

Financing Energy Improvements in the Mortgage

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ABSTRACT

Mortgage refinancing provides significant and scalable opportunities for deep energy savings projects. Larger loans for decarbonization projects that support environmental and customer service goals can also provide a tremendous business opportunity for lenders. The “Clean Energy Mortgage” (CEM) is an innovative mortgage product incorporating home energy improvements into the mortgage process, making them more accessible and affordable. Under a U.S. D.O.E. Small Business Innovation Research (SBIR) grant Energy Futures Group, ClearlyEnergy and the Northeast Energy Efficiency Partnerships piloted the CEM with the Vermont State Employees Credit Union (VSECU) that incorporated weatherization, heat pumps, and solar photovoltaic installation into a mortgage refinancing product through a streamlined package of services including a discounted interest rate, energy coach services, streamlined data intake, a web portal to manage documentation, and access to Home Energy Score™ (HEScore) data and contractors.

Nine energy improvement projects financed through the CEM pilot program averaged \$66,000 (ranging from \$19,000 to \$137,000). With support from the energy coach, the lender, and contractors, energy projects grew 87% larger than originally requested by customers and ended up at 25% of the total refinance loan amount (for the mortgage including improvements). These projects were three times larger and were significantly more comprehensive than typical Vermont energy projects. Average HEScores increased by 3.0 points, saving more than \$1,000 in annual energy costs.

The potential for leveraging mortgage financing to pay for deep energy retrofits is significant. Results from the pilot and lessons learned are shared in anticipation of finding opportunities to scale up CEM programs.

Introduction

Long-term, low-interest rate mortgage loans are a cost-effective financing vehicle to help homeowners and homebuyers upgrade energy features and reduce operating costs of their homes. Yet a widely available, workable, and successful financing product that makes it easy to roll the cost of energy improvements into the mortgage does not currently exist. Though home improvement loans do allow for energy improvements, most options are unsecured loans (higher interest rates and shorter terms) that may not be suitable for comprehensive projects that deliver deep energy savings by including weatherization, HVAC upgrades, and solar PV installation.

Additionally, federally backed green mortgage products exist but limit the amount which can be added to the loan. These limitations are a disadvantage to both the lender and the borrower. However, with a longer-term mortgage, lenders can benefit from the increased loan size resulting from rolling the cost of energy improvements into the mortgage. Also, the improvements made with the loan proceeds helps protect the value of the collateral (the home) through increased durability, mitigation of health and safety issues and reduced operating costs. Additionally, the lender is recognized for providing affordable energy financing products. The borrower also benefits from having access to preferential loan terms for energy-saving measures and the energy cost, comfort, and emissions benefits of those upgrades.

The Energy Futures Group (EFG), ClearlyEnergy, and Northeast Energy Efficiency Partnerships (NEEP) developed an innovative mortgage product that incorporates home energy improvements in the mortgage process. The “Clean Energy Mortgage” (CEM) makes energy improvements more accessible and affordable and encourages homeowners and homebuyers to upgrade the energy performance of their homes. Through a package of services, including a discounted interest rate, a web portal to facilitate communication with both lender and contractor, energy coach services, energy use guarantee, and priority access to home performance contractors and green appraisers, the CEM fills the need for long-term, low-interest financing of energy improvements to homes. Using the CEM concept, we partnered with Vermont State Employees Credit Union (VSECU) to develop and brand their CEM as the “EnergyFirst Mortgage” (EFM). The EFM included a discount of 50 basis points or 0.50% off VSECU’s published interest rate, with a requirement of a minimum of ten percent of the loan amount used for energy-saving improvements. Also included in the ten percent could be other improvements and health and safety measures necessary for the energy-savings measures to be installed. For instance, an old roof could be replaced before installing a solar PV array or basement moisture could be remediated before insulating basement walls. To make the offer simple and easy for borrowers, the only criterion for the energy-savings measures was that the measures contribute to saving energy.

