Energy Efficient Affordable Housing

Final Report

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Project Description

In the South, there has been a considerable effort to develop affordable housing. However, much of this effort ignores proven energy efficiency techniques. The lack of proper attention to energy efficiency results in energy costs being higher for families who can least afford them. Poor energy details often cause problems with comfort, building durability, and indoor air quality.

In 1994, the Southface Energy Institute, working with support from the U.S. Department of Energy, initiated a program to provide technical assistance to nonprofit organizations developing affordable housing in the Olympic target communities of Atlanta. The specific project goals were:

- identify the barriers that nonprofit affordable housing providers face in increasing the energy and resource efficiency of affordable housing
- assist them in developing the resources to overcome these barriers.
- develop specific technical materials and program models that will enable these affordable housing groups to continue to improve the energy efficiency of their programs
- transfer the program materials to other affordable housing providers

Barriers to Energy Efficient Affordable Housing

A variety of nonprofit organizations provide affordable housing services, both new construction and renovation, in the Atlanta area. The program models for these organizations are varied, ranging from groups that construct new homes using paid staff to serve as construction leaders for weekend volunteer work parties to organizations that rely completely on paid management and construction labor for housing rehab.

Early in the project, Southface met with several directors of affordable housing groups to identify common barriers. While the program delivery models for the organizations vary, the following barriers to improving efficiency were common:

Belief that Energy Is Not An Important Issue in Affordability

The relatively mild winters of the Southeast leads some housing professionals to believe that energy costs are not significant enough to be a factor in a home's affordability. Many

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organizations do not monitor energy bills for their clients, and those that do may have a misconception about the level of energy waste. One construction coordinator claimed that winter heating bills for a one thousand-square-foot design were only about \$50 a month. A review of the energy bills for that organization's homes showed some homes with bills three times that amount.

Many low income home owners participate in utility budget billing programs where the projected yearly energy costs are divided into even monthly payments. While this practice helps limited income families budget against a high monthly bill, it hides the true cost of energy waste. Organizations are lulled into accepting two, \$50 per month utility bills as affordable, rather than seeing that yearly energy costs for the family are over \$1,000.

Some affordable housing programs in the South do not provide air conditioning in the homes they construct. Calculating potential savings from increased efficiency does not show a dollar savings on cooling costs. However, at a later date home owners often add room or central air conditioning systems. These systems frequently have low efficiency and cooling bills can exceed those for heating.

Priority is Low First Cost and Fast Construction Schedule

All nonprofit organizations have inadequate resources to meet the need for affordable housing. Many groups are masters at stretching dollars to build as many homes as possible. Improving the energy efficiency adds to the construction costs of their homes. While the cost savings to home owners and other benefits from improved efficiency are significant, most program managers use initial construction cost as the overriding priority.

In addition to increasing the cost of construction materials, program managers fear that energy efficient measures will burden volunteer labor forces. Many nonprofits rely on weekend workparties where twenty or more volunteers work simultaneously to construct a house. These groups have perfected a construction schedule that allows unskilled volunteers to complete houses within a couple of months. Adding extra tasks or changing the established protocol can pose scheduling and training problems.

Acceptable Building Practices

A field survey conducted by Southface of a sample of the homes completed by these organizations showed that acceptable building practices often create energy problems. These poor building practices occur in housing of all design and price ranges. For example, standard corner and partition wall framing creates areas difficult to insulate and airseal. Poor duct sizing and layout leads to uneven air distribution-- a problem often compounded by unsealed seams in ductwork.

The poor enforcement of the energy code adds to this barrier. Some affordable housing organizations believe that because their homes are "code approved" they are providing reasonable levels of energy efficiency.

Some affordable housing organizations have turned to utility sponsored energy efficiency programs as both a source of funds to offset the cost of efficiency improvements and for technical assistance. While utility partnerships with affordable housing groups has resulted in several model homes being constructed that showcase improved efficiency measures, there has been little continuing commitment to improving the energy efficiency of all homes. Often the utility programs focus on fuel choice and equipment efficiency, and neglect many other cost effective energy measures.

Lack of Energy Expertise Available to Affordable Housing Community

Some nonprofit affordable housing programs are managed by people with little construction experience. They often rely on building professionals to serve as "mentors" or to actually construct the houses. Since the program managers are not aware of the problems with "building as usual" they do not demand efficiency beyond standard practices.

While the people who serve as mentors may be experienced professionals, many are not aware of advances in energy efficient design and techniques. If they are aware, they face the pressure of keeping first costs low and working with untrained crews.

Frequently there is poor communication between those making design and construction decisions and those knowledgeable of energy problems. Few agencies monitor energy costs or evaluate the performance of their buildings. Home owner complaints can provide some insights, but it is often difficult for the nonprofit organizations to identify the source of the problem that leads to the complaint.

For example, recently a home owner complained to a nonprofit organization about a mildew problem at the junction of an outside wall and ceiling. The staff initially diagnosed the problem as a leaky roof, but a closer inspection showed the roof was weathertight. The culprit was inadequate ceiling insulation which caused the ceiling to drop below the dew point temperature of room air leading to condensation and the resulting mildew.

