

Linking Home Energy Rating Systems with Energy Efficiency Financing: Progress on National and State Programs

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Preface

The evaluation research on which this report is based was managed and conducted at the National Renewable Energy Laboratory (NREL). It was funded by the U.S. Department of Energy (DOE). Cognizant DOE program managers for the effort were Jacob Kaminsky, Louis V. Divone, and John Reese.

The report contains results from a preliminary comparative analysis of early efforts to link energy efficiency financing with home energy rating systems in five states: Alaska, Arkansas, California, Vermont, and Virginia. The U.S. Department of Housing and Urban Development's Federal Housing Administration (HUD/FHA) selected these five states to pilot the energy-efficient mortgage program mandated under the Energy Policy Act of 1992.

The evaluation research has been guided by an evaluation plan developed by an Evaluation Working Group comprising interested stakeholder organizations, including HUD/FHA, DOE, the Federal National Mortgage Association, Sandia National Laboratories, Nebraska Energy Office, Virginia Home Energy Rating Organization, U.S. Department of Veterans Affairs (DVA), Western Area Power Administration, Arkansas Industrial Development Commission, Delta-Montrose Electric Association (Colorado), and the Rural Housing Service (RHS, formerly the Farmers Home Administration). This plan is reported in *A Plan for Evaluating Alternative Approaches to Financing Energy Improvements in Housing*, by Nancy E. Collins, Barbara C. Farhar, William M. Babiuch, and Jan Eckert (NREL/TP-461-6688-Final Draft), Golden, CO: National Renewable Energy Laboratory, August 1994.

Several individuals contributed to the study. Foremost were the respondents in the pilot states and federal agencies who provided much of the data included. NREL funded each of the major HERS provider organizations in each pilot state to provide data for this study and to further develop their own data and evaluation systems. Among pilot state respondents were Barbara Collins in Alaska; Carol Cales in Arkansas; Jay Luboff in Colorado; Michael Martin in California; Richard Faesy in Vermont; and Christine Lowrie in Virginia. Notable among the federal officials providing data were David Dwyer and Virginia Holman, HUD; Walt Patton, RHS; and Kathleen Mangold, DVA.

Author Barbara Farhar of NREL managed the project and was responsible for data collection in Colorado and Virginia. Co-author Nancy Collins with Q⁴ Associates in Oakland, California, was responsible for data collection in Alaska and California. Co-author Roberta Ward Walsh, with the University of Vermont, Burlington, was responsible for data collection in Arkansas and Vermont.

Reviewers included Ron Judkoff, NREL; John Reese, DOE; Diane Pirkey, DOE; and Malcolm Verdict, Alliance to Save Energy, Washington, D.C. At NREL, Jan Eckert and Laura Vimmerstedt assisted in collecting national data on energy efficiency financing. Janet Saunders, Mary Anne Dunlap, Kathleen O'Dell, Kay Vernon, Irene Medina, and Stefani Cairns completed the report's editing and word processing.

Executive Summary

Creation and subsequent institutionalization of energy efficiency financing (EEF) products linked with home energy rating systems (HERS) are gaining momentum across the nation and, in the process, transforming the housing marketplace by improving the energy efficiency of the housing stock. Energy efficiency financing is a consumer mortgage or home improvement loan that enhances a borrower's ability to qualify based on the increased cash flow gained from a more efficient home. Because energy improvements generally reduce home energy costs more than the increase in the loan payment, lenders can use this effective "added income" to qualify borrowers to finance the costs of the improvements in the larger mortgage loan amount. When these loans are based on a quality home energy rating, lenders can have more confidence that the improvements made will result in a positive cash flow for the consumer.

In concert with the U. S. Department of Energy (DOE), the Federal Housing Administration (FHA), the Rural Housing Service (RHS, formerly the Farmers Home Administration), the Department of Veterans Affairs (DVA), the Federal National Mortgage Association (Fannie Mae), and the Federal Home Loan Mortgage Corporation (Freddie Mac), states are supporting the development of EEF products linked with HERS. States in the forefront of these developments include the five selected to pilot a U.S. Department of Housing and Urban Development (HUD) program requiring that existing homes be rated in order to qualify for FHA energy-efficient mortgages (EEMs): Alaska, Arkansas, California, Vermont, and Virginia. In October 1995, HUD extended EEMs to new and existing homes in all 50 states; the DVA program also offers EEMs in all states. In addition, Colorado and Virginia are in the process of piloting a Fannie Mae program that offers both EEMs and energy improvement mortgages (EIMs).

During 1995, national- and state-level data on EEF activity were collected from cognizant agencies and institutions on the mortgages they insured, guaranteed, or purchased. In addition, data were gathered on the number and value of EEF products actually completed. This report summarizes information on ratings completed and their use for financing improvements; raters and rating organizations; organizations involved in establishing rating systems; and training for lenders, builders, and real estate agents. The EEF products summarized include those of the mortgage community mentioned above; utility/rating financing partnerships; private financing; and state financing programs.

One lesson learned from the HUD pilot program is that FHA EEMs tend to reach only a small segment of the new and existing home markets—usually first-time home buyers and low- and middle-income borrowers. Without a larger market, the demand for ratings is small and most likely insufficient to support a rating industry. The result has been that HERS provider organizations have worked actively to expand ratings-linked products offered by utilities, state housing finance agencies, mortgage lenders, and the secondary mortgage markets.

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Introduction

Background

In 1991 and early 1992, the U.S. Department of Energy (DOE), in cooperation with the U.S. Department of Housing and Urban Development (HUD), established a National Collaborative on Home Energy Rating Systems (HERS) and Energy Efficient Mortgages (EEMs). The Collaborative's purpose was to involve stakeholders at a national policy level to develop a plan leading the nation toward a voluntary system linking HERS with EEMs. The National Renewable Energy Laboratory (NREL) coordinated the National Collaborative's meetings for DOE. Composed of representatives from 25 stakeholder organizations, the Collaborative, after some 14 meetings, reached consensus on two documents, both published by NREL in 1992: *A National Program for Energy-Efficient Mortgages and Home Energy Rating Systems: A Blueprint for Action* and *Going National with HERS and EEMs: Issues and Impacts, The Collected Papers of the National Collaborative*.

As the Collaborative's participants worked to move its recommendations forward, DOE sponsored work at NREL to monitor their progress (Farhar and Eckert 1993). Government agencies and the private housing industry have been cooperating since the Collaborative to establish voluntary programs that link HERS with EEMs and other lending products to finance energy improvements in housing. The assumption underlying these programs is that money saved on utility bills over the long term will more than offset the cost of making energy efficiency improvements—which are added to the total loan amount—and, therefore, default rates for loans with slightly higher payments will not be any greater than for conventional loans. The long-term benefit (and goal) of these programs is to improve the energy efficiency of the nation's housing stock.

