

Making Energy Efficient Mortgages Work—Market Effects of a California EEM Program

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ABSTRACT

The Time of Sale Energy Renovation (TOSER) Program is a Pacific Gas and Electric (PG&E) program initiated in 1999 that aims to increase the use of energy efficient mortgages (EEMs) to improve residential energy efficiency, primarily at the time existing homes are purchased. This paper presents an overview of the Program and the results of a market effects study of the Program. It relies primarily on data from interviews with real estate agents and lenders who participated in the training provided by the Program, and interviews with buyers who implemented EEMs. The paper develops a theory describing how the Program was expected to influence the market. It uses the study data to test the extent to which evidence shows that key cause-effect relationships did occur that would indicate that the Program was transforming the market for EEMs.

Introduction

An energy efficient mortgage (EEM), coupled with a rating from a home energy rating system (HERS), aims to address many of the reasons buyers do not invest in residential efficiency improvements at the time they purchase an existing home. The rating can answer a buyer's questions about the energy use and utility bills of the existing home, what different types of efficiency improvements cost, which are cost-effective, and how much they will reduce utility bills. The EEM can help overcome financial impediments by helping the buyer qualify for financing the efficiency improvements and by making the buyer aware that, even with higher monthly loan payments, her combined financing and utility costs will decline.

EEMs were first proposed at least 20 years ago as one way to alleviate many of these impediments and were first implemented in 1980 (Farhar, Collins, and Walsh 1997). EEMs typically allow the buyer to include the cost of the efficiency upgrades in his mortgage and the added cost is not counted toward the maximum loan amount for which the buyer can qualify (or, alternatively, the qualifying debt-to-income ratio is "stretched").¹

Through a number of efforts, including the 1992 Energy Policy Act, EEMs have been implemented in conjunction with energy ratings provided through HERS. Use of a consistent, reliable, and accurate rating system is critical because it helps answer questions about how much energy and utility bill savings can be expected from specific efficiency improvements.

Although the EEM process can help mitigate many of the energy-efficiency upgrade barriers faced by buyers, other barriers remain. Two important barriers likely to remain are

¹ Note that various EEM programs, such as some funded by utilities, also have offered better lending terms such as lower interest rates, longer loan terms, or reduced downpayments.

that 1) buyers may still not know how to implement the efficiency improvements and 2) the procedure required to make the improvements may interfere with the overall sales process.

Both real estate agents (agents) and lenders can be key players in the EEM process. The agent can play a major role by acting as a “gatekeeper” and first point-of-contact for the buyer (SHA 1999). Often the agent is the conduit through which potential buyers learn what EEMs are and their benefits. The lender’s role is critical because he must be knowledgeable about EEMs and willing to implement them with minimum complications.

Although an EEM process can alleviate several buyer barriers to *installing efficiency improvements*, the *EEM process itself* faces its own barriers including the following:

- Lenders are not fully aware of or knowledgeable about EEMs and lenders often view an EEM as a complication of the lending process.
- Real estate agents are not very aware of EEMs and fear that EEMs can interfere with the orderly home sale/purchase transaction.
- Buyers are generally unaware of and lack knowledge about EEMs and often find the process complicated.
- The home energy rating process can be perceived to be relatively costly.

This paper presents the results of an evaluation and market effects study of a third-party program designed to alleviate several key barriers associated with EEMs. The reader is referred to XENERGY (2000) for details on the methodology, findings, and conclusions.

The Time of Sale Energy Renovation Program

The Time of Sale Energy Renovation (TOSER) Program is a Pacific Gas and Electric (PG&E) program initiated in 1999, which builds upon the 1998 third-party Energy-Aware Housing Agent Program (EAHAP). TOSER focuses on increasing the use of EEMs for all PG&E-area homes purchased through the U.S. Department of Housing and Urban Development’s (HUD’s) Federal Housing Administration (FHA) loans and homes financed through the Department of Agriculture’s Rural Housing Program. TOSER was conducted in PG&E’s service territory, including the Fresno, Sacramento and San Francisco HUD regions.

