddington Place.

The architect designing Coddington is knowledgeable in LEED criteria and is including green techniques in his planning and design. He integrates LEED strategies for energy conservation and sustainability, and has received awards for his designs.

The projects we are now planning all have different challenges and characteristics. We learn more from each experience, and we've developed relationships with suppliers, educators, and professionals offering technical assistance for green building to continue expanding on our knowledge and capacity.

Benefits and Affordability

Exploring the options and analyzing cost effectiveness takes extra time and planning with other professionals, but the end results do benefit low-income families and our environment. Reduction in utility costs and improved comfort levels for residents will be a measure of success. Our goal is to reduce these costs by one-third to one-half for long-term, ongoing savings. We already have shown huge utility benefits to the residents of Calapooia Crossing. We will be able to poll the residents who have lived long-term at Hillside Terrace and Jefferson Park and measure directly, on a before and after basis, the savings produced by their upgrades, as well as measuring the changes in their comfort/general health areas.

Challenges

Our region has challenges that are common to all rural regions, and some that are unique to our area. These include the high cost of transportation of building materials and the scarcity of contractors who are familiar with green and sustainable building techniques. Our specific region of southwest Oregon has

suffered from high unemployment for the past two decades due to the decline in the timber and fisheries industries. For this reason we try to hire and train local contractors, keeping the construction money in the community. With our unique energy systems, however, we sometimes have to contract with specialized companies from over 100 miles away. Due in part to our specifying these elements in our designs, local contractors are learning, although their bids are sometimes higher to allow for the cost of their learning curve.

Educating our community about the benefits of green building has also been a challenge. The attitude that “we’ve always done it that way” is slowly giving way as recycling becomes cost effective and the long-term energy savings become clear.

One major barrier is that the dump in Douglas County, where Heartwood ReSources is located, is free; there are no tipping fees. This does not encourage recycling or deconstruction, as demolition is far cheaper than taking a building down for its materials. We’ve been working with the county to consider tipping fees just for construction materials.

In these days of housing booms with increasing land values, the face of building is changing, with a much stronger focus on preserving our natural resources. We continually examine and explore new ways to balance the rising costs of construction with the energy efficient measures that can produce savings for everyone. Umpqua CDC looks into the future with an open mind, envisioning well planned, educated, healthy communities that appreciate the natural beauty that surrounds us. 

Betty Tamm is Executive Director of Umpqua Community Development Corporation. Information about the organization is available at www.umpquacdc.org.

RURAL DEVELOPMENT, INC.

by Anne Perkins

Rural Development, Inc. was created by the Franklin County Regional Housing and Redevelopment Authority in 1991 to “finance, develop, package, insure, manage, regulate, control, acquire and own diverse types of housing designed to provide safe, sanitary and suitable living accommodations of any and every type and kind to all persons of low, moderate and middle income within the Commonwealth of Massachusetts.”

RDI works with its partners to expand housing and economic opportunities for residents and communities in rural

Franklin County and northern Quabbin regions of western Massachusetts. Because the area’s long, dark, cold winters require heat for ten months of the year, RDI determined that the best way to lower our buyers’ operating expenses was by lowering the number of gallons of fuel oil they needed to purchase along with their electrical use. Thus our first foray into the field of green building was to increase the energy efficiency of the houses. We began to work with the Energy Star Homes program and today routinely exceed its standards in our homes. In 2003 RDI was honored with the 2003 Energy Star Builder Achievement Award for Affordable Housing.

Green Techniques

RDI employs a number of green techniques in its development of affordable housing, but energy efficiency is at the heart of its efforts. The RDI Affordable Green Homes project has developed over the years since 1999. It began with a phone call to the local utility company asking if there were any programs to support increased energy efficiency in affordable houses. We were directed to the Energy Star Homes program and began to work with it in the year 2000. The program secured funding from the utility companies to pay RDI for the upgrades necessary to bring the houses up to Energy Star standards, a relationship that has grown and continues today.

Of the 81 houses RDI has sold to date, the last 43 have been Energy Star homes. In 2003 RDI was awarded a \$20,000 grant from the Massachusetts Technology Collaborative, a program of the Massachusetts Renewable Energy Trust, to study the feasibility of including photovoltaics systems in affordable houses. RDI used that money to develop an innovative new colonial style house design that can incorporate photovoltaics on either the front or rear roof, on a side porch, or on a stand-alone shed. The study also included an in-depth look at the various energy efficient heating system options. MTC subsequently awarded RDI \$67,000 to include 1 kW photovoltaic system and high efficiency Viessmann Vitodens gas boilers in four homes, a project that was completed in July 2005 with a final public open house.

Since 2000, RDI has built approximately 10 single-family affordable houses per year either under contract or as spec houses. RDI acts as the developer, the general contractor, and the recruiter/educator of low-income buyers. All the houses have been sold to first-time low-income buyers (with incomes not higher than 80 percent of area median income) who have contributed at least 200 hours of sweat equity in the construction of their homes. RDI has four skilled carpenters on staff who have learned the techniques of green building and who

oversee the work of the subcontractors. Families choose their own appliances. RDI teaches them to look for Energy Star appliances and passes the rebates on to them.

Efficient heating systems are crucial to homeowners' ability to pay for winter heat in Franklin County. RDI has done extensive study of appropriate heating systems and has used several different brands and models. We have installed Smith 8, Viessmann Vitorand, Viessmann Vitodens, and Buderus oil and gas boilers. We also install an outside air intake to each boiler and an indoor-outdoor sensor that modulates the water temperature, heating it to just what is needed. We do not install cooling systems.