HERS and EEMs programs, both of which have existed independently at various local, state, and national levels for more than a decade, were accelerated by three 1992 federal laws¹: (1) The Energy Policy Act (EPAct) directed the U. S. Department of Energy (DOE) to develop guidelines for a uniform, voluntary HERS, to evaluate the effectiveness of the U. S. Department of Housing and Development (HUD)/Federal Housing Administration (FHA) pilot EEMs program, and to document training activities; (2) the Housing and Community Development Act of 1992 required that FHA conduct an EEMs pilot program in Alaska, Arkansas, California, Vermont and Virginia, report on the program's success, and based on the report, expand the program nationwide; and (3) the Veterans Home Loan Program Amendments of 1992 required that the U. S. Department of Veterans Affairs (DVA) conduct a demonstration EEMs program in 50 states for veterans. EPAct also required HUD and the U.S. Department of Agriculture's Rural Housing Service (RHS, formerly the Farmers Home Administration) to establish and promulgate energy efficiency standards for new homes receiving loans made, guaranteed, or insured by these agencies as of October 1993.

In general, most performance-based home energy rating systems calculate the annual energy use and energy cost of a house and then translate that to a scale ranging from 0 to 100 points. DOE published a Notice of Proposed Rulemaking (NOPR) in July 1995 that included a proposed rating scale based on the site energy use of a reference house. The energy efficiency of the house must exceed that of a reference house based on the Council of American Building Officials' Model Energy Code (CABO MEC '93), and a value on the rating scale must be associated with these standards. To simplify use of the ratings, the scale is abbreviated

¹ Statutes are described and cited in Farhar and Eckert 1993.

using a star system as illustrated in Figure 1. This proposed voluntary national rating scale is presented as an example only; it is still under review at DOE.

0-39	40-59	60-79	80-85	86-91	92-100
↑	↑↑	↑↑↑	↑↑↑↑	↑↑↑↑↑	↑↑↑↑↑↑+

Source: Constructed by the authors based on *The Federal Register* Notice of Proposed Rulemaking, July 25, 1995, pp. 37961 ff.

Figure 1. Example of a Proposed National Home Energy Rating System Scale

The generic mortgage process is complicated, involving many different actions during the buying and selling of a home—many of them not apparent to the consumer. Participants in the home sale include, of course, the seller (either homeowner, mortgage holder if a foreclosure, or builder/developer), the buyer, and the real estate agent, who is the "ringmaster." In some states, both buyer and seller are represented by lawyers. The buyer may find a lender directly, the agent may identify a lender on behalf of the buyer, or a mortgage broker may find a lender. The mortgage paperwork is examined by an underwriter and is completed by an officer at the financial institution, the appraisal is conducted, inspections are completed, disclosures are prepared, and signatures are obtained to complete the sale. With so many steps, introducing a new financing product could add time and staff cost to the process. These complexities represent a significant barrier in introducing energy efficiency financing (EEF) products. Moreover, deregulation of financial institutions has created a more competitive environment in the mortgage industry in recent years, forcing lenders to reduce costs whenever possible.

After a conventional mortgage is in place, many financial institutions sell it on the secondary market (e.g., to the Federal National Mortgage Association [Fannie Mae] or the Federal Home Loan Mortgage Corporation [Freddie Mac]). Institutions in the primary and secondary markets do not want to increase the risk of defaults; they are wary of home loans that may stretch the limits of the buyer's ability to make mortgage payments. Risk aversion in the financial community is another major barrier that has to be overcome if EEF products are to be widely used.

Scope of the Report

This report summarizes information about the progress of EEF products at the national level. It also documents the development of EEF products linked with HERS in the five HUD/FHA pilot states. Its purpose is to describe organizations involved and their roles, progress in training raters, conducting ratings, and measures of success in linking home energy ratings with EEF products. Collection of the data followed a protocol established in an evaluation plan (Collins et al. 1994) and, although the case studies produced trace activities in each state from the beginning (in some cases 15 years), the report focuses on 1993-1995, the period since EAct was passed. Preliminary findings of the process evaluation based on observations about and data from the five HUD pilot states are also presented.²

² Although this report focuses on the five HUD/FHA pilot states, the evaluation project includes a sixth state, Colorado, which became a pilot state in 1994 for Fannie Mae. The Colorado Housing and Finance Authority (CHFA), through Energy Rated Homes of Colorado, is spearheading a partnership with Colorado real estate financing, appraisal, sales, and construction industries; the state's rural, municipal, and investor owned utilities; Energy Rated Homes of America; Fannie Mae; Freddie Mac; and HUD. As with other state programs, the Colorado goal is to improve the energy efficiency of housing stock. CHFA is training and certifying raters to make the program a market force in Colorado as rapidly as possible. However, this preliminary report focuses on the original five pilot states because Colorado's program began somewhat later and piloted a different EEF product.

Methodology

Evaluation Design

Once HUD had selected the five pilot states in May 1993, DOE established two working groups to support the development of the HERS/EEMs pilots: (1) the Pilot States Working Group and (2) the Evaluation Working Group. DOE facilitated meetings between representatives of the HERS provider organizations in the pilot states and HUD/FHA officials to share experiences from the field, refine procedures, and define and resolve problems. The Pilot States Working Group met several times during 1993 and 1994. In FY 1995, DOE provided funding to each of the HERS provider organizations in the five HUD/FHA pilot states and Colorado, the Fannie Mae/Freddie Mac pilot state, to support program implementation and evaluation.

One conclusion reached by the National Collaborative was the importance of evaluating the development process of HERS/EEMs, estimating the impacts of the pilot state efforts, and sharing the results with other states. Therefore, in 1994, DOE also requested that NREL establish an Evaluation Working Group. NREL worked with national- and state-level stakeholders to write a detailed evaluation plan that would provide national data for use by the states, as well as a method for aggregating state data at the national level (Collins, et al. 1994).

The plan covers three types of evaluation: (1) short-term process evaluation and feedback (monitoring and market response) to identify implementation barriers and learn how they were overcome; (2) traditional process evaluation, focusing on comparing characteristics of the various approaches to determine the program characteristics associated with the most successful programs; and (3) impact evaluation, which collects data for a causal analysis linking programmatic actions with key outcomes such as loan default rates and housing affordability. This report focuses on the first type of evaluation.

Data Collection Procedures

During 1995, NREL began data collection efforts at the national level and from the FHA pilot states. At the national level, considerable effort went into obtaining information from HUD, DVA, RHS, Freddie Mac, and Fannie Mae on mortgages and loans underwritten, purchased, or made during FY 1993, FY 1994, and FY 1995. Total numbers and values of mortgages and loans provide a look at the market potential for EEF products. In addition, these data were obtained for the pilot states, where available.

At the pilot state level, NREL undertook the development of case studies, documenting process evaluation-related activities in each one from inception through December 1995 and collecting available impact evaluation data. A protocol, based on the evaluation plan, delineated both impact and process data to be collected. These included: background of rating programs; evolution of loan products; implementation costs and participants; rating systems and use of ratings; training and education; marketing and outreach; market transformation achieved; program evaluation and data collection systems; barriers encountered and overcome; lessons learned; successes; and near- and long-term plans.