TOSER’s primary intervention is training aimed at influencing the key housing supply-side market actors—lenders and agents. Its secondary activities are directed at facilitators (contractors who provide EEM/HERS services) and home loan consultants. Table 1 shows the number of training sessions held and session attendees for the period FY98-FY00. Note that FY98 sessions were conducted under EAHAP. In both FY98 and FY99, training sessions did not begin until the middle of the calendar year. FY00 data are for September-December 1999. In FY99, the number of sessions conducted and attendance in the Fresno region increased by more than a factor of six over FY98 levels. In the Sacramento region, the number of FY99 sessions and attendees more than doubled. In the San Francisco region, the number of training sessions increased by only one-third, but the number of attendees almost doubled.²

² There are over 74,000 licensed agents in the Program area, including those who specialize in commercial property.

Table 1. Summary of EEM Training Statistics

	# of Trainings	# Attending	Professions			
			Real Estate Agent	Lender	Facilitator	Other
Fresno (total)	26	507	402	86	6	13
FY98	3	19	9	9	0	1
FY99	19	430	350	65	6	9
FY00	1	58	43	12	0	3
Sacramento (total)	18	276	179	80	7	10
FY98	4	56	45	9	2	0
FY99	9	144	94	36	5	9
FY00	5	76	40	35	0	1
San Francisco (total)	8	160	86	56	1	17
FY98	3	55	8	30	0	17
FY99	4	102	75	26	1	0
FY00	1	3	3	0	0	0
Total	52	943	667	222	14	40
FY98	10	130	62	48	2	18
FY99	32	676	519	127	12	18
FY00	10	137	86	47	0	4

The Study Approach

This study addresses principally changes the Program caused in the *market for EEMs*, rather than the overall market for residential efficiency improvements. We assessed the effects of the Program from a market transformation (MT) perspective and used the Theory-Based Evaluation (TBE) approach to develop a program theory as a framework for data collection and analysis. The first lesson of TBE is that an evaluation must be informed by the causal theory that underlies the program intervention; Bickman and Peterson (1990) note, "Program theory is essential for deciding what to measure in a program...With a good sense of program theory, the evaluator can move to observing program process and operation, rather than focusing on simple (and frequently uninterpretable) outcomes."

Study Scope

Budget limitations restricted the scope of our study. Our primary task was to update the 1998 Market Effects Study (Schiller Assoc. 1998), which assessed market effects of the EAHAP. The 1998 Study provided initial, although limited, evidence that the EAHAP had produced several desired market effects. As the 1998 Study did, we focused on data collection from key market actors; scope limitations precluded us from collecting data from comparison groups to quantify program effects. Consequently, we designed instruments that would allow comparing our data with data collected for the 1998 Study, thus permitting a limited examination of longitudinal effects. We also obtained self-reported information from supply-side market actors about the perceived Program effects on their awareness, behavior,

and market barriers; this permitted us to examine the market effects of the training component of the Program. Because the Program targeted agents and lenders as change agents to influence home buyers, we concentrated on assessing market effects from the perspective of these key supply-side actors, but we also tried to obtain some market effects information indirectly from buyers.

In addition to effects on EEM implementation, the Program's effectiveness is linked to changes in market actor awareness, knowledge, and perceptions of *energy efficiency*. Consequently, we investigated these market changes as part of this study, but to a lesser extent than our assessment of *market effects related directly to EEMs*.

Program Theory

A program theory, or model, provides a framework for understanding how a program is hypothesized to influence, and ultimately transform, a market—in this case, the market for EEMs. The model can help structure data collection and analysis to determine whether the cause-effect relations expected under the program in fact exist, and whether they are working as expected. The model also provides the foundation for determining which processes are not working as anticipated and merit further attention and possibly revisions.

Many early market transformation studies relied primarily on combining procedures from demand-side management (DSM) evaluations with concepts from the *Scoping Study* (Eto, Prahl, and Schlegel. 1996). We derived a broader view of market transformation factors from also examining diffusion-of-innovation theory (DOIT) and its communications implications, which led us to include in our market barrier assessment 1) whether EEMs were developing champions and 2) to what extent there were positive feedback and reinforcing communications that supported commitments to using EEMs (Peters et al. 1998).