This package of services benefits the borrower, the lender, and the climate. For the borrower, the EFM offers access to a significant amount of capital for energy improvements at a low rate and a streamlined package of services. For the lender, the EFM offers a turn-key approach comprised of a web portal and document generation service, forms, training, energy coach services that provide the expertise that lenders may not have in-house, contractor connections, support services, and the opportunity to write significantly larger loans to satisfy customers with better housing conditions. For the climate, the EFM provides access to financing large comprehensive energy packages resulting in deep energy savings. These loan components were all developed or adapted to the EFM, keeping in mind that they could be enhanced or modified for other programs later.

The EFG Team focused on the home refinance process with our partners VSECU, ClearlyEnergy and NEEP. To minimize the number of interested parties in the mortgage transaction and avoid the challenges with the home purchase market, we focused the pilot on homeowners who were refinancing their mortgage.¹ This pilot demonstrated the viability of the CEM concept on a small scale through nine pilot projects in Chittenden and Washington Counties in Vermont. The low-interest-rate and hot sellers’ market environment necessitated

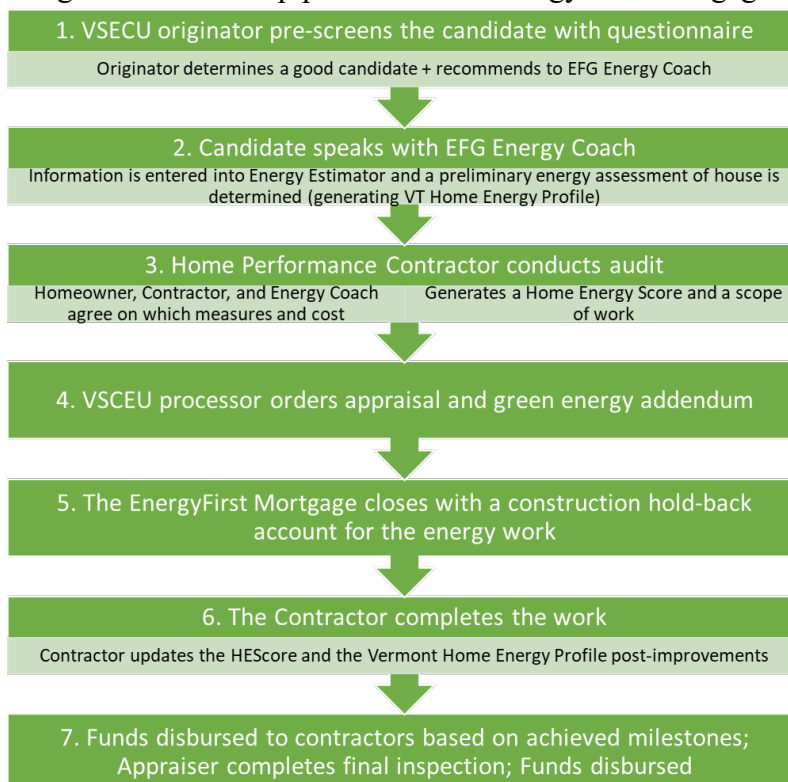
¹ For a discussion about mortgage purchase financing challenges with energy mortgages, see Understanding and Overcoming the Energy Mortgage Barrier: Financing Energy Improvements in Existing Homes, by Richard Faesy, August 2000, https://www.eceee.org/library/conference_proceedings/ACEEE_buildings/2000/Panel_2/p2_9/.

using only refinance projects at this time as buyers were likely unable to ask a seller for an energy audit or other inspection given competitive bidding and short tenure on the market.

EnergyFirst Mortgage Background

The EFM was launched in February 2021 after months of planning and preparation. The preparation included developing mortgage origination and underwriting guidelines and systems with VSECU and then training their staff. EFG hosted training sessions with staff members from VSECU, including originators, underwriters, processors, an EFM liaison with project partners, and the Senior VP of Lending, all of whom were involved in the EFM development. In addition, EFG recruited, supported, trained, and certified four Home Performance Contractors to become Home Energy Score Assessors to provide the Home Energy Scores as part of their energy improvement services, as required by the DOE Small Business Innovation Research (SBIR) grant. Figure 1 presents the seven steps of the EFM.