Among the limitations to the data collection efforts conducted in 1995 were:

- (1) National-level data are difficult to obtain, either because of their proprietary nature, confidentiality issues, or cost. Furthermore, identifying EEMs in the HUD/FHA database is not always possible; not all EEMs are identified as such and some are coded as EEMs but are not.
- (2) Because programs and activities operate in the volatile housing and mortgage markets, monitoring events was similar to shooting at moving targets. In fact, for several pilot states, events occurred late in 1995 or during 1996 that changed how some rating organizations operated and how some state programs were designed. These events point to the need to collect process and impact data on an annual basis, updating the case studies for an accurate understanding of how HERS/EEF systems can be effectively institutionalized.
- (3) Not all of the stakeholders in the pilot states could be contacted because of limited funding; therefore, in some states, all data available have not yet been obtained and some reliability issues regarding the data collected have not been fully resolved.
- (4) Reconstructing data in the pilot states was not always possible because of staff changes, organizational and operating reconfigurations, and, in some cases, a lack of adequate records.

EEF Products and the Housing Market

With FHA EEMs now offered nationwide, the housing market recovering from a multi-year slump, and utilities beginning to shift away from rebates and other demand-side management (DSM) programs, many states are initiating HERS/EEF programs. This nationwide movement involves public/private partnerships often led by state energy offices (SEOs) or their equivalent. Collecting data on lending at the national and state levels permits an assessment of the market potential for EEF products and, hence, sheds light on how ratings are used. To develop markets for ratings, rating organizations are proactive in creating new loan and financing products with utility companies and in the private sector.

EEF Products

No commonly accepted terminology yet exists to distinguish types of EEF products. However, an agreed-upon classification scheme will ultimately be useful in accurately evaluating their performance. A full discussion of the complexities involved in how such a classification scheme might be developed is beyond the scope of this report; however, a few germane issues are as follows.

- Some mortgage borrowers want to borrow the maximum amount for which they can qualify to purchase a home. For these borrowers, an EEM offers the opportunity to qualify for a mortgage that is slightly more costly each month because the home's reduced monthly operating costs (especially reduced utility bills) are taken into consideration.
- Other mortgage borrowers, particularly those interested in conventional financing, may not wish to borrow to the maximum limit for which they can qualify. For these borrowers, increasing the maximum amount they can borrow to include energy improvements in their mortgages is not an incentive. But having technically valid information about the energy improvements that will make their homes more comfortable and energy efficient in a cost-effective manner is valuable to them. When this information is regarded by their mortgage lender as a credible element of the mortgage lending process, this could also be valuable to these types of borrowers.
- Still other homeowners wish to use rating information to improve the energy efficiency of their homes, but they are not in a mortgage lending process because they are not buying or selling their homes. These borrowers may wish to finance energy improvements through home equity loans, home improvement loans, credit card borrowing, signature loans, or other forms of credit.
- Yet another category of homeowners using home energy rating information might not be borrowers at all. These homeowners use the rating information to make energy improvements to their homes that they pay for from their personal capital at the time the improvements are made. Although not borrowers, the activity of these homeowners is relevant to the improvement of the nation's housing stock resulting from home energy rating activity.

Specific EEF products currently available include the following:

2%-stretch EEMs. Under the 2%-stretch policy, underwriters for conventional mortgages are permitted to "stretch" the amount for which borrowers can qualify by 2% for an energy-efficient home, once underwriters have already taken into account other determining factors (such as income and credit history). The 2% stretch is an allowance for the improved energy efficiency of the home based on a home energy

rating of the cost-effective improvements to the home. Although the 2% stretch EEM has been available for many years, neither Freddie Mac nor Fannie Mae has included an indicator for loans using this feature in its national databases on mortgages. Therefore, no data are available on the penetration of these loans at the national level. Anecdotal information from Freddie Mac and Fannie Mae officials suggests that the 2%-stretch EEMs have not been widely used.

FHA 2% stretch for energy-efficient homes. FHA also offers to insure a 2% stretch loan when a borrower is purchasing or refinancing an energy-efficient home (EEH). The higher housing expense and debt-to-income ratios are justified because of anticipated energy cost savings and become 31% and 43%, respectively. Local FHA offices determine whether a property qualifies for the EEH designation. The original documentation attesting to energy efficiency is required on resales.

FHA EEMs. HUD/FHA will underwrite EEMs that permit an addition of up to \$4,000 or 5% of the appraised value (up to \$8,000) to the loan amount for cost-effective energy improvements based on ratings for new and existing single-family homes. To qualify for the EEMs, these improvements must pass a net present value test for cost effectiveness. That is, the total cost of the improvements (including maintenance costs) must be less than the total present value of the energy saved over the useful life of the improvements. Several HERS providers are providing lenders with not only the rating information on residences but also the results of the net present value calculations to expedite the EEMs lending process.

If the energy improvements pay for themselves through lowered home energy bills, then 100% of their cost can be added to the amount of an FHA mortgage without an appraisal. The EEM can exceed traditional loan limits by the amount of the improvements. EEMs also are available to borrowers who wish to refinance their properties.

Although FHA initiated its EEMs program in 1993 in five pilot states and limited the mortgages to existing housing, the FHA EEMs are now available (as of October 6, 1995) in all 50 states for both new and existing housing.

DVA EEMs. DVA allows the addition of \$3,000 without analysis for energy improvements or up to \$6,000 for improvements if energy savings will be greater than the increased monthly payment. Amounts greater than \$6,000 are subject to appraisal. These loans are available to veterans and reservists in all 50 states. Energy-efficiency improvements covered include solar heating and cooling systems (i.e., both active and passive systems); caulking and weatherstripping; furnace efficiency modifications; clock thermostats; ceiling, attic, wall, and floor insulation; water heater insulation; storm windows and doors; and heat pumps. In some states, DVA is using rating information for its EEMs.

Energy-efficient new homes. After April 24, 1994, newly constructed homes insured by HUD/FHA or made by RHS were required to meet or exceed the 1992 CABO MEC. This means that all HUD/FHA and RHS mortgages insured or made after that date have been for more energy-efficient new homes than was previously the case. All properties meeting the 1992 CABO MEC are considered energy efficient and are thus eligible for FHA's EEH 2%-stretch ratios.

Fannie Mae and Freddie Mac EIMs. Being piloted in Colorado, Virginia, and elsewhere, EIMs permit borrowers to improve the energy rating of the residence being financed by a minimum of 10 points on a 100-point home energy rating scale through the installation of energy improvements. To qualify for EIMs, borrowers' homes must achieve ratings of 80 points if they were built after January 1, 1995, or 70 points if they were built before that date.

Appraisers are permitted to add the value of the energy improvements to the market value of the home, which enables lenders to add it to the mortgage amount. This value is determined by comparing the present value of the expected energy savings to the expected installed costs of making the improvements. The lower of the two figures is selected and added to the mortgage amount as an “energy efficiency value increment” or EEVI. This increment cannot exceed 10% of the original mortgage amount.

Once added, a percentage of the EEVI equal to the loan-to-value ratio of the mortgage (usually 95%) is placed in a 120-day escrow account by the lender. To this escrow account, the borrower contributes the remaining percentage of the EEVI out of pocket, in addition to a 10% contingency fee. The escrow account is used to pay for the energy improvements. Unused contingency fees are returned to the borrower; unused portions of the EEVI are applied to the loan principal.

No data are currently available on the penetration of EIMs in conventional financing markets. Because these programs are still being piloted, it will be some time before data on their use become available.

Other EEF products.