The Affordable Green Homes project is not static, but continues to develop. We have recently been awarded a grant from the HAC/Home Depot Foundation Green Building Initiative to increase the use of green materials in the homes (bamboo flooring and cement siding). In the next year, we will be installing 2.5 kW photovoltaic systems on several new homes. We also plan to buy a dumpster so that we can recycle sheet rock and cardboard scrap into compost. We hope to use the services of the local landscape design school in the next year to assist us in sustainable landscape design. We have contracted with the U.S. Green Building Council and the Conservations Services Group to participate in the LEED for Homes Rating System Pilot Demonstration.

Benefits

There are multiple benefits to RDI's green houses:

- ▶ They support low-income buyers by lowering utility and maintenance costs; analysis of five recently built homes by Energy Star Homes suggests fuel savings ranging from \$178 to \$466 per year (pre-Katrina figures); new homeowners with 1 kW photovoltaic systems are paying one half to two thirds of the amount other homeowners are paying for electricity that is net-metered.
- ▶ They are healthier and more comfortable to live in.
- ▶ They raise the awareness of both the buyers and the community about the benefits of sustainable living.
- ▶ They demonstrate the feasibility of incorporating green techniques in modest housing that is aesthetically pleasing and fits into the community.
- ▶ They serve to train students from the local technical school as well as the local suppliers and subcontractors who work for RDI about the value of and techniques of green building.

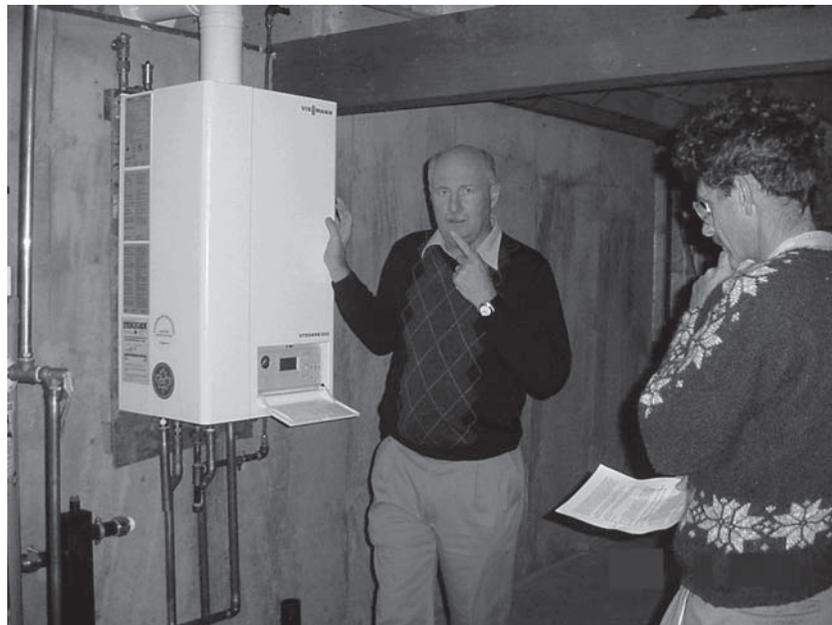


Photo courtesy of Rural Development, Inc.

A Rural Development, Inc. representative describes the benefits of boiler heating systems and how they operate.

- ▶ Through public open houses, they educate the community at large about the benefits of green building.
- ▶ They promote a positive image of the RDI Home Ownership Program in the community.
- ▶ They serve to participate in the worldwide effort to promote conservation of resources.

Challenges and Affordability

RDI has pondered how to expand our construction practices to include the all-encompassing green building concept. How do we balance the need to decrease the cost of the houses for low-income people with the desire to raise the quality of our houses and incorporate an environmental sensibility to our land use and construction practices? How do we create new houses that meet the needs of low-income first-time homebuyers without contributing to the depletion of the earth's resources and without encroaching on open space? How do we show our respect for low-income people by building quality houses that are aesthetically pleasing and that are easy to maintain? How do we build "green" while keeping both construction and operating costs affordable? With those questions in mind we have worked to go as far as we can in the green direction. Given the increased costs, it has been a challenge. We have searched out and found wonderful supportive resources to help us along the way.

The two power companies in our area, Western Massachusetts

TIPS FOR ENERGY EFFICIENCY



Well designed high-efficiency furnaces, air conditioners, and instant supply-on-demand water heaters not only save the end homebuyers money on their energy bills, but also produce less pollution during operation.



Perform a blower door test to determine cost-effective air sealing and combustion safety for sample unit types. Analyze results to benefit all project units.



Specify and install Energy Star lighting fixtures and appliances. Energy Star rated products reduce energy and water consumption, as well as residents' utility bills.



Contact your utility company to find out how you can build Energy Star homes.

Electric Company and Massachusetts Electric Company, have programs to encourage energy efficiency in homes. They have reimbursed RDI for upgrade costs that have increased the quality of insulation, windows, compact fluorescent lighting, and heating systems. They have also instituted a program to teach energy efficient construction practices to the students of the local technical school, who assist RDI in the building of a home each year.

We have also received significant private investment by securing grant funds from the Massachusetts Technology Collaborative described above. In addition, community members, local technical students, and homebuyers have contributed hours of volunteer labor, helping to lower the total development cost and creating broad interest in building green.

It is worth the extra effort to build Affordable Green Homes! It is foreclosure prevention for low-income homeowners. It gives them a comfortable home. It saves the environment. It gives all of those involved in the building process a sense of satisfaction and pride. It earns community support. 