Figure 1. Seven-step process of the EnergyFirst Mortgage.



VSECU did not publish the EFM on their webpage, due to the temporary, limited time offering, but instead emailed approximately 4,000 of their members in the eligible counties. The trained originators were provided an online screening tool to filter prospects and were the primary recruiters. The screening tool allowed originators to estimate the cost of a customer's "Wishlist" of energy improvements as shown in Figure 2 below. The lower interest rate was a significant tool in piquing customer interest in the EFM.

ClearlyEnergy developed a web portal to help manage the onboarding of customers and project documentation so that lenders, contractors, borrowers, and the energy coach all had a

central repository to access and submit documents. The project documentation includes the scope of work agreed upon by borrower and contractor, the Home Energy Score reports and, if required, the Appraisal Institute's green addendum.² The web portal is also a useful tool in managing milestones and due dates, with the ability to assign a due date for each step and communicate next steps with other members of the team. Figure 3 is an example of a page of the ClearlyEnergy portal showing its use to track progress and milestones for one of the projects.

Vermont EnergyFirst Mortgage
 Prioritize energy efficiency in your home and get discounted rates with the **EnergyFirst Mortgage**. EnergyFirst Mortgage reduces your costs by offering discounted interest rates and wrapping the costs of your home and your energy saving projects into one affordable loan.

VSECU is a member-owned cooperative and not for profit credit union for Vermonters, offering a full range of affordable financial products and services to its member-owners. VSECU is committed to improving the lives of Vermonters by empowering the possibilities for greater social, environmental, and financial prosperity. For more information, call 802/808 371-5162 or visit [vsecu](http://vsecu.org)

EnergyFirst Mortgage Questionnaire

The EnergyFirst Mortgage is an innovative finance solution offered by VSECU designed to wrap the costs of energy saving projects into one affordable mortgage. You can benefit from energy savings, health benefits, and increased home value from day one! We will help you to identify the possible energy improvements for your home, provide resources to connect with qualified energy contractors, and streamline the project funding process. Can we tell you a little bit more?

☒ Yes ☐ No

EnergyFirst Mortgage Wishlist

Prices are for homes up to 2,000 sq. ft. For homes larger than 2,000 sq. ft., we are adding 50%/1,000 sq. ft.

Attic insulation	☐	\$2000-\$4000
Wall insulation	☐	\$3000-\$5000
Basement insulation	☐	\$2000-\$4000
Garage ceiling insulation	☐	\$1000-\$2000
Ceiling/closets insulation	☐	\$2000-\$3000

Figure 2. EnergyFirst Mortgage web portal questionnaire and Wishlist.

² The EnergyFirst Mortgage materials can be found on the EFG website <https://energyfuturesgroup.com/mortgage/>.

Update	Milestone	Company	Started On	Due Date	Description	Status	Notes	Documents
Note	Coach	Energy Futures Group	02 Apr	28 May	Richard went over program with Steve Clem. 1. Steve Clem...	Evaluation	View	
Note	Scope of work	Building Energy	02 Apr	30 Apr	Tim - Can we wrap up the scope of work...	Evaluation	View	
Note	Scope of work	VSECU	06 Apr	30 Apr	a. Richard talked to Sheri DeLatte b. \$275k appraised value...		View	
Note	Scope of work	Building Energy	07 Apr	07 Apr	Called Homeowner to schedule Energy Audit. No Answer Left Message.		View	
Note	Scope of work	Energy Futures Group	29 Apr	30 Apr	RF talked with Tim Smith who will send customer	In progress	View	Clem Energy Audit

Figure 3. EnergyFirst Mortgage web portal documentation and milestone management site.