Market barriers. One key step in our approach to analyze the MT effects of TOSER was to identify probable market barriers that might impede the adoption of the efficiency products promoted by the Program. We started with the generic barriers defined in the *Scoping Study* and supplemented them with factors related to barriers from DOIT.

The barriers we identified were those anticipated to exist to some extent in the market for EEMs. Note, in particular, that “access to financing” was not included as an EEM barrier because an EEM's *main purpose* is to overcome this barrier to efficiency investments.

The major EEM barriers that were anticipated for home buyers included these:

- lack of availability of EEMs in the market,
- the costs of acquiring information about EEMs,
- transaction/hassle costs associated with arranging an EEM including the effort required to obtain a home rating, and
- complexity of the EEM process including the number of participants involved and the paperwork.

Moderate barriers for home buyers included the following:

- differences between buyer and vendor (such as HERS raters) knowledge (asymmetric information) about energy use and efficiency,

- hidden costs (such as higher mortgage payments) coupled with uncertainties about energy bill savings and linked to questions about the relative advantage of making efficiency upgrades and using an EEM,
- lack of observability of EEMs used by others, and
- inability to try out an EEM without a major commitment.

For lenders, the two major barriers identified were these:

- transaction/hassle costs of completing the paperwork and other steps required by an EEM and
- organizational practices.

Many lenders are concerned that an EEM will complicate the loan process and increase the lender's costs. Similarly, lenders prefer to stick with established practices and there is organizational resistance to change.

As noted earlier, the agent can be instrumental in motivating the buyer to consider an EEM. The main barriers we identified for agents to promote EEMs are associated with a

- perceived lack of buyer demand for EEMs (market uncertainty) and
- the potential complexity of instituting an EEM.

Because the real estate agent has only a limited role in implementation, most of the other barriers associated with agents were relatively minor ones.

Details of program theory. Based on Program materials and interviews with the Program manager, we developed the Program model shown in Figure 1. The *primary interventions* of the Program are shown along the top of the figure. They include the following:

- Development/promotion/implementation of the Energy Snapshot³ through a pilot project (box labeled 1)
- Training of real estate agents on EEMs (2)
- Training of lenders on EEMs (3) and
- Several means for informing and educating home buyers about EEMs (4)

The two following *secondary interventions* are shown in the next level of Figure 1:

- Improving the dialog between housing real estate agents and lenders and facilitators (5)
- Training and providing EEM materials to home loan consultants (6).

Figure 1 shows the expected causal chains associated with Program interventions. The Program was expected to have several direct effects, which, in turn, were expected to induce other market changes. All these direct and indirect effects can be formulated as hypotheses about the expected market effects of the Program. We developed hypotheses for the role of the TOSER Program. They are discussed in detail in XENERGY (2000).

³ The Energy Snapshot is a simplified assessment of a home used to indicate whether it might be a good candidate for an EEM. This tool was first applied late in the Program year and, consequently, there was inadequate information available to assess it in depth.

