

Building Affordable ENERGY STAR® Qualified Homes



HAC

\$5.00

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HAC, founded in 1971, is a nonprofit corporation that supports the development of rural low-income housing nationwide. HAC provides technical housing services, loans from a revolving fund, housing program and policy assistance, research and demonstration projects, and training and information services. HAC is an equal opportunity lender.

**Building Affordable
ENERGY STAR® Qualified Homes**

Housing Assistance Council

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INTRODUCTION

Rising energy prices have forced many low-income households—the majority of which pay a much greater share of their income on energy costs—to make tremendous sacrifices. Studies show that more families are now choosing between heating their homes and buying groceries, paying their utilities or refilling a prescription (American Gas Association 2007). Although the challenges faced by these households are many, proven methods do exist for improving the energy efficiency and reducing the operating cost of their homes. Many affordable housing developers have incorporated these methods and are building energy efficient housing in order to protect low-income households from further economic hardship.

The United States Department of Housing and Urban Development (HUD) has also developed new energy strategies for affordable housing, which has led to some increases in minimum efficiency requirements. For example, under the Energy Policy Act of 2005, public housing authorities are now required to purchase ENERGY STAR® qualified products. The Self-Help Homeownership Opportunity Program recently established ENERGY STAR® certification as a minimum requirement for all newly constructed units, and several HUD competitive grant programs award points for energy efficiency. HUD also stated in the 2007 SuperNOFA that ENERGY STAR® certification may soon be established as a requirement for all HUD competitive grant programs (HUD 2008).

These new requirements and incentives are helping to fuel the transition to energy efficient affordable housing. However, this transition is difficult for many organizations that now must navigate a new world of construction modifications, home energy raters, and unfamiliar requirements. This guide serves as a tool for rural nonprofit organizations building ENERGY STAR® qualified homes, outlining the basic steps, providing advice from home energy raters, and sharing best practices from affordable housing developers in the field.

ENERGY STAR® Qualified Homes

The energy efficiency of today's homes continues to improve as a result of new policies, innovative technologies, and effective programs such as ENERGY STAR®. ENERGY STAR® is a joint program of the U.S. Environmental Protection Agency (EPA) and the U.S. Department of Energy

HUD Implements New Energy Efficiency Standards

Program offices may now award points for energy efficiency in competitive applications for:

- Section 202 Supportive Housing for the Elderly
- Section 811 Supportive Housing for Persons with Disabilities
- HOPE VI
- Rural Housing and Economic Development
- Housing Opportunities for Persons with AIDS (HOPWA)
- Indian Community Development Block Grants
- Housing Counseling
- University Partnerships Program

Source: U.S. Department of Housing and Urban Development www.huduser.org/publications/pdf/EnergyReport_08.pdf

(DOE), helping consumers save money and protect the environment through energy efficient products and practices (EPA 2009a).

Since its introduction in 1992, the ENERGY STAR® blue label has been awarded to products in over 60 categories, becoming a recognizable indicator of energy efficiency. In addition to products, any single- or multi-family structure of up to three stories can earn the ENERGY STAR® rating by complying with high efficiency performance guidelines and passing an inspection by a certified home energy rater. Units in four and five story buildings can also earn the ENERGY STAR® rating if the units are permitted as residential structures and each unit has its own heating, cooling, and hot water systems separate from other units. (EPA 2009a).

According to the EPA, ENERGY STAR® qualified homes have energy efficient features that make them at least 15 percent more efficient than homes built to the 2004 International Residential Code, and 20 to 30 percent more efficient than standard homes. Further, the rigorous building standards

Features of an ENERGY STAR® Qualified Home

- Effective Insulation
- High Performance Windows
- Tight Construction Ducts
- Efficient Heating and Cooling Equipment
- Efficient Lighting and Appliances
- Third-Party Verification

Additional information on the ENERGY STAR® program and ENERGY STAR® qualified homes is available online at www.energystar.gov/homes.

of an ENERGY STAR® qualified home improve durability and comfort with better indoor air quality and more even temperatures throughout the house (EPA 2009b).

Building an ENERGY STAR® qualified home is a realistic goal for any developer. However, successful certification of the unit requires a high degree of planning, coordination, and the use of a certified home energy rater. For those developers preparing to take on the additional requirements of ENERGY STAR® certification, the first step is to find a certified home energy rater excited about the project and willing to take an active role.

Choosing A Home Energy Rater

Residential Energy Services Network (RESNET®)—a national nonprofit organization whose mission is to ensure the success of the building energy performance certification industry, set the standards of quality, and increase the opportunity for ownership of high performance buildings—has trained and certified a network of home energy rating providers across the country. These home energy rating providers are, in-turn, authorized to train and certify home energy raters, all of whom must pass a national test and abide by RESNET® standards and procedures (RESNET® 2009a).