Results

Financial Results

The EFG Team initially enrolled ten borrowers in the EFM, but due to over-booked contractor schedules were only able to close nine loans. The results from working with these customers provided useful insights into the potential for using mortgage lending to finance energy improvements. With an offer of a discounted interest rate in exchange for adding energy improvements, customers were willing to borrow significantly more than is available through Efficiency Vermont's standard Home Energy Loan³, resulting in substantially larger energy projects and greater energy savings. EFM borrowers were not able to take advantage of some of the lower interest rates offered in the Home Energy Loan since they tended to be moderate to higher income, which would have meant rates higher than what was being offered through the EFM. While borrowers benefit from the deeper energy savings, lenders benefit from writing larger loans. Details of the EFM results are summarized in Tables 1 and 2 below.

Customers reached in the EFM pilot program had home values about 52% higher than the average Vermont home.⁴ The average appraised value of the EFM participants was \$504,333, ranging from \$355,000 to \$750,000. Customers had also generally built up some equity in their

³ <https://www.efficiencyvermont.com/services/financing/homes/home-energy-loan>. Note that Home Energy Loans are capped at \$20,000. Borrowers can also take out a separate loan for solar PV, not covered under the Home Energy Loan. But the EFM allowed financing both efficiency and renewables (along with their mortgage balance) in one low-interest rate loan.

⁴ The typical home value of homes in Vermont is \$330,982 as of 2/24/2022, according to Zillow at <https://www.zillow.com/vt/home-values/>.

homes. The average loan-to-value (LTV) ratio was only 54% and ranged from 0% (i.e., no mortgage) up to 80%.

The discounted interest rate of 0.50% incentivized borrowers to increase their total refinanced loan amounts by an average of \$43,589 more than their original request. Many borrowers were already in the midst of refinancing when they learned about the EFM, the opportunity to improve their home's energy efficiency, and access to lower interest rates for the entire mortgage. Increasing their customers' loan size by 19% meant more revenue for the lender even with the discounted interest rate. Additionally, recent studies by the Lawrence Berkeley National Laboratory demonstrate better performance for energy loans, which further reduces lender risk and costs (Deason 2022). Larger and less risky loans that support customers improving their homes (i.e., the lenders' collateral) while helping meet climate and sustainability goals presents a strong business proposition for lenders.

Appraisal Issues

VSECU carefully considered whether the energy project costs would bring enough value to the “as completed” appraisal to justify the larger mortgage amount. VSECU reached out to their appraiser pool serving the two pilot counties to identify willingness to participate and confirm which appraisers had been trained by the Appraisal Institute as designated Green Appraisers. Appraisals are a pass-through cost to borrowers, and green appraisals cost up to 50% more than standard ones. The pilot included an amount of up to \$1,000 for each borrower to help cover added appraisal fees. There were a few EFM borrowers who utilized these funds, but for most the appraisal was a standard “as completed” one where the contractor helped complete the sections related to energy improvements.

By operating in a market with rising home prices and working with homeowners who all had some equity in their homes, the appraisals ended up supporting the value of the homes subject to completion of the energy improvements. Working with customers who have built up some equity in their homes not only allowed them to qualify for larger energy projects, but also gave the lenders some room to qualify the borrowers even if appraisals didn't fully support the refinanced mortgage plus the energy improvements. The EFM web portal provided a Green Appraisal Addendum with each project, but it was not clear during the pilot what role this played in valuing the energy improvements.

Table 1. EnergyFirst Mortgage Customer Overall Loan Details.