Anne Perkins is Director of Home Ownership Programs at Rural Development, Inc. More information is available at www.ruraldevelopmentinc.org.

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Miscommunication, carelessness, or ignorance on the part of one member of the building team can spoil months of careful planning and the best intentions.

7

Budget for careful monitoring of the construction process and commissioning of systems prior to occupancy.

Be sure the owner's representative on the construction site is familiar with the green goals of the project and the construction techniques that will help meet these goals. Commissioning, a post-construction check to insure that all systems and features are installed and operating as designed, is especially important if any unfamiliar technology is used. However, even with "standard" systems, components are often improperly installed or adjusted. There are many horror stories about fans installed backwards or systems never switched from "test" to "operate." Checking these systems can mean the difference between meeting goals for energy efficiency and wasting money far into the future.

8

Educate the occupants and maintenance staff on how to use systems and keep the project green.

Keep it green. Be sure that residents know that they are moving into a different kind of space, why it is different and how they need to use systems and maintain their space. The benefits of low VOC paint won't last if the first occupants repaint with regular paint because they don't like the color. Indoor air quality can be degraded by use of pesticides and toxic cleaning products. Remember to come up with an effective way to communicate with the occupants – a technical booklet will not always do. Also be sure that those responsible for maintenance, landscaping, and cleaning are on board, trained, and properly equipped. 

Edward F. Connelly is President of New Ecology Inc., which specializes in working with the developers of affordable housing to overcome the obstacles to greening affordable housing and implement the comprehensive approach described in this article. More information, including the report mentioned in this article, is available at www.newecology.org.

GREEN BUILDING TECHNIQUES: HEALTHY HOMES

Rural residents have long suffered some of the most extreme housing problems in America, many of which have been linked to specific health concerns among children, the elderly, and other high-risk populations. Rural homes are more likely than urban units to have structural defects that make the units susceptible to mold and vermin infestation, which can trigger asthma attacks and other respiratory conditions. Rural households are also twice as likely to rely on heating sources that are potentially hazardous or insufficient, which can lead to carbon monoxide poisoning, fires, and explosions.

Local organizations across the country are working to create healthy homes – homes that are developed, maintained, or rehabilitated to ensure the health of residents. Healthy units incorporate ventilation systems, toxin-free materials, and maintenance practices that reduce environmental impacts on human health. Housing programs that decrease moisture, remove or abate toxic materials, improve ventilation, or address structural defects can help to create healthy living environments for residents.

The following organizations have engaged in successful programs to improve housing quality using strategies and techniques that promote healthy homes in rural communities.

SHEEN HOUSING

by Allynn Smith

Bishop Sheen Ecumenical Housing Foundation, Inc. is a nonprofit corporation that provides safe, decent, affordable housing for low-income families, seniors, and persons with disabilities in order to promote their self-worth and dignity. We offer a wide range of housing assistance, with a commitment to compassionate quality service. We provide home repair services to decrease substandard housing conditions that threaten the health and safety of our communities, offer homeownership opportunities as well as housing counseling, and provide affordable rental opportunities for families and assisted living facilities for seniors.

Sheen Housing's programs encompass a comprehensive

housing and economic development approach within our service area, which includes 13 western New York counties (Allegany, Cayuga, Chemung, Livingston, Monroe, Ontario, Schuyler, Seneca, Steuben, Tioga, Tompkins, Wayne, and Yates).

The housing stock in rural New York is getting older and the funding to remedy this ever-present and critical issue is becoming more scarce. Sheen Housing has a long history in delivering high-quality home rehabilitation services in the region. Specifically, our Emergency Home Repair Program provides funds to low-income homeowners for critical housing repairs. With \$5.9 million in funding, Bishop Sheen has served over 503 families, providing health and safety home repairs. The need for these services has outpaced available resources, however. Due to severe weather conditions and the economic downturn, our organization witnessed a drastic increase in the use of this program since 2003, with over 125 families, seniors, and persons with disabilities still on our waiting list.

Green Techniques

In the past five years, Sheen Housing has included a green/healthy homes initiative in our home repair program. We started with our healthy homes initiative which included features such as window locks, deadbolt locks on doors, locks or safety latches on medicine cabinets as needed, smoke detectors, carbon monoxide detectors, energy-efficient windows, elimination of lead-based paint, and any other upgrades or repairs that contributed to a safe, secure home, especially regarding children and elderly people.

We then moved forward with our green techniques. These included energy-efficiency techniques such as weather-stripping, insulation, energy efficient windows, or properly maintained heating systems are less likely to exist in homes occupied by low-income families, seniors, and persons with disabilities than those occupied by higher-income families.

Sheen Housing provides further energy conservation and thermal upgrading, including the repair or replacement of primary and storm windows, doors, and appliances (many recycled); re-insulation of ceilings and sidewalls; and weather-stripping and caulking of windows, doors, sills, etc. to eliminate



Photos courtesy of Bishop Sheen Ecumenical Foundation, Inc.



What a difference! Look at this home before Sheen Housing renovated it. They replaced the siding, roofing, and storm windows.

air infiltration. Energy audits and assessments of energy conservation measures are done in developing the scope of work for each rehabilitation effort.

Benefits

Rural developers, like Sheen Housing, engaged in the rehabilitation of older homes have an ideal opportunity to create healthier housing for families and seniors at risk. By making simple and cost-effective modifications to current rehabilitation practices, Sheen Housing has eliminated exposure to sources that may lead to respiratory distress, including asthma. Important techniques for achieving healthier housing include minimizing moisture, promoting adequate ventilation, properly exhausting combustion appliances, eliminating entry points for pests, and providing smooth, easily cleanable surfaces. With the continued support of local and national government agencies, foundations, and the community, Sheen Housing is able to provide these services and repairs.