To connect housing developers with nearby certified home energy raters, ENERGY STAR® and RESNET® both maintain directories which are found on the websites below. Raters on the ENERGY STAR® website have joined ENERGY STAR® as partners and have experience doing ratings specifically for homes earning the ENERGY STAR® label. In addition to searching online,

Locate a Home Energy Rater

Residential Energy Services Network (RESNET®)

www.resnet.us/directory/raters.aspx

ENERGY STAR®

www.energystar.gov/index.cfm?fuseaction=new_homes_partners.showHomesSearch

developers may also find it beneficial to seek recommendations from partner architects, builders, engineers, city code officials, or other affordable housing developers. It is also recommended that developers building their first ENERGY STAR® qualified project interview a number of raters to compare rates, services, and experience or interest in affordable housing.

“Ratings of single-family homes typically run in the \$800 to \$1,200 range, depending on size,” says Art Paterson of AJP Development LLC, a HERS rater in New Mexico. Many raters charge a set fee that includes an initial rating of the construction plans and two onsite visits; one pre-drywall and one post-construction. As described in one of the following case studies, some raters may also inspect the home before insulation is installed to examine the framing and ductwork.

Home energy raters are often knowledgeable in other aspects of green building, such as water efficiency, environmentally preferred products, renewable energy options, waste reduction and recycling, smart growth, and improved indoor environments. If interested in incorporating these elements into the project, the developer should ask potential raters about their experience and/or interest in green building. Raters who have received additional training in green building techniques are certified by RESNET® as Green Raters and are identified by the Green Rater icon in RESNET’s® online directory (RESNET® 2009b).

Unfortunately, it is often difficult for home energy raters to discount their services as it requires the same effort and resources to rate an affordable project as it does a market rate project. However, opportunities do exist for reducing home energy rating costs. For example, housing developers building multiple units can take advantage of the sampling method, under which the rater conducts a random onsite inspection and rating on one out of every seven housing units in the development. There are strict guidelines for the sampling protocol and not all providers are accredited in this method, so developers should check with their rater. Home energy rating providers trained and accredited to oversee sampling ratings are listed online at www.natresnet.org/programs/sampling_providers/default.htm.

Important Questions for Home Energy Raters

- Is the rater certified by RESNET®?
- How many units has the rater tested?
- Where was the rater trained?
- How far will the rater travel?
- Is the rater’s provider local or out-of-state?
- Does the rater have any experience in affordable housing?
- Is the rater willing to work hands on to improve the home’s energy efficiency while still keeping it affordable?

CHOOSING A PATH: PRESCRIPTIVE OR PERFORMANCE

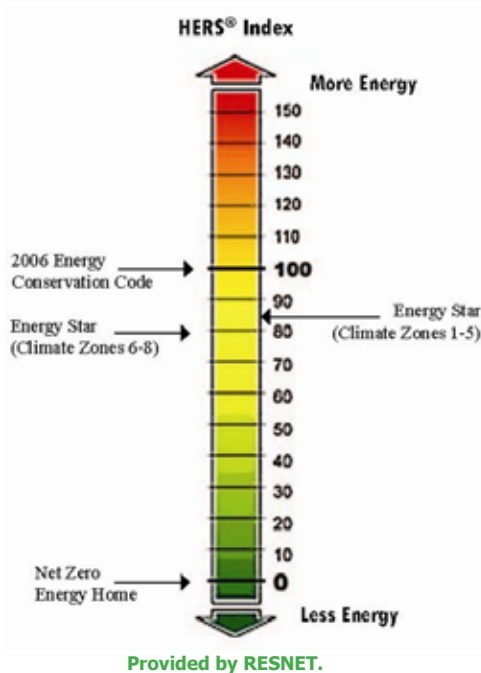
In most states, housing developers may follow either the prescriptive path or the performance path to ENERGY STAR® certification. However, developers in Washington, Oregon, California, Hawaii, and Florida¹ should review state and region-specific ENERGY STAR® requirements with their certified home energy rater. Developers in Idaho and Montana may use either the national ENERGY STAR® program or the regional Northwest ENERGY STAR® program. More information on ENERGY STAR® certification in these states may be found on the websites below (EPA 2009d).

Regional and State ENERGY STAR® Guidelines

Washington and Oregon
www.northwestenergystar.com

California, Hawaii, and Florida
www.energystar.gov/index.cfm?c=bldrs_lenders_raters.homes_guidelns

The *performance path*, which is generally preferred among affordable housing developers, allows for the flexibility to accommodate conditions unique to the locality and project. Projects following this path must receive a passing score on the HERS® Index, a standard measurement of energy efficiency created by RESNET® (RESNET® 2009d).