Customer #	Appraised Value As Completed	Refinance Amount	Original Loan Amount Requested / Approved	Final / Closed Loan Amount	Increase in Final / Closed Loan Amount	Loan to Value Ratio
1	\$470,000	\$248,366	\$290,000	\$290,000	\$ -	62%
2	\$385,000	\$238,036	\$265,000	\$286,800	\$21,800	74%
3	\$355,000	\$163,502	\$220,000	\$284,000	\$64,000	80%
4	\$518,000	\$295,666	\$360,000	\$385,000	\$25,000	74%
5	\$468,000	\$62,195	\$100,000	\$100,000	\$ -	21%
6	\$608,000	\$245,034	\$285,000	\$305,000	\$20,000	50%
7	\$750,000	\$215,000	\$245,000	\$365,000	\$120,000	49%
8	\$425,000	\$-	\$30,000	\$116,500	\$86,500	27%
9	\$560,000	\$189,173	\$220,000	\$275,000	\$55,000	49%
Average	\$504,333	\$184,108	\$223,889	\$267,478	\$43,589	54%
Low	\$355,000	\$-	\$30,000	\$100,000	\$-	21%
High	\$750,000	\$295,666	\$360,000	\$385,000	\$120,000	80%
Range	\$395,000	\$295,666	\$330,000	\$285,000	\$120,000	59%
Increased Final Loan Amount over Original Loan Request						19%

Energy Improvement Cost Impacts

As shown in Table 2, customers included an average of almost \$66,000 worth of energy improvements in their mortgages, ranging from a low of \$19,000 to a high of \$137,000. This is three times more than VSECU's average Energy Improvement Loan "VGreen" loan⁵ of \$21,169. These EFM projects demonstrate that borrowers are willing to take out much larger loans as part of a discounted rate refinance project as compared to dedicated loans for energy projects.

Not only were EFM projects larger than VSECU's VGreen Loans, but by accessing the EFM, customers significantly increased their original loan request for energy improvements by 87%. Average energy projects requests started at about \$35,000 (ranging from \$22,400 to \$62,000) but ended up at an average of about \$66,000, an increase of more than \$30,000. Loans grew for various reasons. Some customers came in with a limited energy improvement project (e.g., just adding solar or replacing windows), but expanded once they discussed the project with the energy coach or home performance contractor. Others realized they could take advantage of a lower interest rate for their entire loan package and decided to include additional energy upgrades they were considering doing in the future as part of the EFM.

At the same time, customers also took an average of about \$17,000 additional cash out while refinancing to consolidate other debt and for non-energy saving home improvements ranging from asbestos remediation to decks, siding, kitchen and bathroom upgrades and other

⁵ Based on 2,897 secured and unsecured loans worth \$61,327,472 from 7/1/2019-6/30/2021.

general home repairs. This illustrates one of the benefits to a lending institution of offering a CEM, which increases loan sizes in exchange for offering a lower interest rate.

As noted above, VSECU required that the energy improvement measures in the EFM be at least ten percent of the loan amount. In the end, the average amount of the loans dedicated to energy improvement measures was 25%, far exceeding the ten percent threshold set for energy improvements in return for receiving the 0.50% discounted interest rate for the EFM.

Table 2. EnergyFirst Mortgage Customer Overall Financing and Energy Project Details.

Customer #	EFM Loan Term (Years)	EFM Interest Rate	Original Requested Energy Improvements Amount	Final Amount of Energy Improvements	Increase Amount	Other Non-Energy Improvement - Cash Out
1	15	1.875%	\$40,000	\$ 41,964	\$1,964	\$(330)
2	15	2.000%	\$24,000	\$38,032	\$14,032	\$10,732
3	20	2.500%	\$55,000	\$81,864	\$26,864	\$38,634
4	30	2.625%	\$62,000	\$82,940	\$20,940	\$6,395
5	15	1.750%	\$22,407	\$19,160	\$(3,247)	\$18,645
6	20	2.125%	\$29,340	\$48,092	\$18,752	\$11,874
7	30	2.500%	\$30,000	\$137,100	\$107,100	\$12,900
8	15	1.750%	\$25,253	\$101,477	\$ 76,224	\$15,023
9	15	1.875%	\$30,000	\$ 42,799	\$ 12,799	\$43,028
Average	19	2.11%	\$35,333	\$ 65,936	\$ 30,603	\$17,433
Low	15.0	1.75%	\$22,407	\$19,160	\$(3,247)	\$(330)
High	30.0	2.63%	\$62,000	\$137,100	\$107,100	\$43,028
Range	15.0	0.88%	\$39,593	\$117,940	\$110,347	\$43,359
Increase from Original Energy Improvement Request				87%		
Percent of Final Loan Amount for Energy Improvements				25%		