By developing programs and utilizing technologies and products to improve energy efficiency in lower income housing, Sheen Housing also improves the efficiency of homes while reducing the high cost to owners that results from energy waste. Typically, each year families save 30 percent of their former costs. Energy efficiency produces a more comfortable home, extends the life of the unit, and may result in a higher resale value.

Challenges

The most obvious obstacle in the provision of green/healthy home rehabilitation is the significant cost involved. Sheen Housing's clients typically live in extreme poverty. Because of

their financial situations, our clients come to us with homes that are already in dire need of repair and rehabilitation. Most of the homes we serve have not been maintained in several years, making the repairs quite extensive and costly.

An additional challenge is the fact that many local contractors are simply not aware of or trained in green techniques. To address this need for education, a step-by-step project-specific plan is created for each contractor to ensure the required repairs and updates are made in an environmentally conscious way.

Affordability

The average cost of Sheen Housing's rehab work is \$18,500. We have made the green building technique available to low-income families at no cost to them, by simply stretching our project dollars to the max and leveraging our funds with federal, state, and local funding sources. We also continually fundraise through grant writing to national and local foundations, solicitation campaigns to various groups, and holding an annual gala. Our efforts have paid off and our results are promising—Sheen Housing leverages additional federal/state funding for every green building dollar we raise.

As a whole, much more could be done in rural New York, but steps certainly have been taken to initiate a strong green building initiative within our communities. The desire, knowledge, and skills are in place and the implementation of the tools is sure to follow. 

Allynn Smith, Ph.D., is Executive Director of Sheen Housing.

RURAL CAP

by Mitzi Barker

For 40 years, the Rural Alaska Community Action Program has been working to protect and improve quality of life for low-income Alaskans through education, training, direct services, decent and affordable housing, advocacy, and strengthening the ability of low-income people to advocate for themselves. One of 1,000 Community Action Agencies nationwide, RurAL CAP started out in 1965 with a handful of staff and a budget of a few thousand dollars. Today, the agency is one of the largest and most diverse nonprofit corporations in Alaska, employing more than 500 people annually, with expenditures over \$20 million, and is the state's sole CAA, serving a territory one-fifth the size of the continental United States.

Most of the communities served by RurAL CAP are remote Alaska Native villages. Many of the residents pursue a largely traditional lifestyle, centered on hunting, fishing, and foraging for food. Few cash-paying jobs are available, and household incomes are, not surprisingly, very low. A good deal of each household's scant cash income is spent on fuel oil and electricity.

Green Techniques

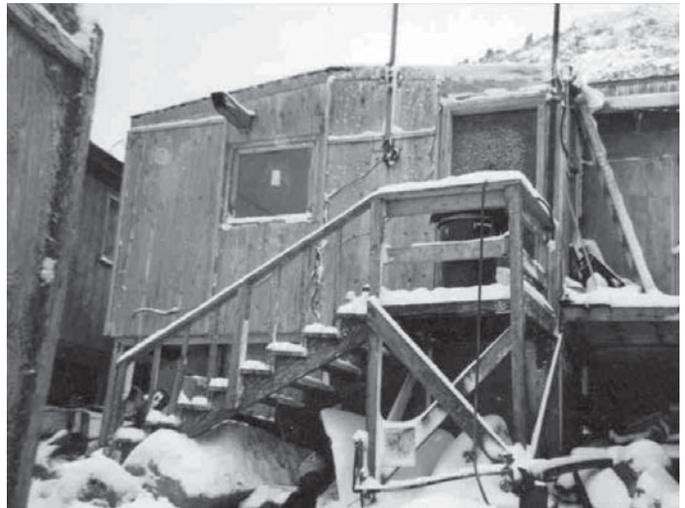
In a climate where winter temperatures regularly plunge below zero, a warm home is essential to human survival. During the mid-1970s, RurAL CAP developed a program that was a forerunner of the now-familiar weatherization program, providing building materials and technical assistance to low-income rural Alaskans to make homes more weather resistant and energy efficient. Since 1975, RurAL CAP has rehabilitated and/or weatherized over 8,300 homes. The effect of these measures is tremendous in villages where winter temperatures routinely reach -40°, the landed price of a gallon of fuel oil is \$3.50 and the price of a kilowatt hour of electricity exceeds 40 cents.

In addition to typical weatherization measures, RurAL CAP's program also addresses basic structural integrity and indoor air quality. The effort preserves precious rural housing stock, improves the health of the occupants, and reduces energy costs. Before- and after-rehab building audits reveal a 31 percent reduction in average energy costs and a 50 percent reduction in heating costs. In addition, the program allows families to save money, improves indoor air quality, lowers levels of carbon monoxide, controls moisture and mold, eliminates drafts and cold spots, and reduces combustion emissions. Funding for the program comes from the U.S. Department of Energy, with supplemental funding through the Alaska Housing Finance Corporation.

Challenges

Delivering a housing rehab and weatherization program in rural Alaska is fraught with challenges. Virtually everything has to be shipped into the village from Anchorage or Seattle (2,000 miles to the south). Bush logistics is the delicate science of ordering materials months in advance and arranging to get them on site in time for construction to begin, balancing barge schedules with the uncertainties of Alaska weather, forecasting when the river ice will break up, and realizing that if something is forgotten running to the local hardware store is not an option.