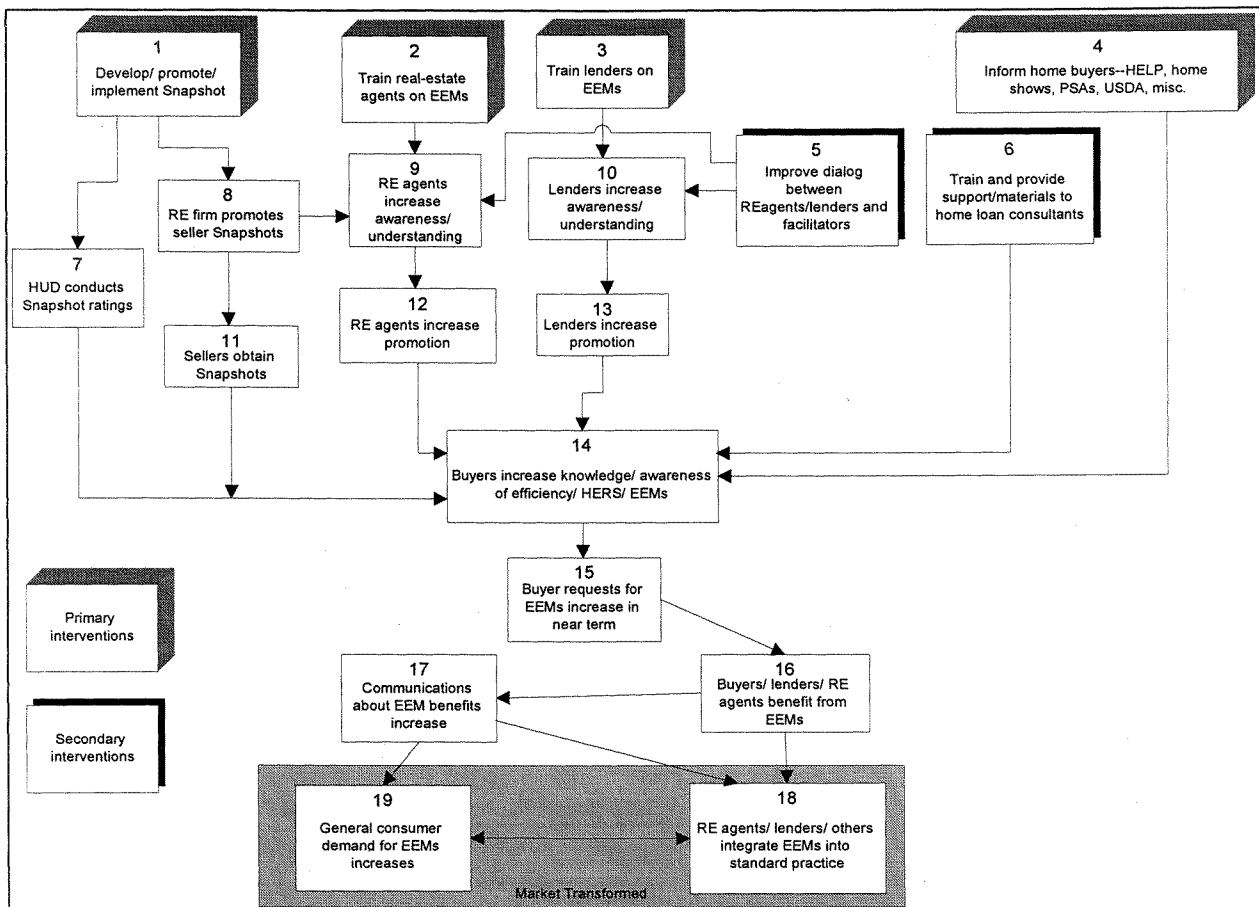


Figure 1. Model for TOSER Program

Data collection. This study was based on both surveys and statistical data. Telephone surveys were conducted with the three types of key market actors in the home purchase transaction: 30 home buyers, 35 agents, and 20 lenders distributed throughout the Program area. Sample sizes were limited by the budget available for data collection, and we caution the reader that these modest sample sizes limit the precision and generalizability of the findings from the surveys.

The statistical data we collected included total numbers of EEM closures and FHA loan closures in the HUD regions served by the TOSER program.

Findings

The key findings from the study are summarized in this subsection. The reader is referred to the model in Figure 1 by bracketed numbers showing the step or link to which a specific finding applies; e.g., [10-13] would apply to increased lender awareness/understanding of EEMs being linked to increased lender EEM promotion.

Overall Market for EEMs

The number of EEMs increased substantially in the Program area during the Program. There were 1,964 EEMs in FY99 in the Program area—a 6% increase from the prior year.

Because the number of FHA loans also increased from FY98 to FY99, we calculated what proportion EEMs were of total FHA loans. Figure 2 shows EEMs as a percentage of the total number of FY99 FHA loans in the Program areas. EEMs represented 3% of the total number of FHA loans in the Program area, compared to 1.5% in other parts of California; this supported the hypothesis that EEM penetration was higher in the Program area during FY99.

