



research works

A bridge linking housing research and practice

volume 4, number 1

Action Plan Achieves Objectives and Promotes Energy Efficiency



HUD's Energy Action Plan is reducing energy costs as it promotes energy efficiency.

Each year, energy expenses incurred through operating grants to public housing authorities, utility allowances to renters, and housing assistance payments to building owners cost HUD approximately \$4 billion – more than 10 percent of our budget. In 2001, then-Deputy Secretary Alphonso Jackson convened a department-wide Energy Task Force to identify measures and establish goals for reducing HUD energy expenditures and supporting the President's National Energy Policy. This year, in August, HUD submitted a Report to Congress as required under Section 154 of the Energy Policy Act, that describes the progress it has made in implementing the Energy Action Plan, and identifies an energy strategy for the next two years. The Act requires HUD to develop an integrated energy strategy for public and assisted housing

that includes establishing energy reduction goals and incentives for public housing agencies, and reporting on our progress in two years' time. The Energy Action Plan proposed 21 action items in the following 6 categories:

- Establishing new partnerships with the U.S. Department of Energy (DOE) and the U.S. Environmental Protection Agency to distribute Energy Star® information to HUD customers and to initiate HUD-DOE multifamily weatherization projects in at least five states.
- Providing information, training, and technical assistance to encourage the adoption of energy-efficient appliances, fixtures, and housing.
- Strengthening energy program rewards and incentives, including promoting the use of Energy Efficient Mortgages (EEMs) and awarding priority rating points for energy-efficient housing in HUD's competitive grant programs.
- Strengthening standards and compliance with program requirements by encouraging the use of Energy Star-rated equipment.

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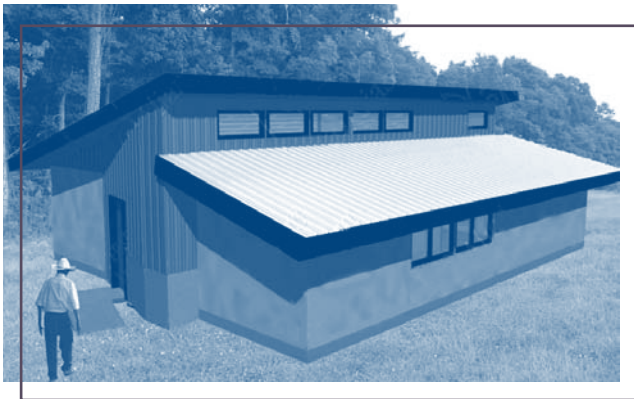
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- Improving management of HUD's energy programs by assigning department-wide responsibility for coordinating HUD's energy program, and enhancing the tracking and monitoring of energy conservation in public and assisted housing.
- Supporting further research and technology development by conducting energy-related analysis and research, testing innovative housing technologies, and developing integrated approaches to energy efficiency.

The two-year energy strategy for public and assisted housing described in the Report to Congress continues many of these actions, but also identifies several new measures, including an enhanced strategy for multifamily housing, as well as sections on Indian and manufactured housing. In transmitting the report, the Secretary committed HUD to implementing the actions and noted that "With the continuing upward trend in oil prices, the Department is especially concerned with the impact of utility costs on affordable housing."

This Energy Action Plan, funded through existing allocations and executed in collaboration with other agencies, could help HUD achieve significant savings for the federal government, property owners, and residents of HUD-insured and -assisted housing. Reducing the Department's energy bill by just 5 percent could save taxpayers \$2 billion over the next 10 years.

Cities, states, and counties, as well as housing authorities and other nonprofit organizations, can benefit from incorporating elements of HUD's Energy Action Plan into new and existing developments. A growing number of communities receiving formula grants



An artist's rendering depicts the straw bale housing constructed by the Telamon Corporation in Leedsville, Virginia, to house seasonal workers.



Energy-efficient building technologies are proving to be cost-effective during both construction and occupancy.

from HUD (CDBG or HOME) are establishing Energy Star guidelines for new construction—2,700 units are underway in New England alone.

One of the Plan's measures ensures that nonprofit and faith-based organizations have access to information about energy-efficient technologies, as well as opportunities to participate in HUD-sponsored training and technical assistance. Two organizations that benefited from this new focus were the Telamon Corporation in Leedsstown, Virginia, and the Wytheville Redevelopment and Housing Authority (WRHA) in Wytheville, Virginia.