Every energy efficiency measure that RurAL CAP installs in a home needs to work well, be durable, and be easy to maintain. That means obtaining materials and appliances that are made to perform well in the arctic environment. Unfortunately, the



Photos courtesy of RurAL CAP.

In Alaska, where the temperatures often plunge below zero, many Alaskan Natives live in homes which lack sufficient insulation and are not air tight (top). RurAL Alaska renovated this home to be weather resistant and energy efficient.

supply chain for these items has not always been reliable. In the 1980s, RurAL CAP responded to this challenge by becoming a distributor of Toyostoves (safe, efficient kerosene space heaters) and other energy efficient appliances especially suited for rural Alaska applications. Soon, the agency was selling these items to a broader Alaskan market, and in 1987 spun off Rural Energy Enterprises as a wholly owned for-profit subsidiary company. Today, REE serves a territory that extends into Canada and the intermountain West, and pays RurAL CAP an annual dividend on its earnings, a welcome source of discretionary income.

Affordability

Preserving homes through weatherization and rehabilitation not only extends the life of individual homes, but also contributes to community viability and sustainability. RurAL CAP's weatherization and rehabilitation program targets entire communities. Communities apply to the Alaska Housing Finance Corporation

for services. AHFC staff then work with RurAL CAP to select communities based on need, and schedule projects three years at a time. Every home in each community is evaluated, and every resident who wishes to participate is screened for income qualification. Most families qualify for grants; few could afford loans, even if they were available.

Whenever possible, RurAL CAP collaborates with tribal organizations who may have HUD Indian Housing Block Grant funds to contribute, as well as with USDA Rural Development. These collaborations stretch funding and allow more comprehensive work to be performed, such as foundations, home additions, and other items outside the scope of weatherization and energy efficiency. 

Mitzi Barker is Director of Rural Housing and Planning at the Rural Alaska Community Action Program.

GREEN BUILDING IN ACTION – LITTLE DIOMEDE, ALASKA

Sometimes, it is only through collaboration that an Alaskan community receives services at all. When a village is extremely remote, weatherization program funds alone are not always sufficient to create a viable project. Freight and travel costs often exceed the cost of materials and labor. This was the case for the village of Little Diomed.

In 2002, RurAL CAP was contacted by the manager of the regional grantee for the federally funded Bureau of Indian Affairs Housing Improvement Program, who is based in Nome. He had just returned from a trip to Little Diomed, a remote island 125 miles to the northwest, in the Bering Sea. The village's housing was in dire condition and the traditional council had just voted, with great sadness, to begin relocating the villagers to the mainland. Relocation would mean not only physically uprooting families, but abandoning centuries of seafaring subsistence culture that relies on the harvesting of migratory birds and marine mammals. Could RurAL CAP help?

Little Diomed was at the top of the Alaska Housing Finance Corporation's needs list, but the available funds were not sufficient to mount a project large enough to justify the high cost of logistics. RurAL CAP brokered a partnership of public and tribal organizations and assembled nearly \$2 million in funding to rehabilitate every occupied home on the island.

In addition to increasing the energy efficiency of the homes through insulation, new windows, siding, and installation of high efficiency water heaters and oil stoves, foundations were shored up, dilapidated exterior stairs were replaced with durable materials, and interior mold and condensation issues were addressed. One home was completely rebuilt, while several others obtained increased living space through room additions. All the work was performed by local residents working under the supervision of a RurAL CAP foreman. Workers received on-site job training in carpentry and related skills through a Denali Commission training grant program sponsored by Kawerak, Inc., the Alaska Native regional nonprofit agency based in Nome.

Residents and tribal officials saw benefits almost immediately. Fuel sales at the village store were sharply reduced; some residents reported a 50 percent reduction in consumption. Families told of healthier children, with fewer colds and respiratory infections. Other residents observed the impact of the local jobs and income generated by the project, gauged in part by sales at the village store and families upgrading aging snowmachines (essential, basic winter transportation for hunting and travel).

Critical to the success of the Diomed project were:

- ▶ designating a lead partner early in the process, with each partner willing to trust the lead partner to act in a way that would achieve the project's goals and would respect the needs and limitations of the other partners;
- ▶ working closely with and communicating regularly and in person with local residents and officials;
- ▶ accurately estimating costs and defining the project scope before work began; and
- ▶ involving funders in figuring out how to overcome conflicting requirements. Everyone wanted to make the project work and no one wanted to be the one that made it fail.

Building on the lessons learned and partnerships forged during the Little Diomed project, RurAL CAP is working to create similar programs that will help other small, remote villages improve their housing and community stability. Every home improved contributes to reduced fuel consumption, healthier families, and reduced waste.

KEYS TO GOOD INDOOR AIR QUALITY IN HOMES

by Mike Barcik

Indoor air quality problems in homes can take many forms but the main way to look at problems is to remember the three “P’s” of indoor air quality: “Pollutants need a Pathway to People.” If you eliminate any one of the 3 “P’s,” the problem goes away.

When building or renovating a home, it is important to make good choices to avoid bringing pollutants into homes. Many times the building materials we choose contain the pollutants – in fact, chemically sensitive individuals must be extra careful with their material selections.

Some common pollutants found in homes are VOCs, mold, dust (pollen, dust mites, insulation fibers, etc.), carbon monoxide and other combustion products, radon, pesticides, and household chemicals.