- **HUD 203(k) loans** finance rehabilitation and improvements of homes up to a maximum amount based upon local mortgage limits. Although not directly linked to ratings, these loans can be combined with HUD/FHA EEMs and with HUD Title I loans to finance energy improvements in housing being rehabilitated. Eligible improvements include insulation; efficient doors and windows; and efficient heating, ventilating, and air-conditioning systems.
- **HUD Title I home improvement loans** are available to any homeowner whose mortgage is insured by FHA. Up to \$25,000 can be borrowed for 15 years; interest rates vary. Although these loans are not directly linked with energy ratings, borrowers are encouraged to obtain a rating to identify cost-effective energy improvements.
- **Reverse mortgages** use equity from a home to provide income to homeowners age 62 and over. In at least some states, up to 10% of the funds given to the homeowner can be used for energy efficiency improvements that will decrease the home’s utility bills and extend the length of time that a homeowner can be supported by the equity in the house.
- Some state housing finance agencies offer home improvement loans with varying amounts and conditions imposed for the express purpose of installing energy efficiency measures. In states where rating systems are in place, a rating may be required to qualify.

Other EEF incentives. Some states and localities have selections of loans, rebates, interest rate buydowns, and incentives available to homeowners, buyers, and builders. Incentives may be offered by utilities as part of their demand-side management programs, by housing finance agencies, by private/public partnerships, and by other organizations and programs. Utilities were, for much of the last decade, in the forefront of offering rebates, but, with the recent trend toward competition, many are moving away from rebates and toward energy efficiency financing programs.

The Potential Market for EEF Products

Total volume and value of loans made, purchased, or underwritten for FY 1993, FY 1994, and FY 1995 are shown in Table 1 for FHA, DVA, RHS, Fannie Mae, and Freddie Mac. Also shown are the number and

value of FHA and DVA EEMs. However, because FHA EEMs were available only in the five pilot states for the period covered in Table 1, it is inappropriate to look at how many EEMs have been underwritten in the context of national numbers. In future years, these numbers will be better indicators of progress in the acceptance and use of EEF products. To further understand the market potential, additional data are needed on the total housing market. In California, for example, many homes are financed through jumbo loans (>\$203,500) that are excluded from EEF products now offered, even though many of these homes could benefit considerably from energy efficiency improvements that would translate into comfort increases and dollar savings because of high energy costs.

Pilot-State Market Indicators

Table 2 shows total mortgage (including EEMs) activity in the pilot states for HUD/FHA and DVA during FY 1993, FY 1994, and FY 1995. Also shown are HUD and DVA EEMs. Using the data in both Tables 1 and 2, the average values of conventional loans can be compared to EEMs. The EEMs are higher in about the amounts that would be expected, in line with program parameters. Now that the HUD program is available nationwide, more states are starting rating programs, national-level activities are moving forward rapidly, a greater variety of financing products is being made available, and tracking these numbers on a larger scale will provide better indicators of progress.

Table 1. The Potential for Energy Efficiency Financing in the United States

Types of Loans	FY 1993			FY 1994			FY 1995		
	Number	Total \$ Value ^a	Average \$ Value ^a	Number	Total \$ Value ^a	Average \$ Value ^a	Number	Total \$ Value ^a	Average \$ Value ^a
FHA loans insured ^b	943,715	69,342	73,478	1,340,247	100,632	75,084	580,967	45,561	78,423
FHA new home loans ^b	53,136	4,670	87,895	61,495	5,796	94,253	42,137	4,016	95,282
FHA EEMs	64	7	103,639	340	34	99,815	862	91	105,079
DVA loans made ^b	383,236	34,633	90,370	602,220	55,141	91,562	263,102	25,340	96,313
DVA EEMs	241	18	76,584	995	88	88,832	863	80	92,919
RHS loans made ^b	27,531	1,216	44,186	31,206	1,560	50,006	21,455	934	43,532
RHS loans guaranteed ^b	8,947	540	60,338	11,569	726	62,741	16,677	1,049	62,886
Fannie Mae loans purchased	2,850,256	278,794	97,814	2,334,662	223,915	95,911	1,051,706	100,212	95,286
Freddie Mac loans purchased	2,185,855	214,606	98,135	1,855,767	183,877	99,084	748,437	74,552	99,610

Source: Constructed by the authors using data from cognizant organizations.

^aIn million \$

^bThe mortgage markets targeted by the Energy Policy Act of 1992

Table 2. Mortgage Activities in the HUD/FHA Pilot States

Pilot State	Fiscal Year	FHA Loans		FHA EEMs		DVA Mortgages		DVA EEMs	
		Number	Total Value ^a	Number	Total \$ Value ^a	Number	Total \$ Value ^a	Number	Total \$ Value ^a
Alaska	1993	4,287	444	0	—	2,304	258	NA	NA
	1994	6,194	627	16	1.76	3,286	358	4	0.51
	1995	2,620	279	18	1.89	2,500	309	9	1.11
Arkansas	1993	9,622	518	0	—	3,870	254	9	0.42
	1994	12,365	671	13	0.86	6,036	399	19	1.18
	1995	7,479	402	30	1.67	2,758	193	17	0.93
California	1993	83,931	8,337	47	5.40	39,030	5,082	11	1.66
	1994	135,178	13,740	261	26.94	75,601	9,843	65	9.36
	1995	69,184	7,310	740	79.49	22,605	3,076	27	3.73
Virginia	1993	36,884	3,070	17	1.24	34,265	3,654	12	1.45
	1994	54,171	4,563	47	4.08	47,946	4,981	71	9.78
	1995	16,215	1,215	72	7.38	21,054	2,354	124	16.10
Vermont	1993	315	28	0	—	233	23	NA	NA
	1994	507	45	3	0.29	529	52	2	0.26
	1995	179	16	0	—	266	26	1	.06

Source: Constructed by authors using data from cognizant organizations.

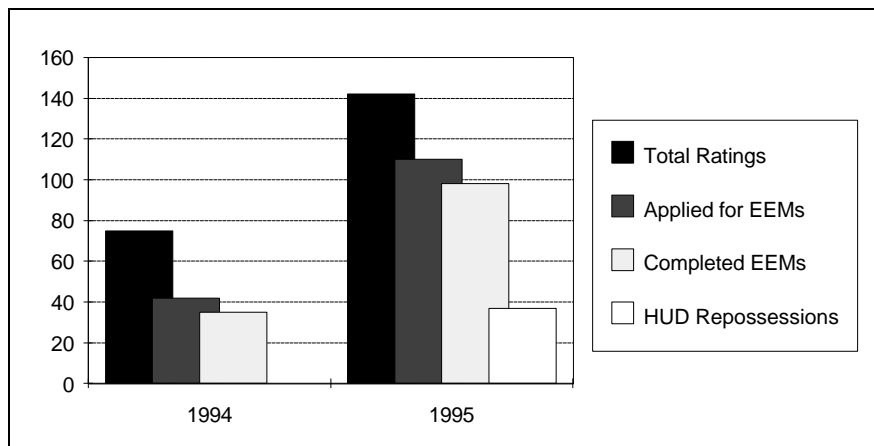
^a In million \$

Pilot-State Activities

Uses of Ratings Linked with EEF Products

One purpose of conducting the case studies in 1995 was to work with state HERS provider organizations to set up evaluation systems and databases to track uses of ratings by homeowners to obtain loans or mortgages, linking HERS with EEF. This is, after all, the ultimate measurement of success—to see as many ratings as possible used as the basis for improving the energy efficiency of housing. As already discussed, EEF can be one step in that process.