Assisting Nonprofits

Working with nonprofit and faith-based organizations to develop and manage affordable housing is one way that HUD is meeting the objectives of the Energy Action Plan. In Leedsstown, Virginia, HUD is helping a farm worker advocacy group build houses for seasonal workers using straw-bale technology. With funding from HUD's Office of Rural Housing and Economic Development and the Virginia Department of Housing and Community Development, the private, nonprofit Telamon Corporation built four houses that use straw bale as an energy-efficient and low-cost alternative to traditional wood frame or concrete block construction.

The homes cost approximately \$85 per square foot, or roughly \$10 less than the national average, according to Greg Miller, a Telamon architect. The homes would have cost even less had they not been custom designed to include passive solar heating, adds Miller. In addition to the reduced building costs, residents will benefit from lower heating and cooling costs. The 150 straw bales used for each house are

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Collaboration between academia and communities is forging new bonds between resident and student populations, giving rise to an evolutionary leap in the research agendas of colleges and universities around the world. Both within and beyond the ivy-covered walls, a growing number of college students, faculty, and community groups are uniting to tackle local challenges, and this teamwork is enhancing the quality of life for all concerned. For their part, community members contribute invaluable local knowledge and skills, while colleges and universities apply knowledge, technology, and rigorous research skills to solving real-world problems.

HUD has a tradition of investing in helping colleges and universities use their resources to meet community needs. Now HUD's Office of University Partnerships (OUP) has a new monograph called *Scholarship in Action: Applied Research and Community Change* (www.oup.org/files/pubs/scholarship.pdf). It is an edited volume of peer-reviewed articles that describe the experiences of researchers, students, and local residents in blending scientific expertise with local knowledge to achieve results that would otherwise be out of reach. Among the monograph's examples of community-university partnerships are two in Worcester, Massachusetts that illustrate how collaboration benefits all concerned.

Scholarship in Action

Worcester, Massachusetts, received state funds in 2000 to map neighborhoods according to their

suitability for economic development, housing, open space, and transportation. The suitability maps were to serve as planning guides for neighborhood development. A condition of the funding was that the public would help define and determine suitability.

The city invited Worcester Polytechnic Institute (WPI) to collaborate on this project. The university has a record of incorporating project-based service learning into its curriculum. WPI faculty and students from multiple disciplines—management, electrical engineering, computer science, urban planning, and economic development—brought a wealth of experience, expertise, and time to the project. To initiate meaningful public discussion on how best to define suitability, WPI developed a decisionmaking tool using geographic information systems (GIS) technology that enabled citizens to visualize how the alternatives under discussion might work.

A team of students was assigned to each area for which suitability maps would be developed. The housing team prepared for its task by studying urban development literature, key concepts, and relevant policy issues. They learned about GIS tools, reviewed data sources, and interacted with the city's planning staff. Once the project was implemented, students worked out of city offices, gathering and analyzing pertinent data. The students attended city administrative and board meetings and spoke with community activists. Faculty advisors remained actively involved throughout the process.

The housing team was guided by the city's desire to maintain an adequate mix of affordable, market-rate, and special-needs housing. Because the city lacked an inventory of existing housing, the students compiled a housing profile and typology. Despite some difficulties, they were able to calculate housing suitability using three criteria: lot size, accessibility, and proximity to open space. Using GIS technology to map the results, students identified suitable and unsuitable land areas for single-family, multifamily, and special-needs housing. With this draft in hand, the housing team then conducted focus groups composed of individuals randomly selected from economic development, business, community-based nonprofit, and environmental groups. GIS-based technology specifically

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Students apply their classroom knowledge to real-world activities in the communities surrounding their schools.

In June 2006, HUD and the U.S. Census Bureau began releasing the results of the 2005 national American Housing Survey (AHS), which updates the type, age, location, condition, and cost of housing in America.

The AHS gathers data on renters and homeowners, household composition and income, housing conditions and structural characteristics, neighborhoods, financing and housing costs, monthly housing expenses, and the overall availability of affordable housing. The Census Bureau conducts the nationwide survey of approximately 60,000 housing units every 2 years and a metropolitan survey of 3,500 housing units every 6 years. An unusual and important aspect of the AHS is that the same housing units are visited each time, ensuring continuity in the history of America's housing. The survey also adds newly constructed housing units each survey year to ensure that the sample represents all housing in the United States.