An energy rater calculates a home's score on the HERS index by entering the home's construction features as well as onsite testing results into a RESNET®-approved software program. As illustrated in the graphic, a zero-energy home² scores 0 on the HERS Index, a home built to the 2006 International Energy Code scores 100, and each 1 point decrease on the Index is equal to a 1 percent increase in energy efficiency. To earn the ENERGY STAR® label, a home must score ≤ 85 on the HERS Index in climate zones 1-5 or score ≤ 80 in climate zones 6-8 (EPA 2009e). (See map on page 5)

The *prescriptive path* requires the builder to follow a Builder Option Package (BOP) and does not utilize the HERS Index. BOPs—which are searchable by climate zone and county on the ENERGY STAR® website—contain construction specifications for the home's heating and cooling equipment, thermostat,

- 1 Homes permitted in Florida after June 1, 2009 must achieve a HERS Index of 77 or better to earn the ENERGY STAR.
- 2 A zero-energy home is an energy-efficient home that produces at least as much energy as it consumes.

ENERGY STAR® Qualified Homes 2011

ENERGY STAR® has released a proposed new specification for homes. Once finalized, it will replace current requirements. The new specification is proposed to go into effect on January 1, 2011, and is posted on the ENERGY STAR® website: www.energystar.gov/index.cfm?c=bldrs_lenders_raters.nh_2011_comments

ductwork, envelope, windows, water heating, lighting, and appliances. Homes built to BOP specifications consistently meet ENERGY STAR® guidelines.

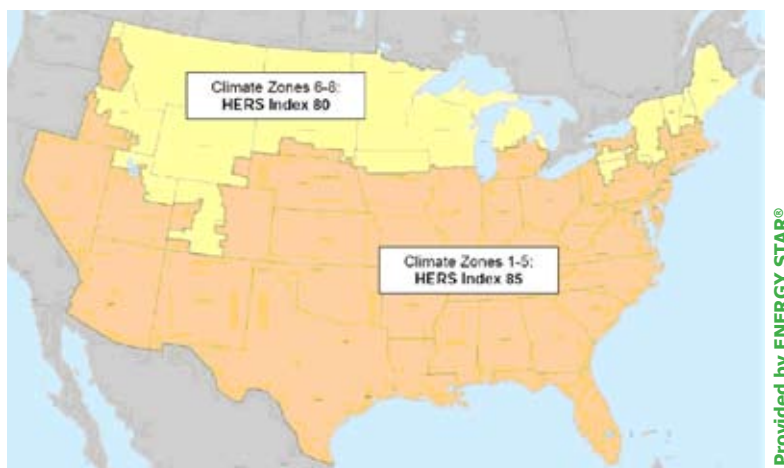
All ENERGY STAR® qualified homes, regardless of the path taken to certification, must pass onsite testing and inspections by a certified home energy rater (EPA 2009d).

Designing For ENERGY STAR® Certification

“Home energy raters are excited about saving energy,” says David Mann of Energy Matters LLC, a HERS provider in New Mexico. “They should be brought in at the design stage if possible to offer energy-relevant input and perform a projected rating based on the plans.” A projected HERS report, which assesses the planned insulation levels, window efficiency, wall-to-windows ratio, heating and cooling systems, solar orientation of the home, water heating system, and other energy related elements, provides an accurate indication of whether the completed home will earn the ENERGY STAR® rating (RESNET® 2009c).

The home energy rater produces the report with the use of a RESNET®-approved software program, which, if necessary, provides recommendations and suggestions to bring the projected rating within ENERGY STAR® performance levels (≤ 85 or ≤ 80 depending on the climate zone). The report also provides an estimate of the annual energy costs of the home as well as any energy savings that would result from specific design modifications or upgrades.

Not consulting with a home energy rater during design can create delays and obstacles down the road. If brought into the project after the design phase, the home energy rater may tell the project



Note: Due to the unique nature of some state codes and/or climates, EPA has agreed to allow regionally-developed definitions of ENERGY STAR in California, Hawaii and the Pacific Northwest to continue to define program requirements. The States of Montana and Idaho may use either the requirements of the national program or the regionally-developed program in the Pacific Northwest.

manager to make adjustments, such as redoing the furnace or upgrading the insulation. These types of modifications may result in additional architectural and design fees or other unexpected costs. If the home energy rater is consulted after construction has begun, it may be too late for ENERGY STAR® certification altogether.

Home Energy Rating System (HERS) Report

A HERS report is similar to a miles-per-gallon rating on a car. HERS reports, which are prepared by a trained energy rater, provide an evaluation of an individual home's energy efficiency. Factors such as insulation, appliance efficiencies, window types, local climate, and utility rates are used to rate the home and calculate energy costs.

