MARKET RESPONSE FOR AFFORDABLE HOUSING
THE RESULTS OF THE ENERGY-EFFICIENT HOME PROJECT OF OREGON

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ABSTRACT

The added cost of conservation measures and their impact on affordability of lower priced homes has been controversial. Especially in times of high mortgage interest rates, any increase in costs to the builder which may reduce the pool of eligible buyers for "starter" homes are strongly resisted by the housing industry.

This paper describes a completed project which was coordinated by the Energy Efficient Housing Group, sponsored by the Bonneville Power Administration. The project addressed the marketability of efficient lower priced homes.

The project created an opportunity for builders to voluntarily upgrade thermal performance of home designs. The driving force behind the project was a pool of low-interest rate mortgage money (9 3/4 percent, 30-year fixed rate) provided by the Oregon Department of Commerce Housing Division. The mortgage capital was serviced by a savings bank which was willing to consider monthly energy savings in its loan qualification of buyers. Fourteen homes were built and sold; they are being triple-metered, and partial energy usage data is presented in the paper. Government monies invested in this project were leveraged at a ratio of 1:40.

A highly successful design/build competition resulted in 68 entries, providing an ample selection of reliable builders and quality designs. These homes are projected to save over 2.8 million kWh's over the 30-year term of their mortgages in comparison to houses built to current Oregon code.

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INTRODUCTION

The Energy-Efficient Home Project of Oregon (EEHPO) was a joint public/private effort, involving mortgage investors, government agencies, professional associations, a lending institution, energy consultants, and homebuilders in the design, construction, and mortgage financing of 14 moderately priced efficient homes.

The project was created to demonstrate that an industry itself knows best how to achieve a particular objective of efficiency. Public funds were used in EEHPO to:

1. create a favorable atmosphere and an attractive investment vehicle for energy-efficient residential construction;

2. set up a design/build competition aimed at builders;

3. introduce lenders to concepts of qualifying ratio adjustments based on energy savings; and

4. prove in the marketplace the benefits of energy-efficient housing for all participants, from secondary mortgage market to homebuyer.

Project funding came from the Oregon Department of Commerce's Housing Division (ODCHD), which provided $900,000 in low-interest rate mortgage funds, and the Bonneville Power Administration (BPA), which provided the administrative costs contract to the Energy-Efficient Housing Group--the consultant which ran the project. Other co-sponsors included: Far West Federal Bank, which made the primary mortgage loans; the Oregon State Homebuilders Association, which provided publicity and logistic support; and the Oregon Department of Energy, which provided technical assistance.

The idea was to demonstrate to homebuilders, mortgage lenders, and buyers the market acceptability and specific advantages of solar/energy conserving construction in the entry-level home market. Solar and conser-

vation techniques are widely perceived as being accepted and included in today's housing design. However, the project designers believe that a new technology has not truly become a normal feature of housing stock until it has been proven in the entry-level home market.

The ODCHD manages an ongoing program to provide mortgage financing on affordable homes to below-median-income families in the State of Oregon. The funds are raised through State-backed bond sales, and are typically offered at below-market rates through participating lenders which make the primary mortgage loans.

NARRATIVE

The Energy-Efficient Home Project of Oregon was implemented in a 10-month span between September 1982 and July 1983. The major features of the project are:

Publicity

Promotion and publicity for the design competition was accomplished via press releases, announcement in the newsletter of the Homebuilders Association (HBA), and direct mailings to builders.

A press release about the project appeared in at least 13 newspapers around the State; five radio stations also picked up on the item.

In the direct mail efforts, there was a deliberate focus on builders rather than architects and engineers who were encouraged to adapt a standard starter home model to be more energy-efficient rather than to design from scratch.

Responses requesting competition application packets came in from 155 builders. All respondents were asked to indicate how they had heard about the project. Tallied results: 40 percent from direct mailings; 29 percent through HBA's; 17 percent from press and radio media; and 14 percent from word-of-mouth.

Design Competition

All respondents were sent a competition application packet.[1] This document contained: a complete program description; the program rules and underwriting guidelines; full instructions on how to apply; a special section of "Alternative Component Measures", describing various means of

achieving target R-values and air-change rates for the home; and a Conservation Worksheet, consisting of a simplified UA heat loss calculation method.