Figure 2 shows one example of the results of such tracking systems. It shows data maintained by Energy Plus, a market-driven private rating service operated in California. Energy Plus conducts a rating when it receives a referral for a home buyer who intends to seek a HUD EEM. In 1995, Energy Plus focused on HUD repossessed properties and greatly increased the number of rated houses for which FHA EEMs were completed. (Selling these properties is a performance measure for HUD employees, while insuring EEMs is not.)



Source: Constructed by authors using data from Energy Plus

Figure 2. Use of Ratings Conducted by Energy Plus in California

Other HERS provider organizations do not yet have data on the uses of ratings.

Funding the Pilot Programs

Considerable levels of funding have been committed by the public/private partnerships that established the ratings systems in the pilot states. Funding comes in many forms: the EEF products described above; SEO funds received from DOE and state budgets; DOE funds; petroleum violation escrow (PVE) funds; specially legislated program funds; grants; utility programs; private sector in-kind contributions; fees for courses and seminars; fees for processing ratings; and sales of materials (books, videos, rating software). Funding amounts also vary considerably, as shown in Table 3. These amounts are not relative to a state's

size (or any other measure), nor should funding be viewed as a subsidy for conducting ratings (as in "funding divided by number of ratings"). Rather, the organizations that receive the funds have important functions that go well beyond completing ratings and training raters, as described in later sections of this report. The purpose of funding the pilot programs is to transform the housing marketplace—creating a need for ratings that is based on a readily available and diverse set of routinely used EEF products.

As high as the funding in Table 3 appears, even more has been spent by other organizations involved that has not yet been documented. For example, trade and professional associations are active in training and educating their members; utilities are likely to have considerable in-house costs for staff, programs, advertising, consumer information, and so on; and other state agencies, such as utility oversight and housing finance agencies, have staff and program expenses. A major question that may require continued analysis of the pilot states is: "How much money must be put into the marketplace transformation process, for how long, and to achieve what measurable benefits?"

Table 3. Funding for Portions of Rating Activities in the HUD/FHA Pilot States, 1993-1995

Funding Source	Alaska^a	Arkansas^b	California^c	Vermont^d	Virginia^e
State energy office	1,800,000	170,500	—	34,250	225,000
Utilities	—	—	1,742,900	—	100,000
DOE ^f	135,000	130,000	260,000 ^g	130,000	190,000
NREL	10,000	10,000	10,000	10,000	10,000
Ratings/dues/sales	550,000	—	388,600	344,300	45,000
State-level funds	6,000,000 ^h	—	200,000	120,000	70,000
In-house	—	—	165,000	30,900	—
Other	—	68,300	228,000	13,700	100,000
Totals	\$8,495,000	\$378,800	\$2,994,500	\$683,150	\$740,000

Source: Constructed by authors using data from organization as noted.

^aIncludes Alaska Housing Finance Corporation, Energy Rated Homes of Alaska Program, Energy Rated Homes of Alaska, Inc., and Alaska Craftsman Home Program, Inc.

^bEnergy Rated Homes of Arkansas only

^cCalifornia Home Energy Efficiency Rating System, Inc. (CHEERS) and California Energy Commission (CEC)

^dEnergy Rated Homes of Vermont; funds from utilities and consulting included with funds shown for dues/sales ratings; source of state-level funds is Vermont Housing Finance Agency

^eVirginia Home Energy Rating Organization only

^fThe DOE funding for the pilot states is shown in Table 4 as FY 1993-1995 funding; however, the pilot state HERS provider organizations did not actually receive any DOE funds until the spring of 1995. Therefore, the figures shown represent awards to the HERS provider organizations, not their operating budgets

^g\$170,000 to CHEERS; \$90,000 to CEC

^hAlaska Housing Finance Corporation rebates and loans linked to ratings.

Ratings Completed in Pilot States

Table 4 shows the numbers of ratings completed in the five pilot states prior to 1993, and then in each year from 1993 through 1995. In those 3 years, a total of 33,672 ratings were completed in the five states. Overall, nearly 40,000 ratings had been completed by the end of 1995. We know that many more ratings were completed than energy-efficient mortgages and loans were made or insured, based on available data. To what uses this rating information was put remains an unanswered question. Clearly, some ratings resulted in energy-improved housing; however, the percentage of ratings used to actually improve housing is still unknown.

Table 4. Ratings Completed in the Five HUD/FHA Pilot States

State/Rating System	Prior to CY 1993	CY 1993	CY 1994	CY 1995	Total CY 1993- CY 1995	Totals
Alaska	4,572 ^a	2,794	3,293	2,869	8,956	13,528
Arkansas	75 ^b	152	98	106	356	431
California						
CHEERS	--	6,369	8,307	344	15,020	15,020
Energy Plus	--	--	71 ^d	204	275	275
Vermont	1,352 ^c	350	363	427	1,140	2,492
Virginia	--	40 ^e	250	7,635	7,925	7,925
Totals	5,999	9,705	12,382	11,585	33,672	39,671

Source: Constructed by the authors using data from the HUD/FHA EEMs pilot states HERS providers organizations.

^aCY 1986 - CY 1992

^bCY 1992

^cCY 1988 - CY 1992

^dDid not begin conducting ratings until March 1994

^eManassas, Virginia pilot project.

The number of ratings vary considerably across the pilot states. This can be attributed to several factors: (1) the dynamics of the housing market over time; (2) the number of years the state has been working toward establishing rating systems; (3) the level of financial support; (4) the degree of involvement of public and private sector organizations; and (5) the variety of EEF products offered.

If a homeowner has received financing for energy efficiency improvements, a rating is usually required after installation to confirm that actions have been taken; thus, the rating numbers in Table 4 include both "as is" ratings and "post" ratings. In Alaska, 33% of "as is" ratings have "post" ratings; in California, 2.5% have both ratings. In states where ratings are also used for new construction, the initial rating is based on the plans and a final rating is conducted when construction is complete.

Raters and Rater Training

HERS provider organizations train raters in the use of rating systems and software, conducting ratings accurately, marketing EEF products, educating consumers, and connecting consumers with real estate professionals. Rater training, in most cases, takes one week of classroom work, field activities, and testing. In some states, raters must be certified, but responsibility for this certification varies. Depending on location, some raters are able to work full time, but this is the exception rather than the rule. Table 5 shows that the pilot states have 213 active raters as of the end of calendar year 1995. This is not the same as number trained because not all of those trained and certified actively conduct ratings. In most cases, raters work independently but receive referrals from HERS provider organizations, which also provide quality control.

Table 5. Raters in the HUD/FHA Pilot States as of December 31, 1995	
State/Rating System	Number of Raters
Alaska	24
Arkansas	13
California	
CHEERS	80
Energy Plus	2
Vermont	16
Virginia	78
Total	213
<i>Source:</i> Constructed by the authors using data from the pilot states.	