VOCs: Volatile organic compounds are the off-gassing of chemicals (think of “that new car smell”) typically found in many glues and adhesives, finishes such as paints and carpets, and pressboard materials such as particle board or MDF. Often low- or non-VOC options are available for these materials.

Almost every major manufacturer carries a line of low-VOC paints at little or no cost premium. Several carpeting options are available that use different glues or are made with natural fibers, such as wool. Low-VOC caulks and adhesives are also commercially available, as are pressboard products made with no-added-VOC glues. And, while many solid surface countertop options exist, those on tight budgets can still utilize laminate surfaces if the substrate has low VOCs or is sealed to reduce off-gassing.

Mold: Mold is a common pollutant. Its development requires mold spores, a food source, typical room temperatures, and high moisture content (above 70 percent relative humidity). Because spores and food sources are everywhere, mold growth can only effectively be prevented by controlling moisture.

Proper moisture management means particular attention to exterior drainage and flashing details. Certain exterior cladding systems, such as brick veneer and vinyl siding, are intentionally designed to have drainage spaces behind them, effectively creating escape routes for water that gets beyond the exterior surface of the cladding. This drainage plane concept can be applied to virtually any cladding system. Acceptable “behind the cladding” water shedding surfaces are felt, housewrap, and foam sheathing.

When a mold outbreak does occur, it is important to react quickly and to document your efforts in case of liability

concerns. Generally, except in cases where required by litigation, mold testing is not recommended. If you see mold, you have mold (remember, mold spores are everywhere). Instead, spend the money and effort on finding and fixing the moisture problems and then on remediation of the mold.

Mold remediation rules and guidelines vary depending on the degree of exposure, the physical size of the outbreak, and the materials affected. Porous and absorptive materials, such as dry-wall and carpet, must generally be removed while wood studs and joists can often be wiped down with a mixture of mild soap and water or water and TSP. Visit www.epa.gov/iaq for more information.

If the source of the mold is an uninhabited portion of the home, such as an attic or crawlspace, careful air sealing to prevent that air from mixing with the conditioned space is crucial. While efforts should be made to prevent mold growth in those locations, the physical pathways made by plumbing, electrical, and HVAC penetrations should be sealed to eliminate the connection to the living space.

Since ductwork is often located in attics, crawlspaces, and basements, it should be carefully sealed with mastic (not tape!) to prevent pressure differences that cause pollutants to enter the home. Besides saving energy, sealing leaky ducts is one of the most effective means of improving air quality.

Dust (pollen, dust mites, insulation fibers, etc.): Dirt and dust can be comprised of many possible different materials. Larger dirt particles are often brought into a home on people’s shoes, so a mud room area or an effective mat can be useful. Most of the dust that creates respiratory problems is of a smaller particle size, which means that it is lighter and more airborne and thus more difficult to capture.

While pollen, insulation fibers, and other particles can usually be controlled by air sealing their entry pathway and separating them from the occupants, dust mites are commonly generated internally. Dust mites are microscopic critters that feast on dead skin cells and their population flourishes when the indoor moisture content exceeds 50-60 percent relative humidity. Tiny, dead dust mite body parts and waste actually make up a portion of the airborne dust in homes.

The best solution is to try to maintain the relative humidity at or below 50 percent to keep the dust mite population from thriving. Properly sized and installed air conditioning equipment (consider variable speed equipment for greater moisture control), tight ductwork, and good exterior moisture details are all part of the effort to control moisture. In some cases, a separate dehumidifier may be necessary for a home with a moisture problem.

Dust and fibers can be somewhat contained by filtration. Since most homes come standard with a one-inch fiberglass filter that is designed mainly to protect the equipment, the amount of filtering actually achieved is minimal. While bet-

ter filters are available in a one-inch thickness, their increased resistance to airflow could create greater problems with duct pressures. Changing filters regularly is critical.

Better quality, thicker, pleated media filters are available as an upgrade that will typically require modification to the duct system and the HVAC professional's understanding of their impact on the air distribution system. Since generally leaving the air handler running full time is expensive and can worsen duct pressure problems, this is not a recommended practice unless the blower is variable speed. However, filters can only catch pollutants that are blown across them so the bottom line is that filters are only a partial solution, at best, to an air quality problem.

Carbon monoxide and other combustion products:

Since burning any fuel requires oxygen, air must be provided for combustion to be sustained. A good rule to follow is that combustion air and people air should never be allowed to mix. Combustion appliances like water heaters, space heaters, and furnaces should always be located in a non-conditioned space or be of the sealed combustion, direct vent type.

For example, a home with a water heater in a small closet may have a louvered door connecting the house air with the closet air. This scenario is dangerous in that any negative pressure could prevent the flue gasses from going up the flue pipe, causing backdrafting to occur. Since one of the common results of backdrafting is the production of carbon monoxide, this is a dangerous and potentially deadly possibility.

A better approach would be to seal and isolate the closet from the occupied portion of the house and provide combustion air directly to the closet via high-low vents (as per code). Another option is sealed combustion, direct vent equipment that, due to its double pipe venting, provides combustion air and exhaust venting as part of the installation. A final option (in milder climates) would be to relocate the water heater to an unconditioned garage or vented attic. Each of these approaches separates the water heater from the conditioned space air.

It may seem obvious, but flue pipes are absolutely necessary to vent combustion products (such as water vapor, carbon dioxide, carbon monoxide, nitrogen oxides, sulfur oxides, etc.) for safe operation of combustion appliances. That said, many gas-log fireplace inserts are unvented and should be avoided. Choose a wood or gas-log fireplace that has both a flue pipe and combustion air ducted to the firebox. Better yet, select a sealed combustion, direct vent gas-log with a solid glass front.