The application packet gave enough information that a builder could utilize to pretest a design to see how well it would score relative to current Oregon minimum code standards.

By the submittal date, a total of 68 design entries had been received from 52 builders. This response level exceeded the project manager's hopes: over 52 of the 155 application requests (1/3) had resulted in a design proposal.

The quality of entries was likewise surprising: only one applicant failed to understand and follow through on the instructions.

A review team was assembled, representing the co-sponsoring oganizations and a cross-section of professional specialties ranging from design, engineering and construction, to lending, appraising, and sales. In preparation for review the eight team members agreed upon criteria and weighing factors to assess each entry, and prepared an evaluation form.

A winning design had to excel in several areas. Though technical considerations were of major importance (55 percent of the possible score), the team also scored on the marketability of the design (30 percent) and the builder's financial qualifications and experience record (15 percent). Here again, the selection process was intended to maintain the project's major emphasis: that the production of energy conserving homes is not a radical departure from the shelter industry's normal practices. It was of high importance that the homes excel not only on paper, but in the marketplace as well.

Winner Announcement

Sixteen winners and five alternates were selected. The winning designs averaged 1160 square feet. All of the winning designs featured suntempering in addition to a tight well-insulated envelope. There were 12 passive solar designs. Most of these employed simple direct gain schemes; five included sunspaces, and there were two designs which used partial Trombe walls. Winners prepared working drawings over the next month and secured lots. Upon approval of final designs and materials specifications, builders lined up construction financing and began work.

A press conference was called to announce the winners, all of whom were presented an award letter from the Housing Division. The project interest and support was described by administrators and executives of the Bonneville Power Administration, State of Oregon, State Homebuilders Association, and Far West Federal Bank. The attendant press coverage resulted in a deluge of calls from consumers. Over 400 telephone inquiries were logged in the ensuing 2 days from prospective homebuyers wanting to purchase one of the winning homes. As result, a majority of the EEHPO homes were presold.

Energy Underwriting

With such serious levels of buyer activity, the monthly energy savings computations were the next task. From the final working drawings, the savings predictions were calculated and the data supplied to Far West Federal Bank for use in buyer qualifying.

Positive cash flow based on savings can be used in loan underwriting to adjust debt-to-income ratios, thus allowing a lender to qualify more buyers for this type of housing stock.

The specific savings information for each home was provided to each builder for their use in future sales of their winning model, and as a practical example of how energy efficiency can be used as a marketing tool for home sales in general.

The Uniform Rating System (URS) developed by the Western Resources Institute[2] was utilized by the Far West Federal Bank which serviced the morgages that were transacted as a result of this program. The URS is utilized to rate the energy efficiency of new and existing housing stock. Lending institutions which utilize the URS are able to offer consumers the advantages of energy underwriting with low risk. The URS is recognized by secondary morgage institutions such as Freddie Mac, the Federal Home Loan Mortgage Corporation. The major benifit of the URS to the consumer who wishes to purchase an energy efficient home is that energy underwriting practices allow lenders to favorably adjust debt to income ratios. Bankers generally insist that a monthly morgage payment -- in combination with long term obligations -- not exceed 36 to 38 percent of the applicants monthly income. When a home has a high energy efficiency rating that percentage may be raised as high as 42 percent, enabling the lender to qualify the buyer for a larger morgage. In the EEHPO the use of the URS resulted in the qualification of one buyer who would have otherwise been unable to afford the home.

Construction and Sales

Several builders took full marketing advantage of their success in the program. Of the winners, at least nine generated their own publicity and/or used the house as a model which resulted in obtaining further sales.

Monitoring

BPA provided extra meter heads for the winning homes and reimbursed the builders for associated wiring charges. It should be noted that this cost to BPA (average: $400) was the only cash payment to the builder for the incremental costs incurred by building an energy conserving home. Virtually the entire incentive for their participation was, in other words, the advantageous mortgage financing and underwriting. Results from energy performance triple metering for several of these homes are presented (TABLE I).