A HERS Report Includes:

- Overall Rating Index of the house as it is
- Recommended cost-effective energy upgrades
- Estimates of the cost, annual savings, and useful life of upgrades
- Improved Rating Index after the installation of recommended upgrades
- Estimated annual total energy cost for the existing home before and after upgrades

Source: U.S. Department of Housing and Urban Development www.hud.gov/offices/hsg/sfh/eem/eemhog96.cfm

Developers interested in the prescriptive path to ENERGY STAR® certification should consult with their certified home energy rater and refer to the climate specific builder option packages available on the ENERGY STAR® website. To earn the ENERGY STAR®, the project must follow the correct BOP and pass an onsite inspection by a certified home energy rater.

Thermal Bypass Resources for Builders



Thermal Bypass Checklist: www.energystar.gov/index.cfm?c=bldrs_lenders_raters.thermal_bypass_checklist

ENERGY STAR® Guide: www.energystar.gov/ia/partners/bldrs_lenders_raters/downloads/TBC_Guide_062507.pdf

RESNET® Guide: www.natresnet.org/rater/checklist/Thermal_Bypass_Checklist.ppt#886,1

Preparing for an ENERGY STAR® Build: Both Paths

As the designs are finalized, it is critical that the project manager and home energy rater discuss the timeline with the builder and contractors, explaining the onsite inspections and the importance of communication. During the construction of the home, the builder, contractors, and laborers should communicate any changes, regardless of how small or insignificant, to the home energy rater. Not doing so could jeopardize ENERGY STAR® certification.

Before construction, the builder should also review the requirements for the thermal bypass checklist and discuss any concerns or questions with the home energy rater. The Thermal Bypass Checklist is available in Spanish and English on the ENERGY STAR® website. Guidance for building to the thermal bypass checklist is found on both the ENERGY STAR® website and the RESNET® website.

Before construction, the builder should also register as an ENERGY STAR® partner on the ENERGY STAR® website. Becoming an ENERGY STAR® partner gives builders the opportunity to use the ENERGY STAR® partners-only logos (www.energystar.gov/logos) in promoting ENERGY STAR® qualified homes. Partners are listed on the ENERGY STAR® partner locator tool, a searchable tool for locating and contacting builders, raters, lenders, and program sponsors who are directly involved in the construction and sale of ENERGY STAR® qualified homes.



Photo courtesy of Rural Development Inc.

BUILDING AN ENERGY STAR® QUALIFIED HOME

After the plans have been finalized, the rater will clear the construction team to begin the framing and insulation of the home. While framing and insulating, it is important that the team be mindful of the thermal bypass checklist, which the rater will use to conduct the first onsite inspection. During the first inspection, the rater will examine the insulation, overall air barrier, thermal barrier alignment, walls adjoining exterior walls or unconditioned spaces, floors between conditioned and exterior spaces, shafts, attic and ceiling interfaces, and common walls between dwelling units (EPA 2009c). The home energy rater may also conduct a duct blaster test at this time to measure the air-tightness of the ducts.

Raters recommend that these tests be scheduled while the HVAC contractor is still onsite. If the rater detects any problems with the duct system, the HVAC contractor can repair them immediately and the home energy rater can test or inspect again. By planning ahead, the project manager can prevent the need for additional visits from the rater and HVAC team, saving both time and money.

Organizations may request that the home energy rater perform an inspection before insulation is installed. At this point in the project, the rater can examine the HVAC system and the air sealing of the building, identifying any areas that need to be corrected before insulation is installed.

Only after the home energy rater inspects the insulated home and gives approval should the construction team continue forward. It is very important that these inspections be conducted before any drywall is hung.



Photo provided by CHP.

Construction crew members insulate a duplex for Community Housing Partners. Successful ENERGY STAR® certification requires that a HERS rater inspect the home after insulation has been installed and before drywall is hung.

Testing And Inspecting An ENERGY STAR® Qualified Home



Photo provided by CHP.

A blower-door test measures the air-tightness of a Community Housing Partners home.

Upon completion of the home, the home energy rater will perform a final inspection to verify the air-tightness of the home. Proper building tightness reduces energy consumption, prevents moisture condensation, reduces draftiness, and improves indoor air quality (DOE 2009). To test the air-tightness of the home, the home energy rater will conduct a blower door test, duct blaster test, and will complete the thermal bypass

checklist. The results of these tests help to determine if the finished home meets the high energy efficiency specifications of an ENERGY STAR® qualified home.