Inadequate Technical Assistance on Energy Issues

Even if a nonprofit organization recognizes the need for improved energy efficiency, they often do not have access to training, design assistance, in-field testing or other forms of technical assistance critical to making improvements.

Where technical assistance is available, it must be delivered at a time and in a format that recognizes the unique nature of the nonprofit affordable housing community. Training one group of volunteers on energy improvements may help lower costs for one home, but has little continuing impact.

Burnout of construction supervisors is also a barrier to energy efficiency. Many professionals who work in the affordable housing arena are committed to helping low income families. However pay scales are frequently low, hours long, and pressure high so

turnover can be quick. Few organizations commit significant resources to training construction supervisors, especially on energy efficiency detailing.

The energy efficiency knowledge must be "institutionalized" in the construction program. Technical assistance programs must develop educational materials that will be useful after current staff have left. The educational tools must suit audiences with vastly different building expertise.

Developing complicated energy specifications for a new program manager who lacks the construction experience to ensure they are followed by subcontractors will not save energy. The manager must be trained in why energy efficiency is important; what specifications are critical to ensuring safe, efficient, affordable housing; and in how to monitor compliance with the specifications.

The traditional sources of technical information, such as trade associations, product vendors and utilities, have had limited success in increasing the energy efficiency of affordable housing in the Southeast.

Project Results

To overcome these barriers to improving the energy efficiency of affordable housing in the target Olympic communities, Southface worked with several nonprofit organizations to develop the following program model:

Technical Assistance

- walk through energy surveys of specific projects to be constructed or renovated
- comprehensive testing of energy systems using blower door, duct blaster, digital monoxer, and other diagnostic tools to identify energy problems
- review of house designs and specifications to ensure proper energy measures were incorporated into the design and bid process
- assistance in procuring product specifications for energy measures that agencies were unfamiliar with, such as airtight drywall gaskets, spray foam sealant, and duct mastic.

Milestones

Direct technical assistance was provided to over twelve nonprofit housing agencies including:

- ◇ Atlanta Chapter of Habitat for Humanity
- ◇ Brown Village Cluster of the Atlanta Project
- ◇ Charis Community Housing
- ◇ Cobb County Chapter of Habitat for Humanity

- ◇ Community Design Center
- ◇ Georgia Housing and Finance Authority
- ◇ Habitat for Humanity International
- ◇ Historic Redevelopment District Corporation (Martin Luther King, Jr. Historic District)
- ◇ Martin Street Plaza Housing Cooperative
- ◇ Metropolitan Atlanta Olympic Games Authority
- ◇ Progressive Redevelopment Incorporated
- ◇ Resource Service Ministries
- ◇ Scottdale Community Planning Council

Training Of Affordable Housing Professionals

- in-field hands-on training on bypass airsealing, Airtight Drywall Approach, energy efficient framing, duct sealing, and duct design
- seminar on energy efficient construction sponsored by the Metro Atlanta Housing Forum for the affordable housing community
- workshops on energy efficient construction sponsored by Atlanta Chapter Habitat for Humanity, Charis Community Housing, and Cobb County Chapter Habitat for Humanity
- private consultations on topics ranging from cost-benefit analysis to reducing condensation in homes

Milestones

- ◇ Over thirty housing professionals attended training activities.
- ◇ The energy efficiency of over six houses was improved directly through hands-on training exercises
- ◇ Three of the largest nonprofit housing providers in Atlanta have incorporated energy efficiency improvements into their ongoing programs

Energy Efficient Affordable Housing Publications

- technical specifications on energy efficiency for common affordable housing designs
- a field checklist to ensure critical energy efficiency measures are adopted
- a simple affordable homeowner's manual on proper energy management and maintenance

Developing the following written materials for this project will help ensure that energy efficiency becomes an ongoing component of these housing programs. These materials are also suitable for other affordable housing providers in the Southeast.

Technology Transfer

As a result of this project, several affordable housing providers in Atlanta have moved to increase the energy and resource efficiency of their construction programs. In addition, the program materials developed under this project are being adopted by a wide range of organizations, ranging from local affordable housing groups to a statewide housing rehab program sponsored by the Georgia Housing and Finance Authority.

Some of the specific technology transfer accomplishments that have resulted to date from this project include:

- Atlanta Habitat for Humanity has agreed to build an energy and environmental concept house that will be used to evaluate technologies for the 100 houses they will construct for the Olympics
- The Home Depot Corporation has agreed to sponsor the Earth Wise home with Southface and Habitat and has expressed interest in distributing information on energy and resource efficiency to affordable housing providers through its network of stores
- The statewide Habitat for Humanity association has asked Southface to conduct a workshop at its annual conference in Morrow, Georgia, November 4, 1995, to discuss energy efficiency improvements practical for their housing program
- The Georgia Housing and Finance Authority has asked Southface for technical assistance to incorporate the affordable housing energy efficiency materials into their HOME program
- Knox Housing Partners in Knoxville, Tennessee, along with Oak Ridge National Laboratory and Southface, will develop a series of assessment tools for energy efficient affordable housing rehab. The materials developed under this project will form the foundation for this new initiative.
- The Home Depot Company has agreed to print 1000 copies of *Keeping Your Home Safe, Attractive and Affordable, A Home Owner's Manual*. Southface will be distributing these booklets through the affordable housing community.