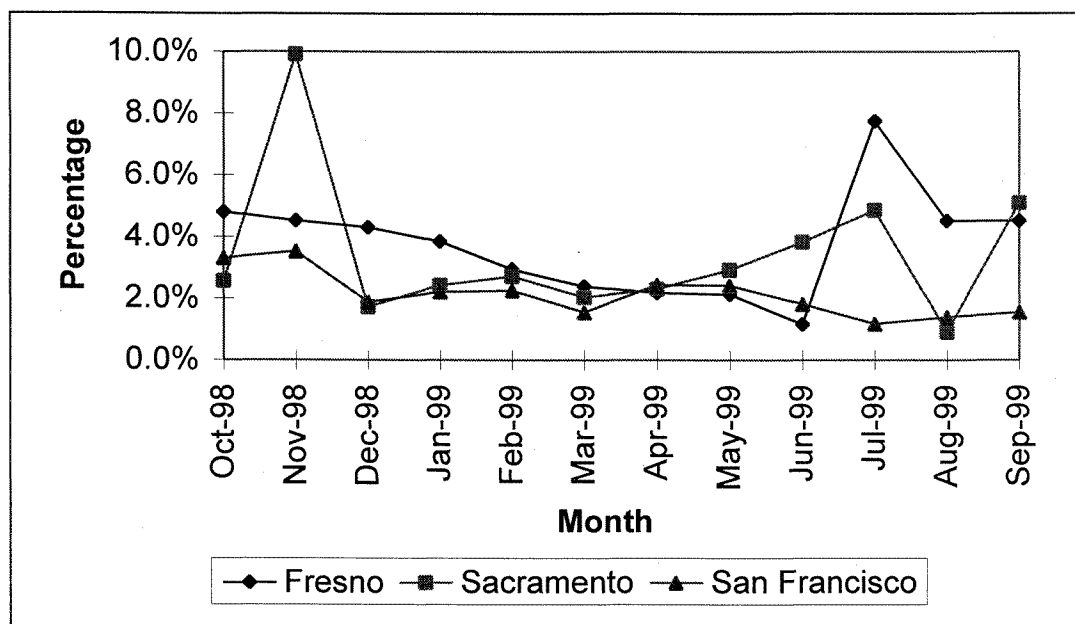


Figure 2. EEMs as Percent of FHA Loans in TOSER Area

Although a more extensive study, which was beyond our scope, would be necessary to determine the amount of the increase that was attributable to the Program, these data were consistent with the hypothesis that the Program had increased EEM penetration [14-15].

Supply Side Results

This subsection discusses findings for real estate agents and lenders. On the average, agents and lenders were interviewed 83 and 97 days, respectively, after attending the seminar.

Seminar effectiveness. *Attendees found the seminars very useful.* Approximately 88% of the agents and 95% of the lenders said that the seminars had “provided everything they needed” to discuss EEMs with potential buyers. Suggestions for improving seminars included increasing the visibility of market “champions,” providing follow-up with training attendees, and providing additional EEM cost/benefit information.

Seminars were effective in increasing agents’ and lenders’ understanding of EEMs [2-9, 3-10]. Overall, the data indicated that the seminars appeared to substantially increase understanding of EEMs for both real estate agents and lenders. Agents reported that their

understanding level, on a scale from 0 to 5, increased from 0.7 before the seminar to 3.5 after the seminar and lenders reported an increase from 1.9 to 4.0. The magnitude of the increase was larger for the agents than the lenders, in part because agents were less likely to be at all knowledgeable about EEMs before attending the seminar.

Seminars were effective in reducing perceived EEM barriers for agents and lenders [2-9, 3-10]. The seminars reduced the perception of EEM implementation barriers for both groups; they were particularly effective for agents. Tables 2 and 3 provide the overall rating of key barriers after the seminar and the percentage change in the average ratings of barriers from before to after the seminar, for agents and lenders, respectively.