Energy Savings

The EFM projects were quite comprehensive in terms of energy saving measures. As show in Table 3, each of the projects included more than one energy improvement measure and they all installed a mix of solar PV (5), heat pumps (6), heat pump water heater (1), windows (4), and weatherization measures (8). Two borrowers initially requested just a solar PV project, but after speaking with the energy coach, VSECU staff, and the participating contractor, both decided to do a solar project plus another measure (one included air sealing and insulation while the other decided to also install a heat pump).

Table 3. Energy Improvements Installed by the Nine EnergyFirst Mortgage Customers.

Project Types	Count	%
Insulation/Air Sealing	8	89%

Heat Pump	6	67%
Solar PV	5	56%
Windows	4	44%
Heat Pump Water Heater	1	11%

EFM customers anticipate an average of more than \$1,000 in annual energy savings. A DOE Home Energy Score was provided as part of the initial assessment of each home by the participating contractor. Homes scored an average of 3 in their pre-condition. After the improvements are installed, they are projected to score 7, an improvement of 4 on the 1-10 scoring system. Average carbon savings per home are reported to be 2.8 tons/year.

While the energy savings are relatively large, the incremental mortgage payment to cover the average energy improvement project costs of \$66,000 would be about \$4,000/year (at the EFM discounted interest rate) or about four times the energy savings. Some additional “savings” is also likely coming back to customers in the form of utility incentives and federal tax credits, but unlikely enough to make up this difference between project costs and savings. The fact that customers were willing to pay the net of \$3,000 per year (annual incremental mortgage payment less the annual energy savings) for the benefit of installing the energy features speaks to customer perceptions of comfort, resiliency from future climate impacts, resale value or other benefits of energy efficiency and renewable energy since they clearly were not motivated solely by energy cost savings.

Table 4. Home Energy Scores Before and After Installation of Measures Financed through EnergyFirst Mortgages.

Customer #	Home Energy Score Before	Anticipated Home Energy Score After	Difference	Estimated Annual Savings
1	3	7	4	\$2,021
2	3	8	5	\$764
3	5	8	3	\$357
4	3	6	3	\$802
5	3	4	1	\$236
6	4	10	6	\$1,560
7	4	10	6	\$1,560
8	1	4	3	\$2,351
9	3	5	2	\$480
Average	3	7	4	\$1,126

Effects of the Energy Coach on the Borrower

The energy coach served an important role in facilitating the transaction. The goal was to have an energy expert who could provide independent guidance and support alongside the lender to clarify the project process and options. While the contractor and lender have a vested interest

in increasing the number of measures and the size of the loan, the energy coach can support the borrower in understanding the costs and benefits of the energy measures.

VSECU loan originators and program staff also benefited from the support of an energy coach. Lenders are not energy experts and are not in the position to answer building science questions or address borrowers' inquiries about specific energy-saving opportunities and measures. The energy coach was available to facilitate communication between the contractors and the homeowners on project steps and coordinate regularly with VSECU staff to support each of the participating projects.

Energy Coach Success Story

A contractor discovered Vermiculite insulation (potentially containing asbestos) in the attic of an EnergyFirst Mortgage customer's home during the home's audit. Despite the health and safety risk that Vermiculite poses, the homeowner wanted to go forward with the energy improvements without addressing the Vermiculite, which could potentially become a health risk and a liability for the home in a future sale. After several discussions with the energy coach, who advocated to the homeowner to address this issue, the homeowner decided to include Vermiculite remediation in the EnergyFirst Mortgage. Health and safety issues related to energy improvements can be included in the EnergyFirst Mortgage. The inclusion of an energy coach in the process helped the customer make an informed decision.