A home energy rater performs the blower door test by covering one of the home's exterior doors with the blower door. The blower door is equipped with a fan, a pressure gauge, and a device to measure airflow. When turned on, it will create a pressure difference of 50 Pascals between the inside and outside of the home. In a leaky home, the fan must move more air to maintain the pressure difference. The home energy rater will measure the amount of air passing through the fan and will use this number to determine the air-tightness of the home (Southface 2009).

While the blower door test measures the air-tightness of the home, the duct blaster test measures the tightness of the ductwork. As seen in the photo, the rater attaches the duct blaster to the air handler or central return grille and pressurizes the duct system to 25 Pascals. While pressurizing the ductwork, the rater takes a measurement of the air passing through the duct blaster fan. More air must pass through the fan to pressurize a leaky duct system. If leaks are detected, the home energy rater may inject a non-toxic fog into the duct system to locate deficiencies in the system (Southern California Gas Company).



A duct-blaster test pressurizes the duct system to measure the air-tightness of the system.

Photo provided by CHP.

For homes certifying via the performance path, the rater will enter the results of these tests into a RESNET®-approved software program along with additional information about the home's general structure, mechanical systems, building shell, light and appliance features, as well as information about local climate and utility rates. Based on this information, the program will produce a confirmed rating report. The rating report will include the HERS score, which must be ≤ 85 on the HERS Index in climate zones 1-5 or ≤ 80 in climate zones 6-8 for the home to certify as an ENERGY STAR® qualified home (RESNET® 2009c).

Home Energy Rating Certificate

If the home meets or exceeds ENERGY STAR® requirements, the developer will receive an official Home Energy Rating Certificate as well as a blue ENERGY STAR® label to attach to the home's utility box. In addition to the HERS score, the certificate will include a star rating of 1-5 and a summary of estimated annual energy costs.

CASE STUDIES: AFFORDABLE ENERGY STAR® PROJECTS

“It just doesn’t make sense to build an affordable home if it comes with high monthly utility bills,” says David Mann. “That’s building failure into the homeownership dream.” Mann and others working in the field have seen how higher up-front construction costs for energy efficiency are usually offset by decreased utility costs. Cutting costs at construction may lower the purchase price, but the higher utility bills can result in a higher combined monthly expense.

As highlighted in the following case studies, earning the ENERGY STAR® label is an attainable goal for rural affordable housing developers and will guarantee a home’s energy efficiency, durability, and sustainability for years to come.

Community Housing Partners and ENERGY STAR®³

Energy efficiency has long been a priority for Community Housing Partners (CHP), a nonprofit community development organization based in Christiansburg, Virginia. In 1976, CHP first created an in-house energy services division to provide energy and weatherization assistance to low-income households. Since then, CHP has strived to provide sustainable green housing for low- and moderate-income households in the southeast, receiving several awards for their efforts.

Among CHP’s award-winning projects is Roanoke-Lee Street, a 14-unit duplex project in Blacksburg, Virginia. CHP completed this project in collaboration with its in-house design team, Community Design Studio, LLC (CDS). CDS followed the performance path to certification, which allowed for more flexibility in the overall design of the units. The firm also worked with CHP’s Energy Service division and an in-house certified home energy rater throughout the design, construction, and final ENERGY STAR® certification. Upon completion in 2006, the 14 units of this project received an average score of 75 on the HERS Index.

Photo provided by CHP.

Before Construction

When CDS completed the housing designs for the Roanoke-Lee Street project in 2004, the home energy rater conducted a preliminary analysis using Residential Energy Analysis & Rating software V12.3, a RESNET®-approved software program. The CDS designs scored very well with an average preliminary score of 74. The home energy rater approved the major design components, such as the insulation level, mechanical system, and water heater. However, the rater did recommend that



The fourteen ENERGY STAR® qualified units of the Roanoke-Lee Street project received an average score of 75 on the HERS Index.

3 All information for this case study was derived via an interview with Colin Arnold on March 23, 2009.



Not only is a tightly sealed and insulated home more energy efficient, but it is also healthier and more comfortable.

CDS change the lighting package. Although this was not difficult, it did add to the overall cost of the project. However, CDS was able to minimize the increase in cost by using attractive and affordable ENERGY STAR® lighting products in heavily used rooms while installing less expensive fluorescent lighting in places such as closets.

During Construction

The home energy rater conducted the first thermal bypass checklist inspection and duct blaster test on the project during the rough-in stage and prior to drywall. The rater did find one deficiency, which was fixed by making a change to the air sealing on the air handler. After this was corrected, the home energy rater approved the project to move forward.

“Before hanging drywall, it is important to ensure that all of the appropriate inspections have been made and that no issues need to be addressed,” explains the director of CDS, Colin Arnold AIA/LEED AP. “These inspections should be given the same consideration and importance as inspections for plumbing and electrical and should be incorporated into the construction timeline.”