Marketing, Training, and Education

Training and educating housing market professionals and informing home-buying consumers are important aspects of developing the infrastructure in the marketplace in order for ratings to become an accepted tool for selling homes. Table 6 presents data collected on numbers of real estate agents, lenders, appraisers, and builders/contractors who have attended classes and training. These numbers must be viewed in the context of total state population and the size of each professional group (where information is available) and may include some double counting; both issues illustrate the kinds of data availability and reliability problems that must be resolved as part of the evaluation process. Training ranges from an hour-long presentation at a conference, to a 3-hour course for continuing education credit, to a week-long course resulting in certification by a trade association or state agency.

Table 6. Housing Industry Professionals Trained in the HUD/FHA Pilot States. 1993-1995

Professionals trained	Alaska	Arkansas	California	Vermont^a	Virginia
Real estate agents	450 of 2,200	971	2,650 of 100,000	97	7,000 of 28,000
Lenders	150 from 35 institutions	103	450 of 70,000	117	960
Appraisers	6 of 80	—	NA	—	50
Builders/contractors	400 of 1,000	95	200	—	150 of 500
Population 1994 ^b	550,000	2,450,000	31,000,000	580,000	6,552,000

Source: Constructed by the authors using data from the pilot states

^aMuch of Vermont's training activity occurred prior to 1993.

^b*Statistical Abstract of the United States, 1995.*

Among the key professionals to reach with training and education are builders, contractors, developers, and real estate professionals. These groups have vested interests in finding marketing tools to set them apart from their competitors. Offering comfort, quality, energy efficiency, and lower home energy bills is one such tool, whether for new or resale homes. Lenders, in turn, want to keep agents and contractors as their clients, and so will be more willing to help put together a financing package. Energy Rated Homes of Vermont has employed a real estate professional on a part-time basis to focus the attention of the real-estate community on EEF products. Virginia, Alaska, and California have found that identifying specific agent/lender teams for intensive training results in highly visible role models. Once the success of these individuals becomes known, others quickly follow their lead. Because licensing requirements usually include taking a certain number of hours of continuing education coursework, a successful means of training in several states has been the development of accredited courses in the areas of HERS/EEMs.

Appraisers and multiple listings service (MLS) companies are other professional groups that need training. The focus of their training and education needs to be on developing databases that keep comparable housing values as rated homes come on the market, so that the value of energy efficiency improvements can be documented. This, combined with tracking EEM default rates on these homes, can help build the case for lenders that such loans present no more risk than conventional loans. Perhaps the state that is experiencing the most progress to date in involving appraisers and MLS companies is Alaska, possibly due to the aggregation of housing in Anchorage, Juneau, and Fairbanks. The five MLS companies in the state (to be consolidated into one by 1997) list the star rating in many of their ads, and new home builders use either the rating or Alaska Craftsman Home Program (ACHP) certification as an advertising tool.

Also critical is raising the awareness of homeowners and buyers about the availability and value of ratings and energy efficiency financing, whether they are upgrading an existing home, building a new one, or buying or selling a home. Common ways of reaching homeowners are through home shows, special community meetings and seminars, and public information channels. All pilot states have at least one 800 number for access to information and some have put considerable effort into publicity in newspapers, on television and radio, and in specialty publications. Many flyers have been produced for distribution, and several utilities have included information in bill stuffers.

Operation of Pilot-State Programs

The pilot state operations are important in understanding the development of HERS provider organizations and their approaches to linking rating outputs and other services with systems of financing energy efficiency as part of real estate transactions.

Alaska

Alaska organizations that have participated in HERS/EEMs activities include: the Alaska Housing Finance Corporation (AHFC); Energy Rated Homes of Alaska, Inc. (ERHAI); the ACHP; the HUD/FHA Anchorage office; the Alaska Home Builders Association; and the Appraisal Institute of Alaska. Many other housing, lending, and consumer associations are involved in HERS/EEMs activities through these organizations, and private sector lenders and realty agencies offer varying types of incentives.

In 1984, the SEO provided \$10,000 to modify a rating system developed for the Northwest, adapting it for Alaska's climates. In 1986, the rating system was in place. Ironically, the rating system was completed just as Alaska entered an economic depression that affected the housing market. In 1989, the market began to recover and the SEO began giving grants from oil overcharge settlement funds to market the rating system and support formation of ACHP in preparation for AHFC's plans to offer loans and rebates to install energy efficiency measures (based on ratings) in 1990. ACHP also began training builders in constructing ACHP homes, which are rated as 5★+. Thus the rating system incorporated ACHP certification. With the rating system in place, it was relatively simple—when state building standards became more stringent in 1995—to move the rating associated with the standards from 4★ to 4★+.

The focus of the Alaska program through 1995 has been on rating new homes and convincing builders to build to the highest standards possible. Now that 83% of new homes are being rated, the focus can shift to rating existing homes and to difficult-to-reach rural areas. This means activities directed toward real estate agents, lenders, underwriters, and appraisers will be stepped up, with the goal of convincing them that energy efficiency adds permanent value to a home and can be calculated in the same manner as, say, an additional bedroom or bath.

Arkansas

The Arkansas Energy Office (AEO) was instrumental in formulating the concept of a third party, nonprofit organization to conduct residential energy efficiency ratings. The recognition of this role led to the establishment of Energy Rated Homes of Arkansas (ERH-AR) in 1986, with which Energy Rated Homes of America became commingled organizationally until January 1994. Although it is no longer a source of funding support for the organization, the AEO maintains a close connection with ERH-AR through legislation enabling an energy-efficient mortgage program in Arkansas.

The AEO and ERH-AR have identified and are directing efforts to address barriers to more effective implementation. Among these efforts are (1) providing education about HERS/EEF for stakeholders (lenders, real estate professionals, trade associations, and appraisers), (2) providing energy education for the construction trades, (3) developing consistency in funding for the rating organization, (4) coordinating with FHA based on experience in the pilot program, and (5) making a concerted effort to form effective working relationships with partners including the FHA Field Office, Entergy (a large utility company), and the Arkansas Mortgage Bankers Association.

California

California organizations that have participated in HERS/EEMs activities include the California Home Energy Efficiency Rating System, Inc. (CHEERS); Energy Plus, Inc.; the California Energy Commission (CEC); the six HUD/FHA local offices; Pacific Gas & Electric Company (PG&E); Southern California Edison (SCE); and other utilities. Many other housing, lending, and consumer groups are involved in HERS/EEMs activities through contracts with CEC, and private sector lenders and realty agencies offer their own incentives.

The CEC initiated development of an acceptable rating tool and system in the early 1980s, field tested it, contracted for further development and research on HERS in the late 1980s, became responsible through state legislation for issuing HERS guidelines and oversight of the HERS industry in the early 1990s, and is implementing a state-mandated and -funded marketing, training, and consumer information program. The state's energy efficiency building performance standards exceed CABO-MEC '92.

With the support of the CEC, a consortium of California utilities formed CHEERS (a public/private partnership) for the purpose of developing and testing a rating tool and system that would be used in conjunction with their demand-side programs and incentives. Once field testing was completed in 1994, CHEERS began the difficult transition toward becoming self-sufficient by the end of 1996. This includes developing a market for ratings that goes far beyond HUD EEMs and utility rebates (which have been largely phased out in response to deregulation of the electric utilities in California) by training raters on behalf of other states and expanding operations beyond California.