Insights

VSECU launched the EFM February 2021, and Phase 1 of the DOE SBIR grant under which this project was funded ended just five and a half months later on July 31, 2021, under difficult pandemic circumstances. With this level of uptake in a relatively short period of time since the product was developed and launched, we have been able to show that there is demand for mortgage financing that incorporates home energy improvements. While we secured nine borrower commitments to participate in the EFM, VSECU loan originators, staff, and the energy coach interacted with more than 30 potential customers interested in the offer, but for reasons ranging from location outside of the pilot counties to eligibility and qualification issues they did not enroll.

The EFM pilot has yielded valuable research findings that will be useful in providing the basis for expanding and improving VSECU's EFM in Vermont and CEMs elsewhere. Our experience shows that the tradeoff between lower interest rate and larger mortgage size is a win-win for lenders and borrowers. VSECU was willing to offer a lower interest rate in exchange for the chance to increase the mortgage size to incorporate home energy improvement measures along with fulfilling their mission to provide energy saving products to their members and book high-quality loans on strong collateral (i.e., their customers' homes). Borrowers were also willing to increase the size of the mortgage in exchange for a lower interest rate, energy savings, and increased comfort.

Additionally, the web platform created by ClearlyEnergy was useful in facilitating onboarding of prospects, driving down documentation costs and providing transparency on the

progress of the project. The web portal and data collection are a useful tool if the CEM were expanded. It could also be enhanced to provide some Q&A to replace the cost of an energy coach and would be a necessary tool for CEM expansion.

Challenges and Barriers to Expanding Scope

One challenge we faced in the EFM process was a lack of designated Green Appraisers, which may pose a challenge for any CEM in the future. In this project, we were able to work with VSECU to figure out how to utilize standard appraisals with contractor input on energy improvements to properly assign value. The appraisal issue (i.e., crediting enough value to energy improvement measures to justify their cost as part of the mortgage) has been one of the primary reasons why energy mortgages have not succeeded in the past. We see addressing this issue as paramount to a successful CEM product in the future.

The current market environment presented challenges to the goals of this pilot. We did intend to test EFMs at the point of purchase but the environment of rising home prices, low interest rates, and low inventory meant that the conditions were not ideal for purchase mortgages. In order to test a few features of the EFM, we focused on refinances for borrowers with existing equity in their homes. Home value needs to be demonstrated for lenders to write mortgage loans against that collateral. If homeowners do not have adequate equity to cover the refinanced amount, project costs, other borrowing needs, plus the customary mortgage processing costs, then the CEM is likely not the right pathway for them. VSECU worked with members in these situations to get financing in other ways, such as through an unsecured energy improvement loan.

Due to the Covid-19 pandemic, we encountered several challenges, including extremely busy contractors. Participating contractors were in high demand and were challenged by workforce and supply chain difficulties. Offering them pre-screened customers eligible for large energy projects enabled us priority access and contractors' willingness to move EFM customers up their service lists. Pandemic-related challenges, such as supply chain interruptions and workforce shortages, also impacted timing and resulted in delays. VSECU needed to target appraisers who would be willing to prioritize assignments and work with contractors to include 'as completed' measures in their evaluations. We also experienced longer than normal closing timeframes as town clerks, title agents, and attorneys were short-staffed or had limited office hours.

While it is important to understand the conditions that make for viable CEM candidates, it will be important to consider how to better serve borrowers with lower equity in their homes. Addressing this issue of serving high loan-to-value customers may be one way of helping some lower-income homeowners. Increasing energy training for home appraisers could also enhance homeowner access if through this training appraisers find more home value. This can be addressed by providing guarantees to the lender, or mortgage backers willing to stretch qualifying ratios because this type of loan is shown to have better repayment characteristics.

A challenge that the CEM concept may face as it expands into the purchase mortgage market will be getting real estate agents professionals on board. The CEM is another step in the home selling and buying process that some real estate agents will perceive as burdensome and an impediment to closing. This is also a challenge in the current market where homes hitting the market are selling fast, often without conditions for building inspections and for prices over asking, so it's unlikely that a bid with an added step for an energy audit would be accepted. Also, the home may not appraise as is, not including additional energy improvements. Perhaps in a

future market, if the CEM can be positioned as a customer service opportunity and a way to reduce customers' operating expenses, real estate agents may view it more positively. By focusing on refinancing with the EFM, we avoided the issues of interacting with the real estate transaction process. For any program expansion going forward, this may be a good place to start until the program is established and there is customer demand.