After Construction

In 2006, CHP completed the Roanoke-Lee Street projects and awaited approval from the home energy rater. The home energy rater visually inspected the homes and completed the final thermal bypass checklist, duct blaster, and blower door test. The blower door test did locate a few failures to the envelope where band joists were not properly sealed. However, these deficiencies did not prevent the project from earning the ENERGY STAR® label.

After final inspections and calculations, the home energy rater sent the completed paperwork to a third party home energy rating provider that approved the projects as ENERGY STAR® qualified. *(See page 17 to view certificate.)*

The Roanoke-Lee Street project earned several honors, including the 2007 ENERGY STAR® Award for Excellence in Energy Efficient Affordable Housing, the Home Depot Foundation’s Award for Excellence in Affordable Housing Built Responsibly, a 2007 Best in American Living (BALA)/HUD Secretary’s Award for Excellence, and a 2008 Silver EnergyValue Housing Award (EVHA) in the Affordable Home/Cold Climate category. CHP has monitored the energy consumption of the units, finding that they are even more efficient than expected.

4 EarthCraft House,™ is a regional green building program that serves as a blueprint for healthy comfortable homes that reduce utility bills and protect the environment. More information is available at www.earthcrafthouse.com.

Moving Forward

After the Roanoke-Lee Street Project, CHP began building EarthCraft House™⁴ homes, which require other green building criteria in addition to ENERGY STAR® certification. In building sustainable affordable housing, CHP has learned that just as every home is different, so are the ways to incorporate energy efficiency into the construction process. Colin Arnold advises project managers to work with builders who share the goal of energy efficiency and believe that it is an important part of the project. “The construction superintendent needs to make sure the trades are doing the work correctly, because when you are building ENERGY STAR® qualified homes, you can get to a point when you can not fix it.”

YouthBuild McLean County and ENERGY STAR®⁵

YouthBuild McLean County (YBMC), an accredited member of the YouthBuild USA Affiliated Network, is a nonprofit community development corporation located in Bloomington, Illinois. YBMC provides low-income youth aged 17-24 with the opportunity to earn their high school diplomas, gain job skills, and serve low-income families in their community by constructing affordable housing. Since opening its doors in 1994, YBMC has worked with hundreds of youth while building and rehabilitating more than 50 local units of housing. The organization also incorporates energy efficiency into its projects and in 2008 received ENERGY STAR® certification for seven self-help homes in Stoneman Gardens, a 53-acre subdivision in Carlock, Illinois.

Photo provided by YBMC.



This ENERGY STAR® home built by YBMC's self-help program earned a 75 on the HERS Index.

Before Construction

In 2000, YBMC's Vice President of Construction and Development, Brian Fitzgerald PMP/LEED AP, visited Austin, Texas to learn more about the innovative green building techniques used by the YouthBuild affiliate in that city. Brian had hoped to find replicable ideas and techniques to incorporate into YBMC projects. However, upon returning to Bloomington, he found that many of the materials used by the YouthBuild program in Austin were not available on the local market. He also found that some local contractors were not enthusiastic about trying new techniques or stepping out of their comfort zone. Despite these challenges, which are common in many rural areas, YBMC has found ways to incrementally incorporate green practices into its projects.

Although training opportunities are limited in Bloomington, many who work in the construction industry have responded to the increased demand for energy efficiency and sustainable building by enrolling in workshops and trainings in nearby Normal, Illinois. With more contractors receiving this

5 All information for this case study was derived via an interview with Brian Fitzgerald on April 21, 2009.

training, YBMC has found it easier to find those who are not afraid to incorporate new techniques or try suggestions from the design team. YBMC makes it a point to work with progressive thinking contractors who are also willing to work with the students and self-help families.

In 2007, YBMC began construction on its first ENERGY STAR® qualified project consisting of seven self-help homes, each with three bedrooms and approximately 2500 square feet. YBMC chose the performance path and used the ENERGY STAR® program as a tool to improve upon the organization's already energy efficient building techniques. YBMC staff also viewed ENERGY STAR® certification as a good first step towards other green building programs that focus on energy efficiency in addition to other sustainable features such as materials reuse, land use, and water efficiency.

YBMC contracted with a home energy rater from Thermal Imaging Services, a company based in Lewiston, Illinois. Staff had spoken with the home energy rater at various trainings and information sessions in Normal and was confident in the rater's knowledge and ability. The rater had extensive experience rating homes and was able to discuss best practices as well as answer questions, both complex and simple, on topics ranging from insulation, air sealing, moisture control, weatherization, and the thermal bypass checklist.

