

Insulation Tops List of Low-Income Weatherization Measures

The gas savings from the 1994 Ohio Home Weatherization Program (HWAP) were among the highest that have been documented in any published, large-scale state weatherization assistance program evaluation based on actual billing data. Electricity savings were also significant. Attic and wall insulation, along with air sealing, provided the bulk of energy savings.

For the 244 gas-heated multifamily units, the average reduction in gas usage following weatherization was 251 ccf per year; for the 2,209 gas-heated single-family homes, the reduction was 324 ccf per year (see Table 1). This represented 23% of total usage and 29% of heating usage for the single-family homes.

The 150 electrically heated single-family homes and 116 electrically heated multifamily units averaged a savings of 2,000 kWh per year, which represented 9% of total usage and 17% of heating usage.

High Savers—No Surprises

Examination of the savings factors produced no surprises. Among the gas-heated homes, the highest 25% of savers—those with savings greater than 480 ccf per year—generally had very high usage. Both attic and wall insulation were strongly associated with high savings. Ninety-five percent of the high savers received attic insulation, and 83% received wall insulation. (Cellulose was used in both attics and side-walls.) Ninety-three percent of the homes received air sealing.

An analysis of the cost-effectiveness of selected measures was done on the sin-



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Tony Sykes, a case manager supervisor with the Mid-Ohio Regional Planning Commission (MORPC), installs cellulose insulation into a sidewall using the tubing method. MORPC is one of the HWAP grantees in the Columbus area.

gle-family homes. As expected, wall insulation was estimated to provide the most savings—183 ccf per year (see Table 2). (Attic insulation provided savings of 148 ccf per year.) An estimate was made of the total effect of wall insulation, including its air sealing benefit, by analyzing the relationships among blower door reductions, program treatments, house size, and the initial air leakage rate. According to this analysis, the wall insulation was responsible for about a 0.37 CFM₅₀ leakage reduction for each ft² of wall insulated. When this effect was included, the total savings attributable to wall insulation was estimated at 221 ccf per year.

Low Savings in Floor Insulation

The two measures that appeared to provide no savings were floor insulation and heating system tune-ups (although heater replacement, which was done only for safety reasons, did result in significant savings).

The lack of savings for floor insulation was surprising. Many of the units that received floor insulation were mobile homes. Although customers reported increased comfort as a result of the warmer floors, the decrease in heat loss was not enough to result in measurable energy savings. One-fourth of all the homes received duct sealing, but the observed savings were not significant.

In terms of cost-effectiveness, using a real discount rate of 5%, attic and wall insulation provide savings worth twice their cost. To improve the overall cost-effectiveness of the program, the evaluation report recommends that consideration be given to a low-cost program for units with a small potential for energy savings, targeting services to high-use households. It also recommends baseload electric measures such as compact fluorescent lighting for



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"I've been in seventh heaven ever since [the weatherization crew] were here," says Juanita Hiser, a 74-year-old widow on a fixed income. "Not only is my house more comfortable, but my energy bills have gone down quite a bit"

Table 1. Energy Impact Summary

Participant Groups	Annual Gas Savings (in ccf)	Annual Electricity Savings (in kWh)	Annual Cost Savings	Lifetime Cost Savings	Program Cost	Benefit/Cost Ratio
Single family: gas heat	320	300	\$220	\$2,700	\$2,600	1.0
Multifamily: gas heat	220	200	\$140	\$1,800	\$1,700	1.1
Single family: electric heat	0	2000	\$180	\$2,200	\$1,910	1.2
Multifamily: electric heat	0	900	\$80	\$1,000	\$910	1.1

Note: Lifetime cost savings are the net present value of the energy savings over the life of the measures. Program costs include all HWAP and utility weatherization spending, including HWAP administrative costs (local provider management; state office management; and fiscal and technical monitoring, training, and evaluation costs) but exclude health and safety measures that are not performed for energy savings. Benefit/cost ratio does not include non-energy benefits.

Table 2. Cost-Effectiveness of Selected Measures in Gas-Heated, Single-Family Homes

Measure	Annual Gas Savings (in ccf)	Annual Cost Savings	Present Value Savings	Cost *	Benefit/Cost Ratio
Wall insulation	180	\$110	\$1,300	\$680	2.0
Wall insulation (dual effect)	210	\$120	\$1,500	\$680	2.3
Attic insulation	150	\$90	\$1,100	\$470	2.3
Air sealing	110	\$60	\$780	\$430	1.8
Heater replacement	150	\$90	\$1,100	\$1,500	0.7

Note: Heating system replacements are performed only for safety reasons, not for energy savings. Floor insulation and heating system tune-ups are not shown, since we found no savings attributable to them. Wall insulation (dual effect) includes the estimated savings from the air leakage reductions that the insulation provides.

*There is some uncertainty regarding cost allocations because per-measure costs were not tracked, so they had to be estimated based on statistical analysis and past experience in cost allocations for this type of program.

frequently used lights, photocells and motion detectors for exterior lighting, removal of secondary refrigerators or chest freezers, and replacement of low-efficiency primary refrigerators.

Highest Savings Seen

Program evaluator Michael Blasnik (also see "Cost-Effective Weatherization in Philadelphia," *HE* May/June '99,

p. 8) says the 1994 Ohio Home Weatherization Assistance Program demonstrated the highest savings of all weatherization assistance programs he has seen. The report, *Impact Evaluation of Ohio's Home Weatherization Assistance Program: 1994 Program Year*, examined both gas and electric savings using a standard pre/post analysis of weather-normalized energy consumption based

on utility usage data. The evaluation used a comparison group of households weatherized in 1995; Princeton Scorekeeping Method (PRISM) software was used for the weather normalization.

In addition to calculating the energy savings and cost-effectiveness of Ohio's HWAP, the evaluation examined the impact of the program on customer payment behavior and on Ohio's Percent of Income Payment Plan for the low-income customers of regulated utilities.

—Stjepan Vlahovich

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