Table 2. Effects of TOSER Seminar on Real Estate Agent Perceptions of EEM Barriers

Barriers	Real Estate Agents	
	Rating After Seminar	Difference
Complicating the sales/lending transaction	1.8	-61%
Difficulty of understanding and explaining EEMs	1.8	-59%
Lack of benefits for buyers	0.8	-34%
Lack of information on EEMs	2.9	-50%
Lack of assistance available to implement EEMs	1.7	-69%
Poor fit with how agents do business	1.7	-28%
Lender resistance to using EEMs	1.9	-56%
Difficulty finding lenders to process EEMs	1.7	-50%
Lack of EEM facilitators to recommend to buyers	2.6	-36%
Notes: Ratings are based on a scale for 0 to 5 where 0=no barrier at all and 5=major barrier. "After" rating is average across all participants. "Difference" is average percent change from rating prior to seminar for those participants who were aware of EEMs prior to seminar.		

Table 3. Effects of TOSER Seminar on Lender Perceptions of EEM Barriers

Barriers	Lenders	
	Rating After Seminar	Difference
Complicating the sales/lending transaction	1.8	-23%
Difficulty of understanding and explaining EEMs	0.9	-47%
Lack of information on EEMs	2.9	-26%
Lack of assistance available to implement EEMs	2.2	-24%
Poor fit with how lenders do business	1.3	-25%
Notes: Ratings are based on a scale for 0 to 5 where 0=no barrier at all and 5=major barrier. "After" rating is average across all participants. "Difference" is average percent change from rating prior to seminar for those participants who were aware of EEMs prior to seminar.		

Important barriers remain. Significant supply-side barriers did remain after the seminars, including some that emerged from our study. These included the following:

- Lack of agents/lenders who act as examples or “champions” [17-18]
- Agents/lenders believe buyers lack interest in or understanding of EEMs [14]
- Lenders’ perceptions that there is little support for EEMs in the refinancing market
- High front-end costs for inspection/HERS and perceived conflicts of interest for facilitators

Supply-side market effects. *Increased understanding leads to increased promotion of EEMs [9-12, 10-13].* The data partially support the hypothesis that increased understanding leads to increased promotion. On the average, agents said they were eight times as likely to discuss EEMs with buyers after the seminar and lenders were twice as likely. Despite the large increases in the *likelihood* of discussing EEMs, however, only about half the agents reported that they actually had discussed EEMs with one or more buyers since the seminar.

Lenders were twice as likely as real estate agents to have discussed EEMs with other professionals after the seminar. Those lenders and agents who rated their understanding of EEMs as high were more likely to tell others about EEMs.

Home Buyer Results

Because the Program did not focus significantly on buyers, our findings for home buyers were based on the experiences buyers had with EEMs and their attitudes, knowledge, and behaviors related to energy efficiency and EEMs. To a limited extent, the Program influenced the buyers that we interviewed indirectly through the participating agents and lenders and other Program activities. However, without analysis of data from buyers in a non-Program area, it was not possible to infer with certainty the Program’s effects on buyers.

Buyers were satisfied with EEMs overall [14]. On a scale from 0 to 5, the average satisfaction rating of the buyers surveyed regarding the EEM process was 4.1.

Every buyer we interviewed said they would recommend an EEM to other buyers [16-17].

EEMs were useful in overcoming barriers to energy-efficiency upgrades for buyers [14]. Buyers found EEMs very useful in reducing barriers to installing energy-efficiency upgrades overall. The buyers surveyed found EEMs to be particularly useful in reducing the difficulty in financing improvements and reducing the time required to select and make improvements.

Buyers reported very low levels of difficulty with the EEM process [16]. No step in the EEM process received an average difficulty rating from buyers greater than 1.4 on a 0 to 5 point scale. The most difficult steps were reported to be “choosing measures to install” (1.4) and “obtaining information about how EEMs work” (1.2).

Buyers heard about EEMs from lenders, agents, and home buyer seminars [12-14, 13-14]. About 30% had heard about an EEM first from either an agent or lender, and 20% had heard about an EEM first in a home buyer seminar.