A Profile of America's Housing

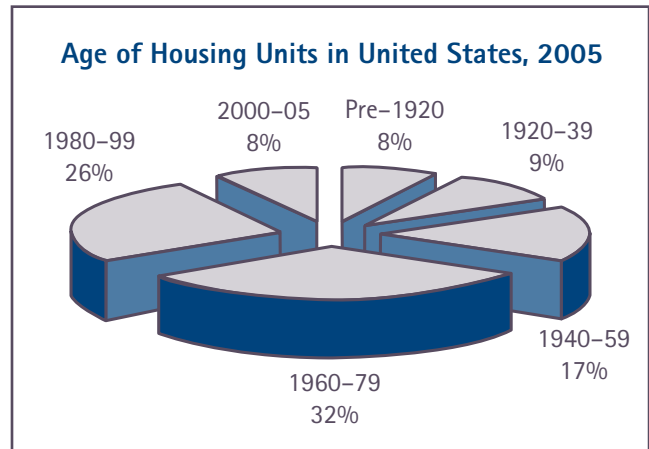
The American housing stock consists of more than 124 million housing units, of which approximately 15 million are vacant or for seasonal use. Of the 108.9 million occupied units, 68.8 percent are owner-occupied, up from the 68.2 percent rate recorded in 2003. The ratio of homeowners to renters is 2 to 1.

Types of Homes

Homeowners generally live in single-family housing; occupy fairly new homes; live in the suburbs of metropolitan areas; and live in homes with between four and six rooms, three or more bedrooms, and one or more complete bathrooms. Single-family units account for 75 percent of the nation's housing stock. The most popular housing units are detached units (68%), followed by attached multifamily units (25%), and manufactured (mobile) homes (7%). The most common multifamily structure, accounting for approximately 30 percent of all multifamily buildings, has two to four units. At the opposite end of the size continuum, 17 percent of the multifamily housing stock is in large structures with 50 or more units.

Age

American housing stock is relatively new. About one-third of the units have been built since 1980. The median construction date of 1970 indicates that half of the housing units are less than 35 years old.



Source: U.S. Housing Market Conditions, Second Quarter 2006, p. 6.

Location

Housing is generally located in metropolitan areas (74 percent of the stock), and 60 percent of these units are in suburban areas outside central cities. Regionally, the South has the greatest number (46 million) and proportion (37%) of housing units. The Northeast has the fewest, with 23 million units (18 percent of all housing units). These percentages have changed little from the 2003 AHS.

Housing Location	Units*	% of Total Housing Stock
Metropolitan areas	91,625,000	73.7
Inside central cities	35,537,000	28.6
Suburban	56,089,000	45.1
Outside metropolitan areas	32,752,000	26.3
Northeast	22,839,000	18.4
Midwest	28,642,000	23.0
South	46,400,000	37.3
West	26,496,000	21.3

Source: U.S. Housing Market Conditions, Second Quarter 2006, p. 6.

*Numbers may not add to totals due to rounding.

Condition

American housing units – especially owner-occupied units – have few deficiencies. Of the 108.9 million occupied units in the United States, about 1 million have holes in the floors; the incidence is lower for owner-occupied units (0.7%) than for renter-occupied

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Research Partnerships Forge Bonds Between Communities and Universities continued from page 3

developed for this purpose was used to project alternative suitability maps based on suggestions by focus group members.

In this joint research project, the university and the city produced suitability maps that met the state's funding requirements. The maps were developed using thorough research, up-to-date data, and multidisciplinary review. The partners also created a rich educational experience for students, who walked away with greater insight into how government works (politically and administratively), how citizens interface with government, and how policymakers must keep varied interests in mind. They also learned how to engage the public in decisionmaking, explain abstract concepts like suitability, draft discussion points for public deliberation, and test technology that assists community decisionmaking in the field.

Clark University, another academic institution located in Worcester, formed a partnership with several community-based organizations (CBOs) to work for better environmental health in poverty-stricken neighborhoods. Scholars and residents worked on this project as equal partners—a novel arrangement for the academic researchers, who wrote about what they learned. They found not only that their academic

language interfered with their communications with CBOs and residents, but also that they had to rely on their CBO partners to get accurate information about neighborhood health and environmental conditions.

Clark University faculty unexpectedly found themselves in an intense dialogue with CBO partners over a draft household safety survey developed on campus (and outside of the collaborative framework). The instrument was viewed by some members of the community as inappropriate for achieving its stated objective. As the authors of this account observe, "Researchers engaging in Community-Based Research should be prepared for a bumpy ride as their methods are rightfully scrutinized and they are held accountable." Lasting lessons that Clark University researchers learned by working in this community-based project include the following:

- Every phase of the project requires the involvement of all partners.
- Local knowledge is essential to successful community-based research.
- It is crucial to convey respect to residents of targeted areas.
- Anecdotal experience has value for scientific research.
- The value of people's time and knowledge lent to the project must be acknowledged and, preferably, reimbursed.