While still in the pre-design phase, YBMC sent the project's plans to the home energy rater to get his initial thoughts as well as a bid on the project. The home energy rater responded with a set fee, which YBMC was able to pay for with a grant from the Wal-Mart Foundation.

The home energy rater entered the initial plans into the RESNET®-approved software program, REM/Rate™ 12.6, which approved the overall designs for the homes. The home energy rater did, however, recommend that YBMC change the homes' proposed fiberglass insulation to either dense pack cellulose or Icynene® Insulation, both of which have a higher R-Value. YBMC staff ultimately decided that changing the insulation would be beneficial.

As with all of its self-help projects, YBMC conducted 15 meetings with the participating families to provide information and training on the upcoming build. Staff explained to the participants that a number of professionals had been involved in the project's design and that it was important to follow directions, as even small changes can be costly. Before stepping foot on the construction site, the families knew exactly what to do and successfully stuck to the plan.

In preparing for the build, YBMC staff and the home energy rater finalized the schedule, giving the home energy inspections a high priority.



Photo provided by YBMC.

A YBMC student puts the finishing touches on a Stoneman Gardens home. YBMC students gain useful skills, earn their high school diplomas, and help build affordable housing for their community.

During Construction

The home energy rater was fairly involved throughout the construction process, conducting an initial onsite visit after the homes had been framed and a second after the mechanical installation, each time inspecting the caulk work and verifying that the homes had been properly sealed. After insulation, the home energy rater conducted the first mandatory inspection, which included the thermal bypass checklist. The rater approved the duct work and the building teams began the drywall and final phases of construction.

After Construction

As part of the process for verifying a home's energy efficiency, the home energy rater performed a blower door test, duct blaster test, and final thermal bypass checklist on the completed units. With the results of these tests, the home energy rater calculated the homes' scores on the HERS Index, which ranged from 75-84. Within a few weeks of the final onsite inspection, YBMC received its final home energy rating certificates and ENERGY STAR® labels. *(See page 16 to view certificate.)*

Moving Forward

YBMC is currently constructing six additional self-help ENERGY STAR® qualified homes which are scheduled for completion in June 2009. The organization is also in the pre-design phase on six new homes with the goal of attaining LEED for Homes certification or higher. Fitzgerald acknowledges that it is a learning process and they hope to continue to aggressively improve the energy efficiency of their homes.

CONCLUSION

YouthBuild McLean County, Community Housing Partners, and numerous other affordable housing developers across the nation have persistently found ways to overcome the challenges of building energy efficient housing. Driven by the ultimate goals of reducing monthly utility costs, providing healthier living areas, and protecting the environment, these developers continue to provide housing that is both affordable and sustainable for low- and moderate-income homeowners. Their accomplishments should serve as motivation and remind us that we can no longer afford *not* to build energy efficient affordable housing.

Other Resources for Affordable Housing Developers

The ENERGY STAR® Bulk Purchasing Tool is an online tool that allows organizations looking to purchase ENERGY STAR® products and appliances to negotiate prices with multiple suppliers: www.quantityquotes.net.

A comprehensive listing of incentives for energy efficiency and renewable energy is available at: www.dsireusa.org. Information on federal tax credits can be found at www.energystar.gov.

ENERGY STAR® has a webpage containing tools and resources specifically for affordable housing stakeholders. The website can be accessed by going to www.energystar.gov/homes.

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Home Energy Rating Certificate

101 Poston Dr.
Carlock, IL 61725



5 Stars

Confirmed Rating

Uniform Energy Rating System			Energy Efficient		
1 Star	2 Stars	3 Stars	4 Stars	5 Stars	5 Stars Plus
500-401	400-301	300-251	250-201	200-151	150-101
1 Star Plus	2 Stars Plus	3 Stars Plus	4 Stars Plus	5 Stars Plus	5 Stars Plus
100-91	90-86	85-71	70 or Less		

HERS Index: 75

General Information

Conditioned Area: 2574 sq. ft.
Conditioned Volume: 20592 cubic ft.
Bedrooms: 3

House Type: Single-family detached
Foundation: Conditioned basement

Mechanical Systems Features

Heating: Fuel-fired air distribution, Natural gas, 73.0 AFUE.
Cooling: Air conditioner, Electric, 13.0 SEER.
Water Heating: Conventional, Natural gas, 64 EF, 40.0 Gal.
Duct Leakage to Outside: 15.00 CFM.
Ventilation System: None

Programmable Thermostat: Heating: Yes Cooling: Yes

Building Shell Features

Ceiling Flat: R-45 Exposed Floor: NA
Vaulted Ceiling: NA Window Type: U-0.33, SHGC:0.40*
Above Grade Walls: R-13 Infiltration:
Foundation Walls: R-6.1 Rate: Htg: 0.21 Cig: 0.12 ACHnat
Slab: R-0.0 Edge, R-0.0 Under Method: Blower door test

Lights and Appliance Features

Percent Fluorescent Pin-Based: 0.00 Clothes Dryer Fuel: Natural gas
Percent Fluorescent CFL: 100.00 Range/Oven Fuel: Natural gas
Refrigerator (kWh/yr): 775.00 Ceiling Fan (cfm/Watt): 0.00
Dishwasher Energy Factor: 0.46

The Home Energy Rating Standard Disclosure for this home is available from the rating provider.