Concerns about costs and facilitators remain. While buyers were satisfied with the process overall, several expressed concerns about the cost of measures installed and about

one-third of those who had used a facilitator had concerns about the measure costs and the objectivity of recommendations from facilitators and a lack of facilitator follow-through.

Recommendations

Program Recommendations

Based on our analysis of the qualitative and quantitative data evaluated, we have developed the following recommendations to improve the TOSER Program:

- *Increase promotion to potential buyers [4-14]:* Feedback from real estate agents and lenders clearly demonstrated that increased penetration of EEMs depends on buyer awareness and demand for EEMs, as well as energy efficiency in general.
- *Increase visibility of market “champions” who actively promote EEMs [17]:* Both agents and lenders indicated that they would be more likely to promote EEMs if there were leaders in their business who visibly led the way in promoting EEMs.
- *Take more advantage of existing home-buying classes as a way to educate buyers about EEMs:* About 20% to 30% of the buyers we interviewed had attended a class on how to buy a home. Many indicated that they relied on the information provided by the classes and when information was presented on EEMs they were more likely to ask their lender or agent about an EEM.
- *Provide more post-seminar follow-up to agents and lenders who attend the training (materials, data, contact names, etc.) [2-9, 3-10]:* Many seminar attendees indicated that they would be more likely to promote EEMs if there were follow-up, such as mailings, phone calls, an information hotline, etc., that would remind them about the EEM process and provide needed information.
- *Work with lenders to include information about EEMs in the loan prequalification process:* The share of buyers who are prequalified for loans is increasing, but several buyers and agents noted that EEMs were not included in the prequalification process. The steps and costs required to do so should be investigated with lenders because not including EEMs during this process amounts to a lost opportunity for increasing EEM awareness and implementation.
- *Provide additional EEM cost/benefit information to training attendees [2-9, 3-10]:* Several agents and lenders felt that if they had more information about the costs and benefits of EEMs they could do a more effective job of informing buyers.
- *Improve perceptions about facilitators:* Many of the buyers we interviewed who had used facilitators to implement EEMs expressed reservations about the objectivity and incentives of the facilitators. Facilitators can be very effective in making the EEM process work, but their image must be improved to allay buyer concerns.
- *Clarify the ceiling dollar amounts for EEMs to reduce misunderstanding about the dollar limits [2-9, 3-10]:* A substantial proportion of both lenders and agents we interviewed were uncertain or incorrect about the dollar amounts that could be included in EEMs. The Program needs to communicate more clearly what the dollar limits are.

Overall, there are specific areas in which lender and agent training should be improved to increase their understanding and promotion of EEMs. On-going technical support to these market actors should be increased. The Program should increase the visibility of lender and agent “champions” who have demonstrated that implementing EEMs is good business. It appears that more effort should be directed at increasing buyer awareness and knowledge, possibly by leveraging existing mechanisms such as buyer classes. Although facilitators were not a major focus of the Program or this study, our data showed that some buyers have negative perceptions about their interactions with facilitators and steps to alleviate these perceptions should be investigated.

Program Evaluation Recommendations

The following recommendations address ways to improve future Program evaluation efforts:

- *Analyze the Program’s effect on EEM penetration by using larger samples and conducting analyses in non-Program areas:* Although the HUD EEM and FHA loan statistics suggested that the Program had increased the penetration of EEMs, the scope of this study did not permit analyzing this to provide conclusive results.
- *Implement improved procedures to document Program participant and EEM recipient information:* A significant challenge in this study was obtaining information to permit selecting interviewees. More complete documentation on seminar attendees would have helped. A major obstacle was the difficulty of obtaining good contact information for buyers who had implemented EEMs. This led to a disproportionate use of resources to contact the buyers that we interviewed.
- *Assess the persistence of market effects:* Our study and the 1998 Market Effects study both identified significant effects of the Program training. However, the longevity of these effects has not been investigated and the ultimate effects of this Program in transforming the market can be confirmed only if the long-term effects are analyzed. PG&E is planning to conduct follow-on studies that should help determine the persistence of the observed effects.

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