A final note: one common source of carbon monoxide is attached garages. At a minimum, careful air sealing to separate the garage air from the conditioned space is crucial. A better approach would be a garage exhaust fan controlled with an occupancy sensor. The best option is a detached garage or open air carport. Avoid locating air handling units in attached garages due to duct leakage concerns and never add a supply duct to the

garage from the home's HVAC system.

Radon: Radon is a colorless, odorless gas naturally caused by the breakdown of radioactive materials in the earth. It is also the second leading cause of lung cancer (after cigarettes) and seeps into homes through cracks and seams in foundations. Since it is not practical to know whether there will be a radon problem until after a home is built, radon prevention should be a consideration during construction and the home should be tested for radon upon completion.

Test kits are commonly available and mitigation is generally warranted for levels of four pico-Curies/litre or more. Proper air sealing of the foundation plus a sub-slab depressurization effort may be employed to mitigate high levels. A passive vent system is generally not expensive to install during construction and a continuous duty exhaust fan can be retrofitted if testing deems it necessary.

Pesticides and household chemicals: It doesn't make sense to follow building science principles and construct a tight, well insulated home with properly sealed ductwork and then bring nasty chemicals into the living space. Make safe choices about cleaning solutions, pesticides, and other household products to avoid the hazards of creating a toxic indoor air "soup."

If home projects require the use of strong chemicals, attempt to relocate the effort outdoors or at least open all windows and run fans for safety. Read and follow all safety labels for proper use of chemicals and try not to store them in the living space if possible.

V is for Ventilation: Sealing up a home and the ductwork is important for energy and pollutant entry reasons. Operable windows are always provided to allow the occupants the ability to vary the connections to the outside air (although they often remain closed). Most homes, however, regardless how leaky they are, should have some degree of regular outside air ventilation provided.

One simple method of introducing outside air is to duct a small amount (about 50 cfm via a four- to six-inch duct) of outside air to the return plenum. A motorized damper and controller can make this process even more efficient and consistent and prevent over-ventilating on extreme temperature days.

Exhaust fans in the kitchen and baths that are ducted to the outside are also vital. Ducts must be routed carefully and terminate through to the outside and not into an attic or crawlspace. Quiet, efficient, Energy Star fans are available that are more effective than the standard quality, noise-maker variety. 

Mike Barcik is Director of Technical Services at Southface Energy Institute. Additional information on the topics covered in this article can be found at www.southface.org.

TIPS FOR HEALTHY HOMES



Educate residents on ways to maintain good indoor air quality including minimizing and treating mold, reducing track-in of dirt, and using mechanical ventilation properly. Install a ventilation system that includes operable windows and mechanical ventilation to reduce or eliminate instances of mold, control odor, and reduce excess moisture.



Reduce emissions of volatile organic compounds, or VOCs. Carpeted areas collect dust and can be breeding grounds for molds and dust mites, and carpets, carpet pads, and carpet glues off-gas volatile organic compounds. In living rooms and sleeping areas, install hard flooring surfaces or carpets with a CRI IAQ (Carpet and Rug Institute Indoor Air Quality) label that identifies low-emitting carpets and cushion materials. Use non-toxic adhesives and sealants as well as "Green Seal" rated paints to improve safety for both the construction crew and later residents. Use medium density fiberboard or wheatboard instead of particleboard for underlayment, cabinets, and storage units.

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Water conservation: Currently, low-flush (1.6 gallon) toilets are installed in the bathroom units. We also educate families on water conservation methods to prevent water waste and reduce monthly bills. In the future, NCRCAP will also install low-flow shower heads and faucets in bathrooms and kitchens.

Energy efficiency: NCRCAP partners with local community action agencies to ensure that homes are energy efficient and meet USDA thermal guidelines. Various insulating materials are used to create a tight home, thereby reducing energy consumption and improving the quality of indoor air. Additionally, all doors are weather-stripped and insulated steel or solid core wood exterior doors are installed when needed. Since 50 percent of heat/cooling loss in a home is through the windows, double-glazed (paned) vinyl window units are installed if we are replacing windows.

Many of the families NCRCAP assists are the poorest of the poor, and therefore many rely on wood stoves and electric ovens to heat their homes. Our partnering organizations, Regional Consolidated Services and Joint Orange Chatham Community Action, replace wood stoves with propane-heating units to eliminate safety and health hazards. Propane units do not emit dangerous toxins into the indoor air, they reduce the chances of house fires, and they minimize environmental degradation of our forests.

Waste reduction, reuse, and recycling: Unused materials, such as lumber and partial sheets of plywood, are transferred from site to site to minimize waste. NCRCAP also routinely purchases salvaged bathroom fixtures and materials from local building surplus stores in an effort to reuse materials.

Benefits

Green building techniques reduce the overall impact to the environment. Green building, in the form of waste reduction and reuse, helps NCRCAP to conserve resources, thereby lowering project material costs. Most importantly, green techniques help to improve the overall health and safety of our households while reducing energy bills for low-income families.

Challenges

Cost has been a primary challenge in using these green building techniques. Although we do achieve cost savings in some areas, other activities, such as systematic window replacements, increase overall project expenses. NCRCAP addresses this issue by leveraging materials and labor through partnerships with other agencies, contractor discounts, and donations.

Affordability

NCRCAP receives funding for the Safe Housing Initiative from the USDA Rural Development Housing Preservation Grant program and the Section 504 loan/grant program in addition to the Southeast Rural Community Assistance Project. Funding from HAC allows us to incorporate additional green building techniques. All improvements to participating households are provided as grants.