Another potential barrier to scaling the CEM may be the availability of energy coach services. The energy coach serves as the customer's advocate in determining the best package of home improvements, reviewing the contractor's bid, and supporting the lenders and appraisers through the mortgage process. While VSECU did have an on-staff EFM liaison to assist mortgage staff with the pilot, lending institutions do not generally have someone on staff with energy expertise, and customers may be wary of contractors serving in this capacity. While we have learned that the energy coach is a valued part of the process, a CEM will have to streamline some of these services.

Areas for Future Research

While the CEM Phase 1 pilot provided valuable insights into creating an energy mortgage financing product that provides benefits for lenders, borrowers, and contractors, there remain numerous areas for future research.

One crucial area for future research is to determine the optimal features of the mortgage product that benefit both lenders and borrowers. For example, what is the optimal interest rate discount? What is the minimum percentage of loan that must go towards energy improvements? Should non-energy improvement amounts receive a lesser interest rate discount? Are there different energy improvement packages that work better when someone is refinancing with more equity compared to purchasing a home at the top of their borrowing limits? Could a savings guarantee, or loan loss reserve serve as important elements in offering these loans? It will be crucial in establishing a standard CEM to determine these and other loan features and characteristics.

Another area of future research is to expand the CEM concept beyond this pilot project to include purchase mortgages. It would be important to understand how the structure and process would best suit purchase mortgages. This is already a complicated transaction so it's vital that the process is not too cumbersome or it won't get used. This would give insight into how to build the CEM into a more versatile and scalable product, which would enable significantly more opportunities for home energy improvements than refinance mortgages alone.

In addition, there are questions associated with the issue of Green Appraisers that need to be explored in an expanded iteration of the CEM. For example, are certified Green Appraisers necessary in the CEM process, or can appraisers with standard training be considered "competent" and able to incorporate energy improvement measures into their appraisal process? Are there other appraisal approaches acceptable to the government-sponsored enterprises (GSE)⁶ such as pre-approved or Home Energy Score based values that can be considered in adjusting home values? Determining a workable appraisal process remains an important issue in expanding the CEM and should be explored in the future.

The EFM pilot was also limited to just one lender in two counties in Vermont. Expanding statewide, including other lenders and the broadening to other lenders in other states

⁶ Well known GSEs are the Federal National Mortgage Association, or Fannie Mae, and the Federal Home Loan Mortgage Corporation, or Freddie Mac. (Wikipedia, 2022)

would provide useful insights as to how to scale up the offering. Northeast Energy Efficiency Partnerships (NEEP) has organized a regional advisory committee to pursue some of these questions and look for opportunities to expand the CEM concept in other jurisdictions.

Conclusion

The EFG and ClearlyEnergy Team developed the EnergyFirst Mortgage, a Clean Energy Mortgage product, and enrolled nine borrowers. With this limited sample in a relatively short period of time, we have been able to demonstrate that there is demand for mortgage financing that incorporates energy improvements. VSECU's EFM has resulted in refinance mortgages that grew by 19% from what customers originally applied for once they learned more about the benefits of the EFM. These larger loans earmark an average 25% for energy improvements, with the balance covering their home mortgage and other improvements. These customers spent an average of \$66,000 on energy projects, more than three times the average VSECU energy loan. This target market for lenders could offer a business opportunity to write larger loans to help customers to make energy improvements, improve their assets, and meet goals. On average, these improvement projects are modeled to save each of the nine customers over \$1,000 on energy costs and 2.8 tons in carbon emissions annually. Scaling access to CEMs with similar designs has the potential to dramatically scale the rate of deep energy retrofits happening across the country among homeowners that are compelled by low-cost financing opportunities.

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