California was unique in that a second organization (a private company) also offered ratings in the state. The two owners of Energy Plus, Inc., which began operating in March 1994, were raters trained by CHEERS; they concluded that a viable business opportunity existed in the Central Valley. Their approach is totally market-based. Working with EEM brokers and spending considerable time in one-on-one meetings with lenders and real estate agents, they focus on rating homes that have a high probability of obtaining HUD EEMs.

Vermont

Energy efficiency financing linked with energy ratings in Vermont began in 1986 with the allocation of \$500,000 in PVE funds to the Vermont Housing Finance Agency (VHFA) by the state legislature, through the Vermont Department of Public Service (DPS). The VHFA organized a team of energy professionals to explore a program design and form two advisory committees representing stakeholder groups. The outcome was the formation of Energy Rated Homes of Vermont (ERH-VT) in 1987. In the beginning, rating services were offered without charge. In 1989, the organization commenced a fee-for-service policy and a membership dues structure to support its activities when the PVE funds became exhausted. In 1993, ERH-VT increased active promotion of EEMs as one of the five FHA pilot states. At the same time, the organization was involved in promoting the DVA and Fannie Mae EEF products. In 1994, rating activity further increased with contracts from major utilities in the state in conjunction with DSM programs implemented with DPS oversight.

ERH-VT maintains strong ties with DPS and VHFA. Maintaining and enhancing partnerships with stakeholder groups (lenders, real estate professionals, appraisers, builders/contractors) is a critical aspect of ERH-VT's outreach work. Finding ways to enhance the involvement of real estate professionals remains the most challenging component of work with Vermont stakeholders.

Seven EEF products are presently available in Vermont. In addition, four utility companies have incorporated energy efficiency ratings in new construction programs. These products affect the housing market in Vermont for both existing houses and new construction. An examination of data on property transfers and housing starts suggests that the market for EEF can be exploited further; however, market research specific to EEF is required to fully understand its potential. In addition to general stakeholder issues, barriers to implementation exist in the financing process itself and are best overcome by emphasizing appropriate incentives for stakeholders, especially lenders. ERH-VT directs its strategic marketing efforts toward overcoming these barriers.

Virginia

The Virginia Department of Energy (DE) contracted with Energy Rated Homes of America in 1989 to develop a HERS program for Virginia. To provide oversight, DE established a task force consisting of builders; real estate professionals; heating, ventilating, and air-conditioning, solar, and weatherization contractors; utility representatives; and home inspectors. DE decided that a nonprofit corporation, Energy Rated Homes of Virginia (ERHV), incorporated in July 1992, should be established to administer the program. A parallel nonprofit organization, the Virginia Home Energy Rating Organization (V-HERO), which trains and certifies raters and performs the actual ratings, was established in February 1993.

V-HERO was intended to become self supporting through rating and membership fees. In April 1993, ERHV became the Virginia Residential Energy Foundation (VREF), ending its affiliation with Energy Rated Homes of America. As these organizations evolved, V-HERO emerged as the central nonprofit rating organization in Virginia and, in January 1995, VREF signed its assets and liabilities over to V-HERO and ceased to exist.

The Virginia program has been unique in its approach to marketing activities. V-HERO has used a multifaceted marketing strategy based on galvanizing the consumer demand its directors believed existed. The array of marketing techniques V-HERO has used include major network and cable television advertising, media events with high-level DOE officials, radio advertising, human interest articles in newspapers, stories in trade publications, public speaking, telephone calls, direct mailings of brochures, distribution of educational materials to schools, and direct advertising in real estate racks.

From the outset, the program directors stressed the importance of linking their efforts with those of other cognizant organizations. V-HERO has formed partnerships at the national level with DOE, the HERS Council, the Alliance to Save Energy, the National Association of Home Builders, and the U. S. Environmental Protection Agency. V-HERO has formed financial partnerships with more than 45 lending institutions doing business in Virginia, and with Fannie Mae in developing an EEM pilot program for the conventional housing market. In addition, V-HERO has worked closely with utility companies in the state, including Virginia Power on its Energy Saver Four-Star Home and Energy Saver Plus Five-Star Home Programs, certifying homes for new construction that will qualify for EEF products. In addition, V-HERO has actively sought out relationships with members of the Appraiser Institute, the Virginia Association of REALTORS[®], the Virginia Association of Home Builders, and private energy firms providing ratings and energy services.

During 1995, V-HERO created a model for pilot programs aimed at saturating loans in small geographic markets for all types of borrowers, from those wishing to exceed their normal borrowing capabilities (such as FHA EEMs borrowers) to those wishing to borrow well below the amount for which they can qualify. V-HERO's ultimate goal is to become an organization that is financially self-sufficient, providing valued services to improve the energy efficiency of housing at all income levels.

In 1995, the V-HERO staff created, as a separate entity, the National Home Energy Resources Organization (N-HERO), which was incorporated on August 1 in the State of Virginia. N-HERO is a national HERS provider organization. Its purpose is to make it economically feasible to develop HERS provider services in other locales without duplicating rating software, rater training and certification, and marketing services.

Preliminary Process Evaluation Findings

Some preliminary findings from the 1995 process evaluation effort are summarized below.

- Considerable financial subsidies are required over fairly long periods of time before a HERS provider organization can become self sustaining through the services it provides. Diversifying services may help HERS provider organizations become more self-sufficient, although not all have financial self sufficiency as a goal, whereas all consider market transformation a program goal. Forming partnerships for more than single-state provision of training and rating services may help through cost sharing.
- Public/private partnerships are essential to building HERS provider organizations, which are usually nonprofit organizations. The home energy rating organizations at the state level are "seedbeds" for developing EEF products in partnership with utility companies, builders, and others in the real estate markets. Going beyond the implementation of the FHA EEMs pilot program, they have been instrumental in the creation of new loan products and an array of services to support energy efficiency financing. Members of stakeholder groups—builders, real estate professionals, lenders, and appraisers—must be involved in the process of developing a viable HERS/EEF linkage in a state or region.
- Although FHA EEMs were limited during the pilot period to existing homes, states have observed that a good way to gain visibility among builders and contractors is to focus on new homes. Energy-efficient construction practices implemented from the outset in building a home are more cost effective than retrofitting. On the other hand, because most of a state's housing stock is already built, retrofitting is a necessity to achieve improved efficiency.
- One of the largest challenges HERS provider organizations have faced is ensuring a market for ratings by educating real estate professionals, developing EEF products beyond the FHA EEMs, informing the public about the availability and value of ratings and EEF, and, in most states, making certain that raters are trained and certified in marketing and EEF lending as well as the technical aspects of ratings.
- Although the involvement of gas and electric utilities varies over space and time, it has fostered the use of rating tools and EEF activity, depending on the level of DSM programs and, recently, the emergence of competition in the utility marketplace, which has led to the demise of many DSM activities. The effect of competition in the utility industry on rating activity remains to be seen.
- Movement toward coordinated activities at the national level has occurred on the part of the pilot states' HERS provider organizations. In particular, they have sought to develop a market for purchasing EEMs by large mortgage servers. This includes HERS provider organizations looking to extend their services beyond state boundaries and, conversely, organizations focusing intensely on limited geographic areas to maximize efforts. The latter has led to another problem, however, in that rural areas are greatly underserved.