Nina Ann Baccanari is Associate Director of the North Carolina Rural Communities Assistance Project. More information is available at www.ncrcap.org. NCRCAP is funded in part by the Southeast Rural Community Assistance Project.

Each issue of *Rural Voices* profiles members of the Housing Assistance Council's board of directors. A diverse and skilled group of people, HAC's board members provide invaluable guidance to the organization. We would like our readers to know them better.



MARIA LUISA MERCADO

"Being a HAC board member is gratifying," says Maria Luisa Mercado. "It allows me to help people through concrete projects like building houses. When you are able to put a roof over the heads of a family it creates stability and hopefully helps them to move out of the constant cycle of poverty. This is never more apparent than when the board makes site visits to communities where HAC has contributed loans and technical assistance."

Mercado has served on HAC's board of directors for more than ten years in the capacities of president, chair of the Loan Committee, and other positions. She maintains this important commitment while also juggling the demands of her law practice in Galveston, Texas and her family. Her pro bono work has included cases related to building affordable housing for low-income people, particularly farmworkers.

Mercado's commitment to decent affordable housing for everyone stems from her background in migrant farm labor. Originally from Mexico, Mercado labored in the fields from age six until her junior year in college. Like many people who work in the fields, she lived in rural areas where the only available housing was in the worst imaginable condition. This first-hand experience motivates her work as a board member.

During her years on the board Mercado has witnessed the benefit accrued to local communities that partner with HAC to address housing problems. Mercado says, "HAC has worked hand-in-hand with many groups to build affordable housing and transmit skills and leveraging power to isolated rural areas. The regional offices allow us to provide extensive technical services at the local level." Mercado is proud to say that HAC's service model has proved to be extremely effective at stretching funding resources to create maximum benefit.

While HAC has a long history of providing solutions to regional affordable housing shortages, Mercado suggests that more funding is needed to even begin to serve the need. Because of the limited funding resources, she says, "over the years housing has not gotten much better for farmworkers in Texas, nor for the low-income population in general. A significant portion of Texas's population lives in isolated rural areas with deplorable housing conditions. We have a lot of work ahead of us. The challenge for HAC, as well as for other nonprofits and our political leaders, is to keep the issue of housing front and center."

The Housing Assistance Council thanks retiring board member Amancio Chapa for 27 years of dedicated service.



GIDEON ANDERS

Gideon Anders got involved in rural housing issues as a VISTA volunteer inspecting Colorado's farm labor housing in 1969. He was among the earliest HAC staff hired in 1972, reviewing loan applications and providing advice and assistance to local organizations around the country in the fledgling rural housing movement. In 1977, Anders left HAC to become a staff attorney at the National Housing Law Project. Now NHLP's executive director, he has served on HAC's board since 1993 and presently chairs the Loan Committee.

Anders's work at NHLP has allowed him to continue to collaborate with HAC on rental preservation and other rural housing issues. Anders says he has seen HAC grow and mature while maintaining its original mission to serve and advocate for the rural poor. As a member of the Loan Committee, he knows that HAC sometimes goes to great lengths to help local organizations provide affordable homes. He also is impressed by the quality and dedication of the current HAC staff.

He is pleased by HAC's willingness to incorporate the advice of field organizations into its service model. He also admires HAC's dedication to fostering leadership at the grassroots level.

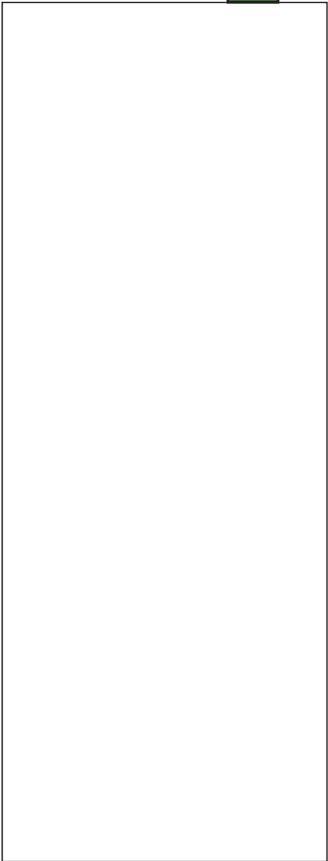
Anders has focused on furthering the rights of homeowners and renters in the USDA housing programs. He has devoted a great deal of time to the preservation of Section 515 affordable rural rental units. He was involved in developing legislation that first imposed use restrictions on new USDA Section 515 rental units and that later restricted the rights of owners to prepay their loans. As an attorney, he has participated in several lawsuits that prevented the owners of Section 515 properties from converting RHS affordable rental housing to moderate- and above moderate-income housing. His current preservation work includes legislative advocacy as well as advising attorneys involved in lawsuits related to Section 515 project owners' efforts to prepay their mortgages. He has also represented farmworkers who have resided in Section 514 farm labor housing and were improperly charged rent. His representation ultimately resulted in hundreds of thousands of dollars being refunded or credited to farmworkers all over the country.

Despite some past successes, current Administration proposals worry Anders because they would essentially eliminate affordability requirements for Section 515 housing, potentially displacing 50,000 to 100,000 tenant households. The disrepair of some Section 515 units is also an unresolved preservation challenge. As he and others continue their efforts on behalf of tenants, Anders hopes his work will help ensure that Section 515 continues to serve the low- and very low-income people for whom it was intended.



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