REM/Rate - Residential Energy Analysis and Rating Software v12.6

This information does not constitute an warranty of energy cost or savings.
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APPENDIX I Home Energy Rating Certificate - YouthBuild

Rating Number: Youthbuild #1 6/18/08
Certified Energy Rater: Brian Kumer
Rating Date: 6/18/08
Rating Ordered For: Jackie Crawford

Use	Estimated Annual Energy Cost		Percent
	Confirmed Rating	Cost	
Heating	72.8	\$356	31%
Cooling	2.9	\$74	6%
Hot Water	18.1	\$126	11%
Lights/Appliances	25.4	\$456	39%
Photovoltaics	-0.0	\$-0	-0%
Service Charges		\$154	13%
Total		\$1165	100%

This home meets or exceeds the minimum criteria for all of the following:

Brian Kumer
Thermal Imaging Services, Inc.
198 N. Robinson St.
Lewistown, IL 61542
309-547-5000
309-547-5005

Home Energy Rating Certificate

Roa & Lee 202
202 Prospect St
Blacksburg, VA 24060



5 Stars

Confirmed Rating

Uniform Energy Rating System				Energy Efficient				
1 Star Plus 500-401	2 Stars 300-251	2 Stars Plus 250-201	3 Stars 200-151	3 Stars Plus 150-101	4 Stars 100-51	5 Stars 90-86	5 Stars Plus 85-71	70-0
HERS Index: 73								
General Information								
Conditioned Area: 1038 sq. ft.			House Type: Duplex, single unit			Foundation: Slab		
Conditioned Volume: 8300 cubic ft.			Bedrooms: 2					

Mechanical Systems Features

Air-source heat pump: Electric, Htg: 8.1 HSPF, Cfg: 15.0 SEER.
Water Heating: Conventional, Electric, 0.91 EF.

Duct Leakage to Outside: Total: 40.00 CFM @ 25 Pascals.
Ventilation System: Supply Only: 90 cfm, 150.0 watts.
Programmable Thermostat: Heating: Yes Cooling: No

Building Shell Features

Ceiling Flat: R-38 Exposed Floor: NA
Vaulted Ceiling: NA Window Type: U: 0.34, SHGC: 0.33
Above Grade Walls: R-21
Foundation Walls: NA
Slab: R-7.5 Edge, R-7.5 Under
Rate: Htg: 784 Cfg: 784 CFM50
Method: Blower door test

Lights and Appliance Features

Percent Fluorescent Pin-Based: 20.00
Percent Fluorescent CFL: 77.00
Refrigerator (kWh/yr): 412.00
Dishwasher Energy Factor: 0.58
Clothes Dryer Fuel: Electric
Range/Oven Fuel: Electric
Ceiling Fan (cfm/Watt): 0.00

The Home Energy Rating Standard Disclosure for this home is available from the rating provider.
REMI/Rate - Residential Energy Analysis and Rating Software v12.32
This information does not constitute any warranty of energy cost or savings.
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Rating Number:
Certified Energy Rater: Anthony Cox
Rating Date: 11-3-2006
Rating Ordered For: To Be Determined

Estimated Annual Energy Cost

Use	Confirmed Rating	MMBtu	Cost	Percent
Heating	8.0		\$187	22%
Cooling	1.9		\$45	5%
Hot Water	10.6		\$248	29%
Lights/Appliances	13.1		\$307	36%
Photovoltaics	-0.0		\$-0	-0%
Service Charges			\$60	7%
Total			\$847	100%

This home meets or exceeds the minimum criteria for all of the following:

EPA Energy Star Home
2003 International Energy Conservation Code

Lee O'Neal
NSPECTS Ltd.
PO Box 221704
Chantilly, VA 20153-1704
Phone: (866)-218-9055 Toll Free
Fax: (703) 988-0839
Website: www.nspects.org

The Housing Assistance Council (HAC) has created the Green Building/Healthy Homes Initiative with generous support from the Home Depot Foundation. The initiative is a comprehensive program of capacity building grants, research, training, and technical assistance activities to promote the incorporation of a “greener” approach to affordable rural housing development.

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