Among selections that explore the evolution of research models and methods, the Office of University Partnerships monograph offers a variety of other examples of productive "town and gown" collaborations and their respective achievements. Readers who delve more deeply into the text will learn how Loyola University Chicago's Center for Urban Research and Learning manages to carry out 10 to 15 collaborative research projects annually; how a grassroots think-tank grew from the collaboration between Ontario, California and Claremont Colleges with a grant from OUP; how community-based research in the Salt Lake City, Utah area offers opportunities to new university faculty seeking a path to career advancement; and how the Medical College of Wisconsin is learning to forge community partnerships that help to fill gaps in its educational curriculum. **UI**



Town and gown partnerships are sending students from the classroom into the community.

Exploring New Housing Information continued from page 4

units (1.5%). Open cracks or holes in interior walls are more prevalent—5.3 million occupied units reported this deficiency—with the incidence for renters (7.2%) almost twice that of owners (3.7%). Electrical deficiencies are very rare. Only 50,000 households reported that they have no electrical wiring, and 700,000 reported that they have exposed wiring. The lack of electrical outlets in one or more rooms occurs in 1.5 million homes.

Selected Housing Deficiencies (Occupied Units)	Total Units*	Owner-Occupied Units	Renter-Occupied Units
Holes in floors	983,000	489,000	494,000
Open cracks or holes (interior)	5,251,000	2,797,000	2,454,000
Broken plaster or peeling paint (interior)	2,221,000	1,057,000	1,163,000
No electrical wiring	50,000	40,000	10,000
Exposed wiring	700,000	459,000	242,000
Rooms without electrical outlets	1,546,000	898,000	647,000

Source: *U.S. Housing Market Conditions*, Second Quarter 2006, p. 7.

*Numbers may not add to totals due to rounding.

Cost

As might be expected, median monthly housing costs have increased since 2003 (by 2%). Housing costs for renters include contract rent, property insurance, and utilities. Housing costs for owners include mortgage (or installment loan) payments, property insurance, real estate taxes, fees (association, condominium, or cooperative), park fees for manufactured (mobile) homes, land rents, routine maintenance, and utilities. For all housing units, the median monthly housing cost is \$761 per month, with a median cost of \$855 for owners and \$692 for renters. Although the median housing cost burden (the proportion of income spent on housing) is 21 percent, renters pay a median of 28 percent of their incomes, whereas owners pay only 20 percent.

Housing costs vary significantly among regions. The lowest median monthly housing costs are in the South (\$657) and the Midwest (\$707); the highest are in the West (\$950) and the Northeast (\$862).

A Wealth of Housing Information

The printed version of the 2005 AHS report contains nearly 500 pages describing America's housing units. In addition to having chapters on all housing units and occupied housing units, the report has separate chapters on owner-occupied units, renter-occupied units, African-American households, Hispanic households, and households consisting of elderly people.

Each chapter contains a set of data tables covering general housing characteristics, building height and condition, unit and lot size, equipment and plumbing, fuels, housing-quality indicators, neighborhood, household composition, recent movers, reasons for moving, income, housing costs, value, price, source of downpayments, number of rooms, square footage, detailed tenure, income details, detailed housing costs, structure type, climate, journey to work, and units in structure.

Accessing Housing Information

HUD and the Census Bureau give high priority to making the AHS data accessible. AHS tabulations are available in hard-copy and CD-ROM formats, and as Portable Document Format and HTML files. Internet users may download the information in tabular and microdata formats. The microdata files (in ASCII or SAS formats) are also available on CD-ROM. The microdata can be used to create customized or user-specified tables and to perform multivariate analyses.

Hard-copy and CD-ROM versions of the AHS survey data are available at minimal cost by contacting HUD USER at 800.245.2691 and selecting option 1, or by sending your request to HUD USER, P.O. Box 23268, Washington, DC 20026-3268. Users can also purchase national AHS reports from the U.S. Government Printing Office by calling 202.512.1800. The metropolitan area reports can be obtained from the Census Bureau by calling 301.763.4636 or writing to the Census Bureau, Washington, DC 20233-8500. The information is also available from the HUD USER and Census Bureau websites at www.huduser.org/datasets/ahs.html and www.census.gov/hhes/www/ahs.html, respectively. Another version of this article appeared in the Second Quarter 2006 issue of *U.S. Housing Market Conditions*, available at www.huduser.org/periodicals/ushmc.html or in print by calling HUD USER at 800.245.2691 and selecting option 1. **HJ**

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roughly 3 feet long by 18 inches wide and are stacked to make walls that are 14½ inches thick. "The bales have an insulating factor of R38, or twice what you achieve if you insulated 2 by 6 inch framed walls and even more than the standard 2 by 4 inch framing," says Miller.