CONCLUSIONS

The EEHPO was a successful cooperative effort carried out by a unique coalition of public and private sector participants. By taking a marketplace approach and involving a full range of shelter industry participants, each actor was shown how they can benefit from their role in the process of building and selling solar/energy conserving homes.

The major points demonstrated by EEHPO:

1. A mortgage financing/underwriting component will stimulate energy conserving housing activity, probably at much lower direct governmental cost than isolated awards or training programs.

2. Homebuilders will respond favorably to a performance approach to more stringent conservation standards. Allowing each builder to achieve a total performance target for space heating would probably meet much less resistance than the prescription of specific component standards.

3. The 14 homes are predicted to save over 2.8 million kWh's of energy over the term of the mortgages. BPA's project investment leveraged over $40 of mortgage money per dollar spent on the project.

There is a strong demand for lower-priced efficient homes, which could capture a significant portion of the starter-home market. The shelter industry has the capacity to fulfill this need if the risk involved can be

minimized. A strong financing component, which included the implementation of the URS by the bank that administered the mortgages, attracted the builders to get involved in the program.

Potential homebuyers, who are income limited, are particularly subject to the dilemma of needing an energy-efficient home while confronting the reality of minimal affordable initial cost. The availability of efficient lower-priced housing stock offers these buyers an opportunity to purchase a home with greater assurance that they will be able to meet their monthly expenses once they get into the house that they could just barely afford initially.

The shelter industry has a strong investment in keeping the "eligibility window" of potential buyers open with reasonable monthly payments. Already, initial costs and monthly payments preclude many "would be" buyers from purchasing homes. The front end costs of additional energy conservation improvements can be offset when a financing component is in place.

Energy policy makers should respond to this issue by supporting market-oriented initiatives which allow the shelter industry to design, build, and sell efficient lower-priced homes. The applicability of energy-efficient designs must be proven in the lower priced end of the new home market if efficiency is to truly become mainstream. Lessons learned in the entry level home market where profit margins are lowest and the demands are greatest and where both the consumer and builder have the most to lose or gain identifies solutions that can benefit all levels of the new home construction market.

Table I. Energy Monitoring Results

Homebuilder	Floor Area	Date Occupied	Heating Degree Days/Year		Space Heating kWh/Sq Ft/Yr	Building Performance Index Btu/Sq Ft/HDD/Yr	Hypothetical Comparison Current Code House kWh/Sq Ft/Yr	Wood Heat	Solar Water Heater
Edwards	1000	4/20	4,792		4.15	2.96	5.5	NO	NO
Utility				12706					
Water				03370					
Space				04157					
Fuller	1302	9/23	4,739		1.64	1.18	5.5	NO	NO
Utility				08607					
Water				03115					
Space				02135					
Novi	1181	8/18	4,852		1.37	.96	5.5	YES	YES
Utility				13609					
Water				03615					
Space				01614					
Pyles	1194	8/31	4,852		1.47	.46	5.5	YES	NO
Utility				19046					
Water				03965					
Space				01752					
Reid	1184	7/23	4,792		.73	.47	5.5	YES	YES
Utility				05039					
Water				01040					
Space				00775					
Solar Cncpts	1080	5/1	4,739		2.01	1.44	5.5	NO	NO
Utility				08904					
Water				02845					
Space				02167					
Wardmark	1248	6/10	4,792		.58	.42	5.5	YES	NO
Utility				13597					
Water				04876					
Space				00730					
Greenwood	1239	6/4	5,089		.998	.67	5.5	YES	NO
Utility				04909					
Water				02689					
Space				01237					
Adair	1254	6/6	7,117		4.5	2.18	8.9	YES	NO
Utility				11883					
Water				04194					
Space				05709					
Podorean	1584	6/2	7,117		.927	.45	8.9	YES	NO
Utility				14908					
Water				02369					
Space				01469					
Sundigne	1300	7/1	7,117		.21	.1	8.9	YES	NO
Utility				08005					
Water				04426					
Space				00272					

FOOTNOTES

1. A copy of the competition application packet is available upon request from BPA Office of Conservation New Home Construction Program Manager

2. URS Western Resources Institute, Box 85477, Seattle, WA 98105

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