The linkage of ratings with energy efficiency financing, although proceeding slowly, appears to be on the way toward becoming institutionalized in the United States. A number of problems, such as accreditation of rating systems and knowing about the default rates of energy efficiency loans compared with regular loans, remain to be resolved. Nevertheless, the programs are being created, implemented, and used; data are being collected on their results. Many answers are still to come.

Next Steps

Next Reports Planned

The evaluation of HERS linked with EEF activity in the nation has been guided by an evaluation plan, as noted in this report's Preface. The plan identified a detailed set of research questions on successfully establishing these programs. Some of these have been answered in this report; others will be answered in future reports. The impacts of successful HERS/EEF programs on number of homes improved, costs saved, market value of housing, jobs created, and emissions reductions remain to be calculated.

The next two reports on HERS/EEF evaluation are already underway at NREL:

- A separate volume will contain case studies for each of the pilot states that contain process evaluation information on their experiences in implementing programs linking energy efficiency financing with home energy ratings. This volume will present individual case studies for Alaska, Arkansas, California, Colorado, Vermont, and Virginia.
- A more comprehensive analysis from the evaluation research will define effective projects, based on the case studies and other data, and seek to identify the factors that are associated with more effective program implementation.

These studies will be published in 1997.

New and Unanswered Research Questions

New questions inevitably arose as part of conducting the field research for the HERS/EEF case studies. A sampling of these questions follows.

- What are the uses to which ratings are put? We found that many more ratings were conducted than EEF products were completed, although energy efficiency financing may be happening more frequently than current databases are capable of capturing. Data on the uses of ratings are inconsistent and incomplete, driven by internal organizational reporting needs rather than by an overall view of keeping comprehensive data on the ultimate uses of ratings. Yet this information is important to the design and marketing of home energy rating information and to estimates of the extent of energy improvements of the housing stock.
- What is the market and resale value of energy-efficient homes? If home buyers are considering two houses of similar value in a location, how likely would they be to pay more for an energy-efficient home? No data existed on these questions, yet this information is vital to answering such questions as EEF default rates, reduction of the mortgage industry's perceived risk exposure, and housing affordability.
- What energy improvements are actually being made (not simply recommended by ratings)? No readily available data existed on this question, yet this is critical information to energy industries for understanding their markets and also for calculating actual energy savings.

- How many homes are being improved? Energy efficiency financing is only part of the story; some homeowners are improving their homes out of their own capital reserves. No inventory of improvements existed, yet it is needed to fully estimate the energy savings and emission reductions impacts of rating programs.
- What is the difference between energy consumption predicted by the ratings and actual energy consumption once improvements were installed? Almost no data existed on this, yet this information is important to future technical improvements of rating systems and to evidence that energy cost savings are actually being realized, leading to positive cash flow for homeowners.

Other new questions arose as well.

- Raters often work as independent contractors. At what point does conducting ratings become a viable full-time business opportunity for a rater?
- What is the effect of competing HERS and providers on the credibility of ratings as perceived by borrowers and the financial community?
- What incentives and information might be needed to make EEF services more attractive to more lending institutions?
- How can the quality and accuracy of data on EEF products that are being stored in state and national databases be improved?
- Can rural areas be better served by HERS? In this regard, can the cost of using electronic methods (beyond faxing) for gathering and processing rating information be included in ratings without making them too expensive?
- Ratings cost from \$200 to \$400. How are ratings currently being paid for and how might they be paid for in the future? The cost of ratings and their method of payment (such as inclusion in mortgages) are important to the long-range sustainability of HERS provider organizations.
- Techniques used to market HERS/EEF vary in the states. More analysis is needed on the most effective means to involve home buyers and homeowners in improving the energy efficiency of their homes.

A Concluding Note

This report has documented an immense potential for improving the energy efficiency of the nation's housing stock. Home energy rating systems offer the technical basis for deciding how to invest in cost-effective energy improvements. Energy efficiency financing offers the way to remove the most important barrier to improving the efficiency of housing—first cost—by amortizing the costs of energy improvements over the length of the mortgage. The remaining pieces of the puzzle are beginning to fall into place: stimulating and meeting consumer demand with EEF products that are effective, affordable, and a normal part of business practice.

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Endnote

This report is a presentation of primary data rather than a review of literature. For the interested reader, however, we offer a few sample citations: The Alliance to Save Energy, 1996, *Energy Efficiency Financing, A Lender's Guide for Taking Advantage of This Emerging Market*. Washington, D.C. Luboff, J., 1995, "Making Energy Mortgages Work," *Home Energy* 12(3): 27-33; Faesy, R., 1992, *Lessons Learned from Four Years of Operating a Home Energy Rating System and Energy-Efficient Mortgage Program*, Burlington, Vermont; Energy Rated Homes of Vermont; Braunstein, L., 1992, "Energy-Efficient Mortgages: A Utility Perspective," *Public Utilities Fortnightly*; Cutter Information Corporation, 1993, "New York State Offers \$4,000 per House to Energy-Efficient Home Builders," *Energy Design Update* 13(4): 1; and Mortgage Bankers Association, 1992, "Task Force Proposes National Energy-Efficient Mortgage Program," *MBA StateLines* 5(7): 1; Vories, R. and K. George, 1991, *Analysis of Home Energy Rating Systems: Results of Brief Interviews*. Denver, CO: Infinite Energy, Inc.

Glossary

ACHP	Alaska Craftsman Home Program
AEO	Arkansas Energy Office
AHFC	Alaska Housing Finance Corporation
CBAO MEC	Council of American Building Officials' Model Energy Code
CEC	California Energy Commission
CHEERS	California Home Energy Efficiency Rating System, Inc.
CHFA	Colorado Housing and Finance Authority
DE	Virginia Department of Energy
DOE	U.S. Department of Energy
DPS	Vermont Department of Public Service
DSM	Demand-side management
DVA	Department of Veterans Affairs
EEF	Energy efficiency financing
EEH	Energy-efficient home
EEMs	Energy-efficient mortgages
EEVI	Energy efficiency value increment
EHRAI	Energy Rated Homes of Alaska, Inc.
EIMs	Energy improvement mortgages
EPAct	The Energy Policy Act of 1992
ERH-AR	Energy Rated Homes of Arkansas
ERHV	Energy Rated Homes of Virginia
ERH-VT	Energy Rated Homes of Vermont
Fannie Mae	Federal National Mortgage Association
FHA	Federal Housing Administration
Freddie Mac	Federal Home Loan Mortgage Corporation
HERS	Home energy rating systems
HERS Council	Home Energy Rating Systems Council
HUD	U.S. Department of Housing and Urban Development
MLS	Multiple listings service
N-HERO	National Home Energy Resources Organization
NOPR	Notice of Proposed Rulemaking
NREL	National Renewable Energy Laboratory
PG&E	Pacific Gas & Electric Company
PVE	Petroleum violation escrow
RESNET	Residential Energy Services Network
RHS	Rural Housing Service, U.S. Department of Agriculture
SCE	Southern California Edison
SEO	State energy offices
VHFA	Vermont Housing Finance Agency
V-HERO	Virginia Home Energy Rating Organization
VREF	Virginia Residential Energy Foundation