In exchange for the federal grant, the farms and Telamon agreed to make the straw bale housing available for seasonal and migrant workers for the next 20 years. According to Council Secretary Sam Johnson, for years, the Rappahannock Migrant and Seasonal Workers Council tried to improve housing for workers in Westmoreland County, Virginia. In tandem with the use of efficient technologies, this new relationship is getting safe, decent, and affordable housing built for area workers.

Encouraging Energy-Efficient Technologies

"Cost-effective is also energy-efficient," says WRHA executive director Randy Martin. In 2005, WRHA used federal low-income housing tax credits and funding from the town of Wytheville, the Appalachian Regional Commission, the Federal Home Loan Bank, and the Virginia Housing Development Authority to finance and build a \$2.7 million complex that incorporates readily accessible energy-efficient measures. The new complex at Cassell Pines is proving that energy-saving elements can be cost-effectively installed in affordable housing.

The new complex is far enough away from city life for a quiet, peaceful living environment, but is still within walking distance of churches, grocery stores, restaurants, and retail merchants. The 6 one-bedroom and 12 two-bedroom units rent for between \$251 and \$401 per month. "That is certainly affordable and competitive in our market and well within our rental voucher standards," states Martin. All units in the complex are reserved for residents who earn 50 percent or less of the area median income.

Cassell Pines incorporates low-impact design principles and uses high-efficiency 14 SEER (seasonal energy efficiency ratio) heat pumps. (The SEER indicates the efficiency of the heat pump when it is in the cooling or air conditioning mode.) Other energy-efficient technologies used in the Cassell Pines development include energy-efficient windows and appliances that meet Energy Star standards. "Cassell Pines is a perfect demonstration of how HUD and its partners can use

new technologies to achieve reductions in energy and energy costs as outlined in the Energy Action Plan," says Martin.

In addition to these new developments, there are several excellent examples of energy efficiency in existing housing. Public housing authorities increasingly are tapping third-party private-sector energy performance contracts to finance and install energy-efficiency measures. The Chattanooga Housing Authority, for example, is saving \$16.6 million over 12 years by investing \$9.9 million in energy-efficiency measures. In addition to installing Energy Star appliances, equipment, lighting, and windows, the Oakland Housing Authority is also adding photovoltaic (PV) solar systems in their Chestnut Linden Court Hope VI project. The PV installation will reduce annual electricity consumption by more than 100,000 kWh, representing a \$9,600 cost savings.

For additional information concerning HUD's Energy Action Plan, its implementation, and the progress being made, see *HUD's Energy Action Plan at www.hud.gov/energy and Promoting Energy Efficiency at HUD in a Time of Change: Report to Congress at www.huduser.org/publications/destech/energyefficiency.html.* **HLI**

Regulatory Barriers Clearinghouse

The Regulatory Barriers Clearinghouse provides state and local governments, organizations, and individuals with resources that can help overcome the regulatory barriers to affordable housing.

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In the Next Issue of... ^{research} **works**

- By the mid-1990s, HUD was sponsoring research to establish ways in which the homebuilding industry adapted innovations in its practices and the materials it used. We'll examine the course of pertinent research HUD has supported, beginning with a 1998 attempt to identify innovations used in affordable housing. The story will bring us to a 2006 exploration of differences in how larger and smaller homebuilders embrace innovation.
- Housing Impact Analysis (HIA) is a recently developed method for quantifying the effects of a new regulation on the cost and affordability of housing. We'll examine this method, look at its purpose, and review a demonstration of its use in weighing the costs and benefits of more stringent wind standards for manufactured homes.
- For more than 30 years, HUD's Community Development Block Grant (CDBG) program has provided funding to municipal and county governments to carry out affordable housing, economic development, social services, public works, and other programs. We'll highlight the diverse and innovative public and private partnerships that CDBG grantees have developed to carry out their community development activities. This discussion shares the findings of a recent HUD study that closely scrutinizes the elements of a successful grantee-subrecipient relationship.
- HUD-assisted multifamily housing stock includes more than 22,000 properties with more than 1.5 million units. We'll review the kinds of decisions that assisted property owners are making about keeping these properties in, or withdrawing them from, housing assistance programs. The author relates the impact of these decisions on the affordable housing stock in light of a recent research project described in *Multifamily Properties: Opting In, Opting Out, and Remaining Affordable*.

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